U. S. NUCLEAR REGULATORY COMMISSION

REGION II

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Report No.:	50-395/99-07
Licensee:	South Carolina Electric & Gas (SCE&G)
Facility:	Virgil C. Summer Nuclear Station
Location:	P. O. Box 88 Jenkinsville, SC 29065
Dates:	September 12 - October 23, 1999
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Enclosure

EXECUTIVE SUMMARY

Virgil C. Summer Nuclear Station
NRC Inspection Report No. 50-395/99-07

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 two regional reactor inspectors and another resident inspector.

Operations

- Safety conscious operation was evidenced by the site preparations and precautionary staffing of the technical support center for the approach of Hurricane Floyd. An example of a conservative operational decision was management's decision to lower reactor power to support replacement of a reactor coolant loop flow transmitter (Section O1.1).

- Based on a detailed service water (SW) system walkdown and review of numerous documents associated with the SW system, the inspectors concluded the system was properly aligned and operational in accordance with licensee procedures and Technical Specifications. The system engineer was knowledgeable and was properly monitoring the SW system performance under the maintenance rule and licensee programs (Section O2.1).

- A non-cited violation was identified for the licensee's failure to make a 10 CFR 50.72 non-emergency one-hour report for the service water pond siphon breakers being outside their design basis (Section O8.1).

- The licensee properly evaluated and documented a 10 CFR Part 21 issue which could have prevented 480 volt K-line breakers from either tripping or closing (Section O8.2).

Maintenance

- Routine maintenance and surveillance activities were satisfactorily performed in accordance with approved procedures. Technicians demonstrated that they were experienced and knowledgeable of their assigned tasks (Section M1.1).

- Personnel work practices were deficient, in that, while performing maintenance on nearby equipment, a residual heat removal pump breaker manual closing mechanism was struck by an equipment cart. The licensee actions to address the inadvertent pump start should preclude recurrence. In addition, the licensee revised an annunciator response procedure to better aid operators in diagnosing the cause for the alarm which was received when the pump started (Section M1.2).

- A non-cited violation was identified for an inadequate surveillance procedure for measurement of control room emergency ventilation outside makeup airflow. The procedure was corrected and re-performed successfully (Section M1.3).

- A non-cited violation was identified for inadequate surveillance procedures that positioned several emergency core cooling system valves contrary to the positions listed in Technical Specifications (Section M8.1).

Engineering

- Review of calculations for the component cooling water system led to the conclusion that necessary calculations were on file and that the licensee was adequately addressing weaknesses in these calculations through their design basis document improvement project and internal safety system functional inspections (Section E3.1).

- A non-cited violation was identified for the service water pond siphon breakers not being installed in accordance with plant drawings. The siphon breakers had blind flanges installed such that they would not function. The licensee took prompt corrective actions to resolve the condition once identified (Section E8.1).

Plant Support

- A pre-job briefing conducted prior to an at power reactor building entry was professional and complete. Health Physics personnel provided proper radiological controls during the entry. The entry was successful in identifying the source of a non-reactor coolant system leak into the containment sump. The licensee appropriately identified and entered items discovered during the reactor building entry into their corrective action program for resolution (Section R1.2).

Report Details

Summary of Plant Status

The unit began this inspection period at 100 percent power. On October 8, a planned load reduction to 35 percent power was initiated to allow a reactor coolant loop flow transmitter to be replaced. Power was restored to 100 percent on October 10 and the plant remained at approximately 100 percent power for the remainder of the inspection period.

I. Operations

O1 Conduct of Operations

O1.1 General Comments (71707)

The inspectors conducted frequent reviews of ongoing plant operations. In general, the conduct of operations was professional and safety-conscious. An example of safety-conscious conduct was site preparation and precautionary staffing of the technical support center for the approach of Hurricane Floyd on September 15. The hurricane with wind gusts reaching approximately 35 to 50 miles per hour had no significant impact on the site. An example of a conservative operational decision was the planned replacement of reactor coolant loop C flow transmitter (IFT-00434-RC) at 35 percent reactor power on October 9. This transmitter could have been replaced at full power, but with the risk of a reactor trip during the process of valving the transmitter back into service. Management conservatively decided to lower power below the single reactor coolant loop low flow permissive (P-8) set point of 38 percent power to preclude the potential for a reactor trip while replacing the flow transmitter. The replacement of the transmitter and plant operations associated with a power reduction were performed properly in accordance with established procedures and without incident. Additional specific events and noteworthy observations are detailed in the sections below.

