



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

October 4, 2012

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

SUBJECT: SURRY POWER STATION – NRC TRIENNIAL FIRE PROTECTION  
INSPECTION REPORT NOS. 05000280/2012011 AND 05000281/2012011

Dear Mr. Heacock:

On August 24, 2012, the U.S. Nuclear Regulatory Commission (NRC) completed an inspection at your Surry Power Station, Units 1 and 2. The enclosed inspection report documents the inspection results, which were discussed with Mr. R. Johnson, Surry Power Station Manager of Operations, and other members of your staff on August 24, 2012. Subsequently, additional in-office reviews were conducted and the final inspection results were discussed by telephone with Mr. F. Mladen, Director Station Safety and Licensing, and other members of your staff on September 12, 2012.

The inspection examined activities conducted under your license as they related to safety and compliance with the Commission's rules and regulations and with the conditions of your license. The inspectors reviewed selected procedures and records, observed activities, and interviewed personnel.

No NRC-identified or self-revealing findings were identified during this inspection. However, a licensee-identified violation which was determined to be of very low safety significance is listed in this report. The NRC is treating this violation as a non-cited violation (NCV) consistent with Section 2.3.2 of the NRC Enforcement Policy. If you contest this NCV, 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 20555-001; 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.

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 Website at <http://www.nrc.gov/reading-rm/adams.html> (the Public Electronic Reading Room).

Sincerely,

**/RA/**

Michael F. King, Chief  
Engineering Branch 2  
Division of Reactor Safety

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

Enclosure:  
Inspection Report 05000280/2012011, 05000281/2012011  
w/Attachment: Supplemental Information

cc: See page 3

NRC's document system (ADAMS). ADAMS is accessible from the NRC Website at <http://www.nrc.gov/reading-rm/adams.html> (the Public Electronic Reading Room).

Sincerely,

/RA/

Michael F. King, Chief  
Engineering Branch 2  
Division of Reactor Safety

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

Enclosure:  
Inspection Report 05000280/2012011, 05000281/2012011  
w/Attachment: Supplemental Information

cc: See page 3

☒ PUBLICLY AVAILABLE

☐ NON-PUBLICLY AVAILABLE

☐ SENSITIVE

☒ NON-SENSITIVE

ADAMS:x ☐ Yes

ACCESSION NUMBER: \_\_\_\_\_

☒ SUNSI REVIEW COMPLETE ☐ FORM 665 ATTACHED

OFFICE	RII:DRS	RII:DRS	RII:DRS	RII:DRS	RII:DRS	RII:DRP	RII:
SIGNATURE	RA	RA	RA	RA	RA	RA	
NAME	G. Wiseman	M. Thomas	R. Fanner	L. Dymek	M. King	G. McCoy	
DATE	10/ 3 /2012	10/ 1 /2012	10/ 4/ 2012	10/3 /2012	10/ /2012	10/ 2 /2012	
E-MAIL COPY?	YES NO	YES NO	YES NO	YES NO	YES NO	YES NO	YES NO

OFFICIAL RECORD COPY DOCUMENT NAME: S:\DRS\ENG BRANCH 2\REPORTS\SURRY\INSPECTION  
REPORTS\TFPI REPORT 2012-011\SURRY 2012\_011 TFPI INSPECTION REPORT.DOCX

cc:

Larry Lane  
Site Vice President  
Surry Power Station  
Virginia Electric and Power Company  
Electronic Mail Distribution

B. L. (Sonny) Stanley  
Director, Nuclear Safety and Licensing  
Virginia Electric and Power Company  
Electronic Mail Distribution

Kenny B. Sloane  
Plant Manager  
Surry Power Station  
Virginia Electric & Power Company  
Electronic Mail Distribution

Lillian M. Cuoco, Esq.  
Senior Counsel  
Dominion Resources Services, Inc.  
Electronic Mail Distribution

Tom Huber  
Director, Nuclear Licensing & Operations  
Support  
Innsbrook Technical Center  
Electronic Mail Distribution

Virginia State Corporation Commission  
Division of Energy Regulation  
P.O. Box 1197  
Richmond, VA 23209

Attorney General  
Supreme Court Building  
900 East Main Street  
Richmond, VA 23219

Senior Resident Inspector  
Surry Power Station  
U.S. Nuclear Regulatory Commission  
5850 Hog Island Rd  
Surry, VA 23883

Michael M. Cline  
Director  
Virginia Department of Emergency Services  
Management  
Electronic Mail Distribution

Letter to David A. Heacock from Michael F. King dated October 4, 2012.

SUBJECT:     SURRY POWER STATION – NRC TRIENNIAL FIRE PROTECTION  
              INSPECTION REPORT NOS. 05000280/2012011 AND 05000281/2012011

Distribution:

RIDSNRRDIRS

PUBLIC

RidsNrrPMSurry Resource

**U. S. NUCLEAR REGULATORY COMMISSION**

**REGION II**

Docket Nos.: 50-280, 50-281

License Nos.: DPR-32, DPR-37

Report Nos.: 05000280/2012011 and 05000281/2012011

Licensee: Virginia Electric and Power Company

Facility: Surry Power Station, Units 1 and 2

Location: 5850 Hog Island Road  
Surry, VA 23883

Dates: July 30 – August 3, 2012 (Week 1)  
August 20-24, 2012 (Week 2)

Inspectors: G. Wiseman, Senior Reactor Inspector (Lead Inspector)  
M. Thomas, Senior Reactor Inspector  
R. Fanner, Reactor Inspector  
J. Dymek, Reactor Inspector

Approved by: Michael F. King, Chief  
Engineering Branch 2  
Division of Reactor Safety

Enclosure

## **SUMMARY OF FINDINGS**

IR 05000280/2012011, 05000281/2012011; 07/30 – 08/03/2012 and 08/20 - 24/2012; Surry Power Station, Units 1 and 2; Triennial Fire Protection Inspection

This report covers an announced two-week triennial fire protection inspection by a team of four regional inspectors. The NRC's program for overseeing the safe operation of commercial nuclear power reactors is described in NUREG-1649, "Reactor Oversight Process" Revision 4, dated December 2006.

A. NRC-Identified and Self-Revealing Findings

No findings were identified.

B. Licensee Identified Violations

A violation of very low safety significance that was identified by the licensee has been reviewed by the inspectors. Corrective actions taken or planned by the licensee have been entered into the licensee's corrective action program (CAP). The violation is described in Section 4OA7 of this report.

## REPORT DETAILS

### 1. REACTOR SAFETY

Cornerstones: Initiating Events, Mitigating Systems, Barrier Integrity

#### 1R05 Fire Protection

This report documents the results of a triennial fire protection inspection of the Surry Power Station (SPS), Units 1 and 2. The inspection was conducted in accordance with the guidance provided in NRC Inspection Procedure (IP) 71111.05T, "Fire Protection (Triennial)," dated October 28, 2011. The objective of the inspection was to review a minimum sample of three risk-significant fire areas (FAs) to evaluate implementation of the fire protection program (FPP) as described in the SPS Updated Final Safety Analysis Report (UFSAR) and Appendix R Fire Protection Report (FPR), Units 1 and 2; and to review site specific implementation of at least one mitigating strategy from Section B.5.b of NRC Order EA-02-026, "Order for Interim Safeguards and Security Compensatory Measures" (commonly referred to as B.5.b), as well as the storage, maintenance, and testing of B.5.b mitigating equipment. The sample FAs were chosen based on a review of available risk information as analyzed by a senior reactor analyst from Region II, a review of previous inspection results, plant walk-downs of FAs, consideration of relational characteristics of combustible material to targets, and location of equipment needed to achieve and maintain safe shutdown (SSD) of the reactor. In selecting a B.5.b mitigating strategy sample, the inspectors reviewed licensee submittal letters, safety evaluation reports (SERs), licensee commitments, B.5.b implementing procedures, and previous NRC inspection reports (IRs). Section 71111.05-02 of the IP specifies a minimum sample size of three FAs and one B.5.b implementing strategy for addressing large fires and explosions. This inspection fulfilled the requirements of the procedure by selecting a sample of four FAs and one B.5.b mitigating strategy. The FAs chosen were identified as follows:

1. Fire Area FA-3, Unit 1 emergency switchgear room (ESGR) and relay room
2. Fire Area FA-13, Unit 1 normal switchgear room
3. Fire Area FA-31, Turbine building, northeast sector
4. Fire Area FA-46, Unit 1 cable spreading room

For each of the selected fire areas, the inspectors evaluated the licensee's FPP against the applicable NRC requirements and design basis documents. Applicable design basis documents reviewed by the team are listed in the Attachment to this report.

