



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

Report No: 50-395/95-19

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

Docket No.: 50-395

License No.: NPF-12

Facility Name: Virgle C. Summer Nuclear Station

Inspection Conducted: November 27 - December 1, 1995

Inspectors: D. W. Jones 12/14/95
D. W. Jones Date Signed

F. N. Wright 12/14/95
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Approved by: T. R. Decker 12/14/95
T. R. Decker, Acting Chief Date Signed
Plant Support Branch
Division of Reactor Safety

SUMMARY

Scope:

This routine, announced inspection was conducted in the areas of radioactive effluent monitoring instrumentation, meteorological monitoring, primary and secondary water chemistry, and external radiation exposure controls.

Results:

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

The licensee had established procedures to demonstrate operability of radioactive effluent monitors by performance of surveillances at the frequency specified in the Offsite Dose Calculation Manual. Those required surveillances included channel checks, source checks, channel calibrations, and channel operational tests. Licensee records indicated that those surveillances had been performed in accordance with established procedures for the instruments used to monitor liquid radwaste, turbine building sump, main plant vent, and reactor building purge effluents (Paragraph 2).

The licensee was collecting and reporting the required meteorological data and maintaining the meteorological monitoring instrumentation in an operable condition. Procedures had been established for performing Technical Specification required daily channel checks and semiannual channel calibrations on the those instruments. Licensee records indicated that the licensee required surveillances had been performed in accordance with established procedures (Paragraph 3).

The licensee had implemented water chemistry control programs in accordance with the Technical Specification requirements and the Electric Power Research Institute guidelines for Pressurized Water Reactors primary and secondary water chemistry (Paragraph 4).

Housekeeping and the control of contaminated and radioactive material with the licensee's auxiliary, radioactive waste, fuel handling, and intermediate buildings was very good (Paragraph 5).

The licensee had established procedures to control work in radiological control areas. Procedures for Radiological Work Permits, Radiological Surveys, and Posting of Radiological Areas were reviewed and the inspectors verified that the licensee was effectively implementing those procedures to maintain personnel radiation exposures As Low As Reasonably Achievable (Paragraph 5).

The licensee was in the process of replacing the utility operated and National Voluntary Laboratory Accreditation Program approved dosimetry program with a vendor operated program. The inspectors noted that the licensee had established conditions for the processor including National Voluntary Laboratory Accreditation Program certification (Paragraph 5).

The licensee was implementing an effective external radiation control program (Paragraph 5).

REPORT DETAILS

1. Persons Contacted

Licensee Employees

- F. Bacon, Manager, Chemistry
- *R. Burch, Supervisor, Chemistry
- †*S. Byrne, General Manager, Nuclear Plant Operations
- †L. Faltus, Supervisor, Chemistry
- R. Fowlkes, Manager, Nuclear Licensing and Operating Experience
- *S. Furstenberg, Manager, Maintenance Services
- R. Haselden, Supervisor, Instrumentation and Controls
- *S. Hunt, Manager Quality Systems
- *J. Proper, Supervisor, Nuclear Licensing and Operating Experience
- †P. Shultz, Supervisor, Health Physics and Radwaste Services
- †M. Zaccone, Engineer, Nuclear Licensing and Operating Experience

Other licensee employees contacted during this inspection included engineers, technicians, and administrative personnel.

Nuclear Regulatory Commission

- †*B. Bosner, Senior Resident Inspector

- †Attended entrance interview
- *Attended exit interview

Abbreviations and acronyms used throughout this report are defined in the last paragraph.

2. Radioactive Effluent Monitoring Instrumentation (84750)

TS 6.8.4.e.1 required the licensee to implement a program for the control of radioactive effluents. The program was required to be described in the ODCM, to be implemented by operating procedures, and to include limitations on the operability of radioactive liquid and gaseous monitoring instrumentation including surveillance tests. Sections 1.1.1 and 1.2.1 of the ODCM described the operational and surveillance requirements for the effluent monitoring instrumentation. The instrumentation was required to be operable during specified operations and demonstrated to be operable by the performance of channel checks, source checks, channel calibrations, and channel operational tests at specified frequencies. Compensatory measures for inoperable monitors were specified in action statements.

The inspectors toured the control room with a licensee representative to determine the operational status of the following radiation monitors.

RM-L9	Liquid Radwaste Effluent Line
RM-L8	Turbine Building Sump Effluent Line
RM-A3	Main Plant Vent Exhaust System
RM-A4	Reactor Handling Purge System

Enclosure

The instrumentation for the above radiation monitors was found to be operable at the time of the tour.

