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

Report No.: 50-395/89-18

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

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

Facility Name: V. C. Summer

Inspection Conducted: September 1 - 29, 1989

Inspectors: _____ 10/12/89
Richard L. Prevatte Date Signed

_____ 10/12/89
Perry C. Hopkins Date Signed

_____ 10/12/89
Leo P. Modenos Date Signed

Approved by: _____ 10/12/89
Floyd S. Cantrell, Section Chief Date Signed
Division of Reactor Projects

SUMMARY

Scope:

This routine inspection was conducted by the resident inspectors onsite in the areas of monthly surveillance observations, monthly maintenance observation, operational safety verification, onsite follow-up of events and subsequent written reports, reactor operator license verification, information meetings with local officials, and other areas. Selected tours were conducted on backshift or weekends. Backshift or weekend tours were conducted on 18 days during this inspection period.

Results:

The plant began this reporting period with a restart on September 1, 1989 from an outage for repairs to a pressurizer safety valve. The unit experienced a forced outage on September 8, 1989 due to condenser tube failures and an inoperable MSIV (paragraph 4b). During the investigation of the inoperable MSIV it was discovered that a severe water hammer had occurred on a 4 inch forward flush feedwater line during the plant startup on September 1, 1989

(paragraph 4b). During restart of the plant on September 16-17, 1989, a problem involving the correct method used to determine MSIV stroke time for IST was identified. This item was discussed with Region II and NRR. NRC concurred in the licensee's revised definition of stroke time; however, the licensee has committed to develop a program to determine the cause of the increased stroke time. This item is identified as a IFI (paragraph 4c). In addition, during power escalation the plant experienced a turbine trip from a loss of condenser vacuum due to faulty indication and operator error (paragraph 4d). A follow-up inspection to verify proper controls for insuring that operators were fully qualified before assuming their watch stations was conducted (paragraph 6). The resident inspectors and the V.C. Summer plant staff hosted two visitors from Yugoslavia on September 7, 1989 (paragraph 8a).

In the area of surveillance, a NCV was identified involving the failure to accomplish the incore/excore axial offset surveillance within the TS required periodicity (paragraph 2b). The work associated with routine maintenance activities identified no major deficiencies. However; a review of plant operating history and trend reports identified that eight forced outages have occurred in the past nine months. Several of these are the result of repetitive equipment failures which may indicate a need for additional management attention in this area (paragraph 3). The unit ended the reporting period at 100 percent power.

REPORT DETAILS

1. Persons Contacted

Licensee Employees

W. Baehr, Manager, Chemistry and Health Physics
C. Bowman, Manager, Scheduling and Modifications
*O. Bradham, Vice President, Nuclear Operations
M. Browne, Manager, Systems Engineering & Performance
W. Higgins, Supervisor, Regulatory Compliance
S. Hunt, Manager, Quality Systems
*A. Koon, Manager, Nuclear Licensing
G. Moffatt, Manager, Maintenance Services
*D. Moore, General Manager, Engineering Services
*K. Nettles, General Manager, Nuclear Safety
C. Price, Manager, Technical Oversite
M. Quinton, General Manager, Station Support
J. Shepp, Associate Manager, Operations
*J. Skolds, General Manager, Nuclear Plant Operations
*G. Soult, General Manager, Operations and Maintenance
G. Taylor, Manager, Operations
D. Warner, Manager, Core Engineering and Nuclear Computer Services
*M. Williams, General Manager, Administrative & Support Services
K. Woodward, Manager, Nuclear Operations Education and Training

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. Monthly Surveillance Observation (61726)

a. The inspectors observed surveillance activities of safety related systems and components to ascertain that these activities were conducted in accordance with license requirements. The inspectors observed portions of seven selected surveillance tests including all aspects of the Quarterly Battery Test, STP 501.002. The inspectors verified that required administrative approvals were obtained prior to initiating the test, testing was accomplished by qualified personnel, required test instrumentation was properly calibrated, data met TS requirements, test discrepancies were rectified, and the systems were properly returned to service.

b. On September 25, 1989, core engineering identified that the monthly TS surveillance for incore/excore axial offset evaluation, STP 209.001, had not been performed within the periodicity required by TS 4.3.1.1. TS requires that this test be performed at least every 31 days when the plant is in Mode 1 and above 15 percent rated thermal power.

