UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION II
SAM NUNN ATLANTA FEDERAL CENTER
61 FORSYTH STREET, SW, SUITE 23T85
ATLANTA, GEORGIA 30303-8931

August 11, 2006

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

SUBJECT: SURRY POWER STATION - NRC TRIENNIAL FIRE PROTECTION INSPECTION REPORT 05000280/2006009 AND 05000281/2006009

Dear Mr. Christian:

On June 30, 2006, the U.S. Nuclear Regulatory Commission (NRC) completed an inspection at the Surry Power Station. The enclosed report documents the inspection results, which were discussed on June 30, 2006, with Mr. D. Jernigan and other members of your staff.

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

The report documents two NRC-identified findings of very low safety significance (Green). The findings were determined to involve violations of NRC requirements. However, because of the very low safety significance and because they are entered into your corrective action program, the NRC is treating these findings as non-cited violations (NCVs) consistent with Section VI.A.1 of the NRC Enforcement Policy. If you contest any NCV in this report, you should provide a response within 30 days of the date of this inspection report, with the basis for your denial, to the U. S. Nuclear Regulatory Commission, ATTN.: Document Control Desk, Washington, DC, 20555-0001; with copies to the Regional Administrator, Region II; the Director, Office of Enforcement, U. S. 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 Web site at http://www.nrc.gov/reading-rm/adams.html (the Public Electronic Reading Room).

Should you have any questions concerning this letter, please contact us.

Sincerely,

/RA McKenzie Thomas for/

D. Charles Payne, Chief
Engineering Branch 2
Division of Reactor Safety

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

Enclosure: NRC Inspection Report 05000280/2006009 and 05000281/2006009
w/Attachment: Supplemental Information

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U. S. NUCLEAR REGULATORY COMMISSION

REGION II

Docket Nos.:	50-280, 50-281
License Nos.:	DPR-32, DPR-37
Report Nos.:	05000280/2006009, 05000281/2006009
Licensee:	Virginia Electric and Power Company (VEPCO)
Facilities:	Surry Power Station, Units 1 & 2
Location:	5850 Hog Island Road Surry, VA 23883
Dates:	June 12 - 16, 2006 (Week 1) June 26 - 30, 2006 (Week 2)
Inspectors:	P. Fillion, Senior Reactor Inspector (Lead Inspector) R. Schin, Senior Reactor Inspector B. Melly, Fire Protection Engineer (Consultant)
Approved by:	D. Charles Payne, Chief Engineering Branch 2 Division of Reactor Safety

SUMMARY OF FINDINGS

IR 05000280/2006009 and 05000281/2006009; 06/12-16/2006 and 06/26-30/2006; Surry Power Station, Units 1 and 2; Triennial Fire Protection Inspection.

This report covers an announced two-week period of inspection by two regional inspectors and one contractor. Two Green non-cited violations (NCVs) were identified. The significance of most findings is identified by their color (Green, White, Yellow, Red) using Inspection Manual Chapter (IMC) 0609 "Significance Determination Process" (SDP). The NRC's program for overseeing the safe operation of commercial nuclear power reactors is described in NUREG 1649, "Reactor Oversight Process" Revision (Rev.) 3, dated July 2000.

A. NRC-Identified and Self-Revealing Findings

Cornerstone: Mitigating Systems

- Green. The team identified a non-cited violation of Operating License Condition 3.I for removing the automatic feature of ventilation dampers which degraded the fixed gaseous suppression system in the normal switchgear room at both units by allowing carbon dioxide to flow out should the manual operated dampers be in the open position.

  The finding is more than minor because it was associated with the reactor safety, mitigating systems cornerstone attribute of protection against external factors, i.e. fire, and it affected the objective of ensuring reliability and capability of systems that respond to initiating events. The finding is of very low safety significance because the frequency of fires potentially challenging mitigating systems was relatively low and multiple trains of shutdown equipment would be available. (Section 1R05.03)

- Green. The team identified a non-cited violation of Technical Specification 6.4.E for failure to provide an adequate post-fire safe shutdown procedure. Procedure 0-FCA-7.00, Rev. 10, failed to ensure that a source of water would be aligned to the suction of the charging pump service water pumps during a severe fire in Mechanical Equipment Room 3. Consequently, all charging pumps of both units could have no service water cooling resulting in pump overheating and failure.

  The finding is greater than minor because it affected the objective of the mitigating system cornerstone to ensure the availability, reliability, and capability of systems that respond to initiating events. Since the procedure had been in place for less than one month and during that time a source of water could have been aligned, this finding is of very low safety significance. (Section 1R05.05)

REPORT DETAILS

1. REACTOR SAFETY

Cornerstones: Initiating Events, Mitigating Systems, and Barrier Integrity

1R05 Fire Protection

The purpose of this inspection was to review the Surry Power Station fire protection program (FPP). Emphasis was placed on verification that the post-fire safe shutdown (SSD) capability was free of fire damage. The requirements for SSD are contained in Title 10 of the Code of Federal Regulations, Part 50 (10 CFR 50), Appendix R (hereafter referred to as Appendix R).

The inspection was performed in accordance with Inspection Procedure (IP) 71111.05T, Fire Protection (Triennial), dated April 21, 2006, and the U. S. Nuclear Regulatory Commission's (NRC) Reactor Oversight Process, using a risk-informed approach for selecting the fire areas and attributes to be inspected. The selection of risk-significant fire areas to be evaluated during this inspection considered information contained in licensee FPP documents, results of prior NRC triennial inspections, and observations noted during in-plant tours. The fire areas chosen for review during this inspection are listed below and inspection activities described in the following sections were, in general, restricted to these fire areas:

- Fire Area 1 / Unit 1 cable vault and tunnel. During a severe fire in this area, Unit 1 shutdown would be controlled from the main control room with reliance on Unit 2 systems and local operator actions. Requirements of Appendix R, Section III.G.3, would apply. The vault area and tunnel area are gaseous suppression areas within this fire area, and they are separated by a gas tight wall.

- Fire Area 13 / Unit 1 normal switchgear room. Designated as an area where shutdown would be controlled from the main control room. The licensee's Individual Plant Examination of External Events (IPEEE) identified this area as the highest risk for fire due to potential for loss of offsite power.

- Fire Areas 45 & 54 / Mechanical equipment rooms (MER) 3 & 4. These areas are important to post-fire safe shutdown because they contain all the charging pump service water cooling pumps and three of the five control room chillers. It is also a routing area for cables important to SSD.

For each of the selected fire areas, the inspection team 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.

