

**Edwin I. Hatch Nuclear Plant – Units 1&2  
Joseph M. Farley Nuclear Plant – Units 1&2  
Vogtle Electric Generating Plant – Units 1&2  
Annual Non-Radiological Environmental Operating Reports, Annual  
Radioactive Effluent Release Reports, and Offsite Dose Calculation Manual  
for 2018**

**Enclosure 6**

**Vogtle Electric Generating Plant – Units 1&2  
Annual Radioactive Effluent Release Report for 2018**

**SOUTHERN NUCLEAR COMPANY**  
**VOGTLE ELECTRIC GENERATING PLANT – UNITS 1 AND 2**  
**NRC DOCKET NOS. 50-424 AND 50-425**  
**FACILITY OPERATING LICENSE NOS. NPF-68 AND NPF-81**  
**ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT**  
**FOR**  
**JANUARY 1, 2018 TO DECEMBER 31, 2018**

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**VOGTLE ELECTRIC GENERATING PLANT  
RADIOACTIVE EFFLUENT RELEASE REPORT - 2018  
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## **1.0 Liquid Effluents**

### **1.1 Regulatory Requirements**

The ODCM Specifications presented in this section are for Unit 1 and Unit 2.

#### **1.1.1 Concentration Limits**

In accordance with Technical Specification 5.5.4.b, the concentration of radioactive material released in liquid effluents to UNRESTRICTED AREAS shall be limited at all times to ten times the concentrations 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 concentration shall be limited to 1 E-04  $\mu\text{Ci/ml}$  total activity.

#### **1.1.2 Dose Limits**

The dose or dose commitment to a MEMBER OF THE PUBLIC from radioactive materials in liquid effluents released, from each unit, to UNRESTRICTED AREAS shall be limited as follows:

- a. During any calendar quarter to less than or equal to 1.5 mrems to the whole body and to less than or equal to 5 mrems to any organ, and
- b. During any calendar year to less than or equal to 3 mrems to the whole body and to less than or equal to 10 mrems to any organ.

### **1.2 Effluent Concentration Limit (ECL)**

ECL values used for determining the allowable liquid radwaste release rates and concentrations for the principal gamma emitters, I-131, tritium, Sr-89, Sr-90 and Fe-55 are taken from 10 CFR Part 20, Appendix B, Table 2, Column 2. A tolerance factor of up to 10 is utilized to allow flexibility in establishing practical monitor set points which can accommodate effluent releases at concentrations higher than the ECL values stated in 10 CFR 20, Appendix B, Table 2, Column 2.

For dissolved or entrained noble gases in liquid radwaste, the ECL is 1E-04  $\mu\text{Ci/ml}$  total activity.

For gross alpha in liquid radwaste, the ECL is 2 E-09  $\mu\text{Ci/ml}$ .

For all the above radionuclides or categories of radioactivity, the overall ECL fraction is determined in accordance with 10 CFR Part 20, Appendix B. The method utilizing the ECL fraction to determine release rates and liquid radwaste effluent radiation monitor set points is described in Subsection 1.3 of this report.

### 1.3 Measurements and Approximations of Total Radioactivity

#### 1.3.1 Total Radioactivity Determination

Prior to the release of any tank containing liquid radwaste, and following the required recirculation, samples are collected and analyzed in accordance with the Vogtle Electric Generating Plant Offsite Dose Calculation Manual (ODCM) Table 2-3 "Radioactive Liquid Waste Sampling and Analysis Program". A sample from each tank which is planned for release is analyzed for principal gamma emitters, I-131, and dissolved and entrained noble gases by gamma spectroscopy. Monthly and quarterly composites are prepared for analysis by extracting aliquots from each sample taken from the tanks, which are released. Liquid radwaste sample analyses are performed as follows:

MEASUREMENT	FREQUENCY	METHOD
1. Gamma Isotopic	Each Batch	Gamma Spectroscopy with computerized data reduction.
2. Dissolved or entrained noble gases	Each Batch	Gamma Spectroscopy with computerized data reduction
3. Tritium	Monthly Composite	Distillation and liquid scintillation counting
4. Gross Alpha	Monthly Composite	Gas flow proportional counting (1)
5. Sr-89 & Sr-90	Quarterly Composite	Chemical separation and gas flow proportional or scintillation counting (1)
6. Fe-55	Quarterly Composite	Chemical separation and liquid scintillation Counting (1)
7. Ni-63	Quarterly Composite	Chemical separation and liquid scintillation Counting (1)

(1) Analysis performed by an off-site laboratory

### 1.3.1

#### **Total Radioactivity Determination cont'd**

Gamma isotopic measurements are performed using germanium detectors with a resolution of 2.1 keV or lower. A peak search of the resulting gamma ray spectrum is performed by the computer system. Energy and net count data for all significant peaks are determined, and a quantitative reduction or MDC calculation is performed. This ensures that the MDC's are met for the nuclides specified in ODCM Chapter 10 (i.e., Mn-54, Fe-59, Co-58, Co-60, Zn-65, Mo-99, Cs-134, Cs-137, Ce-141 and Ce-144). The quantitative calculations, corrections for counting time, decay time, sample volume, sample geometry, detector efficiency, baseline counts, branching ratio and MDC calculations, are made based on the counts at the location in the spectrum where the peak for that radionuclide would be located, if present.

ECL fraction is determined using radionuclide concentrations of a tank planned for release, the most current results available for tritium, gross alpha, Sr-89, Sr-90, Fe-55 and Ni-63 and the corresponding ECL values.

This ECL fraction is used, with appropriate safety factors, tolerance factors, and the minimum assured dilution stream flow to calculate maximum permissible release rates and a liquid effluent monitor setpoint. The monitor setpoint is calculated to assure that the limits of the Offsite Dose Calculation Manual (ODCM) are not exceeded.

A monitor reading in excess of the calculated setpoint results in an automatic termination of the liquid radwaste discharge. Liquid effluent discharge is also automatically terminated if the dilution stream flow rate falls below the minimum assured dilution flow rate used in the setpoint calculations and established as a setpoint on the dilution stream flow monitor.

Radionuclide concentrations, safety factors, dilution stream flow rate, and liquid effluent radiation monitor calibrations are entered into the computer and a pre-release printout is generated. If the release is not permissible, appropriate warnings will be displayed on the computer screen. If the release is permissible, it is approved by the Chemistry Department and sent to the Operations Department for release. When the release is completed, the necessary data from the release (i.e., release volume, etc.) is provided by the Operations Department to the Chemistry Department. This data is input to the computer and a post-release printout is generated. The post release printout contains the actual release rates, release concentrations and quantities, actual dilution flow, and calculated doses to an individual.

Typically achieved liquid effluent sample analyses minimum detectable concentrations are reported in Table 1-4.

### 1.3.2 Total Error Estimation

The total or maximum error associated with the effluent measurement includes the cumulative errors resulting from the total operation of sampling and measurement. Because it may be very difficult to assign error terms for each parameter affecting the final measurement, detailed statistical evaluation of error is not suggested. The objective should be to obtain an overall estimate of the error associated with measurements of radioactive materials released in effluents (Reference Reg. Guide 1.21 Rev 1). Total Error is calculated by the root mean square method. The root mean square value is the square root of the arithmetic mean (average) of the squares of the original values.

- a. Fission and activation total release was calculated from sample analysis results and release point flow rates.

Sampling and statistical error	10%
Counting Equipment Calibration	10%
Tank Volumes and System Flow Rates	20%
<b>TOTAL ERROR</b>	<b>24.5%</b>

- b. Total Tritium release was calculated from sample analysis results and release point volumes.

Sampling and statistical errors	10%
Counting equipment calibration	10%
Tank volumes and system flow rate	20%
<b>TOTAL ERROR</b>	<b>24.5%</b>

- c. Dissolved and entrained gases were calculated from sample analysis results and release point volumes.

Sampling and statistical error	20%
Counting equipment calibration	10%
Tank volumes and system flow rate	20%
<b>TOTAL ERROR</b>	<b>30%</b>

- d. Gross alpha radioactivity was calculated from sample analysis results and release point volumes.

Sampling and statistical error	10%
Counting Equipment calibration	10%
Tank volumes and system flowrates	20%
<b>TOTAL ERROR</b>	<b>24.5%</b>

**1.3.2 Total Error Estimation cont'd**

- e. Volume of waste prior to dilution was calculated from level indicators on the tanks and pump discharge flow rates and times.

Level Indicator error	10%
Operator Interpretation of gauge	10%
<b>TOTAL ERROR</b>	<b>14%</b>

- f. Volume of dilution water used was calculated from flow totalizers and pump discharge flow rates and times.

Flow totalizer error	10%
Operator interpretation of gauge	10%
<b>TOTAL ERROR</b>	<b>14%</b>

- g. Gross alpha, Sr-89, Sr-90, Fe-55, Ni-63 and H-3 radioactivity has an additional error associated with sample compositing.

Compositing sample error	5%
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**1.4 Liquid Effluent Release Data**

Regulatory Guide 1.21 Rev. 1 Tables 2A and 2B are found in this report as Tables 1-1A, 1-1B, 1-1C, 1-2A, 1-2B and 1-2C. Data is presented on a quarterly basis as required by Regulatory Guide 1.21 Rev. 1 for all four quarters.

**1.5 Radiological Impact Due to Liquid Releases**

Doses to an individual due to radioactivity in liquid effluent were calculated in accordance with the Offsite Dose Calculation Manual. Results are presented in Table 1-3A for Unit 1 and 1-3B for Unit 2, for all four quarters.

**1.6 Liquid Effluents – Batch Releases**

Batch release information for liquid effluents is presented in Table 1-5A for Unit 1 and Table 1-5B for Unit 2.

**1.7 Liquid Effluents - Abnormal Releases**

There were no abnormal liquid releases during 2018

**Table 1-1A**

**Vogle Electric Generating Plant  
RADIOACTIVE EFFLUENT RELEASE REPORT - 2018  
Liquid Effluents - Summation Of All Releases**

**Unit: 1**

**Starting: 1-Jan- 2018    Ending: 31-Dec-2018**

<b>Type of Effluent</b>	<b>Units</b>	<b>1ST Quarter</b>	<b>2ND Quarter</b>	<b>3RD Quarter</b>	<b>4TH Quarter</b>
<b>A. Fission And Activation Products</b>					
1. Total Release (not including tritium, gases, alpha)	Curies	1.82E-03	1.95E-03	8.72E-03	2.04E-03
2. Average diluted concentration during period	µCi/mL	4.12E-10	1.77E-09	3.18E-09	3.94E-10
3. Percent of Applicable Limit	%	*	*	*	*
<b>B. Tritium</b>					
1. Total Release	Curies	1.66E+01	5.57E+01	4.05E+02	1.12E+02
2. Average diluted Concentration during period	µCi/mL	3.76E-06	5.05E-05	1.48E-04	2.16E-05
3. Percent of Applicable Limit	%	*	*	*	*
<b>C. Dissolved and Entrained Gases</b>					
1. Total Release	Curies	0.00E+00	0.00E+00	1.92E-04	2.48E-04
2. Average diluted Concentration during period	µCi/mL	0.00E+00	0.00E+00	6.99E-11	4.79E-11
3. Percent of Applicable Limit	%	*	*	*	*
<b>D: Gross Alpha Radioactivity</b>					
1. Total Release	Curies	0.00E+00	0.00E+00	0.00E+00	0.00E+00
<b>E: Waste Vol Release (Pre-Dilution)</b>					
	Liters	2.21E+07	2.29E+07	3.16E+07	3.48E+07
<b>F. Volume of Dilution Water Used</b>					
	Liters	4.40E+09	1.08E+09	2.71E+09	5.15E+09

\* Applicable limits are expressed in terms of dose. See Tables 1-3A and 1-3B of this report.

**Table 1-1B**

**Vogtle Electric Generating Plant  
 RADIOACTIVE EFFLUENT RELEASE REPORT - 2018  
 Liquid Effluents - Summation Of All Releases  
 Unit: 2**

**Starting: 1-Jan- 2018    Ending: 31-Dec-2018**

<b>Type of Effluent</b>	<b>Units</b>	<b>1ST Quarter</b>	<b>2ND Quarter</b>	<b>3RD Quarter</b>	<b>4TH Quarter</b>
<b>A. Fission And Activation Products</b>					
1. Total Release (not including tritium, gases, alpha)	Curies	2.04E-04	1.32E-03	4.16E-03	2.07E-03
2. Average diluted concentration during period	µCi/mL	4.61E-11	1.13E-09	1.50E-09	4.39E-10
3. Percent of Applicable Limit	%	*	*	*	*
<b>B. Tritium</b>					
1. Total Release	Curies	1.54E+01	1.07E+02	4.67E+02	1.35E+02
2. Average diluted Concentration during period	µCi/mL	3.50E-06	9.15E-05	1.68E-04	2.87E-05
3. Percent of Applicable Limit	%	*	*	*	*
<b>C. Dissolved and Entrained Gases</b>					
1. Total Release	Curies	0.00E+00	0.00E+00	3.26E-04	4.25E-03
2. Average diluted Concentration during period	µCi/mL	0.00E+00	0.00E+00	1.17E-10	9.01E-10
3. Percent of Applicable Limit	%	*	*	*	*
<b>D. Gross Alpha Radioactivity</b>					
1. Total Release	Curies	0.00E+00	0.00E+00	0.00E+00	0.00E+00
<b>E. Waste Vol Release (Pre-Dilution)</b>					
	Liters	1.72E+07	1.56E+07	2.06E+07	2.13E+07
<b>F. Volume of Dilution Water Used</b>					
	Liters	4.39E+09	1.15E+09	2.76E+09	4.69E+09

\* Applicable limits are expressed in terms of dose. See Tables 1-3A and 1-3B of this report.