This test was due to be performed by September 10, 1989 and had been scheduled to be performed on September 8, 1989. Since the plant entered a forced outage on September 8, 1989, the test was not performed as scheduled. The plant was restarted on September 15, 1989, but did not achieve 15 percent power until September 18, 1989. The unit experienced a turbine trip on September 19, 1989 and was restarted on the same day. It was then intended to increase power to 100 percent, allow the plant to stabilize and conduct the STP. Hurricane Hugo resulted in a power reduction due to the very low power demand on the utility grid on September 21 and 22, 1989. The unit was returned to full power on September 23, 1989 and the test was completed on September 25, 1989.

The surveillance interval for this test was exceeded on September 18, 1989. Performance of this test requires the plant to be at a steady power level for at least 24 hours. When the plant operating history for the month of September was reviewed, it was apparent that the earliest possible date this test could have been completed was September 20, 1989 and then only if the plant had been held at 30 percent power for 24 hours during plant startup. The licensee stated that in the future if events lead them into this same situation, they will establish a power hold at 30 percent power to allow completion of this test. The licensee is currently preparing a LER on this item.

This LIV is not being cited because criteria specified in Section V.G.1 of the NRC Enforcement Policy was satisfied. This item will be tracked as Missed Surveillance Test For Incore/Excore Axial Offset, NCV 89-18-02.

No other violations or deviations were identified.

3. Monthly Maintenance Observation (62703)

The inspectors observed maintenance activities of safety related systems and components to ascertain that these activities were conducted in accordance with approved procedures, TS, industry codes and standards. The inspectors determined that the procedures used were adequate to control the activity, and that these activities were accomplished by qualified personnel. The inspectors independently verified that the

equipment was properly tested before being returned to service. Additionally, the inspectors reviewed several outstanding job orders to determine that the licensee was giving priority to safety related maintenance and not developing a backlog which might affect a given system's performance. The following specific maintenance activities were observed:

MWR 89H0027	Repair leaking diaphragm valve XVD 8552BR
MWR 89D0184	Replace bellows in eighth stage extraction line of LP A turbine
MWR 8900393	Investigate and repair leaking diesel generator attached fuel oil pump on DG B
MWR 8901589	Repair limit switch (MSIV A)
MWR 891291	MSIV A troubleshooting and testing
PMTS P0123472	Perform lubrication of DG A
PMTS P0123474	Perform lubrication of DG B
MWR 8901636	Adjust stroke time on MSIV A
MWR 8901659	Repair pipe support HDH-0015
MWR 8901653	Restore proper voltage to battery

No major deficiencies were identified while observing the above maintenance activities. However, a review of the NRC and licensee performance indicators and plant performance reveals a negative trend in overall performance. The plant has experienced eight forced outages in the past nine months. Seven of these outages were caused by equipment failure. Several of these failures and some past equipment failures have occurred due to repetitive equipment problems, i.e., reactor trip breaker control switch operation (July 1988), resin intrusion into the steam generators (January and February 1989), MSR level switch failures (March and April 1989), pressurizer safety valve failures (May and August 1989), and the failure of "Pathway" expansion joints in the main condenser (June 1988 and September 1989). It is noted that on the "Pathway" expansion joint failure that first occurred in June 1988, the licensee obtained the services of a consultant to assist in determining root cause of the failure. The most probable causes identified were metal fatigue and erosion. The above failures may indicate a need for more management attention in the areas of root cause determination, preventive and predictive maintenance and the effectiveness of corrective actions taken to prevent recurrence.