.01 Analysis of Functions and Systems Required for Safe Shutdown and Protection of Safe Shutdown Capability

a. Inspection Scope

The team evaluated whether the licensee's SSD analysis (SSA) properly evaluated systems and components in terms of functions to be performed for SSD of the units during a severe fire. Once the minimum set of equipment that would be available for SSD was understood by the team, reactor coolant system (RCS) inventory control, RCS pressure control, core reactivity control, core decay heat removal and RCS cooldown rate were carefully evaluated. The RCS system analysis which modeled the particular configuration and scenario of interest was requested and reviewed.

The team reviewed the fire protection features in place to protect SSD capability as compared to the separation and design requirements of Appendix R, Section III.G. The team reviewed the plant procedures that established and implemented controls and practices to prevent fires and to control the storage of permanent and transient combustible materials and ignition sources. These reviews were performed to ensure that the defense-in-depth objectives established by the NRC-approved fire protection program were satisfied.

b. Findings

No findings of significance were identified.

.02 Passive Fire Protection

a. Inspection Scope

The team inspected the material condition of accessible passive fire barriers surrounding and within the fire areas selected for review. Barriers in use included walls, ceilings, floors, mechanical and electrical penetration seals, doors, dampers and cementitious fire resistive coatings. Construction details and fire endurance test data which established the ratings of fire barriers and fire resistive material were reviewed by the team. Engineering evaluations and relevant exemptions described in NRC safety evaluations related to fire barriers were reviewed. Where applicable, the team examined installed barriers to compare the configuration of the barrier to the rated configuration.

b. Findings

No findings of significance were identified.

.03 Active Fire Protection

a. Inspection Scope

The team evaluated the material condition and operational lineup of fire detection and suppression systems through in-plant observation of systems, design document review and reference to the applicable National Fire Protection Association (NFPA) Codes and Standards. The appropriateness of detection and suppression methods for the category of fire hazards in the various areas was evaluated. The total flooding carbon dioxide (CO_2) system in Fire Area 13 was evaluated. The manually operated open head and closed head sprinkler systems and total flooding CO_2 system in Fire Area 1 were inspected. Water fire suppression systems were evaluated relative to placement of sprinkler heads and cable trays in the area.

The team reviewed the hydraulic calculation demonstrating that adequate pressure was available at hose nozzles where greater than 100 feet of fire hose was being used.

The team also reviewed fire brigade staffing, fire brigade response, fire fighting pre-plans, fire brigade training, and the fire brigade drill program procedures. Fire brigade response drill scenarios for shifts A thru E conducted in 2002 were reviewed for the Unit 1 cable tunnel and fire brigade response drill scenarios for shifts A thru D conducted in 2005 were reviewed for the Unit 1 cable vault.

b. Findings

1) Capability of CO_2 System in Normal Switchgear Room and Cable Vault and Tunnel

Introduction: The team identified an Unresolved Item (URI) related to CO_2 fire suppression systems that could not deliver the design basis gas concentration. This URI applied to the Unit 1 and Unit 2 normal switchgear rooms, the Unit 2 cable tunnel, and the Unit 1 and Unit 2 cable vaults. These CO_2 systems would deliver less than 50 percent CO_2 concentration which means they could not extinguish deep seated fires in dry electrical insulation which was the prime combustible in these areas.

Description: The Surry CO_2 gas suppression systems were designed in accordance with NFPA 12, Standard on Carbon Dioxide Extinguishing Systems. NFPA 12 requires a minimum 50 percent design concentration to extinguish fires in dry electrical, wiring insulation hazards. The normal switchgear rooms, cable vaults and cable tunnels primarily contain dry electrical, wiring insulation hazards in the form of cables routed in cable trays. Therefore, a minimum 50 percent extinguishing concentration would be required to protect the hazards in these areas.

The team requested the concentration discharge test reports for the Unit 1 normal switchgear room and Unit 1 cable vault and tunnel areas to determine whether the 50 percent concentration could be met and maintained for the areas being inspected.

Discharge testing was not available so the team reviewed available licensee documentation to determine if the quantity of CO_2 gas being discharged into each of the subject hazard areas would be capable of achieving the required 50 percent concentration. The review determined that an insufficient quantity of CO_2 gas would be discharged into the Unit 1 normal switchgear room and Unit 1 cable vault and that the required 50 percent concentration could not be achieved and maintained. Subsequent to this finding, the Unit 2 normal switchgear room and Unit 2 cable vault and cable tunnel areas were also determined to have an insufficient quantity of CO_2 to achieve the required 50 percent concentration.

The apparent cause for this violation appeared to be that the room volumes for the subject hazard areas were incorrectly calculated at the time of system design and an allowance for leakage was not factored into the system design. The required quantities of CO_2 are calculated by multiplying the volume of a hazard area by the flooding factor assigned by NFPA 12 for the specific type of hazard being protected with additional CO_2 added for leakage. Dry electrical, wiring insulation hazards require a flooding factor of 0.083 Lb. CO_2/ft^3 to achieve a 50 percent concentration.

The licensee estimated that the CO_2 systems in the Unit 1 and Unit 2 normal switchgear rooms could deliver 37.4 percent and 40.1 percent CO_2 concentration respectively. The CO_2 system in the Unit 2 cable tunnel area could deliver about 45 percent concentration. The CO_2 systems in the Unit 1 and Unit 2 vault areas could deliver 51.3 percent and 47 percent respectively. These concentrations were calculated assuming zero leakage of CO_2 from the protected area. Therefore, even the 51.3 percent was below the standard requirement for extinguishing deep seated dry electrical insulation fires.

The licensee generated a Plant Issue (PI) report. After having the CO_2 vendor perform CO_2 flow calculations based on the CO_2 panel discharge timer settings, the licensee declared the Unit 1 & 2 normal switchgear rooms, Unit 1 cable vault and Unit 2 cable vault and cable tunnel CO_2 system inoperable and stationed fire watch personnel in accordance with the Technical Requirements Manual (TRM) requirements.

Analysis: The finding is a performance deficiency because it was within the licensee's control to realize that the CO_2 systems in various fire areas did not meet the criterion for gas concentration contained in industry standards to which they are committed. The finding is more than minor because it was associated with the reactor safety, mitigating systems, cornerstone attribute of protection against external factors, i.e. fire, and it affected the objective of ensuring reliability and capability of systems that respond to initiating events. Analysis of the significance of the finding with respect to the normal switchgear rooms led to the conclusion that it was of very low safety significance primarily due to the frequency of fires potentially challenging mitigating systems being relatively low and the availability of shutdown systems was relatively good. The licensee had redone the IPEEE analysis for fire in the normal switchgear rooms and calculated the core damage frequency due to fire to be 7.0E-7 per year and this evaluation assumed that the automatic CO_2 system fails.

