



**UNITED STATES
NUCLEAR REGULATORY COMMISSION**
REGION II
245 PEACHTREE CENTER AVENUE NE, SUITE 1200
ATLANTA, GEORGIA 30303-1257

November 12, 2015

Mr. David A. Heacock
President and Chief Nuclear Officer
Virginia Electric and Power Company
Innsbrook Technical Center
5000 Dominion Boulevard
Glen Allen, VA 23060-6711

**SUBJECT: SURRY POWER STATION – NRC INTEGRATED INSPECTION REPORT
05000280/2015003 AND 05000281/2015003**

Dear Mr. Heacock:

On September 30, 2015, the United States Nuclear Regulatory Commission (NRC) completed an inspection at your Surry Power Station Units 1 and 2. On October 15, 2015, the NRC inspectors discussed the results of this inspection with Mr. R. Simmons and other members of your staff. Inspectors documented the results of this inspection in the enclosed inspection report.

NRC inspectors documented three findings of very low safety significance (Green) in this report. Two of these findings involved a violation of NRC requirements. Additionally, one licensee-identified violation, which was determined to be of very low safety significance, is listed in this report. The NRC is treating these violations as non-cited violations (NCVs) consistent with Section 2.3.2.a of the NRC Enforcement Policy.

If you contest the violations or significance of any of these/this NCVs, you should provide a response within 30 days of the date of this inspection report, with the basis for your denial, to the Nuclear Regulatory Commission, ATTN.: Document Control Desk, Washington DC 20555-0001; with copies to the Regional Administrator Region II; the Director, Office of Enforcement, United States Nuclear Regulatory Commission, Washington, DC 20555-0001; and the NRC Resident Inspector at the Surry Power Station.

If you disagree with a cross-cutting aspect assignment in this report, you should provide a response within 30 days of the date of this inspection report, with the basis for your disagreement, to the Regional Administrator, Region II, and the NRC Resident Inspector at the Surry Power Station.

In accordance with Title 10 of the Code of Federal Regulations (CFR) 2.390, "Public Inspections, Exemptions, Requests for Withholding," of the NRC's "Agency Rules of Practice and Procedure," a copy of this letter, its enclosure, and your response (if any) will be available electronically for public inspection in the NRC's Public Document Room or from the Publicly Available Records (PARS) component of the NRC's Agencywide Documents Access and Management 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/

Anthony D. Masters, Chief
Reactor Projects Branch 5
Division of Reactor Projects

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

Enclosure:
IR 05000280/2015003, 05000281/2015003
w/Attachment: Supplemental Information

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Letter to David Heacock from Anthony D. Masters dated November 12, 2015.

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05000280/2015003 AND 05000281/2015003

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U.S. NUCLEAR REGULATORY COMMISSION

REGION II

Docket Nos.: 50-280, 50-281

License Nos.: DPR-32, DPR-37

Report No: 05000280/2015003, 05000281/2015003

Licensee: Virginia Electric and Power Company (VEPCO)

Facility: Surry Power Station, Units 1 and 2

Location: 5850 Hog Island Road
Surry, VA 23883

Dates: July 1, 2015 through September 30, 2015

Inspectors: P. McKenna, Senior Resident Inspector
C. Jones, Resident Inspector
E. Stamm, Senior Reactor Inspector (4OA5)
T. Fanelli, Senior Reactor Inspector (4OA5)

Approved by: Anthony D. Masters, Chief
Reactor Projects Branch 5
Division of Reactor Projects

Enclosure

SUMMARY

IR 05000280/2015003, 05000281/2015003; 07/01/2015 – 09/30/2015; Surry Power Station, Units 1 and 2: Maintenance Effectiveness and Other Activities

The report covered a three-month period of inspection by resident inspectors and region-based inspectors. Inspectors identified two non-cited violations (NCVs) and one finding of very low safety significance. The significance of most findings is indicated by their color (Green, White, Yellow, Red) using Inspection Manual Chapter (IMC) 0609, "Significance Determination Process" (SDP), dated April 29, 2015. The cross-cutting aspects were determined using IMC 0310, "Components Within The Cross-Cutting Areas" dated December 4, 2014. All violations of NRC requirements are dispositioned in accordance with the NRC's Enforcement Policy, dated February 4, 2015. The NRC's program for overseeing the safe operation of commercial nuclear power reactors is described in NUREG-1649, "Reactor Oversight Process," Revision 5.

Cornerstone: Mitigating Systems

- **Green.** A self-revealing, Green finding was identified because the instructions section of the procedure used to test floor drain back flow preventers (BFPs) did not include the instructions necessary to successfully fulfill the purpose of the procedure. A lack of testing methodology instructions allowed BFPs to be installed in the Unit 1 and Unit 2 charging (CH) pump cubicle floor drains that would not prevent backflow into the cubicles during low flow conditions. This was discovered when the Unit 1 and 2 CH pump cubicles filled with approximately two inches of water during the Unit 1 Safeguards building basement flooding event on May 20, 2015. This issue was documented in the licensee's corrective action program (CAP) as condition reports (CRs) 580231 through 242.

The inspectors concluded that the failure of the licensee to have the instructions necessary to successfully fulfill the purpose of 0-MPM-1900-02, "Flood Protection Floor Drain Back Water Stop Valve Replacement" as required by Dominion procedure SPAP-0504, "Technical Procedure Writers Guide," and to correctly test the CH pump cubicle floor drain BFPs to prove functionality, was a performance deficiency (PD). Specifically, 0-MPM-1900-2 did not have instructions on the flow rate to fill the test stand and to observe that the BFP seats at a specified flow rate. Using IMC 0612, Appendix B, Issue Screening, dated September 7, 2012, the inspectors determined that the performance deficiency was more than minor because it was associated with the procedural quality attribute of the Mitigating Systems Cornerstone, and it adversely affected the cornerstone objective to ensure the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. Specifically, the lack of complete testing instructions for BFPs allowed BFPs to be installed in the CH pump cubicle floor drains that would not seal during all flooding scenarios; and once cocked to the side during low flow, then had the potential to pass much higher flow rates into the CH pump cubicles. Using IMC 0609.04, "Initial Characterization of Findings," Table 2, dated June 19, 2012, the finding was determined to affect the Mitigating Systems Cornerstone. The inspectors screened the finding using Manual Chapter 0609, Appendix A, "Significance Determination Process (SDP) for Findings at-Power," dated June 19, 2012, and determined that it screened as Green because the deficiency involved the degradation of equipment specifically designed to mitigate a flooding initiating event, but did not involve the total loss of any safety function. This finding has

a cross-cutting aspect in the documentation aspect of the human performance area, H.7, because the licensee did not have an adequate test procedure to ensure that the floor drain BFPs would seal during low flow backflow conditions. (Section 1R12)

- Green. A self-revealing, Green NCV of Technical Specifications (TS) 6.4.D was identified for failure to follow procedure WM-AA-101, "Work Order Planning," Revision 1. Specifically, the licensee inappropriately revised a work order which resulted in the actuator and hand wheel assembly on 1-SW-495, the 1D Service Water (SW) header inlet isolation valve, being rotated incorrectly. The incorrect rotation resulted in the 1D SW header being inoperable from November 19, 2013, the time the 1D SW header was placed in service following 1-SW-495 replacement, until the issue was corrected on April 11, 2014. This issue was documented in the licensee's CAP as CR 544361.

