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

November 28, 2001

South Carolina Electric & Gas Company
ATTN: Mr. Stephen A. Byrne
Senior Vice President, Nuclear Operations
Virgil C. Summer Nuclear Station
P. O. Box 88
Jenkinsville, SC 29065

SUBJECT: VIRGIL C. SUMMER NUCLEAR STATION - NRC INSPECTION REPORT 50-395/01-09

Dear Mr. Byrne:

On October 19, 2001, the NRC completed a triennial fire protection inspection at your Virgil C. Summer Nuclear Station. The enclosed report documents the results of this inspection which were discussed on October 19, 2001, with you and other members of your staff. A followup call to discuss the results of this inspection was held on November 20, 2001, with Mr. G. Halnon and other members of your staff.

The inspection examined activities conducted under your license as they relate 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.

Based on the results of this inspection, the inspection team identified one issue of very low safety significance (Green). This issue was determined to involve a violation of NRC requirements. However, because of the very low safety significance and because this issue has been entered into your corrective action program, the NRC is treating the issue as a non-cited violation, in accordance with Section VI.A.1 of the NRC's Enforcement Policy. If you deny the non-cited violation, you should provide a response with the basis for your denial, within 30 days of the date of this inspection report, to the United States Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington DC 20555-0001; with copies to the Regional Administrator, Region II; the Director, Office of Enforcement, United States Nuclear Regulatory Commission, Washington, DC 20555-0001; and the NRC Resident Inspector at the Virgil C. Summer Nuclear Station.

In accordance with 10 CFR 2.790 of the NRC's "Rules of Practice," a copy of this letter and its enclosure will be available electronically for public inspection in the NRC Public Document Room or from the Publicly Available Records (PARS) component of NRC's Document system

(ADAMS). ADAMS is accessible from the NRC web site at http://www.nrc.gov/reading-rm/adams.html (the Public Electronic Reading Room).

Sincerely,

/RA D. Charles Payne for/

Charles R. Ogle, Chief
Engineering Branch 1
Division of Reactor Safety

Docket No.: 50-395
License No.: NPF-12

Enclosure: Inspection Report No. 50-395/01-09
w/Attachment

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U. S. NUCLEAR REGULATORY COMMISSION

REGION II

Docket No.:	50-395
License No.:	NPF-12
Report No.:	50-395/01-09
Licensee:	South Carolina Electric & Gas (SCE&G) Company
Facility:	Virgil C. Summer Nuclear Station
Location:	P. O. Box 88 Jenkinsville, SC 29065
Dates:	October 15-19, 2001
Lead Inspector:	M. Thomas, Senior Reactor Inspector
Inspectors:	R. Aiello, Senior Operator Licensing Examiner C. Smith, P.E., Senior Reactor Inspector S. Walker, Reactor Inspector G. Wiseman, Senior Reactor Inspector
Other Personnel:	C. Fong, Co-op Student, RII
Approved by:	C. Ogle, Chief Engineering Branch 1 Division of Reactor Safety

Enclosure

SUMMARY OF FINDINGS

IR 05000395-01-09**,** on 10/15-19/2001, South Carolina Electric & Gas Company, Virgil C. Summer Nuclear Station. Triennial fire protection baseline inspection.

The inspection was conducted by a team of regional inspectors. The inspection identified one Green finding, which was a non-cited violation. The significance of most findings is indicated by their color (Green, White, Yellow, Red) using IMC 0609 "Significance Determination Process" (SDP). Findings for which the SDP does not apply are indicated by "No Color" or by the severity level of the applicable violation. The NRC's program for overseeing the safe operation of commercial nuclear power reactors is described at its Reactor Oversight Process website at http://nrr10.nrc.gov/NRR/OVERSIGHT/index.html.

A. Inspector Identified Findings

Cornerstone: Mitigating Systems

- TBD. A finding was identified, in that, the lack of operator training combined with licensee management's expectations regarding when to enter fire emergency procedure (FEP)-4.0, Control Room Evacuation Due to Fire, could result in the operators taking actions during a fire in the main control room (MCR) that would not be consistent with the licensee's safe shutdown analysis, fire hazards analysis, or procedure FEP-4.0. The operator training program neither addressed nor had job performance measures (JPM)/simulator scenarios for MCR operator actions and evacuation due to a fire in accordance with procedure FEP-4.0.

  This finding was determined to have a credible impact on safety because it affected the ability of the operators to perform actions (within the times required by the licensee's safe shutdown analysis and fire hazards analysis) necessary to achieve and maintain post-fire safe shutdown conditions. Licensee management's philosophy and expectations contributed to the operators' performance and slow response in deciding whether to enter procedure FEP-4.0 and evacuate the MCR during two simulator scenarios observed by the team. (Section 1R05.05)

- Green. A non-cited violation of Virgil C. Summer Operating License Condition 2.C. (18), Fire Protection System, was identified for failure to install battery pack emergency lighting units, in accordance with the approved V.C. Summer Fire Protection Program, in 13 areas (access and egress routes included) where manual operator actions were required to support post-fire safe shutdown.

  This finding had a potential to impact the licensee's ability to shut down the plant in the event of a loss of power to normal lighting during a fire. The finding was of very low safety significance because it did not affect fire detection, fire suppression, or fire barriers. (Section 1R05.07).