The inspectors reviewed the procedures listed below which related to channel checks, source checks, channel calibrations, and channel operational tests for the above listed monitors.

AOP-106.1 "Operating Logs"
 SOP-108 "Liquid Waste Processing System"
 SOP-119 "Waste Gas Processing"
 HPP-710 "Sampling and Release of Radioactive Liquid Effluents"
 STP-137.002 "Radiation Monitor Monthly Source Check"
 STP-360.069 "Liquid Waste Effluent Liquid Radiation Monitor (RML0009) Calibration"
 STP-360.070 "Liquid Radiation Monitor RM-L9 OP Test"
 STP-360.067 "Turbine Building Sump Liquid Radiation Monitor (RML0008) Calibration"
 STP-360.068 "Turbine Building Sump Liquid Radiation Monitor RM-L8 OP Test"
 STP-360.035 "Main Plant Exhaust Atmospheric Radiation Monitor (RMA0003) Calibration"
 STP-360.036 "Main Plant Vent Exhaust Atmospheric Radiation Monitor RM-A3 Gaseous Channel Operational Test"
 STP-360.037 "Reactor Building Purge Exhaust Atmospheric Radiation Monitor (RM-A4) Calibration"
 STP-360.038 "Reactor Building Purge Exhaust Atmospheric Radiation Monitor (RM-A4 Gas Channel) Operational Test"

The inspectors determined that the above procedures included provisions for performing the required surveillances in accordance with the relevant sections of the ODCM and at the specified frequencies. The inspectors also reviewed selected licensee records of performance of channel checks, source checks, channel calibrations, and channel operational tests for each of the above listed monitors. The records selected for review were generally the three most recently completed surveillances for each of the required checks/tests. Those records indicated that the surveillances had been performed in accordance with their applicable procedures.

Based on the above reviews and observations, it was concluded that the licensee had implemented an effective program for maintaining radioactive effluent monitoring instrumentation in an operable condition and for performing the required surveillances to demonstrate their operability.

No violations or deviations were identified.

3. Meteorological Monitoring Program (84750)

TS 3/4.3.3.4 described the operational and surveillance requirements for the meteorological monitoring instrumentation. Instruments for measurement of wind speed and wind direction at 10 and 61 meters above grade elevation and differential temperature between the upper and lower

elevations were required to be operable at all times. Operability of the instrumentation was required to be demonstrated by the performance of daily channel checks and semiannual channel calibrations. An action statement specified that if one or more channels were inoperable for more than 7 days, a Special Report was required to be submitted to the NRC within 10 days which described the cause of the malfunction and the plans for restoring the channel(s) to operable status.

The inspectors reviewed the procedures listed below and determined that they included provisions for performing the required surveillances.

AOP-106.1 "Operating Logs"
STP-393.004 "Meteorological Tower Calibrations"

The inspectors reviewed licensee records for calibrations performed during December 1994 and June 1995, and for daily channel checks performed on November 28 & 29, 1995. Those records indicated that the required surveillances were performed in accordance with the above procedures and at the required frequency. The inspectors visited the control room and determined that the meteorological monitoring instrumentation was then currently operable.

The licensee's 1994 Annual Radioactive Effluent Release Report provided a summary of the meteorology data collected during the year. The combined annual data recovery rate for the meteorological monitoring instruments was greater than 96 percent.

Based on the above reviews and observations, it was concluded that the license had implemented an effective program for collecting the required meteorological data and maintaining the meteorological instrumentation in an operable condition.

No violations or deviations were identified.

4. Primary and Secondary Water Chemistry (84750)

TS 3/4.4.7 and 3/4.4.8 described the operational and surveillance requirements for reactor coolant chemistry and specific activity. Maximum concentration limits and sampling frequencies were specified for dissolved oxygen, chloride, fluoride, and specific activity during various operational modes. Action statements applicable to specific modes were provided for conditions in which the concentration limits were exceeded. TS 6.8.4.c required the licensee to establish, implement and maintain a program for monitoring secondary water chemistry to inhibit steam generator tube degradation. The program requirements included identification of the variables to be monitored, process sampling points, sampling frequency and control limits for those variables. The program was also required to include procedures for measurement of the variables, data recording and management, assignment of responsibility for data interpretation, and corrective actions for off-control chemistry conditions.