The inspectors determined that the failure to follow procedure WM-AA-101, "Work Order Planning," Revision 1, was a performance deficiency that was within the licensee's ability to foresee and correct and should have been prevented. The inspectors determined that the finding was more than minor because it was associated with the human performance attribute of the Mitigating Systems Cornerstone and adversely affected the cornerstone objective to ensure the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. Specifically, the rotation of the actuator and hand wheel assembly of 1-SW-495 resulted in the inoperability of the 1D SW header from November 19, 2013 until April 11, 2014. Using IMC 0609.04, Initial Characterization of Findings, Table 2, dated June 19, 2012, and IMC 0609 Appendix A, "SDP for Findings at-Power," dated June 19, 2012, the inspectors determined that a detailed risk evaluation was required because the finding represented an actual loss of system function for greater than the TS allowed outage time for both the main control room (MCR) air conditioning system and the charging SW system during the two periods where only one SW header was operable. The finding had a cross-cutting aspect in human performance, work management, H.5, because the organization did not appropriately control or implement the maintenance activity associated with 1-SW-495 and also did not identify the need for coordination with other groups when the scope of the planned work was changed. (Section 4OA3)

- Green. The team identified a Green non-cited violation of 10 CFR Part 50, Appendix B, Criterion III, "Design Control," for the licensee's failure to verify or check the adequacy of design of the Class 1E 125 volt direct current (VDC) molded case circuit breakers (MCCBs). The licensee entered the issue into their CAP as CRs 559872 and 59875 and performed an immediate determination of operability, which determined the Class 1E 125VDC switchgear to be operable.

The licensee's failure to assure the quality levels of MCCBs through the specification of requirements known to promote high quality, such as requirements for design, for the de-rating of components, for manufacturing, quality control, inspection, calibration, and test, as specified by IEEE 279, Section 4.3, was a performance deficiency. The performance deficiency was determined to be more than minor because it was associated with the design control attribute of the Mitigating Systems Cornerstone and adversely affected the cornerstone objective of ensuring the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. Specifically, the failure to adequately assess the electrical rating of

electrical components could prevent the Class 1E 125VDC circuits from performing their safety function. The team determined the finding to be of very low safety significance (Green) because the finding was a deficiency affecting the design or qualification of a mitigating structure, system, or component, which maintained its operability or functionality. The team determined that no cross-cutting aspect was applicable because the finding was not indicative of current licensee performance. (Section 4OA5)

Other Findings

One violation of very low safety significance, which was identified by the licensee, was reviewed by the inspectors. Corrective actions taken or planned by the licensee have been entered into the licensee's corrective action program. This violation and its respective corrective actions are listed in Section 4OA7 of this report.

REPORT DETAILS

Summary of Plant Status

Unit 1 operated at or near rated thermal power (RTP) from the beginning of the inspection period until July 11, 2015, when it was shutdown to begin a planned maintenance outage to replace the "B" reactor coolant pump (RCP) seal package. It remained offline until July 22, when the main turbine was synchronized to the grid. On July 23, the unit reached RTP and operated there for the remainder of the inspection period.

Unit 2 operated at or near RTP from the beginning of the inspection period until July 13, 2015 when it was shutdown for a forced maintenance outage to repair the "A" pressurizer spray valve. Unit 2 was restarted on July 21 and tripped that same day while at 5% power. It was restarted on July 22 and synchronized to the grid. On July 25, the unit reached RTP and operated there for the remainder of the inspection period.

1. REACTOR SAFETY

Cornerstones: Initiating Events, Mitigating Systems, and Barrier Integrity

1R01 Adverse Weather Protection

.1 External Flooding

a. Inspection Scope

The inspectors performed an inspection of the external flood protection measures for Surry. The inspectors reviewed TS, procedures, design documents, and the Updated Final Safety Analysis Report (UFSAR), which depicted the design flood levels and protection areas containing safety-related equipment to identify areas that may be affected by external flooding. The inspectors conducted a site walkdown of the turbine building, auxiliary building, decontamination building and emergency diesel generator (EDG) fuel oil pump houses, including doors, flood protection barriers, penetrations, and the integrity of the perimeter structure to ensure the licensee erected flood protection measures in accordance with design specifications. The inspectors also reviewed operating procedures for mitigating external flooding during severe weather to determine if the licensee planned or established adequate measures to protect against external flooding events. This sample was conducted in conjunction with TI-190, Inspection of the Proposed Interim Actions Associated with Near-Term Task Force Recommendation 2.1 Flooding Hazard Evaluations.

b. Findings

No findings were identified.

1R04 Equipment Alignment

.1 Partial Walkdown

a. Inspection Scope

The inspectors conducted four equipment alignment partial walkdowns to evaluate the operability of selected redundant trains or backup systems, listed below, with the other train or system inoperable or out of service. The inspectors reviewed the functional systems descriptions, UFSAR, system operating procedures, and TS to determine correct system lineups for the current plant conditions. The inspectors performed walkdowns of the systems to verify that critical components were properly aligned and to identify any discrepancies which could affect operability of the redundant train or backup system.

- Unit 2 "B" and "C" Charging (CH) Pumps while the "A" CH pump was out of service for planned maintenance.
- Unit 1 and Unit 2 "B" CH Pump SW train while "A" CH/SW train was out of service for planned maintenance.
- EDG 2 and 3 during the EDG 1 monthly performance test (PT).
- The Emergency Service Water (ESW) Pumps after the "B" ESW pump was returned to service following a suction bowl cleaning.

b. Findings

No findings were identified.

1R05 Fire Protection

.1 Quarterly Fire Protection Reviews

a. Inspection Scope

The inspectors conducted tours of the five areas listed below that are important to reactor safety to verify the licensee's implementation of fire protection requirements as described in fleet procedures CM-AA-FPA-100, "Fire Protection/Appendix R (Fire Safe Shutdown) Program," Revision 10, CM-AA-FPA-101, "Control of Combustible and Flammable Materials," Revision 8, and CM-AA-FPA-102, "Fire Protection and Fire Safe Shutdown Review and Preparation Process and Design Change Process," Revision 5. The reviews were performed to evaluate the fire protection program operational status and material condition and the adequacy of: (1) control of transient combustibles and ignition sources; (2) fire detection and suppression capability; (3) passive fire protection features; (4) compensatory measures established for out-of-service, degraded or inoperable fire protection equipment, systems, or features; and (5) procedures, equipment, fire barriers, and systems so that post-fire capability to safely shutdown the plant is ensured. The inspectors reviewed the corrective action program to verify fire protection deficiencies were being identified and properly resolved.

- Machinery Equipment Room (MER) 3 and MER 4
- Unit 2 Battery Room 2B
- #1 EDG Room
- Unit 2 Cable Vault
- Unit 2 Emergency Switchgear Room

b. Findings

No findings were identified.

1R11 Licensed Operator Regualification Program

.1 Resident Inspector Quarterly Review

a. Inspection Scope

The inspectors observed and evaluated a licensed operator simulator exercise given on August 3, 2015. The scenario involved a failed open steam generator power operated relief valve with an automatic reactor trip signal that fails to open the reactor trip breakers, the loss of a motor driven auxiliary feedwater (AFW) and the turbine driven AFW pumps, a steam generator (SG) tube rupture, and a fuel element failure. This scenario was intended to exercise the entire operations crew and assess the ability of the operators to react correctly to multiple failures. The inspectors observed the crew's performance to determine whether the crew met the scenario objectives; accomplished the critical tasks; demonstrated the ability to take timely action in a safe direction and to prioritize, interpret, and verify alarms; demonstrated proper use of alarm response, abnormal, and emergency operating procedures; demonstrated proper command and control; communicated effectively; and appropriately classified events per the emergency plan. The inspectors observed the post training critique to determine that weaknesses or improvement areas revealed by the training were captured by the instructor and reviewed with the operators.

b. Findings

No findings were identified.

.2 Resident Inspector Observation of Control Room Operations

a. Inspection Scope

During the inspection period, the inspectors conducted observations of licensed reactor operator activities to ensure consistency with licensee procedures and regulatory requirements. For the following activities, the inspectors observed the following elements of operator performance: 1) operator compliance and use of plant procedures including technical specifications; 2) control board component manipulations; 3) use and interpretation of plant instrumentation and alarms; 4) documentation of activities; 5) management and supervision of activities; and 6) control room communications.

- On July 11, Unit 1 reactor plant shutdown for the planned maintenance outage on the “B” RCP.
- On July 13, Unit 2 reactor plant shutdown for a forced maintenance outage to repair the “A” pressurizer (PZR) spray valve.
- On July 21, Unit 1 withdrawal of control rods to criticality for reactor startup.

b. Findings

No findings were identified.

