



UNITED STATES  
 NUCLEAR REGULATORY COMMISSION  
 REGION II  
 101 MARIETTA STREET, N.W., SUITE 2900  
 ATLANTA, GEORGIA 30323-0199

Report No.: 50-395/93-26

Licensee: South Carolina Electric & Gas Company  
 Columbia, SC 29218

Docket No.: 50-395

License No.: NPF-12

Facility Name: Virgil C. Summer Nuclear Station

Inspection Conducted: November 21 through December 31, 1993

Inspectors:	<u>For R. W. Wright</u>	<u>1/13/94</u>
	R. C. Haag, Senior Resident Inspector	Date Signed
	<u>For R. W. Wright</u>	<u>1/13/94</u>
	T. R. Farnholtz, Resident Inspector	Date Signed
Approved by:	<u>Floyd S. Cantrell</u>	<u>1/14/94</u>
	Floyd S. Cantrell, Chief Reactor Projects Section 1B Division of Reactor Projects	Date Signed

SUMMARY

Scope:

This routine inspection was conducted by the resident inspectors onsite in the areas of monthly surveillance observations, monthly maintenance observations, operational safety verification, review of licensee evaluations regarding changes to the environs around licensed reactor facilities, onsite follow-up of written reports of nonroutine events at power reactor facilities, and action on previous inspection findings. Selected tours were conducted on backshift or weekends. These tours were conducted on four occasions.

Results:

No violations or deviations were identified.

Several minor problems were noted with observed maintenance activities. They involved poor labeling of lubricants and post maintenance testing instructions which lacked sufficient details. A new procedure for oil additions to pump bearings thoroughly addressed previous problems in this area (paragraph 4). The documentation of actions to comply with TS for an inoperable containment isolation valve was poor (paragraph 5). The licensee does not have a formalized program for periodic review of changes to the surrounding area for new hazards. However, there appears to be adequate means available to recognize changes in the surrounding environs and evaluate their impact on the plant (paragraph 6).

## REPORT DETAILS

### 1. Persons Contacted

#### Licensee Employees

- W. Baehr, Manager, Health Physics
- \*C. Bowman, Manager, Maintenance Services
- M. Browne, Manager, Design Engineering
- L. Faltus, Acting Manager, Chemistry Services
- \*M. Fowlkes, Manager, Nuclear Licensing & Operating Experience
- \*S. Furstenberg, Associate Manager, Operations
- \*S. Hunt, Manager, Quality Systems
- \*A. Koon, Nuclear Operations Project Coordinator
- \*D. Lavigne, General Manager, Nuclear Safety
- \*J. Nesbitt, Acting Manager, Technical Services
- \*K. Nettles, General Manager, Station Support
- \*H. O'Quinn, Manager, Nuclear Protection Services
- \*M. Quinton, General Manager, Engineering Services
- \*J. Skolds, Vice President, Nuclear Operations
- \*G. Taylor, General Manager, Nuclear Plant Operations
- \*R. Waselus, Manager, Systems and Performance Engineering
- \*R. White, Nuclear Coordinator, South Carolina Public Service Authority
- B. Williams, Manager, Operations

Other licensee employees contacted included engineers, technicians, operators, mechanics, security force members, and office personnel.

\*Attended exit interview

Acronyms and initialisms used throughout this report are listed in the last paragraph.

### 2. Plant Status

The plant operated at or near 80 percent power for the purpose of conserving fuel from the beginning of the inspection period until December 1, 1993 when a power increase was commenced. Reactor power reached 100 percent on December 2, 1993 and operated at that level for the remainder of the inspection period. On December 8, 1993, the licensee conducted an emergency preparedness drill. The inspector observed activities in the technical support center during the drill.

Other inspections or meetings:

- During the week of December 6, 1993, a regional inspection in reference to Generic Letter 89-10, Motor Operated Valves, was performed (NRC Inspection Report No. 395/93-27).
- During the week of December 13, 1993, a regional inspection in the area of Health Physics was performed (NRC Inspection Report No. 395/93-28).