#### .01 Protection of Safe Shutdown Capabilities

##### a. Inspection Scope

For the selected FAs, the inspectors performed physical walk-downs to observe: (1) the material condition of fire protection systems and equipment; (2) the storage of permanent and transient combustibles; (3) the proximity of fire hazards to cables relied upon for SSD; and (4) the licensee's implementation of procedures and processes for



limiting fire hazards, housekeeping practices, and compensatory measures for inoperable or degraded fire protection systems and credited fire barriers.

### Methodology

Cable routing information by FA was reviewed for a selected sample of SSD components to verify that the associated cables would not be damaged by a fire in the selected fire areas or the licensee's analysis determined that the fire damage would not prohibit safe plant shutdown. The inspectors reviewed the SPS FPR for the selected FAs and compared it to the fire contingency action (FCA) procedures, emergency procedures, and abnormal procedures to verify that cables and equipment credited for post-fire SSD in the FPR and applicable procedures were adequately protected from fire damage in accordance with the requirements of 10 CFR 50, Appendix R, Section III.G, "Fire Protection of Safe Shutdown Capability." In cases where local operator manual actions (OMAs) were credited in-lieu of cable protection of SSD equipment, the inspectors reviewed the OMAs to verify that the OMAs were feasible utilizing the guidance of NRC IP 71111.05T, paragraph 02.02.j.2. A list of SSD components examined for cable routing is included in the Attachment.

### Operational Implementation

The inspectors reviewed applicable sections of FCA procedures, emergency procedures, and abnormal procedures to verify that the shutdown methodology properly identified the systems and components necessary to achieve and maintain SSD conditions. The inspectors performed a walk-through of the FCA procedure steps to ensure the implementation and human factors adequacy of the procedures. The inspectors verified that licensee personnel credited for procedure implementation had procedures available, were trained on implementation, and were available in the event a fire occurred. The inspectors also reviewed selected operator actions to verify that the operators could reasonably be expected to perform the specific actions within the time required to maintain plant parameters within specified limits.

#### b. Findings

No findings were identified.

### .02 Passive Fire Protection

#### a. Inspection Scope

For the selected FAs, the inspectors evaluated the adequacy of fire barrier walls, ceilings, floors, mechanical and electrical penetration seals, fire doors, and fire dampers. The inspectors walked down accessible portions of the selected FAs to observe material condition of the passive barriers and to identify any potential degradation or non-conformance. The inspectors compared the installed configurations to the approved construction details and supporting fire endurance test data to assure the respective fire barriers met the requirements of 10CFR50, Appendix R, Section III.G and Appendix A to BTP APCSB 9.5-1. In addition, the inspectors reviewed licensing basis documentation to verify that passive fire protection features met license commitments. Also, a sample of completed surveillance and maintenance procedures for selected fire doors, fire dampers, and penetration seals were reviewed to ensure that these passive fire barriers

were being properly inspected and maintained. The fire protection features included in the review are listed in the Attachment.

b. Findings

No findings were identified.

.03 Active Fire Protection

a. Inspection Scope

For the selected FA's, the inspectors performed in-plant observations of the material condition and operational lineup of fire water storage tanks, diesel and electric motor-driven fire pumps and fire protection water supply distribution piping, including manual fire hose and standpipe systems and sprinklers. Using operating and valve alignment procedures as well as engineering drawings, the inspectors examined selected fire pumps and accessible portions of the fire main piping system to evaluate operational status, consistency of as-built configurations with engineering drawings, and to verify correct system valve lineups.

Automatic carbon dioxide (CO<sub>2</sub>) gaseous fire extinguishing systems were inspected in conjunction with the associated heat and smoke detection systems for the Unit 1 normal switchgear room (FA-13) and Unit 1 cable spreading room, (FA-46) respectively. The inspectors reviewed the CO<sub>2</sub> systems' vendor equipment specifications and drawings and engineering calculations to determine whether the fire detection and suppression methods were appropriate for the types of fire hazards that exist in the selected FAs.

The inspectors compared the fire detection and fire suppression systems to the applicable National Fire Protection Association (NFPA) Standard(s) by reviewing design documents and observing their as-installed configurations as part of performing the in-plant walkdowns. The manually actuated Halon system installed in the Unit 1 ESGR and relay room (FA-3) was also reviewed. The inspectors reviewed completed periodic surveillance, testing and maintenance program procedures for the fire detection and suppression systems and compared them to the testing and maintenance requirements of the SPS FPP and Technical Requirements Manual (TRM). This review was to assess whether the test program was sufficient to validate proper operation of the fire detection and suppression systems in accordance with their design requirements.

For the selected FAs, the inspectors compared fire fighting pre-plan strategies to existing plant layout and equipment configuration and to fire response procedures. The inspectors also assessed the condition of fire fighting and smoke control equipment by inspecting equipment located at fire brigade staging and dress out areas. In addition, the inspectors evaluated fire brigade staffing, qualification and training, and conducted a review of applicable drill records for the past five years. "Letters of Agreement" and "Invitations to Participate" with off-site emergency responders were also reviewed.

b. Findings

No findings were identified.

.04 Protection From Damage From Fire Suppression Activities

a. Inspection Scope

The inspectors evaluated whether manual water-based fire fighting activities or installed manual Halon 1301 or automatic CO<sub>2</sub> gaseous fire extinguishing systems for the selected FAs could adversely affect equipment credited for SSD, inhibit access to alternate shutdown equipment, or adversely affect local operator actions required for SSD. The inspectors reviewed documentation related to flooding analysis from fire protection activities as well as potential flooding through unsealed concrete floor cracks. The inspectors reviewed SPS evaluations addressing concerns identified in Information Notice (IN) 1988-060, Inadequate Design and Installation of Watertight Penetration Seals and IN 2003-030 Unanalyzed Internal Flooding Events and Inadequate Design. Fire Strategies (Pre-Fire Plans); Fire Brigade Training Procedures; heating, ventilating and air conditioning (HVAC) drawings; and, Fire Abnormal Operating Procedures were also reviewed to verify that inter-area migration of water or ventilation of gaseous fire extinguishing agents or heat and smoke was addressed and would not adversely affect SSD equipment or the performance of operator manual actions.

b. Findings

No findings were identified.

.05 Alternative Shutdown Capabilities

a. Inspection Scope

Methodology

For a postulated fire in FA-3, Unit 1 ESGR and relay room (ESGR-1), the licensee credited alternative shutdown capability (the capability to achieve SSD outside the main control room (MCR), a requirement for areas where redundant trains of equipment required for hot shutdown were located in the same FA and may be subject to damage from a single fire, from fire suppression activities, or from the rupture or inadvertent operation of fire suppression systems). The inspectors reviewed UFSAR Section 9.10, the SPS FPR, and corresponding FCA procedures to ensure that appropriate controls provided reasonable assurance that alternative shutdown equipment remained operable, available, and accessible when required. In cases where local OMAs were credited in lieu of cable protection of SSD components, the inspectors performed a walk-through of the procedures to verify that the OMAs were feasible. Reviews also included verification that alternative shutdown could be accomplished with or without offsite power. The inspectors reviewed the licensee's credited SSD capability for transferring control to an alternate control station, if needed for a fire in the chosen area. The inspectors reviewed the licensee's safe shutdown analysis (SSA) specified in the SPS FPR and the corresponding procedures. The inspectors reviewed a sample list of credited components specified in 1-FCA-4.00, "Limiting Emergency Switchgear Room (ESGR) Number 1 Fire", to ensure the sample list was consistent with those stated in the analysis. In instances where components were specified by the procedure yet not in the analysis the inspectors performed a further review to determine if there was an impact to the SSD strategy.

The inspectors reviewed a sample of completed surveillance testing records to ensure the circuits credited for the alternate control stations were isolated based on transfer from the MCR.

#### Operational Implementation

The inspectors reviewed selected training materials for licensed and non-licensed operators to verify the training reinforced the shutdown methodology in the SPS FPR and FCAs for FA-3. The inspectors also reviewed shift turnover logs and shift manning to verify that personnel required for SSD using alternative shutdown systems and procedures were available onsite, exclusive of those assigned as fire brigade members.

The inspectors performed a walk-through of procedure steps with operations personnel to assess the implementation and human factors adequacy of the procedures and shutdown strategy, evaluate the expected ambient conditions, relative difficulty and operator familiarization associated with each OMA. The inspectors reviewed the systems and components credited for use during this shutdown method to verify that they would remain free from fire damage. The inspectors reviewed selected operator actions to verify that the operators could reasonably be expected to perform the specific actions within the time required to maintain plant parameters within specified limits.