1R12 Maintenance Effectiveness

a. Inspection Scope

For the two equipment issues described in the condition reports listed below, the inspectors evaluated the effectiveness of the corresponding licensee's preventive and corrective maintenance. The inspectors performed a detailed review of the problem history and associated circumstances, evaluated the extent of condition reviews, as required, and reviewed the generic implications of the equipment and/or work practice problems. Inspectors performed walkdowns of the accessible portions of the system, performed in-office reviews of procedures and evaluations, and held discussions with system engineers. The inspectors compared the licensee's actions with the requirements of the Maintenance Rule (10 CFR 50.65), station procedures ER-AA-MRL-10, “Maintenance Rule Program,” Revision 6, and ER-AA-MRL-100, “Implementing the Maintenance Rule,” Revision 8.

- CR 581101, Unit 2 “B” RCP Seal Package replacement
- CR 581039, MER 3/4/5 and CH Pump Cubicle floor drain backflow preventers replacement

b. Findings

Introduction: A self-revealing Green finding was identified because the instructions section of the procedure used to test floor drain back flow preventers (BFP) did not include the instructions necessary to successfully fulfill the purpose of the procedure. A lack of testing methodology instructions allowed BFPs to be installed in the Unit 1 and Unit 2 CH pump cubicle floor drains that would not prevent backflow into the cubicles during low flow conditions. This was discovered when the Unit 1 and 2 CH pump cubicles filled with approximately two inches of water during the Unit 1 Safeguards building basement flooding event on May 20, 2015.

Description: On May 20, 2015, the Unit 1 Safeguards basement flooded with about 2.5 feet of water when service water (SW) flow to the “C” component cooling (CC) water heat exchanger (HX) was restored; pressurizing the Unit 1 circulating water (CW) and SW discharge tunnel and pushing water out of the tunnel through an opening in the Safeguards building basement created by the removal of 1-SW-REJ-105B, the “B” recirculation spray (RS) HX outlet motor-operated valve (MOV) downstream expansion

joint. The water then flowed to the auxiliary building through building penetrations and accumulated about three inches of water on the auxiliary building basement floor. Additionally, about two inches of water accumulated on the floor of the three CH pump cubicles in Unit 1 and Unit 2 when the cubicle floor drain BFPs failed to seal to prevent the back-flow of water. This issue was documented in the licensee's CAP as CRs 580231 through 242.

The licensee installed BFPs in the CH pump cubicle floor drains as a result of the Individual Plant Examination (IPE) performed in accordance with Generic Letter 88-20, "Individual Plant Examination for Severe Accident Vulnerabilities." The BFPs were installed in each CH pump cubicle's floor drain (two per each cubicle) to isolate these areas from common mode flooding of both Unit 1 and Unit 2 CH pumps via the common auxiliary building floor drain system.

The CH pump cubicle BFPs were installed in 1992 by engineering work request (EWR) 90-178. Preventative maintenance and testing is performed on the backflow preventers every six months. The maintenance consists of replacing the BFP device with a new device drawn out of supply stock. The new device is tested in shop and then installed in the floor drain. The in-shop test consists of mounting the BFP on a test rig and applying between 18 to 30 inches of water test pressure on bottom of the BFP. If BFP valve leakage is less than 0.5 gallons per minute (GPM) the test is procedurally successful.

The licensee conducted an apparent cause evaluation (ACE) of the event and as part of the evaluation tested the BFPs that were installed at the time of the Safeguards Building flooding event. When the test was performed as normally conducted by the maintenance department in accordance with 0-MPM-1900-02, "Flood Protection Floor Drain Back Water Stop Valve Replacement", Revision 14, the BFP closed. When a new BFP was taken from the supply warehouse and tested with water flowing at a reduced rate into the test rig, the BFP float cocked to one side and never moved into position on the seat to seal. Additional tests conducted confirmed that at low flow rates the BFP float would cock to one side and would never seat, even if the flow rate to the BFP increased significantly. Once the BFPs were cocked to the side they were in a condition to let higher flow rates of flooding to back flow through the floor drains and challenge the operability of the charging pumps. Licensee interviews with the maintenance personnel performing the tests revealed that the maintenance personnel were aware that at low flow rates the BFP float would cock to the side and not seat; however, 0-MPM-1900-02 did not provide any direction for this condition, and the test was reperfomed until the criteria of 18 to 30 inches of water column was achieved. In this testing method, the BFP would never fail the testing acceptance criteria of letting pass less than .5 GPM of water.

Dominion procedure SPAP-0504, "Technical Procedure Writers Guide, Revision 9," states in section 6.3.9 that "each technical procedure shall contain the Instructions Section which provides the step-by-step instructions necessary to fulfill the purpose of the procedure." In the procedure 0-MPM-1900-02, the purpose of the procedure is to provide instructions for the replacement of floor drain BFPs including the testing to prove the BFP is functional. The instructions section of 0-MPM-1900-02 to perform an as found bench pressure test of a new BFP taken from supply stock did not have

instructions to perform an initial seat test of the BFP and did not specify the flow rate to fill the test stand. Without these instructions, maintenance personnel would reperform the pressure test to get the initial test pressure of 18 to 30 inches of water, if the BFP cocked to one side during the initial application of water.

Analysis: The inspectors concluded that the failure of the licensee to have the instructions necessary to successfully fulfill the purpose of 0-MPM-1900-02, as required by Dominion procedure SPAP-0504, and to correctly test the CH pump cubicle floor drain BFPs to prove functionality, was a PD that was within the licensee's ability to foresee and correct. Specifically, 0-MPM-1900-2 did not have instructions on the flow rate to fill the test stand and to observe that the BFP seats at a specified flow rate. This allowed maintenance personnel to repeat the test if the BFP float cocked to one side during the testing, until the desired test results were achieved. Using IMC 0612, Appendix B, Issue Screening, dated September 7, 2012, the inspectors determined that the performance deficiency was more than minor because it was associated with the procedural quality attribute of the Mitigating Systems Cornerstone, and it adversely affected the cornerstone objective to ensure the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. Specifically, the lack of complete testing instructions for BFPs allowed BFPs to be installed in the CH pump cubicle floor drains that would not seal during all flooding scenarios; and once cocked to the side during low flow, then had the potential to pass much higher flow rates into the CH pump cubicles. As a result, the Unit 1 and Unit 2 CH pump cubicles filled with about two inches of water during the Unit 1 Safeguards basement flooding event on May 20, 2015.

Using IMC 0609.04, "Initial Characterization of Findings," Table 2, dated June 19, 2012, the finding was determined to affect the Mitigating Systems Cornerstone. The inspectors screened the finding using IMC 0609, Appendix A, "SDP for Findings at-Power," dated June 19, 2012, and determined that it screened as Green because the deficiency involved the degradation of equipment specifically designed to mitigate a flooding initiating event, but did not involve the total loss of any safety function. This finding has a cross-cutting aspect in the documentation aspect of the human performance area, H.7, because the licensee did not have an adequate test procedure to ensure that the floor drain BFPs would seal during low flow backflow conditions.

Enforcement: Enforcement action does not apply because the performance deficiency did not involve a violation of a regulatory requirement: FIN 05000280, 281/2015003-01, Charging Pump Cubicle Floor Drain Backflow Preventer Failures during Unit 1 Safeguards Building Flooding.

1R13 Maintenance Risk Assessments and Emergent Work Control

a. Inspection Scope

The inspectors evaluated, as appropriate, the six activities listed below for the following: (1) the effectiveness of the risk assessments performed before maintenance activities were conducted; (2) the management of risk; (3) that, upon identification of an unforeseen situation, necessary steps were taken to plan and control the resulting

emergent work activities; and, (4) that maintenance risk assessments and emergent work problems were adequately identified and resolved. The inspectors verified that the licensee was complying with the requirements of 10 CFR 50.65(a)(4) and the data output from the licensee's safety monitor associated with the risk profile of Units 1 and 2. The inspectors reviewed the corrective action program to verify deficiencies in risk assessments were being identified and properly resolved.