### 3. Monthly Surveillance Observation (61726)

The inspectors observed surveillance activities of safety related systems and components listed below to ascertain that these activities were conducted in accordance with license requirements. The inspectors verified that required administrative approvals were obtained prior to initiating the test, testing was accomplished by qualified personnel in accordance with an approved test procedure, test instrumentation was calibrated, and limiting conditions for operation were met. Upon completion of the test, the inspectors verified that test results conformed with technical specifications and procedure requirements, any deficiencies identified during the testing were properly reviewed and resolved and the systems were properly returned to service. Specifically, the inspectors witnessed/reviewed portions of the following test activities:

- a. Train "B" solid state protection system (SSPS) surveillance testing (STP 345.074). During normal operation of the SSPS, the OPERATE/TEST switch is in OPERATE and supplies the master and slave relays with 120 VAC. During testing, the OPERATE/TEST switch is placed in TEST and supplies 15 VDC to the slave relays through a master relay selector switch and a test pushbutton. This allows continuity testing of the coils in the slave relays without causing the relays to change state. During the performance of this procedure on December 3, 1993, the OPERATE/TEST switch was placed in TEST, the master relay selector switch was placed in test position 1, and the test pushbutton was depressed. No evidence of the 15 VDC test voltage was present. Other positions of the master relay selector switch were tried with the same result. The test was halted at this point and a troubleshooting plan was developed to determine the cause of the problem. The plan was developed using what was thought to be an accurate schematic diagram of the SSPS. In accordance with the troubleshooting plan, the OPERATE/TEST switch was repositioned to OPERATE. This occurred while the master relay selector switch remained in position 1 from earlier testing. The slave relays associated with the master relay in test position 1 received 120 VAC and resulted in a partial phase "A" containment isolation.

To recover from this action, the "B" train SSPS was returned to a normal, at power, configuration. The licensee verified that all slave relays that should have changed state from the affected master relay did change state and verified that all components associated with each slave relay performed as expected. The inspector noted that this verification was successfully completed in an orderly manner.

Following the plant recovery, an effort was made to determine why this unexpected event occurred. A theory was proposed that the schematic diagram which was used to develop the troubleshooting plan had not been changed to reflect a wiring change that was completed in the early 1980's. The licensee found a record of the suspected

modification which showed that it was done in 1984, but the drawing was not updated following the modification. The drawing was corrected and a procedure change was initiated to reflect the actual configuration to avoid future problems of this type. A review of other SSPS drawings and work documents was performed by the licensee to determine if other drawing errors existed. Two other SSPS drawings affected by the same 1984 modification had not been updated. These drawings were revised. No other drawing errors were discovered. Due to changes in the process for drawing revisions, which are now completed by the licensee verses a contractor, the licensee believes that similar drawing errors would not occur for recent modifications.

The licensee concluded that the original problem was in the OPERATE/TEST switch while in the TEST position and that the system was fully operable with the switch in the OPERATE position. This was based on indications observed during the test and the fact that the green indicating light, which verifies the presences of 120 VAC to the master relay, was illuminated when the switch was in the OPERATE position. The inspector reviewed the circumstances and agreed with the licensee's operability determination.

A repair plan was written to replace the OPERATE/TEST switch if the switch failed to function as required during the performance of the next surveillance test on December 10, 1993. The inspector observed this surveillance test. No problems were encountered and the switch was not replaced. The licensee is continuing to review this event and the problem associated with the OPERATE/TEST switch. The decision not to replace the switch until an additional failure occurs or during the next plant shutdown, was based on the potential risk that the SSPS may not operate properly after the replacement or that an inadvertent actuation could occur during the replacement process.

- b. Service water booster pump "A" surveillance testing (STP 223.002). During performance of this test, a flow indicator on the main control board (FI-4466) did not function as expected. The licensee vented the lines supplying the transmitter which solved the problem and the indicator read properly. The licensee's system engineering group initiated a root cause evaluation of this problem to determine if anything can be done to avoid future problems of this type.
- c. Reactor building (RB) escape hatch interlock test (STP 215.001B). Prior to testing the door seals, the interlocks were tested to insure that only one door can be opened at a time. Test personnel experienced difficulty when trying to close the outer door using the operating mechanism inside the RB. After an adjustment was made on the outer door, the test was completed satisfactorily.
- d. Reactor building closeout inspection (STP 109.001). TS 4.5.2.c requires a visual inspection to verify that no loose debris is in the RB. During the RB entry to work on the escape hatch, the

inspector noted effective usage of the material inventory sheet to ensure that all items taken into the RB were also taken out of the RB. The presence of a QC inspector on the team entering the RB aided in the verification that material was properly controlled.