The inspectors reviewed the following procedures for controlling the chemical environment of the primary and secondary plant systems:

SAP-400	"Chemistry Operations Manual"
SAP-401	"Secondary Water Chemistry Program"
SAP-402	"Primary Water Chemistry Program"
CP-613	"Steam Generator Chemistry Control"
CP-614	"Reactor Coolant Chemistry Control"
CP-615	"Feedwater and Condensate Chemistry Control"

The SAPs provided descriptions of the chemistry control programs and guidance for conducting chemistry operations. They also included provisions for sampling and analyzing reactor coolant for the TS required parameters at the specified frequencies and for implementing, with a few minor exceptions, the EPRI guidelines for PWR primary and secondary water chemistry. The exceptions were made in accordance with guidelines established by the fuel supplier for the plant specific chemistry regimes. Guidance was also provided for actions to be taken if analytical results exceeded prescribed action limits. The CPs provided instructions for implementing the chemistry program as described in the SAPs.

The inspectors also reviewed records and trend plots of analytical results for dissolved oxygen, chloride, fluoride, and DEI in reactor coolant. Plots of analytical results for selected parameters designated in the EPRI guidelines as control parameters for reactor coolant, feedwater, blowdown, and condensate during power operations were also reviewed. The records and trend plots reviewed included data generated during the period January through November 1995. During steady state operations the dissolved oxygen concentrations were typically <5 ppb, chloride concentrations were typically <0.5 ppb, and fluoride concentrations were typically <0.5 ppb. These parameters were well below their respective TS limits of 100 ppb, 150 ppb, and 150 ppb. The DEI was typically <1.3 E-3 $\mu\text{Ci/ml}$ which was also well within the TS limit of 1 $\mu\text{Ci/g}$. The other parameters selected for review were generally maintained within the EPRI guidelines.

Based on the above reviews, it was concluded that the licensee had implemented chemistry control programs in accordance with the TS requirements and, generally, the EPRI guidelines for PWR primary and secondary water chemistry.

No violations or deviations were identified.

5. External Radiation Exposure Controls (83750)

This area was reviewed to determine whether individual personnel exposures were controlled, monitored and less than the 10 CFR Part 20 regulatory limits.

10 CFR Part 20.1101(a) requires, in part, that each licensee develop, document, and implement a radiation protection program commensurate with the scope and extent of licensed activities and sufficient to ensure compliance with the provisions of this part.

The inspection included reviews of licensee procedures and records, interviews with licensee personnel and observations made during tours of the licensee's RCAs. Tours were made in the licensee's Auxiliary, Intermediate, Radioactive Waste and Fuel Handling buildings. During the tours, the inspectors took independent radiation and contamination surveys; observed housekeeping and control of radioactive material and contamination; examined radiological postings; verified the security of LHRAs; observed conditions of radiological monitoring equipment; and noted HP presence in the RCA.

a. Radiological Work Controls

The licensee used RWPs for incorporating job planning and radiological exposure controls into work activities performed in site RCAs. HPP-151, "Use of the Radiation Work Permit and Standing Radiation Work Permit," described the licensee's procedures for using RWPs. HPP-401, "Issue, Termination and Use of RWPs and SRWPs" outlined requirements for preparing, issuing, use, maintenance and termination of RWPs. HPP-152, "Radiation Control Area Access Control," described the access control process for entering the RCA. HPP-403, "Radiological Controls for Nuclear work activities," described minimum radiological control guidelines for health physics coverage of radiological work activities.

The inspectors reviewed selected RWPs for their work activity and determined that they appeared to prescribe adequate radiation protection requirements for the assigned task. The inspectors observed personnel reviewing RWPs and logging onto the RWPs with the licensee's access control computer. The access computer was used to track individual personnel radiation exposures with RWP entries.

The inspectors observed plant radiation workers interacting with HP personnel at the main RCA control point. HP personnel were adequately evaluating job scope to prescribe proper radiological protection measures and controls.

No violations or deviations were identified.

b. Radiological Postings

This area was reviewed to evaluate the licensee's use of radiological postings and to verify that postings met regulatory requirements.

10 CFR Part 20.1902 specified the posting requirements for radiation, high radiation, very high radiation, airborne radioactivity, and radioactive material areas.

Licensee procedure HPP-160, "Control and Posting of Radiation Control Zones," described requirements for posting, control, and access of RCAs. The procedure described the site's specific

posting and access requirements for radiation, high radiation, locked high radiation, very high radiation, contaminated, airborne radioactivity, and radioactive material areas. The procedure also addressed requirements for posting hot spots.

The inspectors observed the licensee's radiological postings and found them conspicuous, clear and consistent. All postings met 10 CFR Part 20 requirements. Area boundaries were also clearly established.