**Table 1-1C**

**Vogtle Electric Generating Plant  
RADIOACTIVE EFFLUENT RELEASE REPORT - 2018**

**Liquid Effluents - Summation Of All Releases**

**Unit: Site**

**Starting: 1-Jan- 2018 Ending: 31-Dec-2018**

<b>Type of Effluent</b>	<b>Units</b>	<b>1ST Quarter</b>	<b>2ND Quarter</b>	<b>3RD Quarter</b>	<b>4TH Quarter</b>
<b>A. Fission And Activation Products</b>					
1. Total Release (not including tritium, gases, alpha)	Curies	2.02E-03	3.28E-03	1.29E-02	4.11E-03
2. Average diluted concentration during period	µCi/mL	2.29E-10	1.44E-09	2.33E-09	4.15E-10
3. Percent of Applicable Limit	%	*	*	*	*
<b>B. Tritium</b>					
1. Total Release	Curies	3.21E+01	1.63E+02	8.71E+02	2.48E+02
2. Average diluted Concentration during period	µCi/mL	3.63E-06	7.16E-05	1.58E-04	2.50E-05
3. Percent of Applicable Limit	%	*	*	*	*
<b>C. Dissolved and Entrained Gases</b>					
1. Total Release	Curies	0.00E+00	0.00E+00	5.18E-04	4.50E-03
2. Average diluted Concentration during period	µCi/mL	0.00E+00	0.00E+00	9.38E-11	4.54E-10
3. Percent of Applicable Limit	%	*	*	*	*
<b>D. Gross Alpha Radioactivity</b>					
1. Total Release	Curies	0.00E+00	0.00E+00	0.00E+00	0.00E+00
<b>E. Waste Vol Release (Pre-Dilution)</b>					
	Liters	3.93E+07	3.85E+07	5.22E+07	5.61E+07
<b>F. Volume of Dilution Water Used</b>					
	Liters	8.79E+09	2.23E+09	5.47E+09	9.84E+09

\* Applicable limits are expressed in terms of dose. See Tables 1-3A and 1-3B of this report.



**Table 1-2A**  
**Vogtle Electric Generating Plant**  
**RADIOACTIVE EFFLUENT RELEASE REPORT - 2018**  
**Liquid Effluents**  
**Unit: 1**  
**Starting: 1-Jan-2018 Ending: 31-Dec-2018**

Nuclides Released	Units	<u>Continuous Mode</u>			
		1ST Quarter	2ND Quarter	3RD Quarter	4TH Quarter
<b>Fission &amp; Activation Products</b>					
Sr-89	Curies	0.00E+00	0.00E+00	5.02E-03	0.00E+00
Total For Period	Curies	0.00E+00	0.00E+00	5.02E-03	0.00E+00
<b>Tritium</b>					
H-3	Curies	1.62E-01	1.31E-01	8.57E-02	7.65E-02
<b>Dissolved And Entrained Gases</b>					
No Nuclides Found	Curies	0.00E+00	0.00E+00	0.00E+00	0.00E+00
<b>Gross Alpha Radioactivity</b>					
No Nuclides Found	Curies	0.00E+00	0.00E+00	0.00E+00	0.00E+00

\*Zeroes in this table indicate that no radioactivity was present at detectable levels. See Table 1-4 for typical minimum detectable concentrations.

**Table 1-2 A**

**Vogtle Electric Generating Plant  
 RADIOACTIVE EFFLUENT RELEASE REPORT - 2018  
 Liquid Effluents  
 Unit: 1  
 Starting: 1-Jan-2018 Ending: 31-Dec-2018**

**Batch Mode**

<b>Nuclides Released</b>	<b>Units</b>	<b>1ST Quarter</b>	<b>2ND Quarter</b>	<b>3RD Quarter</b>	<b>4TH Quarter</b>
<b>Fission &amp; Activation Products</b>					
Ni-63	Curies	3.45E-04	6.04E-04	6.53E-04	2.25E-04
Co-57	Curies	0.00E+00	7.88E-06	0.00E+00	0.00E+00
Co-60	Curies	2.30E-04	3.16E-04	3.08E-04	8.92E-05
Fe-55	Curies	9.57E-04	5.54E-04	6.13E-04	1.66E-04
Cs-137	Curies	1.35E-05	6.24E-05	9.61E-06	0.00E+00
Co-58	Curies	2.60E-04	2.12E-04	1.99E-04	1.53E-03
Te-125M	Curies	0.00E+00	0.00E+00	1.82E-03	0.00E+00
Mn-54	Curies	1.49E-05	1.78E-05	3.07E-06	3.48E-06
Sb-125	Curies	0.00E+00	1.78E-04	8.76E-05	0.00E+00
Cr-51	Curies	0.00E+00	0.00E+00	0.00E+00	2.93E-05
<b>Total For Period</b>	<b>Curies</b>	<b>1.82E-03</b>	<b>1.95E-03</b>	<b>3.70E-03</b>	<b>2.04E-03</b>

**Table 1-2 A**

**Vogtle Electric Generating Plant  
RADIOACTIVE EFFLUENT RELEASE REPORT - 2018  
Liquid Effluents**

**Unit: 1**

**Starting: 1-Jan-2018 Ending: 31-Dec-2018**

**Batch Mode**

<b>Nuclides Released</b>	<b>Units</b>	<b>1ST Quarter</b>	<b>2ND Quarter</b>	<b>3RD Quarter</b>	<b>4TH Quarter</b>
<b>Tritium</b>					
H-3	Curies	1.65E+01	5.56E+01	4.05E+02	1.12E+02
<b>Dissolved And Entrained Gases</b>					
Xe-133	Curies	0.00E+00	0.00E+00	1.92E-04	2.48E-04
Total For Period	Curies	0.00E+00	0.00E+00	1.92E-04	2.48E-04
<b>Gross Alpha Radioactivity</b>					
No Nuclides Found	Curies	0.00E+00	0.00E+00	0.00E+00	0.00E+00

\*Zeroes in this table indicate that no radioactivity was present at detectable levels. See Table 1-4 for typical minimum detectable concentrations.

**Table 1-2 B**  
**Vogtle Electric Generating Plant**  
**RADIOACTIVE EFFLUENT RELEASE REPORT - 2018**  
**Liquid Effluents**  
**Unit: 2**  
**Starting: 1-Jan-2018 Ending: 31-Dec-2018**

**Continuous Mode**

<b>Nuclides Released</b>	<b>Units</b>	<b>1ST Quarter</b>	<b>2ND Quarter</b>	<b>3RD Quarter</b>	<b>4TH Quarter</b>
<b>Fission &amp; Activation Products</b> No Nuclides Found	Curies	0.00E+00	0.00E+00	0.00E+00	0.00E+00
<b>Tritium</b> H-3	Curies	1.04E-01	1.40E-01	1.98E-01	1.35E-01
<b>Dissolved And Entrained Gases</b> No Nuclides Found	Curies	0.00E+00	0.00E+00	0.00E+00	0.00E+00
<b>Gross Alpha Radioactivity</b> No Nuclides Found	Curies	0.00E+00	0.00E+00	0.00E+00	0.00E+00

\*Zeroes in this table indicate that no radioactivity was present at detectable levels. See Table 1-4 for typical minimum detectable concentrations.

**Table 1-2 B**

**Vogtle Electric Generating Plant  
RADIOACTIVE EFFLUENT RELEASE REPORT - 2018**

**Liquid Effluents**

**Unit: 2**

**Starting: 1-Jan-2018 Ending: 31-Dec-2018**

**Batch Mode**

<b>Nuclides Released</b>	<b>Units</b>	<b>1ST Quarter</b>	<b>2ND Quarter</b>	<b>3RD Quarter</b>	<b>4TH Quarter</b>
<b>Fission &amp; Activation Products</b>					
Co-57	Curies	0.00E+00	0.00E+00	1.69E-06	6.07E-06
Te-125M	Curies	0.00E+00	0.00E+00	9.41E-04	0.00E+00
Co-58	Curies	5.43E-05	1.03E-04	1.55E-03	1.59E-03
Sr-90	Curies	0.00E+00	0.00E+00	1.16E-05	0.00E+00
Nb-95/Zr-95	Curies	0.00E+00	0.00E+00	3.92E-06	3.20E-06
Ni-63	Curies	7.94E-05	3.38E-04	4.11E-04	1.88E-04
Cs-137	Curies	2.38E-06	1.79E-05	0.00E+00	0.00E+00
Co-60	Curies	6.75E-05	1.59E-04	2.74E-04	1.06E-04
Sr-89	Curies	0.00E+00	0.00E+00	3.41E-04	0.00E+00
Sb-125	Curies	0.00E+00	3.36E-04	1.08E-04	0.00E+00
Mn-54	Curies	0.00E+00	9.49E-06	4.89E-06	1.83E-06
Fe-55	Curies	0.00E+00	3.60E-04	5.19E-04	1.80E-04
<b>Total For Period</b>	<b>Curies</b>	<b>2.04E-04</b>	<b>1.32E-03</b>	<b>4.16E-03</b>	<b>2.07E-03</b>

\*Zeroes in this table indicate that no radioactivity was present at detectable levels. See Table 1-4 for typical minimum detectable concentrations.

**Table 1-2 B**  
**Vogtle Electric Generating Plant**  
**RADIOACTIVE EFFLUENT RELEASE REPORT - 2018**  
**Liquid Effluents**  
**Unit: 2**  
**Starting: 1-Jan-2018 Ending: 31-Dec-2018**

Nuclides Released	Units	<u>Batch Mode</u>			
		1ST Quarter	2ND Quarter	3RD Quarter	4TH Quarter
<b>Tritium</b>					
H-3	Curies	1.54E+01	1.07E+02	4.67E+02	1.35E+02
<b>Dissolved And Entrained Gases</b>					
Xe-133	Curies	0.00E+00	0.00E+00	3.24E-04	4.20E-03
Xe-133M	Curies	0.00E+00	0.00E+00	0.00E+00	4.59E-05
Xe-135	Curies	0.00E+00	0.00E+00	2.29E-06	3.91E-06
Total For Period	Curies	0.00E+00	0.00E+00	3.26E-04	4.25E-03
<b>Gross Alpha Radioactivity</b>					
No Nuclides Found	Curies	0.00E+00	0.00E+00	0.00E+00	0.00E+00

\*Zeroes in this table indicate that no radioactivity was present at detectable levels. See Table 1-4 for typical minimum detectable concentrations.

**Table 1-2 C**

**Vogtle Electric Generating Plant  
RADIOACTIVE EFFLUENT RELEASE REPORT - 2018  
Liquid Effluents**

**Unit: Site**

**Starting: 1-Jan-2018 Ending: 31-Dec-2018**

**Continuous Mode**

<b>Nuclides Released</b>	<b>Units</b>	<b>1ST Quarter</b>	<b>2ND Quarter</b>	<b>3RD Quarter</b>	<b>4TH Quarter</b>
<b>Fission &amp; Activation Products</b>					
Sr-89	Curies	0.00E+00	0.00E+00	5.02E-03	0.00E+00
Total For Period	Curies	0.00E+00	0.00E+00	5.02E-03	0.00E+00
<b>Tritium</b>					
H-3	Curies	2.66E-01	2.72E-01	2.84E-01	2.12E-01
<b>Dissolved And Entrained Gases</b>					
No Nuclides Found	Curies	0.00E+00	0.00E+00	0.00E+00	0.00E+00
<b>Gross Alpha Radioactivity</b>					
No Nuclides Found	Curies	0.00E+00	0.00E+00	0.00E+00	0.00E+00

\*Zeroes in this table indicate that no radioactivity was present at detectable levels. See Table 1-4 for typical minimum detectable concentrations.

**Table 1-2 C**

**Vogtle Electric Generating Plant  
RADIOACTIVE EFFLUENT RELEASE REPORT - 2018  
Liquid Effluents**

**Unit: Site**

**Starting: 1-Jan-2018 Ending: 31-Dec-2018**

**Batch Mode**

<b>Nuclides Released Fission &amp; Activation Products</b>	<b>Units</b>	<b>1ST Quarter</b>	<b>2ND Quarter</b>	<b>3RD Quarter</b>	<b>4TH Quarter</b>
Ni-63	Curies	4.24E-04	9.42E-04	1.06E-03	4.13E-04
Sr-89	Curies	0.00E+00	0.00E+00	3.41E-04	0.00E+00
Sr-90	Curies	0.00E+00	0.00E+00	1.16E-05	0.00E+00
Sb-125	Curies	0.00E+00	5.14E-04	1.95E-04	0.00E+00
Nb-95/Zr-95	Curies	0.00E+00	0.00E+00	3.92E-06	3.20E-06
Fe-55	Curies	9.57E-04	9.14E-04	1.13E-03	3.46E-04
Mn-54	Curies	1.49E-05	2.73E-05	7.95E-06	5.32E-06
Cs-137	Curies	1.58E-05	8.03E-05	9.61E-06	0.00E+00
Co-60	Curies	2.98E-04	4.76E-04	5.83E-04	1.95E-04
Cr-51	Curies	0.00E+00	0.00E+00	0.00E+00	2.93E-05
Te-125M	Curies	0.00E+00	0.00E+00	2.76E-03	0.00E+00
Co-58	Curies	3.14E-04	3.16E-04	1.75E-03	3.12E-03
Co-57	Curies	0.00E+00	7.88E-06	1.69E-06	6.07E-06
<b>Total For Period</b>	<b>Curies</b>	<b>2.02E-03</b>	<b>3.28E-03</b>	<b>7.86E-03</b>	<b>4.11E-03</b>

\*Zeroes in this table indicate that no radioactivity was present at detectable levels. See Table 1-4 for typical minimum detectable concentrations.



**Table 1-2 C**

**Vogtle Electric Generating Plant  
RADIOACTIVE EFFLUENT RELEASE REPORT - 2018  
Liquid Effluents**

**Unit: Site**

**Starting: 1-Jan-2018 Ending: 31-Dec-2018**

Nuclides Released	Units	<u>Batch Mode</u>			
		1ST Quarter	2ND Quarter	3RD Quarter	4TH Quarter
<b>Tritium</b>					
H-3	Curies	3.19E+01	1.63E+02	8.71E+02	2.48E+02
<b>Dissolved And Entrained Gases</b>					
Xe-133M	Curies	0.00E+00	0.00E+00	0.00E+00	4.59E-05
Xe-135	Curies	0.00E+00	0.00E+00	2.29E-06	3.91E-06
Xe-133	Curies	0.00E+00	0.00E+00	5.16E-04	4.45E-03
<b>Total For Period</b>	<b>Curies</b>	<b>0.00E+00</b>	<b>0.00E+00</b>	<b>5.18E-04</b>	<b>4.50E-03</b>
<b>Gross Alpha Radioactivity</b>					
No Nuclides Found	Curies	0.00E+00	0.00E+00	0.00E+00	0.00E+00

\*Zeroes in this table indicate that no radioactivity was present at detectable levels. See Table 1-4 for typical minimum detectable concentrations.