The observed tests were performed in accordance with procedural requirements and demonstrated acceptable results.

#### 4. Monthly Maintenance Observation (62703)

Station maintenance activities for the safety-related systems and components listed below were observed to ascertain that they were conducted in accordance with approved procedures, regulatory guides, and industry codes or standards and in conformance with TS.

The following items were considered during this review: that limiting conditions for operation were met while components or systems were removed from service, approvals were obtained prior to initiating the work, activities were accomplished using approved procedures and were inspected as applicable, functional testing and/or calibrations were performed prior to returning components or systems to service, activities were accomplished by qualified personnel, parts and materials used were properly certified, and radiological and fire prevention controls were implemented. Work requests were reviewed to determine the status of outstanding jobs and to ensure that priority was assigned to safety-related equipment maintenance that may affect system performance. The following maintenance activities were observed:

- a. Replacement of tubing on the actuators for condenser steam dump valves IFV2117 and IFV2116 (MWR 93I3176 and MWR 93I3177). All 3/8 inch tubing and fittings were replaced on these two steam dump valve actuators.
- b. Preventive maintenance on service water pump "A" (PMTS P0172983). This maintenance included cleaning inside the speed switch cabinets. During this cleaning, the inspector noted that the paint on the inside of the cabinets was peeling and flaking. The licensee wrote a nonconformance notice (NCN 4870) on this condition. The disposition was to vacuum/remove existing flaking paint and repaint the inside of the cabinet. The inspector noted that this work was performed satisfactorily and no further problems were encountered.
- c. Five year inspection of the coupling for "C" charging pump speed reducer (PMTS P0162940). Both the coupling pins and mating holes were measured and verified to be within the specified tolerances.
- d. Preventive maintenance on "C" charging pump air handling unit XAH0002 (PMTS P0172866 and P0172867). Work included inspection of the filters, inspection and cleaning of the cooling coils and fan, and lubrication of the unit. The filters were replaced due to a small accumulation of oil on the filters. The inspector noted that

the grease gun used to lubricate the fan bearings had no material identification markings. A mechanic stated that the grease cartridge inside the gun had the required material labeling. The inspector considered this a poor practice not to label the outside of the grease gun with type of lubricant to help prevent any possible misapplication. The licensee informed the inspector that it was their expectation for grease guns to have material identification labeling on the outside. The licensee inspected other grease guns in storage lockers and found 5 additional guns without the required outer labels. These were immediately labeled. Also, the inspector noted a significant amount of rust and flaking paint on the chill water vent and drain valves associated with all three air handling units. The licensee was informed of this condition.

- e. Replacement of the constant oil levelers on "A" service water booster pump XPP45A and the annual change of the pump bearing oil (MWR 93M3213). Previously, the inspectors had identified that the instructions for adding oil to pump bearings with constant oil levelers were incomplete. For one of the emergency feedwater pumps, the inspectors noted that the oil bearing oil level was below the vendors recommended level. As part of the corrective action the licensee developed a new maintenance procedure, MMP 300.033, Change Oil in Pumps Equipped With Trico OPTO-MATIL Oilers. The inspectors reviewed this procedure and noted the comprehensive instructions for changing and adding oil for these types of bearings. In addition, several constant oil levelers were changed out such that for safety-related application only one style of oiler will be utilized.
- f. Semi-annual inspection of oil level in the dashpot for service water booster pump discharge check valve XVC3135A (PMTS P0173074).
- g. Inspection and lubrication of the motor operator for mainsteam supply valve to the turbine driven EFW pump XVG2802A (PMTS P0169331). During the work on the motor operator, the electrician identified a small valve packing leak and then initiated action to repack the valve. This was a good example of maintenance personnel looking beyond the specific scope of their work instruction and providing a broader assessment of the component.
- h. Replacement of a shear pin in the RB escape hatch right angle gear drive assembly (MWR 93M3296). Earlier repair work in the RB had required several RB entries through the escape hatch. During one of these entries, the shear pin associated with the inner door was discovered to be broken. The shear pin was replaced with no difficulty. While reviewing the work instructions, the inspector noted that the post maintenance testing was limited and provided no specific acceptance criteria. The wording used was "Door Operates Properly". While the inspector noted that subsequent testing