Report Details

1. REACTOR SAFETY

Cornerstones: Initiating Events, Mitigating Systems

1R05 FIRE PROTECTION

.01 Systems Required To Achieve and Maintain Post-Fire Safe Shutdown

a. Inspection Scope

The team used the licensee's individual plant examination for external events (IPEEE) to select four risk significant fire areas. The team reviewed the IPEEE, Safe Shutdown Analysis (SSA), Fire Hazards Analysis (FHA), associated procedures, and system drawings to identify those systems credited for safe shutdown (SSD) of the facility in the event of a fire in the selected fire areas. The inspection included review of the post-fire safe shutdown capability and the fire protection features to ensure that at least one post-fire SSD success path was maintained free of fire damage in the event of a fire as defined in the guidelines of Appendix A to Branch Technical Position (BTP) Auxiliary Power Conversion Systems Branch (APCSB) 9.5-1, "Guidelines for Fire Protection for Nuclear Power Plants," and 10 CFR 50, Appendix R. For each of the fire areas selected, the team focused its inspection on the fire protection features, and the structures, systems, and components (SSCs) necessary to achieve and maintain SSD conditions.

Applicable fire protection related licensing documents and plant design output documents were reviewed to verify that the shutdown methodology had properly identified and included those SSCs necessary to achieve and maintain safe shutdown. The documents reviewed included the Updated Final Safety Analysis Report (UFSAR) Chapters 7, 8, and 9; NRC Safety Evaluation Report (SER) dated February 1981 and SER Supplements dated January 1982 and August 1982; NRC safety evaluations dated May 22, 1986, November 26, 1986, and July 27, 1987; licensee Fire Protection Evaluation Report (FPER); FHA; SSA; various piping and instrumentation drawings (P&IDs); calculations; electrical one-line drawings; cable routing data; plant monitoring instrumentation; and plant fire area drawings. The objective of these reviews was to ensure that the post-fire SSD analytical approach, SSD equipment, and procedures were consistent and complied with the 10 CFR 50, Appendix R reactor performance criteria for safe shutdown (i.e., reactivity control, reactor coolant makeup, reactor heat removal, process monitoring, and support system functions), and the SSD components were physically separated from the fire area. The fire areas selected for inspection included the following:

- **Fire Area CB-6, Relay Room:** A fire in this area would involve shutdown from the control room evacuation panel (CREP) B utilizing Train B systems and equipment.

- **Fire Area CB-17/Fire Zone CB-17.1, Main Control Room (MCR):** A fire in this area would involve evacuation of the MCR and require shutdown from the CREP-B utilizing Train B systems and equipment.

- **Fire Area IB-20, Switchgear Room 1DA:** A fire in this area would involve shutdown of the unit from the MCR utilizing Train B systems or Train C equipment (aligned to Train B power) and Train B systems.

- **Fire Area TB-1/Fire Zones TB-1.1, TB-1.2, Turbine Building:** A fire in this area would involve shutdown of the unit from the MCR utilizing Train B systems.

b. Findings

No findings of significance were identified.

.02 Fire Protection of Safe Shutdown Capability

a. Inspection Scope

The team reviewed the V. C. Summer Nuclear Station (VCSNS) UFSAR, FPER, FHA, and administrative fire protection program fire prevention/combustible hazards control procedures to determine if they satisfied the objectives established by the NRC approved fire protection program. The team inspected the selected plant fire areas and observed the licensee's implementation of these procedures to ensure that the licensee was maintaining the fire protection systems, controlling hot-work activities, and controlling combustible materials in accordance with their fire protection program. The team also reviewed the plant fire protection program transient materials logs and fire incident reports resulting from fire, smoke, sparks, arcing, and equipment overheating incidents for the 2000-2001 time period to assess the effectiveness of the fire prevention program and any maintenance or material condition problems related to fire incidents.

The team reviewed the drawings and design specifications for the reactor coolant pump (RCP) oil collection system enclosures to assess their ability to collect any oil leakage and spray from the oil cooler, oil lift system, oil level alarm piping, the oil fill and drain, and the lower pump area in accordance with the requirements of 10 CFR Part 50, Appendix R, Section III.O. The team also reviewed the RCP operational procedures to determine if sufficient procedural guidance was provided to verify that the RCP oil collection tank was normally maintained empty and that the plant operators could identify an oil leak from the lubrication system of one of the RCP motors and take appropriate action.

The team performed a walk down of the primary and secondary fire brigade lockers to assess the condition of fire fighting equipment. Fire brigade fire fighting and personal protective equipment was reviewed to evaluate equipment accessibility and functionality. The team also reviewed lighting to verify that backup emergency lighting was provided in the fire brigade locker areas in support of fire brigade operations should a power failure occur from any cause during a fire emergency. The fire brigade self-contained breathing apparatuses (SCBAs) were reviewed for adequacy as well as the availability of supplemental breathing air tanks. Team members also performed walk downs of the selected fire areas and compared associated fire fighting pre-plan procedures and drawings with as-built plant conditions to verify that they were consistent with the fire protection features and potential fire conditions described in the FHA.

The team reviewed the licensee's fire emergency response procedures as well as fire brigade training and drill program procedures. Operating shifts' fire drill critiques for 2001 and fire brigade training/drill records were reviewed to verify that fire brigade drills had been conducted in the high fire risk plant areas and that the fire brigade personnel qualifications, brigade drill response, and brigade performance met the requirements of the licensee's approved fire protection program. The team also reviewed the South Carolina Fire Academy's Initial Nuclear Fire Brigade Course Number 9139 student manual, toured the off-site fire academy's training facility, and reviewed the VCSNS fire brigade training attendance records to verify that the initial fire brigade training met the requirements of Section III.6 of the Nuclear Training Manual (NTM).

Additionally, the team reviewed flow diagrams and flooding analysis calculations associated with the control building and intermediate building floor drain systems to verify that SSD systems and operator actions required for post-fire safe shutdown would not be inhibited by leakage or flooding from fire suppression activities or rupture of fire suppression systems.

b. Findings

No findings of significance were identified.

