U. S. NUCLEAR REGULATORY COMMISSION

REGION II

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Report No.:	50-395/99-04
Licensee:	South Carolina Electric & Gas (SCE&G)
Facility:	Virgil C. Summer Nuclear Station
Location:	P. O. Box 88 Jenkinsville, SC 29065
Dates:	May 9 - June 19, 1999
Inspectors:	M. Widmann, Senior Resident Inspector M. King, Resident Inspector G. Hopper, Reactor Engineer, RII (Section O5.1) G. Hutto, Robinson, Resident Inspector (In-Training), (Section O1.3) G. McCoy, Surry, Resident Inspector, (Section E8.1) W. Sartor, Senior Radiation Specialist, RII (Section P2.1)
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. 50-395/99-04

This integrated inspection included aspects of licensee operations, maintenance, engineering, and plant support. The report covers a six-week period of resident inspection; in addition, it includes the results of announced inspections by a regional operator examiner, an emergency preparedness specialist, and two visiting resident inspectors.

Operations

- In general, operator performance following a manual reactor trip due to high main turbine vibration was appropriate. The operators responded slowly to decreasing reactor coolant average temperature (Tavg) and delayed the reduction of emergency feedwater flow following the trip. Reactor coolant system temperature decreased approximately eight degrees Fahrenheit below the normal no-load Tavg value. Primary and secondary systems responded as designed to the reactor trip (Section O1.2).

- Operator response to an automatic reactor trip was effective in stabilizing the plant and was in accordance with emergency operating procedures. The trip was caused by caused by spiking on power range instrument N-43 during N-42 power range instrument calibration. Safety-related components functioned as expected. Post trip reviews and troubleshooting effectively isolated the problem to a defective nuclear instrument current meter and appropriate corrective actions were taken (Section O1.3).

- The reactor startups following the refueling outage and plant trips were performed safely. Reactivity additions were carefully controlled and monitored by operations and reactor engineering personnel. The operators demonstrated good command and control, proper communications and performed the startups in accordance with approved procedures (Section O1.4).

- The clearance of danger tagouts for a motor driven emergency feedwater pump and the diesel driven fire pump was performed in accordance with procedure requirements. Operators used proper communication, observed safety precautions, and properly conducted independent verification (Section O1.5).

- A general walkdown of the safety injection system independently verified proper equipment configuration and system alignment for Mode 1 operation. No significant concerns were identified (Section O2.1).

- The content of the annual operating tests and biennial written examinations was satisfactory. The written examinations and simulator scenarios provided very good evaluation tools to measure operator knowledge, skills and abilities. This portion of the licensed operator requalification program met the requirements of 10 CFR 55.59, "Requalification" (Section O5.1).

- Overtime deviations for refueling outage work were approved by the General Manager Nuclear Plant Operations in accordance with administrative procedures. CER 99-0947

was generated to evaluate overtime practices during outages. No concerns with overtime control were identified during Mode 1 operations (Section O6.1).

- Observed Plant Safety Review Committee and Management Review Board meetings were comprehensive, properly focused on safety and probing with relevant issues being adequately reviewed. The inspectors noted action items were issued to ensure proper followup and resolution on issues of concern (Section O7.1).

Maintenance

- Based on review and observation of eleven surveillance test and maintenance packages, routine maintenance and surveillance activities were satisfactorily performed. Activities were conducted in accordance with written procedure instructions and the procedures provided sufficient detail and guidance. Technicians demonstrated that they were experienced and knowledgeable (Section M1.1).

- A non-cited violation was identified for the failure to test the Turbine Trip Actuating Device prior to reactor startup in accordance with Technical Specification Table 4.3-1, Item 17. The surveillance test was performed following the reactor startup (Section M8.1).

Engineering

- The inspectors verified reactor engineering was entering and maintaining the proper core physics constants in the integrated plant computer system. These constants are used for low power physics testing to verify core performance during startup following refueling (Section E1.2).

Plant Support

- The emergency preparedness program was being maintained in a state of operational readiness. Changes made to the Emergency Preparedness program since the last inspection met NRC requirements and did not adversely affect the overall state of emergency preparedness (Section P2.1).

- Security force handgun training and testing was effective, well controlled, with appropriate emphasis on safety and conducted in accordance with the Security Plan Procedures. A minor security training handgun qualification record administrative error was discovered and corrected (Section S5.1).

Report Details

Summary of Plant Status

The unit began the inspection period in Mode 3, nearing completion of a scheduled refueling outage. The unit entered Mode 2 and Mode 1 on May 10 and 11, respectively. During the increase in power on May 18, with the unit at approximately 82 percent power, an increase in main turbine vibration was noted. The operators commenced a load reduction and at approximately 73 percent power a manual reactor trip was initiated due to high main turbine vibration. The reactor was restarted on May 18 and the unit reached 100 percent power on May 21. On June 4 the reactor automatically tripped from 100 percent power when a spike occurred on the N-43 power range detector during N-42 power range detector calibration. The unit was restarted on June 5 and returned to 100 percent power on June 8. The plant remained at full power through the end of the inspection period.