O2 Operational Status of Facilities and Equipment

O2.1 Engineered Safety Feature System Walkdown

a. Inspection Scope (71707)

The inspectors conducted a detailed walk down of accessible portions of the service water (SW) system and related support systems.

b. Observations and Findings

A walkdown was performed of accessible valves in the main SW system flowpath to verify correct position alignment. Labeling of equipment and local-remote position indication was verified as accurate. Power supplies and breakers were verified to be correctly aligned. Interior of breakers and electrical cabinets were inspected and found to be in acceptable condition. Control room switch positions were verified to be consistent with established procedures. The inspectors reviewed the SW system related log readings conducted per OAP-106.1 "Operating Logs," Revision 7, on October 14. No

deficiencies or discrepancies were noted. Control room and local instrument indications were verified to be in accordance with Technical Specifications (TS) and procedural requirements. Generally good housekeeping and cleanliness of the systems were noted. The system was free from leakage or if present (i.e., excessive SW pump packing leakage) was captured under a maintenance work request (MWR). The inspectors observed the repack of SW Pump A (XPP0039A) mechanical seal performed under MWR 9917623 and reviewed the post maintenance test conducted under surveillance test procedure (STP)-223.002A, "Service Water Pump Test," Revision 7. No discrepancies were identified and inspectors noted that the time out-of-service was minimized.

The inspectors observed proper control of ignition sources and flammable materials in the vicinity of the SW system. Fire protection systems were checked, including fire extinguishers for current inspection certifications and charge pressure. The inspectors verified that the SW building Simplex 4100 fire alarm panel was clear of any fire alarms, trouble alarms and was properly powered with a normal display. Recently performed fire protection surveillance test procedures, STP-128.304, "Service Water Building Pre-Action Sprinkler Detection System XPN-099 Operational Test," Revision 11, and STP-170.013, "Fire Switch Functional Test for XFN-80B Service Water Building Supply Fan B," Revision 2, were reviewed. No fire protection system issues were identified related to the SW system.

The inspectors reviewed the most recently completed SW system surveillance test procedures:

- STP-123.001 "Service Water System Valve Lineup Verifications," Revision 7
- STP-123.003A "Train A Service Water System Valve Operability Test," Revision 4
- STP-123.003B "Train B Service Water System Valve Operability Test," Revision 3
- STP-130.005J "Service Water Valve Operability Testing (Mode 5)," Revision 2
- STP-223.002A "Service Water Pump Test," (for all three pumps) Revision 7
- STP-230.006J "Service Water System Full Flow Testing of XVC03130A-SW, XVC03130B-SW, XVC03115A-SW, XVC03115B-SW, and XVC03115C-SW," Revision 2
- STP-250.007 "SW System Leak Test Outside Reactor Building," Revision 4

Review of these procedures identified no discrepancies. All the required acceptance criteria were met or dispositioned with maintenance work requests or condition evaluation reports when deficiencies were noted. Appropriate retests were performed and documented.

The inspectors discussed with the system engineer various aspects of the SW system maintenance rule trending and system monitoring and reviewed the SW system engineer files as part of a 10 CFR 50.65 maintenance rule system review. The system engineer was knowledgeable and performed a monthly SW system walkdown which was observed by the inspectors. The inspectors reviewed the scope, risk classification, performance criteria, and classification and recording of failures for the SW system related to the maintenance rule. The inspectors reviewed 41 SW system related condition evaluation reports (CER) generated since July 1998 and discussed with the system engineer outstanding MWRs on the system. System health was categorized by the licensee's system as green (i.e., system meeting its goals, with no significant problems) in the monthly system status report. The inspectors verified the SW system has met its performance criteria for availability and reliability and has been properly placed in the (a)(2) category under the maintenance rule.

The inspectors verified SW system operation was consistent with the Final Safety Analysis Report (FSAR) Section 9.2 and Figures 9.2-1 and 9.2-2 and TSs 3/4.6.2.3 and 3/4.7.4, 7.5, and 7.9. Based on their review, the inspectors determined the SW system and its support systems (SW building heating, ventilation, traveling screen and fire protection) were operable and available as required to perform their intended safety function.

c. Conclusions

Based on a detailed service water (SW) system walkdown and review of numerous documents associated with the SW system, the inspectors concluded the system was properly aligned and operational in accordance with licensee procedures and Technical Specifications. The system engineer was knowledgeable and was properly monitoring the SW system performance under the maintenance rule and licensee programs.

