

March 27, 2000

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

SUBJECT: NRC INTEGRATED INSPECTION REPORT NO. 50-395/00-01

Dear Mr. Byrne:

On February 26, 2000, the NRC completed an inspection at your Virgil C. Summer Nuclear Station. The enclosed report presents the results of that inspection.

During the six weeks covered by this inspection period, your conduct of activities at the Virgil C. Summer Nuclear Station was generally characterized by safety conscious plant operations.

Based on the results of this inspection, the NRC has determined that two violations of NRC requirements occurred. These Severity Level IV violations are being treated as non-cited violations (NCVs), consistent with Section VII.B.1.a of the Enforcement Policy. These NCVs are described in the subject inspection report. If you contest the violations or severity level of these NCVs, you should provide a response within 30 days of the date of this inspection report, with the basis for your denial, to the Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington, DC 20555-0001, with copies to the Regional Administrator, Region II, the Resident Inspector at your facility and the Director, Office of Enforcement, United States Nuclear Regulatory Commission, Washington, DC 20555-0001.

In accordance with 10 CFR 2.790 of the NRC's "Rules of Practice," a copy of this letter and its enclosure will be placed in the NRC Public Document Room.

Sincerely,

/RA/

Robert C. Haag, Chief  
Reactor Projects Branch 5  
Division of Reactor Projects

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

Enclosure: NRC Integrated Inspection Report  
cc w/encl:  
R. J. White

Nuclear Coordinator Mail Code 802  
S.C. Public Service Authority  
Virgil C. Summer Nuclear Station  
Electronic Mail Distribution

J. B. Knotts, Jr., Esq.  
Winston and Strawn  
Electronic Mail Distribution

Virgil R. Autry, Director  
Div. of Radioactive Waste Mgmt.  
Dept. of Health and Environmental  
Control  
Electronic Mail Distribution

R. Mike Gandy  
Division of Radioactive Waste Mgmt.  
S. C. Department of Health and  
Environmental Control  
Electronic Mail Distribution

R. M. Fowlkes, Manager  
Operations (Mail Code 303)  
South Carolina Electric & Gas Company  
Virgil C. Summer Nuclear Station  
Electronic Mail Distribution

April Rice, Manager  
Nuclear Licensing & Operating  
Experience (Mail Code 830)  
Virgil C. Summer Nuclear Station  
Electronic Mail Distribution

Distribution w/encl:  
 K. Cotton, NRR  
 PUBLIC

OFFICE	RII:DRP	RII:DRP	RII:DRP				
SIGNATURE							
NAME	LGarner3/24	MWidmann3/27	MKing3/27				
DATE	3/ /2000	3/ /2000	3/ /2000				
E-MAIL COPY?	YES NO	YES NO	YES NO	YES NO	YES NO	YES NO	YES NO

U. S. NUCLEAR REGULATORY COMMISSION

REGION II

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

Report No.: 50-395/00-01

Licensee: South Carolina Electric & Gas (SCE&G)

Facility: Virgil C. Summer Nuclear Station

Location: P. O. Box 88  
Jenkinsville, SC 29065

Dates: January 16 - February 26, 2000

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

Approved by: R. C. Haag, Chief, Reactor Projects Branch 5  
Division of Reactor Projects

Enclosure

## EXECUTIVE SUMMARY

Virgil C. Summer Nuclear Station  
NRC Inspection Report No. 50-395/00-01

This integrated inspection included aspects of licensee operations, maintenance, engineering, and plant support. The report covers a six-week period of resident inspection.

### Operations

- The conduct of operations was professional and safety conscious. Operators were attentive to plant conditions as demonstrated by proper response to incoming annunciators. During surveillance testing, communications and coordination between multiple operators and test unit personnel were good (Sections O1.1 and O1.2).
- The post accident hydrogen removal system was properly aligned in a standby condition. Technical specification surveillance requirements for the system had been satisfactorily completed. The reactor building portion of the hydrogen removal system had not received an engineering walkdown in approximately three years due, in part, to not requiring a system walkdown when the reactor building is accessible. Engineering management is reviewing this observation and its applicability to other system walkdowns (Section O2.1).