- On July 9, Unit 1 and Unit 2 risk with Unit 2 "A" CH Pump out of service for planned maintenance and the MER-3 SW strainer out of service for unplanned maintenance.
- On July 13, Unit 2 risk during an unplanned forced outage to repair the "A" PZR Spray Valve.
- On July 19 and 20, Unit 1 and Unit 2 shutdown risk while conducting mode changes to place both units back online during an electrical grid hot weather alert.
- On July 29, Unit 2 risk with unplanned corrective maintenance on 1-SI-MOV-1863A, low head safety injection (LHSI) pump "A" to high head SI isolation valve.
- On August 6, Unit 1 risk with both PZR power operated relief valve (PORV) block valves closed.
- On September 17, Unit 2 risk with the 2H emergency bus being powered by EDG 2 after a failed undervoltage relay during performance testing.

b. Findings

No findings were identified.

1R15 Operability Evaluations

a. Inspection Scope

The inspectors reviewed the three operability evaluations listed below, affecting risk-significant mitigating systems, to assess as appropriate: (1) the technical adequacy of the evaluations; (2) whether continued system operability was warranted; (3) whether other existing degraded conditions were considered; (4) if compensatory measures were involved, whether the compensatory measures were in place, would work as intended, and were appropriately controlled; and (5) where continued operability was considered unjustified, the impact on TS Limiting Conditions for Operation and the risk significance. The inspectors' review included verification that operability determinations were made as specified in OP-AA-102, "Operability Determination," Revision 13. The inspectors reviewed the licensee's corrective action program to verify deficiencies in operability determinations were being identified and corrected.

- CR 580495, CH Pump cubicles back flow preventers failed to seal
- CR 1002302, Unit 2 ramped offline to leak seal the "A" PZR spray valve
- CR 1002917, N32 Source Range detector reading erratic

b. Findings:

No findings were identified.

1R19 Post Maintenance Testing

a. Inspection Scope

The inspectors reviewed six post maintenance test procedures and/or test activities for selected risk-significant mitigating systems listed below, to assess whether: (1) the effect of testing on the plant had been adequately addressed by control room and/or engineering personnel; (2) testing was adequate for the maintenance performed; (3) acceptance criteria were clear and adequately demonstrated operational readiness consistent with design and licensing basis documents; (4) test instrumentation had current calibrations, range, and accuracy consistent with the application; (5) tests were performed as written with applicable prerequisites satisfied; (6) jumpers installed or leads lifted were properly controlled; (7) test equipment was removed following testing; and (8) equipment was returned to the status required to perform in accordance with VPAP-2003, "Post Maintenance Testing Program," Revision 14.

- 1-OP-RC-001, Starting and Running any Reactor Coolant Pump, Revision 27, OTO 1, "B" RCP after seal package replacement.
- 2-PT-2.33A, Emergency Bus Undervoltage and Degraded Protection Test H Train, Revision 5, OTO 1, following relay replacement on the undervoltage relay panel for the 2H emergency bus.
- 2-OPT-FW-001, "Motor Driven Auxiliary Feedwater Pump 2-FW-P-3A Performance Test," Revision 34, after pump packing adjustment.
- 2-OPT-CH-001, "Charging Pump Operability and Performance Test for 2-CH-P-1A," Revision 54, after Unit 2 "A" CH pump maintenance package.
- 2-OPT-RC-10.0, "Reactor Coolant Leakage – Computer Calculated," Revision 42, after leak sealing body-bonnet joint of the Unit 2 "A" PZR spray valve.
- 1-OPT-SI-003, "Quarterly Test of SI MOVs and RWST Crosstie TVs", Revision 22, after contact replacement in the breaker for 1-SI-MOV-1863A, LHSI pump "A" to high head SI isolation valve.

b. Findings

No findings were identified.

1R20 Refueling and Other Outage Activities

.1 Unit 1 Planned Maintenance Outage to Replace "B" RCP Seal Package

a. Inspection Scope

Unit 1 began a planned maintenance outage on July 11, 2015, to replace the "B" RCP seal package which had degraded over the previous two months. During the forced outage period, the inspectors used Inspection Procedure 71111.20, "Refueling and Outage Activities," to observe portions of the maintenance and startup activities to verify that the licensee maintained defense-in-depth commensurate with the outage risk assessment and applicable TS. The inspectors also confirmed that the licensee had

appropriately considered industry experience and previous site-specific problems in developing and implementing a plan that assured maintenance of defense-in-depth. The inspectors monitored licensee controls over the outage activities listed below.

- Licensee configuration management, including daily outage reports, to evaluate maintenance of defense-in-depth for key safety functions and compliance with the applicable TS when taking equipment out of service.
- Implementation of clearance activities and confirmation that tags were properly hung and equipment appropriately configured to safely support the work or testing.
- Decay heat removal processes to verify proper operation and that steam generators, when relied upon, were a viable means of backup cooling.
- Controls over activities that could affect reactivity.
- Monitoring of decay heat removal operations.
- Reactor coolant inventory controls, including flow paths, configurations, alternative means for inventory additions, and controls to prevent inventory loss.
- Startup and ascension to full power operation and tracking of startup prerequisites.
- Licensee identification and resolution of problems related to forced outage activities.

.2 Unit 2 Forced Outage Due to Body to Bonnet Leak from Pressurizer Spray Valve

a. Inspection Scope

Unit 2 began a forced outage on July 13, 2015, due to a body to bonnet flange leak from 2-RC-PCV-2455A, "A" pressurizer spray valve which continued until July 21, 2015. During the forced outage period, the inspectors used Inspection Procedure 71111.20, "Refueling and Outage Activities," to observe portions of the maintenance and startup activities to verify that the licensee maintained defense-in-depth commensurate with the outage risk assessment and applicable TS. The inspectors also confirmed that the licensee had appropriately considered industry experience and previous site-specific problems in developing and implementing a plan that assured maintenance of defense-in-depth. The inspectors monitored licensee controls over the outage activities listed below.

- Licensee configuration management, including daily outage reports, to evaluate maintenance of defense-in-depth for key safety functions and compliance with the applicable TS when taking equipment out of service.
- Implementation of clearance activities and confirmation that tags were properly hung and equipment appropriately configured to safely support the work or testing.
- Decay heat removal processes to verify proper operation and that steam generators, when relied upon, were a viable means of backup cooling.
- Controls over activities that could affect reactivity.
- Monitoring of decay heat removal operations.
- Startup and ascension to full power operation and tracking of startup prerequisites.
- Licensee identification and resolution of problems related to forced outage activities.

b. Findings

No findings were identified.

1R22 Surveillance Testing

a. Inspection Scope

For the two surveillance tests listed below, the inspectors examined the test procedures, witnessed testing, or reviewed test records and data packages, to determine whether the scope of testing adequately demonstrated that the affected equipment was functional and operable, and that the surveillance requirements of TS were met. The inspectors also determined whether the testing effectively demonstrated that the systems or components were operationally ready and capable of performing their intended safety functions.

In-Service Testing:

- 2-OPT-FW-001, "A' MDAFW Pump Performance Test", Revision 34

Surveillance Testing:

- 0-OPT-EG-001, "#3 EDG Quarterly Performance Test", Revision 71

b. Findings

No findings were identified.

1EP6 Drill Evaluation

.1 Emergency Preparedness (EP) Drill

a. Inspection Scope

On August 3, 2015, the inspectors reviewed and observed a licensee EP drill involving a failed open steam generator power operated relief valve, an automatic reactor trip signal that fails to open the reactor trip breakers, a steam generator tube rupture, a fuel element failure, and an offsite release that leads to the general emergency declaration. The inspectors assessed the licensee emergency procedure usage, emergency plan classifications, notifications, and protective actions recommendation development. The inspectors evaluated the adequacy of the licensee's conduct of the drill and post-drill critique performance. The inspectors verified that the drill critique identified drill performance weaknesses and entered these items into the licensee's CAP.

b. Findings

No findings were identified.