O8 Miscellaneous Operations Issues (71707, 92700, 92901)

08.1 (Closed) Unresolved Item (URI) 50-395/99006-01: service water siphon breakers not functioning was not reported per 10 CFR 50.72.

A URI was opened to review the 10 CFR 50.72 reportability requirements for the discovery of blind flanges installed on two siphon breaker pipe stubs on the 36-inch diameter pipe connecting the SW pond (ultimate heat sink) and the Monticello Reservoir. With the blind flanges installed, the siphon breakers would not have been able to perform their intended design function. This would have resulted in the SW pond not meeting its minimum design basis level of 415 feet for a loss of Monticello Reservoir event.

Based on additional review of this item, the inspectors determined that there was a time period on July 30 in which licensee personnel were aware that the blanked SW siphon breakers was a current existing condition. The presence of blind flanges on both siphon breakers is contrary to the FSAR and plant drawings and would have resulted in the

minimum SW pond level being below the levels stated in the TS and the FSAR. This represented an existing condition outside the design basis of the plant. The licensee failed to perform the required non-emergency one-hour notification in accordance with 10 CFR 50.72 (b)(1)(ii)(B) for a condition that is outside the design basis of the plant. This Severity Level IV violation is being treated as a non-cited violation (NCV), consistent with Section VII.B.1.a of the NRC Enforcement Policy. This violation is in the licensee's corrective action program as non-conformance notice (NCN) 99-1119 and is identified as NCV 50-395/99007-01.

08.2 (Closed) Licensee Event Report (LER) 50-395/99011-00: 10 CFR 21 on K-Line breakers.

On August 6, during performance of surveillance testing of the ABB 480 volt K-line breaker for the reactor make-up water pump B, the breaker failed to trip on the long time delay setting. NCN 99-1129 was written to document the failure and disposition the failed breaker.

The licensee determined the cause to be inappropriate routing and/or insufficient support of breaker wiring during initial manufacture and overhaul. This condition could prevent ABB K-line breakers, sizes 1600 and 2000, from either tripping or closing. This condition represents a potential for a common mode failure for safety-related ABB K-line breakers. A significant safety hazard report was issued on September 22 and a 10 CFR Part 21 Notification to the NRC was issued on October 21 per 10 CFR 21.21(a)(1) under LER 50-395/99011-00.

Upon discovery of this condition, the licensee developed and implemented an inspection plan for all potentially affected breakers (both safety and non-safety related). The licensee has inspected 26 out of the 30 identified safety-related breakers and all but five of the non-safety related breakers. One other safety-related breaker required additional support for the shunt trip coil wiring. This breaker was installed in XSW1DA1-06C (reactor building cooling unit A fan breaker), but the licensee determined that the wire routing would not have prevented the breaker from tripping. The four remaining safety-related breakers and five remaining non-safety related breakers can not be inspected with the plant at power and have been appropriately added to the scope of the Refueling Outage 12. ABB service has issued an internal bulletin to all ABB refurbishment service centers on this issue. ABB plans to revise the procedure for new breaker assembly by December 31, 1999, to address this condition. Based on the inspectors' review of this condition, observation of corrective actions in the field, and the licensee action plan to address the nine remaining breakers, the inspectors concluded this condition was properly evaluated and documented. The licensee made the required 10 CFR 21 notifications for reporting a defect with substantial safety hazards within 60 days as required. Outstanding actions are in the licensee corrective action program and are tracked under NCN 99-1129.

II. Maintenance

M1 Conduct of Maintenance

M1.1 Observation of Work Activities

a. Inspection Scope (61726, 62707)