.03 Post-Fire Safe Shutdown Circuit Analysis

a. Inspection Scope

The team reviewed electrical schematics of SSD equipment and analyzed the control circuits to evaluate the potential effects of open circuits, shorts to ground and hot shorts. The team also reviewed computerized as-built cable installation data for power, control, and instrumentation cables to verify that SSD equipment cables were not routed in the fire areas of interest.

The team reviewed the licensee's breaker/fuse coordination analysis for selected Train B Class 1E medium voltage and low voltage power supplies to verify that selective breaker/fuse coordination had been established between incoming bus feeder breakers and branch feeder breakers of post-fire safe shutdown equipment.

b. Findings

No findings of significance were identified.

.04 Alternative Shutdown Capability

a. Inspection Scope

The team reviewed the licensee's shutdown methodology, SSD composite equipment list, and fire emergency response procedures for alternative shutdown (ASD) capability for the fire areas selected to verify compliance with BTP APCSB 9.5-1. These reviews were also performed to ensure consistency and compliance with the 10 CFR 50, Appendix R reactor performance criteria for safe shutdown and to verify that hot standby

and cold shutdown from outside the MCR could be achieved and maintained with or without the availability of offsite power.

The team reviewed electrical schematics for a sample of SSD equipment which were required to be operable when controlled from the CREP or local switchgear. The electrical schematics were evaluated to verify that local transfer switches enabled control of post-fire SSD equipment from the CREP or switchgear using local start/stop switches. The electrical schematics were also evaluated to verify that cables capable of disabling control of SSD equipment because of fire induced damage were isolated by the local transfer switches when placed in the local position. The team reviewed the schematics to verify that, when placed in the local position, the transfer switches also connected a second control power supply to ensure operation of SSD equipment.

b. Findings

No findings of significance were identified.

.05 Operational Implementation Of Alternative Shutdown Capability

a. Inspection Scope

The team reviewed the operational implementation of the ASD capability for a fire in the selected fire areas to verify that: (1) the training program for licensed and non-licensed personnel included alternative or dedicated SSD capability; (2) personnel required to achieve and maintain the plant in hot standby from outside the MCR could be provided from normal onsite staff, exclusive of the fire brigade; (3) adequate procedures existed for use during ASD; and (4) the licensee periodically performed operability testing of the SSD instrumentation and transfer and control functions. The team reviewed the contents of damage control kits to verify that equipment needed to implement the transfer from hot standby to cold shutdown was available and being properly maintained. Fire brigade staffing was reviewed to verify that it met the requirements of the licensee's fire protection program. Training requirements were reviewed for the fire brigade members and related support personnel such as nuclear reactor operators (NROs), senior nuclear reactor operators, and auxiliary operators to verify compliance with the licensee's fire protection program. Lesson plans and job performance measures (JPMs) were reviewed to verify that ASD activities were included in the training program.

Selected portions of the procedures were walked down to verify that the procedures could be performed within the specified times, given the minimum required staffing level of operators, concurrent with a loss of offsite power. The team reviewed the licensee's smoke control procedures, ventilation systems, and SCBA availability to verify that smoke would not prevent operators from performing the procedures. The team developed two simulator scenarios in order to observe operator performance in the MCR during implementation of fire emergency procedures (FEP)-1.0, Fire Emergency Procedure Selection, and FEP-4.0, Control Room Evacuation Due to Fire. The two scenarios were also designed to evaluate the operators' response to fires in or adjacent to the MCR.

b. Findings

The team identified a finding where the lack of operator training, combined with licensee's management philosophy and expectations with regard to when to enter procedure FEP-4.0, could result in operators taking actions during a fire in the MCR that would not be consistent with the licensee's safe shutdown analysis, fire hazards analysis, or procedure FEP-4.0. The operator training program neither addressed nor had JPMs/simulator scenarios for MCR operator actions and evacuation due to a fire in accordance with procedure FEP-4.0. The team determined that licensee's management philosophy and expectations regarding when to enter procedure FEP-4.0 and evacuate the MCR contributed to the operators' performance and slow response in deciding whether to enter procedure FEP-4.0 and evacuate the MCR during the two simulator scenarios observed by the team.

The team observed the first simulator scenario on October 16, 2001. A fire was postulated to occur in the administrative office area (Fire Zone CB-17.2) located outside the MCR. The operator entered abnormal operating procedure (AOP)-600.1, Control Room Evacuation, instead of procedures FEP-1.0/FEP-4.0. The entry conditions for AOP-600.1 were either a bomb threat, a high radiation alarm in the MCR, toxic gases in the MCR, or at the shift supervisor's discretion. The entry conditions for procedure FEP-4.0 were either a fire in control room zones CB-17.1, 17.2, or 17.3, cable spreading room zones CB-4 or CB-15, or relay room zone CB-6. The team noted that procedure AOP-600.1 did not contain the same immediate and supplemental actions as procedure FEP-4.0.

The team observed the second simulator scenario on October 17, 2001. A fire was postulated to occur in the MCR (Fire Zone CB-17.1) in control board panel XCP-6109. This panel contained controls for the pressurizer spray valves and the pressurizer power operated relief valves (PORVs). This scenario also included spurious equipment operations due to hot shorts caused by the fire. Spurious valve operations were included in this scenario based on licensee comments that spurious equipment operation was one of the factors control room operators would consider when deciding whether to enter procedure FEP-4.0 and evacuate the MCR. The team observed that the operators were slow to implement procedure FEP-4.0 during this scenario. Even when the postulated fire continued to burn out of control, smoke began to envelop the MCR, and a pressurizer spray valve spuriously failed open, the control room supervisor (CRS) did not immediately enter procedure FEP-4.0 nor did he order evacuation of the MCR. Instead, the CRS directed the NRO at the controls (NROATC) to secure the "A" RCP (which mitigated the RCS pressure reduction transient caused by the failed opened pressurizer spray valve) and directed the operators to don SCBAs. The CRS opened procedures FEP-1.0 and FEP-4.0 but delayed performing the immediate actions of FEP-4.0 (which included tripping the reactor, tripping the main turbine and securing all of the RCPs.) The CRS did not direct the operators to perform any actions in procedure FEP-4.0 until after a pressurizer PORV and its associated block valve were spuriously failed open. The reactor automatically tripped on low pressurizer pressure as a result of the pressurizer PORV and the associated block valve failing open.