#### b. Findings

No findings were identified.

### .06 Circuit Analyses

#### a. Inspection Scope

The inspectors reviewed the licensee's UFSAR, SPS FPR, system flow diagrams, post-fire procedures, operator training material, and applicable information to gain an understanding of the licensee's SSD strategy. The inspectors reviewed credited components specified in the FPR for meeting the SSD function. The inspectors reviewed cable routing information for credited components to determine if these components would be impacted by a fire within the chosen FAs. In instances where questions arose regarding potential fire induced circuit failures to cables, the inspectors performed a more detailed review by evaluating the credited resolution. The inspectors reviewed the licensee's single spurious evaluations specified in the circuit analysis to determine if the sample list of components challenged the assumptions made in the current analysis. The inspectors reviewed the licensee's electrical coordination study to determine if power supplies were susceptible to fire damage, which would potentially affect the credited components for the FAs chosen for review. The specific components reviewed are listed in the Attachment.

#### b. Findings

No findings were identified.

.07. Communications

a. Inspection Scope

The inspectors reviewed the licensee's UFSAR, SPS FPR, plant drawings, and applicable licensing submittals to ascertain the communications commitments for a fire event. The inspectors reviewed cable block diagrams associated with plant communication system to evaluate the availability of the communications systems credited to support plant personnel in fire event notification, fire brigade fire fighting activities, and in the performance of post-fire SSD procedures. The inspectors reviewed the routing information associated with these communications systems to verify that no fire affected damage occurred in the chosen FAs that would prohibit the ability to communicate between operators performing actions in response to the fire event. Additionally, the inspectors observed in-plant operational checks of radio equipment during FCA procedure walk downs to verify radio operation in selected locations.

b. Findings

No findings were identified.

.08. Emergency Lighting

a. Inspection Scope

The inspectors reviewed the UFSAR, SPS FPR, and FCA procedures to gain an understanding of the applicable components for which fixed emergency lighting units (ELUs) were needed in the event of a fire within the selected FAs. The inspectors performed plant walk down inspections with licensee staff of the corresponding FCA procedures to observe if the placement and coverage area of fixed 8-hour battery pack ELUs provided reasonable assurance of illuminating access and egress pathways and any equipment requiring local operation and/or instrumentation monitoring for post fire SSD.

The inspectors reviewed applicable surveillance and maintenance procedures for ELUs. The inspectors also reviewed completed maintenance records to ensure the equipment was being maintained consistent with licensee commitments. In this review, the inspectors verified that the battery power supplies were rated with at least an 8-hour capacity as required SPS FPP. The inspectors reviewed completed surveillance testing records to ensure adequate surveillance testing was being conducted to ensure continued reliable operation of the fixed emergency lights. Where failures were identified, the inspectors reviewed completed work orders (WOs) to verify that battery replacements or other repairs were completed. In addition, the inspectors reviewed the completed 8-hour discharge test records for a random sample of fixed emergency lights to verify they met the minimum rating of at least an eight-hour capacity.

b. Findings

No findings were identified.

.09 Cold Shutdown Repairs

a. Inspection Scope

The inspectors reviewed the SPS FPR and FCA procedures to verify that the licensee identified repairs needed to reach and maintain cold shutdown and had dedicated repair procedures, equipment, and materials to accomplish these repairs after a fire event assuming no offsite power was available.

The inspectors verified that the fire damage repair procedures were current and adequate and repair parts and equipment were being stored and maintained onsite. The inspectors toured the SPS Warehouse Appendix R Storage Aisle, where cold shutdown fire damage repair equipment, tools, cables, and Appendix R gang-boxes” were stored and examined the material condition of the tools and equipment stored in the designated storage area.

The licensee conducted annual inventories of the repair parts and equipment in accordance with the applicable attachments in electrical preventive maintenance procedure 0-EMP-2303-01, “RHR/CC Appendix R Equipment Inspection (Warehouse).” The inspectors reviewed the inventory inspection work order records for 2011-2012 and compared them to the equipment and tool list in 0-EMP-2303-01 to verify that all required replacement parts and equipment were being accounted for and were available for use. In addition, the inspectors reviewed instrument calibration records for 2012, and verified that instrumentation test equipment stored in the Appendix R gang-boxes had also been inventoried and checked for proper calibration.

b. Findings

No findings were identified.

.10 Compensatory Measures

a. Inspection Scope

The team reviewed the administrative controls for out-of-service, degraded and/or inoperable fire protection features (e.g. detection and suppression systems and passive fire barriers). The team reviewed selected items from the impairment list and compared them to the FAs selected for the inspection. The team also observed performance of a fire protection surveillance activity, including implementation of compensatory measures. The team observed continuous and roving fire watch personnel stationed in Turbine and Service Building(s) posted for a licensee identified Appendix R Section III.G. SSD fire protection barrier protection or spatial separation issue. The team reviewed the SPS Fire Protection LCO and Transient Combustible Permit Log for applicable activities performed on August 21, 2012, to determine programmatic requirements were being complied with.

b. Findings

No findings were identified.

.11 Review and Documentation of Fire Protection Program Changes

a. Inspection scope

The inspectors reviewed a sample of FPP changes made between July 2009 and August 2012 to assess the licensee's effectiveness and to determine if the changes to the FPP were in accordance with the fire protection license condition and had no adverse effect on the ability to achieve SSD.

b. Findings

No findings were identified

.12 Control of Transient Combustibles and Ignition Sources

a. Inspection Scope

The inspectors conducted tours of numerous plant areas that were important to reactor safety, including the selected FAs, 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," and CM-AA-FPA-101, "Control of Combustible and Flammable Materials." The inspectors verified that the licensee had properly evaluated in-situ combustible fire loads, limited transient fire hazards, controlled hot-work activities, and maintained general housekeeping consistent with administrative control procedures and the fire hazards analysis (FHA). For the selected FAs, the inspectors evaluated the fire event history, the potential for fires and explosions, and potential fire severity. The inspectors also discussed the assigned duties of roving, continuous, and hot work type fire watch personnel to determine that such duties would be accomplished in accordance with the licensee's administrative control procedures. There were no hot work activities ongoing during the inspection so direct observations of hot work related activities could not be performed.

b. Findings

No findings were identified

.13 B.5.b Inspection Activities

a. Inspection Scope

The inspectors reviewed, on a sample basis, the licensee's spent fuel pool external makeup mitigation measures for large fires and explosions to verify that the measures were feasible, personnel were trained to implement the strategy, and equipment was properly staged and maintained. The inspectors requested and reviewed inventory and maintenance records of required equipment. Through discussions with plant staff, review of documentation, and plant walk-downs, the inspectors verified the engineering basis to establish reasonable assurance that the makeup capacity could be provided using the specified equipment and water sources. The inspectors reviewed the licensee's capability to provide a reliable and available water source and the ability to provide the minimum fuel supply to the portable pumping equipment. The inspectors

performed a walk-down of the storage and staging areas for the B.5.b equipment to verify that equipment identified for use in the current procedures were available, calibrated and maintained. In the presence of licensee staff, the inspectors conducted an independent audit and inventory of required equipment and a visual inspection of the dedicated credited power and water sources. The inspectors reviewed training records of the licensee's staff to verify that operator training/familiarity with the strategy objectives and implementing guidelines were accomplished according to the established training procedures. The inspectors verified, by review of records and physical inspection, that B.5.b equipment was currently being properly stored, maintained, and tested in accordance with the licensee's B.5.b program procedures.

b. Findings

No findings were identified.

**4. OTHER ACTIVITIES**

4OA2 Identification and Resolution of Problems

a. Inspection Scope

The inspectors reviewed recent independent licensee audits for thoroughness, completeness and conformance to FPP requirements. Specifically, fire protection system health reports and Dominion Nuclear Oversight Fire Protection Quality Assurance Program audit reports for 2009 and 2012 were reviewed. In addition, other corrective action program (CAP) documents, including completed corrective actions documented in selected condition reports (CRs) were reviewed to verify that industry-identified fire protection problems potentially or actually affecting the plant were appropriately entered into, and resolved by, the CAP process. The CRs were reviewed with regard to the attributes of timeliness and apparent cause determination to ensure that proposed corrective actions addressed the apparent cause, reportability and operability determination.

4OA6 Meetings, Including Exit

On August 24, 2012, the lead inspector presented the preliminary inspection results to Mr. R. Johnson, SPS Manager of Operations and other members of the licensee's staff. The licensee acknowledged the results. The lead inspector informed the licensee that proprietary information would not be included in this IR, although none was identified. Following completion of additional reviews in the Region II office, another exit meeting was held by telephone with Mr. F. Mladen, Director Station Safety and Licensing, and other members of the licensee's staff on September 12, 2012, to provide an update on changes to the preliminary inspection findings. The licensee acknowledged the findings.