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

- EMP-445.001 "Limitorque Preventive Maintenance," Revision 9A, for XVG03005A-SP, Reactor Building Spray Sump Isolation Valve A.
- ICP- 180.003 "Emergency Diesel Generator B," Revision 8A (Section 7.2 for calibration and sensing line fill of IPI05427 D/G Fuel Oil Suction Strainer DP Pressure Indicator)
- ICP- 340.027 "RCP A Seal Leak-off Flow IFT00156A Calibration," Revision 6
- ICP-365.010 "Steam Header Pressure IPT00464 Calibration," Revision 3A
- PMTS 9909579 Refill manometer fluid on B EDG pressure indicators IPI05451, IPI05453, and IPI15414B
- PMTS 9909704 Perform weekly A EDG lube checks per MMP-180.035 "Emergency Diesel Generator Engine Rocker Arm Lube Oil System Pressure Checks and Adjustments," Revision 7
- STP-102.002 "NIS Heat Balance," Revision 8
- STP-128.319 "Smoke Detector Functional Test," Revision 5 (for Fire Zone PP)
- STP-215.001A "Reactor Building Personnel Escape Airlock Test," Revision 6
- STP-223.002A "Service Water Pump Test," Revision 7
- STP-300.020 "Loose Parts Monitoring System Instrument Operational Test," Revision 7A
- STP-345.037 "Solid State Protection System Actuation Logic and Master Relay Test for Train A," Revision 14A
- WR 9915199 Engine Tachometer reads 45 rpm with B D/G secured/repair/ perform ICP-180.001 "Diesel Generator A/B Engine Speed Switch Calibration (Tachometer Relay)," Revision 4

- WR 9916745 — Trouble alarm for RM-G18 (RB High Range Area Radiation Monitor) locked in, check operation per STP-360.007, "Reactor Building Area Radiation Monitor, RM-G18, Calibration," Revision 6A and NCN 99-1336 repair disposition

- WR 9917623 — A Service Water Pump (XPP0039A) Repack per MMP-320.008 "Service Water Pump Maintenance," Revision 10

b. Observations and Findings

The inspectors observed that work was performed with the work package present and actively referenced. Generally, activities observed were conducted in accordance with written procedural instructions which 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 the procedure. The inspectors noted that appropriate radiation control measures were in place when applicable.

c. Conclusions

Routine maintenance and surveillance activities were satisfactorily performed in accordance with approved procedures. Technicians demonstrated that they were experienced and knowledgeable of their assigned tasks.

M1.2 Inadvertent Start of Residual Heat Removal Pump (RHR)

a. Inspection Scope (62707)

The inspectors reviewed the circumstances surrounding the inadvertent start of the B train RHR pump and licensee corrective actions in response to this event.

b. Observations and Findings

During electrical maintenance, on September 30, a spare breaker was being removed from 480 volt switchgear XSW-1DB1. The breaker cubicle was located directly above the breaker cubicle for the B train RHR pump. During the maintenance activity, a breaker transport cart inadvertently rolled against the supply breaker for the B train RHR pump. The lip of the cart activated the manual closing mechanism on the front of the RHR pump breaker. This resulted in starting the B RHR pump. The pump ran for approximately six minutes before being secured, and placed in the pull-to-lock (PTL) position after it was verified by operations personnel that no valid demand signal was present. The pump remained in the PTL position for approximately 30 minutes until an investigation into the start was completed. The licensee reported this RHR pump start as a non-emergency four-hour notification in accordance with 10 CFR 50.72(b)(2)(ii) requirements for an event or condition that results in a manual or automatic actuation of any engineered safety feature.

The inspectors' review of the pump start event indicated that the work controls in place to facilitate removal of the spare breaker did not address potential impact on other equipment. No pre-job brief was conducted for the work and the cart used to carry the breaker was not inspected or discussed as having potential interference with the switchgear. Based on the inspectors' discussions with maintenance personnel, the electricians did not realize during their activity that a pump start had occurred. One electrician stated that he heard an increase in the load on a nearby transformer, but it was not until he was back in the shop that he was informed that an inadvertent start of the RHR pump had occurred. He then informed his supervision that he was in that switchgear room at the time of the event, and was potentially involved in the event.

At the time of the event, the inspectors were in the control room when the operator at the controls received the annunciator for component cooling water (CCW) loop B essential load flow low. One condition which results in this alarm is when a RHR pump starts and the CCW train which supplies cooling to the associated RHR seal cooler is not in service. Duty shift personnel immediately began to diagnose the apparent cause of the alarm. The operator referred to annunciator response procedure (ARP)-001 XCP-602 for instructions in response to the alarm. The inspectors observed that the ARP did not lead the operator to discover the cause for the alarm or the inadvertent RHR pump start. Use of the ARP actually delayed the identification of the operating RHR pump. It was not until approximately six minutes later during review of main control room board indicators that the pump was discovered in operation.