The Unit 2 cable tunnel did not have any fixed ignition sources as the cables were thermoset type, and the probability for transient combustible fires or hot work initiated fires was judged to be extremely low due to the contents and layout of this area. The low probability for fires in this area dictated the very low safety significance.

Preliminary conservative analysis and evaluation of the cable vault areas indicated that the finding may not be of very low significance. The probability of fires in this area was greater than in the other areas because it contained a number of 480 V motor control center vertical sections with cable trays directly above and available shutdown systems were not as robust. As a minimum, additional information concerning the specific function of the cables directly above the motor control centers must be obtained and evaluated to determine the risk significance of this finding. Also, the significance of the finding must represent the sum of the risk of each of the affected fire areas on a unit bases (i.e. a Unit 1 value and a Unit 2 value), including those fire areas where the individual risk was very low as discussed above.

Enforcement: Surry Units 1 and 2 Operating License Condition 3.I, specifies that the licensee implement and maintain in effect all provisions of the approved fire protection program as described in the UFSAR. UFSAR Section 9.10, Fire Protection, states that low pressure fixed carbon dioxide suppression systems are provided at the normal switchgear rooms, the service building cable vaults [cable tunnel] and the containment cable vaults [cable vault], and other areas. The Surry CO_2 gas suppression systems were designed in accordance with NFPA 12, 1968 Edition. NFPA 12, 1968, specified that an acceptable CO_2 system deliver and hold a minimum gas concentration of 50 percent in the protected area.

Contrary to the above, the CO_2 systems in the Unit 1 and Unit 2 normal switchgear rooms, the Unit 2 cable tunnel, and the Unit 1 and Unit 2 cable vaults could not deliver the 50 percent minimum gas concentration. This condition has existed since initial plant startup. This finding was entered into the licensee's corrective action program as PI S-2006-2627 and PI S-2006-2701. Since additional information described in the Analysis section above is needed to determine the risk significance of this finding, this item will be tracked as URI 05000280,281/2006009-01, Carbon Dioxide Suppression System Degraded in Two Fire Areas at Unit 1 and Three Fire Areas at Unit 2.

2) Modification to HVAC System

Introduction: The team identified a non-cited violation (NCV) of Operating License Condition 3.I for removing the automatic feature of a ventilation damper which degraded the fixed gaseous suppression system in the normal switchgear room at both units by allowing carbon dioxide to flow out should the manual operated dampers be in the open position.

Description: The Surry UFSAR states that all ventilation fans in CO_2 protected areas are stopped and dampers to these areas are closed upon initiation of CO_2 discharge. The team identified that the dampers in the west wall of the Unit 1 normal switchgear room and the east wall of the Unit 2 normal switchgear room did not close on CO_2 discharge

and that CO_2 gas could leak from the normal switchgear room potentially evacuating CO_2 from the upper parts of the normal switchgear room. The licensee produced an engineering work response (EWR) developed in 1986 to address this issue. EWR 86-009 determined that it was acceptable to allow CO_2 gas to flow through the open dampers in the normal switchgear room wall and into the ductwork because the gas would be stopped at the motor operated dampers that were designed to automatically close when the fans stopped on CO_2 discharge.

Contrary to this design configuration, the NRC team found that the motor operators on the subject dampers were removed in 1996 by a field change to Design Change Package (DCP) 95-019. Therefore, through the implementation of this field change, the licensee changed the CO_2 system design basis configuration which could no longer maintain the commitment in the UFSAR to automatically close dampers on CO_2 discharge. The dampers affected by removal of their motor operators were 1-VS-MOD-304, 305, 306, 307, 308 & 309 and 2-VS-MOD-301, 302, 303 & 304. The licensee presented evidence that the dampers with the motor operators removed were administratively controlled closed by procedure. Review of operator logs showed that there were very limited periods when the dampers were open, and the team found this information was consistent with its understanding of the ventilation system design.

The licensee generated a PI and had preliminarily indicated plans to re-install the motor operators on the affected dampers so that they would automatically close on CO_2 discharge. The licensee also indicated that the volume of the ductwork and plenum were being added to the room volume and that damper leakage would be considered in the re-analysis of the CO_2 system needed to address other findings discussed in this report. Immediate corrective action was to verify that the dampers were in the closed position, and the team verified this as well.

Analysis: Removal of the motor operator on dampers which had a function related to the fixed suppression system in the normal switchgear rooms is a performance deficiency. Removal of the automatic feature of the dampers invalidated and degraded the fixed suppression system described in the UFSAR. The finding is more than minor because it was associated with the reactor safety, mitigating systems, cornerstone attribute of protection against external factors, i.e. fire, and it affected the objective of ensuring reliability and capability of systems that respond to initiating events. The finding is of very low safety significance because the frequency of fires potentially challenging safety-related systems for the affected fire areas was relatively low and multiple trains of shutdown equipment would be available. Furthermore, review of records showed that the dampers were opened for only brief periods of time since the modification was implemented (three occasions totaling about 12 hours), and during some of these times fire watches were posted.

Enforcement: Surry Units 1 and 2 Operating License Condition 3.I, specifies that the licensee implement and maintain in effect all provisions of the approved fire protection program as described in the UFSAR. The Surry UFSAR states that all ventilation fans in CO_2 protected areas are stopped and dampers to these areas are closed upon initiation of CO_2 discharge.

Contrary to the above, the NRC team found that the ventilation dampers in the normal switchgear rooms would not have closed upon initiation of CO_2 discharge because the motor operators had been removed from the dampers. This condition existed since 1996, and it applies to both units. Because this finding is of very low safety significance and has been entered into the corrective action program (PI S-2006-2642), this finding is being treated as an NCV, consistent with Section VI.A.1 of the NRC's Enforcement Policy. This finding is identified as NCV 05000280,281/2006009-02, Removal of Damper Motor Operators From CO_2 System in Normal Switchgear Rooms.

.04 Protection from Damage from Fire Suppression Activities

a. Inspection Scope

The team evaluated the selected fire areas from the viewpoint of whether redundant trains of systems required for hot shutdown, which may have been located in the same fire area, could be subject to damage from fire suppression activities or from the rupture or inadvertent operation of fire suppression systems. The team considered the effects of water, drainage, heat, hot gasses, and smoke that could potentially damage all redundant trains. The team also reviewed engineering evaluations that addressed the inadvertent operation of fire protection systems and their effect on safety-related systems or components.

b. Findings

No findings of significance were identified.