### Maintenance

- Observed maintenance and surveillance activities were conducted satisfactorily in accordance with written procedural instructions (Section M1.1).
- A non-cited violation was identified for the failure to perform an adequate stroke time test on two safety-related digital rod position indication cooling unit isolation valves in accordance with Technical Specification 4.0.5 (Section M8.3).
- A non-cited violation was identified for failure to perform a required technical specification surveillance of the circuit for one set of backup overcurrent protection relays for all three reactor coolant pump breakers (Section M8.4).

### Plant Support

- The licensee appropriately responded to the unavailability of 70 of a total of 106 early warning system sirens by restoring the required minimum sirens to an operable status within a reasonable time frame. The licensee made the proper notification for having less than 75 percent of the sirens available (Section P2.1).

## Report Details

### Summary of Plant Status

The plant operated at approximately 100 percent power throughout the inspection period.

## I. Operations

### **O1 Conduct of Operations**

#### O1.1 General Comments (71707)

The inspectors conducted frequent reviews of ongoing plant operations. In general, the conduct of operations was professional and safety conscious. One example of safety conscious operation during the inspection period was operations management's decision to demonstrate that both emergency diesel generators (EDGs) were operable prior to removing from service one of the two available offsite power sources for planned maintenance. Technical specifications (TS) requires that the EDGs be demonstrated as operable within 24 hours from the time the offsite circuit becomes inoperable. The inspectors recognized that the licensee was not required to take this conservative measure to test the EDGs prior to the circuit being removed from service and concluded that the decision to do so reflected safety conscious operation of the unit. Other specific events and noteworthy observations are detailed in the sections below.

#### O1.2 Plant Operations

##### a. Inspection Scope (71707)

The inspectors observed the control room activities and the performance of various testing procedures conducted on the nights of February 8, 9, and 10, 2000. The inspectors also conducted walkdowns of plant equipment to access overall facility operation and verify compliance with TS.

##### b. Observations and Findings

The inspectors observed good control of activities by the control room supervisors and good communications between the operating staff. Conduct of the observed testing procedures was professional and safety conscious including proper control room briefing of personnel prior to the start of testing. Performance of surveillance test procedures (STP) observed by the inspectors included:

- STP-105.003 "Safety Injection Valve Operability Test," Revision (Rev.) 14
- STP-105.016 "Charging Pump & Diesel Generator Slave Relay Testing," Rev. 7B
- STP-125.002 "Diesel Generator Operability Test" (for B EDG), Rev. 18
- STP-205.003 "Charging/Safety Injection Pump and Valve Test," Rev. 5C
- STP-220.002 "Turbine Driven Emergency Feedwater Pump and Valve Test," Rev. 3
  
- STP-225.001A "Diesel Generator Support Systems Pump and Valve Test,"

Rev. 5

The procedures were well coordinated with multiple operators and test unit personnel located throughout the plant. An inspector's observation involving recognition and use of a procedure note during performance of STP-125.002 was addressed through the procedure feedback process.

The inspectors verified through main control board walkdowns, safety system lineups and review of instrumentation log readings that plant operability requirements were being maintained. Proper staffing was being maintained in accordance with TS and station administrative procedure requirements and procedures. In addition, operator log acceptance criteria, channel checks and system lineups meet TS requirements. Review of control room operator logs combined with a review of the Primary Identification Program items (PIPs) provided an accurate record of station activities and ensured potential safety concerns were properly reported and tracked for resolution. Operators properly responded to incoming annunciators by announcing annunciators and referring to annunciator response procedures. The inspectors reviewed and observed several tagouts during the inspection period and concluded they were adequately prepared, properly hung and independently verified.