**Table 1-3 A**

**Vogtle Electric Generating Plant  
 RADIOACTIVE EFFLUENT RELEASE REPORT - 2018  
 Doses to a member of the public due to Liquid Releases  
 Unit: 1  
 Starting: 1-Jan-2018 Ending: 31-Dec-2018**

**Cumulative Doses Per Quarter**

Organ	ODCM Lmt	Units	1ST Qtr	% ODCM	2ND Qtr	% ODCM	3RD Qtr	% ODCM	4TH Qtr	% ODCM
Thyroid	5.00E+00	mRem	1.22E-03	2.44E-02	2.96E-03	5.91E-02	1.66E-02	3.33E-01	4.86E-03	9.72E-02
Total Body	1.50E+00	mRem	1.29E-03	8.63E-02	3.50E-03	2.34E-01	2.79E-02	1.86E+00	4.88E-03	3.25E-01
Kidney	5.00E+00	mRem	1.25E-03	2.50E-02	3.23E-03	6.45E-02	1.72E-02	3.44E-01	4.86E-03	9.73E-02
GI-Lli	5.00E+00	mRem	1.26E-03	2.52E-02	3.08E-03	6.17E-02	7.96E-02	1.59E+00	4.95E-03	9.91E-02
Liver	5.00E+00	mRem	1.35E-03	2.69E-02	3.80E-03	7.60E-02	1.68E-02	3.37E-01	4.88E-03	9.77E-02
Lung	5.00E+00	mRem	1.24E-03	2.48E-02	3.54E-03	7.08E-02	1.69E-02	3.38E-01	4.87E-03	9.74E-02
Bone	5.00E+00	mRem	4.16E-04	8.32E-03	1.14E-03	2.29E-02	3.89E-01	7.79E+00	2.29E-04	4.59E-03

**Cumulative Doses per Year**

Organ	ODCM Lmt	Units	Year to Ending Date	% ODCM	Receptor	Limit
Bone	1.00E+01	mRem	3.91E-01	3.91E+00	Maximum Individual Liquid	Liquid Effluent Organ Annual
Lung	1.00E+01	mRem	2.65E-02	2.65E-01	Maximum Individual Liquid	Liquid Effluent Organ Annual
Liver	1.00E+01	mRem	2.69E-02	2.69E-01	Maximum Individual Liquid	Liquid Effluent Organ Annual
GI-Lli	1.00E+01	mRem	8.89E-02	8.89E-01	Maximum Individual Liquid	Liquid Effluent Organ Annual
Kidney	1.00E+01	mRem	2.66E-02	2.66E-01	Maximum Individual Liquid	Liquid Effluent Organ Annual
Total Body	3.00E+00	mRem	3.76E-02	1.25E+00	Maximum Individual Liquid	Liquid Effluent TB Annual
Thyroid	1.00E+01	mRem	2.57E-02	2.57E-01	Maximum Individual Liquid	Liquid Effluent Organ Annual

**Table 1-3B**

**Vogtle Electric Generating Plant  
 RADIOACTIVE EFFLUENT RELEASE REPORT - 2018  
 Doses to a member of the public due to Liquid Releases  
 Unit: 2  
 Starting: 1-Jan-2018 Ending: 31-Dec-2018**

**Cumulative Doses Per Quarter**

Organ	ODCM Lmt	Units	1ST Qtr	% ODCM	2ND Qtr	% ODCM	3RD Qtr	% ODCM	4TH Qtr	% ODCM
GI-Lli	5.00E+00	mRem	9.14E-04	1.83E-02	6.13E-03	1.23E-01	1.99E-02	3.99E-01	5.89E-03	1.18E-01
Lung	5.00E+00	mRem	9.09E-04	1.82E-02	6.99E-03	1.40E-01	1.98E-02	3.96E-01	5.81E-03	1.16E-01
Kidney	5.00E+00	mRem	9.11E-04	1.82E-02	6.11E-03	1.22E-01	1.97E-02	3.94E-01	5.80E-03	1.16E-01
Thyroid	5.00E+00	mRem	9.06E-04	1.81E-02	6.01E-03	1.20E-01	1.95E-02	3.90E-01	5.80E-03	1.16E-01
Total Body	1.50E+00	mRem	9.19E-04	6.13E-02	6.22E-03	4.14E-01	1.96E-02	1.31E+00	5.81E-03	3.88E-01
Bone	5.00E+00	mRem	8.36E-05	1.67E-03	5.69E-04	1.14E-02	9.44E-04	1.89E-02	2.01E-04	4.03E-03
Liver	5.00E+00	mRem	9.26E-04	1.85E-02	6.33E-03	1.27E-01	1.96E-02	3.91E-01	5.82E-03	1.16E-01

**Cumulative Doses per Year**

Organ	ODCM Lmt	Units	Year to Ending Date	% ODCM	Receptor	Limit
Liver	1.00E+01	mRem	3.26E-02	3.26E-01	Maximum Individual Liquid	Liquid Effluent Organ Annual
Bone	1.00E+01	mRem	1.80E-03	1.80E-02	Maximum Individual Liquid	Liquid Effluent Organ Annual
Total Body	3.00E+00	mRem	3.25E-02	1.08E+00	Maximum Individual Liquid	Liquid Effluent TB Annual
Thyroid	1.00E+01	mRem	3.22E-02	3.22E-01	Maximum Individual Liquid	Liquid Effluent Organ Annual
Kidney	1.00E+01	mRem	3.25E-02	3.25E-01	Maximum Individual Liquid	Liquid Effluent Organ Annual
Lung	1.00E+01	mRem	3.35E-02	3.35E-01	Maximum Individual Liquid	Liquid Effluent Organ Annual
GI-Lli	1.00E+01	mRem	3.29E-02	3.29E-01	Maximum Individual Liquid	Liquid Effluent Organ Annual

**Table 1-3 C**

**Vogtle Electric Generating Plant  
 RADIOACTIVE EFFLUENT RELEASE REPORT - 2018  
 Doses to a member of the public due to Liquid Releases  
 Unit: Site  
 Starting: 1-Jan-2018 Ending: 31-Dec-2018**

**Cumulative Doses Per Quarter**

Organ	ODCM Lmt	Units	1ST Qtr	% ODCM	2ND Qtr	% ODCM	3RD Qtr	% ODCM	4TH Qtr	% ODCM
Total Body	1.50E+00	mRem	2.21E-03	1.48E-01	9.72E-03	6.48E-01	4.75E-02	3.16E+00	1.07E-02	7.13E-01
GI-Lli	5.00E+00	mRem	2.18E-03	4.35E-02	9.22E-03	1.84E-01	9.95E-02	1.99E+00	1.08E-02	2.17E-01
Kidney	5.00E+00	mRem	2.16E-03	4.32E-02	9.33E-03	1.87E-01	3.69E-02	7.39E-01	1.07E-02	2.13E-01
Thyroid	5.00E+00	mRem	2.13E-03	4.26E-02	8.96E-03	1.79E-01	3.62E-02	7.23E-01	1.07E-02	2.13E-01
Bone	5.00E+00	mRem	5.00E-04	9.99E-03	1.71E-03	3.42E-02	3.90E-01	7.81E+00	4.31E-04	8.61E-03
Liver	5.00E+00	mRem	2.27E-03	4.54E-02	1.01E-02	2.03E-01	3.64E-02	7.28E-01	1.07E-02	2.14E-01
Lung	5.00E+00	mRem	2.15E-03	4.30E-02	1.05E-02	2.11E-01	3.67E-02	7.34E-01	1.07E-02	2.14E-01

**Cumulative Doses per Year**

Organ	ODCM Lmt	Units	Year to Ending Date	% ODCM	Receptor	Limit
Lung	1.00E+01	mRem	6.00E-02	6.00E-01	Maximum Individual Liquid	Liquid Effluent Organ Annual
Liver	1.00E+01	mRem	5.95E-02	5.95E-01	Maximum Individual Liquid	Liquid Effluent Organ Annual
Bone	1.00E+01	mRem	3.93E-01	3.93E+00	Maximum Individual Liquid	Liquid Effluent Organ Annual
Thyroid	1.00E+01	mRem	5.79E-02	5.79E-01	Maximum Individual Liquid	Liquid Effluent Organ Annual
Kidney	1.00E+01	mRem	5.91E-02	5.91E-01	Maximum Individual Liquid	Liquid Effluent Organ Annual
GI-Lli	1.00E+01	mRem	1.22E-01	1.22E+00	Maximum Individual Liquid	Liquid Effluent Organ Annual
Total Body	3.00E+00	mRem	7.01E-02	2.34E+00	Maximum Individual Liquid	Liquid Effluent TB Annual

**Table 1-4**

**Vogtle Electric Generating Plant  
RADIOACTIVE EFFLUENT RELEASE REPORT - 2018  
MINIMUM DETECTABLE CONCENTRATIONS – LIQUID SAMPLE ANALYSES**

**Starting: 1-Jan-2018**

**Ending: 31-Dec-2018**

The values in this table represent a priori Minimum Detectable Concentrations (MDC) that are typically achieved in laboratory analyses of liquid radwaste samples.

RADIONUCLIDE	MDC	UNITS
Mn-54	2.73E-08	μCi/ml
Fe-59	8.33E-08	μCi/ml
Co-58	3.78E-08	μCi/ml
Co-60	6.76E-08	μCi/ml
Zn-65	1.32E-07	μCi/ml
Mo-99	4.31E-07	μCi/ml
Cs-134	3.06E-08	μCi/ml
Cs-137	4.51E-08	μCi/ml
Ce-141	6.99E-08	μCi/ml
Ce-144	2.95E-07	μCi/ml
I-131	5.97E-08	μCi/ml
Xe-133	9.11E-08	μCi/ml
Xe-135	4.27E-08	μCi/ml
Fe-55	1.00E-06	μCi/ml
Sr-89	5.00E-08	μCi/ml
Sr-90	7.00E-09	μCi/ml
H-3	2.00E-06	μCi/ml
Gross Alpha	7.00E-08	μCi/ml

**Table 1-5 A**

**Vogtle Electric Generating Plant  
 RADIOACTIVE EFFLUENT RELEASE REPORT - 2018  
 Liquid Effluents - Batch Release Summary  
 Unit: 1  
 Starting: 1-Jan-2018 Ending: 31-Dec-2018**

<b>Liquid Releases</b>	<b>Units</b>	<b>1ST Quarter</b>	<b>2ND Quarter</b>	<b>3RD Quarter</b>	<b>4TH Quarter</b>	<b>Year Totals</b>
1. Number of batch releases		4	5	11	6	26
2. Total time period for Batch releases	( Minutes )	9.37E+02	1.17E+03	6.06E+03	2.26E+03	1.04E+04
3. Maximum time period for a batch release	( Minutes )	3.17E+02	4.04E+02	1.25E+03	6.09E+02	1.25E+03
4. Average time period for a batch release	( Minutes )	2.34E+02	2.34E+02	5.51E+02	3.77E+02	4.01E+02
5. Minimum time period for a batch release	( Minutes )	8.10E+01	7.30E+01	3.20E+01	2.65E+02	3.20E+01
6. Average stream flow during periods of release of liquid effluent into a flowing stream *	( CFS )	2.16E+04	7.82E+03	5.96E+03	5.30E+03	<b>Yearly Average</b> 1.02E+04

\*Average river flowrate taken from USGS Monitoring Station 02197500, Savannah River at Burton's Ferry Bridge near Millhaven, GA. 32 miles downstream of Plant Vogtle.

**Table 1-5B**

**Vogtle Electric Generating Plant**  
**RADIOACTIVE EFFLUENT RELEASE REPORT - 2018**  
**Liquid Effluents - Batch Release Summary**  
**Unit: 2**  
**Starting: 1-Jan-2018 Ending: 31-Dec-2018**

<b>Liquid Releases</b>	<b>Units</b>	<b>1ST Quarter</b>	<b>2ND Quarter</b>	<b>3RD Quarter</b>	<b>4TH Quarter</b>	<b>Year Totals</b>
<b>1. Number of batch releases</b>		3	6	13	5	27
<b>2. Total time period for Batch releases</b>	( Minutes )	8.29E+02	2.55E+03	6.50E+03	3.44E+03	1.33E+04
<b>3. Maximum time period for a batch release</b>	( Minutes )	4.01E+02	1.21E+03	8.76E+02	1.12E+03	1.21E+03
<b>4. Average time period for a batch release</b>	( Minutes )	2.76E+02	4.25E+02	5.00E+02	6.88E+02	4.93E+02
<b>5. Minimum time period for a batch release</b>	( Minutes )	4.80E+01	6.80E+01	2.04E+02	3.89E+02	4.80E+01
<b>6. Average stream flow during periods of release of liquid effluent into a flowing stream *</b>	( CFS )	2.16E+04	7.82E+03	5.96E+03	5.30E+03	1.02E+04

**Yearly Average**

\*Average river flowrate taken from USGS Monitoring Station 02197500, Savannah River at Burton's Ferry Bridge near Millhaven, GA. 32 miles downstream of Plant Vogtle.