.05 Operational Procedures Controlling Post-Fire Safe Shutdown

a. Inspection Scope

The team reviewed the operational implementation of the SSD strategy that would be used during a severe fire in any of the selected fire areas. The team interviewed operators and reviewed lesson plans, job performance measures, plant procedures, and training records for licensed and non-licensed operators. These reviews were performed to verify that: 1) the procedures were available for immediate use and were consistent with the SSA; 2) the operators could reasonably be expected to perform the procedures, including local manual operator actions, within applicable shutdown time requirements; 3) the training program for operators included operator actions relied on for SSD from the main control room or from the alternate shutdown locations; 4) personnel required to perform the procedures could be provided from normal onsite staff, exclusive of the fire brigade; and 5) human factors for operator actions were adequate in the plant (e.g., accessibility, labeling, lighting, tools, ladders, communications).

The team reviewed and walked down applicable sections of the following fire response procedures:

- 0-AP-48.00, Fire Protection - Operations Response, Rev. 19
- 0-FCA-7.00, Limiting Mechanical Equipment Room 3 or 4 Fire, Rev. 10
- 0-FCA-14.00, Establishing Stable RCS Makeup Flowpaths, Rev. 6
- 1-AP-10.0, Loss of Unit 1 Power, Rev. 39
- 1-E-0, Reactor Trip or Safety Injection, Rev. 53
- 1-FCA-3.00, Limiting Cable Vault and Tunnel Fire, Rev. 19

b. Findings

Inadequate Procedure for Post-Fire Safe Shutdown During a Fire in Mechanical Equipment Room 3

Introduction: The team identified a Green NCV of Technical Specification (TS) 6.4.E for failure to provide an adequate post-fire SSD procedure. Specifically, Procedure 0-FCA-7.00, Rev. 10, failed to ensure that a source of water would be aligned to the suction of the charging pumps service water pumps during a severe fire in MER 3.

Description: The team found that Procedure 0-FCA-7.00, Rev. 10, directed operators to align valves during a severe fire in MER 3 to isolate service water to the Unit 1 and Unit 2 charging pump service water pumps and chillers in MER 3 and to supply service water to the Unit 1 and Unit 2 charging pump service water pumps in MER 4. However, the valve alignment in the procedure differed from the valve alignment that was shown in the SSA and the Appendix R Piping and Instrumentation Diagram (P&ID) system drawings. The procedure directed operators to isolate the two service water supply paths that were identified on the drawings as the Appendix R flowpaths and did not direct operators to verify that a third potential service water supply path was open. Consequently, if a fire occurred in MER 3 while that third potential service water supply path was isolated (from its source at the large circulating water supply pipe to the 1D main condenser waterbox), then the charging pumps service water pumps would have no suction source and all charging pumps of both units would have no service water cooling. Operators stated that the third potential water source would normally be in service, but was isolated occasionally to support routine maintenance activities.

Without service water cooling, the charging pumps' bearing oil would overheat and the charging pumps could fail. When informed of this condition, the licensee promptly initiated PI S-2006-2719 and corrected the procedure before the end of the inspection.

The inspectors found that procedure 0-FCA-7.00, Rev. 10 had been in place for less than one month and during that time the third potential service water supply path had not been isolated. Also, the previous version of procedure 0-FCA-7.00 (Rev. 9) did not include this condition in that it did not direct operators to isolate any of the service water supply paths to the charging pumps service water pumps.

Analysis: The team determined that this finding is associated with the "procedure quality" attribute. The finding affected the objective of the mitigating systems cornerstone to ensure the availability, reliability, and capability of systems that respond to initiating events and therefore the safety significance is greater than minor. However, since the procedure had been in place for less than one month and during that time the third potential service water supply path had not been isolated, this finding is of very low safety significance (Green).

Enforcement: TS 6.4.E requires that the facility Fire Protection Program and implementing procedures which have been established for the station shall be implemented and maintained. Procedure 0-FCA-7.00, Limiting Mechanical Equipment Room 3 or 4 Fire, Rev. 10, was an implementing procedure for the Facility Fire Protection Program.

Contrary to the above, procedure 0-FCA-7.00, Rev. 10, had not been adequately implemented and maintained in that it failed to ensure that a source of water would be aligned to the suction of the charging pumps service water pumps during a severe fire in MER 3. Because this finding is of very low safety significance and has been entered into the corrective action program (PI S-2006-2719), this violation is being treated as an NCV, consistent with Section VI.A.1 of the NRC's Enforcement Policy. This finding is identified as NCV 05000280,281/2006009-03, Inadequate Procedure for Post-Fire Safe Shutdown During a Fire in Mechanical Equipment Room 3.

.06 Circuit Analysis

a. Inspection Scope

The team reviewed how systems would be used to achieve inventory control, core heat removal and reactor coolant system pressure control during and following a postulated fire in the fire areas selected for review. System flow diagrams were reviewed. Control circuit schematics were analyzed to identify and evaluate cables important to SSD. The team traced the routing of the selected cables through fire areas selected for review by using cable schedule, and conduit and tray drawings. The team walked down the selected fire areas to compare the actual plant configuration to the layout indicated on the drawings. The team evaluated the above information to determine if the requirements for protection of control and power cables were met.

When the licensee's circuit analysis indicated that an operator action would be included in the operating procedures to mitigate the potential for adverse effects, the team compared the circuit analysis and operating procedures. The following components were reviewed:

1-CH-MOV-1286C, Charging pump discharge to charging line cold leg
1-CH-FCV-1122, Charging flow control valve
1-CH-MOV-1289A/B, Charging pump discharge header valves
1-CH-HCV-1311, Auxiliary spray valve
1-CH-HCV-1137, Excess letdown flow control valve
1-RC-SOV-100A-1, Reactor pressurizer vent valve

LT-1477A, Steam generator level instrumentation loop
LT-1459A, Pressurizer level instrumentation loop
1-MS-SOV-102A/B, Steam supply valves to turbine driven auxiliary steam generator feedwater pump
1-TV-101A/B/C, Main steam isolation trip valve
1/2-SW-P-10A/B, Charging pump service water pumps.

In addition, the team reviewed a list of all the cables routed through Fire Areas 45 and 54 to evaluate the potential effect on safe shutdown should fire damage those cables. In relation to Fire Area 13, the team reviewed various circuits that, if damaged by fire, could result in loss of offsite power. Examples of these circuits were the transformer current differential and overcurrent protection. The routing of offsite power feeders and emergency diesel generator leads and control cables were reviewed to determine which power sources were vulnerable in the various fire areas.

b. Findings

No findings of significance were identified.