Generally, good housekeeping was noted throughout the plant. However, ground water intrusion in the auxiliary building and intermediate building (412-foot level) was evident. The licensee captured this condition in their corrective action program as PIP 0-C-00-0118 and revised procedures to process the ground water. Engineering department personnel were investigating methods to address and reduce water intrusion in the buildings.

c. Conclusions

The conduct of operations was professional and safety conscious. Operators were attentive to plant conditions as demonstrated by proper response to incoming annunciators. During surveillance testing, communications and coordination between multiple operators and test unit personnel were good.

**O2 Operational Status of Facilities and Equipment**

O2.1 Engineered Safety Feature System Walkdown

a. Inspection Scope (37751, 71707)

The inspectors conducted a walkdown of accessible portions of the post accident hydrogen removal (HR) system and reviewed completed surveillance tests to assess system operability.

b. Observations and Findings

The inspectors performed a walkdown of the HR system and related support systems and reviewed various completed operational and surveillance procedures. The hydrogen control system requirements are specified in TS 3.6.5.2, "Electric Hydrogen Recombiners," and TS 3.3.3.6, "Accident Monitoring Instrumentation," and system description and operation are discussed in the Final Safety Analysis Report (FSAR). The inspectors confirmed that the HR system was operable and available to meet the requirements for post accident containment combustible gas control.

The inspectors discussed with the system engineer and reviewed documents associated with various aspects of HR system maintenance rule trending and system monitoring. The inspectors reviewed the scoping, risk classification and past system history under the maintenance rule program. System performance was as expected and the licensees' performance indicator for the HR system was colored green in the monthly system status reports. At the time of this review, the system was meeting maintenance rule criteria for a(2) performance criteria. Review of the last maintenance preventable functional failure indicated appropriate actions had been implemented to prevent recurrence. The eight HR system PIPs, in the data base since July of 1998, were reviewed and no concerns were identified with their processing and status. The inspectors noted that the reactor building portion of the HR system was not required to be walked down by the system engineer when access was available during shutdowns. Discussions with the assigned engineer indicated that reactor building portions of the HR system, including the hydrogen recombiners, had not had a system walkdown in approximately three years. Engineering management is reviewing this observation and its applicability to other system walkdowns.

c. Conclusions

The post accident hydrogen removal system was properly aligned in a standby condition. Technical specification surveillance requirements for the system had been satisfactorily completed. The reactor building portion of the hydrogen removal system had not received an engineering walkdown in approximately three years due, in part, to not requiring a system walkdown when the reactor building is accessible. Engineering management is reviewing this observation and its applicability to other system walkdowns.

## **II. Maintenance**

### **M1 Conduct of Maintenance**

#### M1.1 Observation of Work Activities

##### a. Inspection Scope (61726, 62707)

The inspectors observed or reviewed all or portions of maintenance and surveillance testing activities and associated documentation listed below.

- MWR 0000925 Repair / replace door latch for steam propagation door DRAB/514 (entrance to fuel handling building)
- MWR 0001077 RBCU 1A cooling fan, XFN0064A, troubleshoot plan to investigate fan tripping on start
- MWR 0001292 Repair motor mechanism for ESF Transformer 4 Feed Circuit Switch 1826 (115 kV feed to 7.2 kV ESF electrical buses)
- PMTS 9918879 Perform replacement of IAE08263B / ICP 261.002, "Containment Hydrogen Monitor Leakage Test and Cell Maintenance," Rev. 0
- PMTS 9920581 Perform fuel inspection and reconstitution work in spent fuel pool using Westinghouse vendor procedures and FHP-602, "Limitations and Precautions for Handling New and Partially Spent Fuel Assemblies," Rev. 12B
- STP-115.001 "Penetration Isolation Verification," Rev. 12
- STP-119.001 "Electric Hydrogen Recombiner Functional Test," Rev. 6
- STP-138.001 "Post Accident Hydrogen Removal Valve Operability Test," Rev. 9
- STP-360.002 "Fuel Handling Building Bridge Area Radiation Monitor (RM-G8) Operational Test," Rev. 9
- STP-360.090 "Post Accident Hydrogen Removal to Purge Exhaust Stack Flow IFT08252 Operational Test," Rev. 2
- STP-503.003 "Functional Test of SW to EF Cross Connect Circuits," Rev. 6A