4OA7 Licensee-Identified Violation

The following violation of very low safety significance 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 a Non-Cited Violation (NCV).



10 CFR Part 50.48(b)(1) requires that all nuclear power plants licensed to operate prior to January 1, 1979, must satisfy the applicable requirements of 10 CFR Part 50, Appendix R, Section III.G. Appendix R, Section III.G.2, requires that where redundant trains of equipment necessary to achieve and maintain hot shutdown are located in the same fire area outside of primary containment, one of three means of protecting cables to ensure that one of the redundant trains is maintained free of fire damage shall be provided. The three acceptable methods described in Appendix R, Section III.G.2 for maintaining one of the redundant trains in the same fire area free of fire damage are based on the use of physical barriers, spatial separation, and fire detection and an automatic fire suppression system. Appendix R, Section III.G.2, does not allow the use of operator manual actions in lieu of protection.

Contrary to the above requirements, during walk downs on March 22, 2012, the licensee identified that power and control cables for 1-SW-P-10A and 1-SW-P-10B, redundant trains of charging pump service water pumps, were routed through the turbine building (FA-31) in close proximity to each other and they did not meet the fire protection requirements of 10 CFR Part 50, Appendix R, Section III.G.2. This violation was determined to be of very low safety significance based on the results of the Inspection Manual Chapter 0609, Appendix F, "Fire Protection Significance Determination Process," Phase 2 quantitative screening evaluation performed by a regional fire protection engineer and a senior reactor analyst. The significance determination process screening evaluation resulted in a delta core damage frequency ( $\Delta$ CDF) of  $< 1\text{E-}6$ . Therefore, this finding was determined to be of very low safety significance (Green). This issue was identified in the licensee's corrective action program as Condition Report CR 467396.

ATTACHMENT: SUPPLEMENTAL INFORMATION

## **SUPPLEMENTAL INFORMATION**

### **KEY POINTS OF CONTACT**

#### Licensee Personnel

J. Ashley, Licensing Engineer  
L. Black, Supervisor, Outage Support  
D. Criswell, Security Supervisor  
R. Dillard, Appendix R Coordinator  
J. Eggart, Manager, Radiation Protection & Chemistry  
B. Garber, Supervisor, Station Licensing  
G. Hayes, Manager, Protection Services  
J. Henderson, Manager, Engineering  
R. Johnson, Manager, Operations  
F. Mladen, Director Station Safety and Licensing  
C. Olsen, Manager, Site Engineering  
T. Rawls, Supervisor, Security Training  
J. Rosenberger, Manager, Engineering Programs  
M. Smith, Manager, Nuclear Oversight  
J. Warren, Supervisor Engineering Programs

#### NRC Personnel

J. Nadel, Resident Inspector, Surry Power Station Units 1 & 2

### **LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED**

#### Opened

None

#### Opened and Closed

None

#### Discussed

None

**List of Fire Barrier Features Inspected**  
**(Refer to Report Section 1RO5.02-Passive Fire Barriers)**

<b><u>Barrier Identification</u></b>	<b><u>Description</u></b>
<b><u>Fire Door</u></b>	
1BS-DR40	Separating FA13 and FA31
1BS-DR41	Separating FA13 and FA31
1BS-DR42	Separating FA13 and FA14
1BS-DR46	Separating FA46 and FA31
1STR-RSD1	Separating FA36B and FA36B
<b><u>Fire Damper</u></b>	
1VS-FDMP33	Separating FA36B and FA36B
1VS-FDMP34	Separating FA36B and FA36B
<b><u>Fire Barrier Penetration Seal</u></b>	
01FP-FBAR-009ESGR06	Separating FA3 and FA31
01FP-FBAR-009BTR01	Separating FA9 and FA3
01FP-FBAR-009BTR01	Separating FA10 and FA3
<b><u>Flood Protection Dike (Fire Suppression Effects)</u></b>	
1BS-DR-25	FA3, ESGR
1BS-DR-26	FA3, ESGR
1BS-DR-27	FA3, ESGR
<b><u>Wall, Ceiling, Floor Identification</u></b>	
Floor, wall and ceiling construction	FA 3, ESGR
Floor and wall construction	FA13, Normal Switchgear Room
Floor, wall and ceiling construction	FA 46 Cable Spread Room

## **LIST OF COMPONENTS REVIEWED**

**(Refer to Report Sections 1RO5.05-Alternative Shutdown Capability and 1RO5-.06-Circuit Analysis)**

### **Valves**

1-CH-HCV-1137, Excess Letdown Flow  
1-CH-MOV-1115B, D Charging Pump Suction from RWST  
1-CH-MOV-1287A, Charging Pump Discharge to Alternate Charging Header  
1-CH-LCV-1460A, Letdown Isolation  
1-FW-MOV-160A & B, AFW Cross-connect valves  
1-MS-PCV-102B, Steam Supply to AFW Pump Turbine  
1-RC-PCV-1455C, Pressurizer PORV  
1-RC-MOV-1536, Pressurizer Block Valve

### **Pump Motors**

1-CH-P-1A, Charging Pump  
1-CH-P-1B, Charging Pump  
1-FW-P-3A, Motor Driven AFW Pump "A" Train  
1-FW-P-3B, Motor Driven AFW Pump "B" Train

### **Process Instruments**

1-FW-LI-487A, Steam Generator "B" Wide Range Level  
1-RC-LI-459A, Wide Range Pressurizer Level Indication  
1-LT-1459A, Wide Range Pressurizer Level Transmitter  
1-LT-1461, Pressurizer Level Transmitter

## LIST OF DOCUMENTS REVIEWED

### Procedures

CM-AA-ETE-101, Engineering Technical Evaluations, Rev. 0  
CM-AA-FPA-100, Fire Protection / Appendix R Program, Rev. 5  
CM-AA-FPA-101, Control of Combustibles and Flammable Materials, Rev.4  
CM-AA-FPA-102, Fire Protection and Safe Shutdown Review and Preparation Process and Design Change Process, Rev. 3  
LFFG0, Command and Control, Rev. 1  
LFFG1, Operations Response, Rev. 3  
LFFG2, TSC Response, Rev. 9  
0-AP-48.00, Fire Protection – Operations Response, Rev. 21  
0-AP-48.00, Fire Protection - Operations Response, Rev. 26  
0-DRP-049, Time Critical Operator Actions, Rev. 10  
0-ECM-1401-02, Emergency Power to Residual Heat Removal Motors, Rev. 5  
0-ECM-1401-04, Emergency Installation of Component Cooling Water Motors, Rev. 5  
0-EPM-0105-01, Appendix R ELT Eight Hour Duration Test, Rev. 13  
0-EPM-2303-01, RHR/CC Appendix R Equipment Inspection (Warehouse), Rev. 9  
0-FCA-10.00, Establishing Communications, Rev. 5  
0-FCA-11.00, Remote Monitoring, Rev. 5  
0-FCA-14.00, Establishing Stable RCS Makeup Flowpaths, Rev. 9  
0-FCA-17.00, Limiting Fire Cooldown, Rev. 32  
0-FS-FP-300, Large Loss Fire Strategy, Rev. 8  
0-LPT-FP-001, Fire Doors/Fire Dampers/CO2 Dampers, Rev.14  
0-LSP-FP-050, Inventory of NRC Order EA-02-026 B.5.b Equipment, Rev. 5  
0-OPT-FP-002, Fire Protection Valve Position Surveillance Inside Protected Area, Rev.14  
0-OPT-FP-005, Motor Driven Fire Protection Water Pump 1-FP-P-1, Rev.16  
0-OPT-FP-009, Diesel Driven Fire Protection Water Pump 1-FP-P-2, Rev.21  
0-VSP-C8, Annunciator Response Procedure - Fire Detected, Rev. 8  
1-AP-10.07, Loss of Unit 1 Power, Rev. 44  
1-AP-10.07, Loss of Unit 1 Power, Rev. 64  
1-AP-15.00, Loss of Component Cooling, Rev. 003  
1-E-0, Reactor Trip or Safety Injection, Rev. 65  
1-ECA-0.0, Loss of All AC Power, Rev. 35  
1-EPT-0902-01, Fire Protection Low Pressure CO2 System Puff Test, Rev.26  
1-EPT-0902-02, Fire Protection Low Pressure CO2 System Equipment Test, Rev. 21  
1-ES-0.1, Reactor Trip Response, Rev. 49  
1-FCA-4.00, Limiting ESGR Number 1 Fire (With 6 Attachments), Rev. 20  
1-FCA-4.00, Limiting ESGR Number 1 Fire, Rev. 23  
1-FS-FP-169, Surry Power Station Loss Prevention Fire Strategy, Turbine Building - Mezzanine Unit 1 Elevation 35 Feet, Rev. 2  
1-LPT-FP-017, Flow Test of Emergency Switchgear Room Halon System, Rev. 7  
1-LPT-FP-017, Flow Test of Emergency Switchgear Room Halon System, Rev.8  
1-LSP-FP-007, Inspection of Fire Retardant Coatings, Penetration Seals, Cable Trays and Fire Stops, Rev. 4  
1-OP-FW-002, Turbine Driven AFW Pump Startup and Shutdown, Rev. 16  
1-OSP-ZZ-001, Auxiliary Shutdown Panel Functional Surveillance, Rev. 9  
1-OSP-ZZ-002, Appendix R Isolation/Transfer Switch Functional Surveillance, Rev. 7  
2-OPT-ZZ-002, 547 Day Freq. PT: ESF Actuation, Under/Degraded – OC-23B  
SCPIP-005, Safeguards Contingency Plan Implementing Procedure (SCPIP), Fire, Explosion or