.07 Communications and Lighting

a. Inspection Scope

The team inspected communications equipment and emergency lighting in relation to plant operator and fire brigade needs in accordance with the guidance in Inspection Procedure 71111.05T. Some plant specific attributes and data addressed by the team included but were not limited to the following:

- Availability and readiness of portable radios that were the primary means of communication for the fire brigade and operators.

- Location and aiming of emergency lighting units to support local manual operator actions, access, and egress; and fire brigade activities.

- Availability of the radio repeater and antenna systems during a fire.

b. Findings

No findings of significance were identified.

.08 Cold Shutdown Repairs

a. Inspection Scope

The team performed inspection activities to determine whether the time and power supply requirements in Appendix R, related to achieving cold shutdown following a fire were met. In particular for the Unit 1 cable vault and tunnel fire, the team determined what equipment would be available for long term reactivity control, long term heat

removal and environmental control to support placing the plant in cold shutdown condition. Inspection activities included reviewing a repair procedure for re-energizing a residual heat removal pump in case the feeder cable to the pump was damaged by fire.

b. Findings

No findings of significance were identified.

.09 Compensatory Measures

a. Inspection Scope

The team conducted a review to verify that the licensee put adequate compensatory measures in place for out-of-service, degraded, or inoperable fire protection and post-fire SSD equipment. A number of PIs were reviewed to verify that the compensatory actions were put in place in accordance with the requirements of the licensee's TRM. The team also verified that short-term compensatory measures were adequate to compensate for a degraded function or feature until appropriate corrective actions were taken.

b. Findings

No findings of significance were identified.

4. OTHER ACTIVITIES

4OA2 Identification and Resolution of Problems

a. Inspection Scope

The team reviewed corrective action program audits, self-assessments, and selected PIs related to fire protection and SSD. This review was to verify that the licensee was identifying issues related to this inspection area at an appropriate threshold and correcting them in a timely manner.

b. Findings

No findings of significance were identified.

4OA6 Meetings, Including Exit

Exit Meeting Summary

On June 30, 2006, the team presented the inspection results to Mr. D. Jernigan, Site Vice President, and other members of his staff, who acknowledged the findings. The inspectors confirmed with the licensee that none of the material examined during the inspection should be considered proprietary.

SUPPLEMENTAL INFORMATION

KEY POINTS OF CONTACT

Licensee Personnel:

M. Adams, Director of Station Safety and Licensing
J. Ashley, Licensing Engineeer
B. Garber, Supervisor Licensing
J. Grau, Manager, Nuclear Oversight
J. Hartka, Unit Supervisor - Operations
D. Jernigan, Site Vice President
C. Luffman, Manager, Nuclear Protection Services
W. Oppenhimer, Assistant Manager, Nuclear Site Engineering
D. Padula, Electrical Engineer
D. Totete, Corporate Appendix R Coordinator
W. Webster, System Engineer

NRC Personnel:

D. Arnett, Resident Inspector
N. Garrett, Senior Resident Inspector
K. Landis, Branch Chief, Division of Reactor Projects

LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED

Opened

05000280, 281/2006009-01 URI	Carbon Dioxide Suppression System Degraded in Two Fire Areas at Unit 1 and Three Fire Areas at Unit 2. (Section 1R05.03)

Opened and Closed

05000280, 281/2006009-02 NCV	Removal of Damper Motor Operators From CO_2 System in Normal Switchgear Rooms (Section 1R05.03)
05000280, 281/2006009-03 NCV	Inadequate Procedure for Post-Fire Safe Shutdown During a Fire in Mechanical Equipment Room 3 (Section 1R05.05)

LIST OF DOCUMENTS REVIEWED

Miscellaneous Documents

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

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.

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

Amendment to Facility Operating License, Surry Power Station, Unit 1, dated April 27, 1982.

Safety Evaluation Report by the Office of Nuclear Reactor Regulation, Compliance with Appendix R, 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.

Appendix A to Branch Technical Position APCSB 9.5-1, “Guidelines for Fire Protection for Nuclear Power Plants Docketed Prior to July 1, 1976," dated February 24, 1977

Surry Power Station, Units 1 and 2, Technical Requirements Manual

Surry Power Station, Units 1 and 2, Updated Final Safety Analysis Report, Section 9.10, Fire Protection, Rev. 37, Updated Online March 31, 2006

Technical Report No. EP-0013, Rev. 0, Fire Protection Information Relating to Appendix A to BTP 9.5-1, 1979 FP-SER and National Fire Protection Association Codes, dated June 30, 1999

Appendix R Report, Chapter 2, Identification of Fire Areas, Rev. 23
Appendix R Report, Chapter 3, Safe Shutdown Systems Analysis, Rev. 23
Appendix R Report, Chapter 4, Appendix R Section III.G Compliance Summary, Rev. 23
Appendix R Report, Chapter 5, Post-Fire Safe Shutdown, Rev. 23

TRM, TR 3.7.3, Low Pressure CO_2 System, Rev. 10
TRM, TR 3.7.8, Fire Barriers, Rev. 13
TRM, TR 3.7.9, Appendix R Alternate Shutdown Equipment, Rev. 12
TRM, TR 3.7.13, Appendix R Emergency Communication Equipment, Rev. 16

NFPA 12, Standard on Carbon Dioxide Extinguishing Systems, 1968 edition

NFPA 72D, Standard for the Installation, Maintenance and Use of Propriety Protective Signaling Systems for Watchman, Fire Alarm and Supervisory Service, 1967 edition

Fire Protection Exemptions

No. 5 - Mechanical Equipment Room #3 - Lack of full area automatic fire suppression
No. 12 - Cable Vault/Tunnels - 8" thick masonry wall not 3 hour rated
No. 16 - Cable Vault/Tunnel and Auxiliary Building - 8" thick masonry wall not 3 hour rated

Corrective Action Program Documents Initiated as a Result of the Inspection

Plant Issue S-2006-2200, Drawing does not show CO_2 in cable vault and tunnel and drawing does show heat detection in upper level.
Plant Issue S-2006-2614, Minimum number of heat detectors required is N/A in periodic test procedure.
Plant Issue S-2006-2616, Appendix R block diagram shows cable in turbine building which is actually in normal switchgear room and spread room.
Plant Issue S-2006-2627, Concentration of CO_2 in normal switchgear room may be below 50 percent.
Plant Issue S-2006-2639, No fire seal at top entry of motor control center in cable vault and tunnel.
Plant Issue S-2006-2641, No startup testing and no calculations for CO_2 systems.
Plant Issue S-2006-2642, HVAC dampers in normal switchgear room do not automatically close.

