

May 1, 2026

Docket Nos.: 52-025  
52-026

NL-26-0156

U. S. Nuclear Regulatory Commission  
ATTN: Document Control Desk  
Washington, D. C. 20555-0001

Vogtle Electric Generating Plant – Units 3 and 4  
Annual Radioactive Effluent Release Report for 2025

Ladies and Gentlemen:

In accordance with section 5.6.2 of the Vogtle Electric Generating Plant (VEGP) - Units 3 and 4 Technical Specifications (TS), Southern Nuclear Operating Company submits the enclosed Annual Radioactive Effluent Release Report (ARERR) for 2025.

Please note that there were no revisions to the Offsite Dose Calculation Manual (ODCM) during the 2025 reporting period. Due to an administrative oversight, the ODCM for VEGP Units 3 and 4 was not updated concurrently with the ODCM for VEGP Units 1 and 2 during the 2025 reporting period. This issue was documented in Condition Report No. 11249529. The revision to the VEGP Units 3 and 4 ODCM was completed during the 2026 reporting period and will be submitted with the 2026 ARERR.

Additionally, please note that the VEGP 3 and 4 Environmental Protection Plan does not require the submittal of an Annual Non-Radiological Environmental Operating Report.

This letter contains no NRC commitments. If you have any questions, please contact Ryan Joyce at 205.992.6468.

Respectfully submitted,

Jamie M. Coleman  
Director, Regulatory Affairs  
Southern Nuclear Operating Company

JMC/btr/cbg

U. S. Nuclear Regulatory Commission  
NL-26-0156  
Page 2 of 2

Enclosure: 1. VEGP Units 3 and 4 Annual Radioactive Effluent Release Report (2025)

cc: Regional Administrator, Region II  
NRR Project Manager – Vogtle 3&4  
Senior Resident Inspector – Vogtle 3&4  
R-Type: VND.LI.L00

**Vogtle Electric Generating Plant – Units 3 and 4**

**Annual Radioactive Effluent Release Report for 2025**

**Enclosure to NL-26-0156**

**VEGP Units 3 and 4 Annual Radioactive Effluent Release Report (2025)**



# Annual Radioactive Effluent Release Report 2025

Document Number: 03

Docket Nos. 52-025 & 52-026

Facility Operating License Nos. NPF-91 & NPF-92

Prepared By: Maci N. Brinson / *Maci Brinson* Date: 04/23/26  
Chemistry Supervisor

*Robert Kirchner*  
Reviewed By: Robert Kirchner / Date: 04/23/26  
Chemistry Manager

**TABLE OF CONTENTS**

1.0 LIST OF ACRONYMS AND DEFINITIONS ..... 3

2.0 EXECUTIVE SUMMARY ..... 5

    2.1 Summary of Conclusions: ..... 5

3.0 INTRODUCTION ..... 9

    3.1 About Nuclear Power ..... 9

    3.2 About Radiation Dose ..... 11

    3.3 About Dose Calculation ..... 12

4.0 DOSE ASSESSMENT FOR PLANT OPERATIONS ..... 14

    4.1 Regulatory Limits ..... 14

    4.2 Regulatory Limits for Gaseous Effluent Doses: ..... 15

    4.3 Regulatory Limits for Liquid Effluent Doses ..... 16

    4.4 40 CFR 190 Regulatory Dose Limits for a Member of the Public ..... 16

    4.5 Onsite Doses (Within Site Boundary) ..... 16

5.0 SUPPLEMENTAL INFORMATION ..... 18

    5.1 Gaseous Batch Releases ..... 18

    5.2 Liquid Batch Releases ..... 18

    5.3 Abnormal Releases ..... 19

    5.4 Land Use Census Changes ..... 19

    5.5 Meteorological Data ..... 19

    5.6 Effluent Radiation Monitors Out of Service Greater Than 30 Days ..... 19

    5.7 Offsite Dose Calculation Manual (ODCM) Changes ..... 20

    5.8 Process Control Program (PCP) Changes ..... 21

    5.9 Radioactive Waste Treatment System Changes ..... 21

6.0 OTHER SUPPLEMENTAL INFORMATION ..... 21

    6.1 Temporary Outside Tanks ..... 21

    6.2 Independent Spent Fuel Storage Installation (ISFSI) Monitoring Program ..... 21

    6.3 Carbon-14 ..... 21

    6.4 Corrections to Previous Reports ..... 22

7.0 The following pages were revised. NEI 07-07 ONSITE RADIOLOGICAL  
GROUNDWATER MONITORING PROGRAM ..... 22

8.0 VOLUNTARY NOTIFICATION ..... 22

9.0 BIBLIOGRAPHY ..... 23

**TABLES**

Table 1, Alvin W. Vogtle Generating Plant (Unit 3) Dose Summary ..... 6

Table 2, Alvin W. Vogtle Generating Plant (Unit 4) Dose Summary ..... 7

Table 3, Total Annual Offsite-Dose Comparison to Regulatory Limits for VEGP ..... 8

Table 4, Onsite Doses (Within Site Boundary) ..... 17

Table 5, Gaseous Effluents Summation of All Releases (Vogtle Unit 3)..... 25

Table 6, Gaseous Effluents – Ground Level Release Batch Mode (Vogtle Unit 3) ..... 26

Table 7, Gaseous Effluents – Ground Level Release Continuous Mode (Vogtle Unit 3)..... 27

Table 8, Gaseous Effluents Summation of All Releases (Vogtle Unit 4)..... 28

Table 9, Gaseous Effluents – Ground Level Release Batch Mode (Vogtle Unit 4) ..... 29

Table 10, Gaseous Effluents – Ground Level Release Continuous Mode (Vogtle Unit 4)..... 30

Table 11, Liquid Effluents – Summation of All Releases (Vogtle Unit 3) ..... 31

Table 12, Batch Mode Liquid Effluents (Vogtle Unit 3) ..... 32

Table 13, Continuous Mode Liquid Effluents (Vogtle Unit 3) ..... 33

Table 14, Liquid Effluents – Summation of All Releases (Vogtle Unit 4) ..... 34

Table 15, Batch Mode Liquid Effluents (Vogtle Unit 4) ..... 35

Table 16, Continuous Mode Liquid Effluents (Vogtle Unit 4) ..... 36

Table 17, Types of Solid Waste Summary (Vogtle Unit 3 and Unit 4)..... 37

Table 18, Major Nuclides (Vogtle Unit 3 and Unit 4) by NRC Waste Class A ..... 38

Table 19, Solid Waste Disposition (Vogtle Unit 3 and Unit 4) ..... 38

Table 20, Irradiated Fuel Shipments Disposition (Vogtle Unit 3 and Unit 4) ..... 39

Table 21, Groundwater Protection Program Sample Points ..... 41

Table 22, Groundwater Protection Program 2025 Sample Results ..... 42

**FIGURES**

Figure 1, Pressurized Water Reactor (PWR) [1]..... 9

Figure 2, Boiling Water Reactor (BWR) [2]..... 10

Figure 3, Sources of Radiation Exposure (NCRP Report No. 160) [3]..... 11

Figure 4, Potential exposure pathways to Members of the Public due to Plant Operations [6] ..... 13

Figure 5, Vogtle Electric Generating Plant Units 3&4 GWPP Monitoring Network ..... 43

**ATTACHMENTS**

Attachment 1, ARERR Release Summary Tables (RG-1.21 Tables) ..... 25

Attachment 2, Solid Waste Information ..... 37

Attachment 3, NEI-07-07 Onsite Radiological Groundwater Monitoring Program..... 40

Attachment 4, ERRATA of Previous Reports ..... 44

## 1.0 LIST OF ACRONYMS AND DEFINITIONS

1. Airborne Activity Sampling: Sampling of air through the collection of particulates and radionuclides on filter media, collection of noble gases in a container, and collection of water vapor containing tritium.
2. Alpha Particle ( $\alpha$ ): A charged particle emitted from the nucleus of an atom having a mass and charge equal in magnitude of a helium nucleus.
3. AREOR: Annual Radiological Environmental Operating Report
4. ARERR: Annual Radioactive Effluent Release Report
5. Abnormal Release: is an unplanned or uncontrolled release of licensed radioactive material from the plant. Abnormal releases may be categorized as either batch or continuous depending on the circumstances.
6. Abnormal Discharge: is an unplanned or uncontrolled release of licensed radioactive material to the unrestricted area. Abnormal discharges may also be categorized as either batch or continuous depending on the circumstances.
7. BWR: Boiling Water Reactor
8. Composite Sample: A series of single collected portions (aliquots) analyzed as one sample. The aliquots making up the sample are collected at time intervals that are very short compared to the composite period.
9. Control: A sampling station in a location not likely to be affected by plant effluents due to its distance and/or direction from the Plant.
10. Counting Error: An estimate of the two-sigma uncertainty associated with the sample results based on respective count times.
11. Curie (Ci): A measure of radioactivity; equal to  $3.7 \times 10^{10}$  disintegrations per second, or  $2.22 \times 10^{12}$  disintegrations per minute.
12. Direct Radiation Monitoring: The measurement of radiation dose at various distances from the plant is assessed using thermoluminescent dosimeters (TLDs), optically stimulated luminescent dosimeters (OSLDs), and/or pressurized ionization chambers.
13. Grab Sample: A single discrete sample drawn at one point in time.
14. Indicator: A sampling location that is likely to be affected by plant effluents due to its proximity and/or direction from the plant.
15. Ingestion Pathway: The ingestion pathway includes milk, fish, and garden produce. Meat or other food products may also be included
16. ISFSI: Independent Spent Fuel Storage Installation
17. JFD: Joint Frequency Distribution
18. Lower Limit of Detection (LLD): The smallest concentration of radioactive material in a sample that will yield a net count (above system background) that will be detected with 95% probability with a 5% probability of a false conclusion that a blank observation represents "real" signal.
19. LUC: Land Use Census
20. m/s: Meters per second
21. MDA: Minimum Detectable Activity
22. MDC: Minimum Detectable Concentration, essentially synonymous with MDA for the purposes of radiological monitoring.

**Company: Southern Nuclear****Plant: Vogtle Electric Generating Plant 3&4**

23. Mean: The average, i.e., the sum of results divided by the number of results.
24. Microcurie ( $\mu\text{Ci}$ ):  $3.7 \times 10^4$  disintegrations per second, or  $2.22 \times 10^6$  disintegrations per minute.
25. millirem (mrem): 1/1000 rem; a unit of radiation dose equivalent in tissue.
26. Milliroentgen (mR): 1/1000 Roentgen; a unit of exposure to X or gamma radiation.
27. MWe: Megawatts Electric
28. MWTh: Megawatts Thermal
29. N/A: Not Applicable
30. N/D: Not Detected
31. NEI: Nuclear Energy Institute
32. Nonroutine, planned discharge—An effluent release from a release point that is not defined in the ODCM but that has been planned, monitored, and discharged in accordance with 10 CFR 20.2001.
33. NRC: Nuclear Regulatory Commission
34. ODCM: Offsite Dose Calculation Manual
35. OSLD: Optically Stimulated Luminescence Dosimeter
36. Protected Area: The fenced area immediately surrounding the Plant. Access to the protected area requires a security badge or escort.
37. PWR: Pressurized Water Reactor
38. REC: Radiological Effluent Control
39. REMP: Radiological Environmental Monitoring Program
40. Restricted Area: Any area where access is controlled for the purpose of protecting individuals from exposure to radiation or radioactive materials
41. RGPP: Radiological Ground Water Protection Program
42. SLCs: Selected Licensee Commitments
43. TEDE: The sum of the effective dose equivalent (for external exposures) and the committed effective dose equivalent (for internal exposures).
44. TLD: Thermoluminescent Dosimeter
45. TRM: Technical Requirements Manual
46. TS: Technical Specification
47. Unrestricted Area: an area, access to which is neither limited nor controlled by the licensee.

Annual Radioactive Effluent Release Report	YEAR: 2025	Page 5 of 58
<b>Company: Southern Nuclear</b>	<b>Plant: Vogtle Electric Generating Plant 3&amp;4</b>	

## 2.0 EXECUTIVE SUMMARY

Vogtle Electric Generating Plant 3&4 (VEGP) Radiological Effluent Control (REC) Program was established to limit the quantities of radioactive material that may be released based on calculated radiation doses or dose rates. Dose to Members of the Public due to radioactive materials released from the plant is limited by Appendix I of 10 CFR 50 and by 40 CFR 190. Operational doses to the public during 2025 were calculated to be very small compared to the limits required by regulation and compared to other sources of radiation dose and pose no health hazard.

The 2025 the liquid pathway dose assessments showed the critical receptor / organ for VEGP Unit 3 was the Child / Thyroid. The annual total body and organ doses that were calculated for this age group was 1.01E-01 mrem and 1.04E-01 mrem, respectively. These doses represented 3.36% and 1.04%, respectively of the 10 CFR 50, Appendix I annual limits of 3 mrem to the total body and 10 mrem to the organ.

The critical receptor / organ for VEGP Unit 4 was the Child / Gi-Lli. The annual total body and organ doses that were calculated for this age group were 7.84E-02 mrem and 7.96E-02 mrem, respectively. These doses represented 2.61% and 0.80%, respectively of the 10 CFR 50, Appendix I annual limits of 3 mrem to the total body and 10 mrem to the organ.

The 2025 gaseous doses to the critical receptor for VEGP Unit 3 was the Max Site Boundary / Child, due to the inhalation and ground plane pathways. The maximum annual organ dose calculated for this receptor was 7.54E-03 mrem per year to the thyroid. This annual dose represents a minute fraction (0.05%) of the 10 CFR 50, Appendix I limit of 15 mrem to the Maximum Organ.

The critical receptor for VEGP Unit 4 was the Max Site Boundary / Teenager, due to the inhalation and ground plane pathways. The maximum annual organ dose calculated for this receptor was 3.11E-03 mrem per year to the thyroid. This annual dose represents a minute fraction (0.02%) of the 10 CFR 50, Appendix I limit of 15 mrem to the Maximum Organ.

The total 40 CFR 190 dose from the Vogtle Site (Units 1, Unit 2, Unit 3, and Unit 4) via the gaseous, liquid, direct shine and nearby facilities dose pathways was determined to be **7.13E-01** mrem (Total Body), **7.02E-01** mrem (Thyroid), and **1.20E+00** mrem (Max Organ). These doses include **3.30E-01** mrem from the Savannah River Site.

In addition to monitoring radioactive effluents, VEGP has a Radiological Environmental Monitoring Program (REMP) that monitors for levels of radiation and radioactive materials in the local environment. Data from the REMP is published in the Annual Radiological Environmental Operating Report (AREOR).

### 2.1 Summary of Conclusions:

During 2025 all liquid, and gaseous radioactive effluents from Vogtle Generating Plant Unit 3 and Unit 4 were well below regulatory limits.

Comparison to Regulatory Limits

During 2025 all liquid and gaseous radioactive effluents from Vogtle Electric Generating Plant 3&4 were well below regulatory limits, as summarized in Table 1, Table 2, and Table 3.

Table 1, Alvin W. Vogtle Generating Plant (Unit 3) Dose Summary<sup>1</sup>

	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Annual
<b>Liquid Effluents</b>					
<b>Limit</b>	<b>1.5 mrem</b>	<b>1.5 mrem</b>	<b>1.5 mrem</b>	<b>1.5 mrem</b>	<b>3 mrem</b>
Total Body Dose (mrem) <sup>2</sup>	4.42E-02	4.42E-02	5.93E-03	6.41E-03	1.01E-01
% of Limit	2.94	2.95	0.40	0.43	3.36
<b>Limit</b>	<b>5 mrem</b>	<b>5 mrem</b>	<b>5 mrem</b>	<b>5 mrem</b>	<b>10 mrem</b>
Maximum Organ Dose (mrem) <sup>3</sup>	4.58E-02	4.63E-02	5.86E-03	6.29E-03	1.04E-01
% of Limit	0.92	0.93	0.12	0.13	1.04
<b>Gaseous Effluents</b>					
<b>Limit</b>	<b>5 mrad</b>	<b>5 mrad</b>	<b>5 mrad</b>	<b>5 mrad</b>	<b>10 mrad</b>
Gamma Air Dose (mrad) <sup>4</sup>	5.02E-04	9.68E-04	7.88E-04	6.48E-04	2.91E-03
% of Limit	0.01	0.02	0.02	0.01	0.03
<b>Limit</b>	<b>10 mrad</b>	<b>10 mrad</b>	<b>10 mrad</b>	<b>10 mrad</b>	<b>20 mrad</b>
Beta Air Dose (mrad) <sup>5</sup>	1.77E-04	3.41E-04	2.78E-04	2.28E-04	1.03E-03
% of Limit	< 0.01	< 0.01	< 0.01	< 0.01	0.01
<b>Limit</b>	<b>7.5 mrem</b>	<b>7.5 mrem</b>	<b>7.5 mrem</b>	<b>7.5 mrem</b>	<b>15 mrem</b>
Maximum Organ Dose (mrem) <sup>6</sup>	3.37E-03	2.81E-03	6.42E-05	1.48E-03	7.54E-03
% of Limit	0.04	0.04	< 0.01	0.02	0.05

<sup>1</sup> Table 1 is meant to demonstrate 10 CFR Part 50, Appendix I Limits. It does not include dose from C-14.