As part of licensee corrective actions the ARP was revised. The inspectors verified the licensee had issued a revision to the ARP to include additional actions for the alarm that would address the RHR system. As part of additional corrective actions the licensee plans to modify the breaker transfer cart to eliminate any further potential to interfere with breaker manual trip mechanisms. This event was entered into the licensee corrective action program under condition evaluation report (CER) 99-1295. An LER on this engineered safety feature inadvertent actuation is in preparation.

c. Conclusions

Personnel work practices were deficient, in that, while performing maintenance on nearby equipment, a residual heat removal pump breaker manual closing mechanism was struck by an equipment cart. The licensee actions to address the inadvertent pump start should preclude recurrence. In addition, the licensee revised an annunciator response procedure to better aid operators in diagnosing the cause for the alarm which was received when the pump started.

M1.3 Control Room Ventilation Airflow Measurements

a. Scope of Inspection (61726, 62707)

The licensee identified during a post outage review of instrument calibration issues that the control room ventilation outside makeup airflow exceeded TS limits. The inspectors reviewed this condition and the licensee actions taken to address this condition.

b. Observations and Findings

On September 29, the licensee reviewed airflow measurements taken on March 9, 1999, to satisfy surveillance procedure STP-454.002, "Control Room Emergency Air Cleanup System Performance Test," Revision 2. The review resulted from a June post outage review into instrument calibration issues and the discovery by the system engineer of a potential calculation error. At the conclusion of the review in September, the licensee determined that the allowed outside makeup airflow for the B train control room emergency ventilation system exceeded TS surveillance requirement 4.7.6, "Control Room Normal and Emergency Air Handling System," paragraph e.3 limits. In the calculation used to convert field differential pressure measurements into airflow values, the licensee identified that the density correction factors used previously were incorrect. The licensee also determined that density correction factors were not being used to convert cubic feet per minute (cfm) to standard cubic feet per minute (scfm). Recalculation of data from March 9 with the proper density correction factors resulted in a calculated B train control room ventilation system makeup airflow exceeding the maximum 1000 cfm in TS 4.7.6 by 82 cfm. The A train ventilation system airflow was also recalculated based on data taken in March. The A train recalculated value was within the established TS limit. A review of out-of-service times for both the A and B train ventilation systems revealed that the A train had been removed from service for a total of 67 hours from March 9 to September 30, 1999. The NRC determined that even though the A train ventilation system was out-of-service, the magnitude that the calculated B train outside makeup airflow exceeded the TS limit (by 82 cfm) would have had a minor impact on the accumulated dose for control room personnel during accident conditions.

After discovery of the calculation error, the licensee re-performed STP-452.002 for the B train on September 30. No adjustments to inlet dampers or repairs to duct work to address possible leak paths were performed. A system walkdown was performed to identify potential areas of leakage. None were identified. The re-performed STP-452.002 resulted in a total outside makeup airflow of approximately 795 cfm. Based on discussions with the licensee, the inspectors learned that the only difference between performances of the March and September tests was that plant personnel access (i.e., ingress and egress) to the control room was restricted for the two-hour test duration on September 30. An NRC review determined that it was reasonable to limit access to the control room during the re-performance of STP-452.002.

The inspectors were informed by the system engineer that the incorrect density correction factors were used since startup and were incorporated into the station surveillance procedure in error. The system engineer was unsure of the origin of the error. The inspectors verified during the post test review that instrumentation used during the September 30 test were in calibration. The inspectors were informed that the instruments used were the same instruments used in March. The inspectors reviewed the results of corrected ventilation data extending back to 1983. Based on that review, no other tests were identified in which either train of control room emergency ventilation exceeded the TS limit of 1000 cfm.

The use of inadequate correction factors in a surveillance procedure is a violation of TS 6.8.1.c which requires that procedures be established and maintained for surveillance and test activities of safety-related equipment. This Severity Level IV violation is being treated as a NCV, consistent with Section VII.B.1.a of the NRC Enforcement Policy. This violation is identified as NCV 50-395/99007-02 and has been placed in the licensee's corrective action program as CER 99-1289.

c. Conclusions

A non-cited violation was identified for an inadequate surveillance procedure for measurement of control room emergency ventilation outside makeup airflow. The procedure was corrected and re-performed successfully.

M8 Miscellaneous Maintenance Issues (92700)

M8.1 (Closed) LER 50-395/99002-00: valve surveillance test causes system to be potentially outside design basis.

This LER documented discovery by the licensee on March 8, 1999, that two emergency core cooling systems (ECCS) periodic surveillance test procedures directed personnel to position three ECCS valves contrary to the positions required by TS 4.5.2.

