



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

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Report No.: 50-395/94-04

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

Docket No.: 50-395

License No.: NPF-12

Facility Name: V. C. Summer

Inspection Conducted: January 10-14, 1994

Inspector: *T.R. Decker* 2/11/94  
N. G. McNeill Date Signed

Approved by: *T.R. Decker* 2/11/94  
T. R. Decker, Chief Date Signed  
Radiological Effluents and Chemistry Section  
Radiological Protection and Emergency Preparedness Branch  
Division of Radiation Safety and Safeguards

SUMMARY

Scope:

This routine, announced inspection was conducted in the areas of audits performed by the licensee, the Semiannual Radioactive Effluents Report, the Environmental Monitoring Program, the Microbiologically Induced Corrosion (MIC) Program, the Confirmatory Measurement program, and Liquid Batch Effluent releases.

Results:

The audits performed to assess the adequacy and effectiveness of the quality assurance (QA) program for radiological effluent monitoring as well as shipping and transportation of radioactive materials and radwaste, were, in general, thorough, detailed, and well documented (Paragraph 2).

The doses to the public and the effluents released to the environment, as outlined in the Semiannual Radioactive Effluent Report for 1992, were well within applicable limits (Paragraph 3).

The licensee's radiological environmental monitoring program was effectively implemented and an effective QA program had been maintained for analysis of environmental samples (Paragraph 4).

The licensee's program to monitor and prevent MIC was in place and met minimum requirements (Paragraph 5).

The licensee was in agreement with accepted Nuclear Regulatory Commission values for samples they received as part of the beta-emitters portion of the Confirmatory Measurements Program (Paragraph 6).

Liquid Batch and Gaseous Release permits were examined for previous releases during 1993, and two liquid releases were observed indepth to assure that these activities were performed in accordance within the limits of 10 CFR 20 (Paragraph 7).

One URI was identified for failure to perform the Reactor Building Purge Exhaust Radiation Monitor operational test surveillance requirements as specified in the OffSite Dose Calculation Manual (ODCM) (Paragraph 8).

## REPORT DETAILS

### 1. Persons Contacted

#### Licensee Employees

- \*W. Baehr, Manager, Health Physics and Radwaste Services
- \*R. Clary, Steam Generator Project
- \*J. Dinkins, Environmental Services
- \*L. Faultus, Manager, Chemistry Services
- \*R. Fowlkes, Manager, Nuclear Licensing
- \*D. Franklin, HP Counting Room
- \*J. Geddings, Steam Generator Replacement Project
- \*S. Hunt, Manager, Quality Systems
- \*W. Martin, Quality Services
- \*J. Nesbitt, Manager, Technical Services
- \*L. Nettles, General Manager, Station Support
- \*M. Quinton, GMES
- \*S. Reese, Licensing Specialist
- \*A. Rice, Nuclear Licensing
- \*J. Sowell, Health Physics

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

#### Nuclear Regulatory Commission Personnel

- \*B. Haag, Senior Resident Inspector
- T. Farnholtz, Resident Inspector
- \*W. Kleinsorge, Regional Inspector

\*Attended exit interview

### 2. Audits (84750)

Technical Specifications (TSs) 6.5.2.8(k), (l) and (m) require the Nuclear Safety Review Committee to audit the Radiological Environmental Monitoring Program, the ODCM, and the Process Control Program, at least once every 12, 24, and 24 months, respectively. The audits are performed in order to verify that these programs are being effectively implemented, and are in accordance with regulatory requirements.

The inspector reviewed the following audit and surveillance reports:

- Surveillance Report QA-SUR-93066-0, "Plant Chemistry Control," July 27, 1993
- Surveillance Report QA-SUR-93079-0, "Station Radiation Control," August 20, 1993
- Surveillance Report QA-SUR-93100-0, "Plant Chemistry Control," October 29, 1993

- Surveillance Report QA-SUR-93121-0, "Plant Chemistry Control," December 29, 1993
- Audit Report II-03-93-R, "Radioactive Waste," performed January 11 - February 5, 1993
- Audit Report QA-AUD-93009-0, "Station Radiation Control," performed September 13 - October 29, 1993
- Audit Report QA-AUD-93011-0, "Environmental Monitoring (RAD)," performed October 24 - December 29, 1993
- 1993 Annual ALARA Appraisal of Radiological Effluent Programs, Vertechs Corporation, performed December 8-20, 1993

The above audits and surveillance reports assessed the adequacy and effectiveness of the quality assurance (QA) program for radiological effluent monitoring and shipping and transportation of radioactive materials and radwaste. In general the audits were thorough, detailed, and well documented. The audits identified some program weaknesses and licensee management made adequate commitments to correct the few deficiencies identified.