Other Catastrophe, Rev. 4  
 STD-EEN-0305, Electrical Engineering Nuclear Standard, Fire Protection Systems, Rev. 3  
 VPAP-0301, Design Change Process, Rev. 30  
 VPAP-2802, Notifications and Reports, Rev. 36

### **Calculations, Analyses and Evaluations**

EE-005, Surry Unit 1, Emergency Switchgear Room Flood Level Calculation due to Fire Protection Activities, 8/23/1984  
 EE-006, Surry Unit 1, Emergency Switchgear Room Flood Level Calculation due to Fire Protection Activities, 8/22/1984  
 EP-0013, Fire Protection Information Relating To Appendix A to BTP 9.5-1, 1979 FP-SER and National Fire Protection Association (NFPA) Codes, Rev. 0  
 ET-CEE-99-001, Appendix R Report, Review of Chapter 9 Surry Power Station, Units 1 & 2, Rev. 0  
 ET CEP-99-0009, Appendix R Engineering Evaluation 9, Evaluation of Fire Detector Locations – Surry Power Station Unit(s) 1 & 2, 5/22/1999  
 ET-CEP-2011-0012, Appendix R Multiple Spurious Operation (MSO) Ident. – Surry, Rev. 0  
 ET-NAF-05-0067, Transmittal of Surry Appendix R Timeline Inputs Based on RETRAN Results, Rev. 0  
 ET-SU-2011-0051, Appendix R Multiple Spurious (MSO) Evaluation, Rev. 1  
 NE-0155, Fire Hose Station Calculation for MCR, U1 & U2 ESGR and U1 & U2 NSGR  
 RCE001013, Root Cause Evaluation for Failure of RC Suppressors in the NIS Cabinets at Surry Power Station on 6/8/2010

### **Drawings**

11448-DAR-041A, Appendix R Flowpath Chilled Water System Surry Power Station Unit 1 Virginia Power, Rev. 10, Sheet 2 of 4  
 11448-DAR-064A, Appendix R Flowpath Main Steam System Surry Power Station Unit 1 Virginia Power, Rev. 25, Sheet 1 of 6  
 11448-DAR-064A, Appendix R Flowpath Main Steam System Surry Power Station Unit 1 Virginia Power, Rev. 25, Sheet 2 of 6  
 11448-DAR-064A, Appendix R Flowpath Main Steam System Surry Power Station Unit 1 Virginia Power, Rev. 26, Sheet 3 of 6  
 11448-DAR-064A, Appendix R Flowpath Main Steam System Surry Power Station Unit 1 Virginia Power, Rev. 26, Sheet 4 of 6  
 11448-DAR-064A, Appendix R Flowpath Main Steam System Surry Power Station Unit 1 Virginia Power, Rev. 33, Sheet 5 of 6  
 11448-DAR-071B, Appendix R Flowpath Circulating and Service Water System Surry Power Station Unit 1 Virginia Power, Rev. 33, Sheet 1 of 2  
 11448-DAR-072A, Appendix R Flowpath Component Cooling Water System Surry Power Station Unit 1 Virginia Power, Rev. 18, Sheet 1 of 7  
 11448-DAR-072B, Appendix R Flowpath Component Cooling Water System Surry Power Station Unit 1 Virginia Power, Rev. 13, Sheet 1 of 3  
 11448-DAR-072D, Appendix R Flowpath Component Cooling Water System Surry Power Station Unit 1 Virginia Power, Rev. 34, Sheet 2 of 5  
 11448-DAR-075B, Appendix R Flowpath Compressed Air System Surry Power Station Unit 1 Virginia Power, Rev. 19, Sheet 3 of 3  
 11448-DAR-084A, Appendix R Flowpath Containment Spray System Surry Power Station Unit 1 Virginia Power, Rev. 15, Sheet 1 of 3

11448-DAR-084A, Appendix R Flowpath Containment Spray System Surry Power Station Unit 1  
 Virginia Power, Rev. 48, Sheet 2 of 3  
 11448-DAR-086A, Appendix R Flowpath Reactor Coolant System, Loop-A Surry Power Station  
 Unit 1 Virginia Power, Sheet 1 of 3  
 11448-DAR-086A, Appendix R Flowpath Reactor Coolant System, Loop-B Surry Power Station  
 Unit 1 Virginia Power, Sheet 2 of 3  
 11448-DAR-086A, Appendix R Flowpath Reactor Coolant System, Loop-C Surry Power Station  
 Unit 1 Virginia Power, Rev. 44, Sheet 3 of 3  
 11448-DAR-086B, Appendix R Flowpath Reactor Coolant System Surry Power Station Unit 1  
 Virginia Power, Rev. 31, Sheet 1 of 3  
 11448-DAR-087A, Appendix R Flowpath Residual Heat Removal System Surry Power Station  
 Unit 1 Virginia Power, Rev. 23, Sheet 1 of 2  
 11448-DAR-087A, Appendix R Flowpath Residual Heat Removal System Surry Power Station  
 Unit 1 Virginia Power, Rev. 29., Sheet 2 of 2  
 11448-DAR-088B, Appendix R Flowpath Chemical & Volume Control System Surry Power  
 Station Unit 1 Virginia Power, Rev. 28  
 11448-DAR-088B, Appendix R Flowpath Chemical & Volume Control System Surry Power  
 Station Unit 1, Rev. 44, Sheet 2 of 3  
 11448-DAR-088B, Appendix R Flowpath Chemical & Volume Control System Surry Power  
 Station Unit 1 Virginia Power, Sheet 3 of 3  
 11448-DAR-088C, Appendix R Flowpath Chemical & Volume Control System Surry Power  
 Station Unit 1 Virginia Power, Rev. 13, Sheet 1 of 2  
 11448-DAR-089A, Appendix R Flowpath Safety Injection System Surry Power Station Unit 1,  
 Rev. 59, Sheet 1 of 3  
 11448-DAR-089A, Appendix R Flowpath Safety Injection System Surry Power Station Unit 1,  
 Rev. 50, Sheet 3 of 3  
 11448-DAR-089B, Appendix R Flowpath Safety Injection System Surry Power Station Unit 1  
 Virginia Power, Sheet 2 of 4  
 11448-DAR-089B, Appendix R Flowpath Safety Injection System Surry Power Station Unit 1  
 Virginia Power, Rev. 26, Sheet 3 of 4  
 11448-DAR-089B, Appendix R Flowpath Safety Injection System Surry Power Station Unit 1,  
 Rev. 24, Sheet 4 of 4  
 11448-DAR-124A, Appendix R Flowpath Steam Gen Blowdown Recirc & Xfer Sys Surry Power  
 Station Unit 1 Virginia Power, Rev. 33, Sheet 1 of 4  
 11448-DAR-124A, Appendix R Flowpath Steam Gen Blowdown Recirc & Xfer Sys Surry Power  
 Station Unit 1 Virginia Power, Rev. 33, Sheet 2 of 4  
 11448-FA-1D, Plans, Service Building, Surry Power Station Unit 1, Rev.15  
 11448-FA-6A, Door Schedule, Surry Power Station Unit 1, Rev. 30  
 11448-FA-6B, Door Frame Details, Surry Power Station Unit 1  
 11448-FAR-212, Equipment Location Appendix "R" Fire Pump House Plan – El. 27'-0" Surry  
 Power Station Unit 1 Virginia Power, Rev. 6  
 11448-FB-25A, Ventilation & Air Conditioning, Service Building, Surry Power Station Unit 1,  
 Rev. 9  
 11448-FB-25B, Ventilation & Air Conditioning, Service Building, Surry Power Station Unit 1,  
 Rev. 10  
 11448-FB-25P, Ventilation & Air Conditioning, Service Building, Surry Power Station Unit 1,  
 Rev. 9  
 11448-FB-47A, Flow/Valve Operating Numbers Diagram Fire Protection & Domestic Water  
 System Surry Power Station - Unit 1  
 11448-FE-51H, Conduit Plan Fire Protection System Surry Power Station-Unit 1, Rev. 6  
 11448-FE-64HB Conduit Plan Fire Detection System Service Bldg. - El. 9'-6" Surry Power