<sup>2</sup> Max. Ind. Liquid / Child

<sup>3</sup> Max. Ind. Liquid / Child, Thyroid

<sup>4</sup> Max Site Boundary / All Age Groups

<sup>5</sup> Max Site Boundary / All Age Groups

<sup>6</sup> Max Site Boundary / Child, Thyroid

Table 2, Alvin W. Vogtle Generating Plant (Unit 4) Dose Summary<sup>1</sup>

	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Annual
<b>Liquid Effluents</b>					
<b>Limit</b>	<b>1.5 mrem</b>	<b>1.5 mrem</b>	<b>1.5 mrem</b>	<b>1.5 mrem</b>	<b>3 mrem</b>
Total Body Dose (mrem) <sup>2</sup>	4.36E-02	2.38E-02	3.42E-03	7.63E-03	7.84E-02
% of Limit	2.90	1.58	0.23	0.51	2.61
<b>Limit</b>	<b>5 mrem</b>	<b>5 mrem</b>	<b>5 mrem</b>	<b>5 mrem</b>	<b>10 mrem</b>
Maximum Organ Dose (mrem) <sup>3</sup>	4.35E-02	2.41E-02	5.15E-03	8.81E-03	7.96E-02
% of Limit	0.87	0.48	0.10	0.18	0.80
<b>Gaseous Effluents</b>					
<b>Limit</b>	<b>5 mrad</b>	<b>5 mrad</b>	<b>5 mrad</b>	<b>5 mrad</b>	<b>10 mrad</b>
Gamma Air Dose (mrad) <sup>4</sup>	1.11E-03	9.14E-05	3.33E-02	4.17E-05	3.45E-02
% of Limit	0.02	< 0.01	0.67	<0.01	0.35
<b>Limit</b>	<b>10 mrad</b>	<b>10 mrad</b>	<b>10 mrad</b>	<b>10 mrad</b>	<b>20 mrad</b>
Beta Air Dose (mrad) <sup>5</sup>	3.91E-04	3.22E-05	1.17E-02	1.47E-05	1.22E-02
% of Limit	< 0.01	< 0.01	0.12	< 0.01	0.06
<b>Limit</b>	<b>7.5 mrem</b>	<b>7.5 mrem</b>	<b>7.5 mrem</b>	<b>7.5 mrem</b>	<b>15 mrem</b>
Maximum Organ Dose (mrem) <sup>6</sup>	1.24E-05	8.03E-04	9.95E-04	1.42E-03	3.11E-03
% of Limit	< 0.01	0.01	0.01	0.02	0.02

<sup>1</sup> Table 2 is meant to demonstrate 10 CFR Part 50, Appendix I Limits. It does not include dose from C-14.

<sup>2</sup> Max. Ind. Liquid / Child

<sup>3</sup> Max. Ind. Liquid / Child, GI-LI

<sup>4</sup> Site Boundary / All Age Groups

<sup>5</sup> Site Boundary / All Age Groups

<sup>6</sup> Max Site Boundary / Teenager, Thyroid

Table 3, Total Annual Offsite-Dose Comparison to Regulatory Limits for VEGP<sup>1</sup>

	Whole Body	Thyroid	Max Organ
<b>Limit</b>	<b>25 mrem</b>	<b>75 mrem</b>	<b>25 mrem</b>
<b>Gaseous</b>			
Unit 1 Noble Gas	4.87E-05	7.14E-05	7.14E-05
Unit 1 Particulates and Iodine	3.27E-03	3.27E-03	3.27E-03
Unit 1 C-14	1.69E-02	1.69E-02	8.45E-02
Unit 2 Noble Gas	2.10E-05	3.09E-05	3.09E-05
Unit 2 Particulates and Iodine	1.09E-03	1.09E-03	1.09E-03
Unit 2 C-14	1.69E-02	1.69R-02	8.45E-02
Unit 3 Noble Gas	2.76E-03	2.76E-03	4.07E-03
Unit 3 Particulates and Iodine	2.55E-03	7.54E-03	2.57E-03
Unit 3 C-14	4.49E-02	4.49E-02	2.25E-01
Unit 4 Noble Gas	3.28E-02	3.28E-02	4.83E-02
Unit 4 Particulates and Iodine	2.44E-03	3.11E-03	2.00E-04
Unit 4 C-14	3.91E-02	3.91E-02	1.96E-01
<b>Total Gaseous</b>	<b>1.63E-01</b>	<b>1.52E-01</b>	<b>6.50E-01</b>
<b>Liquid</b>			
Unit 1	2.57E-02	2.41E-02	2.66E-02
Unit 2	1.50E-02	1.42E-02	1.55E-02
Unit 3	1.01E-01	1.04E-01	1.02E-01
Unit 4	7.84E-02	7.78E-02	7.96E-02
<b>Total Liquid</b>	<b>2.20E-01</b>	<b>2.20E-01</b>	<b>2.24E-01</b>
<b>Direct Shine<sup>2</sup></b>	N/A	N/A	N/A
<b>Nearby Facilities<sup>3</sup></b>	<b>3.30E-01</b>	<b>3.30E-01</b>	<b>3.30E-01</b>
<b>Total Dose</b>	<b>7.13E-01</b>	<b>7.02E-01</b>	<b>1.20E+00</b>
<b>% of Limit</b>	<b>2.85%</b>	<b>0.94%</b>	<b>4.81%</b>

<sup>1</sup> Table 3 is a summation of all Units to show compliance with 40 CFR Part 190 Limits.

<sup>2</sup> Based on data from the REMP, direct radiation at the site boundary is indistinguishable from background at the plant perimeter.

<sup>3</sup> Savannah River Site 2024 Environmental Report Summary.

### 3.0 INTRODUCTION

#### 3.1 About Nuclear Power

Commercial nuclear power plants are generally classified as either Boiling Water Reactors (BWRs) or Pressurized Water Reactors (PWRs), based on their design. A BWR includes a single coolant system where water used as reactor coolant boils as it passes through the core and the steam generated is used to turn the turbine generator for power production. A PWR, in contrast, includes two separate water systems: radioactive reactor coolant and a secondary system. Reactor coolant is maintained under high pressure, preventing boiling. The high-pressure coolant is passed through a heat exchanger called a steam generator where the secondary system water is boiled, and the steam is used to turn the turbine generator for power production.

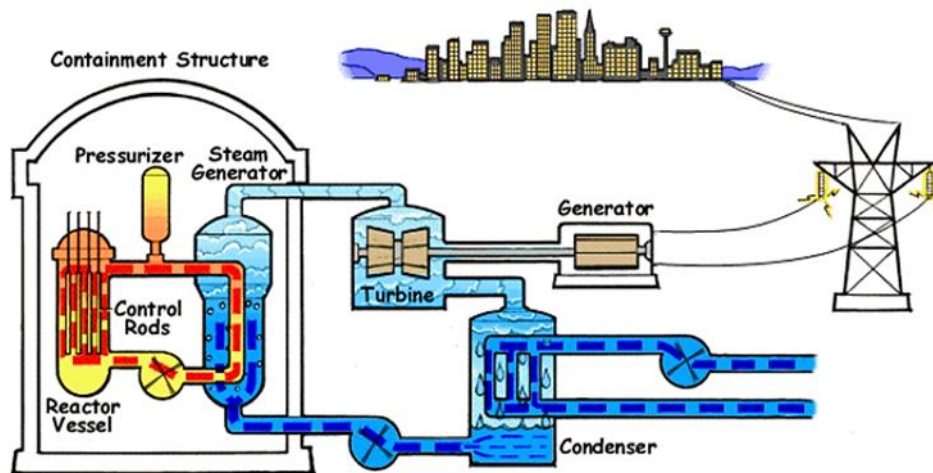


Figure 1, Pressurized Water Reactor (PWR) [1]

## 3.1 (Continued)

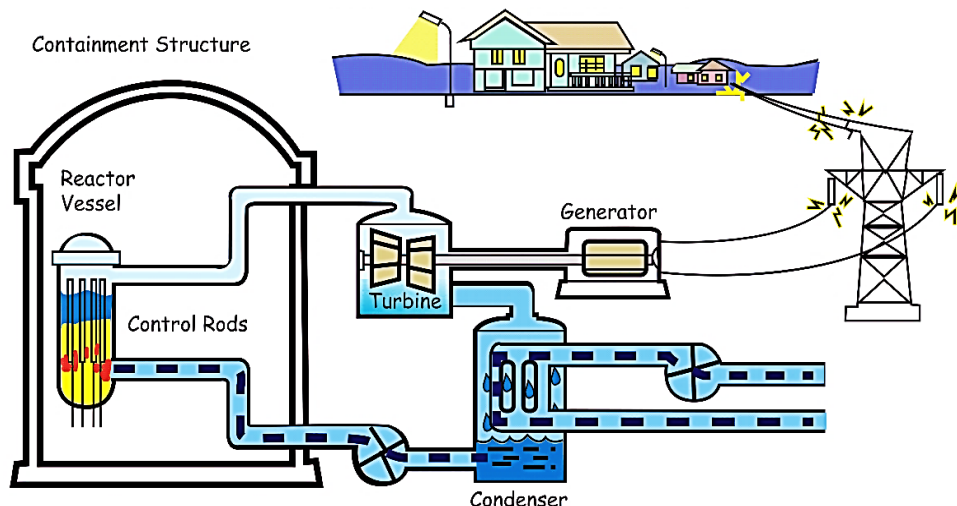


Figure 2, Boiling Water Reactor (BWR) [2]

Electricity is generated by a nuclear power plant similarly to the way that electricity is generated at other conventional types of power plants, such as those powered by coal or natural gas. Water is boiled to generate steam; the steam turns a turbine that is attached to a generator, and the steam is condensed back into water to be returned to the boiler. What makes nuclear power different from these other types of power plants is that the heat is generated by fission and decay reactions occurring within and around the core containing fissionable uranium (U-235).

Nuclear fission occurs when certain nuclides (primarily U-233, U-235, or Pu-239) absorb a neutron and break into several smaller nuclides (called fission products) as well as producing some additional neutrons.

Fission results in production of radioactive materials including gases and solids that must be contained to prevent release or treated prior to release. These effluents are generally treated by filtration and/or hold-up prior to release. Releases are generally monitored by sampling and by continuously indicating radiation monitors. The effluent release data is used to calculate doses in order to ensure that dose to the public due to plant operation remains within required limits.

### 3.2 About Radiation Dose

Ionizing radiation, including alpha, beta, and gamma radiation from radioactive decay, has enough energy to break chemical bonds in tissues and result in damage to tissue or genetic material. The amount of ionization that will be generated by a given exposure to ionizing radiation is quantified as dose. Radiation dose is generally reported in units of millirem (mrem) in the US.

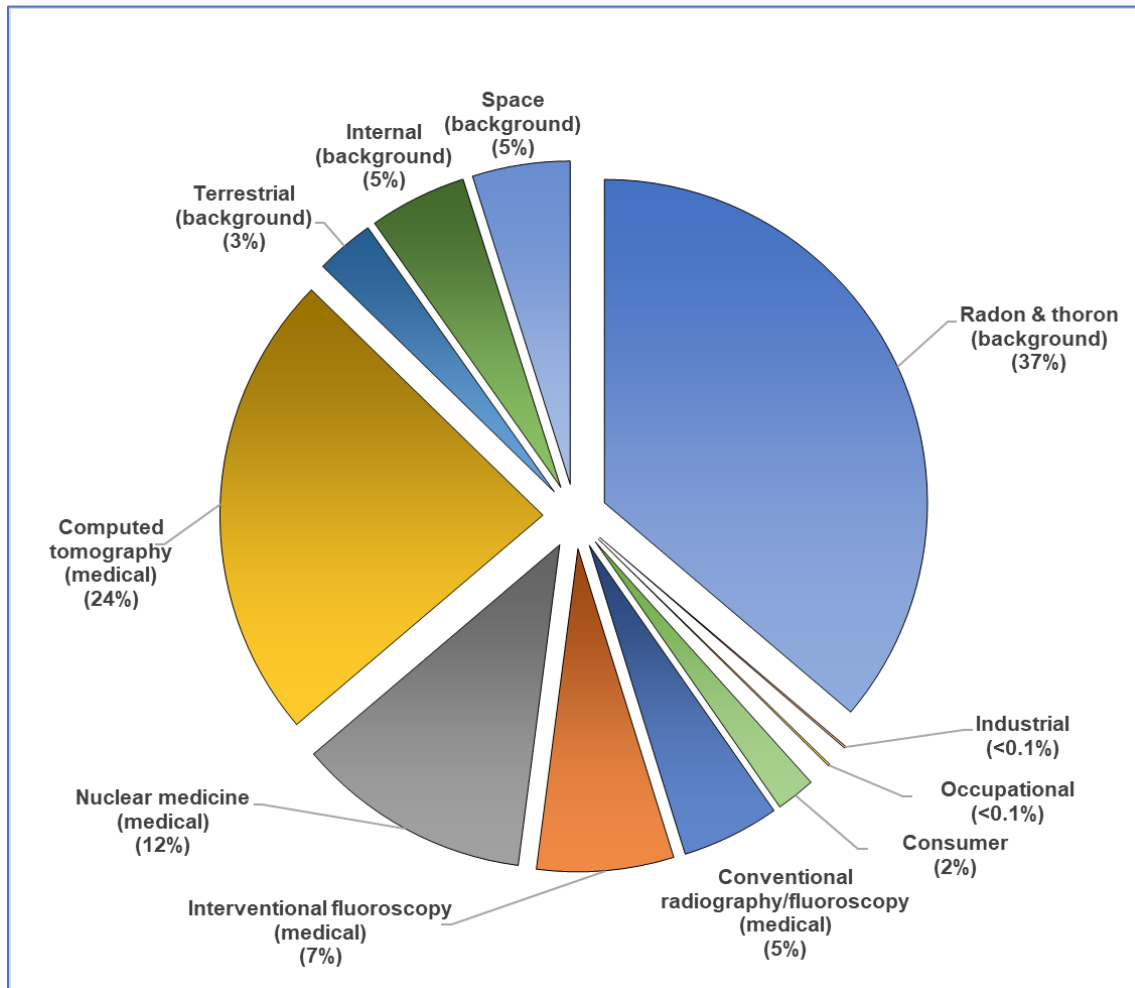


Figure 3, Sources of Radiation Exposure (NCRP Report No. 160) [3]

### 3.2 (Continued)

The National Council on Radiation Protection (NCRP) has evaluated the population dose for the US and determined that the average individual is exposed to approximately 620 mrem per year [3]. There are many sources for radiation dose, ranging from natural background sources to medical procedures, air travel, and industrial processes. Approximately half (310 mrem) of the average exposure is due to natural sources of radiation including exposure to radon, cosmic radiation, and internal radiation and terrestrial due to naturally occurring radionuclides. The remaining 310 mrem of exposure is due to man-made sources of exposure, with the most significant contributors being medical (48% of total mrem per year) due to radiation used in various types of medical scans and treatments. Of the remaining 2% of dose, most is due to consumer activities such as air travel, smoking cigarettes, and building materials. A small fraction of this 2% is due to industrial activities including generation of nuclear power.

Readers that are curious about common sources and effects of radiation dose that they may encounter can find excellent sources of information from the Health Physics Society, including the Radiation Fact Sheets [4], and from the US Nuclear Regulatory Commission website [5].

### 3.3 **About Dose Calculation**

The concentrations of radioactive material in the environment resulting from plant operations are very small and it is not possible to determine doses directly using measured activities of environmental samples. To overcome this, dose calculations based on measured activities of effluent streams are used to model the dose impact for Members of the Public due to plant operation and effluents. There are several mechanisms that can result in dose to Members of the Public, including: Ingestion of radionuclides in food or water; Inhalation of radionuclides in air; Immersion in a plume of noble gases; and Direct Radiation from the ground, the plant or from an elevated plume.