**Table 1-5C**

**Vogtle Electric Generating Plant  
 RADIOACTIVE EFFLUENT RELEASE REPORT - 2018  
 Liquid Effluents - Batch Release Summary  
 Unit: Site  
 Starting: 1-Jan-2018 Ending: 31-Dec-2018**

<b>Liquid Releases</b>	<b>Units</b>	<b>1ST Quarter</b>	<b>2ND Quarter</b>	<b>3RD Quarter</b>	<b>4TH Quarter</b>	<b>Year Totals</b>
<b>1. Number of batch releases</b>		7	11	24	11	53
<b>2. Total time period for Batch releases</b>	( Minutes )	1.77E+03	3.72E+03	1.26E+04	5.70E+03	2.38E+04
<b>3. Maximum time period for a batch release</b>	( Minutes )	4.01E+02	1.21E+03	1.25E+03	1.12E+03	1.25E+03
<b>4. Average time period for a batch release</b>	( Minutes )	2.52E+02	3.38E+02	5.24E+02	5.19E+02	4.48E+02
<b>5. Minimum time period for a batch release</b>	( Minutes )	4.80E+01	6.80E+01	3.20E+01	2.65E+02	3.20E+01
<b>6. Average stream flow during periods of release of liquid effluent into a flowing stream *</b>	( CFS )	8.10E+03	9.07E+03	9.10E+03	1.57E+04	<b>Yearly Average</b> 1.05E+04

\*Average river flowrate taken from USGS Monitoring Station 02197500, Savannah River at Burton's Ferry Bridge near Millhaven, GA. 32 miles downstream of Plant Vogtle.



**Table 1-6 A**

**Vogtle Electric Generating Plant  
RADIOACTIVE EFFLUENT RELEASE REPORT - 2018  
Liquid Effluents - Abnormal Release Summary**

**Unit: 1**

**Starting: 1-Jan-2018 Ending: 31-Dec-2018**

<b>Liquid Releases</b>	<b>Units</b>	<b>1ST Quarter</b>	<b>2ND Quarter</b>	<b>3RD Quarter</b>	<b>4TH Quarter</b>	<b>Year Totals</b>
1. Number of Releases		0	0	0	0	0
2. Total Time For All Releases	( Minutes )	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
3. Maximum Time For A Release	( Minutes )	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
4. Average Time For A Release	( Minutes )	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
5. Minimum Time For A Release	( Minutes )	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
6. Total activity for all releases	( Curies )	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

**Table 1-6 B**

**Vogtle Electric Generating Plant  
RADIOACTIVE EFFLUENT RELEASE REPORT - 2018  
Liquid Effluents - Abnormal Release Summary  
Unit: 2  
Starting: 1-Jan-2018 Ending: 31-Dec-2018**

<b>Liquid Releases</b>	<b>Units</b>	<b>1ST Quarter</b>	<b>2ND Quarter</b>	<b>3RD Quarter</b>	<b>4TH Quarter</b>	<b>Year Totals</b>
1. Number of Releases		0	0	0	0	0
2. Total Time For All Releases	( Minutes )	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
3. Maximum Time For A Release	( Minutes )	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
4. Average Time For A Release	( Minutes )	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
5. Minimum Time For A Release	( Minutes )	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
6. Total activity for all releases	( Curies )	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

**Table 1-6 C**

**Vogle Electric Generating Plant  
RADIOACTIVE EFFLUENT RELEASE REPORT - 2018  
Liquid Effluents - Abnormal Release Summary  
Unit: Site  
Starting: 1-Jan-2018 Ending: 31-Dec-2018**

<b>Liquid Releases</b>	<b>Units</b>	<b>1ST Quarter</b>	<b>2ND Quarter</b>	<b>3RD Quarter</b>	<b>4TH Quarter</b>	<b>Year Totals</b>
1. Number of Releases		0	0	0	0	0
2. Total Time For All Releases	( Minutes )	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
3. Maximum Time For A Release	( Minutes )	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
4. Average Time For A Release	( Minutes )	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
5. Minimum Time For A Release	( Minutes )	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
6. Total activity for all releases	( Curies )	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

## **2.0 Gaseous Effluents**

### **2.1 Regulatory Requirements**

The ODCM Specifications presented in this section are for Unit 1 and Unit 2.

#### **2.1.1 Dose Rate Limits**

The 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:

- a. For noble gases, Less than or equal to 500 mrem/yr. to the whole body and less than or equal to 3000 mrem/yr. to the skin and,
- b. For Iodine-131, for Iodine-133, for tritium and for all radionuclides in particulate form with half lives greater than 8 days: Less than or equal to 1500 mrem/yr. to any organ.

#### **2.1.2 Air Doses Due to Noble Gases in Gaseous Releases**

The air dose due to noble gases released in gaseous effluents, from each unit, to areas at and beyond the SITE BOUNDARY shall be limited to the following:

- a. During any calendar quarter: Less than or equal to 5 mrad for gamma radiation and less than or equal to 10 mrad for beta radiation, and
- b. During any calendar year: Less than or equal to 10 mrad for gamma radiation and less than or equal to 20 mrad for beta radiation.

#### **2.1.3 Doses to a Member of the Public**

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, from each unit, to areas at and beyond the SITE BOUNDARY shall be limited to the following.

- a. During any calendar quarter: Less than or equal to 7.5 mrem to any organ.
- b. During any calendar year: Less than or equal to 15 mrem to any organ.

## **2.2 Measurements and Approximations of Total Radioactivity**

### **2.2.1 Sample Collection and Analysis**

Gaseous Effluents at the Vogtle Electric Generating Plant are currently confined to five paths: plant vents (Unit 1 and Unit 2), the condenser air ejector, the steam packing exhauster systems (Unit 1 and Unit 2), and the Radwaste Processing Facility (RPF).

Waste gas decay tanks are batch released through the Unit 1 plant vent. The containment purges are released through their respective plant vents. Containment atmosphere is also released via the containment equipment hatch during periods when the equipment hatch is open with containment purge/vent being stopped. Approval was granted by the NRC to open the equipment hatch during fuel movement; a release permit is generated when the equipment hatch is opened and the containment exhaust fan is not discharging to the plant vent. Any detected activity in the containment equipment hatch permit is included in the Ground Release Table of the effluent report.

All of the paths with the exception of the RPF can be continuously monitored for gaseous radioactivity. The RPF is equipped with an integrated-type sample collection device for collecting particulates. Plant vent, containment, steam jet air ejector, steam-packing exhauster are equipped with an integrated-type sample collection device for collecting particulates and iodines. During this reporting period, there were no continuous radioactive releases through the condenser air ejector and the steam packing exhauster system vents. Batch Waste Gas Decay Tank releases are analyzed for noble gases before each release. The containment atmosphere is analyzed for noble gases prior to each release and for tritium at least on a monthly basis.

Sample analysis results and release flow rates form the basis for calculating released quantities of radionuclide specific radioactivity, dose rates associated with gaseous releases, and cumulative doses for the current quarter and year.

With each release period and batch release, radioactivity, dose rates, and cumulative doses are calculated. Cumulative dose results are tabulated, along with the percent of the ODCM limits for each release for the current quarter and year.

Typically achieved minimum detectable concentrations for gaseous effluent sample analyses are reported in Table 2-6.

## **2.2.2 Total Quantities of Radioactivity, Dose Rates, and Cumulative Doses**

The methods for determining release quantities of radioactivity, dose rates, and cumulative doses are as follows:

### **2.2.2.1 Fission and Activation Gases**

The released radioactivity is determined from sample analysis results collected as described above and average release flow rates over the period represented by the collected sample. Dose rates due to noble gases, radioiodines, tritium, and particulates are calculated. Calculated dose rates are compared to the dose rate limits specified in ODCM 3.1.2 for noble gases, radioiodines, tritium, and particulates. Dose rate calculation methodology is presented in the ODCM.

Beta and gamma air doses due to noble gases are calculated for the location in the unrestricted area with the potential for the highest exposure due to gaseous releases. Air doses are calculated for each release period and cumulative totals are kept for each unit for the calendar quarter and year. Cumulative air doses are compared with the dose limits specified in ODCM 3.1.3. Current percent of the ODCM limits are shown on the printout for each release period. Air dose calculation methodology is presented in the ODCM.

### **2.2.2.2 Radioiodines, Tritium and Particulate Releases**

The released quantities of radioiodines, tritium and particulates are determined using the weekly samples and release flow rates for the two plant vent release points.

After each quarter, the particulate filters from each plant vent are combined, for strontium analysis. Strontium concentrations are input to the composite file of the computer to be used for release dose rate and individual dose calculations.

Doses to a Member of the Public due to radioiodines, tritium and particulates are calculated for the controlling receptor, which is described in Table 3-7 of the ODCM. Doses are calculated for each release period, and cumulative totals are kept for each unit for the current calendar quarter and year. Cumulative doses are compared to the dose limits specified in ODCM 3.1.4.

Current percent of ODCM limits are shown in this report for each release period.

### **2.2.2.3 Gross Alpha Release**

The gross alpha release is calculated each month by counting the particulate filters for each week for gross alpha activity. The four or five weeks' numbers are then recorded on a data sheet and the activity is summed at the end of the month. This concentration is used for release calculations.

### 2.2.3

### Total Error Estimation

The total or maximum error associated with the effluent measurement will include the cumulative errors resulting from the total operation of sampling and measurement. Because it may be very difficult to assign error terms for each parameter affecting the final measurement, detailed statistical evaluation of error are not suggested. The objective should be to obtain an overall estimate of the error associated with measurements of radioactive materials released in liquid and gaseous effluents and solid waste.

Estimated errors are based on errors in counting equipment calibration, counting statistics, vent-flow rates, vent sample flow rates, non-steady release rates, chemical yield factors, and sample losses for such items as charcoal cartridges. Total Error is calculated by the root mean square method. The root mean square value is the square root of the arithmetic mean (average) of the squares of the original values.

- a. Fission and activation total release was calculated from sample analysis results and release point flow rates.

Sampling and statistical error in counting	10%
Counting equipment calibration	10%
Vent flow Rates	10%
Non-steady release rates	20%
<b>TOTAL ERROR</b>	<b>26.5%</b>

- b. I-131 releases were calculated from each weekly sample:

Statistical error in counting	10%
Counting equipment calibration	10%
Vent Flow Rates	10%
Vent Sample Flow Rates	50%
Non-Steady release rates	10%
Losses from charcoal cartridges	10%
<b>TOTAL ERROR</b>	<b>55%</b>

- c. Particulates with half-lives greater than 8 day releases were calculated from sample and analysis results and release point flow rates.

Statistical error at MDC concentration	10%
Counting equipment calibration	10%
Vent flow rates	10%
Vent sample flow rates	50%
Non steady release rates	10%
<b>TOTAL ERROR</b>	<b>54%</b>

### 2.2.3

#### Total Error Estimation cont'd

- d. Total tritium releases were calculated from sample analysis results and release point flow rates.

Water vapor in sample stream determination	10%
Vent flow rates	10%
Counting calibration and statistics	10%
Non-steady release rates	10%
<b>TOTAL ERROR</b>	<b>20%</b>

- e. Gross Alpha radioactivity was calculated from sample analysis results and release point flow rates.

Statistical error at MDC concentration	10%
Counting equipment calibration	10%
Vent flow rates	10%
Vent sample flow rates	50%
Non Steady release rates	10%
<b>TOTAL ERROR</b>	<b>55%</b>

### 2.3

#### Gaseous Effluent Release Data

Regulatory Guide 1.21 Rev. 1 Tables 1A, 1B, and 1C are found in this report as Tables 2-1A, 2-1B, 2-1C, 2-2A, 2-2B, 2-2C, 2-3A, 2-3B, and 2-3C. Data are presented on a quarterly basis as required by Regulatory Guide 1.21 Rev. 1.

To complete table 2-1A, and 2-1B, the total release for each of the four categories (fission and activation gases, iodines, particulates, and tritium) was divided by the number of seconds in the quarter to obtain a release rate in  $\mu\text{Ci}/\text{second}$  for each category. However, the percent of the ODCM limits are not applicable because VEGP has no curie limits for gaseous releases. Applicable limits are expressed in terms of dose. Noble gases are limited as specified in ODCM 3.1.2. The other three categories (tritium, radioiodines, and particulates) are limited as a group as specified in ODCM 3.1.2.

Dose rates due to noble gas releases and due to radioiodines, tritium, and particulate releases were calculated as part of the pre-release and post-release permits. No limits were exceeded for this reporting period.

Gross alpha radioactivity is reported in Table 2-1A and 2-1B as curies released in each quarter.

Limits for cumulative beta and gamma air doses due to noble gases are specified in ODCM 3.1.3. Cumulative air doses are presented in Table 2-4A, and 2-4B along with the percent of the ODCM limits.



Limits for cumulative doses to a Member of the Public due to radioiodines, tritium and particulates, are specified in ODCM 3.1.4. Cumulative doses to a Member of the Public are presented in Table 2-5A, and 2-5B along with percent of ODCM limits.

## **2.4 Radiological Impact Due to Gaseous Releases**

Dose rates due to the release of noble gases were calculated for the site in accordance with ODCM 3.4.1.1. Dose rates due to radioiodines, tritium, and particulates in gaseous releases were calculated in accordance with ODCM 3.4.1.2.

Dose rates were calculated as part of pre-release and post release permits. No limits were exceeded for this reporting period.

Cumulative air doses due to noble gas releases were calculated for each unit in accordance with ODCM 3.4.2. These results are presented in Tables 2-4A and 2-4B.

Cumulative doses to a Member of the Public were calculated for each unit in accordance with ODCM 3.4.3. These results are presented in Tables 2-5A and 2-5B.

Dose rates and doses were calculated using the methodology presented in the Vogtle Electric Generating Plant Offsite Dose Calculation Manual.

## **2.5 Gaseous Effluents - Batch Releases**

Other data pertinent to batch releases of radioactive gaseous effluent from Unit 1 and Unit 2 are listed in Table 2-7A and 2-7B.

## **2.6 Gaseous Effluents - Abnormal Releases**

There were no abnormal releases for 2018.