I. Operations

O1 Conduct of Operations

O1.1 General Comments (71707)

The inspectors conducted frequent reviews of ongoing plant operations. On a daily basis the inspectors attended shift turnover and plan of the day meetings. Several Plant Safety Review Committee meetings which discussed mode change requirement work items and plant startup readiness were observed. The inspectors identified no concerns and concluded the licensee had implemented satisfactory controls to ensure safe reactor startup and power operation following refueling. In general, the conduct of operations was professional and safety-conscious. Specific events and noteworthy observations are detailed in the sections below.

O1.2 Manual Reactor Trip Due to Main Turbine High Vibration

(Closed) Licensee Event Report (LER) 50-395/99003-00: manual reactor trip due to main turbine high vibration.

a. Inspection Scope (71707, 92700, 93702)

The inspectors reviewed the licensee's actions and the plant response following a manual reactor trip initiated because of high vibration on the main turbine number one and two bearings.

b. Observations and Findings

On May 18, during power ascension with reactor power at approximately 82 percent a main control board annunciator alarmed indicating increased vibration on the main turbine. Control room operators commenced a load reduction in an attempt to lower the vibration levels and dispatched electrical maintenance and the turbine operator to locally

verify the main turbine vibrations. At 12:41 a.m., the vibrations on main turbine bearing number two exceeded 12 mils and a manual reactor trip was initiated in accordance with Annunciator Response Procedure (ARP)-001-XCP-632. Primary and secondary systems responded as designed and all control rods fully inserted. A review of the sequence of the events recorder data revealed that the rod drop times were within the Technical Specification (TS) requirements.

Following the trip, operators performed the immediate operator actions of Emergency Operating Procedure (EOP) -1.0, "Reactor Trip / Safety Injection Actuation," and then transitioned to EOP-1.1, "Reactor Trip Recovery." Continuous action step 3 of EOP 1.1 directs operators to control steam dumps and emergency feedwater (EFW) flow to establish and maintain reactor coolant system (RCS) temperature at the no-load average temperature (Tavg) value of 557 degrees Fahrenheit (F). Following the trip RCS Tavg slowly decreased to approximately 549 degrees F. Approximately six minutes after Tavg decreased below the no-load Tavg value, the operators reduced EFW flow. The decrease in Tavg resulted in pressurizer level slowly decreasing to 18 percent. The operators took appropriate action to reduce letdown flow and manually increased charging flow. Charging flow restored pressurizer level to the expected level of approximately 25 percent. Pressurizer pressure decreased to 2016 psig immediately after the trip and then recovered to the normal pressure range of 2235 psig.

Based on their post trip review the inspectors concluded that the operators were slow to reduce EFW flow to limit the decrease in Tavg and the resulting decrease in pressurizer level. Because EOP-1.1 directs the operators to manually initiate safety injection if pressurizer level cannot be maintained greater than 18 percent, the inspectors were concerned that a further decrease in Tavg could have resulted in an unnecessary manual safety injection initiation. Although pressurizer level was restored without initiation of safety injection, this condition may represent a training weakness, in that, the operators were slow to reduce EFW flow in response to the decrease in Tavg. Condition Evaluation Report (CER) 99-943 was generated to evaluate this concern. With the exception of EFW flow control, the inspectors concluded that operator performance, including the manual trip and the operator post trip responses, was appropriate. The inspectors verified the required 10 CFR 50.72 notification was made.

The licensee determined the most likely cause of the high vibrations was light rubbing within the new mono-block high pressure (HP) turbine rotor. This new HP rotor was installed in the recently completed refueling outage, RF-11.

Actions taken by the licensee to preclude high vibrations on the main turbine during restart included:

- Decreasing the rate of power change when the number 4 control valve begins to open, from 3.0 percent per hour in one percent increments to 1.5 percent per hour in 0.5 percent increments. This allowed more time for the thermal expansion of the HP turbine.

- Changing the setting on the moisture separator reheater (MSR) digital controls systems to place the MSR in pressure mode prior to 75 percent load and ensuring the MSR controls were at 100 percent open on the high range valve at 75 percent reactor power.

- Re-lubricating the HP turbine shell prior to re-start to allow unrestricted shell casing growth.

- Cycling the control valve drain line isolation valve before the number 4 control valve was opened to ensure no pooling of moisture in the drain line.

The inspectors observed portions of unit restart and power increase to 100 percent power. Licensee personnel closely monitored turbine vibration instrumentation during the startup and carefully controlled the rate of power increase. No indications of abnormal main turbine vibrations were noted. The inspectors concluded the licensee's restart plan was cautious, reasonable and supported the successful return of the unit to 100 percent power.

The inspectors reviewed LER 50-395/99008-00 issued on June 17 and determined that the LER properly documented the May 18 reactor trip.

c. Conclusions

In general, operator performance following a manual reactor trip due to high main turbine vibration was appropriate. The operators responded slowly to decreasing Tavg and delayed the reduction of emergency feedwater flow following the trip. Reactor coolant system temperature decreased approximately eight degrees Fahrenheit below the normal no-load Tavg value. Primary and secondary systems responded as designed to the reactor trip.