b. Observations and Findings

The inspectors observed that work was performed with the work package present and actively referenced. Activities were conducted in accordance with written procedural instructions. Procedures provided sufficient detail and guidance for the intended activities. Technicians demonstrated that they were experienced and knowledgeable of their assigned tasks. Quality control personnel were present whenever required by procedure. The inspectors noted that appropriate radiation control measures were in place when applicable. The inspectors concluded that routine maintenance and surveillance activities were satisfactorily performed.

c. Conclusions

Observed maintenance and surveillance activities were conducted satisfactorily in accordance with written procedural instructions.

**M8 Miscellaneous Maintenance Issues (37551, 92700)**

- M8.1 (Closed) Licensee Event Report (LER) 50-395/99-002-01: valve surveillance test causes system to be potentially outside the design basis. This LER documented the discovery by the licensee on March 8, 1999, that two emergency core cooling systems (ECCS) periodic surveillance test procedures directed personnel to position three ECCS valves at power contrary to the positions required by TS surveillance requirement 4.5.2,

“ECCS Subsystems - Tavg  $\geq$  350°F.” The subject LER was previously discussed in NRC Inspection Report No. 50-395/99-07, Section M8.1, and dispositioned as non-cited violation (NCV) 50-395/99007-03. The violation was entered into the licensee’s corrective action program as PIP 0-C-99-0186. The LER revision documents further licensee review and evaluation of the event and addresses the probabilistic consequences. The licensee provided estimates for time in these test conditions (8.7 hours per year) and determined this to have a low risk consequence. A review of these evaluations and the resulting probabilistic risk assessments by the inspectors and regional personnel concluded that this conclusion was reasonable.

- M8.2 (Closed) LER 50-395/00-001-00: missed surveillance on control room evacuation panel B steam generator wide range level indicator. This licensee discovered on January 7, 2000, that the surveillance calibration had not been performed on instrument ILT00477A at the frequency prescribed in TS. STP-345.056, “Steam Generator B Wide Range Level Instrument ILT00477A Calibration,” Rev. 5, was last performed on April 27, 1997, and should have been performed on or before October 25, 1998. TS Surveillance Requirement 4.3.3.5 specifies a calibration interval of 18 months. The licensee promptly performed the surveillance on January 7. No problems were identified and no equipment adjustments were required as a result of the surveillance. The event was entered into the corrective action program as PIP 0-C-00-0036. The event was attributed to a personnel error, in that, a rollover from an old tracking database to a new tracking database created an error in due date calculations. A licensee review found no similar errors in the surveillance tracking system.

The instrument is required by TS 3.3.3.5, “Remote Shutdown Instrumentation,” and FSAR Section 7.4, “Systems Required For Safe Shutdown,” lists this indicator as necessary equipment for achieving and maintaining a hot shutdown condition in the event a control room evacuation is required. The inspectors determined there was little safety consequence associated with the missed surveillance since this instrument was within tolerance when tested and the instrument had no control or protection functions. In addition, a redundant B steam generator wide range indication was available outside the control room. Thus, the singular failure to calibrate the instrument within the allowable TS frequency constitutes a violation of minor significance and is not subject to formal enforcement action.