No violations or deviations were identified.

### 3. Semiannual Radioactive Effluent Report (84750)

TS 6.9.1.8 requires the submittal of routine Radioactive Effluent Release Reports covering the operation of the units during the previous six months of operation. These reports summarize the amounts of liquid and gaseous effluents released from the site and assess the dose to offsite populations from these effluents.

Pursuant to these requirements, the inspector reviewed these reports for the first half of 1993. The amount of radioactivity released did not vary significantly from previous years. A summary of the effluent releases and associated calculation of annual radiation doses to the public for 1991, 1992, and the first half of 1993, are presented in Attachment 1. The doses to the public due to these effluents were less than 2.5 percent of the applicable limits. The doses for 1992 were typically less than those reported for 1991. These lower numbers reflect good fuel performance as well as improved effluent totals. The summaries for the first half of 1993 compare well with the other years reported. These doses are summarized in Attachment 2.

For 1992, V. C. Summer liquid and gaseous effluents were well within TSs, 10 CFR 20, and 10 CFR 50 Appendix I design criteria. The first half values indicate that the plant has maintained these parameters well within TS for 1993.

No violations or deviations were identified.

4. Environmental Monitoring Program (84750)

10 CFR 20.1501(a) requires the licensee to perform surveys as necessary to evaluate the extent of radiation hazards.

TS 6.8.4.f requires that the Radiological Environmental Monitoring Program (REMP) be established, implemented, and maintained. The REMP provides requirements for monitoring the radiation and radionuclides in the environs of the plant. The program shall provide for the representative measurements of radioactivity in the highest exposure pathways. The program is required to include monitoring, sampling, analysis, and reporting of radiation and radionuclides in the environment in accordance with the methodology and parameters in the ODCM; and participation in an Inter-Laboratory Comparison Program. This ensures independent checks on the precision and accuracy of the QA program for the REMP.

Pursuant to these requirements, the inspector accompanied licensee personnel on the environmental sampling route. The inspector observed air filter and iodine cartridge sample changeout as well as water sample collection. The inspector also reviewed sample collection records for 1993 to determine whether all matrices identified in the REMP were collected and whether collection frequencies outlined in the REMP were met. All samples were collected according to procedures and the licensee collected samples at the required frequencies.

The licensee was currently participating in several interlaboratory comparison programs, including the Environmental Protection Agency's Cross-Check Program. A review of records for these programs indicated good agreement on the part of the licensee.

Additionally, the licensee had performed an in-house intralaboratory cross check program consisting of duplicates and spikes as a routine portion of the sampling program.

The licensee appeared to have met and in fact exceeded the requirements of 10 CFR 20.1501(a). The Counting Room has shown a good record in the area of Quality Control (QC) and QA.

No violations or deviations were identified.

5. Microbiologically Induced Corrosion (MIC) Program Items (84750)

TS 3.4.7 requires that reactor coolant chemistry be maintained within limits specified in Table 3.4-2. These limits help ensure that the integrity of reactor components are maintained and helps to reduce radiation field buildup.

The inspector discussed with cognizant licensee personnel the continuing actions that the plant was taking in order to prevent microbiological attack and biofouling by macrobiological agents (bivalves, etc.) of cooling water piping and heat exchangers served by the plant service water system.

Protection against the ingress of corrodants from the plant cooling system is discussed below:

The V. C. Summer site operates a minimal MIC program. The program consists of continual treatment of the Service Water System with a non-oxidizing biocide. The biocide application is injected into the entrance of the Service Water Intake Tunnel. The application rate is approximately 5 to 15 parts per million for 1 to 4 hours per day into the normal flow rate of 24,000 gallons per minute. The specifications and operations of this system are included in the following procedure:

- Chemistry Procedure CP-913, "Service Water Biocide Treatment Equipment Operation," Revision 3, March 1992

The licensee met the minimum requirements of a MIC program. The licensee stated that their treatments are primarily directed toward Asiatic Clams. No Zebra Mussels have been detected in the site's ultimate heat sink, the Broad River.