TS 4.5.2 requires the three valves be verified to be in their TS position and that power to the valve operator is removed. The verification is performed every 12 hours when Tave is greater than or equal to 350 degrees Fahrenheit. Contrary to the required valve positions in TS 4.5.2, quarterly surveillance procedures STP 105.003, "Safety Injection Valve Operability Test," Revision 14, opened valve XVG-08889 (hot leg injection header isolation) and STP 205.004, "RHR Pump and Valve Operability," Revision 4A, shut valves XVG-8888A and B (cold leg injection). STP 105.003 had been performed since 1982 and STP 205.004 since 1992.

The licensee attributed the apparent cause of this condition to failure to consider the design requirements and limitations of system analyses when the in-service test (IST) program surveillance and system operating procedures were developed. Upon discovery of this condition, the licensee took prompt corrective action to reschedule testing to cold shutdown conditions which is consistent with the American Society of Mechanical Engineer code. Licensee actions to revise the procedures were timely and appropriate. Additionally, system operating procedures and associated mode transition surveillance procedures were revised to ensure that the system design basis is not compromised during the performance of these IST procedures.

The NRC reviewed this event and considered that the risk significance of this condition was low. This was due in part to the procedurally controlled testing and that the improper system configurations existed for very short durations with licensed operators immediately available to respond. No actual adverse consequences occurred during the performance of the subject IST surveillance procedures. Surveillance procedures STP 105.003 and STP 205.004 were inadequate, in that, they positioned ECCS valves

contrary to that listed in TS 4.5.2. TS 6.8.1.c requires that procedures be established and maintained for surveillance and test activities of safety-related equipment. Failure to comply with TS 6.8.1.c is a Severity Level IV violation and is being treated as a NCV, consistent with Section VII.B.1.a of the Enforcement Policy. This violation is identified as NCV 50-395/99007-03 and is in the licensee's corrective action program as CER 99-0186. The inspectors verified that the required procedures have been revised as documented in the LER and CER 99-0186.

III. Engineering

E3. Engineering Procedures and Documentation

E3.1 Design Calculations and Design Basis Documents (DBD)

a. Inspection Scope (37550)

NRC Inspection Report No. 50-395/98-03 described the results of a review of the emergency feedwater system design calculations. Weaknesses in calculations prepared prior to 1995 were noted. Examples of the weaknesses were unclear methodology and lack of design input references, which are contrary to ANSI N45.2.11, Section 4.2, "Design Analysis." As a follow-up to these finding, this inspection focused on three areas:

- Review of the results of a recently completed DBD improvement program work, with emphasis on findings related to calculations.
- Review of the calculation list to determine whether all the required calculations were on file.
- Review of calculations.

b. Observations and Findings

The DBD improvement project recently completed its review of the DBD for the component cooling water (CCW) system, and this inspection concentrated on that system. The improvement project open items list had 80 items related to CCW, and 25 of these items were calculation related. Many of the items were in open status. The licensee stated that they plan to resolve these items before starting the review of the next system. The inspectors reviewed and evaluated the list of open items. All the items, except for one, were of minor or no safety significance.

The one significant item on the list (No. 2959) was that the heat transfer analysis did not cover the case of two spent fuel pool coolers running at the same time. The inspectors observed at the main control board that CCW flows to the two spent fuel pool coolers were 800 and 1000 gallons per minute. The open item called for revising calculation DC04330-061, "RHR/CCW/SW Analysis for 2900 MWT," which is a heat transfer analysis. When questioned as to the significance of this item, engineers stated they

considered it to have low significance because the system has considerable margin when non-essential heat loads are shut off. The engineers stated that the emergency operating procedures (EOPs) direct the shedding of non-essential loads when appropriate.

Inspectors reviewed the EOPs and found that they direct the shedding of non-essential loads under some but not all possible CCW system configurations. The inspectors noted that for the accident condition involving a CCW train failure, EOP-2.2, "Transfer to Cold Leg Recirculation," Revision 1.1, directs switching the operating CCW pump to high speed, but does not direct shedding of non-essential loads. This would leave one train of CCW running in high speed while cooling safety-related loads and all previously running non-essential loads. This configuration had not been calculated. Initially, using data and results from calculation DC04330-061, it appeared there could be a problem. The licensee performed a new calculation and evaluation which was reviewed by the inspectors on November 17, 1999. The new calculation involved the following model differences or conditions:

- removed the heat loads that are isolated by Phase B isolation and containment isolation signals which would always be present for the scenario of interest,
- included flow to both spent fuel pool heat exchangers,
- one CCW train fails to operate upon receiving the accident signal,
- the operating CCW pump is in high speed, and
- operators take no action to remove non-essential loads.

