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

Report No.: 50-395/95-18

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

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

Facility Name: Virgil C. Summer Nuclear Station

Inspection Conducted: November 1 through 30, 1995

Inspectors: Stephen Jorgen FOR 12/22/95
B. R. Bonser, Senior Resident Inspector Date Signed

T. R. Farnholtz, Resident Inspector
J. L. Starefos, Resident Inspector
L. W. Garner, Project Engineer, RII (paragraph 4.2)

Approved by: MB Shymlock for 12-22-95
George A. Belisle, Chief Date Signed
Reactor Projects Branch 5
Division of Reactor Projects

SUMMARY

Scope:

This routine resident inspection was conducted on site in the areas of plant operations, maintenance, on-site engineering, and plant support.

Results:

Plant Operations

Measures were implemented to protect the plant against the cold weather experienced during the inspection period (paragraph 2.2).

Actions taken to ensure uniform boron concentrations between the Reactor Coolant System (RCS) and pressurizer on the loss of normal sampling paths were adequate, and an appropriate contingency plan was prepared for taking RCS samples during emergency conditions (paragraph 2.4).

Maintenance

Performance of the ten year maintenance inspection on the spare service water pump did not adversely effect operability of the A and B trains of service water (paragraph 3.2).

Engineering

The licensee routinely performs full core offloads during refueling outages. A weakness was identified for not incorporating the decay time assumed in spent fuel pool cooling capacity calculations into operating procedures (paragraph 4.2).

## REPORT DETAILS

Acronyms used throughout this report are defined in paragraph 8.

### 1.0 Persons Contacted

#### 1.1 Licensee Employees

Bacon, F., Manager, Chemistry Services
*Beale, K., Nuclear Project Coordinator
Blue, L., Manager, Health Physics
*Browne, M., Manager, Design Engineering
*Byrne, S., General Manager, Nuclear Plant Operations
*Fields, C., Manager, Materials and Procurement
*Fowlkes, M., Manager, Nuclear Licensing & Operating Experience
*Franchuk, T., Supervisor, Facilities, Administrative and Document Control
*Furstenberg, S., Manager, Maintenance Services
*Hunt, S., Manager, Quality Systems
*Lavigne, D., General Manager, Nuclear Safety
*Moffat, G., Manager, Planning and Scheduling
*Nesbitt, J., Manager, Technical Services
Nettles, K., General Manager, Station Support
*O'Quinn, H., Manager, Nuclear Protection Services
Quinton, M., General Manager, Engineering Services
*Shepp, J., Shift Supervisor, Operations
*Shultz, P., Health Physics
*Taylor, G., Vice President, Nuclear Operations
*Waselus, R., Manager, Systems & Component Engineering
*White, R., Nuclear Coordinator, South Carolina Public Service Authority
Williams, B., Manager, Operations
Williams, G., Associate Manager, Operations

Other licensee employees contacted included office, operations, engineering, maintenance, chemistry/radiation, and corporate personnel.

### 2.0 Plant Operations (71707, 40500)

#### 2.1 Plant Status

The plant operated at or about full power during the entire inspection period.

#### 2.2 General

The inspectors conducted frequent control room tours to verify proper staffing, operator attentiveness, and adherence to procedures. The inspectors attended daily plant status meetings and shift turnovers to maintain awareness of overall facility operations, and reviewed operator logs to verify operational safety and compliance with TS. Instrumentation and safety system lineups were periodically reviewed from control room indications to assess operability. Frequent plant tours were conducted to

observe equipment status and housekeeping. The inspectors have observed an improving trend in housekeeping.

ONOs were reviewed to assure that potential safety concerns were properly reported and resolved. The inspectors routinely attended plan of the day meetings where management discussed the details of the ONOs and proposed actions to resolve the issues.

2.2 Cold Weather Protection

During periods of cold weather that occurred during the inspection period the inspectors verified that the licensee had implemented their cold weather protection procedure OAP-109.1, Guidelines For Extreme Temperature Conditions, revision 0. The inspectors also reviewed the procedure and verified that selected portions of the procedure were properly performed.

2.3 Observation of Off Normal Instrumentation

During control room reviews the inspectors observed that the indicated reactor power on the NI drawers was consistently reading at or slightly above 100 percent power. The inspectors' review in this area revealed that the power range instruments are adjusted when the results of the thermal heat balance and the NI readings differ by a specific value given in the surveillance procedure. The inspectors reviewed the daily thermal heat balance procedure STP-102.002, Power Range Heat Balance, revision 7, and the corresponding daily results, and concluded that the licensee had followed their procedures by not adjusting the power range instruments when small differences from the calculated thermal power existed. The inspectors also observed that the calculated power from the thermal heat balance did not normally exceed the license limit and concluded that calculated average reactor power did not exceed 100 percent.

2.4 Loss of Normal Reactor Coolant System Sampling Capabilities

Due to an unacceptable amount of leakage through the RCS sampling system containment isolation valves, the affected penetrations for the pressurizer and RCS loops B and C sample lines were isolated in accordance with TS 3.6.4, Containment Isolation Valves. Isolation of these penetrations resulted in the loss of normal sampling capabilities from the RCS and the loss of RCS post accident sampling capabilities directly from the RCS. As an alternative, the licensee was sampling from the CVCS letdown line.