- M8.3 (Closed) LER 50-395/00-002-00 and -01: inadequate surveillance on two safety-related valves operated by a common switch. While researching an indication problem that occurred during performance of STP-123.003A, “Train A Service Water Valve Operability Test,” Rev. 4, the licensee identified that the method used to close stroke time test two valves was not valid. Specifically, XVT03165-SW and XVT03169-SW, Service Water to Digital Rod Position Indication (DRPI) Cooling Unit Coil Isolation Valves, share a common control switch and indication in the control room. The closed stroke time was measured from actuation of the close switch until only the common green closed indication light was lit. However, due to the valves’ position indication wiring configuration, this did not correspond to an actual closed position on both valves. The

licensee revised STP-123.003A to re-performed the test using indications on the integrated plant computer system isolation cards which only change state when a valve is in the full closed position. Retest results indicated that each valve met the established acceptance criteria of 20 seconds. For comparison, the retest measured the stroke times as 19.0 and 8.9 seconds for XVT03165-SW and XVT03169-SW respectively whereas the earlier erroneous test determined that the time was 14.5 seconds. Based on the inspectors' review of the wiring diagram, and system drawings and FSAR description, the inspectors agreed with the licensee's engineer that the valves were operable and available to perform their function. The system engineer recommended to the maintenance department to lubricate and adjust the packing as necessary to shorten the stroke time of XVT03165-SW. The licensee reviewed other valves that use a common control switch and indication and have not identified other test deficiencies.

The DRPI cooling coils are non-safety equipment, but the valves are classified as safety-related. The valves close on a safety injection signal to isolate potential leak paths from the service water system and maximize service water flow to the operating reactor building cooling unit. The improper test method, which had been utilized by the licensee since initial plant operation, had the potential to mask valve degradation. However, visual local valve position verification during each refueling outage provided an opportunity to detect an improperly closing valve. The failure to properly stroke time test XVT03165-SW and XVT03169-SW as required by TS 4.0.5, "Surveillance Requirements" and the inservice test program is a violation of TS 4.0.5. This severity level IV violation is being treated as an NCV, consistent with Section VII.B.1.a of the NRC Enforcement Policy. This violation is identified as NCV 50-395/00001-01 and has been placed in the licensee's corrective action program as PIP 0-C-00-0041.

- M8.4 (Closed) LER 50-395/00-003-00: missed surveillance test for penetration overcurrent protection technical specification. During a review of STP-502.001, "7.2 KV Breaker Test," Rev. 7A, the licensee identified that surveillance functional tests had not tested all portions of each reactor coolant pump (RCP) breaker overcurrent protection circuits. The tests failed to pass a current through one of the two backup overcurrent protection circuits to verify the function of the wiring and contacts. TS 4.8.4.1, "Electrical Equipment Protection Devices" required that each protective relay be calibrated and an integrated functional test be performed to verify that each relay and associated circuit breakers and control circuits function as designed. The relay calibrations were performed, but complete integrated functional tests were not performed. From the time of discovery the licensee tested the missed portion of the RCP circuits satisfactorily within approximately 26 hours of the 72-hour TS allowed action statement time. The licensee discovered the problem during the review of FSAR Figure 8G-2, "Containment Penetration Conductor Overcurrent Protection Devices."

This condition existed since initial plant operation began and was attributed to a deficiency in the original test procedure. The significance of the deficiency was minimized since the primary penetration overcurrent protection relays and circuits, as well as, portions of the backup circuits were being tested. TS 4.8.4.1.a.1.(a) and (b) require that each protective relay be calibrated and an integrated functional test be performed to verify that each relay and associated circuit breakers and control circuits function as designed. The failure to functionally test portions of the breaker control circuits is a violation of TS 4.8.4.1. This severity level IV violation is being treated as an

NCV, consistent with Section VII.B.1.a of the NRC Enforcement Policy. This violation is identified as NCV 50-395/00001-02 and is in the licensee's corrective action program as PIP 0-C-00-0080.

#### **IV. Plant Support**

##### **R1 Radiological Protection and Chemistry (RP&C) Controls**

###### **R1.1 General Comments (71750)**

The inspectors observed radiological controls during conduct of routine inspections and observation of operation and maintenance activities and found them to be acceptable.

##### **P2 Status of EP Facilities, Equipment, and Resources**

###### **P2.1 Adverse Weather Conditions Impact Station**

###### **a. Inspection Scope (71750)**

The inspectors reviewed the licensee's response to loss of emergency notification system equipment for the station due to a snow and ice storm.