The calculation demonstrated that the CCW supply temperature would remain below 120°F, the design limit. Therefore, the EOP guidance was adequate to meet all design basis scenarios, and the issue was resolved.

The revised CCW system DBD was reformatted from the previous version and changes were not highlighted. The inspectors compared the two versions and found that changes were limited to items such as adding valve numbers, revising certain tables to incorporate the power up-rate, and adding more detail. The complete list of calculations was clarified to indicate which calculations were historical, interim, as-built, etc. The inspectors determined that required calculations were contained in the list of calculations on file at the plant.

The inspectors reviewed calculations DC04310-023, "CCW Pump NPSH Requirements," Revision 3, and DC04310-005, "CCW Pipe-Flow Model," Revision 5. The inspectors noted additional examples of quality problems similar to those mentioned in NRC Inspection Report No. 50-395/98-03. The source of some inputs was not referenced. In addition, calculation DC04310-023 determined the required net positive suction head (NPSH), but did not compare it to the available NPSH. The CCW DBD indicated a significant margin in available versus required NPSH and the inspectors verified this

through a review of the NPSH requirements specified by the manufacturer. In their review, the inspectors performed hand calculations to verify examples of the mathematical determinations, verified input values to their sources, and assessed the logic used in the calculations. The licensee's CCW DBD was reviewed as a source of design basis information.

The licensee had performed an internal safety system functional inspection (SSFI) on the CCW system. One calculation reviewed by the SSFI was calculation DC04310-028, "Component Cooling Water System Volume." The SSFI found that the calculation of surge tank size in calculation DC04310-028 was not correct. The calculation based the surge tank size on one train of CCW when the size should have been based on two trains since one tank is common to both trains. Therefore, the surge tank may be too small to handle the thermal expansion. The SSFI team determined that this situation did not affect system operability because the tank had overflow piping to a holding tank and the tank itself was not needed to provide NPSH. The licensee had appropriately entered this issue into their corrective action program.

The recently upgraded calculations were more consistent with ANSI N45.2.11, including referencing the source of inputs. The inspectors noted that the quality of calculations that were recently upgraded, as a result of the DBD improvement project and safety system functional inspections, had improved.

c. Conclusions

Review of calculations for the component cooling water system led to the conclusion that necessary calculations were on file and that the licensee was adequately addressing weaknesses in these calculations through their design basis document improvement project and internal safety system functional inspections.

E8 Miscellaneous Engineering Issues (37551, 92700, 92903)

E8.1 (Closed) URI 50-395/99006-02: siphon breakers on service water crosstie pipe to circulating water were blind flanged and not functional.

(Closed) LER 50-395/99010-00: ultimate heat sink dependent components potentially outside the design basis of the plant.

The URI and LER documented the discovery of blind flanges installed on the two siphon breaker stubs on the 36-inch diameter pipe connecting the SW pond (ultimate heat sink) and the Monticello Reservoir.

Based on the inspectors' review, this condition resulted in the plant being operated with the siphon breakers being unable to perform their design basis function (potentially since original licensing). With the siphon breakers blind flanged, the TS minimum SW pond level of 415 feet would not have been assured. 10 CFR 50 Appendix B, Criterion V, and the licensee's Operational Quality Assurance plan require that activities affecting quality shall be prescribed by documented instructions, procedures or drawings and be

accomplished in accordance with these instructions, procedures or drawings. The licensee's failure to have the two siphon breakers installed in accordance with FSAR Figure 10.4-5 and SCE&G drawing D-302-201 is a violation of Criterion V. This Severity Level IV violation is being treated as a NCV, consistent with Section VII.B.1.a of the Enforcement Policy. This violation is identified as NCV 50-395/99007-04 and is in the licensee's corrective action program as NCN 99-1119.

The licensee's evaluation in LER 50-395/99010-00 appropriately concluded the actual effect on equipment performance and ECCS safety-related component function due to this condition would have been negligible. Additionally, since the peak SW temperature would occur several days into the event, time would have been available for mitigating actions. The risk significance of this condition was therefore minimized and was considered low.