No violations or deviations were identified.

6. Confirmatory Measurements Sampling Program (84750)

10 CFR 20.1501 requires the licensee to perform surveys as necessary to evaluate the extent of radiation hazards.

The licensee uses measurements of effluent streams to assess doses to the public resulting from the operation of the plant. In order for the licensee to assess the doses to the public accurately, it is imperative that the measurements of the different streams be representative and accurate.

Pursuant to these requirements, the inspector evaluated the licensee's analytical capability to make accurate radioactivity measurements. Prior to this inspection, samples containing unknown concentrations of beta-emitting radionuclides were shipped to the licensee. These samples, which are one portion of the NRC's Confirmatory Measurements Program, are supplied by the Department of Energy's Radiological and Environmental Sciences Laboratory (RESL) at the Idaho National Engineering Laboratory (INEL) in Idaho Falls, Idaho.

The results of the licensee's analysis were received by the Radiological Effluents and Chemistry Section within the allotted 60 day frame. The

results of the licensee are presented in Attachment 3 and a discussion of the NRC's acceptance is included in Attachment 4. The results were in agreement for all the radionuclides presented.

No violations or deviations were identified.

7. Liquid Effluent Processing and Batch Release Permits (84750)

TS 4.11.1.1.1 specifies the concentrations of radioactive isotopes which may be present in each batch of radioactive liquid waste which may be released to the environment.

TS Table 4.11-1 specifies the sampling frequency and analysis program for each of liquid release types which are governed by the liquid release program.

The inspector observed the sampling and analysis of Waste Monitor Tanks A and B for batch release permit documentation. The inspector observed the sample collection and the analyses performed in order to generate the permit activities and concentrations. While the primary interest of the inspector was the radioanalytical portion of the permit, the inspector also observed those parameters analyzed as a part of the National Pollution Discharge Elimination System (NPDES) permit which are also performed prior to release. Parameters analyzed as part of the NPDES permit include oil and grease, pH, Total Suspended Solids (TSS), Iron and Copper, Boron, Sulfates, and Chemical Oxygen Demand (COD).

While there were some problems encountered with Tank A as far as high oil and grease results which required further treatment of the water prior to release, the inspector was able to review the final release permit for Tank B. The permit appeared to have been thorough and calculated in accordance with both TSS and Effluent Release criteria as defined in the ODCM. All parameters examined appear to have been satisfactorily completed.

No violations or deviations were identified.

8. Radiological Effluent Monitor Calibration and Operability (84750)

The V. C. Summer ODCM outlines the surveillance requirements for Radioactive Gaseous Effluent Monitors in Limiting Condition of Operation, Section 1.2.1.1. Table 1.2-2 requires that operational tests be performed at a quarterly interval for the Reactor Building Purge System Radiation Monitor, RM-A4, for the noble gas activity monitor, the flow rate measuring device, and the sampler flow rate monitor.

An independent audit performed by a contractor for the QA group found that the frequency of the operability testing for the low flow alarm capability were not being done quarterly as required in the ODCM, but rather, on an 18 month frequency. An Off-Normal Occurrence (ONO) report was generated when these facts surfaced (ONO Report No. 94-01, January 6, 1994). Preliminary review indicated that this frequency

requirement was deleted between Revision 2 and Revision 3 of Surveillance Test Procedure STP-360.037, "Reactor Building Purge Exhaust Atmospheric Radiation Monitor (RM-A4) Calibration."

At the inspection there were not sufficient details available to answer several questions and concerns raised by this issue. It was not apparent as to how this requirement was omitted between revisions. Since the change between the two revisions had occurred in January 1993, it was not possible to determine if the monitors had been used in conditions in which they were technically out of calibration.

While there appears to be a violation of the required frequency of operability testing, several questions are unanswered concerning this occurrence. The concerns of the inspector conveyed to the licensee about this matter and the licensee has indicated that they were to review the facts and provide further information as it becomes available.

One unresolved item (URI) was identified.

#### 9. Exit Interview

The inspection scope and results were summarized on January 14, 1994, with those persons indicated in Paragraph 1. The inspector described the areas inspected and discussed in detail the inspection results as listed in the summary. Proprietary information is not contained in this report. Dissenting comments were not received from the licensee.