Table 2-1 A

**Vogtle Electric Generating Plant  
 RADIOACTIVE EFFLUENT RELEASE REPORT - 2018  
 Gaseous Effluents - Summation Of All Releases  
 Unit: 1  
 Starting: 1-Jan-2018 Ending: 31-Dec-2018**

Type of Effluent	Units	1ST Quarter	2ND Quarter	3RD Quarter	4TH Quarter
<b>A. Fission And Activation Gases</b>					
1. Total Release	Curies	9.34E-02	1.28E-01	3.57E-01	6.92E+01
2. Average Release rate for period	uCi/sec	1.18E-02	1.62E-02	4.53E-02	8.77E+00
3. Percent of Applicable Limit	%	*	*	*	*
<b>B. Radioiodines</b>					
1. Total Iodine-131	Curies	0.00E+00	0.00E+00	9.57E-07	6.59E-07
2. Average Release rate for period	uCi/sec	0.00E+00	0.00E+00	1.21E-07	8.36E-08
3. Percent of Applicable Limit	%	*	*	*	*
<b>C. Particulates</b>					
1. Particulates ( Half-Lives > 8 Days )	Curies	0.00E+00	0.00E+00	6.83E-06	7.28E-07
2. Average Release rate for period	uCi/sec	0.00E+00	0.00E+00	8.67E-07	9.22E-08
3. Percent of Applicable Limit	%	*	*	*	*
<b>D. Tritium</b>					
1. Total Release	Curies	8.73E+00	1.15E+01	3.02E+01	3.31E+01
2. Average Release rate for period	uCi/sec	1.11E+00	1.46E+00	3.83E+00	4.19E+00
3. Percent of Applicable Limit	%	*	*	*	*
<b>E. Gross Alpha</b>					
1. Total Release	Curies	0.00E+00	7.29E-07	1.13E-06	1.36E-06
2. Average Release rate for period	uCi/sec	0.00E+00	9.25E-08	1.43E-07	1.72E-07

\* Applicable limits are expressed in terms of dose. See Tables 2-5A and 2-5B of this report.

**Table 2-1 B**

**Vogtle Electric Generating Plant  
 RADIOACTIVE EFFLUENT RELEASE REPORT - 2018  
 Gaseous Effluents - Summation Of All Releases  
 Unit: 2  
 Starting: 1-Jan-2018 Ending: 31-Dec-2018**

Type of Effluent	Units	1ST Quarter	2ND Quarter	3RD Quarter	4TH Quarter
<b>A. Fission And Activation Gases</b>					
1. Total Release	Curies	1.59E-01	1.94E-01	2.82E-02	1.87E-01
2. Average Release rate for period	uCi/sec	2.02E-02	2.46E-02	3.57E-03	2.37E-02
3. Percent of Applicable Limit	%	*	*	*	*
<b>B. Radioiodines</b>					
1. Total Iodine-131	Curies	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2. Average Release rate for period	uCi/sec	0.00E+00	0.00E+00	0.00E+00	0.00E+00
3. Percent of Applicable Limit	%	*	*	*	*
<b>C. Particulates</b>					
1. Particulates ( Half-Lives > 8 Days )	Curies	0.00E+00	0.00E+00	2.09E-07	7.35E-08
2. Average Release rate for period	uCi/sec	0.00E+00	0.00E+00	2.66E-08	9.316E-09
3. Percent of Applicable Limit	%	*	*	*	*
<b>D. Tritium</b>					
1. Total Release	Curies	6.05E+00	8.31E+00	3.84E+00	1.68E+01
2. Average Release rate for period	uCi/sec	7.68E-01	1.05E+00	4.87E-01	2.13E+00
3. Percent of Applicable Limit	%	*	*	*	*
<b>E. Gross Alpha</b>					
1. Total Release	Curies	8.80E-09	5.27E-07	6.39E-07	7.70E-07
2. Average Release rate for period	uCi/sec	1.12E-09	6.68E-08	8.10E-08	9.76E-08

\* Applicable limits are expressed in terms of dose. See Tables 2-5A and 2-5B of this report

Table 2-1 C

**Vogtle Electric Generating Plant**  
**RADIOACTIVE EFFLUENT RELEASE REPORT - 2018**  
**Gaseous Effluents - Summation Of All Releases**  
**Unit: Site**  
**Starting: 1-Jan-2018 Ending: 31-Dec-2018**

Type of Effluent	Units	1ST Quarter	2ND Quarter	3RD Quarter	4TH Quarter
<b>A. Fission And Activation Gases</b>					
1. Total Release	Curies	2.53E-01	3.22E-01	3.86E-01	6.94E+01
2. Average Release rate for period	uCi/sec	3.20E-02	4.08E-02	4.89E-02	8.80E+00
3. Percent of Applicable Limit	%	*	*	*	*
<b>B. Radioiodines</b>					
1. Total Iodine-131	Curies	0.00E+00	0.00E+00	9.57E-07	6.59E-07
2. Average Release rate for period	uCi/sec	0.00E+00	0.00E+00	1.21E-07	8.36E-08
3. Percent of Applicable Limit	%	*	*	*	*
<b>C. Particulates</b>					
1. Particulates ( Half-Lives > 8 Days )	Curies	0.00E+00	0.00E+00	7.04E-06	8.01E-07
2. Average Release rate for period	uCi/sec	0.00E+00	0.00E+00	8.93E-07	1.02E-07
3. Percent of Applicable Limit	%	*	*	*	*
<b>D. Tritium</b>					
1. Total Release	Curies	1.48E+01	1.98E+01	3.40E+01	4.98E+01
2. Average Release rate for period	uCi/sec	1.88E+00	2.51E+00	4.32E+00	6.32E+00
3. Percent of Applicable Limit	%	*	*	*	*
<b>E. Gross Alpha</b>					
1. Total Release	Curies	8.80E-09	1.26E-06	1.77E-06	2.13E-06
2. Average Release rate for period	uCi/sec	1.12E-09	1.59E-07	2.24E-07	2.70E-07

\* Applicable limits are expressed in terms of dose. See Tables 2-5A and 2-5B of this report.

**Table 2-2 A**

**Vogtle Electric Generating Plant  
 RADIOACTIVE EFFLUENT RELEASE REPORT - 2018  
 Gaseous Effluents - Mixed Mode Level Releases  
 Unit: 1  
 Starting: 1-Jan-2018 Ending: 31-Dec-2018**

**Continuous Mode**

<b>Nuclides Released</b>	<b>Units</b>	<b>1ST Quarter</b>	<b>2ND Quarter</b>	<b>3RD Quarter</b>	<b>4TH Quarter</b>
<b>Fission Gases</b>					
Xe-133	Curies	0.00E+00	0.00E+00	0.00E+00	5.60E+01
Xe-135	Curies	0.00E+00	0.00E+00	0.00E+00	7.15E-01
<b>Total For Period</b>	<b>Curies</b>	<b>0.00E+00</b>	<b>0.00E+00</b>	<b>0.00E+00</b>	<b>5.67E+01</b>
<b>Iodines</b>					
I-131	Curies	0.00E+00	0.00E+00	9.57E-07	4.74E-07
I-133	Curies	0.00E+00	0.00E+00	0.00E+00	1.02E-06
<b>Total For Period</b>	<b>Curies</b>	<b>0.00E+00</b>	<b>0.00E+00</b>	<b>9.57E-07</b>	<b>1.49E-06</b>
<b>Particulates</b>					
Cr-51	Curies	0.00E+00	0.00E+00	1.45E-06	0.00E+00
Co-58	Curies	0.00E+00	0.00E+00	4.42E-06	3.39E-07
Co-60	Curies	0.00E+00	0.00E+00	7.12E-07	0.00E+00
Sr-89	Curies	0.00E+00	0.00E+00	0.00E+00	3.84E-07
Nb-95/Zr-95	Curies	0.00E+00	0.00E+00	2.44E-07	0.00E+00
<b>Total For Period</b>	<b>Curies</b>	<b>0.00E+00</b>	<b>0.00E+00</b>	<b>6.83E-06</b>	<b>7.23E-07</b>
<b>Tritium</b>					
H-3	Curies	8.72E+00	1.15E+01	2.93E+01	3.11E+01
<b>Gross Alpha</b>					
G-Alpha	Curies	0.00E+00	7.29E-07	1.13E-06	1.30E-06
<b>Total For Period</b>	<b>Curies</b>	<b>0.00E+00</b>	<b>7.29E-07</b>	<b>1.13E-06</b>	<b>1.30E-06</b>

**Table 2-2 A**

**Vogtle Electric Generating Plant  
 RADIOACTIVE EFFLUENT RELEASE REPORT - 2018  
 Gaseous Effluents - Mixed Mode Level Releases  
 Unit: 1  
 Starting: 1-Jan-2018 Ending: 31-Dec-2018**

**Batch Mode**

<b>Nuclides Released</b>	<b>Units</b>	<b>1ST Quarter</b>	<b>2ND Quarter</b>	<b>3RD Quarter</b>	<b>4TH Quarter</b>
<b>Fission Gases</b>					
Ar-41	Curies	5.30E-02	6.47E-02	3.12E-01	9.87E-02
Xe-131M	Curies	0.00E+00	0.00E+00	0.00E+00	2.98E-02
Xe-133M	Curies	0.00E+00	6.80E-04	0.00E+00	1.46E-01
Xe-133	Curies	4.04E-02	6.21E-02	6.15E-04	1.22E+01
Xe-135	Curies	0.00E+00	2.64E-04	0.00E+00	3.85E-02
<b>Total For Period</b>	<b>Curies</b>	<b>9.34E-02</b>	<b>1.28E-01</b>	<b>3.13E-01</b>	<b>1.25E+01</b>
<b>Iodines</b>					
No Nuclides Found	Curies	0.00E+00	0.00E+00	0.00E+00	0.00E+00
<b>Particulates</b>					
No Nuclides Found	Curies	0.00E+00	0.00E+00	0.00E+00	0.00E+00
<b>Tritium</b>					
H-3	Curies	1.33E-02	1.33E-02	7.12E-01	1.91E+00
<b>Gross Alpha</b>					
No Nuclides Found	Curies	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Table 2-2 B

**Vogtle Electric Generating Plant  
 RADIOACTIVE EFFLUENT RELEASE REPORT - 2018  
 Gaseous Effluents - Mixed Mode Level Releases  
 Unit: 2  
 Starting: 1-Jan-2018 Ending: 31-Dec-2018**

Continuous Mode

<b>Nuclides Released</b>	<b>Units</b>	<b>1ST Quarter</b>	<b>2ND Quarter</b>	<b>3RD Quarter</b>	<b>4TH Quarter</b>
<b>Fission Gases</b>					
No Nuclides Found	Curies	0.00E+00	0.00E+00	0.00E+00	0.00E+00
<b>Iodines</b>					
No Nuclides Found	Curies	0.00E+00	0.00E+00	0.00E+00	0.00E+00
<b>Particulates</b>					
Co-58	Curies	0.00E+00	0.00E+00	1.59E-07	0.00E+00
Sr-89	Curies	0.00E+00	0.00E+00	0.00E+00	7.35E-08
Sr-90	Curies	0.00E+00	0.00E+00	5.09E-08	0.00E+00
<b>Total For Period</b>	<b>Curies</b>	<b>0.00E+00</b>	<b>0.00E+00</b>	<b>2.09E-07</b>	<b>7.35E-08</b>
<b>Tritium</b>					
H-3	Curies	6.03E+00	8.30E+00	3.82E+00	1.67E+01
<b>Gross Alpha</b>					
G-Alpha	Curies	8.80E-09	5.27E-07	6.39E-07	7.70E-07
<b>Total For Period</b>	<b>Curies</b>	<b>8.80E-09</b>	<b>5.27E-07</b>	<b>6.39E-07</b>	<b>7.70E-07</b>

Table 2-2 B

**Vogtle Electric Generating Plant  
 RADIOACTIVE EFFLUENT RELEASE REPORT - 2018  
 Gaseous Effluents - Mixed Mode Level Releases  
 Unit: 2  
 Starting: 1-Jan-2018 Ending: 31-Dec-2018**

**Batch Mode**

<b>Nuclides Released</b>	<b>Units</b>	<b>1ST Quarter</b>	<b>2ND Quarter</b>	<b>3RD Quarter</b>	<b>4TH Quarter</b>
<b>Fission Gases</b>					
Ar-41	Curies	2.65E-02	2.48E-02	2.24E-02	9.91E-02
Kr-85M	Curies	2.35E-03	0.00E+00	0.00E+00	0.00E+00
Xe-133M	Curies	0.00E+00	2.33E-03	0.00E+00	0.00E+00
Xe-133	Curies	9.58E-02	1.66E-01	5.82E-03	8.74E-02
Xe-135	Curies	3.46E-02	1.02E-03	0.00E+00	5.50E-05
<b>Total For Period</b>	<b>Curies</b>	<b>1.59E-01</b>	<b>1.94E-01</b>	<b>2.82E-02</b>	<b>1.87E-01</b>
<b>Iodines</b>					
No Nuclides Found	Curies	0.00E+00	0.00E+00	0.00E+00	0.00E+00
<b>Particulates</b>					
No Nuclides Found	Curies	0.00E+00	0.00E+00	0.00E+00	0.00E+00
<b>Tritium</b>					
H-3	Curies	2.05E-02	1.58E-02	1.92E-02	1.14E-01
<b>Gross Alpha</b>					
No Nuclides Found	Curies	0.00E+00	0.00E+00	0.00E+00	0.00E+00



Table 2-2 C

**Vogtle Electric Generating Plant  
 RADIOACTIVE EFFLUENT RELEASE REPORT - 2018  
 Gaseous Effluents - Mixed Mode Level Releases  
 Unit: Site  
 Starting: 1-Jan-2018 Ending: 31-Dec-2018**

**Continuous Mode**

<b>Nuclides Released</b>	<b>Units</b>	<b>1ST Quarter</b>	<b>2ND Quarter</b>	<b>3RD Quarter</b>	<b>4TH Quarter</b>
<b>Fission Gases</b>					
Xe-133	Curies	0.00E+00	0.00E+00	0.00E+00	5.60E+01
Xe-135	Curies	0.00E+00	0.00E+00	0.00E+00	7.15E-01
<b>Total For Period</b>	<b>Curies</b>	<b>0.00E+00</b>	<b>0.00E+00</b>	<b>0.00E+00</b>	<b>5.67E+01</b>
<b>Iodines</b>					
I-131	Curies	0.00E+00	0.00E+00	9.57E-07	4.74E-07
I-133	Curies	0.00E+00	0.00E+00	0.00E+00	1.02E-06
<b>Total For Period</b>	<b>Curies</b>	<b>0.00E+00</b>	<b>0.00E+00</b>	<b>9.57E-07</b>	<b>1.49E-06</b>
<b>Particulates</b>					
Cr-51	Curies	0.00E+00	0.00E+00	1.45E-06	0.00E+00
Co-58	Curies	0.00E+00	0.00E+00	4.58E-06	3.39E-07
Co-60	Curies	0.00E+00	0.00E+00	7.12E-07	0.00E+00
Sr-89	Curies	0.00E+00	0.00E+00	0.00E+00	4.58E-07
Sr-90	Curies	0.00E+00	0.00E+00	5.09E-08	0.00E+00
Nb-95/Zr-95	Curies	0.00E+00	0.00E+00	2.44E-07	0.00E+00
<b>Total For Period</b>	<b>Curies</b>	<b>0.00E+00</b>	<b>0.00E+00</b>	<b>7.04E-06</b>	<b>7.97E-07</b>
<b>Tritium</b>					
H-3	Curies	1.48E+01	1.98E+01	3.31E+01	4.78E+01
<b>Gross Alpha</b>					
G-Alpha	Curies	8.80E-09	1.26E-06	1.77E-06	2.07E-06
<b>Total For Period</b>	<b>Curies</b>	<b>8.80E-09</b>	<b>1.26E-06</b>	<b>1.77E-06</b>	<b>2.07E-06</b>