required by the TS, i.e., interlock and door seal test, would be performed after the shear pin maintenance, it appeared that post maintenance testing instructions for that specific activity lacked appropriate details.

The maintenance activities observed were well executed and procedural were followed. Minor problems were noted with material (lubricant) labeling and the level of details provided in post-maintenance testing instructions. A new procedure for oil additions to pump bearings was comprehensive.

## 5. Operational Safety Verification (71707)

### a. Plant Tour and Observations

The inspectors conducted daily inspections in the following areas: control room staffing, access, and operator behavior; operator adherence to approved procedures, TS, and limiting conditions for operations; and review of control room operator logs, operating orders, plant deviation reports, tagout logs, and tags on components to verify compliance with approved procedures.

The inspectors conducted weekly inspections for the operability verification of selected ESF systems by valve alignment, breaker positions, condition of equipment or component(s), and operability of instrumentation and support items essential to system actuation or performance. The residual heat removal system and the high head safety injection ~~system~~ were included in these inspections.

Plant tours included observation of general plant/equipment conditions, fire protection and preventative measures, control of activities in progress, radiation protection controls, physical security controls, plant housekeeping conditions/cleanliness, and missile hazards. Reactor coolant system leak rates were reviewed to ensure that detected or suspected leakage from the system was recorded, investigated, and evaluated; and that appropriate actions were taken if required. Selected tours were conducted on backshifts or weekends.

For service water (SW) temperatures less than or equal to 65 degrees Fahrenheit, the chill water (VU) system is operated with one train running and the other train in standby. For this mode of operation, SW flows for the VU chillers are also balanced to the current chiller load. This is accomplished by throttling the chiller outlet SW flow. Instructions for measuring the required parameters, calculating chiller loads, and graphs for verifying the SW temperature is acceptable are provided in System Operating Procedure, SOP-117. The graphs require that chiller load and SW outlet temperature be plotted to ensure they fall within the acceptable operating region of the graph.

While reviewing the recent heat balance calculations for the three chillers, the inspector noted that only a small portion of the graphs were used. With the small scale increments for temperature (degrees F) and load (BTUs) on the graph, the ability to plot accurate points was made difficult. Since less than a fourth of the graph was used, the inspector questioned why the applicable portion of the graph is not enlarged with larger scale increments. The licensee stated that they would review this improvement item.

b. Control of Inoperable Equipment

While reviewing the operating logs, the inspector noted that containment air sample return isolation valve, PCV9312B, failed to fully close while testing Train "B" slave relays on December 27, 1993. Also, the valve would not fully close while using the hand switch in the control room. The valve was declared inoperable and a removal and restoration (R&R) checksheet was initiated as part of the licensee equipment control process.

Since PCV9312B is a containment isolation valve, the action statement of TS 3.6.4 applied for the inoperable valve. One action method of complying with TS 3.6.4 is to isolate each affected penetration within four hours by use of a deactivated valve secured in the isolation position. Yet when reviewing the R&R sheet and the log book there was no mention that the associated containment isolation valve had been closed or deactivated. There was a note on the R&R sheet to isolate the penetration within the four hour time clock specified in TS 3.6.4, but there was no indication that the penetration had actually been isolated. Also the R&R referenced a related Danger Tag which removed the control power fuses for XVA9312A. On the Danger Tag Log coversheet there was a safety reminder to ensure the valve was closed, but there was no specific instructions nor signoff for closing the valve.