All locked high radiation areas checked by the inspectors were properly secured. Many high radiation areas having radiation levels less than 1,000 mrem/hr were also locked to maintain personnel radiation exposures ALARA. Overall the radiological controls observed on tours of the RCA were good.

No violations or deviations were identified.

c. Radiological Surveys

This area was reviewed to verify the licensee was performing adequate radiation and contamination surveys.

10 CFR 20.1501(a) requires each licensee to make or cause to be made such surveys as (1) may be necessary for the licensee to comply with the regulations and (2) are reasonable under the circumstances to evaluate the extent of radioactive hazards that may be present. During tours of the plant, the inspectors observed HPTs in the plant make radiation and contamination surveys. The inspectors independently verified radiation and contamination levels in selected areas of the Auxiliary, Intermediate, Radioactive Waste, and Fuel Handling buildings. The inspectors survey results within those areas agreed with the licensee's survey results for the control and posting of those areas.

The inspectors noted that portable radiation detectors, friskers, and contamination monitors in the plant had up-to-date calibration stickers and had been source-checked as required.

The inspectors reviewed selected records of radiation and contamination surveys and discussed the survey results with licensee representatives. No concerns with the adequacy of the licensee's radiological survey activities were identified.

No violations or deviations were identified.

d. Control of Radioactive Material and Housekeeping

This area was reviewed to evaluate the licensee's control of radioactive and contaminated material.

10 CFR 20.1904(a) requires the licensee to ensure that each container of licensed material bears a durable, clearly visible

label bearing the radiation symbol and the words "Caution, Radioactive Material," or "Danger, Radioactive Material." The label must also provide sufficient information (such as radionuclides present, and the estimate of the quantity of radioactivity, the kinds of materials and mass enrichment) to permit individuals handling or using the containers, to take precautions to avoid or minimize exposures.

The licensee's controls of radioactive materials were observed during tours of the facilities. In general, the inspectors found that the licensee's control and labeling of contaminated and radioactive material was adequate. No examples of failure to tag or label contaminated or radioactive material were identified by the inspector.

Surface contamination appeared to be aggressively controlled at its source. The licensee continuously monitored and tracked the square footage of plant area contaminated. The plant area having contaminated floor space varied between approximately 1,364 to 1,864 ft² in 1995. The total area included in the licensee's contaminated area monitoring program was approximately 133,291 ft². Overall, contamination control was good and general housekeeping practices were very good.

No violations or deviations were identified.

e. Personnel Monitoring

This area was reviewed to determine the status of the licensee's external personnel radiation monitoring program.

10 CFR 20.1502(a) requires each licensee to monitor occupational exposure to radiation and supply and require the use of individual monitoring devices for:

- (1) Adults likely to receive, in one year from sources external to the body, a dose in excess of 10 percent of the limits in 10 CFR 20.1201(a);
- (2) Minors and declared pregnant women likely to receive, in one year for sources external to the body, a dose in excess of 10 percent of any of the applicable limits of 10 CFR 20.1207 or 10 CFR 20.1208; and
- (3) Individuals entering a high or very HRA.

10 CFR 20.1501(c) requires all personnel dosimeters that require processing to determine the radiation dose and that are used by licensees to comply with 10 CFR Part 20 requirements be processed and evaluated by a dosimetry processor holding current personnel dosimetry accreditation from NVLAP for the type of radiation the dosimeter is monitoring.

The licensee's TLD processing program was NVLAP certified. However, the inspectors learned that the licensee had recently decided to end TLD processing activities and obtain the services of a vendor TLD processor. The inspectors discussed the licensee's processes for selecting a future TLD processor with staff personnel. The inspector determined that the licensee had established specifications and conditions for the prospective TLD processors. The licensee required the vendor to be NVLAP certified in all eight testing categories. The licensee's review of the dosimetry vendors capabilities included: reviews of the vendor's recent NVLAP certification audits; reviews of the dosimetry staff's qualifications and a review of the vendor's calibration and quality control programs. The licensee requested that site radiation characteristics be retained in the vendors dose algorithms. The dosimetry staff also did some minor TLD processing testing with the considered vendors. The test results for the recommended vendors were good. The licensee planned to switch to the selected vendor in 1996. The inspectors determined that the licensee's selection process was attempting to obtain the services of a qualified vendor comparable with the licensee's existing TLD processing program. No concerns with the licensee's TLD replacement project were identified.

The inspectors observed personnel using EADs and TLDs appropriately throughout the inspection. Based on direct observation, discussion, and review of records, personnel dosimeters were being effectively used.

