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

Report No.: 50-395/95-16

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: September 1-30, 1995

Inspectors: _____ 10/18/95
T. R. Farnholtz, Resident Inspector Date Signed

Approved by: _____ 10/18/95
H. O. Christensen, Chief Date Signed
Reactor Projects Branch 1B
Division of Reactor Projects

SUMMARY

Scope:

This routine inspection was conducted by the resident inspector onsite in the areas of operational safety verification; maintenance observations; surveillance observations; onsite engineering; plant support activities and followup on previous inspection findings. Selected tours were conducted on backshift or weekends. These tours were conducted on September 4, 24, and 26, 1995.

Results:

Operations

Operators lacked of a questioning attitude and indicated a willingness to accept locked in alarms when monitoring the control room heating, ventilation and air conditioning panel.

Maintenance and Surveillance

Planning for the "A" heat exchanger gasket replacement was deficient in that the wrong gasket was purchased and this was not detected until the work had begun.

Maintenance associated with troubleshooting/repair of the safety injection pump auxiliary oil pump were considered marginally effective because of the need to reperform troubleshooting to identify a blown fuse and the need to disassemble the pump a second time to repair oil leaks.

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REPORT DETAILS

1. Persons Contacted

Licensee Employees

F. Bacon, Manager, Chemistry Services
*L. Blue, Manager, Health Physics
*M. Browne, Manager, Design Engineering
*S. Byrne, General Manager, Nuclear Plant Operations
*H. Fields, Manager, Materials & Procurement
*M. Fowlkes, Manager, Nuclear Licensing & Operating Experience
*S. Furstenberg, Manager, Maintenance Services
*S. Hunt, Manager, Quality Systems
D. Lavigne, General Manager, Nuclear Safety
*G. Moffatt, Manager, Planning & Scheduling
*J. Nesbitt, Manager, Technical Services
K. Nettles, General Manager, Station Support
*H. O'Quinn, Manager, Nuclear Protection Services
*M. Quinton, General Manager, Engineering Services
*R. Stokes, Systems & Component Engineering
G. Taylor, Vice President, Nuclear Operations
R. Waselus, Manager, Systems & Component Engineering
R. White, Nuclear Coordinator, SC Public Service Authority
B. Williams, Manager, Operations
*G. Williams, Associate Manager, Operations

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

NRC Personnel

*T. Farnholtz, Resident Inspector

*Attended exit interview

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

2. PLANT STATUS AND ACTIVITIES

The plant operated at or near 100 percent power during the entire inspection period.

3. OPERATIONS

Plant Operations (71707)

The inspector conducted daily inspections in the following areas: control room staffing, access, and operator responsiveness; operator adherence to approved procedures, TS, and limiting conditions for operations; status of control room annunciators and instrumentation; and review of control room operator logs, operating orders, plant deviation

reports, tagout logs, equipment out-of-service log, and tags on components to verify compliance with approved procedures. Routinely, the inspector attended the operations shift turnover meetings. The inspector conducted weekly inspections for the operability verification of selected ESF systems by valve alignment, breaker positions, condition of equipment or components, and operability of instrumentation and support items essential to system actuation or performance. The safety-related chilled water and reactor building instrument air systems were included in these inspections. Plant tours included observation of general plant/equipment conditions, control of activities in progress, 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.

a. ESF System Walkdown

The inspector verified the operability of an ESF system by performing a walkdown of the diesel fuel oil system. The inspector confirmed that the licensee's system line-up procedures matched plant drawings and the as-built configuration. The inspector looked for equipment conditions and items that might degrade performance (hangers and supports were operable, housekeeping, etc.). Two test connection valves (XVT30958-DG and XVT30956-DG) were noted as not being listed on the valve line-up sheet. This discrepancy was discussed with the licensee.