In review of the licensee's actions for this inoperable valve, the inspector concluded that the documentation to support TS compliance for this condition was poor. This was based on 1) the R&R being classified as a "Tracking" R&R verses an "Action" R&R when the TS action statement was entered, 2) no factual statement in the R&R nor control room log book that the penetration had been isolated by closing a valve, and 3) the Danger Tag did not provide specific instruction to close the valve nor did it have a signoff that verified the valve was closed. These items were discussed with plant management. While there was agreement that the documentation could have been improved they maintained that the valve was indeed closed to comply with TS. During review of the documentation and conversation with plant personnel, the inspector found no evidence that the valve had not been closed. The licensee informed the inspector that an upcoming revision of the R&R governing procedure will provide clarification on categorizing R&Rs.

6. Review of Licensee Evaluations Regarding Changes to the Environs Around Licensed Reactor Facilities (Temporary Instruction 2515/112)

This inspection was performed to verify that the licensee properly evaluated safety issues which had arisen from changes made near the reactor site involving population distribution or the introduction of new industrial, military, or transportation hazards. The following documents were reviewed by the inspectors during this effort:

- Final Safety Analysis Report (FSAR)
- NUREG-0717, Safety Evaluation Report Related to the Operation of Virgil C. Summer Nuclear Station
- NUREG-0719, Final Environmental Statement Related to the Operation of Virgil C. Summer Nuclear Station
- 10 CFR Parts 50.71 and 100
- NRC Generic Letter 81-06, Periodic Updating of Final Safety Analysis Reports
- Annual Radiological Environmental Monitoring Reports

Through these reviews and discussions with licensee personnel, the inspectors determined that the licensee did not have a specific program to periodically review the local area around the reactor site for new hazards. However, the licensee considered that a compilation of various plant procedures and practices provided a means to adequately identify, evaluate, and report any safety significant changes to the surrounding environment.

No requirements were found in the licensee procedures which required a periodic review of the environs to specifically identify and evaluate site proximity hazards. Nevertheless, licensee personnel were aware of these types of changes through routine communications/meetings with county emergency planning organizations. This communication focused primarily on potential evacuation of the nearby population. A recent example of this type of communication involved a new high school in one of the surrounding counties. While the new school was outside of the EPZ 10 mile radius, county officials inquired if any additional actions were needed in response to this change in population density. Also, the TS requires a land use census be performed annually. This census includes the land located within five miles of the plant, but focuses primarily on the radiological environmental monitoring program.

The inspectors reviewed Chapters 2, 3 and 13 of the FSAR and toured the immediate vicinity surrounding the site to identify potentially new safety hazards. The tour included the facilities at the Parr location, the area surrounding Lake Monticello, the dam for Lake Monticello and the hydro/pump storage facility. No unreviewed safety hazards were identified. The inspectors noted that Chapter 2 of the FSAR regarding

surrounding site characteristics contained most of the original FSAR pages. During the surrounding site tour, it was recognized that some information in Chapter 2 was no longer correct. Examples of changes were the closing of a local elementary school and several industry sites and minor changes in residential locations. For the noted changes, the impact between V. C. Summer station and the surrounding area was lessened. Generic Letter 81-06, Periodic Updating of Final Safety Analysis Reports, states that minor differences between actual and projected population figures or other such changes in the site environment need not be reported unless the conclusions of safety analyses relative to public health and safety are affected.

In conclusion, the inspectors found that the applicable chapters in the FSAR addressed the current safety hazards around the site. The licensee's method for monitoring the environs for potential hazards was considered to be informal. The rural setting of the plant combined with previous slow growth rate for the area contributed to the unchange impact that the surrounding environs had on the plant. There are no indications that these factors will change in the future. The licensee acknowledged the need on their part to be aware of changes in the environs and the need to evaluate the impact between these changes and the operation of the V. C. Summer Station.

7. Onsite Followup of Written Reports of Nonroutine Events at Power Reactor Facilities (92700)

(Closed) LER 92-08, Loss of One Source of Offsite Power.