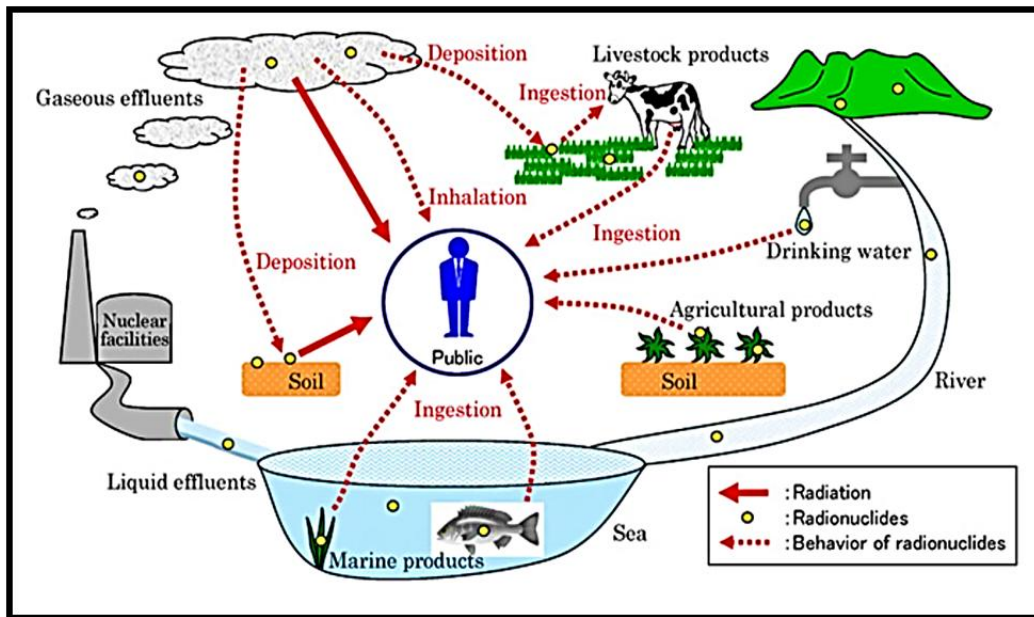


Figure 4, Potential exposure pathways to Members of the Public due to Plant Operations [6]

Each plant has an Offsite Dose Calculation Manual (ODCM) that specifies the methodology used to obtain the doses in the Dose Assessment section of this report. The dose assessment methodology in the ODCM is based on NRC Regulatory Guide 1.109 [7] and NUREG-0133 [8]. Doses are calculated by determining what the nuclide concentration will be in air, water, on the ground, or in food products based on plant effluent releases. Release points are continuously monitored to quantify what concentrations of nuclides are being released. For gaseous releases meteorological data is used to determine how much of the released activity will be present at a given location outside of the plant either deposited onto the ground or in gaseous form. Intake patterns and nuclide bio-concentration factors are used to determine how much activity will be transferred into animal milk or meat. Finally, human ingestion factors and dose factors are used to determine how much activity will be consumed and how much dose the consumer will receive. Inhalation dose is calculated by determining the concentration of nuclides and how much air is breathed by the individual.

For liquid releases, dilution and mixing factors are used to model the environmental concentrations in water. Drinking water pathways are modeled by determining the concentration of nuclides in the water at the point where the drinking water is sourced (e.g., taken from wells, rivers, or lakes). Fish and invertebrate pathways are determined by using concentration at the release point, bioaccumulation factors for the fish or invertebrate and an estimate of the quantity of fish consumed.

### 3.3 (Continued)

Each year a Land Use Census is performed to determine what potential dose pathways currently exist within a five-mile radius around the plant, the area most affected by plant operations. The Annual Land Use Census identifies the locations of vegetable gardens, nearest residences, milk animals and meat animals. The data from the census is used to determine who is the likely to be most exposed to radiation dose as a result of plant operation.

There is significant uncertainty in dose calculation results, due to modeling dispersion of material released and bioaccumulation factors, as well as assumptions associated with consumption and land-use patterns. Even with these sources of uncertainty, the calculations do provide a reasonable estimate of the order of magnitude of the exposure. Conservative assumptions are made in the calculation inputs such as the number of various foods and water consumed, the amount of air inhaled, and the amount of direct radiation exposure from the ground or plume, such that the actual dose received are likely lower than the calculated dose. Even with the built-in conservatism, doses calculated for the maximum exposed individual due to plant operation are a very small fraction of the annual dose that is received due to other sources. The calculated doses due to plant effluents, along with REMP results, serve to provide assurance that radioactive effluents releases are not exceeding safety standards for the environment or people living near the plant.

## 4.0 DOSE ASSESSMENT FOR PLANT OPERATIONS

### 4.1 Regulatory Limits

Regulatory limits are detailed in Plant Vogtle Licensing documents such as the Offsite Dose Calculation Manual (ODCM) and Selected Licensing Commitments. These documents contain the limits to which Plant Vogtle must adhere. VEGP drives to maintain the philosophy to keep dose "as low as reasonably achievable" (ALARA) and actions are taken to reduce the amount of radiation released to the environment. Liquid and gaseous release data show that the dose from VEGP is well below the ODCM limits. The concentration of liquid radioactive material released shall be limited to ten times the concentration specified in 10 CFR 20, Appendix B, Table 2, Column 2, for radionuclides other than dissolved or entrained noble gases. For dissolved or entrained noble gases, the total concentration released shall be limited to 2.0E-04 microcuries/ml. The data reveals that the 2025 radioactive effluents had an overall minimal dose contribution to the surrounding environment.

The annual whole body, skin and organ doses were computed using the 2025 source term and using the dose calculation methodology provided in the ODCM. The calculated doses due to liquid and gaseous effluents to demonstrate compliance with offsite dose limits are presented in Table 1, Alvin W. Vogtle Generating Plant (Unit 3) Dose Summary and Table 2, Alvin W. Vogtle Generating Plant (Unit 4) Dose Summary.

**4.2 Regulatory Limits for Gaseous Effluent Doses:**

1. Fission and activation gases:
  - a. Noble gases dose rate due to radioactive materials released in gaseous effluents from the site to areas at and beyond the site boundary shall be limited to the following:
    - 1) Less than or equal to 500 mrem/year to the total body
    - 2) Less than or equal to 3000 mrem/year to the skin
  - b. Noble gas air dose due to noble gases released in gaseous effluents to areas at and beyond the site boundary shall be limited to the following for each unit:
    - 1) Quarterly
      - a) Less than or equal to 5 mrad gamma
      - b) Less than or equal to 10 mrad beta
    - 2) Yearly
      - a) Less than or equal to 10 mrad gamma
      - b) Less than or equal to 20 mrad beta
2. Iodine, tritium, and all radionuclides in particulate form with half-lives greater than 8 days.
  - a. The dose rate for iodine-131, iodine-133, tritium, and all radionuclides in particulate form with half-lives greater than 8 days in gaseous effluents released from the site to areas at and beyond the site boundary shall be limited to the following:
    - 1) Less than or equal to 1500 mrem/year to any organ
  - b. The dose to a MEMBER OF THE PUBLIC from iodine-131, iodine-133, tritium, and all radionuclides in particulate form with half-lives greater than 8 DAYS in gaseous effluents released to areas at and beyond the site boundary shall be limited to the following for each unit:
    - 1) Quarterly
      - a) Less than or equal to 7.5 mrem to any organ
    - 2) Yearly
      - a) Less than or equal to 15 mrem to any organ

**Company: Southern Nuclear****Plant: Vogtle Electric Generating Plant 3&4**

#### **4.3 Regulatory Limits for Liquid Effluent Doses**

1. The dose or dose commitment to a MEMBER OF THE PUBLIC from radioactive materials in liquid effluents released to unrestricted areas shall be limited to the following for each unit:
  - a. Quarterly
    - 1) Less than or equal to 1.5 mrem total body
    - 2) Less than or equal to 5 mrem critical organ
  - b. Yearly
    - 1) Less than or equal to 3 mrem total body
    - 2) Less than or equal to 10 mrem critical organ

#### **4.4 40 CFR 190 Regulatory Dose Limits for a Member of the Public**

1. Total Dose (40 CFR 190)
  - a. The annual (calendar year) dose or dose commitment to any MEMBER OF THE PUBLIC in the unrestricted area due to releases of radioactivity and to radiation from uranium fuel cycle sources shall be limited to the following:
    - 1) Less than or equal to 25 mrem, Total Body or any Organ except Thyroid.
    - 2) Less than or equal to 75 mrem, Thyroid.

The total annual dose summary compared to 40 CFR 190 limits are presented in Table 3, Total Annual Offsite-Dose Comparison to Regulatory Limits for VEGP. This table also includes projected doses from Units 1, Units 2, Savannah River Site, and from the ISFSI.

#### **4.5 Onsite Doses (Within Site Boundary)**

VEGP classifies individuals within the site boundary as either occupationally exposed individuals or members of the public. This section evaluates dose to non-occupationally exposed workers and members of the public that may be onsite for various reasons.

The report must include any other information as may be required by the Commission to estimate maximum potential annual radiation doses to the public resulting from effluent releases as required by 10 CFR 50.36a(a)(2). While within controlled or restricted areas, the limits from Sections 4.1 through 4.4 do not apply; however, 10 CFR 20.1301 dose limit of 100 mrem per year TEDE and dose rate limit of 2 mrem per hour from external sources continue to apply. Occupancy times within the controlled areas are generally sufficiently low to compensate for the increase in the atmospheric dispersion factor above the site boundary. Groups of concern and occupancy factors (number of hours/years spent inside the site boundary) are listed in Table 4. These groups conservatively represent the most-exposed individual.

The location of concern within the site boundary is the Visitors Center. The activities at the Visitor Center consist of occasional attendance at meetings and/or short visits for informational purposes.

There will be no radiation dose at this location due to radioactive liquid effluents. Delineated in Table 4 for these locations are the values of the basic data assumed in the dose assessment due to radioactive gaseous effluents. Listed in this table are distance, direction from the Unit 3 and 4 reactor and the estimated maximum occupancy factor for an individual.

The annual whole body, organ, and skin dose was computed using the 2025 source term using the dose calculation methodology provided in the NRC Dose3 program GASPAR. The calculated doses due to gaseous effluents for non-rad workers onsite are presented in Table 4, Onsite Doses (Within Site Boundary)

Table 4, Onsite Doses (Within Site Boundary)

Location	Sector	Occupancy Factor	Approx. Distance (Meters)	Dose (mrem)		
				Total Body	Organ <sup>1</sup>	Skin
Visitor's Center	ESE	0.24	605	1.96E-03	3.02E-03	2.41E-03

---

<sup>1</sup> Thyroid

Company: Southern Nuclear

Plant: Vogtle Electric Generating Plant 3&amp;4

**5.0 SUPPLEMENTAL INFORMATION****5.1 Gaseous Batch Releases****5.1.1 VEGP Unit 3**

	Units	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Annual
1. Number of Batch Releases		41	42	42	42	167
2. Total duration of batch releases	minutes	4.63E+03	1.60E+04	6.81E+03	5.09E+03	3.25E+04
3. Maximum batch release duration	minutes	1.39E+03	7.06E+03	5.28E+02	4.78E+02	7.06E+03
4. Average batch release duration	minutes	1.13E+02	3.81E+02	1.62E+02	1.21E+02	1.95E+02
5. Minimum batch release duration	minutes	1.00E+00	1.00E+00	1.00E+00	4.00E+00	1.00E+00

**5.1.2 VEGP Unit 4**

	Units	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Annual
1. Number of Batch Releases		47	29	42	25	143
2. Total duration of batch releases	minutes	3.16E+04	4.87E+03	3.39E+04	1.01E+03	7.14E+04
3. Maximum batch release duration	minutes	1.02E+04	3.92E+03	7.54E+03	3.39E+02	1.02E+04
4. Average batch release duration	minutes	6.72E+02	1.68E+02	8.08E+02	4.04E+01	4.99E+02
5. Minimum batch release duration	minutes	3.00E+00	9.00E+00	6.00E+00	3.00E+00	3.00E+00

**5.2 Liquid Batch Releases****5.2.1 VEGP Unit 3**

	Units	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Annual
1. Number of Batch Releases		19	20	20	12	71
2. Total duration of batch releases	minutes	7.88E+03	8.95E+03	9.57E+03	6.58E+03	3.30E+04
3. Maximum batch release duration	minutes	7.60E+02	8.89E+02	6.38E+02	9.25E+02	9.25E+02
4. Average batch release duration	minutes	4.15E+02	4.47E+02	4.78E+02	5.48E+02	4.64E+02
5. Minimum batch release duration	minutes	2.45E+02	2.65E+02	3.16E+02	3.65E+02	2.45E+02

**5.2.2 VEGP Unit 4**

	Units	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Annual
1. Number of Batch Releases		17	31	63	22	133
2. Total duration of batch releases	minutes	7.47E+03	1.28E+04	2.57E+04	9.58E+03	5.56E+04
3. Maximum batch release duration	minutes	5.93E+02	1.27E+03	7.33E+02	7.63E+02	1.27E+03
4. Average batch release duration	minutes	4.39E+02	4.14E+02	4.08E+02	4.35E+02	4.18E+02
5. Minimum batch release duration	minutes	3.14E+02	2.83E+02	2.62E+02	2.79E+02	2.62E+02

**Company: Southern Nuclear****Plant: Vogtle Electric Generating Plant 3&4****5.3 Abnormal Releases****5.3.1 Gaseous Abnormal Releases**

1. VEGP Unit 3

None

2. VEGP Unit 4

None

**5.3.2 Liquid Abnormal Releases**

1. VEGP Unit 3

None

2. VEGP Unit 4

None

**5.4 Land Use Census Changes**

There were no critical receptor changes affecting the environmental monitoring program such as receptor, receptor locations, sample media changes or availability, and routes of exposure.

**5.5 Meteorological Data**

Per VEGP Units 3 and 4 ODCM, Section 6.7.3.b:

In lieu of submission with the Radioactive Effluent Release Report, the licensee has the option of retaining this summary of required meteorological data on site in a file that shall be provided to the NRC upon request.

Meteorological data accumulation was greater than 96% for all variables required by Regulatory Guide 1.23. At least 90% of data recovery is required by the Regulatory Guide.

**5.6 Effluent Radiation Monitors Out of Service Greater Than 30 Days**

ODCM, Section 6.2.2.d.2 and 6.3.2.c.3 states in part that the Annual Radioactive Effluent Release Report shall include deviations from the liquid and gaseous effluent monitoring instrumentation functionality. The report must also include an explanation as to why the inoperability was not corrected in a timely manner.

1. VEGP Unit 3

- a. 3-LCO-25-0140 - WWS-FT502A/B Wastewater Retention Basin .  
Declared Out of Service on 7/13/2025 and remained OOS into 2026.

Annual Radioactive Effluent Release Report	YEAR: 2025	Page 20 of 58
<b>Company: Southern Nuclear</b>	<b>Plant: Vogtle Electric Generating Plant 3&amp;4</b>	

Missed surveillance for WWS-FT502A/B. Discovered that a Surveillance was not performed within its specified frequency. while performing a review for PMCR 109706 for changing the methodology for performing a channel calibration on 3-WWS-FT502 (TRANSFER PUMP A DISCH FLOW 502A/B), the Chemistry Supervisor questioned the validity of an actual or partial completion for this associated Surveillance. After expanding the team to an I&C Supervisor, it was determined that only a partial completion was logged for SNC 1775468/1775469 and the deferred late date of 7/13/2025 had expired. Since not performed within this periodicity, both instruments were NON-FUNCTIONAL and ODCM action 40 were implemented. (CR11195676).

- b. 3-LCO-25-0226 - 3-WWS-FT509 Raw Water Dilution Flow Transmitter Declared Out of Service on 10/06/2025 and remained OOS into 2026.

During the performance of WO SNC2725949 for (18M) WWS-3-WWS-FT509 - CHANNEL CALIBRATION, it was identified that the Flow Transmitter will need to be replaced due to not being able to be calibrated. (CR11217759)

2. VEGP Unit 4

- a. 4-LCO-25-0184 – Noble Gas Monitor TDS-JERE001A Turbine Island Vent Discharge Rad Monitor Declared Out of Service on 09/24/2025 and remained OOS into 2026.