With the loss of pressurizer sampling capability, the means to verify that there was adequate boron mixing between the RCS and the pressurizer was lost. The NSSS vendor recommends that boron concentration in the pressurizer should not be less than the concentration in the RCS loops by more than 50 ppm. The inspectors questioned the licensee about the operation of the

pressurizer without all backup heaters constantly energized to ensure spray flow and mixing in the pressurizer. The pressurizer backup heaters are not routinely used in order to prevent spray actuation and gas buildup in the pressurizer vapor space. The licensee normally relies on bypass flow around the spray valves of about 2 gpm to ensure pressurizer mixing. A review of RCS and pressurizer sample results and the licensee's evaluation supported the assertion that the bypass flow ensured adequate mixing in the pressurizer during normal operation. During power reductions when boron is added to the RCS there are provisions in the licensee's operating procedures to energize all backup heaters. The inspectors concluded that there was adequate mixing of boron in the pressurizer during normal and transient conditions.

The inspectors reviewed the licensee's contingency plans for loss of normal CVCS letdown and post accident sampling. During normal operation, should the normal letdown be lost, the licensee can also sample via the excess letdown system or from the VCT. To sample under post-accident conditions in modes 1, 2, and 3 the licensee's procedure recommends that the emergency director consider opening the containment isolation valves. The inspectors were satisfied that the licensee had adequately reviewed the sampling contingencies and prepared an appropriate plan.

No violations or deviations were identified.

## 3.0 Maintenance (62703/61726)

### 3.1 General

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

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

- WR 95M3213, Inboard Seal Has Small Leak When Pump Is Running (No. 1 Charging Pump)

- WR 9504434, Excessive Air In-Leakage Causing Chiller To Purge 6 Times Per Fill Cycle

The inspectors identified no concerns during the observation of these activities.

3.2 C Service Water Pump Maintenance

The inspectors observed portions of the ten year maintenance inspection on the C SW pump (PMTS PO191157/MRF 22424). The third SW water pump is considered as an installed spare and the maintenance to remove the pump did not affect the operability of the other two SW pumps. The inspectors identified no concerns during observation of the work activities. The inspectors observed that the work was adequately planned and controlled to safely remove the C SW pump and not affect the operability of the other two SW pumps. The inspectors also observed during the pump removal that no other components in the C train were affected which could also impact operability of the SW system.

The inspectors reviewed two areas of potential concern with the conduct of the maintenance activity during plant operation. The existing piping analysis for the SW system considered all three SW pumps as part of one continuous structural support analysis. The removal of one pump had the potential to affect the operability of the remaining pumps. The second area involved the removal of the SW pump building missile barrier and the affect on the two operable SW pumps.

The inspectors reviewed, with the responsible design engineer, the 10 CFR 50.59 screening worksheet for the C SW pump removal and evaluation addressing loading changes on the remaining pump nozzles and other pipe supports. The evaluation concluded that all the new loads were within the allowable limits. The inspectors concluded from this review that removal of the C SW pump would not affect the operability of the other two pumps.

The inspectors reviewed the licensee's evaluation for removal of the SW building missile barrier. With the missile barrier removed, the interior of the building was exposed. The licensee's review stated that the SW building is designed to act as a physical barrier for the protection of the SW pumps, pump motors, and other associated components from possible missiles created by tornadoes. The criteria for removal of the missile barrier included verification that no threat of adverse weather conditions exists. The inspectors reviewed the procedure for the missile barrier removal, and verified the licensee's compensatory actions were implemented while the barrier was removed. A security officer was stationed to prevent uncontrolled entry into the SW building and the weather service was periodically contacted to check on forecasted weather conditions. In the event of adverse weather, maintenance personnel were available to lift and

reinstall the missile barrier. The inspectors concluded that the licensee's evaluation adequately addressed removal of the missile barrier.

3.3 Component Cooling/Service Water Cross Connect Valve Test

On November 16 the inspectors observed the conduct of STP-122.003, Component Cooling Valve Operability Test, revision 8. The surveillance is a quarterly valve operability test to leak test check valve XCV09680B-CC that cross connects the CC and SW systems. The test was completed with the check valve leakage meeting the acceptance criteria. The inspectors identified no concerns with the conduct of the test.

Before the test was performed, the inspectors observed that the surveillance procedure had been revised to change the acceptable leakage value. The original acceptance criteria was 100 cc/minute. This value was revised to 1.5 gpm. The licensee had revised the acceptance criteria in response to a question regarding the basis of the 100 cc/minute. The inspectors reviewed the Engineers Technical Work Record that evaluated the acceptance criteria and the basis for revising it. The licensee could find no basis for the original acceptance criteria. The licensee then used OMa-1988, Part 10, Inservice Testing of Valves in Light-Water Reactor Power Plants, as a basis to justify the new acceptance criteria. The inspectors reviewed OMa-1988 and NUREG-1482, Guidelines for Inservice Testing at Nuclear Power Plants, and concluded that the licensee had revised the procedure appropriately.

