UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION II
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January 21, 2005

EA-04-005

Virginia Electric and Power Company
ATTN: Mr. David A. Christian
Sr. Vice President and
Chief Nuclear Officer
Innsbrook Technical Center - 2SW
5000 Dominion Boulevard
Glen Allen, VA 23060-6711

SUBJECT: SURRY POWER STATION - NRC SUPPLEMENTAL INSPECTION REPORT 05000280/2004011 AND 05000281/2004011

Dear Mr. Christian:

On December 10, 2004, the United States Nuclear Regulatory Commission (NRC) completed a supplemental inspection at your Surry Power Station, Units 1 and 2. The enclosed inspection report documents the inspection findings which were discussed on December 10, 2004, with Mr. M. Gaffney and other members of your staff.

This supplemental inspection was an examination of your problem identification, root cause evaluation, extent of condition determination, and corrective actions associated with a White performance indicator (PI) and a White inspection finding. The White PI and White inspection finding, which were in the Mitigating Systems cornerstone, placed the performance of Surry Units 1 and 2 in the Degraded Cornerstone Column of the NRC's Action Matrix for the first quarter 2004. The White PI, Safety System Unavailability - Emergency AC Power, was due to various operability concerns associated with the emergency diesel generators and was evaluated in Supplemental Inspection Report 05000280,281/2002008. The White inspection finding involved Surry fire response procedures that were not effective in ensuring safe shutdown for a fire in Emergency Switchgear and Relay Room Numbers 1 or 2, of Surry Power Station Units 1 and 2 respectively. Specifically, these procedures may not have precluded an extended loss of reactor coolant pump (RCP) seal injection flow, which could result in an RCP seal loss of coolant accident. This supplemental inspection also included an independent extent of condition review of issues related to the White PI and White inspection finding and the resultant degraded Mitigating Systems cornerstone.

Based on the results of this inspection, the NRC determined that your corrective actions (both planned and already completed) are appropriate to resolve the deficiencies related to the degraded Mitigating Systems cornerstone. As such, the inspection objectives of Inspection Procedure 95002, "Inspection for One Degraded Cornerstone or Any Three White Inputs in a Strategic Performance Area," have been satisfied. The White PI, Safety System Unavailability - Emergency AC Power, returned to Green in the second quarter 2004 for Unit 2 and the fourth quarter 2004 for Unit 1. Therefore, the open White inspection finding for ineffective fire response procedures related to restoration of RCP seal injection flow (including associated

violation 05000280,05000281/2004008-01 and licensee event report 05000280/2003-005-00) is considered closed.

No findings of significance were identified during this inspection.

In accordance with 10 CFR 2.390 of the NRC's "Rules of Practice," a copy of this letter, its enclosure, and your response (if any) will be available electronically for public inspection in the NRC Public Document Room or from the Publicly Available Records (PARS) component of NRC's document system (ADAMS). ADAMS is accessible from the NRC Web site at http://www.nrc.gov/reading-rm/adams.html (the Public Electronic Reading Room).

Sincerely,

**\\RA By D. C. Payne For **

Charles A. Casto, Director
Division of Reactor Safety

Docket Nos.: 50-280, 50-281
License Nos.: DPR-32, DPR-37

Enclosure: NRC Supplemental Inspection Report 05000280,281/2004011 w/Attachment: Supplemental Information

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U.S. NUCLEAR REGULATORY COMMISSION

REGION II

Docket Nos.: 50-280, 50-281

License Nos.: DPR-32, DPR-37

Report Nos.: 05000280/2004011, 05000281/2004011

Licensee: Virginia Electric and Power Company (VEPCO)

Facility: Surry Power Station, Units 1 & 2

Location: 5850 Hog Island Road
Surry, VA 23883

Dates: November 15-19, 2004 and December 6-10, 2004

Inspectors: M. Thomas, Senior Reactor Inspector (Lead Inspector)
D. Arnett, Resident Inspector
R. Rodriguez, Reactor Inspector
W. Rogers, Senior Reactor Analyst (In-office Review)

Approved by: D. Payne, Chief, Engineering Branch 2
Division of Reactor Safety

Enclosure

SUMMARY OF FINDINGS

IR 05000280/2004011, 05000281/2004011; 11/15-19/2004 and 12/6-10/2004; Surry Power Station, Units 1 & 2; Supplemental Inspection for Degraded Mitigating Systems Cornerstone.

The inspection was conducted onsite by a senior reactor inspector, a resident inspector, and a reactor inspector; and in-office by a senior reactor analyst. The inspection identified no findings of significance. The NRC's program for overseeing the safe operation of commercial nuclear power reactors is described in NUREG-1649, “Reactor Oversight Process,” Revision 3, dated July 2000.

Cornerstone: Mitigating Systems

This supplemental inspection was performed by the NRC to assess the licensee’s problem identification, root cause evaluation, extent of condition determination, and corrective actions associated with a White performance indicator (PI) and a White inspection finding. These two issues, which were in the Mitigating Systems Cornerstone, placed the performance of Surry Units 1 and 2 in the Degraded Cornerstone Column of the NRC’s Action Matrix for the first quarter 2004. The PI, Safety System Unavailability - Emergency AC Power, crossed the threshold from Green to White in the fourth quarter 2001 for both units and remained through the first quarter 2004 for Unit 2, and through the third quarter 2004 for Unit 1. The White PI was evaluated in Supplemental Inspection Report 05000280,281/2002008. The White inspection finding involved Surry fire response procedures that were not effective in ensuring safe shutdown for a fire in Emergency Switchgear and Relay Room Numbers 1 or 2, of Surry Power Station Units 1 and 2 respectively. Specifically, the procedures may not have precluded an extended loss of reactor coolant pump (RCP) seal injection flow, resulting in an RCP seal loss of coolant accident. The performance issue associated with this inspection finding was previously characterized as having low to moderate risk significance (White) in NRC “Final Significance Determination” letter dated September 15, 2004.

During this supplemental inspection, which was performed in accordance with Inspection Procedure 95002, the inspectors utilized the results from Supplemental Inspection Report 05000280,281/2002008 to address the White PI, Safety System Unavailability - Emergency AC Power. The combined assessment of the White PI and the White inspection finding that resulted in the degraded Mitigating Systems cornerstone is summarized below.

As indicated in Supplemental Inspection Report 05000280,281/2002008, the licensee’s formal root cause evaluations (RCE) for the White PI, Safety System Unavailability - Emergency AC Power, was acceptable. The licensee implemented adequate corrective actions to prevent recurrence based upon their RCEs.