Station - Unit 1 & 2, Rev. 19  
 11448-FE-90EE, Appendix R Block Diagram Appendix R Power Source, Rev. 4  
 11448-FE-90EG, Appendix R Block Diagram Emergency Diesel Control, Rev. 2  
 11448-FE-90EF, Appendix R Block Diagram Emergency Diesel Control, Rev 5  
 11448-FE-90EH-1, Appendix R Block Diagram Emergency Diesel Control  
 11448-FE-21J, Elementary Diagram 4160V Circuits Surry Power Station – Unit 1, Rev. 20  
 11448-FE-21D, D.C. Elementary Diagram Generator 1 & Transformers Protection Surry Power Station- Unit 1, Rev. 44  
 11448-FE-1A2, Electric Power Distribution One Line Integrated Schematic Surry Power Station – Unit 1, Rev. 36  
 11448-FE-1L, 480V One Line Diagram Surry Power Station – Unit 1, Rev. 66, Sheet 1 of 1  
 11448-FE-1M, 480V One Line Diagram Surry Power Station – Unit 1, Rev. 75, Sheet 1 of 1  
 11448-FE-3DK, Internal & External Wiring Diagram Rmt Logic Cabinet (1-Rmt-1A) Surry Power Station – Unit 1, Rev. 9, Sheet 1 of 1  
 11448-FE-90A, Appendix R Block Cable, Raceway Numbering Notes and Legend, Rev. 1  
 11448-FE-90AA, Appendix R Block Diagram Auxiliary Feedwater System Surry Power Station – Unit1 1, Rev. 3, Sheet 1 of 1  
 11448-FE-90BA, Appendix R Block Diagram Charging Pump System Sheet 1 Surry Power Station – Unit1 1, Rev. 2  
 11448-FE-90BB, Appendix R Block Diagram Charging Pump System Sheet 2 Surry Power Station – Unit1 1, Rev. 2  
 11448-FE-90BC, Appendix R Block Diagram Charging Pump System Sheet 3 Surry Power Station – Unit1 1, Rev. 2  
 11448-FE-90DA, Appendix R Block Diagram Instrumentation Sh. 1 Unit 1 – Surry Power Station, Rev. 2  
 11448-FE-90DC, Appendix R Block Diagram Instrumentation Sh. 3 Unit 1 – Surry Power Station, Rev. 1  
 11448-FE-90DD, Appendix R Block Diagram Instrumentation Sh. 4 Unit 1 – Surry Power Station, Rev. 1  
 11448-FE-90EA, Appendix R Block Diagram Emergency Electrical Distribution System Surry Power Station – Unit 1, Rev. 7, Sheet 1 of 1  
 11448-FE-90EB, Appendix R Block Diagram Emergency Diesel Control Isolation System Surry Power Station – Unit 1, Rev. 2, Sheet 1 of 1  
 11448-FE-90EC, Appendix R Block Diagram Emergency Diesel Control Isolation System Sh. 1 Unit 1 - Surry Power Station, Rev. 2  
 11448-FE-90ED, Appendix R Block Diagram Emergency Diesel Control Isolation System, Rev. 1, Sheet 3  
 11448-FE-90EE, Appendix R Block Diagram Power Source Surry Power Station Units 1 & 2, Rev. 4, Sheet 1 of 1  
 11448-FE-90EG, Appendix R Block Diagram Emergency Diesel Control Surry Power Station – Unit 2, Rev. 2, Sheet 1 of 1  
 11448-FE-90EH-1, Appendix R block Diagram Emergency Diesel Control  
 11448-FE-90GA, Appendix R Block Diagram High/Low Boundary Valves, Rev. 2, Sheet 1  
 11448-FE-90GB, Appendix R Block Diagram High/Low Boundary Valves, Rev. 2, Sheet 2  
 11448-FE-90GC, Appendix R Block Diagram High/Low Boundary Valves, Rev. 1, Sheet 3  
 11448-FE-90GD, Appendix R Block Diagram High/Low Boundary Valves, Rev. 2, Sheet 4  
 11448-FE-90GE, Appendix R Block Diagram High/Low Boundary Valves, Rev. 2, Sheet 5  
 11448-FE-90HA, Appendix R Block Diagram Main Steam System, Rev.  
 11448-FE-90HB, Appendix R Block Diagram Main Steam System, Rev. 2, Sheet 2  
 11448-FE-90HC, Appendix R Block Diagram Main Steam System, Rev. 1, Sheet 3  
 11448-FS-17A, Service Bldg. Roof Framing Plan, Surry Power Station, Unit 1 & 2, Rev. 11



11448-FS-17C, Service Bldg. Steel Framing El. 42'-0", El. 47'-0" & 58'-6" Surry Power Station - Unit 1 & 2, Rev.13

11548-DAR-064A, Appendix R Flowpath Main Steam System Surry Power Station Unit 2 Virginia Power, Rev. 20, Sheet 1 of 6

11548-DAR-068A, Appendix R Flowpath Feedwater System Surry Power Station Unit 2 Virginia Power, Rev. 37, Sheet 1 of 4

11548-DAR-068A, Appendix R Flowpath Feedwater System Surry Power Station Unit 2 Virginia Power, Rev. 33, Sheet 3 of 4

11548-ESK-6FF, Elementary Diagram 480V Circuit Motor Operated Valves 01-FW-MOV-160A & B Surry Power Station – Unit 2, Rev. 10

11548-ESK-3D, Control Switch Contact Diagrams Sheet 4, Surry Power Station Unit No.2, Rev. 3

11548-FE-45A, Conduit & Cable Tray Plan Cable Tunnel & Vaults Surry Power Station – Unit 2, Rev. 21

11548-FE-42A, Cable Tray Plan Emer Swgr & Relay Rm El 9' – 6" Surry Power Station – Unit 2, Rev. 14

11548-FE-90AA, Appendix R Block Diagram Auxiliary Feedwater System Surry Power Station – Unit 2, Rev. 2

11548-FE-21J, Elementary Diagram 4160V Circuits Surry Power Station – Unit 2, Rev. 19

11548-FE-21Q, D.C. Elementary Diagram 4160V Bus 2H Bkr 25H3 & 25H8 Surry Power Station – Unit 2, Rev. 12

11548-FM-068A, Flow/Valve Operating Numbers Diagram Feedwater System Surry Power Station Unit 2 Virginia Power, Rev. 61, Sheet 3 of 4

11548-FM-068A, Flow/Valve Operating Numbers Diagram Feedwater System Surry Power Station Unit 2 Virginia Power, Rev. 61, Sheet 1 of 4

### **Completed Surveillance Procedures, Test Records, & Work Orders (WO)**

1-EPT-0902-01, Fire Protection Low Pressure CO2 System Puff Test, Rev.26, completed 1/31/2012

0-EPT-0904-05, Smoke and Thermal Detector Channel Functional Test (SimplexGrinnell), Rev. 9, completed 6/28/12

0-LPT-FP-001, Fire Doors/Fire Dampers/CO2 Dampers, Rev.14, completed 2/29/2012

0-LPT-FP-002, Fire Hose Station Inspection, Rev.3, completed 1/20/2011

0-LPT-FP-004, Inspection of Hose Stations and Fire Extinguishers – Unit 1 Turbine Building, Rev. 5, completed 7/18/12

0-LPT-FP-005, Inspection of Hose Stations and Fire Extinguishers – Unit 2 Turbine Building, Rev. 4, completed 6/26/2012

0-LPT-FP-006, Inspection of Hose Stations and Fire Extinguishers – RCA/North Yard, Rev. 8, completed 7/19/2012

0-LPT-FP-008, Inspection of Hose Stations and Fire Extinguishers – Service Bldg. Rev. 5, completed 8/16/2012

1-LPT-FP-017, Flow Test of Emergency Switchgear Room Halon System, Rev.8, completed 5/12/2012