ODCM Att 6 4-TDS-RY001 Detector failure, needs detector replacement. (CR11208268)

- b. 4-LCO-25-0246 - WWS-RY021 Wastewater Discharge Rad monitor Declared Out of Service on 10/12/2025 and remained OOS into 2026.

Unit 4 turbine building sumps OOS, 4-WWS-RY021 is bypassed. Enter ODCM Action Statement 38 for flow bypassing 4-WWS-RY021. (SNC2891318)

- c. 4-LCO-25-0103 - 4-WLS-RY-229 Liquid Radwaste Discharge Rad Monitor Declared Out of Service on 05/22/2025 and remained OOS into 2026.

OOS for more than 30 days due to hot water monitor tank releases and contaminated demin water flush lines. Could not get background back to baseline. (CR11178582)

**5.7 Offsite Dose Calculation Manual (ODCM) Changes**

ODCM 6.7.4 states in part that Changes will be documented in the Site's Annual Radioactive Effluent Release Report for the period in which the changes were implemented. There were no changes to the ODCM in 2025.

**Company: Southern Nuclear****Plant: Vogtle Electric Generating Plant 3&4****5.8 Process Control Program (PCP) Changes**

PCP 3.2.2 states changes will be sent to the NRC. Changes will be documented in the Site's Annual Radioactive Effluent Release Report for the period in which the changes were implemented for Vogtle 3 and 4. There were no changes to the PCP in 2025.

**5.9 Radioactive Waste Treatment System Changes**

There were no changes or modifications affecting any portion of the gaseous radioactive waste treatment system, the ventilation exhaust treatment system, or the liquid radioactive waste treatment in 2025.

**6.0 OTHER SUPPLEMENTAL INFORMATION**

None.

**6.1 Temporary Outside Tanks**

In 2025 VEGP did not utilize temporary outside tanks to hold radioactive materials more than 10 Curies. This requirement does not apply to tritium.

**6.2 Independent Spent Fuel Storage Installation (ISFSI) Monitoring Program**

In 2025 VEGP 3&4 did not utilize any ISFSI storage.

**6.3 Carbon-14**

Carbon-14 (C-14) is a naturally occurring radionuclide with a 5730-year half-life. Nuclear weapons testing in the 1950s and 1960s significantly increased the amount of C-14 in the atmosphere. Nuclear power plants also produce C-14, but the amount is infinitesimal compared to what has been distributed in the environment due to weapons testing and what is produced by natural cosmic ray interactions.

In accordance with Regulatory Guide 1.21, "Measuring, Evaluating, and Reporting Radioactive Material in Liquid and Gaseous Effluents and Solid Waste," the NRC recommended re-evaluating "principal radionuclides" and reporting C-14 as appropriate. Carbon-14 production and release estimates were calculated using EPRI Report 1021106, "Estimation of Carbon-14 in Nuclear Plant Gaseous Effluents". This calculation uses active core coolant mass, average neutron flux by energy and reactor coolant nitrogen concentrations to determine Carbon-14 generation based upon an effective full power year. The generation and release of C-14 for Vogtle Unit 3 and Vogtle Unit 4 for 2025 was 11.02 curies and 9.60, respectively for a total of 20.62 curies. Of that total only 30% or 6.19 curies are available for absorption via photosynthesis of  $^{14}\text{CO}_2$ .

Public dose estimates were performed using methodology from the ODCM which is based on Regulatory Guide 1.109 [7] methodology. Carbon-14 is the highest dose contributor of all radionuclides released in gaseous effluents. The annual dose resulting from Carbon-14 releases in gaseous effluents is estimated to be 8.40E-02 mrem to the child total body and 4.21E-01 mrem to the child bone for both units.

## **6.4 Corrections to Previous Reports**

### **6.4.1 2024 ARERR**

1. An administrative error caused the report year to state 2023. The report year should have been stated as 2024.
2. An administrative error occurred in which the radioactive effluent tracking program was not updated with all available monthly and quarterly composite data before the 2024 ARERR was finalized, resulting in the report being published without the full set of results. (CR11209197)
3. A complete review of the text and data tables were made. The incorrect values were lined out (e.g. ~~3.40E-08~~) and the revised number inserted in Red (e.g. **4.16E-08**).
4. The revised pages can be found in Attachment 4, ERRATA of Previous Reports.

## **7.0 The following pages were revised. NEI 07-07 ONSITE RADIOLOGICAL GROUNDWATER MONITORING PROGRAM**

Vogtle Electric Generating Plant 3&4 has developed a Groundwater Protection Initiative (GPI) program in accordance with NEI 07-07, Industry Ground Water Protection Initiative – Final Guidance Document. The purpose of the GPI is to ensure timely detection and an effective response to situations involving inadvertent radiological releases to groundwater to prevent migration of licensed radioactive material off-site and to quantify impacts on decommissioning. The summary of results of 2025, VEGP is located in Attachment 3, NEI-07-07 Onsite Radiological Groundwater Monitoring Program on page 40.

## **8.0 VOLUNTARY NOTIFICATION**

During 2025, Vogtle Electric Generating Plant 3&4 did not make any voluntary NEI 07-07 notification to State/Local officials, NRC, and to other stakeholders required by site procedures.

Annual Radioactive Effluent Release Report	YEAR: 2025	Page 23 of 58
<b>Company: Southern Nuclear</b>	<b>Plant: Vogtle Electric Generating Plant 3&amp;4</b>	

## 9.0 BIBLIOGRAPHY

- [1] Nuclear Regulatory Commission, 30 June 2015. [Online]. Available: <http://www.nrc.gov/reading-rm/basic-ref/students/animated-pwr.html>. [Accessed October 2020].
- [2] Nuclear Regulatory Commission, 25 June 2015. [Online]. Available: <http://www.nrc.gov/reading-rm/basic-ref/students/animated-bwr.html>. [Accessed October 2020].
- [3] "NCRP Report No. 160 - Ionizing Radiation Exposure of the Population of the United States," National Council on Radiation Protection and Measurements, Bethesda, MD, 2009.
- [4] Health Physics Society, [Online]. Available: <http://hps.org/hpspublications/radiationfactsheets.html>. [Accessed 2020].
- [5] "NRC Resource Page," [Online]. Available: <http://www.nrc.gov/about-nrc/radiation.html>. [Accessed 10 November 2020].
- [6] "Japan Atomic Energy Agency," 06 November 2020. [Online]. Available: [https://www.jaea.go.jp/english/04/ntokai/houkan/houkan\\_02.html](https://www.jaea.go.jp/english/04/ntokai/houkan/houkan_02.html).
- [7] "Regulatory Guide 1.109 - Calculation of Annual Doses to Man from Routine Releases of Reactor Effluents for the Purpose of Demonstrating Compliance with 10 CFR Part 50, Appendix I," Nuclear Regulatory Commission, October, 1977.
- [8] "NUREG-0133 - Preparation of Effluent Technical Specifications for Nuclear Power Plants," Nuclear Regulatory Commission, 1987.
- [9] "10 CFR 50 - Domestic Licensing of Production and Utilization Facilities," US Nuclear Regulatory Commission, Washington, DC.
- [10] "40 CFR 190 - Environmental Radiation Protection Standards for Nuclear Power Operation," US Environmental Protection Agency, Washington, DC.
- [11] "10 CFR 20 - Standards for Protection Against Radiation," US Nuclear Regulatory Commission, Washington, DC.
- [12] "NEI 07-07 - Industry Ground Water Protection Initiative — Final Guidance Document, Rev. 1," Nuclear Energy Institute, Washington, D.C., 2019.
- [13] "40 CFR 141 - National Primary Drinking Water Regulations," US Environmental Protection Agency, Washington, DC.
- [14] "NUREG-0324 - XOQDOQ, Program for the Meteorological Evaluation of Routine Effluent Releases at Nuclear Power Stations," Nuclear Regulatory Commission, September, 1977.
- [15] "NUREG-1301 - Offsite Dose Calculation Manual Guidance: Standard Radiological Effluent Controls for Pressurized Water Reactors," Nuclear Regulatory Commission, April 1991.
- [16] "NUREG-1302 - Offsite Dose Calculation Manual Guidance: Standard Radiological Effluent Controls for Boiling Water Reactors," Nuclear Regulatory Commission, April 1991.
- [17] "Regulatory Guide 4.13 - Performance, Testing, and Procedural Specifications for Thermoluminescence Dosimetry: Environmental Applications, Revision 2," Nuclear Regulatory Commission, June, 2019.
- [18] "Regulatory Guide 4.15 - Quality Assurance for Radiological Monitoring Programs (Inception through Normal Operations to License Termination) -- Effluent Streams and the Environment," Nuclear Regulatory Commission, July, 2007.
- [19] 40CFR190 - ENVIRONMENTAL RADIATION PROTECTION STANDARDS FOR NUCLEAR POWER OPERATIONS, EPA, 1979.
- [20] 10CFR72.104.

Annual Radioactive Effluent Release Report	YEAR: 2025	Page 24 of 58
<b>Company: Southern Nuclear</b>	<b>Plant: Vogtle Electric Generating Plant 3&amp;4</b>	

[21] "Regulatory Guide 4.13, Performance, Testing, and Procedural Specifications for Thermoluminescence Dosimetry: Environmental Applications, Revision 2," Nuclear Regulatory Commission, June, 2019.

**Attachment 1, ARERR Release Summary Tables (RG-1.21 Tables)**

**1.0 GASEOUS EFFLUENTS**

**Table 5, Gaseous Effluents Summation of All Releases (Vogtle Unit 3)<sup>1</sup>**

A. Fission & Activation Gases	Unit	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Annual	Est. Total Error %
1. Total Release	Ci	3.13E-01	6.04E-01	4.91E-01	4.04E-01	1.81E+00	26.5
2. Average release rate for the period	μCi/sec	4.03E-02	7.68E-02	6.18E-02	5.08E-02	5.75E-02	
<b>B. Iodine and Halogens</b>							
1. Total Release	Ci	1.49E-03	1.08E-03	2.70E-06	N/D	2.56E-03	55
2. Average release rate for the period	μCi/sec	1.91E-04	1.37E-04	3.40E-07	N/A	8.13E-05	
<b>C. Particulates</b>							
1. Total Release	Ci	2.09E-06	2.45E-06	1.98E-07	3.48E-06	8.22E-06	54
2. Average release rate for the period	μCi/sec	2.69E-07	3.12E-07	2.49E-08	4.38E-07	2.61E-07	
<b>D. Tritium</b>							
1. Total Release	Ci	2.95E+00	4.91E+00	4.92E-01	1.18E+01	2.01E+01	20
2. Average release rate for the period	μCi/sec	3.80E-01	6.24E-01	6.19E-02	1.48E+00	6.38E-01	
<b>E. Gross Alpha</b>							
1. Total Release	Ci	4.47E-07	5.37E-07	8.10E-07	4.38E-07	2.23E-06	55
2. Average release rate for the period	μCi/sec	5.74E-08	6.83E-08	1.02E-07	5.51E-08	7.07E-08	
<b>F. Carbon-14</b>							
1. Total Release	Ci	2.79E+00	2.51E+00	2.86E+00	2.86E+00	1.10E+01	
2. Average release rate for the period	μCi/sec	3.59E-01	3.20E-01	3.59E-01	3.59E-01	3.49E-01	

<sup>1</sup> % of limit is on Table 1, Alvin W. Vogtle Generating Plant (Unit 3) Dose Summary

**Attachment 1, ARERR Release Summary Tables (RG-1.21 Tables)**

**Table 6, Gaseous Effluents – Ground Level Release Batch Mode (Vogtle Unit 3)**

Radionuclide Released	Unit	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Total for year
<b>Fission Gases</b>						
Ar-41	Ci	3.13E-01	6.04E-01	4.91E-01	4.04E-01	1.81E+00
Xe-133	Ci	6.32E-04	N/D	N/D	N/D	6.32E-04
	Ci					
	Ci					
<b>Total for Period</b>	<b>Ci</b>	<b>3.13E-01</b>	<b>6.04E-01</b>	<b>4.91E-01</b>	<b>4.04E-01</b>	<b>1.81E+00</b>
<b>Iodines</b>						
None	Ci	N/D	N/D	N/D	N/D	N/D
	Ci					
<b>Total for Period</b>	<b>Ci</b>	<b>N/D</b>	<b>N/D</b>	<b>N/D</b>	<b>N/D</b>	<b>N/D</b>
<b>Particulates</b>						
None	Ci	N/D	N/D	N/D	N/D	N/D
<b>Total for Period</b>	<b>Ci</b>	<b>N/D</b>	<b>N/D</b>	<b>N/D</b>	<b>N/D</b>	<b>N/D</b>
<b>Tritium</b>						
H-3	Ci	9.80E-02	2.21E-02	2.06E-02	4.72E-03	1.45E-01
<b>Gross Alpha</b>						
Alpha	Ci	N/D	N/D	N/D	N/D	N/D
<b>Carbon-14</b>						
C-14	Ci	N/A	N/A	N/A	N/A	N/A

**Attachment 1, ARERR Release Summary Tables (RG-1.21 Tables)**

**Table 7, Gaseous Effluents – Ground Level Release Continuous Mode (Vogtle Unit 3)**

Radionuclide Released	Unit	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Total for year
<b>Fission Gases</b>						
None	Ci	N/D	N/D	N/D	N/D	N/D
<b>Total for Period</b>	<b>Ci</b>	<b>N/D</b>	<b>N/D</b>	<b>N/D</b>	<b>N/D</b>	<b>N/D</b>
<b>Iodines</b>						
I-131	Ci	9.55E-04	7.21E-04	6.06E-07	N/D	1.68E-03
I-133	Ci	5.30E-04	3.55E-04	2.10E-06	N/D	8.88E-04
<b>Total for Period</b>	<b>Ci</b>	<b>1.49E-03</b>	<b>1.08E-03</b>	<b>2.70E-06</b>	<b>N/D</b>	<b>2.56E-03</b>
<b>Particulates</b>						
Be-7	Ci	1.05E-06	N/D	N/D	N/D	1.05E-06
Co-58	Ci	1.04E-06	2.45E-06	N/D	3.13E-06	6.63E-06
Sr-89	Ci	N/D	N/D	1.98E-07	3.48E-07	5.46E-07
<b>Total for Period</b>	<b>Ci</b>	<b>2.09E-06</b>	<b>2.45E-06</b>	<b>1.98E-07</b>	<b>3.48E-06</b>	<b>8.22E-06</b>
<b>Tritium</b>						
H-3	Ci	2.85E+00	4.89E+00	4.71E-01	1.18E+01	2.00E+01
<b>Gross Alpha</b>						
Alpha	Ci	4.47E-07	5.37E-07	8.10E-07	4.38E-07	2.23E-06
<b>Carbon-14</b>						
C-14	Ci	2.79E+00	2.51E+00	2.86E+00	2.86E+00	1.10E+01

**Attachment 1, ARERR Release Summary Tables (RG-1.21 Tables)**

**Table 8, Gaseous Effluents Summation of All Releases (Vogtle Unit 4)<sup>1</sup>**

A. Fission & Activation Gases	Unit	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Annual	Est. Total Error %
1. Total Release	Ci	6.92E-01	5.70E-02	2.08E+01	2.60E-02	2.15E+01	26.5
2. Average release rate for the period	μCi/sec	8.89E-02	7.25E-03	2.61E+00	3.27E-03	6.83E-01	
<b>B. Iodine and Halogens</b>							
1. Total Release	Ci	N/D	4.48E-06	1.27E-02	1.00E-05	1.27E-02	55
2. Average release rate for the period	μCi/sec	N/A	5.70E-07	1.60E-03	1.26E-06	4.03E-04	
<b>C. Particulates</b>							
1. Total Release	Ci	1.10E-05	8.13E-05	2.06E-04	8.98E-05	3.88E-04	54
2. Average release rate for the period	μCi/sec	1.41E-06	1.03E-05	2.59E-05	1.13E-05	1.23E-05	
<b>D. Tritium</b>							
1. Total Release	Ci	8.08E-02	6.26E+00	7.01E-01	1.08E+01	1.79E+01	20
2. Average release rate for the period	μCi/sec	1.04E-02	7.97E-01	8.81E-02	1.36E+00	5.67E-01	
<b>E. Gross Alpha</b>							
1. Total Release	Ci	3.55E-07	2.41E-07	1.80E-07	N/D	7.76E-07	55
2. Average release rate for the period	μCi/sec	4.56E-08	3.07E-08	2.27E-08	N/A	2.46E-08	
<b>F. Carbon-14</b>							
1. Total Release	Ci	2.55E+00	2.25E+00	2.14E+00	2.67E+00	9.60E+00	
2. Average release rate for the period	μCi/sec	3.27E-01	2.86E-01	2.69E-01	3.36E-01	3.05E-01	