.2 EP Training Evolution (Simulator)

a. Inspection Scope

On September 17, 2015, the inspectors reviewed and observed a licensee simulator-based EP training evolution. The inspectors assessed the licensee emergency procedure usage, emergency plan classifications, and notifications. The inspectors evaluated the adequacy of the licensee's conduct of the training evolution and post-training evolution critique performance. The inspectors verified that the training evolution critique identified performance weaknesses and entered these items into the licensee's CAP.

4. OTHER ACTIVITIES

Cornerstones: Initiating Events, Mitigating Systems, Barrier Integrity, Emergency Preparedness, Public Radiation Safety, and Occupational Radiation Safety

4OA1 Performance Indicator (PI) Verification

a. Inspection Scope

The inspectors performed a periodic review of the four following Unit 1 and 2 PIs to assess the accuracy and completeness of the submitted data and whether the performance indicators were calculated in accordance with the guidance contained in NEI 99-02, "Regulatory Assessment Performance Indicator Guideline," Revision 7. The inspection was conducted in accordance with NRC Inspection Procedure 71151, "Performance Indicator Verification." Specifically, the inspectors reviewed the Unit 1 and Unit 2 data reported to the NRC for the period July 1, 2014 through June 30, 2015. Documents reviewed included applicable NRC inspection reports, licensee event reports, operator logs, station performance indicators, and related CRs.

- Unit 1 Auxiliary Feedwater MSPI
- Unit 2 Auxiliary Feedwater MSPI
- Unit 1 Emergency AC Power MSPI
- Unit 2 Emergency AC Power MSPI

b. Findings

No findings were identified.

4OA2 Identification and Resolution of Problems

.1 Daily Reviews of items Entered into the Corrective Action Program:

a. Inspection Scope

As required by NRC Inspection Procedure 71152, "Identification and Resolution of Problems," and in order to help identify repetitive equipment failures or specific human performance issues for follow-up, the inspectors performed a daily screening of items entered into the licensee's CAP. This review was accomplished by reviewing daily CR report summaries and periodically attending daily CR review team meetings.

b. Findings

No findings were identified.

.2 Semi-Annual Trend Review

a. Inspection Scope

The inspectors performed a review of the licensee's correction action program documents to identify trends that could indicate the existence of a more significant safety issue. The inspectors' review was focused on repetitive equipment and corrective maintenance issues, but also considered the results of daily inspector corrective action program item screening discussed in Section 4OA2.1. The review included issues documented outside the normal correction action program in system health reports, corrective maintenance work orders, component status reports, site monthly meeting reports, and maintenance rule assessments. The inspectors' review nominally considered the six month period of January through June, 2015, although some examples expanded beyond those dates when the scope of the trend warranted.

The inspectors compared and contrasted their results with the results contained in the licensee's latest integrated quarterly assessment report. Corrective actions associated with a sample of the issues identified in the licensee's trend report were reviewed for adequacy.

b. Assessment and Observations

No findings of significance were identified. In general, the licensee has identified trends and has addressed the trends with their corrective action program. No new adverse trends were identified this period that had not already been identified by the licensee.

4OA3 Follow-up of Events and Notices of Enforcement Discretion (71153 – 2 Samples)

.1 (Closed) License Event Report, 05000-280, 281/2014-001-00, Closed Service Water Valve Results in Exceeding Technical Specifications

a. Inspection Scope

On March 29, 2014, with both Unit 1 and Unit 2 operating at 100% power, the Unit 1D SW header was declared inoperable as a result of indications received during testing. The direct cause of the indications was due to a mostly closed 1-SW-495, the Unit 1D SW header isolation valve. In October 2013, following valve replacement, the 1-SW-495 valve hand wheel was reoriented causing the valve to become mostly closed while

indicating open. Therefore the Unit 1D SW header was inoperable from October 21, 2013 until the valve was repaired and declared operable on April 11, 2014. TS limiting conditions of operation were exceeded twice during timeframes when one of two other operable SW headers was tagged out for maintenance. Also, as a result of the restricted flow condition, the Unit 1 "B" CH/SW pump was also determined to be inoperable beyond its TS limiting condition for operation. The inspectors reviewed the Licensee Event Report (LER) and supporting documents which included completed and planned corrective actions to verify the accuracy of the LER and that the corrective actions address the root cause. This LER is closed.

b. Findings

Introduction: A self-revealing, Green NCV of TS 6.4.D was identified for failure to follow procedure WM-AA-101, "Work Order Planning," Revision 1. Specifically, the licensee inappropriately revised a work order which resulted in the actuator and hand wheel assembly on 1-SW-495, the 1D SW header inlet isolation valve, being rotated incorrectly. The incorrect rotation resulted in the 1D SW header being inoperable from November 19, 2013, the time the 1D SW header was placed in service following 1-SW-495 replacement, until the issue was corrected on April 11, 2014.

Description: On October 18, 2013, the licensee completed work associated with the replacement of 1-SW-495, the 1D SW header isolation valve in accordance with work order 38072198008. However, on October 21, 2013, an annotation was added in the "Work Description" section of the work order indicating that a maintenance technician had rotated the actuator and hand wheel assembly of the valve by 90 degrees. This work, which was beyond the original scope of the work order, was performed at the request of welding personnel who determined that the actuator and hand wheel assembly of 1-SW-495 may interfere with their work in the SW to component cooling water valve pit. When the mechanic rotated the actuator, it was not disconnected from the valve stem, causing the valve stem and disc to rotate almost fully closed while indicating open. No configuration control or analysis was performed to ensure that the valve remained in the proper configuration. Post maintenance testing did not reveal the error because the testing performed consisted only of a valve stroke test and an American Society of Mechanical Engineers (ASME) code class leakage test. The rotation of the actuator and hand wheel assembly was not performed in accordance with any procedure or written job steps and there was no indication that any other supervisors signed or reviewed the annotation in the work order after it was documented.

Inspectors reviewed the licensee's work order planning and usage requirements and associated procedure WM-AA-101, "Work Order Planning," revision 1. In section 3.9, "Work Order Revision," inspectors noted step 3.9.1.a, which requires a work package to be returned to the planning department if discrepancies are discovered requiring work order revision. Contrary to this requirement, when the scope of the valve replacement changed because it was desired to rotate the actuator, Dominion personnel did not return the work package to planning so that a procedure or specific job steps could be prepared for that activity. As a result, the actuator and hand wheel assembly was

rotated incorrectly and the 1D SW header was inoperable when station personnel thought it was in service.

The licensee is required to have two of three (1D, 2A, and 2C) operable SW flow paths to the charging SW system. However, the licensee subsequently isolated the 2A flow path to perform maintenance from January 6, 2014, until January 11, 2014, and on another occasion, isolated the 2C flow path from March 16, 2014 until March 23, 2014. Therefore, during both time periods, the licensee operated with two flow paths not operable (1D and either 2A or 2C respectively).

The fact that 1-SW-495 was mostly closed when the associated 1D SW header was thought to be in service was discovered on March 31, 2014, during troubleshooting initiated because of indications received during surveillance testing two days earlier on the main control room (MCR) air conditioning system, which is cooled by SW. During the testing, a MCR annunciator for low discharge pressure on the charging SW pumps was received due to the upstream blockage from 1-SW-495. The licensee completed immediate corrective actions to return the valve actuator and hand wheel assembly to their original configuration and return the 1D SW header to an operable status on April 11, 2014. Dominion entered the issue into their corrective action program as CR 543530.

Analysis: The inspectors determined that the failure to follow procedure WM-AA-101, "Work Order Planning," Revision 1, was a performance deficiency that was within the licensee's ability to foresee and correct and should have been prevented. The inspectors determined that the finding was more than minor because it was associated with the human performance attribute of the Mitigating Systems Cornerstone and adversely affected the cornerstone objective to ensure the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. Specifically, the rotation of the actuator and hand wheel assembly of 1-SW-495 resulted in the inoperability of the 1D SW header from November 19, 2013 until April 11, 2014.