O1.3 Automatic Reactor Trip Due to N-43 Spike

a. Inspection Scope (71707, 93702)

The inspectors reviewed the licensee's actions, plant response, and post trip activities following an automatic reactor trip initiated by a spike on neutron flux power range instrument N-43 while N-42 was in test during nuclear instrument calibration.

b. Observations and Findings

On June 4, at 1:58 p.m., an automatic reactor trip occurred from 100 percent power during the calibration of power range instrument N-42. The trip occurred when the N-42 drawer was slid back into the nuclear instrumentation cabinet. The movement of the N-42 drawer caused a faulty current meter in the adjacent N-43 drawer to introduce a current spike into the protection circuitry of N-43. This resulted in a trip of N-43 neutron flux high setpoint bistable. This, in combination with N-42 being in test with its bistables tripped, resulted in the necessary two out of four coincidence for a reactor trip.

The inspectors reviewed the sequence of events log, post trip plots and copies of the control board strip recorders, and verified that safety-related components functioned as expected following the reactor trip. All control rods inserted fully and the drop times were within the TS requirement of 2.7 seconds. The inspectors also reviewed operator logs, statements from the control room personnel, interviewed the shift supervisor and shift engineer, and determined that operator actions were appropriate and in accordance with the licensee's emergency operating procedures.

The inspectors reviewed the troubleshooting maintenance work request (MWR) 9907347, "Determine Cause of the Inadvertent Hi Flux Trip Bistable." The troubleshooting was effective in isolating the problem to the upper detector current meter in N-43. The spiking current was reproducible by tapping the meter. The meter was also installed in a spare drawer in the shop and the conditions were reproduced in the spare drawer giving further confidence that the problem was isolated to the meter. CER 99-0860 was written on the defective meter and the meter was shipped to the vendor to determine the root cause of the failure. This meter was replaced during the last outage due to a failure of the LED readout (no effect on current output) and appears to be unrelated to the recent failure. A meter from a spare drawer was installed in N-43 per the work request. The inspectors reviewed quality control (QC) documentation, Station Administrative Procedure (SAP)-300, "Conduct of Maintenance," Revision 7 and Quality Systems Procedure (QSP)-204, "Quality Control and Inspection," Revision 9, and determined that the replacement was performed with the proper QC controls and in accordance with the licensee's procedures. The inspectors also reviewed the retest data and noted no discrepancies with the expected/required results.

The inspectors verified that restart activities were in accordance with SAP-116, "Plant Trip/Safety Injection Plant Recovery," Revision 3. The trip evaluation, Attachment I of SAP-116 was completed, was consistent with the trip data and troubleshooting results, and contained the required management reviews and signatures necessary for restart. A Plant Safety Review Committee convened on June 5 and approved plant restart plans.

The inspectors attended a Management Review Board (MRB) held June 11 to discuss the June 4 automatic reactor trip and the May 18 manual reactor trip. The presentations to the board were thorough and the presenters responded to all questions. The board members asked probing questions and were well prepared. Long term corrective actions for the nuclear instrument current meters were discussed. Aging issues and life cycle management considerations were discussed. Engineering plans to perform a detailed review of these issues as part of their CER evaluation. Following the June reactor trip, relief valve XVR 1455A on the low pressure turbine reheat steam line opened for about three to five seconds. The lifting of the relief valve was also discussed during the MRB and will be evaluated by the licensee's corrective action program under CER 99-0863.

c. Conclusions

Operator response to an automatic reactor trip was effective in stabilizing the plant and was in accordance with emergency operating procedures. The trip was caused by

caused by spiking on power range instrument N-43 during N-42 power range instrument calibration. Safety-related components functioned as expected. Post trip reviews and troubleshooting effectively isolated the problem to a defective nuclear instrument current meter and appropriate corrective actions were taken.

O1.4 Startup Observations

a. Inspection Scope (71707)

The inspectors observed portions of and reviewed the data for the reactor startups conducted on May 10, May 18, and June 5 following the refueling outage and the recent plant trips. Portions of the subsequent power escalations were also included in the inspection.

b. Observations and Findings

On May 9, the inspectors observed the initial criticality activities following the refueling outage. The evolution was conducted in accordance with Reactor Engineering Procedure (REP)-107.03, "Beginning of Cycle Dilution To Criticality," Revision 8. The inspectors noted that the control room supervisor demonstrated good command and control of the operators, reactor engineers and the startup activities. The startup was closely monitored in accordance with procedures using the inverse count ratio (ICRR) plot. Criticality was achieved on May 10. Prior to plant startup from the refueling outage the inspectors performed main control board walkdowns in the control room and plant tours to monitor the readiness of systems for reactor startup. The inspectors reviewed system lineups, plant configurations and the Removal and Restoration (R&R) logbook to ensure compliance with TS requirements. The inspectors concluded plant safety was properly maintained and the plant was in a condition for startup.

On May 19, the inspectors observed the plant entry into Mode 1 following the May 18 reactor trip. The inspectors observed the control room briefing for placing the unit on-line, reviewed the R&R Log and performed a main control board walkdown prior to the unit entering Mode 1. No concerns were identified and the inspectors noted a thorough control room briefing, followed by a deliberate, carefully controlled startup evolution with clear communications. The activity was conducted in accordance with procedures with no unusual main turbine vibrations being noted.