The licensee performed a Category 1 RCE, S-2003-1490, to address the fire response procedure finding associated with restoration of seal injection flow to the RCPs. This RCE was considered by the inspectors to be independent and consistent with the prescribed charter. However, the inspectors noted that the licensee’s extent of condition reviews lacked thoroughness with regard to the RCE findings. Additionally, the licensee performed Common Cause Evaluation (CCE) S-2004-1504 in January 2004 to assess Surry Power Station Units 1 and 2 performance in the NRC’s Reactor Oversight Process. The licensee also performed

CCE S-2004-3295 in October 2004 to address the degraded Mitigating Systems cornerstone for Surry Units 1 and 2. The inspectors considered that, although CCE S-2004-3295 did not possess the attributes of an extent of condition evaluation, this CCE determined, through review of various corrective action system documents, that there was a common cause for these White issues. During this 95002 supplemental inspection, the licensee performed more comprehensive extent of condition related actions through additional reviews of external information programs and processes, and reviews of various management committees' charters/procedures for dispositioning technical concerns. These additional extent of condition and extent of cause related reviews, combined with the efforts in CCE S-2004-3295, were considered to be appropriately focused based on the inspectors' independent extent of condition review.

Although corrective actions appeared to be appropriately prioritized and tracked, the inspectors noted that the licensee was still evaluating long-term corrective action options for resolving the White inspection finding related to restoration of RCP seal injection flow. Consequently, the licensee had not identified all of the corrective actions for this finding and a completion date was not available. Overall, corrective actions related to this White inspection finding adequately addressed compliance restoration and the identified root causes and causal factors. While the inspectors considered that the appropriate root causes were identified by the licensee in RCE S-2003-1490, the contributing cause identified in this RCE was not considered to be the most appropriate. Specifically, the licensee identified that the failure to install Westinghouse (W) high temperature O-rings in the RCP seals in a timely manner was a contributing cause to the failure to revise the Surry Fire Contingency Action (FCA) procedures once the difference between the FCAs and the emergency response guidelines (ERG) was identified. The inspectors noted that the RCE did not recommend any corrective actions for this identified contributing cause. However, the inspectors considered that this contributing cause identified in the RCE was not the most appropriate one. The inspectors considered that the more appropriate contributing cause should have been the unclear responsibilities and inaccurate perception of who had ownership of the FCA procedures. This determination was based on the inspectors' review of RCE S-2003-1490, Potential Problem Report (PPR) 2000-004, and the meeting minutes of the Management Problem Review Team (MPRT) related to PPR 2000-004. The inspectors noted that the licensee had implemented corrective actions to address ownership of the FCA procedures by revising Virginia Power Administrative Procedure (VPAP)-0502, Procedure Process Control.

A. NRC Identified and Self-Revealing Findings

No findings of significance were identified.

B. Licensee-Identified Violations

None.

Report Details

01 Inspection Scope

This 95002 supplemental inspection was performed by the U.S. Nuclear Regulatory Commission (NRC) in response to Surry Units 1 and 2 first quarter 2004 performance being in the Degraded Cornerstone Column of the NRC's Action Matrix as a result of: (1) a fourth quarter 2001 White performance indicator (PI), Safety System Unavailability - Emergency AC Power, due to various operability concerns associated with the emergency diesel generators (EDG); and (2) a first quarter 2004 White inspection finding involving Surry fire response procedures that were not effective in ensuring safe shutdown for a fire in Emergency Switchgear and Relay Room (ESGR) Numbers 1 or 2, of Surry Power Station Units 1 and 2 respectively. Specifically, the procedures may not have precluded an extended loss of reactor coolant pump (RCP) seal injection flow, which could result in an RCP seal loss of coolant accident. The PI crossed the threshold from Green to White in the fourth quarter 2001 for both units and remained through the first quarter 2004 for Unit 2, and through the third quarter 2004 for Unit 1. The performance issue associated with this inspection finding was previously characterized as having low to moderate risk significance (White) in NRC "Final Significance Determination" letter dated September 15, 2004. This 95002 supplemental inspection involved a review of the licensee's problem identification, root cause and extent of condition evaluation, corrective actions, and an NRC independent extent of condition review for both the White PI and White findings. The White PI, Safety System Unavailability - Emergency AC Power, was previously evaluated and closed in the 95001 Supplemental Inspection Report 05000280,281/2002008. As such, with the exception of NRC's independent extent of condition review, the assessment results of this earlier 95001 supplemental inspection were utilized in the 95002 supplemental inspection of this White PI and White inspection finding and the associated degraded Mitigating Systems cornerstone.

The inspectors assessed the adequacy of the licensee's root cause evaluation by determining if the root causes and contributing causes were understood, and if the resulting corrective actions were sufficient to address those causes in order to prevent recurrence. As noted above, Supplemental Inspection Report 05000280,281/2002008 was utilized and referenced in the assessment of the White PI involving Emergency AC Power Unavailability. The assessment of the White inspection finding and the resultant degraded Mitigating Systems cornerstone included: (1) review of licensee Category 1 Root Cause Evaluation (RCE) S-2003-1490, its associated corrective actions, and other related/referenced documents; (2) review of Common Cause Evaluation (CCE) S-2004-1504 which assessed the licensee's performance in the NRC's ROP; (3) review of CCE S-2004-3295 performed for the degraded Mitigating Systems cornerstone; and (4) interviews with key personnel from the RCE S-2003-1490 team and from the licensee's engineering and operations groups. Recognizing that both the White PI and the White inspection finding concerned the review and disposition of vendor and user/owners' group information, the NRC's independent extent of condition review focused on external information programs and processes, and reviews of various management committees' procedures for dispositioning technical concerns. For both White issues

and the resultant degraded Mitigating Systems cornerstone, a comparison was made of the NRC's independent extent of condition determination with that of the licensee.

02 Evaluation of Inspection Requirements

02.01 Problem Identification

a. Determination of who (i.e., licensee, self-revealing, or NRC) identified the issues and under what conditions.

(1) Emergency AC Power Unavailability Issue

Identification of this issue was a combination of licensee identified and self-revealing. [From Supplemental Inspection Report 05000280,281/2002008] - The degraded/failed EDG 3 piston wrist pin condition was identified by the licensee during inspection of the wrist pins and documented in Plant Issue S-2001-1168, dated April 23, 2001. The piston wrist pin inspection was conducted as a result of elevated silver content levels in periodic lube oil analyses which were documented in Plant Issue S-2001-0872, dated March 22, 2001. The initial EDG 2 output breaker problem was self revealing when it failed to operate properly during the EDG monthly start exercise test, 2-OPT–EG-001, performed on September 16, 2001. Licensee trouble shooting did not identify a cause and it was concluded that the breaker was functional after successful bench testing. The breaker was returned to service until September 27, 2001, when it was replaced with a spare breaker and additional investigation was performed on the original breaker. Disassembly and inspection of the breaker on October 12, 2001, identified a broken contact on the anti-pump coil.