Licensee management has recently taken steps to improve plant performance. These include: increased nuclear operations staffing over the next year; conducting an internal productivity study; utilization of INPO resources in a self assessment program; and initiation of the Gilbert/Commonwealth Operational Excellence Program for Nuclear Power Plants. The above programs and changes are only in the initial information assembly stages and have not progressed to a stage that provides visible results. The inspectors will continue to evaluate this area as a part of the routine inspection program.

No violations or deviations were identified.

4. Operational Safety Verification (71707)

a. 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; examination of panels containing instrumentation and other reactor protection system elements to determine that required channels are operable; and review of control room operator logs, operating orders, plant deviation reports, tagout logs, jumper logs, and tags on components to verify compliance with approved procedures.

The inspectors conducted weekly inspections in the following areas: verification of operability 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.

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.

The inspectors conducted biweekly inspections in the following areas: verification review and walkdown of safety related tagout(s) in effect; review of sampling program (e.g., primary and secondary coolant samples, boric acid tank samples, plant liquid and gaseous samples); observation of control room shift turnover; review of implementation of the plant problem identification system; verification of selected portions of containment isolation lineup(s); and verification that notices to workers are posted as required by 10 CFR 19.

Selected tours were conducted on backshifts or weekends. Inspections included areas in the cable vaults, vital battery rooms, safeguards areas, emergency switchgear rooms, diesel generator rooms, control

room, auxiliary building, containment, cable penetration areas, service water intake structure, and other general plant areas. 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. On a regular basis, RWP's were reviewed and specific work activities were monitored to assure they were being conducted per the RWP's. Selected radiation protection instruments were periodically checked, and equipment operability and calibration frequency were verified.

In the course of monthly activities, the inspectors included a review of the licensee's physical security program. The performance of various shifts of the security force was observed in the conduct of daily activities to include: protected and vital areas access controls; searching of personnel, packages and vehicles; badge issuance and retrieval; escorting of visitors; and patrols and compensatory posts.

b. On September 7, 1989, at approximately 7:00 p.m., the chemistry department notified operations that secondary chemistry was out of specifications and it appeared that there may be a condenser tube leak. Operations began a power reduction to 30 percent power at 8 p.m. Upon reaching 30 percent power the condensate polishing system was placed in service and an investigation was started to determine the cause for out of specification chemistry.

At approximately midnight, the licensee discovered that the MSIV A test circuitry indicating lights were illuminated, indicating that the test circuit for MSIV A was energized. Since the status of this valve was unknown, the licensee entered TS LCO 3.7.1.5 and declared MSIV A inoperable. The licensee was unable to identify the source of the problem and affect repairs within the TS allotted 4 hours. Unit power was reduced to less than 5 percent by 6 a.m. on September 8, 1989.

At that time, chemical analysis of the condensate system indicated CW intrusion into the main condenser hotwell. As a result of the above, a decision was made to place the unit in hot standby, shutdown the secondary system and inspect inside the condenser and the condenser water boxes. This inspection revealed that two 20 inch "Pathway" expansion bellows in the extraction steam lines from the eighth and tenth stage of low pressure turbines had failed. Steam escaping from these expansion bellows had ripped sheet metal insulation off adjacent extraction steam lines. These parts and steam impingement had severed nearby sensing lines and damaged condenser tubes. A total of 437 tubes were plugged in the condenser. The condenser tube plugging, replacement of the defective expansion joints, and other condenser repairs were completed on September 15, 1989.

The plant had experienced a previous failure of a "Pathway" expansion bellows in June 1988. At that time and during the refueling outage, which ended in December 1988, an inspection was conducted on all 32 expansion bellows in low pressure A and B condensers with no defects identified. It should be noted that a detailed inspection of the components cannot be completed without cutting off a 1/8 inch sheet metal wrapper that covers the bellows. This was not done during the above inspections. The licensee is currently reviewing this item and investigating the potential needs to replace all the above units during the next refueling outage in March 1990. The licensee is also preparing a LER on this item.