The inspectors reviewed plant data from the startup conducted on June 5. This startup was conducted following an automatic trip that occurred on June 4. The reactor was taken critical and entered Mode 1 on June 5. No concerns were identified with the startups or power escalation to 100 percent power.

c. Conclusions

The reactor startups following the refueling outage and plant trips were performed safely. Reactivity additions were carefully controlled and monitored by operations and reactor

engineering personnel. The operators demonstrated good command and control, proper communications and performed the startups in accordance with approved procedures.

O1.5 Observations of Danger Tagouts

a. Inspection Scope (71707)

The inspectors observed the clearance of tagouts on the A motor driven emergency feedwater (MDEFW) pump and the diesel driven fire pump.

b. Observations and Findings

On May 24, the inspectors observed operations personnel perform clearance activities for danger tagout 99-1068 for the A MDEFW pump. The guidance of Station Operating Procedures (SOP)-313, "Local Switchgear Breaker Operations," Revision 3, was followed. Operators used proper safety precautions and notified the control room prior to racking in the breaker. The clearance, including independent verification, for the diesel driven fire pump danger tagout 99-1067 was properly conducted in accordance with SAP-201, "Danger Tagging," Revision 7A, and SAP-153, "Independent Verification," Revision 1.

c. Conclusions

The clearance of danger tagouts for a motor driven emergency feedwater pump and the diesel driven fire pump was performed in accordance with procedure requirements. Operators used proper communication, observed safety precautions, and properly conducted independent verification.

O2 Operational Status of Facilities and Equipment

O2.1 Engineered Safety Feature System Walkdown

a. Inspection Scope (71707)

The inspectors conducted a walk down of accessible portions of the safety injection (SI) system and related support systems.

b. Observations and Findings

On June 8, the inspectors performed a walkdown of the SI system and related support systems (component cooling water, residual heat removal, service water and room ventilation). The inspectors verified components in the main system flowpath were in their correct positions, power was available to required valves and TS requirements for de-energized valves were also being met. Control power supplies for breakers were correctly aligned and components were in a condition to receive an SI initiation signal. Selected instrumentation supporting TS requirements was verified to be displaying expected indication values. System operation was verified to be consistent with the Final Safety Analysis Report (FSAR) description.

Generally good housekeeping was being maintained for the SI system. Equipment problems generally had appropriate maintenance work requests or leakage evaluation tags hanging as required. The inspectors did note several oil leaks on the gearbox of the running A Charging/ SI pump. This information was communicated to the system engineer and MWR 9909111 was promptly generated. The inspectors also noted during the walkdown that the refueling water storage tank (RWST) insulation jacketing had pulled apart at a few locations allowing the insulation to be exposed to weather, bird infestation and vegetation (weed) growth. A Nonconformance Notice (NCN)-3127 dated October 31, 1988, had previously been originated on this condition. The inspectors reviewed this closed NCN, subsequent dispositions 1 through 4 and related CER 97-0512 resolution dated November 6, 1998, which evaluated the condition as acceptable "as-is." Following the inspection period the licensee repaired the RWST insulation jacket.

The inspectors discussed both normal and emergency modes of the Charging/ SI system with control room operators and they demonstrated a good level of knowledge. A review of completed surveillance test procedures (STP) verified periodic testing was being performed and acceptance criteria were met. Following a review of system engineer's files, maintenance rule tracking and monthly system engineer walkdown status reports, the inspectors concluded that proper trending and monitoring was being conducted. The chemical and volume control system (CS) was previously in a(1) maintenance rule goal setting status due to Charging/ SI pump seal leakage exceeding acceptable limits. Changes to pump maintenance procedure and additional training of the mechanics involved with seal work has resulted in improved seal performance. The CS system was returned to a(2) status during this inspection period.

c. Conclusions

A general walkdown of the safety injection system independently verified proper equipment configuration and system alignment for Mode 1 operation. No significant concerns were identified.

O5 Operator Training and Qualification

O5.1 Requalification Annual Operating and Biennial Written Examinations

a. Inspection Scope (71001)

The inspectors reviewed the quality and level of difficulty of the materials from the last annual requalification examination. The inspectors also observed the licensee's conduct of two simulator examination scenarios. The inspection served to measure the licensee's compliance and effectiveness in conducting operator requalification training and testing in accordance with 10 CFR 55.59, "Requalification."

b. Observations and Findings

1. **Review of Requalification Examinations.** The inspectors reviewed five written examinations, and five simulator scenarios that were administered during the last cycle requalification examination. In general, the inspectors found the examination materials met the guidelines of the licensee's examination development procedures as well as the guidelines of Appendix A of Inspection Procedure (IP) 71001.

The inspectors found that the written examination questions were well written and contained discriminating test items. Almost all questions were application, analysis, calculation or synthesis in nature. The exams appeared to be challenging and were reliable in their ability to measure an operator's competence. The inspectors noted that some of the older questions that were used from the licensee's question bank were not well written. These questions contained some elements or errors which reduced the validity of the questions as a meaningful measurement tool. These discrepancies were discussed in detail with a licensee training representative.