(2) Restoration of RCP Seal Injection Flow Issue

This issue was identified by the NRC during the Triennial Fire Protection Inspection (TFPI) for Surry (Inspection Report 05000280,281/2003007, dated March 31, 2003). The NRC identified that Surry fire response procedures were not effective in ensuring safe shutdown for a fire in ESGR Numbers 1 or 2, of Surry Units 1 and 2 respectively. Specifically, these procedures may not preclude an extended loss of RCP seal injection flow, resulting in an RCP seal loss of coolant accident. As a result, in the event of such a severe fire, there would not be reasonable assurance the facility would be able to maintain pressurizer level within the indicating range, as required by 10 CFR 50, Appendix R, Section III.L. Accordingly, the NRC's "Final Significance Determination" letter dated September 15, 2004, identified this issue as a White finding with an associated violation of 10 CFR 50.48 and 10 CFR 50, Appendix R, Section III.L.

b. Determination of how long the issues existed, and prior opportunities for identification

(1) Emergency AC Power Unavailability Issue

[From Supplemental Inspection Report 05000280,281/2002008] - An adverse trend of increasing silver content in the EDG 3 lube oil began in March 2000, following a change

in the lube oil manufacturer. Increasing silver content in monthly lube oil samples and exceeding the vendor recommended threshold for silver content in October of 2000 provided previous opportunities to identify the developing condition. The degraded output breaker was identified on September 16, 2001. The previous successful monthly EDG surveillance which included breaker operation was on August 19, 2001. The length of time the condition existed with respect to unavailability was based on half the time from the last successful monthly test, which was approximately 15 days. The licensee's evaluation identified that the investigation after the September 16, 2001, failure was the single opportunity for prior identification. This failure to identify and correct the equipment problem on September 16, 2001, was the subject of a non-cited violation in NRC Inspection Report Nos. 05000280,281/2001007.

(2) Restoration of RCP Seal Injection Flow Issue

The inspectors determined that this issue had existed since 1998. This determination was based on a combination of the issuance of Direct Work Request (DW)-94-011, Restoration of RCP Seal Cooling, in 1996 by the Westinghouse Owners Group (WOG); and the licensee's initial installation of some of the Westinghouse (W) high temperature O-rings in 1998. RCE S-2003-1490 identified several prior missed opportunities to identify this issue. These missed opportunities included: (1) issuance of DW-94-011 in November 1996; (2) initiation of Potential Problem Report (PPR) 2000-004 in February 2000; (3) issuance of W Report MUHP-1063, Assessment of RCP Operation During Loss of Seal Cooling, February 2000; and (4) identification by the system engineer for the reactor coolant system at Surry (e-mail dated March 21, 2000), of the potential need to revise the FCA procedures, based on his interpretation of W document MUHP-1063. This e-mail went to several licensee personnel including supervisors at the corporate office and the operations procedure writer at Surry.

c. Determination of the plant-specific risk consequences (as applicable) and compliance concerns associated with the issues

(1) Emergency AC Power Unavailability Issue

[From Supplemental Inspection Report 05000280,281/2002008] - In the licensee's response letter, "Risk Assessment of Surry EDG No. 3 Degradation," dated November 26, 2001, to the NRC's "Letter of Preliminary Yellow Finding," dated October 11, 2001, the licensee documented their risk assessment and compliance concerns on this issue. The licensee used a current updated Surry probabilistic risk assessment (PRA) model for internal initiating events which credited additional deterministic analyses of the EDGs. This included a more detailed PRA model and updated information not used in the NRC's preliminary Phase 3 Significance Determination Process (SDP) analysis. In particular, consideration was given to the impact of successful monthly two hour surveillance runs for the period that EDG 3 was degrading which increased the probability of offsite power recovery. The result was that the delta core damage frequency increase, due to the EDG 3 degraded condition, was between 1E-5 and 1E-6. The licensee's evaluation did not specifically address the risk consequences of the EDG breaker failure. Discussion with the licensee indicated the risk associated with the

breaker failure and associated EDG unavailability was incorporated in the determination of the white threshold for the Safety System Unavailability - Emergency AC Power Performance Indicator. This performance indicator was White due to the combination of unavailability time for the EDG 3 piston wrist pin failure and the EDG 2 output breaker problems. The inspectors agreed that the risk was appropriately addressed by the performance indicator. The risk consequences of just the EDG 2 output breaker problem was characterized in NRC Inspection Report 05000280,281/2001007, Section 4OA7 as having very low safety significance.

(2) Restoration of RCP Seal Injection Flow Issue

The licensee documented their risk characterization of the ineffective fire response procedures for restoration of seal injection flow to the RCPs in their Evaluation of Preliminary White Finding and Associated NRC Risk Analysis Contained in NRC Inspection Reports Nos. 05000280/2003008 and 05000281/2003008. Additionally, the licensee's assessment of the NRC's Phase 3 SDP concluded that Surry plant specific features (e.g., probability of non-suppression, severity factors and non-suppression probabilities for ESGR welding fires, and RCP seal leakage probabilities) were not reflected in the NRC Phase 3 SDP for the Surry Unit 1 ESGR. The licensee's assessment of the risk for the Unit 2 ESGR concluded that the change in core damage frequency (delta CDF) was very low, i.e., Green. The NRC's Phase 3 SDP for the Unit 1 ESGR determined that the delta CDF was greater than 2E-6 and was characterized as a White finding for Unit 1. The NRC's Phase 3 SDP analysis for the Unit 2 ESGR determined that the delta CDF was greater than 1E-6 and was characterized as a White finding for Unit 2. The inspectors considered the NRC's characterization of this finding was appropriate.

(3) Combined Risk

The licensee performed an evaluation (Calculation SM-1459, Combined Risk Analysis for SPS Unit 1, Three White Windows) of the plant specific risk consequences of the issues, both individually and collectively. In addition, the licensee performed a plant specific evaluation (Calculation SM-1465, Human Reliability Analysis for Temporary Administrative Control to Open 1-CH-728 and 2-CH-447 for Surry Unit 1 Charging Cross Connect) assessing the corrective actions that established compliance for the fire protection procedure performance deficiency. A regional Senior Reactor Analyst reviewed these evaluations and determined that they were sufficiently detailed and used standard probabilistic risk analysis techniques. The evaluations provided adequate risk insights to show that the White issues' collective increase in core damage frequency was not enough to support an increase in the regulatory response to the White issues.

d. Assessment

As indicated in Supplemental Inspection Report 05000280,281/2002008, the licensee performed an overall adequate evaluation of the deficiencies related to the EDG 3 piston wrist pin failure and the EDG 2 output breaker problems. The depth of the RCEs was adequate. The corrective actions were appropriately prioritized and consistent with the

identified root causes and contributing factors and provided reasonable assurance to prevent recurrence.