No violations or deviations were identified.

f. Personnel Exposures

This area was reviewed to verify that all personnel radiation exposures were less than regulatory limits.

10 CFR 20.1201(a) requires each licensee to control the occupational dose to individual adults, except for planned special exposures under 10 CFR 20.1206, to the following dose limits:

- (1) An annual limit, which is the more limiting of:
 - (i) The total effective dose equivalent being equal to 5 rems; or
 - (ii) The sum of the deep-dose equivalent and the committed dose equivalent to any individual organ or tissue other than the lens of the eye being equal to 50 rems; and
- (2) The annual limits to the lens of the eye, to the skin, and to the extremities, which are:
 - (i) An eye dose equivalent of 15 rems; and

- (ii) A shallow-dose equivalent of 50 rems to the skin or to any extremity.

The licensee's dose tracking system tracked personnel exposures in order to ensure adherence to procedural administrative allowances as well as 10 CFR Part 20 limits.

The licensee reported the following maximum doses (Rems) for 1994 and 1995:

<u>Year</u>	<u>TEDE</u>	<u>Skin</u>	<u>Extremity</u>	<u>Lens-Eye</u>
1994	1.370	1.370	1.370	1.370
1995 ^a	0.264	0.264	0.264	0.264

a. Through November 28, 1995

Through review of licensee procedures and reported dose information, the inspectors concluded that the licensee was adequately monitoring and tracking individual occupational radiation exposures in accordance with the requirements and that all dose reported were within 10 CFR Part 20 limits.

No violations or deviations were identified.

g. Collective Dose Goals

This review was made to determine the results of the licensee's efforts for maintaining collective personnel exposures ALARA.

The inspectors reviewed the licensee's collective dose and goals for 1995 and the trend of the licensee's three year average collective dose.

Collective Personnel Exposures (Person-Rem)

<u>Year</u>	<u>Annual Dose Actual</u>	<u>Dose Goal</u>	<u>Outage Title</u>	<u>Outage Dose Actual</u>	<u>Dose Goal</u>	<u>Outage Dates</u>
1992	29.6	28.8	Forced	8.9	None	04/27/92 to 05/22/92
1993	276.4	410.0	RF-7	266.0	390.0	03/06/93 to 05/03/93
1994	348.0	506.0	RF-8	336.1	360.0	09/10/94 to 12/16/94
			Forced	4.6	6.0	03/01/94 to 03/18/94
1995*	9.4	11.0	Forced	2.4	2.4	05/12/95 to 05/22/95

* Through November 28, 1995

The inspectors determined that the licensee was on schedule to meet a very low annual collective dose goal of 11.0 person-rem for 1995, which would be the site's lowest annual collective dose since 1992. The licensee had a total collective dose of

approximately 9.453 person-rem through November 28, 1995. A brief outage of approximately 10 days to repair a RCP seal resulted in approximately 2.379 person-rem of the 1995 collective dose total. Should the licensee meet the 1995 goal the three year average collective dose per unit for 1993 through 1995 would be approximately 211.8 and slightly lower than the previous three year average person-rem/unit of 217.8 person-rem for 1992-1994. The 97 day outage in 1994 included a steam generator replacement project dose which elevated the recent three year collective dose averages. No concerns with collective dose were identified.

No violations or deviations were identified.

6. Exit Interview

The inspection scope and results were summarized on December 1, 1995, with those persons indicated in Paragraph 1. The inspectors described the areas inspected and discussed in detail the inspection results listed above. No dissenting comments were received from the licensee. Proprietary information is not contained in this report.

7. Abbreviations and Acronyms

ALARA	As Low As Reasonably Achievable
CFR	Code of Federal Regulations
CP	Chemistry Procedures
DEI	Dose Equivalent Iodine - 131
EAD	Electronic Alarming Dosimeter
EPRI	Electric Power Research Institute
HPP	Health Physics Procedure
HPT	Health Physics Technician
HRA	High Radiation Area
LHRA	Locked High Radiation Area
mrem	Milli-Roentgen Equivalent Man
NVLAP	National Voluntary Laboratory Accreditation Program
ODCM	Offsite Dose Calculation Manual
ppb	Parts Per Billion
RCA	Radiological Controlled Area
RCP	Reactor Coolant Pump
RF	Refueling
RWP	Radiation Work Permit
SAP	Station Administrative Procedures
SRWP	Standing Radiation Work Permit
TEDE	Total Effective Dose Equivalent
TLD	Thermoluminescent Dosimeter
TS	Technical Specifications