The inspectors reviewed the process used to generate the sample plan for the biennial written exam. The procedure and sample plan methods used to create each individual exam were satisfactory with the exception of individual question test item selection. Nuclear Training Manual Appendix 11.5A described the process as, "Exams are developed by systematically using questions from the LOR training cycles. The percentage of questions in each area should correspond to the exam time percentages for the courses taught." The inspectors found that the individual test questions were not proportioned in accordance with the exam time percentages for the courses taught. The questions, however, were proportioned in accordance with overall topic categories such as procedures, systems, and theory.

The inspectors also found that the simulator scenarios were good tools for evaluating operator performance and were challenging. The malfunctions were presented in a logical sequence and consisted of a series of related events that led to major plant transients.

2. **Review of Licensee Administration of Requalification Examinations.** The inspectors noted that the resident inspectors had observed the administration of three simulator annual requalification examinations in March 1999. Details of the observations are contained in NRC Integrated Inspection Report No. 50-395/99-02, Section O5.1. The resident inspectors concluded that the scenarios were challenging and the critiques were thorough, providing a comprehensive assessment of individual and crew performance.

The inspectors observed the weekly as found simulator examination for one crew. The inspectors found that the licensee evaluators adequately identified operator performance errors. The inspectors also observed the post examination

review with the shift supervisor and the crew debrief session. Both were found to be effective training practices. Specific individual and crew strengths and weaknesses were discussed in detail during the critiques. The inspectors noted the strong support the simulator evaluation received from operations management. The inspectors also observed one crew's performance on the simulator during the Emergency Plan Exercise. Overall performance of the crew was satisfactory.

c. Conclusions

The content of the annual operating tests and biennial written examinations was satisfactory. Written examinations and simulator scenarios provided very good evaluation tools to measure operator knowledge, skills and abilities. This portion of the licensed operator requalification program met the requirements of 10 CFR 55.59, "Requalification."

O6 Operations Organization and Administration

O6.1 Overtime Deviation Policy Review

a. Inspection Scope (71707)

The inspectors reviewed the licensee's overtime policy for the refueling outage and reviewed overtime deviations reports for one year prior to the outage.

b. Observations and Findings

The inspectors reviewed the administrative controls related to TS 6.2.2.e, "Unit Staff," on the working hours of unit staff who perform safety-related functions. Also reviewed were deviations to ensure they were controlled and approved in accordance with SAP-152, "Control of Overtime For Station Personnel," Revision 8. The FSAR, Section 13.5.1.3, "Conduct of Plant Operations Procedures," states "as required by NUREG 0737, Item I.A.1.3, administrative procedures establish actual work time limits for plant shift personnel who maintain or operate any structures, systems, or components important to safety." During the outage, the licensee authorized a majority of the plant staff to work a 12-hour day, seven days per week schedule. Deviations from the TS guidelines were authorized by the General Manager Nuclear Plant Operations per an overtime authorization letter dated March 29, and reissued April 26 when the outage duration was recognized that it may extend approximately nine days beyond the originally planned duration of 30 days. Station personnel performing safety- related work per the letter were encouraged to take some days off during the outage. Both letters specified that operations personnel responsible for plant operations would work four days of 12-hour shifts and then would be assigned to administrative tasks or scheduled to take days off.

With the exception of a few minor administrative errors, the inspectors determined that the administrative requirements of SAP-152 were met for outage overtime deviation approvals. The inspectors did question the use of a blanket approval for the majority of

plant employees to deviate from the TS guidelines without stating a specific overtime limit in the Overtime Authorization letter. The licensee generated CER 99-0947 to evaluate their overtime practices during outages.

The objective of the overtime controls is to establish limits to prevent situations where fatigue could reduce the ability of staff to competently perform safety-related functions. As stated in SAP-152, step 5.4, "Supervisors of key plant personnel are responsible for monitoring the working hours of employees under their supervision to assure every reasonable effort is taken to prevent exceeding the overtime guidelines specified in this procedure. The work authorized outside of the guidelines defined in this procedure should be minimized to every extent possible." The inspectors assessed employee behavior and fitness-for-duty during the outage and did not identify any instances where fatigue appeared excessive or resulted in any unsafe actions or performance issues.

The inspectors reviewed the records of overtime deviations for one year prior to the outage. Few overtime deviations were noted and all documentation was properly completed and approved with the reason clearly stated for the deviations. No issues with overtime control were identified during this time of Mode 1 operations.

c. Conclusions

Overtime deviations for refueling outage work were approved by the General Manager Nuclear Plant Operations in accordance with administrative procedures. CER 99-0947 was generated to evaluate overtime practices during outages. No concerns with overtime control were identified during Mode 1 operations.