With respect to the restoration of RCP seal injection flow issue, the inspectors determined that the licensee's problem identification efforts effectively addressed: who and under what conditions the issue was identified; how long it existed; prior identification opportunities; and compliance concerns.

As discussed in Section 02.01.c.(3) of this inspection report, the licensee's combined risk analysis for the two White findings for the degraded Mitigating Systems cornerstone was reviewed. There was agreement between the NRC and the licensee as to the additive nature of the risk increases due to the two White findings.

02.02 Root Cause, Extent of Condition, and Extent of Cause Evaluation

a. Determine that the problem was evaluated using a systematic method(s) to identify root cause(s) and contributing cause(s)

(1) Emergency AC Power Unavailability Issue

[From Supplemental Inspection Report 05000280,281/2002008] - The licensee used a combination of systematic methodologies and structured root cause analysis techniques to evaluate this White PI, including Event and Causal Factor Charting, Interviewing, Walkthrough Task Analysis, and Change Analysis. The licensee performed a Category 2 RCE to address the EDG 3 degraded piston wrist pin condition and extent of condition application to EDG 1 and EDG 2, and a Category 1 RCE to address the failure to identify the adverse trend in EDG lube oil analysis results prior to development of the degraded wrist pin condition. These RCEs were performed and categorized in accordance with Virginia Power Administrative Procedure (VPAP)-1604, Root Cause Evaluation Program, Revision 4. The licensee's evaluation of the EDG 2 output breaker problem included review of breaker history, review of materials and application, and a detailed laboratory analysis of the failed breaker component. No specific root causes were identified and the evaluation concluded this was an isolated case. The component laboratory analysis was performed by an internal test laboratory. The RCE was conducted in accordance with VPAP-1604 as a Category 2 RCE.

(2) Restoration of RCP Seal Injection Flow Issue

The licensee used a combination of structured analysis techniques in the Category 1 RCE S-2003-1490 to evaluate this White inspection finding. Also, the licensee performed the CCEs to assess the combined White PI and White inspection finding for the degraded Mitigating Systems cornerstone. Some of the techniques used by the licensee in the RCE S-2003-1490 included comparative time line; barrier analysis; change management; and interviewing. Analysis techniques used in the CCEs included document reviews; review of corrective action system data base trend reports; and a collective significance methodology. The inspectors concluded that the licensee incorporated systematic methodologies in determination of the root causes. However,

these methodologies did not initially result in thorough and focused extent of condition evaluations, nor did they result in identification of the most appropriate contributing cause for the White inspection finding.

b. Determine that the root cause evaluation was conducted to a level of detail commensurate with the significance of the problem

(1) Emergency AC Power Unavailability Issue

[From Supplemental Inspection Report 05000280,281/2002008] - The licensee's RCEs of the EDG 3 piston wrist pin problem were thorough and incorporated an appropriate level of detail. The level of detail of the initial problem investigation of the failed breaker problem was inadequate, in that, it did not identify the specific breaker component failure and the breaker was returned to service without repair. The second cause investigation was of sufficient detail to identify the failed component.

(2) Restoration of RCP Seal Injection Flow Issue

The licensee had initially planned to perform an apparent cause evaluation, but decided later that an RCE was more appropriate for this issue. The licensee's RCE of the RCP seal injection flow issue was conducted per Dominion Nuclear Administrative Procedure (DNAP)-1604, Cause Evaluation Program, and included: (1) development of a sequence of events leading up the NRC TFPI which identified that the FCAs did not implement the recommendations of DW-94-011; (2) review of the safety significance and personnel safety concerns; (3) a human performance evaluation; (4) a review to determine the results of previous corrective actions; (5) a review of the extent of the deficiency; and (6) review of operating experience to determine similar industry experience in this area. The RCE team consisted of five team members which included personnel from the licensee's corporate office, North Anna Power Station, and Surry.

c. Determine that the root cause evaluation included a consideration of prior occurrences of the problem and knowledge of prior operating experience

(1) Emergency AC Power Unavailability Issue

[From Supplemental Inspection Report 05000280,281/2002008] - Licensee evaluations included appropriate consideration of prior operating experience and previous occurrences. The licensee's evaluation of the EDG 3 piston wrist pin problem included a review of other General Motors Electro-Motive Division (EMD) users, both nuclear and non-nuclear applications, for this condition and a 1986 occurrence was identified at another nuclear plant. The licensee's evaluation of the EDG 2 output breaker problem included a review of equipment history for Asea Brown-Boveri (ABB) 4160 volt and 480 volt breakers at Surry. No previous similar breaker failures were identified. An industry operating experience search was performed and no related failures were identified. Also, the breaker vendor and refurbishment vendors were contacted and they stated that this type of breaker contact failure had not been previously experienced.

(2) Restoration of RCP Seal Injection Flow Issue

The licensee's Category 1 RCE reviewed prior industry operating experience related to loss of RCP seal cooling and loss of reactor coolant system inventory due to increased seal leakage. Documents reviewed by the RCE team included W WCAP-10541, Westinghouse Owners Group Report: Reactor Coolant Pump Seal Performance Following a Loss of All AC Power, Rev. 2; and W Nuclear Safety Advisory Letter (NSAL) NSAL-99-005, Reactor Coolant Pump Operation During Loss of Seal Injection. The RCE team determined that events discussed in WCAP-10541 involving the loss of RCP seal cooling were not caused by an Appendix R fire and not all the events involved a complete loss of seal cooling. The RCE team determined that the conditions described in NSAL-99-005 were different than the loss of all seal cooling event postulated during an Appendix R fire. Also, in the review of PPR 2000-004, the RCE team contacted other utilities concerning their actions in response to a loss of all RCP seal cooling. The RCE determined that other utilities either followed the W guidance by not restoring seal injection or restored seal injection if seal cooling via the thermal barriers had not been lost.

d. Determine that the root cause evaluation addresses the extent of condition and the extent of cause of the problem

(1) Emergency AC Power Unavailability Issue

[From Supplemental Inspection Report 05000280,281/2002008] - The licensee's evaluation of the EDG 3 piston wrist pin problem included appropriate consideration of potential common cause and extent of condition to the other onsite EDGs. The licensee's evaluation in RCE S-2001-1168 addressed the potential common cause of the inadequate lubrication/change in lube oil and its applicability to EDGs 1 and 2. The licensee's evaluation identified the EDG 2 output breaker problem as an isolated occurrence so no common cause factors were identified. Regarding extent of condition, the licensee noted that the type of breaker control device was common for all 4160 volt and 480 volt ABB breakers used at Surry.