The team discussed the performance of the operators with licensee management regarding their slow response in entering procedure FEP-4.0 and evacuating the MCR

during the two simulator scenarios. Licensee management stated that the operators' performance during the simulator scenarios was consistent with operations training and met the expectations and philosophy of licensee management regarding the decision of when to enter procedure FEP-4.0 and evacuate the MCR due to a fire.

The licensee stated that the philosophy and expectation of when to enter procedure FEP-4.0 and evacuate the MCR were based, in part, on the licensee's IPEEE analysis. The licensee stated that the IPEEE identified there was a greater risk (i.e., increase in core damage frequency) associated with entering procedure FEP-4.0, vice entering procedure AOP-600.1, when evacuating the MCR. However, the team noted that the philosophy and expectations of licensee management were not consistent with the licensee's FHA, SSA, or procedure FEP-4.0. During further discussion of this issue with licensee management, the team noted there was no objective evidence which demonstrated that the MCR operators had received training (e.g., simulator scenarios or JPMs) on procedure FEP-4.0 actions or on the decision of which procedure to enter, FEP-4.0 or AOP-600.1, for MCR evacuation. The team determined that the training provided to the operators to enter either addressed nor had JPMs/simulator scenarios for MCR operator actions and evacuation due to a fire per procedure FEP-4.0.

This finding was determined to have a credible impact on safety because it affected the ability of the operators to perform actions (within the times required by the licensee's SSA and FHA) necessary to achieve and maintain post-fire safe shutdown conditions.

The safety characterization of this finding (i.e., Green, White, Yellow, Red) has not been finalized. This finding is unresolved pending further NRC evaluation to determine its significance using the Significance Determination Process. This finding is identified as Unresolved Item (URI) 50-395/01-09-01, Decision of When to Enter Fire Emergency Procedure FEP-4.0 and Evacuate the Main Control Room Due to a Fire. This finding was entered in the licensee's corrective action program under Primary Identification Program (PIP) 0-C-01-1839.

.06 Communications for Performance of Alternative Shutdown Capability

a. Inspection Scope

The team reviewed the adequacy of the communication systems to support plant personnel in the performance of ASD functions and fire brigade duties. The team inspected the control room and CREP radio communications equipment to verify that an adequate number of radios were available for the personnel performing ASD activities. The team also reviewed radio system repeater locations and conducted a number of radio checks in various locations throughout the plant to verify that both the primary and alternate channels were operable.

b. Findings

No findings of significance were identified.

.07 Emergency Lighting for Performance of Alternative Shutdown Capability

a. Inspection Scope

The team reviewed the eight-hour emergency lighting in areas required by the licensee's fire protection program procedure (SAP-131, Fire Protection Program, Section 6.2.80). The team walked down the manual operator actions required in procedure FEP 4.0, and observed the placement, aiming, and operation of the self-contained eight-hour battery powered emergency lighting units (ELUs) to verify their adequacy for illuminating access and egress pathways, and any equipment where local manual actions were required to achieve and maintain SSD conditions. The team reviewed Enclosure 6.3 of fire protection procedure (FPP)-027, Safe Shutdown, and vendor documentation to verify that the battery power supplies were rated with at least an eight-hour capacity. The team also reviewed periodic preventative test and maintenance procedures and the last engineering maintenance rule (MR) quarterly fire service summary report associated with the 10 CFR 50, Appendix R emergency lights to determine if adequate surveillance testing was in place to ensure availability and operation of the ELUs in the event of a fire.

b. Findings

The team identified a non-cited violation (NCV) of V.C. Summer Operating License Condition 2.C. (18), Fire Protection System, for failure to install battery pack emergency lights (in accordance with the approved fire protection program) in 13 areas which could be manned for safe shutdown, including the control room and in access and egress routes to these areas.

On October 19, 2001, the team identified that the licensee did not have ELUs installed in certain areas where manual operator actions were required to support post-fire safe shutdown. The manual operator actions were specified in the following sections of procedure FEP 4.0: (1) step 3.9, pathway to the "A" steam generator PORV; (2) Attachment III, Step 9, Align Service Water to the Reactor Building Cooling Units (RBCUs); (3) Attachment IV, Step 4, align steam generator blowdown valves; and (4) Attachment V, Step 1, Securing Radioactive Liquid or Gaseous Releases, Step 3, Obtaining Appendix "R" keys from the security locker on the AB-412 level, Step 4, placing the 1X - 2X battery chargers in service, Step 5, aligning charging pump "B" for starting. The areas correlating to these FEP-4.0 procedure steps did not have ELUs installed. Access and egress and local manual operation of SSD equipment would be required in certain circumstances for post-fire safe shutdown.

This finding had a credible impact on safety, in that, there was a reasonable likelihood that a lighting power failure during a fire could delay operator response in the areas required for operation of post-fire SSD equipment. This finding affected the mitigating system cornerstone. This finding was determined to be of very low safety significance (Green) using the Significance Determination Process (SDP) because it did not affect fire detection, fire suppression, or fire barriers.