0-LPT-FP-025, Flow Path of Hose Station Valves, Rev.3, completed 1/11/2011

1-LSP-FP-007, Inspection of Fire Retardant Coatings, Penetration Seals, Cable Trays and Fire Stops, Rev. 4, completed 10/07/2011

0-LSP-FP-050, Inventory of NRC Order EA-02-026 B.5.b Equipment, completed 08/13/2010

0-LSP-FP-050, Inventory of NRC Order EA-02-026 B.5.b Equipment, completed 11/02/2011

0-OPT-FP-004, Fire Protection-Fire Main Flush, Rev. 8, completed 4/08/2012

0-OPT-FP-005, Motor Driven Fire Protection Water Pump 1-FP-P-1, Rev.16, completed

8/09/2012

0-OPT-FP-009, Diesel Driven Fire Protection Water Pump 1-FP-P-2, Rev.21, completed

7/25/2012

0-OSP-FP-006, Monthly Fire Door Inspection, Rev.17, completed 7/27/2012

0-MPM-1900-01, Periodic Inspection of Flood and Spill Protection Dikes, Dams, and Expansion Joint Shields, Rev. 10, completed 12/09/2010

0-MPM-1910-11, Inspectional (Functional Check) of Swinging SQN Special Purpose Fire Doors (WO No. 38103035966), Rev. 8, completed 12/15/2011

0-MPM-1900-01, Periodic Inspection of Flood and Spill Protection Dikes, Dams, and Expansion Joint Shields, Rev. 10, completed 11/1/2011

WO 38079411001, Annual RM for B5B/LFFG Emergency Equipment Outside, completed 07/31/2008

WO 38103069019, Calibration of SQC Components within Appendix R Gang Boxes at the Warehouse, completed 03/30/2012

WO 38103063062, Tool Storage Inventory & Inspection, completed 04/16/2012

WO 38102808823, RHR/CC Appendix R Tool Storage Inventory & Inspection, completed 04/22/2012

WO 38103268105, Outside B.5.b/LFFG Piping/Connections Inspection, completed 08/09/2012

WO 38102808823, RHR/CC Appendix R Tool Storage Inventory & Inspection, completed 04/22/2012

WO 38102567101, 1-OSP-ZZ-002-OC-23A, 547 Day Freq. PT: Appendix R Isol./Xfer Switch Function

WO 38102567668, 1-OSP-ZZ-001-OC-23A, 547 Day Freq. PT: AuxShutdown Panel Funct.

WO 38102898666, 1-OSP-ZZ-002, 547 Day Freq. PT: App. R Isol./Xfer Switch Fun – OC-23A

WO 38102920385, 1-OSP-ZZ-001, 547 Day Freq. PT: Aux Shutdown Panel Functional S-OC-23A

WO 38103063062, Tool Storage Inventory & Inspection, completed 04/16/2012

WO 38103069019, Calibration of SQC Components within Appendix R Gang Boxes at the Warehouse, completed 03/30/2012

WO 38102680709, 2-EPT-1801-02, 547 Day Freq. PT: Bus 2J Protective Relay Testing

WO 38102682790, 2-OPT-ZZ-002, 547 Day Freq. PT: ESF Actuation, Under/Degraded-OC-23B

WO 38102996767, 2<sup>nd</sup> Quarter Appendix R ELT Insp. and Repair

WO 38102659662, 3<sup>rd</sup> Quarter Appendix R ELT 8-hr Battery Discharge

### **Fire Strategies (Fire Pre-Plans)**

0-FS-FP-220, Surry Power Station Loss Prevention Fire Strategy, 230KV House - Switchgear Elevation 27 Feet, Rev. 1

0-FS-FP-221, Surry Power Station Loss Prevention Fire Strategy, 500KV House - Switchgear Elevation 27 Feet, Rev. 1

1-FS-FP-107, Surry Power Station Loss Prevention Fire Strategy, Unit 1 Emergency Switchgear Room Elevation 9 Feet-6 Inches, Rev. 2

1-FS-FP-124, Surry Power Station Loss Prevention Fire Strategy, Unit 1 Switchgear Room Elevation 58 Feet-6 Inches, Rev. 2

1-FS-FP-127, Surry Power Station Loss Prevention Fire Strategy, Unit 1 Cable Spreading Room Elevation 45 Feet-3 Inches, Rev. 4

### **Applicable Codes, Specifications, and Standards**

Fire Protection Handbook, 17th Edition  
 NUREG-1552, Supplement 1, Fire Barrier Penetration Seals in Nuclear Power Plants, dated 01/1999  
 Occupational Safety and Health Administration Standard 29 CFR 1910, Occupational Safety and Health Standards  
 Underwriters Laboratory Standard 555, Standard for Fire Dampers and Ceiling Dampers, dated 05/14/1979  
 National Fire Protection Association Standard 72E, Automatic Fire Detectors, 1974  
 National Fire Protection Association Standard 72D, Proprietary Signaling Systems, 1975

### **Audits & Self-Assessments**

Nuclear Oversight Audit Report 09-06 Fire Protection Quality Assurance Program, 06/14/2009  
 Nuclear Services Organization, Surry Nuclear Station Evaluation, 6/19/2012 to 6/21/2012  
 Surry Oversight Audit Report 12-05, Fire Protection Implementation, 8/01/2012  
 System Health Report-Fire Protection, Surry Nuclear Plant, Q2-2012

### **Licensing Basis Documents and Other Docketed Correspondence**

Appendix A to Branch Technical Position APCS 9.5-1, "Guidelines for Fire Protection for Nuclear Power Plants Docketed Prior to July 1, 1976," dated August 23, 1976  
 10 CFR 50.48, Fire Protection  
 10 CFR 50, Appendix R, Fire Protection Program for Nuclear Power Facilities Operating prior to January 1, 1979  
 Updated Final Safety Analysis Report, Chapter 9: Auxiliary and Emergency Systems, Rev 40, Surry Power Station Appendix R Fire Protection Report, Rev. 4  
 Surry Power Station Appendix R Fire Protection Report, Rev. 32  
 Letter, Virginia Electric and Power Company to USNRC, Review of Existing Fire Protection Provisions at the Surry Station Unit Nos. 1 and 2 Against Standard Review Plan 9.5.1, dated May 28, 1976  
 Letter, Virginia Electric and Power Company to USNRC, Submittal of Proposed Fire Protection Technical Specification, dated December 31, 1976  
 Letter, Virginia Electric and Power Company to USNRC, Interim Submittal of Fire Protection Program Review, APCS 9.5-1, Surry Power Station Units 1 and 2, dated April 5, 1977  
 Letter, Virginia Electric and Power Company to USNRC, Submittal of Additional Copies of Fire Protection Systems Review, dated July 14, 1977  
 Letter, Virginia Electric and Power Company to USNRC, Request for Amendment to Operating License Fire Protection Technical Specification, dated August 1, 1977  
 Letter, USNRC to Virginia Electric and Power Company, Request for Review of Fire Protection Program for Conformance with "Nuclear Plant Fire Protection Functional Responsibilities, Administrative Controls, and Quality Assurance", dated February 3, 1978  
 Letter, Virginia Electric and Power Company to USNRC, Response to USNRC Letter of February 3, 1978, dated March 6, 1978  
 Letter, USNRC to Virginia Electric and Power Company, Request for Additional Information for Review of the Surry Fire Protection Program, dated April 6, 1978  
 Letter, Virginia Electric and Power Company to USNRC, Partial Supplemental Information in Response to USNRC Letter of April 6, 1978, dated April 17, 1978  
 Letter, Virginia Electric and Power Company to USNRC, Balance of Supplemental Information in Response to USNRC Letter of April 6, 1978, dated April 24, 1978

Letter, Virginia Electric and Power Company to USNRC, Additional Supplemental Information in Response to USNRC Letter of April 6, 1978, dated May 25, 1978

Letter, USNRC to Virginia Electric and Power Company, Staff Position on Proposed Fire Protection Modifications at Surry Power Station Units 1 and 2, dated June 14, 1978

Letter, Virginia Electric and Power Company to USNRC, Response to USNRC Letter of June 14, 1978, dated July 21, 1978

Letter, Virginia Electric and Power Company to USNRC, Supplemental Response to USNRC Letter of June 14, 1978, dated August 11, 1978

Letter, Virginia Electric and Power Company to USNRC, Response to Draft Fire Protection Safety Evaluation Report and Agreement to Implement Previously Proposed Fire Protection Modifications, dated August 17, 1979

Letter, Virginia Electric and Power Company to USNRC, Response to Draft Fire Protection Safety Evaluation Report with Schedule for Completion of Previously Proposed Fire Protection Modifications, dated September 7, 1979

Letter, Additional Fire Protection Information Review (Enclosure 1) and Fire Protection Review Status (Enclosure 2), Surry Power Station, Units 1 and 2, dated May 29, 1980

Letter, Summary of Staff Requirements (Enclosure 1), Additional Fire Protection Information Review (Enclosure 2) and Fire Protection Review Status (Enclosure 3), Surry Power Station, Units 1 and 2, October 9, 1980.