(2) Restoration of RCP Seal Injection Flow Issue/Degraded Mitigating Systems Cornerstone

The licensee's RCE S-2003-1490 included an extent of deficiency review. The RCE noted that the deficiency identified in NRC Inspection Report 05000280,281/2003007 was the result of not updating the FCA procedures to comply with the guidelines in DW-94-011 and the deficiency extended to all DWs issued by the WOG in that the DWs provided guidance for specific changes to ERGs which may need to be reviewed for impact on FCA procedures. The RCE also concluded that the deficiency extended to other Surry procedures such as abnormal procedures and annunciator response procedures. The RCE indicated that the extent was limited to DWs issued by the WOG because the licensee had controls in place to review other industry experience documents such as W NSALs and Institute of Nuclear Power Operations (INPO) documents.

The inspectors noted that the licensee performed CCE S-2004-1504 in January 2004 to assess the adverse performance trend of Surry Units 1 and 2 in the NRC Reactor Oversight Process (ROP). Additionally, the licensee performed CCE S-2004-3295 in October 2004 to address the degraded Mitigating Systems cornerstone for Surry Units 1 and 2. Specifically, CCE S-2004-3295 was performed to determine if common root or contributing causes existed among the three White performance issues identified under the ROP for Surry Units 1 and 2. The three White issues were: 1) emergency AC power unavailability PI; 2) inspection finding for ineffective fire response procedures for restoration of RCP seal injection flow; and 3) PI for unplanned scrams per 7000 critical hours. These first two White issues are the subject of this 95002 supplemental inspection. The White PI related to unplanned scrams was the subject of NRC 95001 Supplemental Inspection 05000280/2004009. The unplanned scrams White PI was not active coincident with the other two White issues, and thus not included in this 95002 supplemental inspection.

During performance of CCE S-2004-3295, the licensee used document reviews, reviews of trend reports from the corrective action system data base and a collective significance methodology to determine if common causes existed between the RCEs identified for the White performance issues. Additionally, further reviews of other RCEs, plant issues, Nuclear Oversight audits and self assessments, and the most recent NRC Problem Identification and Resolution inspection report for Surry were performed to determine the extent of condition and cause for the identified common factors. CCE S-2004-3295 identified that a common cause for the White issues was vendor information and industry users/owners group recommendations were inadequately reviewed and dispositioned, or were subject to technically flawed decisions. The vendor and users/owners group issues identified in this CCE were associated with vendor technical information, information from industry working groups, and a WOG subcommittee.

e. Assessment

The inspectors considered that the extent of condition review in RCE S-2003-1490 was not thorough because it limited the extent to DWs issued by the WOG. For example, the RCE did not review the activities of groups that were similar in function to the Management Problem Review Team (MPRT). Also, the RCE did not review a sampling of evaluations from the groups responsible for reviewing vendor/industry information to determine if the evaluations met current program and/or procedural controls. The inspectors considered that CCE S-2004-3295 did not possess the attributes of an extent of condition evaluation, in that, the review performed was a look backwards through the corrective action system, which did not include a review of recently evaluated vendor/industry documents to assess whether they were processed per the current procedural controls. During this 95002 supplemental inspection, the licensee performed more comprehensive extent of condition evaluations through additional reviews of external information programs and processes, and reviews of various management committees' charters/procedures for dispositioning technical concerns. As a result of these additional reviews, the licensee identified several corrective action items which warranted further action. The licensee documented these additional items in its corrective action program as Plant Issues S-2004-4500 and S-2004-4520. The

inspectors considered these additional extent of condition and extent of cause reviews, combined with the efforts of CCE S-2004-3295, to be appropriately focused based on the inspectors' independent extent of condition review.

02.03 Corrective Actions

a. Determine that appropriate corrective action(s) are specified for each root/contributing cause or that there is an evaluation that no actions are necessary

(1) Emergency AC Power Unavailability Issue

[From Supplemental Inspection Report 05000280, 281/2002008] - The licensee took immediate corrective actions for the EDG 3 piston wrist pin problem to establish the reliability and operability of all station EDGs. These actions included replacement of all power packs (cylinder, cylinder head, piston, rod) for all three EDGs with new power packs and replacement of lube oil in all EDGs with an oil product used by other nuclear EMD EDG owners. The oil analysis program was upgraded to ensure recognition when analyzed parameters exceed pre-set action levels and correct action levels were incorporated into the program software. The short term corrective actions for the EDG 2 output breaker problem were to replace the problem breaker with a successfully tested spare and inspect the remaining EDG output breakers for contact degradation.

The long term corrective actions addressed organizational and programmatic weaknesses that contributed to the failure to recognize the adverse trend in EDG 3 oil samples and ensure EDG lubrication system design was adequate to minimize any adverse effects on critical EDG components during standby. The long term corrective actions for the EDG 2 output breaker problem were to upgrade 4160 volt and 480 volt breaker maintenance procedures to include internal visual inspection of new and existing control devices.

(2) Restoration of RCP Seal Injection Flow Issue

The licensee's corrective actions for this issue were captured in Plant Issue S-2003-1490. The immediate corrective actions included the establishment of hourly fire watches in both units' Cable Vaults and Tunnels and ESGRs, where RCP seals cooling related equipment is located. Additionally, the licensee further limited the controls for transient combustibles in the previously mentioned areas. Short-term corrective actions included changes to the applicable FCA procedures to isolate seal injection to the RCPs if flow cannot be returned within 13 minutes, and the performance of an RCE.

As part of the return to regulatory compliance, the licensee performed a justification for continued operation (JCO). The JCO directed operations to establish a temporary modification (TM) to support administrative controls to allow performing steps to start establishing the Unit 1/Unit 2 charging pump cross-tie on indication of loss of RCP seal cooling due to a fire. Establishment of the administrative controls would decrease the response time in order to ensure that the licensee could re-establish seal injection flow

to the RCPs to achieve seal cooling within 13 minutes. Due to the limited time available to re-establish RCP seal cooling, the licensee designated a non-licensed operator on each shift (as part of the administrative controls) to perform the cross-tie for valves 1-CH-728 and 2-CH-447. The assigned individual could have other duties, except for fire brigade or first aid teams, as long as the individual could respond and perform the required actions within 13 minutes. The administrative controls were independent of any plant procedures, and implementation could be directed by the Shift Supervisor at any time. The TM implemented to support the administrative controls consisted of failing safe and removing power from Hand Control Valves 1-CH-HCV-1186 and 2-CH-HCV-2186. These valves are used during normal plant operations to remotely control RCP seal injection flow from the main control room.