V. C. Summer Operating License NPF-12, Condition 2.C. (18), Fire Protection System, states, in part, that the V.C. Summer Nuclear Station shall implement and maintain in effect all provisions of the approved fire protection program as described in the Final Safety Analysis Report (FSAR) for the facility as amended and as approved in the Safety Evaluation Report (SER) dated February 1981 (and Supplements dated January 1982 and August 1982), and Safety Evaluations dated May 22, 1986, November 26, 1986, and July 27, 1987. Section 9.5.1 of SER Supplement 4, dated August 1982, stated, in part, that the licensee would install eight-hour battery pack emergency lights in all areas which could be manned for safe shutdown, including the control room, and in access and egress routes to these areas.

Contrary to the above, on October 19, 2001, the team identified that the licensee had failed to install ELUs in 13 areas where manual operator actions, identified in procedure FEP 4.0, were required for post-fire safe shutdown. Areas where ELUs were not installed to support manual operator actions included the following: (1) pathway to the "A" steam generator (S/G) PORV, (2) fuel handling building for alignment of service water to the reactor building cooling units, (3) turbine building for alignment of S/G blowdown valves, (4) intermediate building area of battery charger 1X-2X, (5) residual heat removal (RHR) heat exchanger to align valve XVG08706B-RH for charging pump operation, etc. This violation of Operating License Condition 2.C.(18) is being treated as an NCV, consistent with Section VI.A.1 of the NRC Enforcement Policy and is identified as NCV 50-395/01-09-02, Emergency Lighting Installation Deficiencies for Performing Alternative Shutdown Actions. This finding was entered into the licensee's corrective action program under PIP 0-C-01-1839.

.08 Cold Shutdown Repairs

a. Inspection Scope

The team reviewed the licensee's cold shutdown repair procedures for the selected fire areas to verify that the procedures were consistent with the FHA. The team reviewed the contents of selected damage control kits to verify that equipment (e.g., jumpers) needed to implement the transfer from hot shutdown to cold shutdown was available and being properly maintained.

b. Findings

No findings of significance were identified.

.09 Fire Barrier and Fire Area/Zone/Room Enclosures and Penetration Seals

a. Inspection Scope

The team reviewed the selected plant fire areas to evaluate the adequacy of the fire resistance of the fire area boundaries, structural support protection, fire barrier penetration seals, fire doors, and fire dampers. The team observed the material condition and configuration of the installed fire barrier features, as well as, reviewed the construction details and supporting fire endurance tests for the installed fire barrier features. The team also reviewed the fire loading calculations to verify that the fire

loading used by the licensee was appropriate for determining the fire resistive rating of the fire barrier boundary enclosures. Surveillance test procedures for the fire barrier features were reviewed to determine compliance with the licensee's approved fire protection program.

The team reviewed the actions taken by the licensee to resolve the technical issues related to the performance deficiencies of Thermo-Lag electrical raceway fire barrier systems. The deficiencies were described in NRC Generic Letter (GL) 92-08, Thermo-Lag 330-1 Fire Barriers. The licensee's resolution was reviewed to determine whether the corrective actions were adequate. In selected plant fire areas having redundant trains, the team examined a sampling of the cable separation and fire resistant cables to verify that they were consistent with the plant licensing basis and the NRC approved 10 CFR 50, Appendix R exemption.

The team reviewed fire protection emergency procedures, selected fire fighting pre-plan procedures and drawings, and flow diagrams associated with heating ventilation and air conditioning (HVAC) systems to verify that emergency SSD equipment and operator manual actions would not be inhibited by smoke migration from one fire area to adjacent plant areas used to accomplish safe shutdown. In addition, the team reviewed the licensing documentation, engineering evaluations of fire barrier features, and engineering evaluations for National Fire Protection Association (NFPA) code deviations to verify that the fire barrier installations met design requirements and license commitments.

b. Findings

No findings of significance were identified.

.10 Fire Protection Systems, Features and Equipment

a. Inspection Scope

The team reviewed flow diagrams, cable routing information, periodic test procedures, and valve lineup procedures associated with the electric and diesel driven fire pumps and fire protection water supply system. The review was performed to determine whether the common fire protection water delivery and supply components could be damaged or inhibited by fire-induced failures of electrical power supplies or control circuits. Additionally, team members performed a walk down of the electric and diesel driven fire pumps and portions of the fire protection water supply system in the selected areas to assess the material condition, operational effectiveness, and whether the design of the manual fire hose equipment and fire extinguishers were properly reflected in the fire brigade pre-fire plans.

The team walked down the selected fire areas to observe the material condition, design, and operation of the accessible portions of the fire detection and alarm systems. The team observed the detectors to verify that they were adequately installed to detect fires associated with the hazards of each area. The team also reviewed documentation such as deviations, detector placement drawings, detector design, spacing criteria, and

detector locations for the installed detection systems to assess the effectiveness of the systems and compliance with the placement and spacing criteria of NFPA codes.

The team reviewed the fire hose and standpipe system for the selected fire areas to verify the adequacy of the design and installation. A sample of fire hose lengths were reviewed to verify that they could reach the SSD equipment. Team members also performed a walk down of the carbon dioxide (CO_2) system in the relay room (Fire Area CB-6) to verify proper placement of the system nozzles. Installed CO_2 control equipment was reviewed to verify accessibility and functionality of the system and associated ventilation system fire dampers. Licensee design calculations and vendor pre-operational test reports were reviewed to ensure that the required quantity of CO_2 for the area was available. Surveillance test procedures for the CO_2 fire suppression system were reviewed to determine compliance with the licensee's approved fire protection program.

b. Findings

No findings of significance were identified.

.11 Compensatory Measures

a. Inspection Scope

The team reviewed the administrative controls for out-of-service, degraded, and/or inoperable fire protection systems and post-fire safe shutdown systems and components. The review was performed to verify that the risk associated with removing fire protection and/or post-fire systems or components from service was properly assessed and adequate compensatory measures were implemented in accordance with the licensee's fire protection program procedures SAP-131 and FPP-20 and the testing and inspection requirements in the approved fire protection program.

b. Findings

No findings of significance were identified.