The inspector verified that valves, including instrumentation isolation valves, were in proper position, power was available, and valves were locked as appropriate. No mispositioned valves were noted. One missing identification tag was noted. This discrepancy was discussed with the licensee. Each train of the fuel oil system has a transfer pump discharge pressure gauge located in the common discharge line. The inspector noted that the two pressure gauges were reading 2.7 psi ("A" train) and 3.7 psi ("B" train) when the transfer pumps were not running. The licensee attributed the readings to the elevation difference between the storage tank and the gauge location. Each gauge is located at a lower elevation than that of the tanks. The difference in the readings was accounted for by the difference in fuel oil level in the storage tanks and by instrument inaccuracies. The inspector agreed with this conclusion. No other discrepancies were noted.

b. Inaccurate Status Indication for ESF Equipment

On September 14, the licensee racked in the breaker for the "B" chiller unit and started the "B" chilled water pump and chiller. At approximately the same time, the "C" chiller, which was aligned to the "B" train, was shut off. The purpose of this was to run the "B" chiller for troubleshooting and maintenance. Because two chiller units were simultaneously aligned on one train of the

chilled water system, the "B" train of chilled water was declared inoperable as required by the licensee's procedures. The plant computer BISI program detected this condition and displayed the "B" train chilled water system and the "B" train of the high head safety injection system inoperable. The reason for displaying the "B" train high head safety injection system as inoperable was because of the support function that the "B" train chilled water system performs. This condition continued for approximately eight hours. During this time, the inspector questioned why the "B" train of low head safety injection and containment spray, which were displayed as operable during this time, were not displayed as inoperable since these pumps are also supported by chilled water. Like the high head pumps, the low head and containment spray pumps are located in a harsh environmental area during accident conditions. This would require operable chilled water cooling coils in the ventilation system to maintain acceptable conditions in these areas.

The licensee's interpretation of TS 3.7.9, "Area Temperature Monitoring", states that if the ventilation system for the high and low head safety injection pump areas and the containment spray pump area is inoperable, those components should also be considered inoperable. The inspector verified that these components were declared inoperable and that the appropriate TS action statements were entered. However, the inspector was concerned that the inconsistency of the BISI display could mislead the control room operators since it could be assumed that these components were operable when, in fact, they were not. The inspector discussed this issue with the licensee and at the end of the inspection period the licensee was modifying the BISI program to more accurately indicate system status.

c. Control Room Heating, Ventilation, and Air Conditioning Panel

During a routine tour of the control room area, the inspector noted that an audible alarm was sounding on the control room HVAC panel. This panel is located behind the main control board in an area that is not manned on a continuous basis. The audible alarm is relied upon to alert the control room operators of a problem on this panel. At the time of the inspector's tour, the alarm was sounding in a weak and feeble fashion such that it could not be heard by the control room operators. The inspector informed the control room supervisor of the alarm and he investigated the cause. The alarm was due to a control room high pressure condition that was coming in and out periodically. The inspector also noted two other alarms were locked in on the HVAC panel. These were "Controlled Access Area HI/LO Pressure" and "Fuel Handling Building Delta-P Hi/Lo". When questioned, the operators did not know why these alarms were locked in or how long they had been locked in. The following day, the ventilation system engineer was informed about the situation described above. The

engineer stated that he would investigate the causes of the alarms. The I&C group repaired the audible alarm such that it could be heard throughout the control room.

The inspector made several conclusions based on this event. The operators lacked a questioning attitude which would have revealed the locked in alarm condition on the HVAC panel. Also, this event demonstrated a willingness on the part of the operators to live with locked in alarms on systems which are aligned in a normal configuration. The inspector noted that the HVAC panel is difficult to interpret and that a thorough understanding of the associated systems is required to understand the indications. The inspector will continue to monitor this situation.

Within the areas inspected, no violations or deviations were identified.

4. MAINTENANCE

a. Maintenance Observation (62703)

Station maintenance activities for the 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:

(1) Investigate and repair low evaporator pressure and excessive purging of the "B" chiller unit (MWR 9504203). During operation, this unit was surging. The unit was shutdown until maintenance personnel could determine the cause and make repairs. During a later maintenance run it was determined that a low freon charge was the cause of the abnormal chiller indications. The freon charge was corrected and the unit was successfully tested and declared operable. The inspector considered the actions taken to correct this problem to be appropriate and the technicians's level of knowledge about the chiller was good.

(2) Weld cuts to facilitate the removal of the "A" spent fuel pool heat exchanger end bell (MWR 95D3117). The removal of this end bell required several small diameter pipe weld joints to be cut. The cuts were performed in a satisfactory manner, and the health physics activities to control potential contamination were good.