O7 Quality Assurance in Operations

O7.1 Plant Safety Review Committee (PSRC) and Management Review Board (MRB) Meetings

a. Inspection Scope (71707, 40500)

The inspectors attended the PSRC and MRB meetings to observe and assess the effectiveness of the meetings.

b. Observations and Findings

On June 8 the inspectors attended a PSRC meeting. The inspectors verified the required quorum was present. The meeting agenda item reviews were thorough, comprehensive and appropriately focused on safety. Action items were issued to ensure followup on several topics. The inspectors noted the PSRC issued an action item to the Corrective Action Review Board (CARB) to investigate the frequent use of "age-related" failures in the closeout to several non-conformance notices that were reviewed at this meeting.

The inspectors attended the MRB meeting conducted on June 11. This meeting reviewed the reactor trips of May 18 and June 4. The meeting was timely, professional, and probing. At this meeting the lessons learned from the trips were presented with an in-depth review of the root causes for the reactor trips, the corrective actions developed and other items of concern resulting from the trips (such as the lifting of the reheat safety valve following the trip of June 4) were discussed.

c. Conclusions

Observed PSRC and MRB meetings were comprehensive, properly focused on safety and probing with relevant issues being adequately reviewed. The inspectors noted action items were issued to ensure proper followup and resolution on issues of concern.

II. Maintenance

M1 Conduct of Maintenance

M1.1 Observation of Work Activities

a. Inspection Scope (62707, 61726)

The inspectors observed all or portions of maintenance and surveillance testing activities listed below:

- EMP-230.001 "Emergency Light Battery Service Test," Revision 9B
- FPP-020 "Fire Protection Program Administration," Revision 3 (Attachment IX, Checkout Log for Fire Extinguishers)
- ICP-240.19 "Barton Differential Indicating Pressure Switch Generic Calibration," Revision 8 (for IFI07274C C Component Cooling Water pump flow indicator)
- ICP-340.048 "RTD Cross Calibration," Revision 0 (for RCS loop RTDs)
- MMP-320.012 "Charging /Safety Injection Pump Overhaul and Preventative Maintenance," Revision 12
- SMWR 99-056C Repair Door Controller PAC 63, relay chatter causing excessive sensor data multiplexer input resulting in overload of the security computer system
- STP-125.002 "Diesel Generator Operability Test," Revision 18E (for A Emergency Diesel Generator (EDG))
- STP-205.004 "Residual Heat Removal Pump and Valve Test," Revision 3

- STP-345.037 "Solid State Protection System Actuation Logic and Master Relay Test For Train A," Revision 14
- STP-360.091 "Liquid Radiation Monitor RML-5 and RML-9 Operational Flow Test," Revision 0
- STP-391.010 "Seismic Monitoring System Triaxial Time-History Accelerographs IYM01780 and IYM01784 Operational Tests," Revision 1

b. Observations and Findings

The inspectors observations verified that work was performed with the work package present and actively referenced. All activities observed were conducted in accordance with written procedure 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 and when applicable. The inspectors noted that appropriate radiation control measures were in place. The inspectors concluded that routine maintenance and surveillance activities were satisfactorily performed.

The inspectors did note during a walkdown of the A EDG control panel that the "Ready for Auto Start Light" was not illuminated following the A EDG test conducted on May 20. The inspectors notified the control room shift supervisor of this observation. Status in the control room indicated the A EDG was operable (no abnormal annunciators locked in). An operator was dispatched to the A EDG and determined the problem to be a burned out light bulb which was immediately corrected. The inspectors discussed this item with the operator who performed the local actions to restore the EDG to service following the test. The operator could not recall if the "Ready for Auto Start Light" was illuminated or if he specifically looked at the light while restoring the EDG. The inspectors concluded the post surveillance test walkdown of the EDG local control panel to ensure normal indications may not have been explicitly performed.

c. Conclusions

Based on review and observation of eleven surveillance test and maintenance packages, routine maintenance and surveillance activities were satisfactorily performed. Activities were conducted in accordance with written procedure instructions and the procedures provided sufficient detail and guidance. Technicians demonstrated that they were experienced and knowledgeable.

M8 Miscellaneous Maintenance Issues (92700)

M8.1 (Closed) LER 50-395/99007-00: missed surveillance - turbine stop valve closure trip actuating device operational test. As a result of an initiative to ensure verbatim compliance with TS, the operations staff reviewed STP-142.005, "Turbine Trip Actuating Device Operational Test," Revision 3C, against the surveillance frequency of TS 3.3.1, "Reactor Trip System Instrumentation," Table 4.3-1, Item 17. The surveillance frequency

of TS specifies "S/U," (i.e., startup) "if not performed in the previous 31 days." As defined in TS, S/U is prior to each reactor startup. Because the surveillance test was performed following reactor startup (i.e., in Mode 2 while operating at 2 to 3 percent power) this is considered a missed surveillance. This surveillance has been performed in this manner (i.e., in Mode 2) since June of 1992.

Operator actions potentially available to mitigate a failure of the turbine stop valve closure interlock include: manual reactor trip, main steam isolation valve closures, manual closure of turbine stop valves, manual turbine trip and turning off the turbine electro-hydraulic control system pumps. For the reactor startup following Refueling 11 completion of the surveillance test in Mode 2 verified that the turbine stop valve closure interlocks were functioning properly.