.12 Identification and Resolution of Problems

a. Inspection Scope

The team reviewed selected audit reports and PIPs to verify that items related to fire protection were entered in the licensee's corrective action program in accordance with licensee procedural requirements. The items selected were reviewed for classification and appropriateness of the corrective actions taken to resolve the issues. The team also reviewed selected operating experience items related to fire protection to determine if they were dispositioned properly.

b. Findings

No findings of significance were identified.

4. OTHER ACTIVITIES

4OA6 Meetings

Exit Meeting Summary

The lead inspector presented the inspection results to Mr. S. Byrne, Senior Vice President, Nuclear Operations, and other members of the licensee's management and staff on October 19, 2001. A followup call was held with Mr. G. Halnon, General Manager, Nuclear Plant Operations, and other licensee management and staff members on November 20, 2001, to discuss the inspection results. The licensee acknowledged the findings presented.

The team asked the licensee whether any of the material examined during the inspection should be considered proprietary. Proprietary information was reviewed by the team but is not included in this inspection report.

PARTIAL LIST OF PERSONS CONTACTED

Licensee

J. Archie, General Manager, Engineering Services
M. Browne, Manager, Nuclear Licensing and Operating Experience (NL&OE)
S. Byrne, Senior Vice President, Nuclear Operations
S. Carroll, Electrical Engineer, Design Engineering
T. Estes, Senior Engineer, NL&OE
C. Fields, Manager, Quality Systems
D. Gatlin, Manager, Operations
D. Goldston, Operations Supervisor
G. Halnon, General Manager, Nuclear Plant Operations
T. Keckeisen, Fire Protection Supervisor
A. Koon, Supervisor, Nuclear Operations Training
G. Loignon, Supervisor, Quality Assurance
K. Nettles, General Manager, Nuclear Support Services
J. Pease, Specialist, Licensing/Operating Experience
A. Rice, Manager, Plant Support Engineering
A. Robosky, Fire Protection Engineer, Design Engineering
R. Sweet, Supervisor, NL&OE
A. Torres, Manager, Planning/Scheduling and Project Management
S. Zarandi, Operations Support Supervisor

Other licensee employees contacted included engineers, operations personnel, and security personnel.

NRC

M. King, Resident Inspector
M. Widmann, Senior Resident Inspector

ITEMS OPENED, CLOSED, AND DISCUSSED

Opened

50-395/01-09-01	URI	Decision of When to Enter Fire Emergency Procedure FEP-4.0 and Evacuate the Main Control Room Due to a Fire (Section 1R05.05)

Opened and Closed

50-395/01-09-02	NCV	Emergency Lighting Installation Deficiencies for Performing Alternative Shutdown Actions (Section 1R05.07)

Closed

None

Discussed

None

DOCUMENTS REVIEWED

PROCEDURES:

AOP-600.1, Control Room Evacuation, Revision 1, Change B
EPP-013, Fire Emergency, Revision 12
FEP 4.0, Control Room Evacuation Due to Fire, Revision 3, Change D
FPP-020, Program Administration, Revision 4
FPP-022, Fire Prevention, Revision 2
FPP-023, Fire Detection, Revision 2
FPP-025, Fire Containment, Revision 3
FPP-026, Fire/Hazmat Response, Revision 2
FPP-027, Safe Shutdown, Revision 1
NTM 3.6, General Employee Training, Fire Protection Training, Revision 13
PTP 114.005, Battery Powered and 125 Volt DC Emergency Lights, Revision 11
SAP-131, Fire Protection Program, Revision 6
SAP-148, Temporary Bypass, Jumper, and Lifted Lead Control, Revision 8, Change B
SOP-503, Intermediate Building HVAC, Revision 10
SOP-504, Turbine Building Ventilation System and Auxiliary Heating, Revision 7
SOP-505, Control Building Ventilation System, Revision 8
STP-128.019, Semi-Annual Fire Door Inspection, Revision 6
STP-728.032, Fire Service Pump House Building Fire Barrier Inspection, Revision 4
Fire Protection Preplan, CB-436, dated July 26, 2000
Fire Protection Preplan, CB-463, dated October 15, 2001
Fire Protection Preplan, IB-463, 476, dated December 17, 1996
Fire Protection Preplan, TB-412, dated December 2, 1996
DMI-1, Installation of Fire Seal Damming Media, Revision 6

JOB PERFORMANCE MEASURES

JPP-012, Locally Start an Emergency D/G During a Loss of Offsite Power, Revision 5
JPP-021, Locally Control EFW Flow, Revision 4
JPP-055, Locally Start the Turbine Driven Emergency Feedwater Pump, Revision 4
JPS-056, Control Room Evacuation (Duties of NROATC), Revision 4 (AOP 600.1 Evacuation)
JPP-063, Locally Operator a 7.2KV Breaker, Revision 5
JPP-085, Local Operation of Steamline PORV, Revision 4
JPP-200, Intermediate Building Operator Actions for FEP-2.0, Revision 1
JPP-201, Auxiliary Building Operator Actions for FEP-3.0, Revision 1
JPP-202, “A” Nuclear Reactor Operator Actions for FEP-4.0, Revision 1

DRAWINGS

B-201-359, Electrical MCC Unit Listing XMC1DA2Y, Revision 8
B-201-360, Electrical MCC Unit Listing XMC1DA2Z, Revision 6
B-201-361, Electrical MCC Unit Listing XMC1DB2X, Revision 9
B-201-362, Electrical MCC Unit Listing XMC1DB2Y, Sh. 2, Revision 9
B-201-362, Electrical MCC Unit Listing XMC1DB2Y, Sh. 3, Revision 5