Plant Issue S-2006-2701, Concentration of CO_2 in cable vault and tunnel (penetration area) may be below 50 percent.
Plant Issue S-2006-2719, Procedure for aligning charging pump service water could actually shut off service water.
Plant Issue S-2006-2800, Documentation issue and drawing error related to fire protection.
Plant Issue S-2006-2803, Appendix R report and drawing errors.

Drawings:

Sections 1R05.02: Passive Fire Protection & 1R05.03: Active Fire Protection

11448-FA-1D, Sheet 1, Plans - Service Building, Rev. 15
11448-FA-1E, Sheet 1, Control Room & Relay Room, Service Building, Rev. 23
11448-FA-6A, Sheet 1, Door Schedule, Rev. 30
11448-FA-24A, Sheet 1, Floor Plans - Auxiliary Building, Rev. 14
11448-FB-24B, Sheet 1, Ventilation Arrangement Service Building, Floor Elevations 42'-0", 45'-3", 47'-0" & 58'-6", Rev. 13
11448-FB-25A, Sheet 1, Ventilation and Air Conditioning, Service Building, Rev. 9
11448-FB-25F, Sheet 1, Ventilation - Service Building, Floor El. 42'-0" and 47'-0", Rev. 13
11448-FB-25G, Sheet 1, Ventilation - Service Building, Floor El. 42'-0", Rev. 12
11448-FB-47B, Sheet 1, Flow/Valve Operating Numbers Diagram, Fire Protection System, Rev. 27
11448-FB-47B, Sheet 2, Flow/Valve Operating Numbers Diagram, Fire Protection System, Rev. 23
11448-FB-47B, Sheet 3, Flow/Valve Operating Numbers Diagram, Fire Protection System, Rev. 25
11448-FB-47B, Sheet 4, Flow/Valve Operating Numbers Diagram, Fire Protection System, Rev. 3
11448-FB-47B, Sheet 5, Flow/Valve Operating Numbers Diagram, Fire Protection System, Rev. 2
11448-FB-47C, Sheet 1, Flow/Valve Operating Numbers Diagram, Fire Protection System, Rev. 18
11448-FB-47B, Sheet 2, Flow/Valve Operating Numbers Diagram, Fire Protection System, Rev. 1
11448-FB-47B, Sheet 3, Flow/Valve Operating Numbers Diagram, Fire Protection System, Rev. 0
11448-FB-47E, Sheet 1, Flow/Valve Operating Numbers Diagram, Low Pressure Carbon Dioxide System, Rev. 4
11448-FB-47E, Sheet 2, Flow/Valve Operating Numbers Diagram, Low Pressure Carbon Dioxide System, Rev. 0
11448-FB-47E, Sheet 3, Flow/Valve Operating Numbers Diagram, Low Pressure Carbon Dioxide System, Rev. 0
11448-FB-47E, Sheet 4, Flow/Valve Operating Numbers Diagram, Low Pressure Carbon Dioxide System, Rev. 0
11448-FB-47E, Sheet 5, Flow/Valve Operating Numbers Diagram, Low Pressure Carbon Dioxide System, Rev. 0
11448-FE-42T, Sheet 1, Conduit Plan - Emer. Swgr. Rm., El. 9'-6", Rev. 21
11448-FE-45A, Sheet 1, Conduit & Cable Tray Plan, Cable Tunnel & Vaults, Rev. 19

11448-FE-45B, Sheet 1, Conduit Plans & Details, MCC Rm. Above Cable Vault El. 35'-6", Rev. 13
11448-FE-45C, Sheet 1, Conduit Plan, Cable Tunnel and Vaults, Rev. 17
11448-FE-48F, Sheet 1, Cable Terminations & Conduit Sleeve Loading Tables, Auxiliary Building, Rev. 31
11448-FAR-200, Sheet 1, Site Fire Boundaries - Appendix 'R' Plot Plan, Rev. 14
11448-FAR-205, Sheet 2, Equipment Location - Appendix 'R', Auxiliary Building, Plan - El. 13'-0", Rev. 16
11448-FAR-205, Sheet 4, Equipment Location - Appendix 'R', Auxiliary Building, Plan - El. 45'-10", Rev. 15
11448-FAR-206, Sheet 1, Equipment Location - Appendix 'R', Service Building, Plan - El. 58'-0", Rev. 13
11448-FAR-206, Sheet 7, Equipment Location - Appendix 'R', Service Building, Plan - El. 9'-6", Rev. 15
11448-FAR-206, Sheet 8, Equipment Location - Appendix 'R', Service Building, Plan - El. 9'-6", Rev. 19
11448-FAR-305, Sheet 2, Fire Barrier Penetrations, Auxiliary Building, Plan - El. 13'-0", Rev. 0
11448-FAR-305, Sheet 5, Fire Barrier Penetrations, Auxiliary Building, Sections, Rev. 0
11448-FAR-305, Sheet 6, Fire Barrier Penetrations, Auxiliary Building, Sections, Rev. 0
11448-FAR-306, Sheet 1, Fire Barrier Penetrations, Service Building, Plan - El. 58'-6", Rev. 0
11448-FAR-306, Sheet 9, Fire Barrier Penetrations, Service Building, Plan - El. 9'-6", Rev. 0
11448-FAR-306, Sheet 10, Fire Barrier Penetrations, Service Building, Sections, El. 58'-6", Rev. 0
11448-FAR-306, Sheet 18, Fire Barrier Penetrations, Service Building, Sections, El. 9'-6", Rev. 0
11548-FE-45A, Sheet 1, Conduit and Cable Tray Plan, Cable Tunnel & Vaults, Rev. 21
11548-FE-42T, Sheet 3, Conduit Plan, Emer. Swgr., Relay, Instr. & Mech. Eqpt. Rm- No.3, Rev. 16

Section 1R05.05 Operational Procedures etc.