The licensee took prompt action upon discovery of this condition. The time between the diver confirming that the siphon breaker flanges were installed and the first flange being removed was relatively short (approximately 15 minutes). Both flanges were promptly removed and divers verified that siphon break holes were available to perform their function as described in the FSAR. Based on the above review the inspectors concluded adequate corrective actions have been taken and the issue was properly documented in the LER.

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.

R1.2 Reactor Building Entry

a. Inspection Scope (71750)

The inspectors observed the pre-job briefing for a reactor building (RB) entry at power and accompanied the RB entry team that entered containment to observe licensee efforts to identify the source of a non-RCS leak.

b. Observations and Findings

On October 15, the inspectors attended a pre-job briefing conducted with personnel who were preparing to enter the RB at power to determine the source of containment sump in-leakage. The pre-job briefing was conducted in a professional manner with relevant aspects of the job discussed and requirements of radiation work permit (RWP)-162 covered. Health Physics personnel provided proper radiological controls during the entry.

The team identified the source of the non-RCS leakage as originating from the control rod drive motor (CRDM) cooling coil. The leakage was minor, was directed to the containment sumps, and did not affect any safety-related components. The licensee generated CER 99-1254 to address this condition. An access hatch door to the CRDM cooler duct was noted as having dropped open and was closed by the entry team. Conditions inside containment were generally good, however, several rubber strips were found by licensee personnel on the RB floor 412 foot level. All materials were removed. CER 99-1253 was issued to evaluate this condition. No additional concerns were identified by the inspectors. The inspectors verified the escape hatch airlock was tested as required by TS and the Containment Leakage Rate Testing Program following the containment entry. At the close of the inspection period the licensee was preparing a troubleshooting plan to isolate the CRDM cooling leakage.

c. Conclusions

A pre-job briefing conducted prior to an at power reactor building entry was professional and complete. Health Physics personnel provided proper radiological controls during the entry. The entry was successful in identifying the source of a non-reactor coolant system leak into the containment sump. The licensee appropriately identified and entered items discovered during the reactor building entry into their corrective action program for resolution.

V. Management Meetings

X1 Exit Meeting Summary

The inspectors presented the results of an engineering calculation followup review to members of the licensee management and plant staff on September 23, 1999. The inspectors presented additional inspection results to members of licensee management at the conclusion of the inspection on October 28 and November 19, 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

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

INSPECTION PROCEDURES USED

IP 37550:	Engineering
IP 37551:	Onsite Engineering
IP 61726:	Surveillance Observations
IP 62707:	Maintenance Observations
IP 71707:	Plant Operations
IP 71750:	Plant Support Activities
IP 92700:	Onsite Followup of Written Reports of Nonroutine Events at Power Reactor Facilities
IP 92901:	Followup - Plant Operations
IP 92903:	Followup - Engineering

ITEMS OPENED AND CLOSED

Opened

50-395/99007-01	NCV	siphon breaker unavailability not reported in accordance with 10 CFR 50.72 requirements (Section O8.1)
50-395/99007-02	NCV	inadequate control room ventilation surveillance procedure (Section M1.3)
50-395/99007-03	NCV	inadequate surveillance procedures energized and positioned three ECCS valves contrary to TS 4.5.2 (Section M8.1)

50-395/99007-04	NCV	siphon breakers not installed in accordance with station drawings (Section E8.1)

Closed

50-395/99006-01	URI	service water siphon breakers not functioning was not reported per 10 CFR 50.72 (Section O8.1)
50-395/99007-01	NCV	siphon breaker unavailability not reported in accordance with 10 CFR 50.72 requirements (Section O8.1)
50-395/99011-00	LER	10 CFR 21 on K-Line breakers (Section O8.2)
50-395/99007-02	NCV	inadequate control room ventilation surveillance procedure (Section M1.3)
50-395/99002-00	LER	valve surveillance test caused system to be potentially outside design basis (Section M8.1)
50-395/99007-03	NCV	inadequate surveillance procedures energized and positioned three ECCS valves contrary to TS 4.5.2 (Section M8.1)
50-395/99006-02	URI	siphon breakers on service water crosstie pipe to circulating water were blind flanged and not functional (Section E8.1)
50-395/99010-00	LER	ultimate heat sink dependent components potentially outside the design basis of the plant (Section E8.1)
50-395/99007-04	NCV	siphon breakers not installed in accordance with station drawings (Section E8.1)