3.4 Personnel Airlock Test

The inspectors observed the performance of surveillance procedure STP-215.001A, Reactor Personnel Building Personnel Airlock Test revision 4, on November 9. The procedure is used to verify the operability of the airlock by checking the integrity of the door seals. The inspectors observed that the equipment used to measure leakage was calibrated, the technicians were knowledgeable of it's use and the test was conducted in a controlled manner. Numerous valve manipulations were necessary during the test. The inspectors observed that the valve positioning was carefully performed and independently verified.

No violations or deviations were identified.

4.0 On-Site Engineering (37551)

4.1 General

General engineering activities were reviewed to determine their effectiveness in preventing, identifying, and resolving safety issues, events, and problems. During the inspection period the

inspectors interfaced routinely with system and design engineers to resolve issues. These issues included SW pump and chilled water system maintenance, RCS sampling and sampling valves problems, and component cooling/SW check valve surveillance test acceptance criteria. The inspectors found the engineers knowledgeable of their systems and able to justify technical recommendations.

4.2 Spent Fuel Pool Cooling Design Review

During November 1 through the 3, the inspectors reviewed the Spent Fuel Pool Cooling System design to verify its adequacy. The design bases for the Spent Fuel Pool Cooling System is summarized in an engineering report from Joseph Oat Corporation to South Carolina Electric and Gas Company, dated April 9, 1984. This report provided the technical bases for the Updated Final Safety Analysis Report change associated with the installation of high density spent fuel pool storage racks. The report addressed two cases. In the first case, a normal discharge, 72 assemblies were assumed to be loaded into the spent fuel pool at the rate of one assembly per hour after the reactor had been shutdown for 144 hours. With only one of the two seismic class I cooling trains in service, the maximum spent fuel pool bulk temperature was calculated as 140° F. In the second case, a full core offload, the entire core of 157 fuel assemblies was assumed to be moved into the spent fuel pool within 52 hours after the first fuel assembly was discharged. As in case one, the first fuel assembly was not moved until the reactor had been shutdown for 144 hours. With both spent fuel cooling trains in service, the maximum expected spent fuel pool bulk temperature was 139° F. In both calculations, the spent fuel locations not required for the analyzed number of fuel assemblies were considered to be filled with decayed irradiated fuel assemblies from previous refueling outages. Thus, the calculations reflected the "end of life" heat load challenges to the Spent Fuel Pool Cooling System.

BTP 9.1.3, Spent Fuel Pool Cooling And Cleanup System, revision 1, provides the general guidelines used by the NRC to evaluate the acceptability of spent fuel pool cooling systems. The above described design was found to met BTP 9.1.3 as indicated by the NRC issuing, in 1984, a Safety Evaluation Report that approved installing the high density racks. However, the licensee now routinely performs a full core offload each refueling outage to expedient outage work. NRC Information Notice 95-54, Decay Heat Management Practices During Refueling Outage, dated December 1, 1995, addresses this practice.

During the review, the inspectors determined that operating procedures and TS 3.9.3 prohibit movement of irradiated fuel in the reactor vessel until the reactor has been subcritical for 100 hours. As stated above, the design calculation assumptions were more restrictive, i.e., the design basis documents allow decay for

144 hours before fuel movement. The inspectors reviewed the records for the previously three refueling outages and determined that in these instances fuel was not moved until more than 200 hours after subcriticality. However, not incorporating the more restrictive design basis into operating procedures was considered as a weakness in the engineering area.

No violations or deviations were identified.

5.0 Plant Support (71750)

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

No violations or deviations were identified.

6.0 Other NRC Personnel On Site

Mr. George A. Belisle, Branch Chief, DRP, was on site November 14 and 15 to review resident inspector's activities, tour the plant and meet with licensee management.

7.0 Exit

The inspection scope and finding were summarized on December 11, 1995, by B. R. Bonser with those persons indicated by an asterisk in paragraph 1. An interim exit was conducted on November 3. The inspectors described the areas inspected and discussed in detail the inspection results. Proprietary information is not contained in this report. Dissenting comments were not received from the licensee.

8.0 Acronyms

| | |
|---|---|
| BTP | Branch Technical Position |
| cc | Cubic Centimeter |
| CFR | Code of Federal Regulations |
| CVCS | Chemical and Volume Control System |
| DRP | Division of Reactor Projects |
| F | Fahrenheit |
| gpm | Gallons Per Minute |

| | |
|---|---|
| MRF | Modification Request Form |
| NI | Nuclear Instrumentation |
| NPF | Nuclear Production Facility [Type of license] |
| NRC | Nuclear Regulatory Commission |
| NSSS | Nuclear Steam Supply System |
| OAP | Operations Administrative Procedure |
| ONO | Off Normal Occurrence |
| PMTS | Preventive Maintenance Task Sheet |
| ppm | Parts Per Million |
| RCS | Reactor Coolant System |
| STP | Surveillance Test Procedure |
| SW | Service Water |
| TS | Technical Specification |
| VCT | Volume Control Tank |
| WR | Work Request |

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