###### **b. Observations and Findings**

On January 24, a snow and ice storm entered the Virgil C. Summer Station area, as well as the surrounding areas, that affected the availability of sirens associated with the early warning siren system. At one point during the storm, 70 of the 106 sirens (approximately 66 percent) were out of service. The licensee made a one-hour notification to the NRC in accordance with 10 CFR 50.72(b)(1) non-emergency reporting requirements. State and local officials were also notified of the out-of-service sirens. The licensee worked with the four local power companies that supply power to the sirens to restore their availability. On January 25 the minimum level of required operable sirens, 75 percent, was achieved. The inspectors noted during their review that during the regular weekly scheduled test performed on January 24 prior to the storm, 97.17 percent of sirens were available. The licensee documented this event in the corrective action program as PIP 0-C-00-0096. The storm also caused numerous power outages in the surrounding areas for several days, but the plant continued to operated at full power without incident.

###### **c. Conclusions**

The licensee appropriately responded to the unavailability of 70 of a total of 106 early warning system sirens by restoring the required minimum sirens to an operable status within a reasonable time frame. The licensee made the proper notification for having less than 75 percent of the sirens available.

#### **V. Management Meetings**

**X1 Exit Meeting Summary**

The inspectors presented the inspection results to members of licensee management at the conclusion of the inspection on March 2, 2000. The licensee acknowledged the findings presented.

The inspectors asked the licensee whether any materials examined during the inspection should be considered proprietary. No proprietary information was identified.

**PARTIAL LIST OF PERSONS CONTACTED**Licensee

J. Archie, Manager, Planning & Scheduling  
 F. Bacon, Manager, Chemistry Services  
 L. Blue, Manager, Health Physics and Radwaste  
 M. Browne, Manager, Plant Support Engineering  
 S. Byrne, General Manager, Nuclear Plant Operations  
 R. Clary, Manager, Plant Life Extension  
 C. Fields, Manager, Quality Systems  
 M. Fowlkes, Manager, Operations  
 L. Hipp, Manager, Nuclear Protection Services  
 G. Moffatt, Manager, Design Engineering  
 K. Nettles, General Manager, Nuclear Support Services  
 A. Rice, Manager, Nuclear Licensing and Operating Experience  
 G. Taylor, Vice President, Nuclear Operations  
 R. White, Nuclear Coordinator, South Carolina Public Service Authority  
 B. Williams, General Manager, Engineering Services  
 G. Williams, Manager, Maintenance Services

**INSPECTION PROCEDURES USED**

IP 37551: Onsite Engineering  
 IP 61726: Surveillance Observations  
 IP 62707: Maintenance Observations  
 IP 71707: Plant Operations  
 IP 71750: Plant Support Activities  
 IP 92700: Onsite Followup of Written Reports of Nonroutine Events at Power Reactor Facilities

## ITEMS OPENED, CLOSED, AND DISCUSSED

Opened

50-395/00001-01	NCV	inadequate surveillance identified for the performance of individual ISI test on two safety-related valves operated by a common switch (Section M8.3)
50-395/00001-02	NCV	missed surveillance test for penetration overcurrent protection relay circuit on all three RCPs (Section M8.4)

Closed

50-395/99-002-01	LER	valve surveillance test causes system to be potentially outside the design basis - revised (Section M8.1)
50-395/00-001-00	LER	missed surveillance on control room evacuation panel B steam generator wide range level indicator (Section M8.2)
50-395/00-002-00, -01	LER	inadequate surveillance on two safety-related valves operated by a common switch (Section M8.3)
50-395/00001-01	NCV	inadequate surveillance identified for the performance of individual ISI test on two safety-related valves operated by a common switch (Section M8.3)
50-395/00-003-00	LER	missed surveillance test for penetration overcurrent protection technical specification (Section M8.4)
50-395/00001-02	NCV	missed surveillance test for penetration overcurrent protection relay circuit on all three RCPs (Section M8.4)