During the investigation of problems with MSIV A, it was discovered that a severe water hammer had occurred in the 4 inch forward flush feedwater line for SG A. This system is used during start-up to heat the main feedwater lines up to the feedwater isolation valve. The water hammer had crushed an electrical conduit containing wiring for MSIV A. This had created electrical shorts which illuminated the test circuit lights. The water hammer had also damaged nine pipe supports in the feedwater forward flush piping and one main steam line support. The damages ranged from pulled out Hilti bolts, bent or broken support tubes on support struts to bent angle iron on box and guide supports. There was also some slight deformation and denting of this piping at two locations. The licensee replaced or repaired all damaged supports. A regional inspection was performed on the effects of the water hammer. Additional information on this item is contained in inspection report 395/89-19.

c. On September 12, 1989 at approximately 3:45 p.m., the licensee discovered a fire on the 485' elevation of the auxiliary building in the heat tracing circuit of RM-A3. During the fire fighting operations, RM-A3 was sprayed with water. The monitor was secured by operations at approximately 4:00 p.m. The alternate sampler was also sprayed with water. This precluded setting up the alternate sampler. Sampling was reestablished at 5:10 p.m. This resulted in 1 hour and 10 minutes of unmonitored release through the main plant vent. TS 3.3.3.9, Table 3.3-13, Action Statement 43 requires that with less than the required channels operable, effluent releases may continue for up to 30 days provided samples are continuously collected with auxiliary sampling equipment. With both the RM-A3 and alternate sampler sprayed with water due to the fire, the licensee made a conscious effort to either replace the alternate sampler with one from a different location in the plant or restore the alternate sampler that had been sprayed with water. The licensee concluded that it was faster to restore the alternate sampler on the 485' elevation then to replace it. The licensee held discussions with the NRC residents, Region II and NRR on clarification of the continuous samples requirement. The NRC concluded with the licensee that due to the above circumstances and their conscious effort to restore the alternate sampler, there was no violation of the TS.

c. While restarting the reactor the weekend of September 16-17, 1989, a problem was encountered during the IST stroke time testing of MSIV A. The test results stroke time ranged from 5.2 - 5.8 seconds. Surveillance requirement 4.7.1.5 of TS require that each MSIV be demonstrated OPERABLE by verifying full closure within 5.0 seconds when tested pursuant to TS 4.0.5. Surveillance requirement 4.0.5 addresses the IST program for ASME Code class 1, 2, and 3 components. The MSIV stroke time test is one of the tests required by TS 4.0.5.

The licensee's procedure for stroke-time testing the MSIV involved measuring the elapsed time from initiation of the valve closure at the MCB until the position indication light on the MCB changed status. In an attempt to bring the stroke time below 5.0 seconds when measured from the MCB, the licensee performed various operations on the MSIV including maintenance on the power-pack without success. In order to meet the TS requirement, the licensee proposed a new procedure which would measure the stroke time based upon the time of movement of the valve stem and until movement was completed. This measurement would be performed locally. Measurement of the stroke time with the revised procedure would ignore the time required to initiate the signal and the time required for the signal to initiate action of the valve. The licensee had determined that the closure time for the valve using the revised procedure was 3.8 seconds. Therefore, using the revised procedure the TS requirement would be met.

A review of the FSAR section 10.3.2.3 indicates that the MSIV's have a closure time of 5.0 seconds upon receipt of the signal. In addition, a review of the steam line break analysis in Chapter 15 of the FSAR indicates that the total elapsed time for the MSIV's to close is 10.0 seconds in one case and 12.0 seconds in another. Based upon the above information, the licensee concluded that the revised stroke time results of 3.8 seconds and the previous 5.2 to 5.8 seconds, were all within the design basis of the facility as presented in the FSAR.