Table 2-2 C

**Vogtle Electric Generating Plant  
 RADIOACTIVE EFFLUENT RELEASE REPORT - 2018  
 Gaseous Effluents - Mixed Mode Level Releases  
 Unit: Site  
 Starting: 1-Jan-2018 Ending: 31-Dec-2018**

**Batch Mode**

<b>Nuclides Released</b>	<b>Units</b>	<b>1ST Quarter</b>	<b>2ND Quarter</b>	<b>3RD Quarter</b>	<b>4TH Quarter</b>
<b>Fission Gases</b>					
Ar-41	Curies	7.95E-02	8.94E-02	3.35E-01	1.98E-01
Kr-85M	Curies	2.35E-03	0.00E+00	0.00E+00	0.00E+00
Xe-131M	Curies	0.00E+00	0.00E+00	0.00E+00	2.98E-02
Xe-133M	Curies	0.00E+00	3.01E-03	0.00E+00	1.46E-01
Xe-133	Curies	1.36E-01	2.28E-01	6.43E-03	1.23E+01
Xe-135	Curies	3.46E-02	1.29E-03	0.00E+00	3.86E-02
<b>Total For Period</b>	<b>Curies</b>	<b>2.53E-01</b>	<b>3.22E-01</b>	<b>3.41E-01</b>	<b>1.27E+01</b>
<b>Iodines</b>					
No Nuclides Found	Curies	0.00E+00	0.00E+00	0.00E+00	0.00E+00
<b>Particulates</b>					
No Nuclides Found	Curies	0.00E+00	0.00E+00	0.00E+00	0.00E+00
<b>Tritium</b>					
H-3	Curies	3.39E-02	2.91E-02	7.31E-01	2.02E+00
<b>Gross Alpha</b>					
No Nuclides Found	Curies	0.00E+00	0.00E+00	0.00E+00	0.00E+00

**Table 2-3A**

**Vogtle Electric Generating Plant  
 RADIOACTIVE EFFLUENT RELEASE REPORT - 2018  
 Gaseous Effluents - Ground Level Releases  
 Unit: 1  
 Starting: 1-Jan-2018 Ending: 31-Dec-2018**

**Continuous Mode**

<b>Nuclides Released</b>	<b>Units</b>	<b>1ST Quarter</b>	<b>2ND Quarter</b>	<b>3RD Quarter</b>	<b>4TH Quarter</b>
<b>Fission Gases</b>					
No Nuclides Found	Curies	0.00E+00	0.00E+00	0.00E+00	0.00E+00
<b>Iodines</b>					
I-131	Curies	0.00E+00	0.00E+00	0.00E+00	1.86E-07
I-133	Curies	0.00E+00	0.00E+00	0.00E+00	1.74E-07
<b>Total For Period</b>	<b>Curies</b>	<b>0.00E+00</b>	<b>0.00E+00</b>	<b>0.00E+00</b>	<b>3.60E-07</b>
<b>Particulates</b>					
Sr-90	Curies	0.00E+00	0.00E+00	0.00E+00	4.21E-09
<b>Total For Period</b>	<b>Curies</b>	<b>0.00E+00</b>	<b>0.00E+00</b>	<b>0.00E+00</b>	<b>4.21E-09</b>
<b>Tritium</b>					
H-3	Curies	0.00E+00	0.00E+00	0.00E+00	1.59E-02
<b>Gross Alpha</b>					
G-Alpha	Curies	0.00E+00	0.00E+00	0.00E+00	5.43E-08
<b>Total For Period</b>	<b>Curies</b>	<b>0.00E+00</b>	<b>0.00E+00</b>	<b>0.00E+00</b>	<b>5.43E-08</b>

**Table 2-3 A**

**Vogtle Electric Generating Plant  
RADIOACTIVE EFFLUENT RELEASE REPORT - 2018  
Gaseous Effluents - Ground Level Releases  
Unit: 1  
Starting: 1-Jan-2018 Ending: 31-Dec-2018**

**Batch Mode**

<b>Nuclides Released</b>	<b>Units</b>	<b>1ST Quarter</b>	<b>2ND Quarter</b>	<b>3RD Quarter</b>	<b>4TH Quarter</b>
<b>Fission Gases</b>					
Ar-41	Curies	0.00E+00	0.00E+00	4.45E-02	0.00E+00
<b>Total For Period</b>	<b>Curies</b>	<b>0.00E+00</b>	<b>0.00E+00</b>	<b>4.45E-02</b>	<b>0.00E+00</b>
<b>Iodines</b>					
No Nuclides Found	Curies	0.00E+00	0.00E+00	0.00E+00	0.00E+00
<b>Particulates</b>					
No Nuclides Found	Curies	0.00E+00	0.00E+00	0.00E+00	0.00E+00
<b>Tritium</b>					
H-3	Curies	0.00E+00	0.00E+00	1.74E-01	0.00E+00
<b>Gross Alpha</b>					
No Nuclides Found	Curies	0.00E+00	0.00E+00	0.00E+00	0.00E+00

**Table 2-3 B**

**Vogtle Electric Generating Plant  
RADIOACTIVE EFFLUENT RELEASE REPORT - 2018  
Gaseous Effluents - Ground Level Releases  
Unit: 2  
Starting: 1-Jan-2018 Ending: 31-Dec-2018**

**Continuous Mode**

<b>Nuclides Released</b>	<b>Units</b>	<b>1ST Quarter</b>	<b>2ND Quarter</b>	<b>3RD Quarter</b>	<b>4TH Quarter</b>
<b>Fission Gases</b> No Nuclides Found	Curies	0.00E+00	0.00E+00	0.00E+00	0.00E+00
<b>Iodines</b> No Nuclides Found	Curies	0.00E+00	0.00E+00	0.00E+00	0.00E+00
<b>Particulates</b> No Nuclides Found	Curies	0.00E+00	0.00E+00	0.00E+00	0.00E+00
<b>Tritium</b> No Nuclides Found	Curies	0.00E+00	0.00E+00	0.00E+00	0.00E+00
<b>Gross Alpha</b> No Nuclides Found	Curies	0.00E+00	0.00E+00	0.00E+00	0.00E+00

**Table 2-3 B**

**Vogtle Electric Generating Plant  
RADIOACTIVE EFFLUENT RELEASE REPORT - 2018  
Gaseous Effluents - Ground Level Releases  
Unit: 2  
Starting: 1-Jan-2018 Ending: 31-Dec-2018**

**Batch Mode**

<b>Nuclides Released</b>	<b>Units</b>	<b>1ST Quarter</b>	<b>2ND Quarter</b>	<b>3RD Quarter</b>	<b>4TH Quarter</b>
<b>Fission Gases</b> No Nuclides Found	Curies	0.00E+00	0.00E+00	0.00E+00	0.00E+00
<b>Iodines</b> No Nuclides Found	Curies	0.00E+00	0.00E+00	0.00E+00	0.00E+00
<b>Particulates</b> No Nuclides Found	Curies	0.00E+00	0.00E+00	0.00E+00	0.00E+00
<b>Tritium</b> No Nuclides Found	Curies	0.00E+00	0.00E+00	0.00E+00	0.00E+00
<b>Gross Alpha</b> No Nuclides Found	Curies	0.00E+00	0.00E+00	0.00E+00	0.00E+00

**Table 2-3 C**

**Vogtle Electric Generating Plant  
 RADIOACTIVE EFFLUENT RELEASE REPORT - 2018  
 Gaseous Effluents - Ground Level Releases  
 Unit: Site  
 Starting: 1-Jan-2018 Ending: 31-Dec-2018**

**Continuous Mode**

<b>Nuclides Released</b>	<b>Units</b>	<b>1ST Quarter</b>	<b>2ND Quarter</b>	<b>3RD Quarter</b>	<b>4TH Quarter</b>
<b>Fission Gases</b>					
No Nuclides Found	Curies	0.00E+00	0.00E+00	0.00E+00	0.00E+00
<b>Iodines</b>					
I-131	Curies	0.00E+00	0.00E+00	0.00E+00	1.86E-07
I-133	Curies	0.00E+00	0.00E+00	0.00E+00	1.74E-07
<b>Total For Period</b>	<b>Curies</b>	<b>0.00E+00</b>	<b>0.00E+00</b>	<b>0.00E+00</b>	<b>3.60E-07</b>
<b>Particulates</b>					
Sr-90	Curies	0.00E+00	0.00E+00	0.00E+00	4.21E-09
<b>Total For Period</b>	<b>Curies</b>	<b>0.00E+00</b>	<b>0.00E+00</b>	<b>0.00E+00</b>	<b>4.21E-09</b>
<b>Tritium</b>					
H-3	Curies	0.00E+00	0.00E+00	0.00E+00	1.59E-02
<b>Gross Alpha</b>					
G-Alpha	Curies	0.00E+00	0.00E+00	0.00E+00	5.43E-08
<b>Total For Period</b>	<b>Curies</b>	<b>0.00E+00</b>	<b>0.00E+00</b>	<b>0.00E+00</b>	<b>5.43E-08</b>

**Table 2-3 C**

**Vogtle Electric Generating Plant  
 RADIOACTIVE EFFLUENT RELEASE REPORT - 2018  
 Gaseous Effluents - Ground Level Releases  
 Unit: Site  
 Starting: 1-Jan-2018 Ending: 31-Dec-2018**

**Batch Mode**

<b>Nuclides Released</b>	<b>Units</b>	<b>1ST Quarter</b>	<b>2ND Quarter</b>	<b>3RD Quarter</b>	<b>4TH Quarter</b>
<b>Fission Gases</b>					
Ar-41	Curies	0.00E+00	0.00E+00	4.45E-02	0.00E+00
<b>Total For Period</b>	<b>Curies</b>	<b>0.00E+00</b>	<b>0.00E+00</b>	<b>4.45E-02</b>	<b>0.00E+00</b>
<b>Iodines</b>					
No Nuclides Found	Curies	0.00E+00	0.00E+00	0.00E+00	0.00E+00
<b>Particulates</b>					
No Nuclides Found	Curies	0.00E+00	0.00E+00	0.00E+00	0.00E+00
<b>Tritium</b>					
H-3	Curies	0.00E+00	0.00E+00	1.74E-01	0.00E+00
<b>Gross Alpha</b>					
No Nuclides Found	Curies	0.00E+00	0.00E+00	0.00E+00	0.00E+00



**Table 2-4 A**

**Vogtle Electric Generating Plant**  
**RADIOACTIVE EFFLUENT RELEASE REPORT - 2018**  
**Air Doses Due to Gaseous Releases**  
**Unit: 1**  
**Starting: 1-Jan-2018 Ending: 31-Dec-2018**

**Cumulative Doses Per Quarter**

Type of Radiation	ODCM Lmt	Units	1ST Qtr	% ODCM	2ND Qtr	% ODCM	3RD Qtr	% ODCM	4TH Qtr	% ODCM
Gamma Air	5.00E+00	mRad	7.43E-06	1.49E-04	9.14E-06	1.83E-04	7.60E-05	1.52E-03	3.88E-04	7.76E-03
Beta Air	1.00E+01	mRad	3.17E-06	3.17E-05	4.09E-06	4.09E-05	2.68E-05	2.68E-04	1.08E-03	1.08E-02

**Cumulative Doses Per Year**

Type of Radiation	ODCM Lmt	Units	Year to End Date	% ODCM	Receptor	Limit
Gamma Air	1.00E+01	mRad	4.80E-04	4.80E-03	Site Boundary / Child	Air Dose Gamma Annual 1.21
Beta Air	2.00E+01	mRad	1.12E-03	5.59E-03	Site Boundary / Child	Air Dose Beta Annual 1.21

**Table 2-4 B**

**Vogle Electric Generating Plant  
 RADIOACTIVE EFFLUENT RELEASE REPORT - 2018  
 Air Doses Due to Gaseous Releases  
 Unit: 2  
 Starting: 1-Jan-2018 Ending: 31-Dec-2018**

**Cumulative Doses Per Quarter**

Type of Radiation	ODCM Lmt	Units	1ST Qtr	% ODCM	2ND Qtr	% ODCM	3RD Qtr	% ODCM	4TH Qtr	% ODCM
Gamma Air	5.00E+00	mRad	5.13E-06	1.03E-04	4.27E-06	8.54E-05	3.08E-06	6.15E-05	1.40E-05	2.79E-04
Beta Air	1.00E+01	mRad	4.06E-06	4.06E-05	3.83E-06	3.83E-05	1.16E-06	1.16E-05	6.11E-06	6.11E-05

**Cumulative Doses Per Year**

Type of Radiation	ODCM Lmt	Units	Year to End Date	% ODCM	Receptor	Limit
Gamma Air	1.00E+01	mRad	2.64E-05	2.64E-04	Site Boundary / Child	Air Dose Gamma Annual 1.21
Beta Air	2.00E+01	mRad	1.52E-05	7.58E-05	Site Boundary / Child	Air Dose Beta Annual 1.21