<sup>1</sup> % of limit is on Table 2, Alvin W. Vogtle Generating Plant (Unit 4) Dose Summary

**Attachment 1, ARERR Release Summary Tables (RG-1.21 Tables)**

**Table 9, Gaseous Effluents – Ground Level Release Batch Mode (Vogtle Unit 4)**

Radionuclide Released	Unit	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Total for year
<b>Fission Gases</b>						
Ar-41	Ci	6.92E-01	5.70E-02	1.96E-01	2.60E-02	9.70E-01
Xe-133	Ci	N/D	N/D	2.25E-02	N/D	2.25E-02
Xe-135	Ci	N/D	N/D	1.27E-02	N/D	1.27E-02
Total for Period	Ci	<b>6.92E-01</b>	<b>5.70E-02</b>	<b>2.31E-01</b>	<b>2.60E-02</b>	<b>1.01E+00</b>
<b>Iodines</b>						
None	Ci	N/D	N/D	N/D	N/D	N/D
Total for Period	Ci	<b>N/D</b>	<b>N/D</b>	<b>N/D</b>	<b>N/D</b>	<b>N/D</b>
<b>Particulates</b>						
None	Ci	N/D	N/D	N/D	N/D	N/D
Total for Period	Ci	<b>N/D</b>	<b>N/D</b>	<b>N/D</b>	<b>N/D</b>	<b>N/D</b>
<b>Tritium</b>						
H-3	Ci	8.08E-02	6.48E-03	7.01E-01	1.13E-03	7.89E-01
<b>Gross Alpha</b>						
Alpha	Ci	N/D	N/D	N/D	N/D	N/D
<b>Carbon-14</b>						
C-14	Ci	N/A	N/A	N/A	N/A	N/A

Company: Southern Nuclear

Plant: Vogtle Electric Generating Plant 3&amp;4

## Attachment 1, ARERR Release Summary Tables (RG-1.21 Tables)

Table 10, Gaseous Effluents – Ground Level Release Continuous Mode (Vogtle Unit 4)

Radionuclide Released	Unit	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Total for year
<b>Fission Gases</b>						
Ar-41	Ci	N/D	N/D	2.05E+01	N/D	2.05E+01
	Ci					
<b>Total for Period</b>	<b>Ci</b>	<b>N/D</b>	<b>N/D</b>	<b>2.05E+01</b>	<b>N/D</b>	<b>2.05E+01</b>
<b>Iodines</b>						
I-131	Ci	N/D	N/D	1.32E-04	1.37E-06	1.33E-04
I-132	Ci	N/D	N/D	1.26E-02	N/D	1.26E-02
I-133	Ci	N/D	4.48E-06	4.81E-06	8.68E-06	1.80E-05
	Ci					
<b>Total for Period</b>	<b>Ci</b>	<b>N/D</b>	<b>4.48E-06</b>	<b>1.27E-02</b>	<b>1.01E-05</b>	<b>1.27E-02</b>
<b>Particulates</b>						
Cr-51	Ci	N/D	N/D	1.17E-05	7.57E-06	1.92E-05
Mn-54	Ci	N/D	N/D	4.26E-07	N/D	4.26E-07
Fe-59	Ci	N/D	N/D	N/D	9.13E-07	9.13E-07
Co-58	Ci	1.10E-05	8.13E-05	1.64E-04	7.26E-05	3.29E-04
Co-60	Ci	N/D	N/D	6.89E-06	3.05E-06	9.94E-06
Sr-89	Ci	N/D	N/D	3.30E-07	8.91E-07	1.22E-06
Zr-95	Ci	N/D	N/D	3.01E-06	1.44E-06	4.45E-06
Nb-95	Ci	N/D	N/D	1.10E-05	3.33E-06	1.44E-05
Cd-109	Ci	N/D	N/D	8.86E-06	N/D	8.86E-06
	Ci					
<b>Total for Period</b>	<b>Ci</b>	<b>1.10E-05</b>	<b>8.13E-05</b>	<b>2.06E-04</b>	<b>8.98E-05</b>	<b>3.88E-04</b>
<b>Tritium</b>						
H-3	Ci	N/D	6.26E+00	N/D	1.08E+01	1.71E+01
<b>Gross Alpha</b>						
Alpha	Ci	3.55E-07	2.41E-07	1.80E-07	N/D	7.76E-07
<b>Carbon-14</b>						
C-14	Ci	2.55E+00	2.25E+00	2.14E+00	2.67E+00	9.60E+00

**Attachment 1, ARERR Release Summary Tables (RG-1.21 Tables)**

**2.0 LIQUID EFFLUENTS**

**Table 11, Liquid Effluents – Summation of All Releases (Vogtle Unit 3) <sup>1</sup>**

A. Fission & Activation Products	Unit	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Annual	Est. Total Error %
1. Total Release	Ci	2.04E-02	1.72E-02	1.95E-02	1.45E-02	7.18E-02	24.5
2. Average diluted concentration	µCi/mL	3.61E-08	2.88E-08	4.44E-08	5.01E-08	3.80E-08	
<b>B. Tritium</b>							
1. Total Release	Ci	1.96E+02	1.96E+02	1.61E+02	1.66E+02	7.18E+02	24.5
2. Average diluted concentration	µCi/mL	3.48E-04	3.28E-04	3.66E-04	5.73E-04	3.80E-04	
<b>C. Dissolved &amp; Entrained Gases</b>							
1. Total Release	Ci	8.84E-04	1.82E-03	9.19E-04	8.95E-04	4.52E-03	30.
2. Average diluted concentration	µCi/mL	1.57E-09	3.05E-09	2.09E-09	3.10E-09	2.39E-09	
<b>D. Gross Alpha Activity</b>							
1. Total Release	Ci	N/D	N/D	N/D	N/D	N/D	24.5
2. Average diluted concentration	µCi/mL	N/A	N/A	N/A	N/A	N/A	
<b>E. Volume of Waste Released (prior to dilution)</b>							
	Liters	8.93E+05	9.43E+05	9.44E+05	5.81E+05	3.36E+06	
<b>F. Volume of Dilution Water Used During Period</b>							
	Liters	5.63E+08	5.98E+08	4.38E+08	2.88E+08	1.89E+09	

<sup>1</sup> Percent of limit is on Table 1, Alvin W. Vogtle Generating Plant (Unit 3) Dose Summary

Company: Southern Nuclear

Plant: Vogtle Electric Generating Plant 3&amp;4

## Attachment 1, ARERR Release Summary Tables (RG-1.21 Tables)

Table 12, Batch Mode Liquid Effluents (Vogtle Unit 3)

Radionuclide Released	Unit	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Total for Year
<b>Fission &amp; Activation Products</b>						
Be-7	Ci	2.23E-03	2.84E-03	5.48E-04	7.18E-05	5.69E-03
Cr-51	Ci	8.79E-05	3.43E-04	8.04E-05	N/D	5.11E-04
Mn-54	Ci	8.83E-05	3.93E-04	5.07E-04	6.95E-05	1.06E-03
Fe-55	Ci	8.13E-03	2.96E-03	7.24E-03	7.42E-03	2.57E-02
Fe-59	Ci	2.84E-04	3.16E-04	5.06E-04	1.64E-04	1.27E-03
Co-57	Ci	2.38E-06	1.91E-05	2.41E-05	N/D	4.56E-05
Co-58	Ci	4.76E-03	5.81E-03	6.58E-03	4.32E-03	2.15E-02
Co-60	Ci	3.92E-04	1.47E-03	2.04E-03	7.62E-04	4.67E-03
Ni-63	Ci	1.07E-03	1.80E-04	5.98E-04	5.65E-04	2.41E-03
Ni-56	Ci	3.75E-06	N/D	N/D	N/D	3.75E-06
Zn-65	Ci	N/D	1.98E-05	3.50E-06	N/D	2.33E-05
As-76	Ci	N/D	3.87E-05	N/D	N/D	3.87E-05
Sr-89	Ci	2.62E-05	N/D	2.62E-05	3.39E-05	8.63E-05
Y-91m	Ci	2.53E-05	N/D	N/D	N/D	2.53E-05
Zr-95	Ci	1.86E-04	5.03E-04	4.52E-04	1.41E-05	1.16E-03
Nb-95	Ci	4.23E-04	1.04E-03	9.35E-04	9.40E-05	2.50E-03
Nb-97	Ci	N/D	1.06E-05	1.05E-05	N/D	2.10E-05
Mo-99	Ci	1.48E-04	N/D	N/D	N/D	1.48E-04
Tc-99m	Ci	3.04E-05	N/D	N/D	N/D	3.04E-05
Sn-113	Ci	N/D	2.58E-05	4.24E-05	N/D	6.82E-05
Sn-117m	Ci	6.32E-06	N/D	N/D	N/D	6.32E-06
Sb-124	Ci	2.80E-05	N/D	N/D	N/D	2.80E-05
I-131	Ci	2.03E-03	1.13E-03	5.37E-05	1.32E-05	3.22E-03
I-133	Ci	3.70E-05	3.65E-05	N/D	N/D	7.35E-05
La-140	Ci	6.65E-05	8.20E-05	5.90E-05	9.22E-04	1.13E-03
W-187	Ci	3.32E-04	N/D	N/D	N/D	3.32E-04
	Ci					
<b>Total for Period</b>	<b>Ci</b>	<b>2.04E-02</b>	<b>1.72E-02</b>	<b>1.97E-02</b>	<b>1.45E-02</b>	<b>7.18E-02</b>
<b>Tritium</b>						
<b>H-3</b>	<b>Ci</b>	<b>1.96E+02</b>	<b>1.96E+02</b>	<b>1.61E+02</b>	<b>1.66E+02</b>	<b>7.18E+02</b>
<b>Entrained Gases</b>						
Xe-133	Ci	8.84E-04	1.71E-03	8.74E-04	8.92E-04	4.35E-03
Xe-135	Ci	N/D	1.19E-04	4.47E-05	3.84E-06	1.67E-04
	Ci					
<b>Total for Period</b>	<b>Ci</b>	<b>8.84E-04</b>	<b>1.82E-03</b>	<b>9.19E-04</b>	<b>8.95E-04</b>	<b>4.52E-03</b>
<b>Gross Alpha</b>						
<b>G. Alpha</b>	<b>Ci</b>	<b>N/D</b>	<b>N/D</b>	<b>N/D</b>	<b>N/D</b>	<b>N/D</b>

**Attachment 1, ARERR Release Summary Tables (RG-1.21 Tables)**

**Table 13, Continuous Mode Liquid Effluents (Vogtle Unit 3)**

Radionuclide Released	Unit	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Total for Year
<b>Fission &amp; Activation Products</b>						
None	Ci	N/D	N/D	N/D	N/D	N/D
	Ci					
<b>Total for Period</b>	<b>Ci</b>	<b>N/D</b>	<b>N/D</b>	<b>N/D</b>	<b>N/D</b>	<b>N/D</b>
<b>Tritium</b>						
<b>H-3</b>	<b>Ci</b>	<b>N/D</b>	<b>N/D</b>	<b>N/D</b>	<b>N/D</b>	<b>N/D</b>
<b>Entrained Gases</b>						
None	Ci	N/D	N/D	N/D	N/D	N/D
<b>Total for Period</b>	<b>Ci</b>	<b>N/D</b>	<b>N/D</b>	<b>N/D</b>	<b>N/D</b>	<b>N/D</b>
<b>Gross Alpha</b>						
<b>Gross Alpha</b>	<b>Ci</b>	<b>N/D</b>	<b>N/D</b>	<b>N/D</b>	<b>N/D</b>	<b>N/D</b>

**Attachment 1, ARERR Release Summary Tables (RG-1.21 Tables)**

**Table 14, Liquid Effluents – Summation of All Releases (Vogtle Unit 4) <sup>1</sup>**

A. Fission & Activation Products	Unit	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Annual	Est. Total Error %
1. Total Release	Ci	5.00E-03	2.90E-02	2.05E-02	2.20E-02	7.65E-02	24.5
2. Average diluted concentration	µCi/mL	9.47E-09	3.54E-08	1.13E-08	6.12E-08	2.17E-08	
<b>B. Tritium</b>							
1. Total Release	Ci	1.92E+02	9.61E+01	1.03E+02	1.51E+02	5.43E+02	24.5
2. Average diluted concentration	µCi/mL	3.64E-04	1.17E-04	5.68E-05	4.21E-04	1.54E-04	
<b>C. Dissolved &amp; Entrained Gases</b>							
1. Total Release	Ci	2.71E-03	3.94E-03	4.24E-02	4.42E-05	4.91E-02	30
2. Average diluted concentration	µCi/mL	5.13E-09	4.81E-09	2.33E-08	1.23E-10	1.39E-08	
<b>D. Gross Alpha Activity</b>							
1. Total Release	Ci	N/D	N/D	N/D	N/D	N/D	24.5
2. Average diluted concentration	µCi/mL	N/A	N/A	N/A	N/A	N/A	
<b>E. Volume of Waste Released (prior to dilution)</b>							
	Liters	8.09E+05	1.48E+06	3.04E+06	1.06E+06	6.39E+06	
<b>F. Volume of Dilution Water Used During Period</b>							
	Liters	5.27E+08	8.18E+08	1.82E+09	3.58E+08	3.52E+09	

<sup>1</sup> Percent of limit is on Table 2, Alvin W. Vogtle Generating Plant (Unit 4) Dose Summary

Company: Southern Nuclear

Plant: Vogtle Electric Generating Plant 3&amp;4

## Attachment 1, ARERR Release Summary Tables (RG-1.21 Tables)

Table 15, Batch Mode Liquid Effluents (Vogtle Unit 4)

Radionuclide Released	Unit	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Total for Year
<b>Fission &amp; Activation Products</b>						
Cr-51	Ci	N/D	8.60E-04	1.75E-03	1.77E-03	4.38E-03
Mn-54	Ci	6.90E-06	8.04E-05	5.54E-05	1.25E-04	2.68E-04
Fe-55	Ci	4.34E-04	4.34E-04	2.50E-03	6.91E-03	1.03E-02
Fe-59	Ci	2.56E-05	3.57E-04	6.24E-04	4.93E-04	1.50E-03
Co-57	Ci	N/D	2.14E-05	3.13E-06	1.23E-05	3.68E-05
Co-58	Ci	4.03E-03	2.48E-02	1.32E-02	8.60E-03	5.06E-02
Co-60	Ci	1.66E-04	6.53E-04	5.01E-04	7.57E-04	2.08E-03
Ni-63	Ci	6.88E-05	N/D	2.75E-04	9.92E-04	1.34E-03
Ni-56	Ci	N/D	N/D	1.48E-05	6.72E-06	2.15E-05
Zn-65	Ci	7.07E-05	N/D	N/D	N/D	7.07E-05
As-76	Ci	N/D	N/D	1.64E-04	N/D	1.64E-04
Zr-95	Ci	2.26E-05	6.24E-04	4.96E-04	7.96E-04	1.94E-03
Nb-95	Ci	1.75E-04	1.09E-03	9.01E-04	1.43E-03	3.60E-03
Nb-97	Ci	N/D	N/D	N/D	1.53E-05	1.53E-05
Sn-113	Ci	N/D	6.68E-06	N/D	2.56E-05	3.23E-05
Sn-117m	Ci	N/D	N/D	1.33E-05	4.39E-05	5.72E-05
Te-132	Ci	N/D	N/D	1.02E-05	N/D	1.02E-05
I-131	Ci	N/D	N/D	4.07E-05	N/D	4.07E-05
La-140	Ci	7.15E-08	N/D	2.20E-05	N/D	2.21E-05
Rh-105	Ci	N/D	6.11E-05	N/D	N/D	6.11E-05
<b>Total for Period</b>	<b>Ci</b>	<b>5.00E-03</b>	<b>2.90E-02</b>	<b>2.05E-02</b>	<b>2.20E-02</b>	<b>7.65E-02</b>
<b>Tritium</b>						
<b>H-3</b>	<b>Ci</b>	<b>1.92E+02</b>	<b>9.61E+01</b>	<b>1.03E+02</b>	<b>1.51E+02</b>	<b>5.43E+02</b>
<b>Entrained Gases</b>						
Ar-41	Ci	N/D	N/D	5.22E-05	N/D	5.22E-05
Kr-85m	Ci	N/D	N/D	6.13E-06	N/D	6.13E-06
Xe-133m	Ci	2.31E-05	N/D	3.45E-04	N/D	3.69E-04
Xe-133	Ci	2.56E-03	3.76E-03	4.06E-02	4.42E-05	4.70E-02
Xe-135	Ci	1.23E-04	1.76E-04	1.37E-03	N/D	1.67E-03
	Ci					
<b>Total for Period</b>	<b>Ci</b>	<b>2.71E-03</b>	<b>3.94E-03</b>	<b>4.24E-02</b>	<b>4.42E-05</b>	<b>4.91E-02</b>
<b>Gross Alpha</b>						
<b>G. Alpha</b>	<b>Ci</b>	<b>N/D</b>	<b>N/D</b>	<b>N/D</b>	<b>N/D</b>	<b>N/D</b>