<u>Type</u>	<u>Item Number</u>	<u>Status</u>	<u>Description and Reference</u>
URI	50-395/94-04-01	Open	Failure to perform the low flow alarm verification on Reactor Building Purge Exhaust RM-A4 as required in the ODCM (Paragraph 8).



ATTACHMENT 1

V. C. Summer Radioactive Effluent Summary

	1991	1992	First Half 1993
No. of Unplanned Releases			
a. Liquid	0	0	0
b. Gas	0	0	0
Activity Released (Curies)			
a. Gaseous			
1. Fission and Activation Products	4.34E+02	3.38E+02	2.43E+02
2. Iodine	2.36E-04	2.34E-04	4.26E-03
3. Particulates	4.97E-05	5.61E-06	1.32E-04
4. Tritium	8.32E+00	2.47E-01	2.24E+00
b. Liquid			
1. Fission and Activation Products	6.09E-01	2.23E-01	1.75E-01
2. Tritium	8.13E+02	6.08E+02	3.73E+02
3. Gross Alpha	<LLD	<LLD	<LLD
4. Dissolved and Entrained Gases	4.13E-01	4.14E-01	2.81E+00
c. Volume of Liquid Wastes Released Prior to Dilution (liters)	2.36E+08	9.83E+07	9.09E+07

ATTACHMENT 2

V. C. Summer Annual Doses

Annual Dose Totals	1991	1992	First Half 1993
a. Liquid Effluents			
1. Total Body (mRem)	7.47E-02	1.83E-02	2.25E-02
2. Critical Organ (mRem)	1.05E-01	4.13E-02	3.21E-02
b. Gaseous Effluents			
1. Noble Gas Gamma (mRad)	3.03E-02	2.61E-02	1.75E-02
2. Noble Gas Beta (mRad)	8.05E-02	6.62E-02	4.54E-02
3. Critical Organ (mRem)	7.57E-03	4.20E-03	8.33E-02

ATTACHMENT 3

Confirmatory Measurement Comparison for V. C. Summer Nuclear Power Plant

Isotope	NRC (pCi/mL)	Licensee (pCi/mL)	Resolution	Ratio (Licensee/NRC)	Comparison
H-3	145.61	137.00	20	0.941	Agreement
Fe-55	14.08	16.30	20	1.157	Agreement
Sr-90	25.79	23.60	20	0.915	Agreement
Sr-89	NDA	LLD	--	-----	-----

## ATTACHMENT 4

### CRITERIA FOR COMPARISONS OF ANALYTICAL MEASUREMENTS

This attachment provides criteria for the comparison of results on analytical radioactivity measurements. These criteria are based on empirical relationships which combine prior experience in comparing radioactivity analyses, the measurement of the statistically random process of radioactive emission, and the accuracy needs of this program.

In these criteria, the "Comparison Ratio Limits"<sup>1</sup> denoting agreement or disagreement between licensee and NRC results are variable. This variability is a function of the ratio of the NRC's analytical value relative to its associated statistical and analytical uncertainty, referred to in this program as "Resolution"<sup>2</sup>.

For comparison purposes, a ratio between the licensee's analytical value and the NRC's analytical value is computed for each radionuclide present in a given sample. The computed ratios are then evaluated for agreement or disagreement based on "Resolution." The corresponding values for "Resolution" and the "Comparison Ratio Limits" are listed in the Table below. Ratio values which are either above or below the "Comparison Ratio Limits" are considered to be in disagreement, while ratio values within or encompassed by the "Comparison Ratio Limits" are considered to be agreement.

TABLE

NRC Confirmatory Measurements Acceptance Criteria  
Resolution vs. Comparison Ratio Limits

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<u>Resolution</u>	<u>Comparison Ratio Limits for Agreement</u>
<4	0.4 - 2.5
4 - 7	0.5 - 2.0
8 - 15	0.6 - 1.66
16 - 50	0.75 - 1.33
51 - 200	0.80 - 1.25
>200	0.85 - 1.18

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$$^1\text{Comparison Ratio} = \frac{\text{Licensee Value}}{\text{NRC Reference Value}}$$

$$^2\text{Resolution} = \frac{\text{NRC Reference Value}}{\text{Associated Uncertainty}}$$

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