**Table 2-4 C**

**Vogtle Electric Generating Plant**  
**RADIOACTIVE EFFLUENT RELEASE REPORT - 2018**  
**Gaseous Effluents - Ground Level Releases**  
**Unit: Site**  
**Starting: 1-Jan-2018 Ending: 31-Dec-2018**

**Cumulative Doses Per Quarter**

Type of Radiation	ODCM Lmt	Units	1ST Qtr	% ODCM	2ND Qtr	% ODCM	3RD Qtr	% ODCM	4TH Qtr	% ODCM
Gamma Air	5.00E+00	mRad	1.26E-05	2.51E-04	1.34E-05	2.68E-04	7.91E-05	1.58E-03	4.02E-04	8.04E-03
Beta Air	1.00E+01	mRad	7.23E-06	7.23E-05	7.91E-06	7.91E-05	2.80E-05	2.80E-04	1.09E-03	1.09E-02

**Cumulative Doses Per Year**

Type of Radiation	ODCM Lmt	Units	Year to End Date	% ODCM	Receptor	Limit
Gamma Air	1.00E+01	mRad	5.07E-04	5.07E-03	Site Boundary / Child	Air Dose Gamma Annual 1.21
Beta Air	2.00E+01	mRad	1.13E-03	5.67E-03	Site Boundary / Child	Air Dose Beta Annual 1.21

**Table 2-5 A**

**Vogtle Electric Generating Plant  
RADIOACTIVE EFFLUENT RELEASE REPORT - 2018**

**Doses To A Member Of The Public Due To Radioiodines, Tritium, and Particulates in Gaseous Releases**

**Unit: 1**

**Starting: 1-Jan-2018 Ending: 31-Dec-2018**

**Cumulative Doses Per Quarter**

Organ	ODCM Lmt	Units	1ST Qtr	% ODCM	2ND Qtr	% ODCM	3RD Qtr	% ODCM	4TH Qtr	% ODCM
Total Body	7.50E+00	mRem	1.89E-04	2.52E-03	2.48E-04	3.31E-03	6.68E-04	8.90E-03	7.16E-04	9.55E-03
GI-Lli	7.50E+00	mRem	1.89E-04	2.52E-03	2.48E-04	3.31E-03	6.68E-04	8.91E-03	7.16E-04	9.55E-03
Lung	7.50E+00	mRem	1.89E-04	2.52E-03	2.48E-04	3.31E-03	6.68E-04	8.90E-03	7.16E-04	9.55E-03
Thyroid	7.50E+00	mRem	1.89E-04	2.52E-03	2.48E-04	3.31E-03	6.69E-04	8.93E-03	7.18E-04	9.57E-03
Kidney	7.50E+00	mRem	1.89E-04	2.52E-03	2.48E-04	3.31E-03	6.68E-04	8.90E-03	7.16E-04	9.55E-03
Bone	7.50E+00	mRem	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.40E-07	7.20E-06	9.38E-07	1.25E-05
Liver	7.50E+00	mRem	1.89E-04	2.52E-03	2.48E-04	3.31E-03	6.68E-04	8.90E-03	7.16E-04	9.55E-03

**Cumulative Doses per Year**

Organ	ODCM Lmt	Units	Year to Ending Date	% ODCM	Receptor Limit
Total Body	1.500E+01	mRem	1.821E-03	1.214E-02	Maximum Individual / Child Iodine/Part Dose Annual 1.21
GI-Lli	1.500E+01	mRem	1.821E-03	1.214E-02	Maximum Individual / Child Iodine/Part Dose Annual 1.21
Lung	1.500E+01	mRem	1.821E-03	1.214E-02	Maximum Individual / Child Iodine/Part Dose Annual 1.21
Thyroid	1.500E+01	mRem	1.824E-03	1.216E-02	Maximum Individual / Child Iodine/Part Dose Annual 1.21
Kidney	1.500E+01	mRem	1.821E-03	1.214E-02	Maximum Individual / Child Iodine/Part Dose Annual 1.21
Bone	1.500E+01	mRem	1.478E-06	9.856E-06	Maximum Individual / Child Iodine/Part Dose Annual 1.21
Liver	1.500E+01	mRem	1.821E-03	1.214E-02	Maximum Individual / Child Iodine/Part Dose Annual 1.21

**Table 2-5 B**

**Vogle Electric Generating Plant  
RADIOACTIVE EFFLUENT RELEASE REPORT - 2018**

**Doses To A Member Of The Public Due To Radioiodines, Tritium, and Particulates in Gaseous Releases**

**Unit: 2**

**Starting: 1-Jan-2018 Ending: 31-Dec-2018**

**Cumulative Doses Per Quarter**

Organ	ODCM Lmt	Units	1ST Qtr	% ODCM	2ND Qtr	% ODCM	3RD Qtr	% ODCM	4TH Qtr	% ODCM
Thyroid	7.50E+00	mRem	1.31E-04	1.75E-03	1.80E-04	2.40E-03	8.31E-05	1.11E-03	3.63E-04	4.84E-03
Total Body	7.50E+00	mRem	1.31E-04	1.75E-03	1.80E-04	2.40E-03	8.36E-05	1.11E-03	3.63E-04	4.84E-03
Kidney	7.50E+00	mRem	1.31E-04	1.75E-03	1.80E-04	2.40E-03	8.31E-05	1.11E-03	3.63E-04	4.84E-03
Bone	7.50E+00	mRem	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.02E-06	2.69E-05	8.64E-08	1.15E-06
Liver	7.50E+00	mRem	1.31E-04	1.75E-03	1.80E-04	2.40E-03	8.31E-05	1.11E-03	3.63E-04	4.84E-03
Lung	7.50E+00	mRem	1.31E-04	1.75E-03	1.80E-04	2.40E-03	8.31E-05	1.11E-03	3.63E-04	4.84E-03
GI-Lli	7.50E+00	mRem	1.31E-04	1.75E-03	1.80E-04	2.40E-03	8.31E-05	1.11E-03	3.63E-04	4.84E-03

**Cumulative Doses per Year**

Organ	ODCM Lmt	Units	Year to Ending Date	% ODCM	Receptor	Limit
Thyroid	1.500E+01	mRem	7.567E-04	5.045E-03	Maximum Individual / Child	Iodine/Part Dose Annual 1.21
Total Body	1.500E+01	mRem	7.573E-04	5.048E-03	Maximum Individual / Child	Iodine/Part Dose Annual 1.21
Kidney	1.500E+01	mRem	7.567E-04	5.045E-03	Maximum Individual / Child	Iodine/Part Dose Annual 1.21
Bone	1.500E+01	mRem	2.107E-06	1.405E-05	Maximum Individual / Child	Iodine/Part Dose Annual 1.21
Liver	1.500E+01	mRem	7.567E-04	5.045E-03	Maximum Individual / Child	Iodine/Part Dose Annual 1.21
Lung	1.500E+01	mRem	7.568E-04	5.045E-03	Maximum Individual / Child	Iodine/Part Dose Annual 1.21
GI-Lli	1.500E+01	mRem	7.568E-04	5.045E-03	Maximum Individual / Child	Iodine/Part Dose Annual 1.21

**Table 2-5 C**

**Vogtle Electric Generating Plant  
RADIOACTIVE EFFLUENT RELEASE REPORT - 2018**

**Doses To A Member Of The Public Due To Radioiodines, Tritium, and Particulates in Gaseous Releases**

**Unit: Site**

**Starting: 1-Jan-2018 Ending: 31-Dec-2018**

**Cumulative Doses Per Quarter**

<b>Organ</b>	<b>ODCM Lmt</b>	<b>Units</b>	<b>1ST Qtr</b>	<b>% ODCM</b>	<b>2ND Qtr</b>	<b>% ODCM</b>	<b>3RD Qtr</b>	<b>% ODCM</b>	<b>4TH Qtr</b>	<b>% ODCM</b>
Kidney	7.50E+00	mRem	3.20E-04	4.26E-03	4.28E-04	5.71E-03	7.51E-04	1.00E-02	1.08E-03	1.44E-02
Liver	7.50E+00	mRem	3.20E-04	4.26E-03	4.28E-04	5.71E-03	7.51E-04	1.00E-02	1.08E-03	1.44E-02
Lung	7.50E+00	mRem	3.20E-04	4.26E-03	4.28E-04	5.71E-03	7.51E-04	1.00E-02	1.08E-03	1.44E-02
Thyroid	7.50E+00	mRem	3.20E-04	4.26E-03	4.28E-04	5.71E-03	7.52E-04	1.00E-02	1.08E-03	1.44E-02
GI-Li	7.50E+00	mRem	3.20E-04	4.26E-03	4.28E-04	5.71E-03	7.51E-04	1.00E-02	1.08E-03	1.44E-02
Bone	7.50E+00	mRem	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.56E-06	3.41E-05	1.02E-06	1.37E-05
<b>Total Body</b>	<b>7.50E+00</b>	<b>mRem</b>	<b>3.20E-04</b>	<b>4.26E-03</b>	<b>4.28E-04</b>	<b>5.71E-03</b>	<b>7.51E-04</b>	<b>1.00E-02</b>	<b>1.08E-03</b>	<b>1.44E-02</b>

**Cumulative Doses per Year**

<b>Organ</b>	<b>ODCM Lmt</b>	<b>Units</b>	<b>Year to Ending Date</b>	<b>% ODCM</b>	<b>Receptor</b>	<b>Limit</b>
Kidney	1.500E+01	mRem	2.578E-03	1.718E-02	Maximum Individual / Child	Iodine/Part Dose Annual 1.21
Liver	1.500E+01	mRem	2.578E-03	1.718E-02	Maximum Individual / Child	Iodine/Part Dose Annual 1.21
Lung	1.500E+01	mRem	2.578E-03	1.718E-02	Maximum Individual / Child	Iodine/Part Dose Annual 1.21
Thyroid	1.500E+01	mRem	2.581E-03	1.721E-02	Maximum Individual / Child	Iodine/Part Dose Annual 1.21
GI-Li	1.500E+01	mRem	2.578E-03	1.719E-02	Maximum Individual / Child	Iodine/Part Dose Annual 1.21
Bone	1.500E+01	mRem	3.585E-06	2.390E-05	Maximum Individual / Child	Iodine/Part Dose Annual 1.21
<b>Total Body</b>	<b>1.500E+01</b>	<b>mRem</b>	<b>2.578E-03</b>	<b>1.719E-02</b>	<b>Maximum Individual / Child</b>	<b>Iodine/Part Dose Annual 1.21</b>

Table 2-6

Vogtle Electric Generating Plant

RADIOACTIVE EFFLUENT RELEASE REPORT -- 2018

MINIMUM DETECTABLE CONCENTRATIONS  
GASEOUS SAMPLE ANALYSES

Starting: 1-Jan-2018

Ending: 31-Dec-2018

RADIONUCLIDE	MDC	UNITS
Kr-87	1.82E-08	μCi/ml
Kr-88	2.53E-08	μCi/ml
Xe-133	2.05E-08	μCi/ml
Xe-133m	8.63E-08	μCi/ml
Xe-135	7.12E-08	μCi/ml
Xe-138	1.05E-07	μCi/ml
I-131	7.93E-15*	μCi/ml
Mn-54	3.94E-14*	μCi/ml
Fe-59	2.45E-14*	μCi/ml
Co-58	1.39E-14*	μCi/ml
Co-60	1.75E-14*	μCi/ml
Zn-65	2.82E-14*	μCi/ml
Mo-99	9.57E-14*	μCi/ml
Cs-134	1.12E-14*	μCi/ml
Cs-137	8.71E-15*	μCi/ml
Ce-141	8.62E-15*	μCi/ml
Ce-144	2.77E-14*	μCi/ml
Sr-89	1.00E-13	μCi/ml
Sr-90	1.00E-13	μCi/ml
H-3	9.00E-08	μCi/ml
Gross Alpha	1.00E-13	μCi/ml

\* Based on an estimated sample volume of 5.7E+08 mls for particulate filters and charcoal cartridges

**Table 2-7 A**

**Vogtle Electric Generating Plant  
RADIOACTIVE EFFLUENT RELEASE REPORT - 2018  
Gaseous Effluents - Batch Release Summary  
Unit: 1  
Starting: 1-Jan-2018 Ending: 31-Dec-2018**

<b>Gaseous Releases</b>	<b>Units</b>	<b>1ST Quarter</b>	<b>2ND Quarter</b>	<b>3RD Quarter</b>	<b>4TH Quarter</b>	<b>Year Totals</b>
1. Number of batch releases		41	42	43	50	176
2. Total time period for batch releases	( Minutes )	6.75E+03	2.91E+03	2.28E+04	3.80E+03	3.63E+04
3. Maximum time period for a batch release	( Minutes )	1.62E+03	5.82E+02	9.57E+03	4.88E+02	9.57E+03
4. Average time period for a batch release	( Minutes )	1.65E+02	6.93E+01	5.31E+02	7.59E+01	2.06E+02
5. Minimum time period for a batch release	( Minutes )	2.60E+01	1.70E+01	2.80E+01	2.90E+01	1.70E+01



**Table 2-7 B**

**Vogtle Electric Generating Plant  
RADIOACTIVE EFFLUENT RELEASE REPORT - 2018  
Gaseous Effluents - Batch Release Summary  
Unit: 2  
Starting: 1-Jan-2018 Ending: 31-Dec-2018**

<b>Gaseous Releases</b>	<b>Units</b>	<b>1ST Quarter</b>	<b>2ND Quarter</b>	<b>3RD Quarter</b>	<b>4TH Quarter</b>	<b>Year Totals</b>
1. Number of batch releases		21	18	16	20	75
2. Total time period for batch releases	( Minutes )	4.37E+03	1.23E+03	7.90E+02	2.51E+03	8.90E+03
3. Maximum time period for a batch release	( Minutes )	1.75E+03	5.49E+02	9.00E+01	1.85E+03	1.85E+03
4. Average time period for a batch release	( Minutes )	2.08E+02	6.84E+01	4.94E+01	1.25E+02	1.19E+02
5. Minimum time period for a batch release	( Minutes )	2.50E+01	1.80E+01	2.70E+01	5.00E+00	5.00E+00

**Table 2-7 C**

**Vogle Electric Generating Plant  
RADIOACTIVE EFFLUENT RELEASE REPORT - 2018  
Gaseous Effluents - Batch Release Summary  
Unit: Site  
Starting: 1-Jan-2018 Ending: 31-Dec-2018**