Safety Evaluation Report by the Office of Nuclear Reactor Regulation, US NRC in the matter of VEPCO Fire Protection Program for Surry Power Station, Units 1 & 2, Compliance With Appendix A to BTP APSCB 9.5-1, dated September 19, 1979

Supplement 1 to Fire Protection Safety Evaluation Report dated on September 19, 1979 (Enclosure 1) and Fire Protection Status Review (Enclosure 2), Surry Power Station, Units 1 and 2, dated December 18, 1980

Supplement 2 to Fire Protection Safety Evaluation Report dated on September 19, 1979 (Enclosure 1), and Unresolved Fire Protection Issues (Enclosure 2), Surry Power Station, Units 1 and 2, dated February 13, 1981

Safety Evaluation Report by the Office of Nuclear Reactor Regulation, Appendix R to 10 CFR Part 50, Sections III.G.3 and III.L, VEPCO Fire Protection Program for Surry Power Station, Units 1 & 2, dated December 4, 1981

Supplemental Safety Evaluation Report (SSER) by the Office of Nuclear Reactor Regulation, For Appendix R to 10 CFR Part 50, Sections III.G.3 and III.L, dated November 18, 1982

Safety Evaluation related to Amendment No. 93 to Facility Operating License No. DPR-32 and Amendment No. 92 to Facility Operating License No. DPR-37, Surry Power Station, Units 1 and 2, dated January 17, 1984

Safety Evaluation Report by the Office of Nuclear Reactor Regulation Relative to Appendix R Exemptions Requested for VEPCO Fire Protection Program for Surry Power Station, Units 1 & 2, dated February 25, 1988

Safety Evaluation Report by the Office of Nuclear Reactor Regulation, Post-Fire Safe Shutdown, dated July 23, 1992.

Fire Protection Safety Evaluation Related to Issuance of Amendments RE: Relocation of Fire Protection Requirements from Technical Specification to the Updated Final Safety Evaluation Report (UFSAR), Surry Power Station, Units 1 and 2, dated December 16, 1998.

### **Other Documents**

Dominion Nuclear Facility Quality Assurance Program Description Topical Report DOM-QA-1, Rev.13

Fire Control Instructors Guide, March 04, 2008

Fire Brigade Training Instructor Guide Lesson Plan – Fire Streams, November 15, 2007

Generic Letter (GL) 82-21, Technical Specifications for Fire Protection Audits, October 06, 1982  
 ND-88.3-LP-5, Charging Pumps, Rev. 16  
 ND-89.1-LP-2-DRR, Main Steam System, Rev. 15  
 ND-90.1-LP-5, Station Transformers, Rev. 7  
 ND-90.3-LP-5, Vital and Semi-Vital Bus Distribution, Rev. 7  
 ND-90.3-LP-7, Station Service and Emergency Distribution Protection and Control, Rev. 13  
 ND-90.3-PP-5, Vital and Semi-Vital Bus Distribution  
 ND-92.2-LP-1, Fire Protection, Rev. 8  
 ND-95.1-LP-8, Loss of Off-Site Power (LOOP), Rev. 9  
 Nuclear Emergency Preparedness Annual Training for Off-Site Fire and Rescue Department Response, "Invitation to Participate" letter(s) dated February 04, 2011 and January 12, 2012  
 Nuclear Plant Fire Protection Functional Responsibilities, Administrative Controls and Quality Assurance, June 20, 1977  
 Safety and Emergency Response Training Lesson Plan, Fire 2066 – Switchgear Fires, April 05, 2012  
 Safety and Emergency Response Training Lesson Plan, Fire 2066 – Transformer Fires, September 30, 2009  
 Surry Power Station Technical Requirements Manual, Rev.29  
 Regulatory Issue Summary (RIS) 2004-03, Risk-Informed Approach for Post-Fire Safe Shutdown Circuit Inspection, Rev. 1, December 29, 2004  
 RIS 2005-30, Clarification of Post-Fire Safe-Shutdown Circuit Regulatory Requirements, December 20, 2005  
 Stone and Webster Fire Protection Review – Appendix R Surry Power Station – Units 1 and 2. dated, May 23, 1986, Volumes 1 & 2  
 Surry Power Station Hostile Action Based Drill SDEC08HAB, Management Critique for Drill of December 2, 2008  
 Surry Power Station, Operating Experience Review, IN 1988-060, Inadequate Design & Installation of Watertight Penetration Seals  
 Surry Power Station, Operating Experience Review, IN 1998-031, Fire Protection Design Deficiencies and Common Mode Flooding of Emergency Core Cooling System Rooms at Washington Nuclear Project Unit 2  
 Surry Power Station, Operating Experience Review, IN 2003-008, Potential Flooding Through Unsealed Concrete Floor Cracks  
 Surry Power Station, Operating Experience Review, IN 2005-030, Unanalyzed Internal Flooding Events and Inadequate Design  
 Surry Power Station, Operating Experience Review, IN 2008-004, Counterfeit Parts Supplied to Nuclear Plants  
 Surry Power Station, Operating Experience Review, IN 2010-013, Failure to Ensure that the Post-fire Shutdown Procedures can be Performed  
 Surry Power Station, Operating Experience Review, IN 2011-012, Reactor Trips Resulting from Water Intrusion into Electrical Equipment  
 Surry Power Station, Operating Experience Review, IN 2012-003, Design Vulnerabilities in Electric Power Systems  
 Surry Volunteer Fire Department, Inc. "Letter of Agreement", January 3, 2011

### **List of Condition Reports (CRs) Reviewed During Inspection**

CR467396, Appendix R Issue with Charging Pump/ SW Pumps

**List of Condition Reports (CRs) Generated as a Result of this Inspection**

CR481477, Fire strategy drawings for the 230 and 500KV houses need clarification  
CR481505, ELT light fixture requires adjustment  
CR484123, RM for B.5.b/LFFG piping/connections not performed  
CR484194, Inconsistencies and omissions noted in Appendix R design basis documents  
CR485721, Fire drills are not being conducted in all safety-related areas  
CR485733, Fire Drills/Orientation with local fire departments not conducted in 2011  
CR485734, 2012 TFPI-Discrepancies found in Appendix R document CEE-99-001  
CR485735, 2012 TFPI-Discrepancies found in Appendix R document CEE-99-001  
CR485737, GL82-21 for independent observations of fire drills by QA personnel not met  
CR485818, NRC identified issues with fire detection in Unit 1 Cable Spreading Room  
CR485819, NRC identified issues with fire detection in Unit 1 Normal Switchgear Room  
CR485821, Credited equipment in 0-FCA-14.00 not identified in Appendix R report  
CR485823, Diesel driven fire pump auto-start testing  
CR485826, Review of cold shutdown ECM/EPM procedures  
CR485849, Review of procedure 1-FCA-4.00

## LIST OF ACRONYMS AND ABBREVIATIONS

APCSB	Auxiliary and Power Conversion Systems Branch
B.5.b	Refers to a section of Interim Compensatory Measures Order, EA-02-026
BTP	Branch Technical Position
CAP	Corrective Action Program
CC	component cooling
CFR	Code of Federal Regulations
CO <sub>2</sub>	carbon dioxide
CR	Condition Report
ECM	electrical corrective maintenance
ELU	emergency lighting unit
EPM	electrical preventative maintenance
ESGR	emergency switchgear room
FA	fire area – a volume within the plant enveloped by 3-hour fire barriers
FCA	fire contingency action
FHA	fire hazards analysis
FPP	fire protection program
FPR	Fire Protection Report
Halon 1301	Bromotrifluoromethane gas effective for extinguishing fires
HVAC	heating, ventilating and air conditioning
IP	Inspection Procedure
IR	inspection report
IN	Information Notice
KV	kilovolts
MCR	main control room
NCV	non-cited violation
NFPA	National Fire Protection Association
NRC	Nuclear Regulatory Commission
NUREG	An explanatory document published by the NRC
OMA	operator manual action
RHR	residual heat removal
SDP	significance determination process
SER	Safety Evaluation Report
SSA	safe shutdown analysis
SSD	safe shutdown
TRM	Technical Requirements Manual
UFSAR	Updated Final Safety Evaluation Report
WO	Work Order