(3) Spent fuel pool heat exchanger "A" end bell gasket replacement (MWR 94M3277). The bolted joint between the end bell and the shell of this heat exchanger had been leaking at a rate of approximately one drop every five minutes for a period of several years. The original flexitallic gasket was suspected as being inadequate to provide a leak tight connection in this application. A new type of gasket was identified as being more appropriate for this heat exchanger. This gasket was described as a Lattyflex graphite filled spiral wound gasket. The Lattyflex gasket procured to perform this maintenance was not the correct gasket and an original flexitallic type gasket was used during reassembly. Post maintenance testing indicated that joint leakage increased to 3-5 drops per minute. Following post maintenance testing, the heat exchanger was declared operable. The inspector concluded that this leakage does not effect heat exchanger operability. However, planning for the "A" heat exchanger gasket replacement was deficient in that the wrong gasket was obtained and not detected until the work had begun.

In addition, when the end bell was removed, two pieces of yellow barrier tape of the type used by health physics, was found in the area of the tube sheet. Each piece was approximately eight inches long. The tape had apparently fallen into the spent fuel pool and been picked up by the suction of the spent fuel pool cooling pumps and deposited on the tube sheet of the heat exchanger. No other material was found in the system. The inspector concluded that the operability of the heat exchanger was not adversely affected by the tape. The inspector considers present spent fuel pool foreign material exclusion controls to be adequate.

(4) Charging/safety injection pump "A" auxiliary oil pump repairs (MWR 9504230). This auxiliary oil pump is designed to supply oil to the bearings of an idle charging/safety injection pump when the pump is in standby. The motor of the auxiliary oil pump was identified as being faulty due to a broken wire at the motor and oil was leaking from the pump seal. The motor was replaced but failed to rotate at the required speed during post maintenance testing. A blown fuse on one phase at the motor control center circuit breaker was identified as the problem and was replaced. This blown fuse was not identified during the initial troubleshooting. During post maintenance testing additional

leaks on the pump were noted and the pump was disassembled a second time to repair the leaks. The inspector considered this maintenance to be only marginally effective because of the need to reperform troubleshooting to identify a blown fuse and the need to disassemble the pump a second time in order to repair oil leaks.

b. Surveillance Observation (61726)

The inspector observed surveillance activities of systems and components listed below to ascertain that these activities were conducted in accordance with license requirements. The inspector 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 inspector 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 inspector witnessed/reviewed portions of the following test activities:

(1) Main turbine first stage pressure transmitter adjustment (STP 345.034 and 345.035). During the inspection period, control room operators acknowledged repeated high steam flow alarms for the "B" and "C" steam generators. To correct this, I&C technicians adjusted the two high pressure turbine first stage pressure transmitters. These transmitters supply an input to the circuitry which, in turn, provides alarm signals and some bistable actuations. Following these adjustments, the six steam flow transmitters (two for each steam generator) were calibration checked to ensure their outputs were within specifications. None of these transmitters required adjustment. The adjustments and checks were performed in accordance with approved procedures and no further high steam flow alarms have occurred since these adjustments were made.

(2) Residual heat removal pump test (STP 205.004). The test was completed satisfactorily. When the pump was turned off from the main control board, an annunciator indicated that an overcurrent device on the 480 volt circuit breaker tripped. The licensee replaced the breaker with a spare which was tested and the pump was declared operable. The faulty breaker was examined and it was determined that a mechanical problem existed, which allowed the overcurrent indicator device to actuate due to the vibration that the breaker experienced when it was opened at the end of the pump test. The overcurrent indication device provides visual indication on the breaker as well as an annunciator on the main control board. This problem affected only the indication device and

did not affect the operability of the circuit breaker. The inspector considered the licensee actions in this case to be appropriate.

(3) Component cooling water system Train "A" walkdown (STP 250.005). This is a TS 4.0.5 required surveillance test which demonstrates the integrity of the accessible portions of the CCW system while at normal operating pressure. The test is performed every 3 1/3 years and consists of a detailed visual inspection. The results of this walkdown revealed no visible leakage from the system.

(4) SW pump "C" test (STP 223.002). This test is performed every 92 days and, in this case, the "C" pump was run on the "B" train. The technician performing the test was knowledgeable and performed his duties in accordance with the procedure. The test results met the acceptance criteria specified in the procedure.

c. Followup - Maintenance (92902)

(Closed) Unresolved Item 94-16-01, Determination of Testing Requirements for ESF Slave Relay.