B-201-362, Electrical MCC Unit Listing XMC1DB2Y, Sh. 7, Revision 8
B-201-363, Electrical MCC Unit Listing XMC1DB2Z, Revision 12
B-208-011, Sh.04 A-C, Component Cooling “B” Pump XPP1B (Channel B), Revision 19
B-208-011, Sh.70, Isolation Valve, XVG-9684B-CC, Component Cooling Water To Charging Pump B, Revision 2
B-208-011, Sh.71, Isolation Valve, XVG-9684C`-CC, Component Cooling Water To Charging Pump C, Revision 2
B-208-021, Sh.06 A-B, Charging / Safety Injection Pump B (XPP43B Channel B), Revision 9
B-208-021, Sh.04, Charging / Safety Injection Pump C (XPP43C Channel A), Revision 8
B-208-021, Sh.21, Seal Water Injection Valve (XVT8105), Revision 4
B-208-021, Sh.35, Refueling Water Supply Line Stop Valve LCV-115D (XVG0115D Channel B), Revision 12
B-208-021, Sh.34, Volume Control Tank Outlet Line Stop Valve LCV-115C (XVG0115C Channel A), Revision 10
B-208-021, Sh.36, Volume Control Tank Outlet Line Stop Valve LCV-115E (Channel B), Revision 11
B-208-021, Sh.98, Charging Flow Control Valve FCV-122, Revision 0
B-208-067, Sh.02, Main Steam Loop 3 to Turbine Driven Emergency Feed (PP XVG2802B), Revision 12
B-208-067, Sh.47, Main Steam to EFW Pump Turbine Valve (IFV-2030 Train B), Revision 10
B-208-101, Sh.02, Service Water Pump B XPP39B (Channel B), Revision 8
B-208-101, Sh.04, Service Water Pump C XPP39C (Channel B), Revision 9
B-208-044, Motor Driven Fire Pump XPP134A & Diesel Driven Fire Pump XPP134B Connection, Revision 1
B-817-034, Control Air Signal Tubing Diagram, Revision 8
B-816-018, Instrument Air Supply Diagram, Revision 13
E-207-14, 3 Line Diagram 7.2 kV Switchgear Bus 1C, Revision 13
E-207-15, 3 Line Diagram 7.2 kV Switchgear Bus 1DX, Revision 16
E-207-16, 3 Line Diagram 7.2 kV Switchgear Bus 1DA, Revision 13
E-207-17, 3 Line Diagram 7.2 kV Switchgear Bus 1DB, Revision 14
E-207-18, 3 Line Diagram 7.2 kV Switchgear Bus 1EA & 1EB, Revision 19
E-206-005, Simplified Plant Electrical Distribution, Revision 17
E-206-012, 1 Line & Relay Diagram ESF Power System, Revision 27
E-206-022, 1 Line & Relay7.2 kV Switchgear Bus 1DA,1DB,1EA, & 1EB, Revision 14
E-206-034, 1 Line & Relay 480V/277V Switchgear Bus 1DA1,1DA2,1DB1,1DB2,1EA1, & 1EB1, Revision 19
E-206-047, 1 Line 480V Engineering Safeguards (ESF) MCC Power Feeds, Revision 6
E-206-062, 1 Line & Relay ESF Vital DC System, Sh. 4, Revision 5
E-206-062, 1 Line & Relay ESF Vital DC System, Sh. 3, Revision 18
E-206-062, 1 Line & Relay ESF Vital AC System, Sh. 2, Revision 33
E-206-062, 1 Line & Relay ESF Vital AC System, Sh. 1, Revision 38
VCS-IPT02020A-MS, Instrument Loop Diagram- Steam Generator “C” Pressurizer, Revision 0
VCS-ILT00459A-RC, Instrument Loop Diagram- Pressurizer Level, Sh. 0
VCS-ILT00497A-MS, Instrument Loop Diagram- Steam Generator “C” Wide Range Level, Revision 0

VCS-IFT00122-CS, Instrument Loop Diagram- Charging Flow FT-122, Revision 5
VCS-ILT00112-CS, Instrument Loop Diagram- Volume Control Tank Level, Revision 2
VCS-ILT00115-CS, Instrument Loop Diagram- Volume Control Tank Level, Sh. 1-2, Revision 2
VCS-IVS07005-XI, Instrument Loop Diagram- XPN7005 Card and Power Supply Failure Alarm Circuitry, Revision 0
Pressurizer Level Protection Process Control Block Diagram 108D932, Sh. 6
1MS-07-174, Reactor Coolant Pumps Oil Fill and Drain Valve, Revision 6
B-318-010-8, Ionization Detectors, Intermediate Building - 448', Revision4
B-318-010-10, Ionization Detectors, Turbine Building - 412', Revision 2
B-318-010-11, Ionization Detectors, Turbine Building - 436', Revision 3
D-105-011, Control Building Floor Plans, Revision 40
D-105-013, Control Building Wall Elevations and Details, Revision 5
D-108-012, -013, Fire Door Schedule, Revision 33
D-302-231, Series, System Flow Diagram, Fire Service, Revision 6
D-302-232, System Flow Diagram, Low Pressure CO_2, Revision 3
D-302-606, Reactor Coolant Pumps Oil Collection System, Revision 0
E-023-012, Fire Protection Evaluation - Intermediate Building, Revision 5
E-023-017, Fire Protection Evaluation - Intermediate Building Sections, Revision 3
E-023-018, Fire Protection Evaluation - Control Building, Revision 28
E-023-022, Fire Protection Evaluation - Condenser Circulating Water Pump House, Revision 5
E-911-105, Control Building, Floor and Equipment Drains, Revision 3
E-921-504, Intermediate Building, Floor and Equipment Drains, Revision 5