After discussions between the NRC staff and the licensee, the NRC staff agreed that the licensee interpreation was acceptable. It was confirmed that the licensee was committed to the 1977 edition through summer addenda of 1978 of the ASME Code, Section XI for the IST program. The 1977 edition of the ASME Code did not specifically define the method to be used to test the MSIV's. Subsequent editions of the 1979 addenda defined stroke time as the time from initiation of the action until its conclusion. Therefore, since the licensee is committed to the 1977 Code, they concluded that they could revise their procedures to test the valves locally. The action taken by the licensee is not consistent with their previous testing methods, however, the licensee has committed to develop a program to determine

the reason for the increased MSIV stroke time. Although the 1977 Code allows the licensee to define stroke time, the reasons for the increase in the stroke time needs to be determined to ensure that critical degradation of this valve is not occurring. This will be identified as an Inspection Follow-up Item, 89-18-01, MSIV Stroke Time.

d. The plant was restarted on September 15, 1989, with half of the main condenser water side isolated to permit testing for tube leakage. With power restricted to approximately 36 percent the outer loop was tested and operations was directed to transfer CW flow from the outer loop to the inner loop to complete tube integrity testing. The operators dispatched to perform this evolution first positioned the local control switch for the inner loop CW discharge valve XVB 807B to open and observed a red open indicating light. They then proceeded to close the outer CW discharge valve XVB 807A and isolate the outer loop. Shortly after this, the unit received a turbine trip from a loss of condenser vacuum. Since reactor power was less than 50 percent, the reactor did not trip. With the steam dumps not available, the PORV's operated and maintained secondary system pressure. The operators investigated this event and found that CW flow to the inner loop was at a minimal value and that XVB 807B was only partially open. CW flow was reestablished to the main condenser, vacuum was recovered and the unit was returned to power. Further investigation revealed that a green closed indicating light was missing a bulb from the local control station for XVB 807B. When the operator went to open the local control switch, he should have received both green (closed) and red (open) indicating lights until the valve completed its 92 second stroke. When the valve reaches its fully open position, the green indicating light would go out. Since the green light was missing a bulb, the only indication the operator observed was the red open light as soon as the valve started moving open. The root cause of this problem was the failure of the operator to observe the inoperable (missing) green (closed) indicating light before operating the local control switch. This indicates a lack of attention to detail by the operator. The licensee was still investigating for all root causes of this incident at the end of this report period. Recent NRC system and watch stations walkdown with plant operators had identified similar situations where indicator lights were missing or burned out.

No violations or deviations were identified.

5. Onsite Follow-up of Events and Subsequent Written Reports (92700, 93702)

The inspectors reviewed the following SPR's to ascertain whether the licensee's review, corrective action and report of the identified event or deficiency was in conformance with regulatory requirements, TS, license conditions, and licensee procedures and controls.

(Closed) SPR 89-006, Fire door IB-203 inoperable. This item was reported to Region II in a letter dated June 16, 1989. The IB-203 fire door was declared inoperable due to damaged welds on the skin of the door. The inspectors verified that the subject door had been replaced with a new door.

(Closed) SPR 89-002, Meteorological instrumentation. This item was reported to Region II in a letter dated February 17, 1989. On February 2, 1989, the licensee discovered that the Delta T 10-40 meter aspirator motor had failed. Replacement motors were discovered to have arrows of rotation opposite the desired direction. Corrections were made to establish rotation such that air flow is across the element to the aspirator motor and the unit was declared operable on February 9, 1989. The licensee tagged the onsite spares to identify the connection required for correct rotation.

(Closed) Temporary Instruction 2515/100, Proper Receipt, Storage and Handling of Emergency Diesel Generator (EDG) Fuel Oil. TI 2515/100 inspection activities consisted of completion of a brief questionnaire involving the licensee's programs to purchase and store emergency diesel generator fuel oil. This information has been completed, thus no additional inspection activities are required.

6. Reactor Operator License Verification (41701, 42700, 71707)

The inspector conducted an inspection to verify the licensee's status of control board operators and supervisors qualifications. SAP-200, Conduct of Operators, was reviewed to determine the ease of which shift supervisors can determine the Part 55 license status of each operator on watch. The licensee, following a recent enforcement case, had revised SAP-200 and required that the oncoming shift supervisor verify and document that his shift is adequately manned, that all personnel are qualified for their watch stations and are fit for duty. They also established NRC Licensed Operator Qualification Tracking, NLP-117, to track the active or inactive status of operator licenses. An updated Operator License Status List is maintained in the control room and a copy of the list is sent to each shift supervisor. The inspector selected five reactor operators at random and verified that each operator had current valid NRC operator's licenses; had successfully participated in the licensed operator requalification training program; and had satisfied the watch standing requirements of Station Directive No. 13, Section 4.b or 4.c. In addition, the inspector reviewed the medical files of these operators and verified that their physicals had been completed in the last two years. All five operator records reviewed were up-to-date in accordance with the requirements of 10CFR 55.21.