**Attachment 1, ARERR Release Summary Tables (RG-1.21 Tables)**

Table 16, Continuous Mode Liquid Effluents (Vogtle Unit 4)

Radionuclide Released		Quarter 1	Quarter 2	Quarter 3	Quarter 4	Total for Year
<b>Fission &amp; Activation Products</b>						
None	Ci	N/D	N/D	N/D	N/D	N/D
<b>Total for Period</b>	<b>Ci</b>	<b>N/D</b>	<b>N/D</b>	<b>N/D</b>	<b>N/D</b>	<b>N/D</b>
<b>Tritium</b>						
H-3	Ci	N/D	N/D	N/D	N/D	N/D
<b>Entrained Gases</b>						
None	Ci	N/D	N/D	N/D	N/D	N/D
<b>Total for Period</b>	<b>Ci</b>	<b>N/D</b>	<b>N/D</b>	<b>N/D</b>	<b>N/D</b>	<b>N/D</b>
<b>Gross Alpha</b>						
G. Alpha	Ci	N/D	N/D	N/D	N/D	N/D

**Attachment 2, Solid Waste Information**

**1.0 SOLID WASTE SHIPPED OFFSITE FOR BURIAL OR DISPOSAL (NOT IRRADIATED FUEL)**

Table 17, Types of Solid Waste Summary (Vogtle Unit 3 and Unit 4)

Type of Waste – NRC Waste Class A	Total Quantity (m <sup>3</sup> )	Total Activity (Ci)	Est. Total Error (%)
a. Spent resins, filter sludges, evaporator bottoms, etc.	1.36E+01	8.09E+00	10
b. Dry compressible waste, contaminated equip, etc.	2.70E+02	1.36E+00	25
c. Irradiated components, control rods, etc.		N/A	N/A
d. Control Rod Drive Filters		N/A	N/A
d. Other (describe)		N/A	N/A
<b>Total</b>	<b>2.84E+02</b>	<b>9.45E+00</b>	
Type of Waste – NRC Waste Class B	Total Quantity (m <sup>3</sup> )	Total Activity (Ci)	Est. Total Error (%)
a. Spent resins, filter sludges, evaporator bottoms, etc.	N/A	N/A	10
b. Dry compressible waste, contaminated equip, etc.	N/A	N/A	N/A
c. Irradiated components, control rods, etc.	N/A	N/A	N/A
d. Control Rod Drive Filters	N/A	N/A	N/A
d. Other (describe)	N/A	N/A	N/A

**Attachment 2, Solid Waste Information**

**2.0 ESTIMATE OF MAJOR NUCLIDE COMPOSITION (BY WASTE TYPE) ONLY >1% ARE REPORTED.**

Table 18, Major Nuclides (Vogtle Unit 3 and Unit 4) by NRC Waste Class A

Major Nuclide Composition	%	Curies
a. Spent resins, filter sludges, evaporator bottoms, etc.		
C-14	10.7	8.66-01
Cr-51	1.69	1.37E-01
Mn-54	1.04	8.42E-02
Fe-55	18.94	1.53E+00
Co-58	52.08	4.21E+00
Co-60	5.65	4.57E-01
N-63	5.63	4.55E-01
Nb-95	1.16	9.42E-02
b. Dry compressible waste, contaminated equipment, etc.		
Cr-51	6.71	9.15E-02
Mn-54	1.09	1.48E-02
Fe-55	25.98	3.54E-01
Co-58	37.79	5.15E-01
Co-60	6.97	9.50E-02
N-63	5.1	6.96E-02
Zr-95	4.81	6.55E-02
Nb-95	8.82	1.20E-01

**3.0 SOLID WASTE DISPOSITION**

Table 19, Solid Waste Disposition (Vogtle Unit 3 and Unit 4)

Number of Shipments	Mode of Transportation	Destination
7	Hittman Transport	Energy Solutions – Bear Creek
3	Interstate Ventures	WCS
10	Total	

**Attachment 2, Solid Waste Information**

**4.0 IRRADIATED FUEL DISPOSITION**

Table 20, Irradiated Fuel Shipments Disposition (Vogtle Unit 3 and Unit 4)

Number of Shipments	Mode of Transportation	Destination
0	N/A	N/A

**Attachment 3, NEI-07-07 Onsite Radiological Groundwater Monitoring Program**

**1.0 VEGP 3&4:**

To ensure compliance with NEI 08-08A (Generic FSAR Template Guidance for Life-Cycle Minimization of Contamination) and NEI 07-07 (Industry Ground Water Protection Initiative – Final Guidance Document), Southern Nuclear implemented a groundwater protection program which is proceduralized in Nuclear Management Procedure, Radiological Groundwater Protection Program. The procedure contains detailed site-specific monitoring plans, program technical bases, and communications protocol (to ensure that radioactive leaks and spills are addressed and communicated appropriately). To prevent future leaks of radioactive material to groundwater, SNC plants have established buried piping and tanks inspection programs. No changes were made to the Groundwater Protection Program in 2025.

Vogtle Electric Generating Plant Units 3&4 groundwater protection program consists of 20 sample points listed in Table 21. The points are sampled at a frequency that satisfies the requirements of NEI 08-08A. Table 25 contains the 2025 analytical results of the VEGP 3&4 groundwater protection program tritium results (in pCi/L). Figure 5 is a map of the monitoring network.

**Attachment 3, NEI-07-07 Onsite Radiological Groundwater Monitoring Program**

Table 21, Groundwater Protection Program Sample Points

Sample Point	Aquifer	Monitoring Purpose
GWPP-1	Surficial Aquifer	Monitor potentiometric surface for location of historical groundwater divide. Location is potentially intermittently downgradient of Power Block.
GWPP-2	Surficial Aquifer	Monitor potentiometric surface for location of historical groundwater divide. Location is potentially intermittently downgradient of Power Block.
GWPP-3	Surficial Aquifer	Monitor potentiometric surface for location of historical groundwater divide. Location is potentially intermittently downgradient of Power Block. Also monitors for incoming plume from Units 1 and 2.
GWPP-4	Surficial Aquifer	Located downgradient to sidegradient of Power Block.
GWPP-5	Surficial Aquifer	FSAR required SSC monitoring well located west and south of Unit 4 radwaste building.
GWPP-6	Surficial Aquifer	FSAR required SSC monitoring well located east of the Unit 4 auxiliary building rail bay and radwaste building truck doors.
GWPP-7	Surficial Aquifer	FSAR required SSC monitoring well located west of the Unit 4 auxiliary building in the area of the fuel transfer canal.
GWPP-8R	Surficial Aquifer	FSAR required SSC monitoring well located west of the Unit 3 auxiliary building in the area of the fuel transfer canal.
GWPP-9	Surficial Aquifer	FSAR required SSC monitoring well located east of the Unit 3 auxiliary building rail bay and radwaste building truck doors.
GWPP-10	Surficial Aquifer	FSAR required SSC monitoring well located west and south of Unit 3 radwaste building.
GWPP-11	Surficial Aquifer	Location is primarily sidegradient of but also potentially intermittently downgradient of the Power Block. Also monitors for incoming plume from Units 1 and 2.
GWPP-12F	Surficial Aquifer	Location is primarily downgradient of the Power Block.
GWPP-13	Surficial Aquifer	Location is primarily downgradient of the Power Block.
GWPP-15	Surficial Aquifer	Location is primarily sidegradient of but also potentially intermittently downgradient of the Power Block. Adjacent to location of monitoring well OW-1006 where the screen is installed above the marl.
GWPP-16	Surficial Aquifer	Downgradient of Power Block and upgradient of Mallard Pond.
GWPP-17	Surficial Aquifer	Downgradient of Power Block and upgradient of Mallard Pond.
GWPP-18	Surficial Aquifer	Location is primarily sidegradient of but also potentially intermittently downgradient of the Power Block. Located adjacent to WWS line. Also monitors for plume from Units 1 and 2. Located west of existing sampled well 808.
GWPP-19	Surficial Aquifer	Located adjacent to WWS line.
GWPP-20	Surficial Aquifer	Located adjacent to WWS line.

Company: Southern Nuclear

Plant: Vogtle Electric Generating Plant 3&amp;4

## Attachment 3, NEI-07-07 Onsite Radiological Groundwater Monitoring Program

Table 22, Groundwater Protection Program 2025 Sample Results				
Sample Point	Sampling Period (pCi/L)			
	1Q2025	2Q2025	3Q2025	4Q2025
GWPP-1	2.23E+02	---	NDM	1.55E+02
GWPP-2	1.06E+02	1.06E+02	NDM	9.93E+01
GWPP-3	1.71E+02	1.25E+02	1.43E+02	1.46E+02
GWPP-4	1.01E+02	NDM	NDM	NDM
GWPP-5	NDM	NDM	NDM	1.74E+02
GWPP-5a <sup>1</sup>	NDM	NDM	NDM	2.22E+02
GWPP-6	2.16E+02	1.46E+02	NDM	1.61E+02
GWPP-7	NDM	NDM	NDM	1.29E+02
GWPP-8R	1.22E+02	NDM	NDM	2.39E+02
GWPP-9	1.75E+02	NDM	NDM	9.96E+01
GWPP-10	NDM	NDM	NDM	2.43E+02
GWPP-11	2.74E+02	3.22E+02	2.22E+02	1.16E+02
GWPP-12F	9.12E+01	NDM	NDM	1.77E+02
GWPP-13	NDM	9.93E+01	NDM	1.52E+02
GWPP-15	NDM	NDM	NDM	1.31E+02
GWPP-16	NDM	NDM	NDM	1.55E+02
GWPP-17 <sup>2</sup>	NS	NS	NS	NS
GWPP-18	1.06E+02	NDM	1.45E+02	1.65E+02
GWPP-19	NDM	NDM	9.70E+01	NDM
GWPP-20	NDM	NDM	NDM	1.06E+02
GWPP-20a <sup>3</sup>	NDM	NDM	1.09E+02	9.30E+01
<b>Notes</b>	<b>NS:</b> Not Sampled <b>NDM:</b> No Detectable Measurement - Less than Minimal Detectable Activity <b>DRY:</b> No Water in Well Casing			

<sup>1</sup> GWPP-5a is a duplicate of GWPP-5.<sup>2</sup> GWPP-17 not sampled due to dry well.<sup>3</sup> GWPP-20a is a duplicate of GWPP-20.

**Attachment 3, NEI-07-07 Onsite Radiological Groundwater Monitoring Program**

Notes:  
 - GWPP-12R was damaged by construction activities in 2021 and was abandoned in May 2022.  
 - GWPP-12 was abandoned in March 2020 due to conflicts with construction plan.  
 - GWPP-12F was installed in May 2022.  
 - GWPP-17 has been dry since installation in December 2016.



**Figure 5, Vogtle Electric Generating Plant Units 3&4 GWPP Monitoring Network**

Annual Radioactive Effluent Release Report	YEAR: 2025	Page 44 of 58
Company: Southern Nuclear	Plant: Vogtle Electric Generating Plant 3&4	

#### Attachment 4, ERRATA of Previous Reports

##### 1.0 2024 ARERR ERRATA

1. An administrative error caused the report year to state 2023. The report year should have been stated as 2024.
2. An administrative error occurred in which the radioactive effluent tracking program was not updated with all available monthly and quarterly composite data before the 2024 ARERR was finalized, resulting in the report being published without the full set of results. (CR11209197)
3. A complete review of the text and data tables were made. The incorrect values are lined out (e.g. ~~3.40E-08~~) and the revised number inserted in Red (e.g. **4.16E-08**).
4. The following pages were revised.

Annual Radioactive Effluent Release Report	YEAR: 2025	Page 45 of 58
Company: Southern Nuclear	Plant: Vogtle Electric Generating Plant 3&4	

**Attachment 4, ERRATA of Previous Reports**

Annual Radioactive Effluent Release Report	YEAR: 2024	Page 5 of 44
Company: Southern Nuclear	Plant: Vogtle Electric Generating Plant 3&4	

**2.0 EXECUTIVE SUMMARY**

Vogtle Electric Generating Plant 3&4 (VEGP 3&4) Radiological Effluent Control (REC) Program was established to limit the quantities of radioactive material that may be released based on calculated radiation doses or dose rates. Dose to Members of the Public due to radioactive materials released from the plant is limited by Appendix I of 10 CFR 50 and by 40 CFR 190. Operational doses to the public during 2024 were calculated to be very small compared to the limits required by regulation and compared to other sources of radiation dose and pose no health hazard.

~~In 2024 Dose assessments showed the critical receptor for Vogtle Unit 3 and 4 was the Max Site Boundary / Child due to the liquid pathway. The maximum annual organ dose calculated for this receptor was 1.41E-02 mrem per year, to the Bone. This annual dose represents a minute fraction (0.09%) of the 10 CFR 50, Appendix I limit of 15 mrem to the Maximum Organ. The dose from the liquid effluents was determined to be 2.10E-02 mrem to the Child Total Body and 3.67E-02 mrem to the Child Bone. These doses represented 0.700% and 0.367%, respectively of the 10 CFR 50, Appendix I limits of 3 mrem and 10 mrem, respectively.~~

**In 2024 Dose assessments showed the critical receptor for Vogtle Units 3 and 4 was the Max Site Boundary / Child due to the liquid pathway. The maximum annual Total Body dose from Units 3 and 4 were 2.37E-02 mrem and 3.17E-02 mrem, respectively. These doses were a small fraction (0.79% and 1.06%) of the 10 CFR 50, Appendix I limit of 3 mrem per year per unit. The maximum annual Organ doses from Units 3 and 4 were 6.41E-02 mrem to the Child/Bone and 3.21E-02 mrem to the Child/Liver, respectively. These doses were a small fraction (0.64% and 0.32%) of the 10 CFR 50, Appendix I limit of 10 mrem per year per unit.**

~~The 2024 gaseous doses to the critical receptor for Vogtle Unit 3 and 4 was the Max Site Boundary / Teenager due to the inhalation pathway. The maximum annual organ dose calculated for this receptor was 1.41E-02 mrem per year. This annual dose represents a minute fraction (0.094%) of the 10 CFR 50, Appendix I limit of 15 mrem to the Maximum Organ. The dose from the gaseous effluents was determined to be 2.11E-02 mrem to the Teenager Total Body and 2.21E-02 mrem to the Thyroid. These doses represented 0.141% and 0.147%, respectively of the 10 CFR 50, Appendix I limits of 15 mrem for both, respectively.~~

**In 2024 Dose assessments showed the critical receptor for Vogtle Units 3 and 4 was the Max Site Boundary / Teenager due to inhalation pathway. The maximum annual Organ doses from Units 3 and 4 were 1.44E-02 mrem and 8.19E-03 mrem, respectively. These doses were a small fraction (0.10% and 0.06%) of the 10 CFR 50, Appendix I limit of 15 mrem per year per unit.**

In addition to monitoring radioactive effluents, VEGP 3&4 has a Radiological Environmental Monitoring Program (REMP) that monitors for levels of radiation and radioactive materials in the local environment. Data from the REMP is published in the Annual Radiological Environmental Operating Report (AREOR).

**Attachment 4, ERRATA of Previous Reports**

**2.2 Comparison to Regulatory Limits**

During 2024 all liquid and gaseous radioactive effluents from Vogtle Electric Generating Plant 3&4 were well below regulatory limits, as summarized in Table 1, Table 2, and Table 3.