11448-DAR-071B, Appendix R Flowpath, Circulating & Service Water System, Surry Power Station Unit 1, Sheet 1 of 2, Rev. 31
11448-DAR-071D, Appendix R Flowpath, Circulating & Service Water System, Surry Power Station Unit 1, Sheet 1 of 2, Rev. 36
11448-DAR-071D, Appendix R Flowpath, Circulating & Service Water System, Surry Power Station Unit 1, Sheet 2 of 2, Rev. 3
11448-DAR-088B, Appendix R Flowpath, Chemical & Volume Control System, Surry Power Station Unit 1, Sheet 2 of 3, Rev. 27
11548-DAR-071A, Appendix R Flowpath, Circulating & Service Water System, Surry Power Station Unit 2, Sheet 3 of 3, Rev. 45
11548-DAR-071B, Appendix R Flowpath, Circulating & Service Water System, Surry Power Station Unit 2, Sheet 1 of 2, Rev. 21

Section 1R05.06 Circuit Analysis

11448-ESK-6BL, Elementary Diagram Charging Pump Service Water Pump
11448-ESK-6BL2, Sh. 4, Elementary Diagram Charging Pump Discharge Cold Leg, Rev. 7
11448-ESK-6BU, Sh. 3, Elementary Diagram Charging Line Stop, Rev. 17
11448-ESK-6CR1, Elementary Diagram Charging Pump Service Water Pump, Rev. 2
11448-ESK-6DB, Elementary Diagram Auxiliary Spray Valve, Rev. 21
11448-ESK-6EH1, Elementary Diagram Steam Inlet to Steam Generator Aux PP, Rev. 11
11448-ESK-6EN, Elementary Diagram, Sh. 16, Main Steam Isolation Valve, Rev. 3
11448-ESK-6ER, Elementary Diagram Reactor Pressurizer Vent Valves, Rev. 6
11448-FE-1A, Main One Line Diagram - Unit 1, Rev. 27
11448-FE-3DV, Wiring Diagram ASC-Remote Monitoring Panel, Rev. 5
11448-FE-8AF, Wiring Diagram Breaker 15D1 Supply to Transfer Bus D, Rev. 14
11448-FE-21K, Elementary Diagram Breaker 15D1 Supply to Transfer Bus D, Rev. 20
11448 & 11548-FE-90 Series, Appendix R Block Diagrams
5965D07, Interconnecting Wiring Diagram Excess Letdown Valve, Rev. 13
5965D10, Interconnecting Wiring Diagram Charging Flow Control Valve, Rev. 16

Procedures:

0-AP-48.00, Fire Protection - Operations Response, Rev. 19
0-ECM-1410-02, Emergency Power to Residual Heat Removal Motors, Rev. 3
0-FCA-7.00, Limiting Mechanical Equipment Room 3 or 4 Fire, Rev. 9
0-FCA-7.00, Limiting Mechanical Equipment Room 3 or 4 Fire, Rev. 10
0-FCA-7.00, Limiting Mechanical Equipment Room 3 or 4 Fire, Rev. 11
0-FCA-11.00, Fire Contingency Action, Remote Monitoring, Rev. 1
0-FCA-14.00, Establishing Stable RCS Makeup Flowpaths, Rev. 6
0-FS-FP-115, Loss Prevention Fire Strategy, Mechanical Equipment Room #3 Elevation 9 Feet - 6 Inches, Rev. 1
0-VSP-E3, Annunciator Response Procedure, Fire Detected, Rev. 13
1-AP-10.0, Loss of Unit 1 Power, Rev. 39
1-ASP-A1, Annunciator Response Procedure, Unit 1 Fire Wtr Sys Init, Rev. 4
1-E-0, Reactor Trip or Safety Injection, Rev. 53
1-FCA-3.00, Limiting Cable Vault and Tunnel Fire, Rev. 19
1-FS-FP-101, Loss Prevention Fire Strategy, Unit 1 Cable Vault Penetration Area Elevation 15 Feet - 0 Inches, Rev. 1
1-FS-FP-102, Loss Prevention Fire Strategy, Unit 1 Cable Vault Penetration Area, Elevation 9'-6", Rev. 1
1-FS-FP-103, Loss Prevention Fire Strategy, Unit 1 Upper Cable Vault, Elevation 35'-6", Rev. 1
1-FS-FP-124, Loss Prevention Fire Strategy, Unit 1 Switchgear Room Elevation 58 Feet - 6 Inches, Rev. 1
2-FS-FP-107, Loss Prevention Fire Strategy, Unit 2 Emergency Switchgear Room, Elevation 9'-6", Rev. 1
0-ECM-0105-01, Appendix R ELT Inspection and Rework, Rev. 17
0-EPM-0105-01, Appendix R ELT Eight Hour Duration Test, Rev. 7
0-EPM-0901-01, Smoke and Thermal Detector Test (Robertshaw), Rev. 9
0-EPM-0901-02, Smoke Detector Test (Pyrotronics), Rev. 6

0-EPM-0901-05, MER 3 and MER 4 Smoke Detector Test, Rev. 3
0-EPT-0904-03, Six Month Smoke Detector Test (Robertshaw), Rev. 10
1-EPT-0902-02, Fire Protection Low Pressure CO_2 System Equipment Test, Rev. 11
0-LPT-FP-001, Fire Doors/Fire Dampers/Fire Wrap, Rev. 8
0-LPT-FP-012, Fire Barriers (Including Penetration Seals), Rev. 1
0-LPT-FP-013, Fire Barriers (Including Penetration Seals), Rev. 0
0-LPT-FP-014, Fire Barriers (Including Penetration Seals), Rev. 0
0-LPT-FP-015, Fire Barriers (Including Penetration Seals), Rev. 0
0-LPT-FP-016, Fire Barriers (Including Penetration Seals), Rev. 0
1-LPT-FP-015, Flow Test of Cable Tunnel Sprinkler System, Rev. 5
1-LPT-FP-016, Cable Tunnel Sprinkler System Inspection, Rev. 4
1-LSP-FP-007, Inspection of Fire Retardant Coatings, Penetration Seals, Cable Trays, and Fire Stops, Rev. 4
0-MPM-1910-10, Mechanical Preventive Maintenance, Rev. 6
0-MPM-1910-11, Inspection (Functional Check) of Door Swinging NSQ Special Purpose Fire Doors, Rev. 7
0-OSP-FP-005, Appendix R Radio System Test, Rev. 2
0-OSP-FP-006, Monthly Fire Door Inspection, Rev. 12
0-OSP-FP-010, Daily Fire Door Inspection, Rev. 3
0-LSP-FP-004-Night, LP Fire Drills, Unit 1 Cable Tunnel, completed September 28, 2002
0-LSP-FP-004-OPS-A, LP Fire Drills, Unit 1 Cable Tunnel, completed September 28, 2002
0-LSP-FP-004-OPS-B, LP Fire Drills, Unit 1 Cable Tunnel, completed September 27, 2002
0-LSP-FP-004-OPS-C, LP Fire Drills, Unit 1 Cable Tunnel, completed September 28, 2002
0-LSP-FP-004-OPS-D, LP Fire Drills, Unit 1 Cable Tunnel, completed September 25, 2002
0-LSP-FP-004-OPS-E, LP Fire Drills, Unit 1 Cable Tunnel, completed October 02, 2002
0-LSP-FP-004-Day, LP Fire Drills, Unit 1 Upper Cable Vault, completed March 03, 2002
0-LSP-FP-004-OPS-A, LP Fire Drills, Unit 1 Upper Cable Vault, completed March 03, 2002
0-LSP-FP-004-OPS-B, LP Fire Drills, Unit 1 Upper Cable Vault, completed March 11, 2002
0-LSP-FP-004-OPS-C, LP Fire Drills, Unit 1 Upper Cable Vault, completed March 15, 2002
0-LSP-FP-004-OPS-D, LP Fire Drills, Unit 1 Upper Cable Vault, completed March 10, 2002
PT-24.38, HVAC Fire Damper Operability, Rev. 8