7. Information Meetings With Local Officials (94600)

The resident inspectors and their section chief for Reactor Projects 1B met with the county administrators and the emergency preparedness directors for Fairfield and Newberry counties on September 25 and 26, 1989. Discussions included the mission of the NRC, Region II and the resident inspectors. While in Winnsboro on September 25, 1989, an inspection of the Public Document Room at Fairfield County Library was also conducted. All records and material appeared to be well maintained and available for public use.

8. Other Areas

a. Mr. Marjan Levster, Deputy Director Republic Administration for Nuclear Safety and Mr. Ljubo Fabjan, Reactor Engineering Division of E. Kardelj University of Yugoslavia visited the V.C. Summer Nuclear Plant on September 7, 1989. They toured the Nuclear Training Center and the Fairfield Pumped Storage Facility. Meetings and discussions on the Westinghouse D3 steam generator problems and corrective measures were held with the licensee's engineering department. Discussions on the role, duties and resident inspection program were discussed in detail.

b. The licensee declared an unusual event and manned the TSC during hurricane Hugo on September 21 and 22, 1989. The hurricane passed approximately 30 to 40 miles northeast of the plant and no significant damages occurred to this plant.

9. Exit Interview (30703)

The inspection scope and findings were summarized on September 29, 1989, with those persons indicated in paragraph 1. The inspectors described the areas inspected and discussed the inspection findings. The plant operations for September, the forced outage problems associated with MSIV A, water hammer in the main feedwater forward flush piping, and the failure of two expansion joints in the main condenser was discussed in detail. The licensee is still investigating the incidents involving the loss of condenser vacuum and MSIV stroke time testing. The current status and actions planned by the licensee on these item was discussed. The licensee was made aware of the information required to close the IFI for MSIV stroke time testing. The inspectors noted that no deficiencies were identified during the inspection of controls recently implemented to ensure that all operators are fully qualified prior to assuming a licensed watch station. The licensee was in agreement with the NCV for failure to accomplish the incore/excore axial offset surveillance test within the TS required periodicity. They indicated that the planned corrective actions should prevent repetition. The licensee agreed that there has been an excessive number of forced outages during the past nine month, but

indicated that they were not sure that all of the items discussed in the report could be related to weaknesses in maintenance. They also stated that credit should be given for the root cause training that has been conducted and the extensive engineering and research efforts into the safety valve problems. 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

ASME	American Society of Mechanical Engineers
CW	Circulating Water
DG	Diesel Generator
ESF	Engineered Safety Feature
FSAR	Final Safety Analysis Report
IFI	Inspector Follow-up Item
INPO	Institute of Nuclear Power Operators
IST	Inservice Testing
LCO	Limiting Conditions for Operations
LIV	Licensee Identified Violation
LP	Low Pressure
LER	Licensee Event Reports
MCB	Main Control Board
MSIV	Main Steam Isolation Valve
MSR	Moisture Separator Reheater
MWR	Maintenance Work Request
NCV	Non-Conformance Violation
NLP	Nuclear Licensing Procedure
NRC	Nuclear Regulatory Commission
NRR	Nuclear Reactor Regulation
PMTS	Preventive Maintenance Task Sheet
PORV	Pressure Operated Relief Valve
RCS	Reactor Coolant System
RCSLK9	Reactor Coolant System Leak Rate
RWP	Radiation Work Permits
SAP	Station Administrative Procedure
SPR	Special Reports
STP	Surveillance Test Procedures
TB	Turbine Building
TS	Technical Specifications
TSC	Technical Support Center