The inspector had previously questioned ESF slave relay testing associated with the 36 inch containment purge exhaust and supply valves required by TS Table 4.3-2. The two slave relays in question, K615, (one for train "A" and one for train "B") provide the ESF closure signal for only these valves. No other ESF equipment is controlled by the K615 relays. The licensee's basis for not testing the relay was that TS 3.6.1.7 requires that the 36 inch containment purge exhaust and supply isolation valves be sealed closed during Modes 1 through 4. With the valves sealed closed, the ability for the valves to open was defeated; therefore, the licensee did not believe that a surveillance test on the valves' closure feature was required. On July 28, 1995, the licensee submitted a TS amendment application to clarify TS Table 4.3-2 test requirements. This amendment (No. 128) was approved by the NRC on September 18, 1995.

(Closed) Unresolved Item 95-13-02, Installation of a Non Safety-Related Component in a Safety-Related Application.

On July 26, 1995, the licensee identified that a non safety-related CCW booster pump stator had been installed where a safety-related stator was required. The stator for this pump forms the pressure boundary. As described in NRC Inspection Report 395/95-13, the licensee accepted the non safety-related stator as safety-related after some research and testing. The inspector concurred with the actions taken following the identification of the problem. To determine the circumstances surrounding this event, the licensee initiated a root cause analysis. The

inspector reviewed the report and noted that it was detailed and complete. The report stated that individuals made an inappropriate decision to use the non safety-related part in this application. The major factor contributing to this decision was a lack of understanding of how the material management system was to be used to identify the correct parts. Also, an error in the classification of the pump in the computerized history and maintenance program reinforced the incorrect decision. The failure to install appropriately classified parts in a safety-related system is identified as NCV 50-395/95-16-01, Failure to Control the Design of a Safety-Related System. This violation will not be subject to enforcement action because the licensee's efforts in identifying and correcting the violation meet the criteria specified in Section VII.B of the Enforcement Policy.

Within the areas inspected, one NCV was identified.

5. ONSITE ENGINEERING (37551)

a. Steam Generator Moisture Carryover

Since the startup in December 1994, the licensee has experienced significantly greater than expected moisture carryover from the new Delta 75 steam generators. The expected moisture carryover is approximately 0.1 percent. Lithium and sodium carryover tests conducted during the operating cycle indicate that the actual moisture carryover is about 0.8 percent. The responsibility for correcting this condition rests with the vendor with support from the licensee. The necessary steam generator modifications are still in the planning and design phase pending the results of tests being conducted on separator and dryer assemblies. Preliminary results indicate that the problem is principally in the steam separator assemblies which are of the swirl vane type and are the first stage of moisture separation. Tests conducted on a steam dryer assembly, which acts as the second and final stage of moisture separation, indicate that these components are functioning as required.

The inspector discussed these issues with the individuals involved from the licensee's design engineering group and concluded that the licensee was aggressively pursuing the cause of excessive steam generator moisture carryover. Implementation of the required steam generator modifications is planned for refueling outage nine in Spring 1996. However, the scope of the modifications have not yet been determined. The possibility exists for performing a partial modification or no modification at all during refueling outage nine. With the exception of the high moisture carryover, the new steam generators have performed as expected.

b. Preparation for Fuel Movement Offsite

During the inspection period, the licensee along with Westinghouse personnel, disassembled three spent fuel assemblies and removed a total of 18 fuel rods from these assemblies. Each of the fuel rods were placed in a "waste basket" where they will be temporarily stored in the spent fuel pool until they are transferred to a shipping container. The shipping containers will be loaded onto trucks and transported via overland route to a facility in Canada. The purpose for this movement of spent fuel offsite is to enable Westinghouse to perform a detailed inspection of fuel that has experienced three full operating cycles. Specifically, items such as gas pressure, fuel pellet condition, and cladding condition will be determined. The inspector observed portions of the preparation of the fuel rods for shipment. Approved procedures were used and proper spent fuel handling techniques were employed.

Prior to disassembling the fuel assemblies, the waste basket was moved from the spent fuel pool racks to the fuel transfer canal where the work would take place. During refueling outage eight, the licensee reconstituted several fuel assemblies by replacing individual fuel rods which showed indications of damage with stainless steel "dummy" rods. The damaged rods were placed in the waste basket for storage. According to licensee records, three damaged rods should have been in the waste basket. Only two could be observed with the underwater camera equipment. Using video tape taken during the reconstitution, it was verified that the unobserved fuel rod had been severely damaged with a nearly circumferential crack. The licensee theorized that the rod broke into two pieces when it was being lowered into its designated spot in the waste basket during reconstitution and fell into two adjacent storage locations. Since only the tops of the stored rods can be seen, this would account for the observed conditions of the waste basket. This theory was confirmed by using a stainless steel dummy rod to probe all apparently empty storage locations. The full length of the damaged fuel rod was accounted for using this method. In addition, the area of the spent fuel pool where the waste basket had been stored was visually inspected using the underwater television camera to look for any fuel pellets that may have fallen out of the rod when it broke. None was observed. The inspector was satisfied that the licensee's efforts to account for all of the nuclear material was appropriate. The licensee reviewed the program for storage of fuel rods in the waste basket and revised the applicable procedure to require that a visual inspection be performed after a fuel rod is placed in the waste basket.