Calculations and Evaluations:

ET-NAF-05-0067, Engineering Transmittal (ET)Transmittal of Surry Appendix R Inputs Based on RETRAN Results, Rev. 0
SM-728, 70 Minutes Delay of Charging After Appendix R Fire, Rev. 0
SM-728, 70 Minutes Delay of Charging After Appendix R Fire, Rev. 0, Add. B
ET CEP-99-0009, Appendix R Engineering Evaluation 9 - Evaluation of Fire Detector Locations, dated May 12, 1999 with Professional Loss Control, Fire Detection Study of Surry Power Station prepared February 12, 1985 attached
ET CEP-99-0020, Rev. 0, Appendix 'R' Engineering Evaluation 20 - Evaluation of Structural Steel in Fire Barriers, dated May 17, 1999
ET CEP-99-0021, Rev. 0, Appendix 'R' Engineering Evaluation 21 - Evaluation of Bus Duct Configuration between Unit 1 and Unit 2 Switchgear Rooms, dated May 12, 1999
ET CEP-99-0033, Rev. 0, Technical Changes to Exemptions 14, 17, 22 and 23, dated July 7, 1999

ET CEP 02-0023, Acceptance of Low Pressure CO_2 Fire Suppression Systems, Surry Power Station, Unit 2, dated November 4, 2002
ET S96-0036, Fire Protection Smoke Detector Identification in MER 3, dated February 14, 1996
ET S 03-0017, Rev. 0, BS Block Wall Fire Rating Evaluation, dated February 5, 2003
Design Change - 93-013-3, Thermo-Lag Fire Barrier Replacement with Pyrocrete 241 Cementitious Fire Resistive Barrier, MER #3, dates July 29, 1993
EWR 86-009, Evaluation of Fire Dampers in Normal Switchgear Room, dated February 19, 1986
EWR 87-331, Addition of FP Cardox Odorizer, Unit 1 & 2, circa 1989
Calculation NE-0155 Fire Hose Station Calculation for Main Control Room (MCR), (Unit 1 & 2) Emergency Switchgear Rooms and the (Unit 1 & 2) Normal Switchgear Rooms, dated February 17, 2005
Field Change Documentation to DCP 95-019, Air Conditioning Upgrade to Normal Switchgear Rooms, including Field Changes 1 thru 13 and Installation Problem Reports, circa 1996
Design Change No. DC79-S70, Addition of CO_2 Nozzles in the upper levels of service building cable vault and upper levels of containment penetration vault, circa April 1980
Chemetron - Cardox Proposal No. HL-529-R2
Chemetron - Cardox Proposal No. HL-529-R2 Addendum "A"
Stone & Webster, Fire Extinguishing System - Final Test Reports, dated April 21, 1972
VP Document Number 11448/11548-582N, Low Pressure CO_2 Storage Capacity, January 22, 1969

PI Reports, Audits, and Self-Assessments Reviewed:

Dominion Formal Self-Assessment Report SPS-SA-05-24, Appendix R Fire Safe Shutdown Multiple Circuit Failure Exposure
Nuclear Oversight Audit Report 2005-04, Fire Protection QA Program
Self-Assessment ITC-SA-03-16, Fire Protection / Appendix R Program - North Anna, Millstone, & Surry Power Stations
PI S-1992-0119, Information Notice 92-28, Inadequate Fire Suppression System Testing
PI S-2002-3277-R7, CEN 02-03 - Fire Protection/Appendix R Program Assessment relative to lack of CO_2 testing information for Unit 2
PI S-2003-0642-R1, Lack of Concentration Testing for the Unit 2 Normal Switchgear Room
PI S-2004-0637-R1, Develop a technical report for the Appendix R time critical actions
PI S-2004-0637-R3, Update the Appendix R Report to reflect time critical operator actions
PI S-2004-0637-R4, Develop basis documents for each FCA procedure
PI S-2004-0637-R5, Re-validate FCA procedures
PI S-2004-0637-R6, Revise the Appendix R procedure review process
PI S-2004-0637-R7, Revise the Appendix R design Guidelines to require review of timeline issues
PI S-2004-0637-R9, Update training lesson plans and JPMs to reflect Appendix R time critical actions
PI S-2004-0637-R12, Update training lesson plans and JPMs (for both licensed and non-licensed operators) as necessary to reflect Appendix R time critical actions
PI S-2006-1379-R1, MER 4 is a III.G.3 area but lacks suppression and has no approved exemption

LIST OF ACRONYMS

BTP APCSB	Branch Technical Position - Auxiliary and Power Conversion Systems Branch
CFR	Code of Federal Regulations
CO_2	carbon dioxide
DCP	Design Change Package
DPR	Demonstration Power Reactor
EWR	Engineering Work Request
FCA	Fire Contingency Action (a class of operating procedures)
FPP	Fire Protection Program
IMC	Inspection Manual Chapter
IP	Inspection Procedure
IPEEE	Individual Plant Examination of External Events
IR	Inspection report
MER	mechanical equipment room
MOV	motor operated valve
NCV	Non-Cited Violation
NFPA	National Fire Protection Association
NRC	Nuclear Regulatory Commission
NUREG	Refers to a series of publications by the Nuclear Regulatory Commission
PI	Plant Issue
RCS	reactor coolant system
Rev.	revision
SDP	Significance Determination Process
SOV	solenoid operated valve
SSA	Safe shutdown analysis
SSD	Safe shutdown
TRM	Technical Requirements Manual
TS	Technical Specification
UFSAR	Updated Final Safety Evaluation Report
URI	Unresolved Item
V	Volts