Using IMC 0609.04, Initial Characterization of Findings, Table 2, dated June 19, 2012, and IMC 0609 Appendix A, "Significance Determination Process (SDP) for Findings at-Power," dated June 19, 2012, the inspectors determined that a detailed risk evaluation was required because the finding represented an actual loss of system function for greater than the TS allowed outage time for both the MCR air conditioning system and the charging SW System during the two periods where only one SW header was operable.

While there were several periods of time with only one SW header in service, the actual flow provided through the mostly shut SW-495 was adequate to maintain the MCR air conditioning system functional as demonstrated by surveillance testing. A detailed risk assessment was performed by a regional senior reactor analyst (SRA) in accordance with the guidance of IMC 0609 Appendix A, using the NRC Standardized Plant Analysis Risk model for Surry. The major analysis assumptions included: no loss of function for MCR air conditioning system, a six day exposure period for the charging SW system, and no recovery consideration. The dominant sequence was a SG tube rupture, failure

of high pressure injection, success of SG isolation, and failure of secondary side cooldown. The licensee's risk model produced similar results. The risk was mitigated by the remaining mitigation equipment and the short exposure period. The performance deficiency resulted in an increase in core damage frequency of $< 1.0 \text{ E-6/year}$ and an increase in large early release fraction of $< 1.0\text{E-7/year}$ and was characterized as a Green finding of very low safety significance.

The finding had a cross-cutting aspect in human performance, work management, H.5, because the organization did not appropriately control or implement the maintenance activity associated with 1-SW-495 and also did not identify the need for coordination with other groups when the scope of the planned work was changed.

Enforcement: Surry TS 6.4.A.7 requires, in part, detailed procedures be provided for "preventative or corrective maintenance operations which would have an effect on the safety of the reactor." Additionally, TS 6.4.D requires, in part, "All procedures described in Specifications 6.4.A shall be followed." Contrary to the above, on 21 October, 2013, the licensee failed to follow procedure WM-AA-101, "Work Order Planning," Revision 1, step 3.9.1.a, when work order 38072198008, for a preventative maintenance replacement of 1-SW-495, was revised and was not sent to the Planning Department as required. This violation was entered into the licensee's corrective action program as CR 544361. (NCV 05000280/2014003-02, Failure to Follow Procedure during Maintenance Results in Service Water Header Inoperability)

2. (Closed) Licensee Event Report, 05000-280, 281/2015-001-00, Inadequate Missile Protection Due to Failure to Procedurally Control Sliding Missile Shields

a. Inspection Scope

On January 27, 2015, with Units 1 and 2 operating at 100 percent power, it was identified that four sliding missile shields on the Main Steam Valve House (MSVH) were not included in the "Abnormal Environmental Conditions" procedure to be closed upon the threat of high winds. The shields are necessary to meet the design function of the MSVH for protection of the AFW and main steam (MS) safety-related equipment and must be closed to perform their design function. The licensee determined that during weather conditions when it would have been appropriate to close the MSVH missile shields, a missile could have penetrated the unprotected access doors and interacted with the AFW and MS safety-related components located inside the MSVH. Corrective action was to revise procedure "Abnormal Environmental Conditions" to add the missile shields. The inspectors reviewed the LER and supporting documents which included completed and planned corrective actions to verify the accuracy of the LER and that the corrective actions address the root cause. This performance deficiency constitutes a licensee identified violation which is documented in section 4OA7 in accordance with the NRC's Enforcement Policy. This LER is closed.

b. Findings

The licensee identified finding is discussed in section 4OA7 of this report.

4OA5 Other Activities.1 Temporary Instruction 2515/190 - Inspection of the Proposed Interim Actions Associated with Near-Term Task Force Recommendation 2.1 Flooding Hazard Evaluationsa. Inspection Scope

The inspectors verified that licensee's interim actions will perform their intended function for flooding mitigation.

The inspectors independently verified that the licensee's proposed interim actions would perform their intended function for flooding mitigation as follows:

- Visual inspection of the flood protection features was performed. External visual inspection was conducted for indications of degradation that would prevent its credited function from being performed.
- Reasonable simulations of flood mitigation actions, to verify they could be executed as specified, were reviewed.
- Flood protection feature functionality was determined using either visual observation or by review of other documents.

The inspectors verified that issues identified were entered into the licensee's CAP.

a. Findings

No findings were identified.

.2 (Closed) Unresolved Item (URI) 05000280/2014007-03; 05000281/2014007-03, Adequacy of Class 1E 125VDC Branch Circuit Breaker Designa. Inspection Scope

On November 10, 2014, the NRC issued inspection report 05000280/2014007 and 05000281/2014007 (ADAMS Accession Number ML14316A445), which included an URI associated with the adequacy of design of the Class 1E 125VDC power branch circuit breaker for the 1H 4160V Bus controls. The URI was initiated to determine whether the issue of concern constituted a violation of regulatory requirements. The team conferred with the Office of Nuclear Reactor Regulation (NRR) staff regarding the adequacy of design of the Class 1E 125VDC power branch circuit breaker for the 1H 4160V Bus controls. The team also reviewed the licensee's evaluations and calculations of alternating current (AC) molded case circuit breakers (MCCBs) used in the direct current (DC) system. Documents reviewed are listed in the Attachment.

.b Findings

Introduction: The team identified a Green non-cited violation (NCV) of 10 CFR Part 50, Appendix B, Criterion III, "Design Control," for the licensee's failure to verify or check the

adequacy of design of the Class 1E 125 VDC power branch circuit breaker for the logic controls associated with the 1H 4160 volts AC switchgear.

Description: The UFSAR, Section 7.2.1, "Design Basis," stated, in part, "The reactor protection system and the engineered safeguards are designed in accordance with IEEE-279 Standard, Nuclear Power Plant Protection Systems, August 1968." Standard IEEE 279-1968, Section 4.3, "Quality of Components and Modules," stated, in part, "Quality levels shall be achieved through the specification of requirements known to promote high quality, such as requirements for design, for the derating of components, for manufacturing, quality control, inspection, calibration, and test."

The team identified errors in calculation EE-0499, "DC Vital Bus Short Circuit Current," dated November 30, 1998, which inappropriately used AC power time current curve (TCC) curves designated for Eaton HFB and HFD MCCBs used in DC applications. The TCCs were not de-rated as required for their application. In addition, since 2009, the licensee had replaced some HFB with HFDDC MCCBs, which is designed specifically for DC applications. The team identified that HFDDC MCCBs were used in the circuits and the HFD AC TCCs were evaluated in calculations that did not represent the calibration data for HFDDC MCCBs. The team determined that the HFD and HFDDC MCCBs were designed for different applications and their calibration data was not interchangeable. These calculation errors and omissions masked the potential for damage to Class 1E circuits because the AC calibration data of the HFB MCCBs was not de-rated for DC applications, after which the MCCBs were inadequate to protect certain circuits from the most limiting short circuits. The HFDDC MCCBs were not verified to adequately protect the most limiting components in the 1H branch circuit. The team determined that the design of the MCCBs was to isolate failed equipment automatically and thus should protect the smallest wires in the circuits from possible extended damage. The team determined that existing switchgear fuses did not protect upstream wires from damage. A failure of this circuit could cause a loss of a number of engineered safety feature (ESF) components. These calculation errors and omissions were consistent across both trains A & B and for both Unit 1 and Unit 2.

Analysis: The licensee's failure to assure the quality levels of MCCBs through the specification of requirements known to promote high quality, such as requirements for design, for the de-rating of components, for manufacturing, quality control, inspection, calibration, and test, as specified by IEEE 279, Section 4.3, was a PD. The PD was determined to be more than minor because it was associated with the design control attribute of the Mitigating Systems Cornerstone and adversely affected the cornerstone objective of ensuring the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. Specifically, the failure to adequately assess the electrical rating of electrical components could prevent the Class 1E 125VDC circuits from performing their safety function. The team used IMC 0609, Att. 4, "Initial Characterization of Findings," issued June 19, 2012, for Mitigating Systems, and IMC 0612, App. A, "The Significance Determination Process for Findings At-Power," issued June 19, 2012, and determined the finding to be of very low safety significance (Green) because the finding was a deficiency affecting the design or qualification of a mitigating system, structure, or component (SSC), and the SSC maintained its

operability or functionality. The team determined that no cross-cutting aspect was applicable because the finding was not indicative of current licensee performance.