CALCULATIONS

DC0862A-001, Appendix R Cable Worksheets Data Summary, Revision 7
DC0862-025, Appendix R Evaluation Phase II Composite Equipment List, Revision 13
DC0862-029A, Cable Worksheets Data Summary, Revision 6
DC0862-041, Appendix R Selected Circuits and Equipment List, Revision 6
DC0862-045, Selected Success Path Diagrams, Revision 12
DC0862-061, Appendix R Analysis Misc. Computer Lists, Revision 6
DC08040-012, Protective Device Coordination, Revision 0
DC00310-003, V.C. Summer 1998 FIVE Analysis Electrical Evaluation Work Package, Revision 0
DC08320-045, Class 1E 125V DC System Voltages & Voltage Drop, Revision 12
DC03290-002, Flooding Evaluation for All Areas Except for Those Affected by the FW System, Revision 6
DC07850-001, Ionization Detector Layout, Revision 2
DC07860-006, Fire Loading Calculation (Appendix R), Revision 6

OTHER DOCUMENTS

TR08620-008, Safe Shutdown Scenarios for V.C. Summer Nuclear Station, Revision 5
TR07800-002, Analysis of Selected Success Paths for Each Fire Zone, Revision 1
V.C. Summer UFSAR Chapters 7, 8, and 9
Design Basis Document, Heating, Ventilation, and Air Conditioning, Revision 8

Design Basis Document, Fire Protection System, Revision 2
AR17735, Evaluation of Ionization Detection Layout, Revision 0
AR177355, Evaluation of Albi Duraspray, Revision 0
FPEE-P1465-003-001, Engineering Evaluation of Penetrations With Openings Equal to Penetrant Size, Revision 0
VCSNS, Thermo-Lag Related Ampacity Derating Issue and Completion of Licencing Actions for Generic Letter (GL) 92-08, dated May 5, 1998
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Fire Test Report 748-134, dated May 14, 1984
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Chemetron Fire Systems, Flow Calculations, Job FL 22425-3, dated August 22, 1977
Fire Drill Critique Sheets, FPP-026, Attachment III, 2000-2001
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Fire Protection Program Log, Transient Materials, 2000-2001
Fire Initiator Search and Fire Incident Reports, 2000-2001
Fire Protection Permit, No. 00-0332, Battery Change-out
South Carolina Fire Academy, Initial Nuclear Fire Brigade Course 9139, Revision 1
Fire Brigade and Respiratory Protection Status Report for Operations, October 2001, Revision 3
Training Attendance Record For Multiple Sessions, NTM-7, Revision9
FPP-26, Attachment III, Fire Brigade Drill Critiques for 2001, Revision 2
Preventative Task Functional Test Sheet, PTP0114.005, 8-Hour Light Inspection, completed September 27, 2001
Exide Lightguard, Model F110 and F100RT, LEC-36 Battery Unit
Fire Service Maintenance Rule, System Functional Worksheet, dated February 16, 2000
MMP-0100.006, Fill Floor Drain Loop Seals Preventative Task Worksheet 0008522, completed July 22, 2000
STP-428.061D, HVAC Fire Damper Inspection Surveillance Task Worksheet 0014432, completed March 16, 2001
STP-428.065E, HVAC Fire Damper Inspection Surveillance Task Worksheet 0009319, completed January 16, 2001
STP-728.032, Fire Barrier Inspection Surveillance Task Worksheet 0014411, completed January 24, 2001
STP-728.032, Fire Barrier Inspection Surveillance Task Worksheet 0010875, completed December 12, 2000
Albi Duraspray, Fireproofing Application Manual and Field Guide, dated March 1988
Simplex Time Recorder Company, Technical Training Manual, PER-91-024, September 1992
NEIL Fire Service Impairments, 2000-2001
Penetration Seal Program, IB 596, Segment IB5102C/IB6301F, dated October 18, 2001
Penetration Seal Program, IB 674, Segment IB5101S/IB5102N, dated October 17, 2001
Penetration Seal Program, IB 676, Segment IB5101S/IB5102N, dated October 17, 2001
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NFPA 72E, Standard on Automatic Fire Detectors, 1978 Edition
NFPA 90A, Standard on Air Conditioning and Ventilating Systems, 1981 Edition
NUREG-1552, Supplement 1, Fire Barrier Penetration Seals in Nuclear Power Plants, dated January 1999
Underwriters Laboratories (UL) Fire Resistance Directory, Design No. N712

PRIMARY IDENTIFICATION PROGRAM (PIP) REPORTS AND AUDITS

PIP 0-C-01-1216, Safe Shutdown Controls and Switches are not Being Tested
PIP 0-C-01-1255, Emergency Lights may not Provide Adequate Lighting
PIP 0-C-01-1263, Overall Fire Protection Program not Understood by All Individuals Involved
PIP 0-C-01-1318, Some Sprinkler Heads not in Compliance with NFPA Code Requirements
PIP 0-C-01-1815, Benchmark Fire Protection Organizations
PIP 0-C-01-1817, Review Closure of QA Audit Corrective Actions
PIP 0-C-01-1818, Replace Equipment That is Missing
PIP 0-L-99-0121, Operating Experience Evaluation of IN 1999-28, Recall of Star Brand Sprinkler Heads
PIP 0-L-01-0121, Operating Experience Evaluation of IN 2001-10, Failure of Central Sprinkler Company Model GB Series Sprinkler Heads
PIP 0-L-01-0123, Operating Experience Evaluation of IN 2001-12, Hydrogen Fire at Nuclear Power Station

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PIP 0-C-01-1752, Control Building Floor and Equipment Drawing Discrepancies
PIP 0-C-01-1839, NRC Triennial Fire Protection Inspection Comments (corrective actions 1-12)