Medium to long-term corrective actions are still being evaluated by the licensee to permanently address the restoration of RCP seal injection flow issue. The licensee expects to determine the best alternative to resolve the RCP seal injection issue by Spring 2005. Several alternatives being considered include installing a stand alone charging pump for seal injection, incorporating National Fire Protection Association Code 805 into the Surry licensing bases, or installing an improved RCP seal/O-ring package (still in development).

As previously discussed, the licensee's RCE for the restoration of RCP seal injection flow issue determined that there were two root causes (RC) and a contributing cause (CC). These causes are grouped below with their respective corrective actions to prevent recurrence (CAPR).

(RC1) Organization/Programmatic - Inadequate program design due to lack of requirements

Corrective actions taken/planned to address RC1 include: the licensee revised VPAP-0502, Procedure Process Control, to add guidance for processing WOG DWs. Where DWs identify the need for changes in Emergency Operating Procedures (EOP), other procedures, including FCAs, are to be reviewed for impact. Identified changes to EOPs and other procedures should be tracked to completion.

(RC2) Managerial Methods - Methods allowed approval of PPR resolution proposal without adequate critique or technical review

Corrective actions taken/planned to address RC2 include: the licensee revised Procedure NDCM-6.1, Potential Problem Reporting System, to require the PPR initiator be given the opportunity to review the proposed PPR closure plan before final closeout. The procedure also directed the MPRT to consider submitting a Plant Issue for the purpose of tracking selected follow-on actions. The inspectors questioned if these corrective actions adequately addressed the recommended corrective action as stated in the RCE. The RCE recommended that the PPR resolution should be reviewed for adequacy and completeness by the author of the PPR prior to closeout by the MPRT. Licensee indicated that,

although not specifically stated in Procedure NDCM-6.1, the MPRT always had the option to submit a Plant Issue for tracking purposes. The licensee further revised NDCM-6.1 to emphasize the RCE recommendations.

(CC) Equipment Specification, Manufacture and Construction - The need to upgrade the RCP seals to the "high temperature" O-rings was not properly identified.

Corrective actions taken/planned to address this CC include: The RCE did not recommend any corrective actions for this CC. Also, there were no corrective actions taken or planned by the licensee to address this CC. While the inspectors considered that appropriate root causes were identified in RCE S-2003-1490, the CC identified in this RCE was not considered to be the most appropriate. Specifically, the licensee identified that the failure to install the W high temperature O-rings in the RCP seals in a timely manner was a CC to the failure to revise the Surry FCA procedures once the difference between the FCAs and the ERGs was identified. However, the inspectors considered that the more appropriate contributing cause should have been the unclear responsibilities and inaccurate perception of who had ownership of the FCA procedures. This determination was based on the inspectors' review of RCE S-2003-1490, PPR 2000-004, and the minutes of the MPRT meetings associated with PPR 2000-004. The inspectors noted that the licensee had implemented corrective actions to address the unclear ownership of the FCA procedures by revising Procedure VPAP-0502. The inspectors observed that this corrective action was part of a series of corrective actions in licensee self assessment ITC-SA-03-16, Fire Protection/Appendix R Program, North Anna, Millstone, and Surry Power Stations.

As discussed above, the inspectors reviewed all corrective actions associated with the RCP seal cooling RCE, as well as those generated as a direct result of this 95002 supplemental inspection. Completed actions were verified to have been performed as indicated. Overall, appropriate corrective actions were generally specified for the root causes, although some corrective actions were more robust than others.

b. Determine that the corrective actions have been prioritized with consideration of the risk significance and regulatory compliance

(1) Emergency AC Power Unavailability Issue

[From Supplemental Inspection Report 05000280,281/2002008] - The corrective actions to resolve risk significant concerns were completed as immediate corrective actions by the return of all station EDGs to an operable and reliable status.

(2) Restoration of RCP Seal Injection Flow Issue

The inspectors determined that the immediate corrective actions taken by the licensee were appropriately prioritized based on risk significance of the issue and/or regulatory compliance (i.e. fire watches established, FCA procedures revised, RCE performed,

JCO completed, TM and administrative controls to reestablish RCP seal injection flow within 13 minutes). The corrective actions and significance were appropriate to facilitate timely performance.

c. Determine that a schedule has been established for implementing and completing the corrective actions

(1) Emergency AC Power Unavailability Issue

[From Supplemental Inspection Report 05000280,281/2002008] - The licensee's evaluation and corrective actions included appropriate prioritization with consideration of risk significance and regulatory compliance. The completion due dates assigned to the RCE recommended corrective actions reflected the prioritization considerations. The compliance issues were addressed by corrective actions to improve the licensee's capability to identify and correct adverse conditions via the lube oil analysis program. Corrective actions to ensure continued availability of the EDGs were completed or scheduled. RCEs S-2001-1168 and S-2001-2806, for the degraded piston wrist pin and the inadequate problem identification function of the EDG lube oil analysis program included completion due dates and status for the approved corrective actions.

(2) Restoration of RCP Seal Injection Flow Issue

The licensee entered the issues into the corrective action program and implemented immediate interim corrective actions to address risk significance and regulatory compliance. The licensee is still evaluating options to address the RCP seal cooling issue in the long term. The licensee expects to determine the best alternative to resolve the RCP seal injection issue by Spring 2005.

d. Determine that quantitative or qualitative measures of success have been developed for determining the effectiveness of the corrective actions to prevent recurrence

(1) Emergency AC Power Unavailability Issue

[From Supplemental Inspection Report 05000280,281/2002008] - The licensee had established measures for determining the effectiveness of corrective actions to prevent recurrence. The licensee's root cause analysis program, VPAP-1604, requires annual effectiveness reviews for corrective actions for Category 1 and 2 RCEs. Following discussion with the inspector regarding specific action items within the RCE to address effectiveness, the licensee added an action item in each RCE to assess the effectiveness of corrective actions.

(2) Restoration of RCP Seal Injection Flow Issue

The licensee plans to assess corrective action effectiveness for the RCP seal cooling issue after completion of all the corrective actions in accordance with the general criteria provided in their corrective action procedures VPAP-1601, Corrective Actions, and DNAP-1604 (formerly VPAP-1604), Cause Evaluation Program. This effectiveness

review is scheduled to be performed within 6 months following the completion of the last CAPR related to the root and contributing causes.

e. Assessment

[From Supplemental Inspection Report 05000280,281/2002008] - The licensee had specified appropriate corrective actions for identified root and contributing causes for the Emergency AC Power Unavailability White PI associated with EDG 3 piston wrist pin and EDG 2 output breaker problems. The status of these corrective actions were being monitored by the licensee.

This White PI returned to Green in the second quarter 2004 for Unit 2 and the fourth quarter 2004 for Unit 1.