Within the areas inspected, no violations or deviations were identified.

6. PLANT SUPPORT (71750)

a. Plant Support Activities

During inspection activities and tours of the plant, the inspector routinely observed aspects of plant support in the areas of radiological controls, physical security, and fire protection. The level of radiological protection controls applied to work activities observed was commensurate with the difficulty and risk associated with the task. Aspects of the fire protection program that were examined included transient fire loads, fire brigade readiness, and fire watch patrols. Effective implementation of the physical security program continued to be demonstrated during inspector observations of: security badge control; search and inspection of packages, personnel, and vehicles; tours and compensatory posting of security officers; and control of protected and vital area barriers.

b. Review of Early Warning Siren System

Due to a recent increase in the number of inadvertent siren activations, the inspector reviewed the licensees practices for operating and maintaining the early warning siren system. The system consists of 106 sirens mounted on poles within a 10 mile radius of the plant. Each siren is in contact with the plant via a radio signal. In early 1992, the licensee completed a system modification which changed the radio frequency and added a feedback feature to enable the licensee to monitor the performance of each siren. A battery is installed on each pole to act as a backup power source for the system to ensure that contact is maintained between the plant and the sirens. The sirens can be activated from three onsite locations and the emergency operations facility.

During the time between June and September, 1995, five different sirens inadvertently actuated. The licensee has been working with the vendor to determine the reason for the activations. Preliminary indications are that the backup batteries are contributing to the problem by being near the end of their useful life. The vendor has stated that the battery life is expected to be approximately two years. The batteries for these five sirens have been replaced with no further inadvertent activations. In addition, on September 8, 1995, during a semi-annual battery check, at least 19 sirens inadvertently actuated. The backup batteries on all these sirens were replaced and the licensee plans to replace all the remaining backup batteries as preventive maintenance. The cause of these inadvertent actuations has not been positively identified and the investigation is continuing.

During the September 8 event, one siren (N38) was not able to be shutdown from the site. Due to the extended run time, the motor

burned out and required replacement. The licensee maintains a spare motor onsite, but the spare proved to be the wrong motor for this application. As a result, a delay was experienced while a new motor was procured to repair the siren.

The inspector reviewed the operability records for the siren system which revealed that the sirens were maintained at or above approximately 93 percent with the exception of two tests which resulted in 85 and 87 percent of the sirens testing satisfactory. The inspector had no concerns about the operability of the system, however, the problems experienced with individual components and the spare parts issue described above indicate a need for increased attention in these areas. This issue was discussed with the licensee.

Within the areas inspected, no violations or deviations were identified.

7. EXIT INTERVIEW

The inspector met with licensee representatives (denoted in paragraph 1) at the conclusion of the inspection on October 6, 1995. During this meeting, the inspector summarized the scope and findings of the inspection as they are detailed in this report. The licensee representatives acknowledged the inspector's comments and did not identify as proprietary any of the materials provided to or reviewed by the inspector during this inspection. No dissenting comments from the licensee were received.

Item Number	Status	Description and Reference
94-16-01	Closed	URI - Determination of testing requirements for ESF slave relay.
95-13-02	Closed	URI - Installation of a non safety-related component in a safety-related application.
95-16-01	Closed	NCV - Failure to install appropriately classified parts in a safety-related system.

8. ACRONYMS AND INITIALISMS

BISI	Bypass Inoperable Status Indication
CCW	Component Cooling Water
ESF	Engineered Safety Feature
HVAC	Heating, Ventilation, and Air Conditioning
I&C	Instrumentation and Control

MWR	Maintenance Work Request
NCV	Non-Cited Violation
PSI	Pounds Per Square Inch
SW	Service Water
TS	Technical Specification
URI	Unresolved Item