Enforcement: Title 10 CFR Part 50, Appendix B, Criterion III, "Design Control," stated, in part, that "design control measures shall provide for verifying or checking the adequacy of design, such as by the performance of design reviews." Contrary to the above, since 1985, when the Class 1E DC MCCBs were replaced, the licensee did not implement methods to provide for verifying or checking the adequacy of design, such as by the performance of design reviews. Specifically, the licensee failed to assure that a component failure or circuit fault would not cause a loss of electric power to a number of engineered safety features. The licensee performed an immediate determination of operability and determined the Class 1E DC switchgear to be operable. The violation was entered into the licensee's CAP as CRs 559872 and 559875. This violation is being treated as an NCV, consistent with Section 2.3.2 of the Enforcement Policy. (NCV 05000280, 281/2015003-03, Failure to Verify Adequacy of Class 1E 125VDC Branch Circuit Breaker Design)

.3 Independent Spent Fuel Storage Installation (ISFSI) Inspections (IP 60855.1)

a. Inspection Scope

The inspectors reviewed reported changes made to the licensee's procedures and programs for the Independent Spent Fuel Storage Installation (ISFSI) to verify the changes made were consistent with the license and Certificate of Compliance, and did not reduce the effectiveness of the program. The inspectors, through direct observation and independent evaluation, verified cask loading activities were performed in a safe manner and in compliance with approved procedures. Based on direct observation and review of selected records, the inspectors verified the licensee had properly identified each fuel assembly and insert placed in the ISFSI, had recoded the parameters and characteristics of each fuel assembly and insert, and had maintained a record of each as a controlled document. Inspection activities were associated with casks DOM-32PTH-038-C and DOM-32PTH-043-C. Activities observed include: transport and storage of cask DOM-32PTH-043-C, loading of spent fuel in cask DOM-32PTH-038-C, drying and seal welding activities on DOM-32PTH-043-C, and the heavy lift to remove DOM-32PTH-043-C from fuel building to the ISFSI transport trailer.

b. Findings

No findings were identified.

40A6 Meetings, Including Exit

Exit Meeting Summary

On October 15, 2015, the inspection results were presented to Mr. R. Simmons and other members of his staff, who acknowledged the findings. The inspectors asked the licensee whether any of the material examined during the inspection should be considered proprietary. No proprietary information was identified.

4OA7 Licensee-Identified Violation

The following finding of very low significance (Green) was identified by the licensee and is a violation of NRC requirements which meets the criteria of the NRC Enforcement Policy, for being dispositioned as an NCV.

10 CFR 50, Appendix B, Criterion III requires, in part, that “measures shall be established to assure that applicable regulatory requirements and the design basis for those SSCs are correctly translated into specifications, drawings, procedures, and instructions.” Contrary to the above, on January 27, 2015, the licensee discovered that abnormal procedure, 0-AP-37.01, “Abnormal Environmental Conditions,” used when there is a tornado watch or warning declared for Surry County or when hurricane force winds are expected in Surry County within 36 hours, did not have specific steps to shut the four total sliding missile shield doors on the Unit 1 and Unit 2 MSVHs. The shields are necessary to meet the design function of the MSVH for protection of the equipment inside the MSVH which includes the AFW pumps and other safety-related components in the main steam and AFW systems. This issue was discovered during a procedure revision walk-through.

Using IMC 0609.04, Initial Characterization of Findings, Table 2, dated June 19, 2012, and IMC 0609 Appendix A, “Significance Determination Process for Findings at-Power,” dated June 19, 2012, the inspectors determined that a detailed risk evaluation was required because the finding could involve the total loss of any safety function, identified by the licensee through probability risk analysis (PRA) that contributes to external event initiated core damage accident sequences (i.e., severe weather event).

A detailed risk assessment was performed by a regional SRA in accordance with NRC IMC 0609 Appendix A using the NRC Surry SPAR model. The major analysis assumptions included: a one year exposure period, the performance deficiency was modelled as a non-recoverable weather-related loss of offsite power (LOOP) with the Station Blackout DG and all AFW pumps on one unit failed, damage assumed if F2-F5 tornado winds occurred within the 100 square mile radius including the site, and no recovery credit for AFW or for closing the missile shield doors prior to damage. The dominant sequence was a success of the reactor protection system and the electric power system, late failure of AFW and failure of feed and bleed. The risk was mitigated by the low frequency of events requiring use of the sliding missile shields and the remaining mitigation equipment including the AFW unit cross-tie. The result of the risk evaluation was an increase in core damage frequency of $<1.0E-6$ /year, a GREEN finding of very low safety significance. This issue was entered into the licensee’s CAP as CR 570365 and the abnormal procedure 0-AP-37.01 was revised with the correct operator actions.

ATTACHMENT: SUPPLEMENTARY INFORMATION

SUPPLEMENTARY INFORMATION

KEY POINTS OF CONTACT

Licensee Personnel

L. Baker, Training Manager
D. Cobb, Manager, Nuclear Oversight
B. Day, Manager, Nuclear Design Engineering
N. Dodenhoff, Supervisor, Electrical Design Engineering
J. Eggart, Manager, Radiation Protection & Chemistry
B. Garber, Supervisor, Station Licensing
M. Haduck, Manager, Outage and Planning
R. Herbert, Manager, Engineering Systems and Components
D. Herring, Supervisor, Electrical Systems Engineering
R. Johnson, Manager, Operations
L. Lane, Site Vice President
D. Lawrence, Director, Station Safety and Licensing
T. Rawls, Acting Manager, Nuclear Protective Services
J. Rosenberger, Director, Station Engineering
R. Scanlan, Manager, Maintenance
R. Simmons, Plant Manager
M. Smith, Manager, Nuclear Organizational Effectiveness
N. Turner, Manager, Emergency Preparedness

LIST OF ITEMS OPENED, CLOSED AND DISCUSSED

Opened and Closed

05000280, 281/2015003-01	FIN	Charging Pump Cubicle Floor Drain Backflow Preventer Failures during Unit 1 Safeguards Building Flooding (Section 1R12)
05000280, 281/2015003-02	NCV	Failure to Follow Procedure during Maintenance Results in Service Water Header Inoperability (Section 4OA3)
05000280, 281/2015003-03	NCV	Failure to Verify Adequacy of Class 1E 125VDC Branch Circuit Breaker Design (Section 4OA5)

Closed

05000-280, 281/2014-001-00	LER	Closed Service Water Valve Results in Exceeding Technical Specifications (Section 4OA3)
05000-280, 281/2015-001-00	LER	Inadequate Missile Protection Due to Failure to Procedurally Control Sliding Missile Shields (Section 4OA3)

Attachment

TI 2515/190	TI	Inspection of the Proposed Interim Actions Associated with Near-Term Task Force Recommendation 2.1 Flooding Hazard Evaluations (Section 4OA5.1)
05000280, 281/2014007-03	URI	Adequacy of Class 1E 125VDC Branch Circuit Breaker Design (Section 4OA5.2)

LIST OF DOCUMENTS REVIEWED

Section 1R01: Adverse Weather Protection

Procedures

0-AP-37.01, Abnormal Environmental Conditions, Rev. 67

0-OP-ZZ-021, Severe Weather Preparation, Rev. 11

Condition Reports (* NRC Identified)

1001091 1007650 *1007804

Drawings

11448-FC-12A, Miscellaneous Foundations, Rev. 3

11448-FV-34A, Refueling Water Storage Tank, CS-TK-1, Rev. 5

Other Documents

CALC-ZZZ-02071.1910-M-1, Turbine Building Flood Volume and Operator Response Time, 6/30/92