Due to a short on a high voltage transmission line and the slow opening time for the oil circuit breaker (OCB) that connects this line to the V. C. Summer switchyard, a portion of the switchyard was isolated and de-energized. The switchyard has backup relaying protection which senses an OCB opening slowly or not opening for a faulted condition and initiates trip signals to completely isolate the applicable portion of the switchyard. Since the "B" ESF bus is fed from this portion of the switchyard, the bus lost its normal power supply and the "B" emergency diesel generator started and connected to the bus.

After troubleshooting and testing of the OCB, the licensee identified that a partial failure of a roller bearing in the OCB trip actuating device was the most likely cause of the slow OCB opening. The bearing was modified to prevent recurrence of this problem. The other switchyard OCBs were scheduled for similar modifications. Until these modifications were completed, the OCB bearings were inspected on a monthly basis. Recently, the modifications were completed for all the V. C. Summer switchyard OCBs.

8. Action on Previous Inspection Findings (92701 and 92702)

(Closed) Inspector Followup Item 92-10-03, Failure of PORV (PCV445B) to Open Satisfactorily After Successive Strokings of the Valve.

When testing the PORV after seat leakage repairs, the licensee noted inconsistent stroke times for the valve. During successive stroking of the valve to determine the baseline stroke time, the opening times would start to increase after several valve cycles. The increasing open stroke time started after two cycles to open and close the valve. Due to the limiting open time (5.0 to 5.5 seconds) requirement, the PORV was not declared operable.

The licensee pursued two courses of action in response to the inconsistent stroke times. The PORV open stroke time requirements were re-analyzed. The results indicated that the PORVs will continue to perform their original operational design basis function provided they fully open within 7.3 seconds. Also during the past refueling outage, the supply airlines for all three PORVs were disconnected and blowdown to remove any foreign material which could have been partially clogging the airlines. Subsequently, the stroke times for the PORVs were tested satisfactorily. The licensee is also evaluating the removal of the air regulator in the supply airlines, since they appear to be the most susceptible item to become clogged due to foreign material.

(Closed) Notice of Violation 92-19-01 and LER 92-007, Failure to Adequately Test Reactor Trip Bypass Breakers Prior to Placing Them In Service. The licensee's response to this violation is described in a letter dated December 17, 1992.

TS 3.3.1 required that the local manual shunt trip feature be tested prior to placing the bypass reactor trip breakers in service. A push button located on the breaker cubical was provided to accomplish the shunt trip testing. The reactor trip breakers also have a local mechanical trip feature via a trip button on the front of the breaker. The procedure for installing and testing the bypass breaker did not specify which method/trip button should be used to verify the shunt trip mechanism was working properly. Due to a lack of documentation on the method used for testing the shunt trip, the licensee was unable to determine the number of occasions when the TS testing requirements were not satisfied. Corrective action included a procedure enhancement to clearly define the method for complying with TS testing requirement. Also the trip buttons were relabeled to clearly define their function. The inspectors have noted these changes during previous testing and installation of the bypass breakers and concluded that the instructions were adequate.

9. Exit Interview (30703)

The inspection scope and findings were summarized on January 4, 1994, with those persons indicated in paragraph 1. The inspectors described the areas inspected and discussed the inspection findings.

No dissenting comments were received from the licensee. The licensee did not identify as proprietary any of the materials provided to or reviewed by the inspectors during the inspection.

## 10. Acronyms and Initialisms

EFW	Emergency Feedwater
EPZ	Emergency Planning Zone
ESF	Engineered Safety Feature
LER	Licensee Event Report
MMP	Mechanical Maintenance Procedure
MWR	Maintenance Work Request
NCN	Nonconformance Notice
NRC	Nuclear Regulatory Commission
NRR	Nuclear Reactor Regulation
CCB	Oil Circuit Breaker
PMTS	Preventive Maintenance Task Sheet
PORV	Power Operated Relief Valve
QC	Quality Control
RB	Reactor Building
RCS	Reactor Coolant System
R&R	Removal and Restoration
RWP	Radiation Work Permit
SOP	System Operating Procedure
SPR	Special Report
SSPS	Solid State Protection System
STP	Surveillance Test Procedure
SW	Service Water
TS	Technical Specification
VAC	Volts Alternating Current
VDC	Volts Direct Current
VU	Chill Water