Table 1, Alvin W. Vogtle Generating Plant (Unit 3) Dose Summary<sup>1</sup>

		Quarter 1	Quarter 2	Quarter 3	Quarter 4	Annual
<b>Liquid Effluents</b>						
	Limit	1.5 mrem	1.5 mrem	1.5 mrem	1.5 mrem	3 mrem
	Total Body Dose (mrem) <sup>2</sup>	<del>2.17E-03</del> 3.68E-03	<del>3.39E-03</del> 1.06E-02	7.53E-03	<del>1.64E-03</del> 1.96E-03	<del>1.47E-02</del> 2.37E-02
	% of Limit	0.145 0.246	0.226 0.704	0.502	0.109 0.131	0.491 0.791
	Limit	5 mrem	5 mrem	5 mrem	5 mrem	10 mrem
	Maximum Organ Dose (mrem) <sup>3</sup>	<del>1.51E-03</del> 2.85E-02	<del>1.33E-02</del> 8.03E-03	9.57E-03	<del>8.46E-03</del> 1.80E-02	<del>3.28E-02</del> 6.41E-02
	% of Limit	0.030 0.570	0.266 0.161	0.191	0.169 0.360	0.328 0.641
<b>Gaseous Effluents</b>						
	Limit	5 mrad	5 mrad	5 mrad	5 mrad	10 mrad
	Gamma Air Dose (mrad) <sup>4</sup>	9.59E-04	3.46E-03	2.96E-04	2.93E-03	7.65E-03
	% of Limit	0.019	0.069	0.006	0.059	0.077
	Limit	10 mrad	10 mrad	10 mrad	10 mrad	20 mrad
	Beta Air Dose (mrad) <sup>5</sup>	3.39E-04	1.30E-03	1.17E-04	1.07E-03	2.82E-03
	% of Limit	0.003	0.013	0.001	0.011	0.014
	Limit	7.5 mrem	7.5 mrem	7.5 mrem	7.5 mrem	15 mrem
	Maximum Organ Dose (mrem) <sup>6</sup>	1.04E-02	<del>3.06E-03</del> 3.08E-03	<del>7.80E-05</del> 8.86E-05	<del>6.04E-04</del> 9.69E-04	<del>1.41E-02</del> 1.44E-02
	% of Limit	0.138	0.041	0.001	0.008 0.013	0.094 0.096

<sup>1</sup> Table 1 is meant to demonstrate 10 CFR Part 50, Appendix I Limits. It does not include dose from C-14.

<sup>2</sup> Max. Ind. Liquid / Child

<sup>3</sup> Max. Ind. Liquid / Child, Bone

<sup>4</sup> Site Boundary / All Age Groups

<sup>5</sup> Site Boundary / All Age Groups

<sup>6</sup> Max Site Boundary / Teenager, Lung

**Attachment 4, ERRATA of Previous Reports**

Table 2, Alvin W. Vogtle Generating Plant (Unit 4) Dose Summary<sup>1</sup>

		Quarter 1	Quarter 2	Quarter 3	Quarter 4	Annual
<b>Liquid Effluents</b>						
	<b>Limit</b>	1.5 mrem	1.5 mrem	1.5 mrem	1.5 mrem	3 mrem
	<b>Total Body Dose (mrem)<sup>2</sup></b>	N/A 1.44E-04	N/A 1.27E-03	0.00E+00 9.88E-04	1.08E-10 2.93E-02	1.08E-10 3.17E-02
	<b>% of Limit</b>	N/A 0.010	N/A 0.084	N/A 0.066	<0.001 1.951	<0.001 1.055
	<b>Limit</b>	5 mrem	5 mrem	5 mrem	5 mrem	10 mrem
	<b>Maximum Organ Dose (mrem)<sup>3</sup></b>	N/A 1.44E-04	N/A 1.41E-03	0.00E+00 1.00E-03	1.08E-10 2.96E-02	1.08E-10 3.21E-02
	<b>% of Limit</b>	N/A 0.003	N/A 0.028	N/A 0.020	<0.001 0.591	<0.001 0.321
<b>Gaseous Effluents</b>						
	<b>Limit</b>	5 mrad	5 mrad	5 mrad	5 mrad	10 mrad
	<b>Gamma Air Dose (mrad)</b>	N/A 5.61E-03	N/A 1.24E-04	N/A 2.24E-05	N/A 1.86E-04	N/A 5.94E-03
	<b>% of Limit</b>	N/A 0.112	N/A 0.002	N/A < 0.001	N/A 0.004	N/A 0.059
	<b>Limit</b>	10 mrad	10 mrad	10 mrad	10 mrad	20 mrad
	<b>Beta Air Dose (mrad)</b>	N/A 2.03E-03	N/A 4.37E-05	N/A 7.90E-06	N/A 6.57E-05	N/A 2.15E-03
	<b>% of Limit</b>	N/A 0.020	N/A < 0.001	N/A < 0.001	N/A 0.001	N/A 0.011
	<b>Limit</b>	7.5 mrem	7.5 mrem	7.5 mrem	7.5 mrem	15 mrem
	<b>Maximum Organ Dose (mrem)<sup>4</sup></b>	N/A 3.62E-03	N/A 3.58E-03	3.13E-05 8.64E-04	1.32E-03 1.31E-04	1.35E-03 8.19E-03
	<b>% of Limit</b>	N/A 0.048	N/A 0.048	<0.001 0.012	0.018 0.002	0.009 0.055

<sup>1</sup> Table 2 is meant to demonstrate 10 CFR Part 50, Appendix I Limits. It does not include dose from C-14.

<sup>2</sup> Max. Ind. Liquid / Child

<sup>3</sup> Max. Ind. Liquid / Child, Thyroid Liver

<sup>4</sup> Max Site Boundary / Teenager, Lung

**Attachment 4, ERRATA of Previous Reports**

**Table 3, Total Annual Offsite-Dose Comparison to Regulatory Limits for VEGP 1-4<sup>1</sup>**

Limit	Whole Body 25 mrem	Thyroid 75 mrem	Max Organ 25 mrem
<b>Gaseous</b>			
Unit 1 Noble Gas	1.29E-04	1.89E-04	1.89E-04
Unit 1 Particulates and Iodine	6.87E-04	6.87E-04	6.87E-04
Unit 1 C-14	1.69E-02	1.69E-02	8.45E-02
Unit 2 Noble Gas	2.18E-05	3.21E-05	3.21E-05
Unit 2 Particulates and Iodine	4.95E-04	4.94E-04	4.94E-04
Unit 2 C-14	1.69E-02	1.69E-02	8.45E-02
Unit 3 Noble Gas	7.27E-03	1.08E-02	1.08E-02
Unit 3 Particulates and Iodine	1.36E-02	<del>1.41E-02</del> <b>1.44E-02</b>	1.36E-02
Unit 3 C-14	6.58E-03	6.58E-03	3.49E-02
Unit 4 Noble Gas	5.65E-03	8.35E-03	8.35E-03
Unit 4 Particulates and Iodine	<del>8.01E-03</del> <b>8.19E-03</b>	<del>8.01E-03</del> <b>8.19E-03</b>	<del>8.01E-03</del> <b>8.19E-03</b>
Unit 4 C-14	5.77E-03	5.77E-03	3.07E-02
<b>Total Gaseous</b>	<del>8.20E-02</del> <b>8.22E-02</b>	<del>8.88E-02</del> <b>8.93E-02</b>	<del>2.55E-01</del> <b>2.85E-01</b>
<b>Liquid</b>			
Unit 1	2.99E-02	2.55E-02	3.24E-02
Unit 2	1.38E-02	1.05E-02	1.53E-02
Unit 3	<del>1.47E-02</del> <b>2.37E-02</b>	<del>1.25E-02</del> <b>1.99E-02</b>	<del>3.28E-02</del> <b>6.41E-02</b>
Unit 4	<del>6.31E-03</del> <b>3.17E-02</b>	<del>5.87E-03</del> <b>3.12E-02</b>	<del>6.77E-03</del> <b>3.21E-02</b>
<b>Total Liquid</b>	<del>6.45E-02</del> <b>9.89E-02</b>	<del>5.44E-02</del> <b>8.71E-02</b>	<del>3.98E-02</del> <b>1.44E-01</b>
<b>Direct Shine<sup>2</sup></b>	N/A	N/A	N/A
<b>Nearby Facilities<sup>3</sup></b>	0.16	0.16	0.16
<b>Total Dose</b>	<del>3.08E-01</del> <b>3.41E-01</b>	<del>3.03E-01</del> <b>3.38E-01</b>	<del>4.54E-01</del> <b>5.89E-01</b>
<b>% of Limit</b>	<del>1.23E+00</del> <b>1.36E+00</b>	<del>4.04E-01</del> <b>4.48E-01</b>	<del>1.82E+00</del> <b>2.36E+00</b>

<sup>1</sup> Table 3 is a summation of all Units to show compliance with 40 CFR Part 190 Limits.

<sup>2</sup> Based on data from the REMP, direct radiation at the site boundary is indistinguishable from background at the plant perimeter.

<sup>3</sup> Savannah River Site 2023 Environmental Report Summary.

**Attachment 4, ERRATA of Previous Reports**

**5.0 SUPPLEMENTAL INFORMATION**

**5.1 Gaseous Batch Releases**

**5.1.1 VEGP 3&4 Unit 3**

	Units	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Annual
1. Number of Batch Releases		49	48	68	<del>42</del> 41	<del>205</del> 204
2. Total duration of batch releases	minutes	9.73E+03	3.88E+03	9.33E+03	<del>8.08E+04</del> 8.05E+04	<del>4.04E+05</del> 1.03E+05
3. Maximum batch release duration	minutes	6.38E+03	2.47E+03	5.22E+03	1.02E+04	1.02E+04
4. Average batch release duration	minutes	1.99E+02	8.42E+01	1.37E+02	<del>1.92E+03</del> 1.98E+03	5.08E+02
5. Minimum batch release duration	minutes	<del>2.81E+02</del> 1.00E+00	<del>2.60E+02</del> 4.00E+00	<del>7.00E+00</del> 8.00E+00	<del>2.68E+02</del> 5.00E+00	<del>7.00E+00</del> 1.00E+00

**5.1.2 VEGP 3&4 Unit 4**

	Units	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Annual
1. Number of Batch Releases		17	31	33	38	117
2. Total duration of batch releases	minutes	5.35E+02	1.08E+04	5.71E+02	2.23E+03	1.39E+04
3. Maximum batch release duration	minutes	2.81E+02	3.35E+03	4.00E+01	1.32E+03	3.35E+03
4. Average batch release duration	minutes	3.15E+01	3.42E+02	1.73E+01	6.19E+01	1.19E+02
5. Minimum batch release duration	minutes	2.00E+00	8.00E+00	1.00E+00	8.00E+00	1.00E+00

**5.2 Liquid Batch Releases**

**5.2.1 VEGP 3&4 Unit 3**

	Units	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Annual
1. Number of Batch Releases		31	15	70	54	170
2. Total duration of batch releases	minutes	1.50E+04	5.08E+03	2.73E+04	2.31E+04	7.05E+04
3. Maximum batch release duration	minutes	1.48E+03	5.47E+02	1.07E+03	9.57E+02	1.48E+03
4. Average batch release duration	minutes	4.85E+02	3.37E+02	3.90E+02	4.28E+02	4.15E+02
5. Minimum batch release duration	minutes	2.81E+02	2.60E+02	7.00E+00	2.68E+02	7.00E+00

**Attachment 4, ERRATA of Previous Reports**

**Attachment 1, ARERR Release Summary Tables (RG-1.21 Tables)**

**1.0 GASEOUS EFFLUENTS**

**Table 5, Gaseous Effluents Summation of All Releases (Vogtle Unit 3)<sup>1</sup>**

A. Fission & Activation Gases	Unit	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Annual	Est. Total Error %
1. Total Release	Ci	5.99E-01	2.46E+00	2.55E-01	2.01E+00	5.33E+00	28.5
2. Average release rate for the period	µCi/sec	7.62E-02	3.13E-01	3.21E-02	2.53E-01	1.68E-01	
3. Percent of Limit	%						
<b>B. Iodine and Halogens</b>							
1. Total Release	Ci	4.98E-05	6.64E-05	3.34E-05	1.07E-02	1.08E-02	55
2. Average release rate for the period	µCi/sec	6.33E-06	8.45E-06	4.20E-06	1.35E-03	3.43E-04	
3. Percent of Limit	%						
<b>C. Particulates</b>							
1. Total Release	Ci	5.06E-05	2.00E-05	6.94E-05	1.01E-04	2.41E-04	54
2. Average release rate for the period	µCi/sec	6.43E-06	2.55E-06	8.73E-06	1.27E-05	7.63E-06	
3. Percent of Limit	%						
<b>D. Tritium</b>							
1. Total Release	Ci	8.23E+01	2.37E+01	1.32E-01	<del>1.67E+00</del> <b>1.68E+00</b>	1.08E+02	20
2. Average release rate for the period	µCi/sec	1.05E+01	3.02E+00	1.66E-02	<del>2.10E-01</del> <b>2.09E-01</b>	3.41E+00	
3. Percent of Limit	%						
<b>E. Gross Alpha</b>							
1. Total Release	Ci	<del>9.11E-07</del> <b>1.23E-06</b>	<del>8.58E-07</del> <b>1.61E-06</b>	7.90E-07	5.43E-07	<del>3.10E-06</del> <b>4.17E-06</b>	55
2. Average release rate for the period	µCi/sec	<del>1.16E-07</del> <b>1.56E-07</b>	<del>1.09E-07</del> <b>2.05E-07</b>	1.00E-07	6.84E-08	<del>3.83E-08</del> <b>1.32E-07</b>	
3. Percent of Limit	%						
<b>F. Carbon-14</b>							
1. Total Release	Ci	2.26E+00	2.26E+00	2.26E+00	2.26E+00	9.03E+00	
2. Average release rate for the period	µCi/sec	2.87E-01	2.87E-01	2.84E-01	2.84E-01	2.86E-01	
3. Percent of Limit	%						

<sup>1</sup> % of limit is on Table 1, Alvin W. Vogtle Generating Plant (Unit 3) Dose Summary

Attachment 4, ERRATA of Previous Reports

Attachment 1, ARERR Release Summary Tables (RG-1.21 Tables)

Table 6, Gaseous Effluents – Ground Level Release Batch Mode (Vogtle Unit 3)

Radionuclide Released	Unit	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Total for year
<b>Fission Gases</b>						
Ar-41	Ci	5.97E-01	2.12E+00	1.81E-01	1.82E+00	4.72E+00
Kr-85m	Ci	N/D	1.51E-02	N/D	N/D	1.51E-02
Xe-133	Ci	1.12E-03	1.81E-01	6.99E-02	1.93E-01	4.25E-01
Xe-135	Ci	8.34E-04	1.64E-01	4.62E-03	2.84E-04	1.69E-01
Total for Period	Ci	5.99E-01	2.46E+00	2.55E-01	2.01E+00	5.33E+00
<b>Iodines</b>						
I-131	Ci	N/D	7.87E-09	N/D	N/D	7.87E-09
I-133	Ci	N/D	1.17E-08	N/D	N/D	1.17E-08
Total for Period	Ci	N/D	1.96E-08	N/D	N/D	1.96E-08
<b>Particulates</b>						
None	Ci	N/D	N/D	N/D	N/D	N/D
Total for Period	Ci	N/D	N/D	N/D	N/D	N/D
<b>Tritium</b>						
H-3	Ci	5.36E-01	4.82E-02	1.32E-01	<del>1.88E-01</del> 1.64E-01	<del>8.85E-01</del> 8.81E-01
<b>Gross Alpha</b>						
Alpha	Ci	N/D	9.26E-11	N/D	N/D	9.26E-11
<b>Carbon-14</b>						
C-14	Ci	N/A	N/A	N/A	N/A	N/A

Attachment 4, ERRATA of Previous Reports

Attachment 1, ARERR Release Summary Tables (RG-1.21 Tables)

Table 7, Gaseous Effluents – Ground Level Release Continuous Mode (Vogtle Unit 3)