In the subject LER, the licensee has committed to revising STP-142.005 to allow performance of the surveillance in Mode 3 (prior to reactor startup) by August 31,1999, or before the next reactor startup. The licensee also plans to revise their surveillance scheduling procedure, General Test Procedure (GTP)-702, "Surveillance Activity Tracking and Triggering," Revision 12. The failure to test the Turbine Stop Valve Closure prior to reactor startup is a violation of TS 3.3.1, Table 4.3-1, Item 17 surveillance requirement. This Severity Level IV violation is being treated as a Non-Cited Violation (NCV), consistent with Appendix C of the NRC Enforcement Policy. This violation is in the licensee's corrective action program as CER 99-0762 and is identified as NCV 50-395/99004-01.

III. Engineering

E1 Conduct of Engineering

E1.1 General Comments (37551)

The inspectors observed engineering support for the refueling outage, power escalation issues and post reactor trip troubleshooting. Engineering support of the plant through the appropriate and timely resolution of condition evaluation reports and availability of system and design engineers to support troubleshooting was good.

E1.2 Control of Core Physics Constants

a. Inspection Scope (37551)

The inspectors reviewed input of core physics constants into the integrated plant computer system (IPCS).

b. Observations and Findings

Prior to initial criticality, the inspectors reviewed the update of the digital reactivity application on the IPCS to ensure the proper core constants (smoothing constant, prompt neutron lifetime, delayed neutron importance, decay constants and delayed

neutron fraction) were imputed and maintained. These constants are used for low power physics testing to verify core performance during startup and were obtained from Reactor Engineering Procedure (REP)-107.003, "Beginning of Cycle Dilution to Criticality," Revision 8, Attachment X, "Beginning of Cycle Delayed Neutron Data Cycle 12." The inspectors verified the constants were properly entered and consistent with the applicable procedures. The inspectors noted the reactor engineering supervisor directed verification of the core constants following a lockup of the IPCS terminals during plant heatup (this condition was documented in CER 99-0746). The inspectors concluded the action to be a prudent and appropriate response to this condition.

c. Conclusions

The inspectors verified reactor engineering was entering and maintaining the proper core physics constants in the integrated plant computer system. These constants are used for low power physics testing to verify core performance during startup following refueling.

E8 Miscellaneous Engineering Issues

E8.1 Year 2000 (Y2K) Readiness Program Review (TI 2515/141)

During the week of May 10, 1999, the staff conducted an abbreviated review of Y2K activities and documentation using Temporary Instruction (TI) 2515/141, "Review of Year 2000 (Y2K) Readiness of Computer Systems at Nuclear Power Plants." The review addressed aspects of Y2K management planning, documentation, implementation planning, initial assessment, detailed assessment, remediation activities, Y2K testing and validation, notification activities, and contingency planning. The reviewers used NEI/NUSMG 97-07, "Nuclear Utility Year 2000 Readiness," and NEI/NUSMG 98-07, "Nuclear Utility Year 2000 Readiness Contingency Planning," as the primary references for this review.

During the review, the licensee stated that the Y2K Readiness Project assessment and remediation activities were 90 percent complete and contingency planning was 65 percent complete. Both programs were on target to be completed by their scheduled due dates.

A detailed review of the following systems was performed:

- ATWS Mitigation System Actuation Circuitry (AMSAC)
- Bailey Controls for the Turbine Building Closed Cycle Cooling System
- Electronic Dosimeters
- Offsite Warning System (Sirens)
- Plant Computer
- Plant Security Computer (Doors)

The licensee's Contingency Plan was in a draft form, and several improvements were discussed, including the use of checklists to combine all the preparatory actions for the

individual component plans and making plans to use information from Japanese and South Korean nuclear plants when they experience the new year transition.

Conclusions regarding the Y2K readiness of the facility are not included in this report. The results of this review will be combined with the results of reviews of other licensees in a NUREG publication.

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. The total reported outage dose was 115.818 rem (based on electronic dosimeters) which was above the outage goal of 90 rem, but still ranked as the second lowest outage dose in Summer plant history. The plant is still on target to meet its 130 man rem goal for 1999 inclusive of the outage dose of just over 115 man rem.

P2 Status of EP Facilities, Equipment, and Resources

P2.1 Implementation of the Emergency Preparedness (EP) Program

a. Inspection Scope (82701)

The inspection objectives were to determine whether the licensee's EP program was maintained in a state of operational readiness, and to determine whether changes to the program since the last inspection meet commitments and NRC requirements. The effects of these changes on the licensee's overall state of emergency preparedness was also reviewed.

b. Observations and Findings

The inspectors reviewed the current revision of the Emergency Plan, Revision 41 dated November 25, 1998. The changes made with Revision 41, were submitted in accordance with regulatory requirements and did not adversely affect the licensee's overall state of emergency preparedness.

The inspection was scheduled during a week that the licensee had scheduled an emergency preparedness training drill. This provided the inspectors the opportunity to evaluate the training program without having to conduct individual walk-throughs. From the review of training documentation as well as the drill observation, the inspectors determined that the licensee was properly focusing on training proficiency through drill participation.