Overall corrective actions related to the White inspection finding associated with restoration of seal injection flow to the RCPs were considered to have adequately addressed compliance restoration and the identified root and common causes/causal factors. This determination of adequacy was based on corrective actions taken/planned from the RCE S-2003-1490, CCE S-2004-3295, and self assessment ITC-SA-03-16. The corrective actions appeared to be appropriately prioritized, assigned, and formally tracked. During this 95002 supplemental inspection, the licensee performed more comprehensive extent of condition evaluations through additional reviews of external information programs and processes, and reviews of various management committees' activities and charters/procedures for dispositioning technical concerns. These additional extent of condition and extent of cause reviews, combined with the efforts of CCE S-2004-3295, were considered to be appropriately focused based on the inspectors' independent extent of condition review. Accordingly, the open White inspection finding for ineffective fire response procedures related to restoration of RCP seal injection flow [including associated Violation 05000280,05000281/2004008-01 and Licensee Event Report (LER) 05000280/2003-005-00] is considered closed.

02.04 Independent Assessment of Extent of Condition and Extend of Cause

The inspectors performed an independent assessment of the licensee's conclusions with respect to the extent of condition and cause for the White inspection finding for failure to comply with 10 CFR 50 Appendix R requirements for maintaining pressurizer level indication during a postulated fire in the ESGR and a White PI for Emergency AC Power Safety System Unavailability due to various operability concerns associated with the EDGs. The licensee identified a common cause for the two issues. The cause was that vendor and industry users/owners group information and recommendations were inadequately reviewed and dispositioned or were subject to technically flawed decisions. The licensee also concluded that this cause extended beyond the RCEs performed for the White performance issues. The vendor and users/owners group issues identified in the evaluation was associated with vendor technical information, information from industry working groups and a WOG subcommittee.

The independent assessment reviewed the common factors from root and contributing causes (preventive maintenance, design and vendor information users/owners group) which indicated that issues associated with old/original plant design and single point failures have challenged station operation. The inspectors' assessment included: 1) a review of vendor/WOG information to verify that licensee evaluations were timely to determine impact on plant equipment and procedures (e.g., maintenance, operations); 2) a review of WOG/ERG updates to verify these documents were being evaluated by the licensee for differences in guidance with the FCA procedures and to ensure the differences were adequately resolved; 3) a review of the licensee's evaluations of vendor information to verify that material and/or equipment upgrade recommendations were being prioritized and implemented in a timely manner; and 4) a review of corrective action program documents such as plant issues, RCEs, work orders, system health reports, etc., to verify that the licensee was reviewing deficiencies to identify any adverse material or equipment trends similar to the EDG piston wrist pin issue.

Independent Assessment Results

- There was no formal process which included controls for the appropriate level of review, approval, documentation, implementation and level of priority for vendor and industry users/owners group recommendations.

- There was no formal process which included controls for review, approval, documentation and implementation of WOG management committee recommendations.

- The licensee did not have measures for keeping the component engineer informed of updates to applicable technical manuals. This would allow for a complete and current technical manual to be available at all times.

- No method was developed to document, trend, and evaluate plant issues. This would assist in determining if precursors to events are identified and corrected.

- After reviewing 33 RCEs, seven common root and/or contributing factors were identified. The seven common factors were corrective actions, change management, preventative maintenance, organization/programmatic, vendor/users/owners groups, design, and work practices.

- An extensive review of work requests, work orders and work history for similar/potential issues resulted in determining that the licensee was appropriately identifying potential problems. The single exception was with the most recent EDG failure-to-start issue. The inspectors noted that a start failure occurred on November 7, 2004, for EDG 2 (documented in Surry Plant Issue S-2004-3977). This start failure was not evaluated during this inspection relative to actions taken for the White PI. The licensee had initiated an RCE to determine the cause of the EDG 2 start failure. The root cause evaluation was still in progress at the completion of this inspection. The NRC is reviewing this issue in-office and is awaiting additional information from the licensee's RCE in

order to complete its review. The NRC's assessment of this EDG problem will be documented in a subsequent inspection.

Comparison with Licensee's Efforts

Licensee evaluation CCE S-2004-3295 identified the necessary improvements. A formal process was implemented for receipt, evaluation, processing and implementation of vendor and users/owners group recommendations. Specifically, a new engineering guideline to address the preparation of trip reports and the formal disposition of trip report recommendations was being developed. A review of the W DWs was performed to determine if other station procedures were affected. A review of 51 potentially applicable industry operating experience issues was performed to determine applicability to FCAs. A review of PPRs closed since January 2004 was performed to determine if the PPR close out process described in NDCM 6.1 was being implemented effectively. A formalization of the review process for external organization interface (WOG correspondence) was performed. Nuclear Licensing and Operations Support developed a formal process that included controls for review, approval, documentation and implementation of WOG management committee recommendations. The licensee's initial extent of condition review included reviewing only 30 DWs. This number was later expanded significantly by the licensee. Plant Issues are required to document whether an issue is self-identified or self-revealing and trends evaluated from this data to assist in determining if precursors to events are identified and corrected. All seven common factors were appropriately addressed by the licensee during their assessment of the extent of cause and extent of condition.

03 Exit Meeting Summary

On December 10, 2004, the inspectors presented the inspection results to Mr. M. Gaffney and other members of his staff who acknowledge the findings. Proprietary information is not included in this inspection report.

SUPPLEMENTAL INFORMATION

KEY POINTS OF CONTACT

Licensee

R. Blount, Site Vice President
T. Carlisle, Fire Protection Engineer, Corporate Engineering
T. Cyburt, Licensing
M. Gaffney, Director, Nuclear Station Safety and Licensing
B. Garber, Supervisor, Licensing
W. Henry, Maintenance
T. Huber, Manager, Engineering
R. Johnson, Operations
J. Keithley, Supervisor, Health Physics Operations
R. MacManus, Manager, Nuclear Oversight
G. Miller, Licensing Engineer, Corporate
K. Sloane, Director, Nuclear Station Operations and Maintenance
T. Steed, Manager, Organizational Effectiveness
F. Terminella, Root Cause Evaluation Team Leader, Corporate Engineering
E. Turko, Supervisor, Station Nuclear Safety

NRC

K. Landis, Chief, Branch 5, Division of Reactor Projects, Region II

LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED

Opened

None

Closed

05000280, 281/2004008-001	VIO	Alternative Shutdown Capability and Response Procedures Not Adequate to Ensure Safe Shutdown of Unit 1 and Unit 2 (Section 02.03.e)
05000280/2003-005-00	LER	Unanalyzed Condition Related to Loss of RCP Seal Cooling During an Appendix R Fire Event (Section 02.03.e)