Radionuclide Released	Unit	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Total for year
<b>Fission Gases</b>						
None	Ci	N/D	N/D	N/D	N/D	N/D
Total for Period	Ci	N/D	N/D	N/D	N/D	N/D
<b>Iodines</b>						
I-131	Ci	2.13E-05	3.36E-05	1.76E-05	1.36E-04	2.09E-04
I-132	Ci	N/D	N/D	N/D	1.06E-02	1.06E-02
I-133	Ci	2.85E-05	3.28E-05	1.58E-06	8.31E-06	6.54E-05
Total for Period	Ci	4.98E-05	6.64E-05	3.34E-05	1.07E-02	1.08E-02
<b>Particulates</b>						
Cr-51	Ci	N/D	N/D	N/D	2.10E-05	2.10E-05
Fe-59	Ci	N/D	N/D	N/D	3.36E-06	3.36E-06
Co-58	Ci	5.06E-05	2.00E-05	6.82E-05	4.87E-05	1.86E-04
Co-60	Ci	N/D	N/D	N/D	2.00E-06	2.00E-06
Zn-65	Ci	N/D	N/D	N/D	1.04E-05	1.04E-05
Nb-95	Ci	N/D	N/D	1.22E-06	1.58E-05	1.71E-05
Total for Period	Ci	5.06E-05	5.06E-05 2.00E-05	6.94E-05	1.01E-04	2.41E-04
<b>Tritium</b>						
H-3	Ci	8.17E+01	2.37E+01	N/D	1.50E+00	1.07E+02
<b>Gross Alpha</b>						
Alpha	Ci	9.11E-07 1.23E-06	9.58E-07 1.81E-06	7.90E-07	5.43E-07	3.10E-06 4.17E-06
<b>Carbon-14</b>						
C-14	Ci	N/A	N/A	N/A	N/A	N/A

**Attachment 4, ERRATA of Previous Reports**

Attachment 1, ARERR Release Summary Tables (RG-1.21 Tables)

**Table 8, Gaseous Effluents Summation of All Releases (Vogtle Unit 4)<sup>1</sup>**

A. Fission & Activation Gases	Unit	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Annual	Est. Total Error %
1. Total Release	Ci	3.61E+00	7.72E-02	1.40E-02	1.16E-01	3.82E+00	26.5
2. Average release rate for the period	µCi/sec	4.59E-01	9.82E-03	1.76E-03	1.46E-02	1.21E-01	
3. Percent of Limit	%						
<b>B. Iodine and Halogens</b>							
1. Total Release	Ci	N/D	N/D	N/D	N/D	N/D	55
2. Average release rate for the period	µCi/sec	N/A	N/A	N/A	N/A	N/A	
3. Percent of Limit	%						
<b>C. Particulates</b>							
1. Total Release	Ci	N/D	1.28E-08	N/D	N/D	1.28E-08	54
2. Average release rate for the period	µCi/sec	N/A	1.63E-07	N/A	N/A	4.05E-08	
3. Percent of Limit	%				9.34E-08	6.40E-08	
<b>D. Tritium</b>							
1. Total Release	Ci	2.89E+01	2.86E+01	6.17E+00	1.29E+00	6.39E+01	20
2. Average release rate for the period	µCi/sec	3.68E+00	3.64E+00	8.90E-01	1.62E-01	2.02E+00	
3. Percent of Limit	%			8.68E-01	1.31E-01	2.07E+00	
<b>E. Gross Alpha</b>							
1. Total Release	Ci	1.78E-06	4.30E-06	8.98E-07	7.80E-07	7.78E-06	55
2. Average release rate for the period	µCi/sec	2.28E-07	5.42E-07	1.13E-07	9.81E-08	2.48E-07	
3. Percent of Limit	%	2.27E-07	4.87E-07	9.44E-08	1.18E-07	2.31E-07	
<b>F. Carbon-14</b>							
1. Total Release	Ci	1.99E+00	1.99E+00	1.99E+00	1.99E+00	7.95E+00	
2. Average release rate for the period	µCi/sec	2.53E-01	2.53E-01	2.53E-01	2.53E-01	2.53E-01	
3. Percent of Limit	%						

<sup>1</sup> % of limit is on Table 2, Alvin W. Vogtle Generating Plant (Unit 4) Dose Summary

Attachment 4, ERRATA of Previous Reports

Attachment 1, ARERR Release Summary Tables (RG-1.21 Tables)

Table 10, Gaseous Effluents – Ground Level Release Continuous Mode (Vogtle Unit 4)

Radionuclide Released	Unit	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Total for year
<b>Fission Gases</b>						
None	Ci	N/D	N/D	N/D	N/D	N/D
Total for Period	Ci	N/D	N/D	N/D	N/D	N/D
<b>Iodines</b>						
None	Ci	N/D	N/D	N/D	N/D	N/D
Total for Period	Ci	N/D	N/D	N/D	N/D	N/D
<b>Particulates</b>						
Co-58	Ci	N/D	1.28E-06	N/D	N/D	1.28E-06
<b>Sr-89</b>	<b>Ci</b>	<b>N/D</b>	<b>N/D</b>	<b>N/D</b>	<b>7.42E-07</b>	<b>7.42E-07</b>
Total for Period	Ci	N/D	1.28E-06	N/D	<b>7.42E-07</b>	<b>2.02E-06</b>
<b>Tritium</b>						
H-3	Ci	2.89E+01	2.83E+01	<del>5.15E+00</del> <b>6.88E+00</b>	<del>4.20E+00</del> <b>9.60E-01</b>	<del>6.35E+01</del> <b>6.50E+01</b>
<b>Gross Alpha</b>						
Alpha	Ci	1.78E-06	4.30E-06	8.96E-07	7.80E-07	7.76E-06
<b>Carbon-14</b>						
C-14	Ci	N/A	N/A	N/A	N/A	N/A

Attachment 4, ERRATA of Previous Reports

Attachment 1, ARERR Release Summary Tables (RG-1.21 Tables)

2.0 LIQUID EFFLUENTS

Table 11, Liquid Effluents – Summation of All Releases (Vogtle Unit 3) <sup>1</sup>

A. Fission & Activation Products	Unit	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Annual	Est. Total Error %
1. Total Release	Ci	2.85E-02	4.68E-02 1.65E-02	2.61E-02	4.53E-02 4.61E-02	1.17E-01	24.5
2. Average diluted concentration	µCi/mL	3.40E-08	6.21E-08 6.10E-08	1.57E-08	2.84E-08 2.89E-08	2.68E-08 2.69E-08	
3. Percent of Limit	%						
B. Tritium							
1. Total Release	Ci	1.35E+02	9.64E+01 9.79E+01	2.73E+02	2.99E+01	5.34E+02 5.36E+02	24.5
2. Average diluted concentration	µCi/mL	1.61E-4	3.56E-04 3.62E-04	1.65E-04	1.87E-05	1.23E-04	
3. Percent of Limit	%						
C. Dissolved & Entrained Gases							
1. Total Release	Ci	4.97E-03	4.92E-04	7.11E-03	1.87E-03	1.44E-02	30.
2. Average diluted concentration	µCi/mL	5.93E-09	1.82E-09	4.29E-09	1.17E-09	3.31E-09	
3. Percent of Limit	%						
D. Gross Alpha Activity							
1. Total Release	Ci	N/D	N/D	N/D	N/D	N/D	24.5
2. Average diluted concentration	µCi/mL	N/A	N/A	N/A	N/A	N/D	
3. Percent of Limit	%						
E. Volume of Waste Released (prior to dilution)							
	Liters	1.44E+06	6.94E+05	3.13E+06	2.63E+06	7.89E+06	
F. Volume of Dilution Water Used During Period							
	Liters	8.38E+08 8.37E+08	2.71E+08 2.70E+08	1.66E+09	1.59E+09	4.36E+09	

**Attachment 4, ERRATA of Previous Reports**

**Attachment 1, ARERR Release Summary Tables (RG-1.21 Tables)**

**Table 12, Batch Mode Liquid Effluents (Vogtle Unit 3)**

Radionuclide Released	Unit	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Total for Year
<b>Fission &amp; Activation Products</b>						
Be-7	Ci	1.01E-03	4.55E-04	N/D	7.48E-05	1.54E-03
Cr-51	Ci	2.77E-04	4.58E-04	4.07E-05	2.78E-03	3.55E-03
Mn-54	Ci	1.37E-04	6.38E-05	5.85E-05	1.99E-04	4.59E-04
Fe-55	Ci	1.57E-02	3.66E-03	5.61E-03	8.25E-03	3.32E-02
Fe-59	Ci	5.78E-04	3.13E-04	3.44E-04	7.31E-04	1.97E-03
Co-57	Ci	N/D	6.19E-06	N/D	3.94E-05	4.55E-05
Co-58	Ci	8.18E-03	1.05E-02	1.66E-02	2.66E-02	6.18E-02
Co-60	Ci	2.54E-04	2.29E-04	4.35E-04	1.88E-03	2.79E-03
Ni-63	Ci	1.57E-03	<del>7.56E-04</del> 4.02E-04	5.98E-04	<del>5.02E-04</del> 1.28E-03	<del>3.42E-03</del> 3.84E-03
Zn-65	Ci	2.51E-04	6.36E-06	5.36E-06	N/D	2.63E-04
As-76	Ci	N/D	N/D	N/D	3.43E-05	3.43E-05
Sr-89	Ci	8.75E-05	7.07E-05	N/D	N/D	1.58E-04
Zr-95	Ci	1.17E-04	1.14E-04	2.89E-05	1.47E-03	1.73E-03
Nb-95	Ci	2.65E-04	1.76E-04	1.97E-04	2.41E-04	3.05E-03
Sn-113	Ci	5.41E-06	N/D	N/D	2.09E-05	2.63E-05
Sn-117m	Ci	N/D	N/D	N/D	2.30E-05	2.30E-05
Sb-124	Ci	N/D	2.89E-05	3.18E-04	8.00E-05	4.27E-04
Sb-125	Ci	N/D	N/D	1.05E-03	1.18E-04	1.17E-03
Te-132	Ci	N/D	N/D	N/D	2.40E-05	2.40E-05
I-131	Ci	2.39E-05	2.78E-05	3.60E-05	5.91E-06	9.37E-05
I-132	Ci	N/D	N/D	5.87E-06	2.54E-05	3.13E-05
I-133	Ci	1.58E-06	N/D	N/D	N/D	1.58E-06
Cs-138	Ci	N/D	N/D	N/D	9.53E-05	9.53E-05
La-140	Ci	9.88E-05	5.67E-06	8.05E-04	N/D	9.10E-04
Total for Period	Ci	2.85E-02	<del>1.68E-02</del> 1.65E-02	2.61E-02	<del>4.53E-02</del> 4.61E-02	1.17E-01
<b>Tritium</b>						
H-3	Ci	1.35E+02	<del>9.64E+01</del> 9.79E+01	2.73E+02	2.99E+01	<del>5.34E+02</del> 5.36E+02
<b>Entrained Gases</b>						
Xe-133m	Ci	N/D	N/D	3.36E-05	N/D	3.36E-05
Xe-133	Ci	4.87E-03	4.92E-04	6.69E-03	1.85E-03	1.39E-02
Xe-135	Ci	9.47E-05	N/D	3.88E-04	1.48E-05	4.98E-04
Total for Period	Ci	4.97E-03	4.92E-04	7.11E-03	1.87E-03	1.44E-02
<b>Gross Alpha</b>						
G. Alpha	Ci	N/D	N/D	N/D	N/D	N/D

**Attachment 4, ERRATA of Previous Reports**

**Attachment 1, ARERR Release Summary Tables (RG-1.21 Tables)**

**Table 14, Liquid Effluents – Summation of All Releases (Vogtle Unit 4) <sup>1</sup>**

A. Fission & Activation Products	Unit	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Annual	Est. Total Error %
1. Total Release	Ci	N/D	<del>9.19E-03</del> 9.20E-03	1.12E-03	<del>2.48E-03</del> 2.49E-03	1.28E-02	2.45E+01
2. Average diluted concentration	µCi/mL	N/D	<del>4.08E-08</del> 4.07E-08	<del>5.72E-09</del> 5.75E-09	<del>9.10E-09</del> 9.20E-09	1.40E-08	
3. Percent of Limit	%						
<b>B. Tritium</b>							
1. Total Release	Ci	5.94E+00	3.67E+01	3.94E+01	<del>1.54E+02</del> 1.58E+02	<del>2.36E+02</del> 2.40E+02	2.45E+01
2. Average diluted concentration	µCi/mL	2.62E-05	1.62E-04	<del>2.02E-04</del> 2.03E-04	<del>5.65E-04</del> 5.82E-04	<del>2.57E-04</del> 2.61E-04	
3. Percent of Limit	%						
<b>C. Dissolved &amp; Entrained Gases</b>							
1. Total Release	Ci	9.40E-06	1.83E-03	1.54E-04	2.55E-04	2.25E-03	3.00E+01
2. Average diluted concentration	µCi/mL	4.15E-11	<del>8.10E-09</del> 8.12E-09	<del>7.90E-10</del> 7.94E-10	<del>9.37E-10</del> 9.39E-10	<del>2.46E-09</del> 2.45E-09	
3. Percent of Limit	%						
<b>D. Gross Alpha Activity</b>							
1. Total Release	Ci	N/D	N/D	N/D 4.37E-05	N/D	N/D	2.45E+01
2. Average diluted concentration	µCi/mL	N/D	N/D	N/D 2.25E-10	N/D	N/D	
3. Percent of Limit	%						
<b>E. Volume of Waste Released (prior to dilution)</b>							
	Liters	1.32E+06	7.79E+05	3.49E+05	4.70E+05	2.92E+06	
<b>F. Volume of Dilution Water Used During Period</b>							
	Liters	<del>2.27E+08</del> 2.25E+08	<del>2.27E+08</del> 2.25E+08	<del>1.95E+08</del> 1.94E+08	<del>2.72E+08</del> 2.71E+08	<del>9.21E+08</del> 9.15E+08	

<sup>1</sup> Percent of limit is on Table 2, Alvin W. Vogtle Generating Plant (Unit 4) Dose Summary

**Attachment 4, ERRATA of Previous Reports**

**Attachment 1, ARERR Release Summary Tables (RG-1.21 Tables)**

**Table 15, Batch Mode Liquid Effluents (Vogtle Unit 4)**

Radionuclide Released	Unit	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Total for Year
<b>Fission &amp; Activation Products</b>						
Be-7	Ci	N/D	4.41E-04	1.35E-04	1.23E-04	6.99E-04
Cr-51	Ci	N/D	3.46E-03	3.73E-05	N/D	3.50E-03
Mn-54	Ci	N/D	1.88E-05	N/D	N/D	1.88E-05
Fe-55	Ci	N/D	<del>4.91E-04</del> 4.97E-04	8.28E-05	1.38E-04	<del>7.12E-04</del> 7.18E-04
Fe-59	Ci	N/D	5.05E-04	N/D	N/D	5.05E-04
Co-58	Ci	N/D	2.87E-03	6.15E-04	1.45E-03	4.94E-03
Co-60	Ci	N/D	1.19E-04	2.64E-05	5.13E-04	6.59E-04
Ni-63	Ci	N/D	1.22E-04	N/D	<del>N/D</del> 1.76E-05	<del>1.22E-04</del> 1.39E-04
Zn-65	Ci	N/D	N/D	1.46E-05	1.69E-04	1.84E-04
As-76	Ci	N/D	7.13E-06	N/D	N/D	7.13E-06
Sr-89	Ci	N/D	1.81E-05	N/D	N/D	1.81E-05
Zr-95	Ci	N/D	6.06E-04	6.83E-05	N/D	6.74E-04
Nb-95	Ci	N/D	3.54E-04	1.24E-04	6.46E-05	5.42E-04
Sn-113	Ci	N/D	9.01E-06	N/D	N/D	9.01E-06
Sb-122	Ci	N/D	2.08E-05	N/D	N/D	2.08E-05
Sn-117m	Ci	N/D	4.26E-05	N/D	N/D	4.26E-05
Sb-124	Ci	N/D	3.96E-05	N/D	N/D	3.96E-05
I-131	Ci	N/D	4.42E-06	N/D	N/D	4.42E-06
Cs-137	Ci	N/D	N/D	N/D	<del>1.36E-05</del> 1.63E-05	1.63E-05
La-140	Ci	N/D	6.31E-05	1.33E-05	N/D	7.64E-05
Total for Period	Ci	N/D	<del>9.19E-03</del> 9.20E-03	1.12E-03	<del>2.48E-03</del> 2.49E-03	1.28E-02
<b>Tritium</b>						
H-3	Ci	5.94E+00	3.67E+01	3.94E+01	<del>1.54E+02</del> 1.58E+02	<del>2.38E+02</del> 2.40E+02
<b>Entrained Gases</b>						
Xe-133	Ci	9.40E-06	1.82E-03	1.40E-04	2.41E-04	2.21E-03
Xe-135	Ci	N/D	1.76E-05	1.39E-05	1.40E-05	4.55E-05
Total for Period	Ci	9.40E-06	1.83E-03	1.54E-04	2.55E-04	2.25E-03
<b>Gross Alpha</b>						
G. Alpha	Ci	N/D	N/D	<del>N/D</del> 4.37E-05	N/D	<del>N/D</del> 4.37E-05