Random checks of emergency equipment in the facilities identified no issues with the maintenance of equipment. Additionally, the inspectors observed the facilities activated

and in operation on the day of the training drill. The inspectors observed that facilities and equipment would support an emergency response. The 106 sirens provided by the licensee for alerting the public met requirements with a reliability factor of 98.08 percent reported for calendar year 1998, and a year to date reliability of 97.75 percent.

There were no organizational changes that negatively impacted the emergency preparedness organization. The inspectors noted that the corporate knowledge of the emergency preparedness section was good and that the section had worked together as a team for many years.

A review of the 1998 and 1999 Quality Assurance audits reports for the Station Emergency Plan confirmed that the annual audits were meeting regulatory requirements for frequency as well as substance.

c. Conclusions

The emergency preparedness program was being maintained in a state of operational readiness. Changes made to the EP program since the last inspection met NRC requirements and did not adversely affect the overall state of emergency preparedness.

S5 Security and Safeguards Staff Training and Qualification

S5.1 New Handgun Training and Qualification

a. Inspection Scope (71750)

The inspectors observed the conduct of security training and qualification of security guards for a new style of handgun using a new testing methodology.

b. Observations and Findings

On June 3, the inspectors observed gun training and qualification of the security force. The training and qualification testing involved a new style handgun and a new testing methodology. The testing methodology is a Federal Bureau of Investigations (FBI) pistol qualification course with timed shooting from 25, 15, and 5 yards, respectively. Since this was an initial qualification test for a new style of handgun the guards were permitted to repeat the qualification tests should a failure occur (unless the instructor decided the individual would require more training or due to time restraints). The inspectors observed three failures out of six initial individuals tested on June 3. Later that same day these officers satisfactorily passed the handgun qualification tests. When the inspectors reviewed the qualification records it was noted that no test failures had been recorded. The licensee responded that documentation of the test failures was not required for initial qualifications on the new style handgun provided the officer qualified on a subsequent test. Pending further review of the documentation, implementation and qualification of the security force for the new handguns, this issue will be tracked as an Inspection Followup Item, (IFI) 50-395/99004-02.

Overall, the inspectors observed that the testing was well controlled, with an emphasis on safety, and conducted in accordance with Security Plan Procedure (SPP)-300, "Security Training and Qualification Program: Training," Revision 6, Attachment 8, Subject No. 99902, Attachment 19, "FBI Pistol Qualification Course."

The inspectors reviewed the handgun qualification records for the groups recently tested between May 12 and June 8. Four out of 27 individuals tested had failed to successfully qualify (a score of 75 percent is required to pass). Instructors indicated those individuals remain qualified for the previously issued handgun and would retrain and retest at a later date. The inspectors noted a discrepancy on an SPP-301, "Security Training and Qualification Program: Qualification," Revision 6, Attachment 2, "Handgun Qualification," record dated May 26, in that an examinee had a raw score of 64 percent recorded and the result indicated as a passing score (i.e. a "Go") when it should have been recorded as a failure (i.e. "No Go"). Security personnel were informed of this observation and were able to demonstrate to the inspectors that this was a administrative oversight and did not allow the subject guard to be issued a gun for which he was not yet qualified. The inspectors verified the guard was still qualified for use of the previously issued handgun. The administrative error was corrected.

c. Conclusions

Security force handgun training and testing was effective, well controlled, with appropriate emphasis on safety and conducted in accordance with the Security Plan Procedures. A minor security training handgun qualification record administrative error was discovered and corrected.

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 June 24, 1999. 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

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, Quality Systems
M. Fowlkes, Manager, Operations

S. Furstenberg, Manager, Maintenance Services
L. Hipp, Manager, Nuclear Protection Services
D. Lavigne, General Manager, Nuclear Support Services
G. Moffatt, Manager, Design Engineering
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, Associate Manager, Operations

INSPECTION PROCEDURES USED

IP 37551:	Onsite Engineering
IP 40500:	Effectiveness of Licensee Controls in Identifying, Resolving, and Preventing Problems
IP 61726:	Surveillance Observations
IP 62707:	Maintenance Observations
IP 71001:	Licensed Operator Requalification Program Evaluation
IP 71707:	Plant Operations
IP 71750:	Plant Support Activities
IP 82701:	Operational Status of the Emergency Preparedness Program
IP 92700:	Onsite Followup of Written Reports of Nonroutine Events at Power Reactor Facilities
IP 93702:	Prompt Onsite Response to Events at Operating Power Reactors
TI 2515/141:	Review of Year 2000 (Y2K) Readiness of Computer Systems at Nuclear Power Plants

ITEMS OPENED AND CLOSED

Opened

50-395/99004-01	NCV	missed surveillance - turbine stop valve closure trip actuating device operational test (Section M8.1)
50-395/99004-02	IFI	review documentation, implementation and qualification of security force for new handguns (Section S5.1)

Closed

50-395/99008-00	LER	manual reactor trip due to main turbine high vibration (Section O1.2)
50-395/99007-00	LER	missed surveillance - turbine stop valve closure trip actuating device operational test (Section M8.1)
50-395/99004-01	NCV	missed surveillance - turbine stop valve closure trip actuating device operational test (Section M8.1)