Discussed

None

Attachment

DOCUMENTS REVIEWED

Procedures

0-AP-48.00, Fire Protection - Operations Response, Rev. 17
0-FCA-14.00, Establishing Stable RCS Makeup Flowpaths, Rev. 4
1-FCA-3.00, Limiting Cable Vault and Cable Tunnel Fire, Rev. 16
1-FCA-4.00, Limiting ESGR Number 1 Fire, Rev. 16
DNAP-0104, Dominion Nuclear Self-Assessment Program, Rev. 1
DNAP-1604, Cause Evaluation Program, Rev. 1
DNAP-2001, Equipment Reliability Process, Rev. 1
DNAP-3002, Dominion Nuclear Operating Experience (OE) Program, Rev. 0
Dominion Cause Evaluation Handbook, Rev. 2
Common Cause Analysis Evaluator Training Module
ENAP-0023, Vendor Technical Manual Preparation and Revision, Rev. 6
NDCM-6.1, Potential Problem Reporting System, Rev. 11
NE-GL-0026, Rev. 0
SSES-8.04, Controlling Procedure for the Control of Vendor Information, Rev. 2
SSES-9.05, Rev. 0
Surry Nuclear Station Common Cause Analysis Guideline, Rev. 0
VPAP-0502, Procedure Process Control, Rev. 30
VPAP-0602, Vendor Technical Manual Control, Rev. 5
VPAP-1501, Deviations, Rev.17
VPAP-1601, Corrective Action, Rev. 20

Plant Issues

S-2003-1490, 2003 NRC TFP inspection determined that re-establishing seal injection after a prolonged loss is in conflict with DW-94-011
S-2003-5254, Methodology for maintaining Pressurizer level after App R fire in ESGR appears to be inadequate with WCAP 15603, Rev. 1A
S-2004-0637, Fire Protection/App R Program Self-Assessment
S-2004-1504, ROP Performance Common Cause
S-2004-2485, Review WOG DWs issued in 2004 for applicability to the stations
S-2004-3274, Since January 2003, ten RCEs determined Ineffective Corrective Actions were either a root cause or a contributing cause
S-2004-3295, App R issue exited as a White Finding and as a result, the Mitigation Systems Cornerstone was determined as “Degraded”

Plant Issues/Procedure Action Requests Initiated as a Result of This Inspection

S-2004-4500, Corrective actions and enhancements from various root causes, common causes warrant further action
S-2004-4520, Some of the W updates have not been incorporated into the vendor technical manual for the Surry Model 93A RCPs
A-PAR 04-0153, Revise VPAP 0502 to clarify and strengthen Nuclear Engineering Program’s role in reviewing W Direct Work Requests for impact on the FCAs.

Potential Problem Reports

PPR 2000-004
PPR 2003-005
PPR 2003-008
PPR 2003-009
PPR 2003-010
PPR 2003-012
PPR 2003-013
PPR 2003-014
PPR 2004-002
PPR 2004-003
PPR 2004-004
PPR 2004-005
PPR 2004-006
PPR 2004-007
PPR 2004-008

Direct Work Requests

DW-94-011
DW-00-001 - 033
DW-01-001 - 030
DW-02-001 - 008

Design Changes/Temporary Modifications

DC 04-041, Backup RCP Seal Injection Unit 1 Mechanical Tie-In/Surry/Unit 1
DC 04-011, FAC Piping Replacement Program for U1 2004
TM S2-03-020, Unit 2 Temporary Modification to Support Administrative Control AC# S1-03-11
TM S1-03-045, Unit 1 Temporary Modification to Support Administrative Control AC# S1-03-11

Work Orders

00519454-01
00505652-02
00519454-03

Root Cause Evaluations

S-2001-2806
S-2003-5198
S-2003-4281
S-2003-3205
S-2003-2210
S-2003-1490
S-2003-2375
S-2003-2477

S-2003-4072
S-2003-5368
S-2003-5555
S-2003-4161
S-2003-4275
S-2003-5901
S-2003-2379
S-2003-4165
S-2003-1995
S-2003-1113
S-2003-0331
S-2003-0134
S-2003-0329
S-2003-0359
S-2004-1923
S-2004-0722
S-2004-1767
S-2004-0142
S-2004-1339
S-2004-0528
S-2004-2130
S-2004-1867
S-2004-1205
S-2004-0833

Miscellaneous Documents

Common Cause Evaluation S-2004-1504, Surry Units 1 and 2 NRC ROP Performance
Common Cause Evaluation S-2004-3295, Surry Units 1 and 2 Degraded Cornerstone
ITC-SA-03-16, Self-Assessment, Fire Protection/Appendix R Program, North Anna, Millstone and Surry Power Stations
Calculation SM-1459, Combined Risk Analysis for SPS Unit 1, Three White Windows
Calculation SM-1465, Human Reliability Analysis for Temporary Administrative Control to Open 1-CH-728 and 2-CH-447 for Surry Unit 1 Charging Cross Connect
11448-FM-088B, Surry Unit 1 CVCS Flow/Valve Operating Diagram, Sheet 2, Rev. 40
11548-FM-088B, Surry Unit 2 CVCS Flow/Valve Operating Diagram, Sheet 2, Rev. 36
JCO SC-03-001, Compensatory Measures for 1J/2J Switchgear Fire Event, Rev. 0 and Rev. 1
RQ-03.6(S)-TS-11, Licensed Operator Training Synopsis for JCO Appendix R Cross Tie
W Product Update S-012-1, High Temperature O-Rings to Survive Loss of All Seal Cooling, dated November 1991

LIST OF ACRONYMS

ABB	Asea Brown-Boveri
CAPR	Corrective Action to Prevent Reoccurrence
CC	Contributing Cause
CCE	Common Cause Evaluation
CDF	Core Damage Frequency
DNAP	Dominion Nuclear Administrative Procedure
DW	Direct Work Request
EDG	Emergency Diesel Generator
EMD	Electro Motive Division
ERG	Emergency Response Guidelines
ESGR	Emergency Switchgear and Relay Room
FCA	Fire Contingency Action
INPO	Institute of Nuclear Power Operations
JCO	Justification for Continued Operation
LER	Licensee Event Report
MPRT	Management Problem Review Team
NSAL	Nuclear Safety Advisory Letter
PI	Performance Indicator
PPR	Potential Problem Report
PRA	Probabilistic Risk Assessment
RC	Root Cause
RCE	Root Cause Evaluation
RCP	Reactor Coolant Pump
ROP	Reactor Oversight Process
SDP	Significance Determination Process
TFPI	Triennial Fire Protection Inspection
TM	Temporary Modification
VIO	Violation
VPAP	Virginia Power Administrative Procedure
W	Westinghouse
WOG	Westinghouse Owners Group