CALC-ZZZ-12496.17, Flooding Capacity of Auxiliary Building at Surry Power Station, 11/14/74
Dominion Letter 15-107A, VEPCO (Dominion) Surry Power Station Units 1 and 2 Flood Hazard
Reevaluation Report Audit Preparation Documents, 6/11/15

Engineering Eval 14-E15, Dominion Flooding Hazard Reevaluation Report for Surry Power
Station Units 1 and 2, Rev. 1

LA006002, LC001373: 15-107, Flood Hazard Reevaluation Report, 3/09/15

SU-CALC-CIV-14-221, Local Intense Precipitation Flooding Using Site Specific Precipitation
Information – Surry Power Station, Rev. 0

Section 1R04: Equipment Alignment

Procedures

0-OP-EG-001A, EDG 3 System Alignment, Rev. 15

0-OP-SW-002A, Emergency Service Water System Alignment, Rev.9

1-OP-51.5A, Charging Pump CC & SW Systems Valve Alignment, Rev. 20

2-OP-51.5A, Charging Pump CC & SW Systems Valve Alignment, Rev. 16

2-OP-CH-001A, CVCS System Alignment, Rev. 22

2-OP-EG-001A, EDG 2 System Alignment, Rev. 13

Condition Reports (*NRC Identified)

*1001532 *1002002 *1002877 *1002913 *1003021 *1005949

*1006611 *1007204 *1010579 *1010711

Drawings

11448-FB-038A SH 2, Flow/Valve Operating Numbers Diagram Fuel Oil Lines
System Unit 1, Rev. 49

11448-FB-038A SH 4, Flow/Valve Operating Numbers Diagram Fuel Oil Lines
System Unit 1, Rev. 3

11448-FM-071A SH 1, Flow/Valve Operating Numbers Diagram Circulating and Service Water
System Unit 1, Rev. 80

11448-FM-071B SH 1, Flow/Valve Operating Numbers Diagram Circulating and Service Water
System Unit 1, Rev. 60

11448-FM-071E SH 1, Flow/Valve Operating Numbers Diagram Service Water Fuel Oil System Unit 1, Rev. 12

11548-FM-088B SH 2, Flow/Valve Operating Numbers Diagram Chemical and Volume Control System Unit 2, Rev. 44

Section 1R05: Fire Protection

Procedures

0-FS-FP-115, Mechanical Equipment Room #3 – Elevation 9 FT – 6 Inches, Rev. 2

0-FS-FP-121, Diesel Generator Room Number 1 Elevation 27 Feet – 6 Inches, Rev. 2

0-FS-FP-173, Charging Pump Service Water Pump Room (MER 4) Elevation 9 Feet – 6 Inches, Rev. 1

0-LSP-FP-045, Fire Extinguisher Annual Maintenance, Rev. 2

2-FS-FP-101, Unit 2 Cable Vault Penetration Area Elevation 15 Feet – 0 Inches, Rev. 4

2-FS-FP-107, Unit 2 Emergency Switchgear Room Elevation 9 Feet – 6 Inches, Rev. 3

2-FS-FP-108, Unit 2 Relay Room Elevation 9 Feet – 6 Inches, Rev. 3

2-FS-FP-110, Battery Room 2B Elevation 9 Feet – 6 Inches, Rev. 3

Condition Reports

582627 1004588

Drawings

11448-FM-071B SH 1, Flow/Valve Operating Numbers Diagram Circulating and Service Water System, Rev. 60

11448-FAR-206 SH 6, Equipment Location – Appendix 'R' Service Building Part Plan – EL. 27' – 0", Rev. 8

11448-FAR-206 SH 8, Equipment Location – Appendix 'R' Service Building Part Plan – EL. 9' – 6", Rev. 22

Other Documents

RAS000279, Document Functionality of LPCO2 with Master Pilot Valve Deficiency, Rev. 0

Section 1R11: Licensed Operator Regualification Program

Procedures

1-AP-24.01, Large SG Tube Leak, Rev. 37

1-E-0, Reactor Trip or Safety Injection, Rev. 71

1-E-1, Loss of Reactor or Secondary Coolant, Rev. 43

1-E-2, Faulted Steam Generator Isolation, Rev. 20

1-E-3, Steam Generator Tube Rupture, Rev. 51

Section 1R12: Maintenance Effectiveness

Procedures

0-MCM-0102-04, Disassemble and Assemble Three Stage N-9000 Seal Cartridge, Rev. 8

0-MCM-0102-06, Three Stage N-9000 Seal Cartridge Removal and Installation, Rev. 7

0-MPM-1900-02, Flood Protection Floor Drain Back Water Stop Valve Replacement, Rev. 14

1-AP-9.00, RCP Abnormal Conditions, Rev. 36

SPAP-0504, Technical Procedure Writers Guide, Rev. 9

Condition Reports

092679	580231	580232	580233	580234	580235
580236	580237	580238	580239	580240	580241
580242	580495	580496	581034	581039	581101
581188	581770	582023	583107	1005849	1004996

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1005655	1009742				

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580237	580238	580239	580240	580241	580242
580495	580496	581034	581039	581101	581188
581770	582023	583107	1001385	1002302	1002357

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566801 1002302 1004390 1009996 1009999 1010004
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38103638334 38103644329

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1001385	1002166	1002289	1002302	1002389	1002404
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1003260	1003262				

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LIST OF ACRONYMS

AC	Alternating Current
ACE	Apparent Cause Evaluation
ADAMS	Agencywide Document Access and Management System
AFW	Auxiliary Feedwater
ASME	American Society of Mechanical Engineers
BFP	Back Flow Preventer
CA	Corrective Action
CC	Component Cooling
CAP	Corrective Action Program
CDF	Core Damage Frequency
CFR	Code of Federal Regulations
CH	Charging
CLS	Consequence Limiting System
CR	Condition Report
CVCS	Chemical and Volume Control System
DC	Direct Current
EDG	Emergency Diesel Generator
ESF	Engineered Safety Feature
EP	Emergency Preparedness
ESGR	Emergency Switchgear Room
ESW	Emergency Service Water
EWR	Engineering Work Request
FIN	Finding
GPM	Gallons per Minute
IPE	Individual Plant Examination
ISFSI	Independent Spent Fuel Storage Installation
IMC	Inspection Manual Chapter
IST	In-Service Test
LCO	Limiting Condition for Operation
LER	Licensee Event Report
LHSI	Low Head Safety Injection
LOOS	Loss of Offsite Power
MCR	Main Control Room
MCCB	Molded Case Circuit Breaker
MDAFW	Motor Driven Auxiliary Feedwater
MER	Machinery Equipment Room
MOV	Motor Operated Valve
MS	Main Steam
MSPI	Mitigating System Performance Index
MSVH	Main Steam Valve House
NCV	Non-cited Violation
NEI	Nuclear Energy Institute
NRC	Nuclear Regulatory Commission
NRR	Nuclear Reactor Regulation
PARS	Publicly Available Records
PD	Performance Deficiency
PI	Performance Indicator

PMT	Post Maintenance Test
PORV	Power Operated Relief Valve
PRA	Probability Risk Assessment
PT	Performance Test
PZR	Pressurizer
QCE	Quick Cause Evaluation
RCE	Root Cause Evaluation
RCP	Reactor Coolant Pump
RCS	Reactor Coolant System
RFO	Refueling Outage
RWST	Refueling Water Storage Tank
RTP	Rated Thermal Power
SDP	Significance Determination Process
SG	Steam Generator
SI	Safety Injection
SRA	Senior Reactor Analyst
SSC	System, Structure, or Component
SW	Service Water
TCC	Time Current Curve
TI	Temporary Instruction
TS	Technical Specifications
UFSAR	Updated Final Safety Analysis Report
UL	Underwriters Laboratory
URI	Unresolved Item
VDC	Volt Direct Current
VEPCO	Virginia Electric and Power Company
WO	Work Order