<b>Gaseous Releases</b>	<b>Units</b>	<b>1ST Quarter</b>	<b>2ND Quarter</b>	<b>3RD Quarter</b>	<b>4TH Quarter</b>	<b>Year Totals</b>
1. Number of batch releases		62	60	59	70	251
2. Total time period for batch releases	( Minutes )	1.11E+04	4.14E+03	2.36E+04	6.30E+03	4.52E+04
3. Maximum time period for a batch release	( Minutes )	1.75E+03	5.82E+02	9.57E+03	1.85E+03	9.57E+03
4. Average time period for a batch release	( Minutes )	1.79E+02	6.90E+01	4.01E+02	9.00E+01	1.80E+02
5. Minimum time period for a batch release	( Minutes )	2.50E+01	1.70E+01	2.70E+01	5.00E+00	5.00E+00

**Table 2-8 A**

**Vogtle Electric Generating Plant  
RADIOACTIVE EFFLUENT RELEASE REPORT - 2018  
Gaseous Effluents - Abnormal Release Summary  
Unit: 1  
Starting: 1-Jan-2018 Ending: 31-Dec-2018**

<b>Gaseous Releases</b>	<b>Units</b>	<b>1ST Quarter</b>	<b>2ND Quarter</b>	<b>3RD Quarter</b>	<b>4TH Quarter</b>	<b>Year Totals</b>
1. Number of Releases		0	0	0	0	0
2. Total Time For All Releases	( Minutes )	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
3. Maximum Time For A Release	( Minutes )	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
4. Average Time For A Release	( Minutes )	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
5. Minimum Time For A Release	( Minutes )	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
6. Total activity for all releases	( Curies )	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

**Table 2-8 B**

**Vogtle Electric Generating Plant  
RADIOACTIVE EFFLUENT RELEASE REPORT - 2018  
Gaseous Effluents - Abnormal Release Summary  
Unit: 2  
Starting: 1-Jan-2018 Ending: 31-Dec-2018**

<b>Gaseous Releases</b>	<b>Units</b>	<b>1ST Quarter</b>	<b>2ND Quarter</b>	<b>3RD Quarter</b>	<b>4TH Quarter</b>	<b>Year Totals</b>
1. Number of Releases		0	0	0	0	0
2. Total Time For All Releases	( Minutes )	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
3. Maximum Time For A Release	( Minutes )	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
4. Average Time For A Release	( Minutes )	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
5. Minimum Time For A Release	( Minutes )	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
6. Total activity for all releases	( Curies )	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

**Table 2-8 C**

**Vogtle Electric Generating Plant  
RADIOACTIVE EFFLUENT RELEASE REPORT - 2018  
Gaseous Effluents - Abnormal Release Summary  
Unit: Site  
Starting: 1-Jan-2018 Ending: 31-Dec-2018**

<b>Gaseous Releases</b>	<b>Units</b>	<b>1ST Quarter</b>	<b>2ND Quarter</b>	<b>3RD Quarter</b>	<b>4TH Quarter</b>	<b>Year Totals</b>
1. Number of Releases		0	0	0	0	0
2. Total Time For All Releases	( Minutes )	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
3. Maximum Time For A Release	( Minutes )	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
4. Average Time For A Release	( Minutes )	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
5. Minimum Time For A Release	( Minutes )	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
6. Total activity for all releases	( Curies )	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

### **3.0 Solid Waste**

#### **3.1 Regulatory Requirements**

The ODCM requirements presented in this section are stated in part for Unit 1 and Unit 2.

##### **3.1.1 Solid Radioactive Waste System**

###### **10.2.1 Process Control Program (PCP)**

Radioactive wastes shall be solidified or dewatered in accordance with the PCP to meet shipping and transportation requirements during transit and disposal site requirements when received at the disposal site.

##### **3.1.2 Reporting Requirements**

###### **12.1 PCP states in part:**

The Radioactive Effluent Release Report, submitted in accordance with Technical Specification 5.6.3, shall include a summary of the quantities of solid radwaste released from the units, as outlined in Regulatory Guide 1.21 Rev 2.

#### **3.2 Solid Waste Data**

Regulatory Guide 1.21 Rev 2, Table 3 is found in this report as Table 3-1. GEL Laboratories performs hard-to-detect analysis for solid waste. Final calculations for nuclides include sample analysis performed on resin from High Integrity Containers. For Gaseous and Liquid composites, the Georgia Power Environmental Laboratory performs hard-to-detect analysis.

**Table 3-1**  
**Vogtle Electric Generating Plant**  
**RADIOACTIVE EFFLUENT AND WASTE DISPOSAL REPORT - 2018**  
**SOLID WASTE AND IRRADIATED FUEL SHIPMENTS**

**JANUARY 1, 2018 THROUGH JUNE 30, 2018**

**Regulatory Guide 1.21: Effluent and Waste Disposal Semi-Annual Report of Solid Waste and Irradiated Fuel Shipments**

**A. SOLID WASTE SHIPPED OFFSITE FOR BURIAL OR DISPOSAL (Not irradiated fuel)**

1.	Type of waste – <b>NRC Waste Class A</b>	UNIT	6 month Period	Est. Total ERROR %
a.	Spent resins, filter sludges, evaporator bottoms, etc.	m <sup>3</sup>	6.50E+01	+/- 10
		Cl	1.41E+01	+/- 10
b.	Dry compressible waste, contaminated equip. etc.	m <sup>3</sup>	3.09E+02	+/- 25
		Cl	3.20E-01	+/- 25
c.	Irradiated components, control rods,	m <sup>3</sup>	-N/A-	-N/A-
		Cl	-N/A-	-N/A-
d.	Control Rod Drive Filters	m <sup>3</sup>	-N/A-	-N/A-
		Cl	-N/A-	-N/A-
e.	Other (describe) Steam Generator Blowdown Resin (GIC)	m <sup>3</sup>	6.12E+01	+/- 10
		Cl	1.34E-02	+/- 10

1.	Type of waste – <b>NRC Waste Class B</b>	UNIT	6 month period	Est. Total ERROR %
a.	Spent resins, filter sludges, evaporator bottoms, etc.	m <sup>3</sup>	1.98E+00	+/- 10
		Cl	1.95E+01	+/- 10
b.	Dry compressible waste, contaminated equip. etc.	m <sup>3</sup>	-N/A-	-N/A-
		Cl	-N/A-	-N/A-
c.	Irradiated components, control rods,	m <sup>3</sup>	-N/A-	-N/A-
		Cl	-N/A-	-N/A-
d.	Control Rod Drive Filters	m <sup>3</sup>	-N/A-	-N/A-
		Cl	-N/A-	-N/A-
e.	Other (describe) equip. etc.	m <sup>3</sup>	-N/A-	-N/A-
		Cl	-N/A-	-N/A-

2. ESTIMATE OF MAJOR NUCLIDE COMPOSITION:  
**NRC WASTE CLASS A ( $\geq 1\%$  Percent)**

	ISOTOPE	PERCENT	CURIES
a.	<sup>125</sup> Sb	1.47	2.07E-01
	<sup>54</sup> Mn	1.01	1.42E-01
	<sup>55</sup> Fe	25.89	3.65E+00
	<sup>60</sup> Co	35.75	5.04E+00
	<sup>63</sup> Ni	32.64	4.60E+00
	<sup>137</sup> Cs	1.02	1.44E-01
b.	<sup>3</sup> H	2.23	7.11E-03
	<sup>55</sup> Fe	37.71	1.20E-01
	<sup>58</sup> Co	1.6	5.10E-03
	<sup>60</sup> Co	30.28	9.65E-02
	<sup>63</sup> Ni	24.711	7.70E-02
	<sup>54</sup> Mn	1.99	6.35E-02
c.	-N/A-	-N/A-	-N/A-
d.	-N/A-	-N/A-	-N/A-
e.	<sup>3</sup> H	2.24	3.01E-04
	<sup>55</sup> Fe	37.7	5.07E-03
	<sup>58</sup> Co	1.52	2.04E-06
	<sup>60</sup> Co	30.32	4.07E-03
	<sup>63</sup> Ni	24.25	3.26E-03
	<sup>54</sup> Mn	1.97	2.65E-04

2. ESTIMATE OF MAJOR NUCLIDE COMPOSITION:  
**NRC WASTE CLASS B ( $\geq 1\%$  Percent)**

	ISOTOPE	PERCENT	CURIES
a.	<sup>137</sup> Cs	12.13	2.36E+00
	<sup>55</sup> Fe	1.16	2.26E-01
	<sup>60</sup> Co	22.65	4.42E+00
	<sup>63</sup> Ni	34.99	6.82E+00
	<sup>65</sup> Zn	4.66	9.09E-01
	<sup>58</sup> Co	8.32	1.62E+00
	<sup>14</sup> C	2.66	5.19E-01
	<sup>3</sup> H	13.43	2.62E+00
b.	-N/A-	-N/A-	-N/A-
c.	-N/A-	-N/A-	-N/A-
d.	-N/A-	-N/A-	-N/A-
e.	-N/A-	-N/A-	-N/A-

3. Solid Waste Disposition
- |                            |                               |                                |
|----------------------------|-------------------------------|--------------------------------|
| <u>Number of Shipments</u> | <u>Mode of Transportation</u> | <u>Destination</u>             |
| 10                         | Hittman Transport             | Energy Solutions – Bear Creek  |
| 3                          | Hittman Transport             | Energy Solutions – Gallaher Rd |
- B. IRRADIATED FUEL SHIPMENTS (Disposition)
- |                            |                               |                    |
|----------------------------|-------------------------------|--------------------|
| <u>Number of Shipments</u> | <u>Mode of Transportation</u> | <u>Destination</u> |
| -N/A-                      | -N/A-                         | -N/A               |



**Table 3-1**  
**Vogtle Electric Generating Plant**  
**RADIOACTIVE EFFLUENT AND WASTE DISPOSAL REPORT - 2018**  
**SOLID WASTE AND IRRADIATED FUEL SHIPMENTS**

**JULY 1, 2018 THROUGH DECEMBER 31, 2018**

**Regulatory Guide 1.21: Effluent and Waste Disposal Semi-Annual Report of Solid Waste and Irradiated Fuel Shipments**

**A. SOLID WASTE SHIPPED OFFSITE FOR BURIAL OR DISPOSAL (Not irradiated fuel)**

1.	Type of waste – <b>NRC Waste Class A</b>	UNIT	6 month period	Est. Total ERROR %
a.	Spent resins, filter sludges, evaporator bottoms, etc.	m <sup>3</sup>	5.78E+01	+/- 10
		Ci	2.61E+01	+/- 10
b.	Dry compressible waste, contaminated equip. etc.	m <sup>3</sup>	1.77E+02	+/- 25
		Ci	4.08E-02	+/- 25
c.	Irradiated components, control rods,	m <sup>3</sup>	-N/A-	-N/A-
		Ci	-N/A-	-N/A-
d.	Control Rod Drive Filters	m <sup>3</sup>	-N/A-	-N/A-
		Ci	-N/A-	-N/A-
e. Other (describe) Steam Generator Blowdown Resin		m <sup>3</sup>	-N/A-	-N/A-
		Ci	-N/A-	-N/A-

1.	Type of waste – <b>NRC Waste Class B</b>	UNIT	6 month period	Est. Total ERROR %
a.	Spent resins, filter sludges, evaporator bottoms, etc.	m <sup>3</sup>	3.75E+00	+/- 10
		Ci	1.15E+02	+/- 10
b.	Dry compressible waste, contaminated equip. etc.	m <sup>3</sup>	-N/A-	-N/A-
		Ci	-N/A-	-N/A-
c.	Irradiated components, control rods,	m <sup>3</sup>	-N/A-	-N/A-
		Ci	-N/A-	-N/A-
d.	Control Rod Drive Filters	m <sup>3</sup>	-N/A-	-N/A-
		Ci	-N/A-	-N/A-
e. Other (describe) equip. etc.		m <sup>3</sup>	-N/A-	-N/A-
		Ci	-N/A-	-N/A-

**2. ESTIMATE OF MAJOR NUCLIDE COMPOSITION:**

**NRC WASTE CLASS A (≥1% Percent)**

	ISOTOPE	PERCENT	CURIES
a.	<sup>55</sup> Fe	22.21	5.80E+00
	<sup>58</sup> Co	3.37	8.79E-01
	<sup>60</sup> Co	28.01	7.31E+00
	<sup>63</sup> Ni	42.52	1.11E+01
	<sup>64</sup> Mn	1.14	2.97E-01
b.	<sup>51</sup> Cr	5.76	2.35E-03
	<sup>55</sup> Fe	2.45	9.97E-04

	<sup>58</sup> Co	43.61	1.78E-02
	<sup>60</sup> Co	33.23	1.35E-02
	<sup>63</sup> Ni	1.35	5.51E-04
	<sup>54</sup> Mn	3.05	1.24E-03
	<sup>95</sup> Zr	2.37	9.65E-04
	<sup>95</sup> Nb	4.89	1.99E-03
c.	-N/A-	-N/A-	-N/A-
d.	-N/A-	-N/A-	-N/A-
e.	-N/A-	-N/A-	-N/A-

2. ESTIMATE OF MAJOR NUCLIDE COMPOSITION:  
**NRC WASTE CLASS B (≥1% Percent)**

	ISOTOPE	PERCENT	CURIES
a.	<sup>54</sup> Mn	3.77	4.32E+00
	<sup>55</sup> Fe	25.46	2.91E+01
	<sup>58</sup> Co	4.13	4.73E+00
	<sup>60</sup> Co	25.03	2.86E+01
	<sup>63</sup> Ni	35.01	4.01E+01
	<sup>65</sup> Zn	1.02	1.16E+00
	<sup>125</sup> Sb	3.24	3.71E+00
b.	-N/A-	-N/A-	-N/A-
c.	-N/A-	-N/A-	-N/A-
d.	-N/A-	-N/A-	-N/A-
e.	-N/A-	-N/A-	-N/A-

3. Solid Waste Disposition

Number of Shipments

6

1

Mode of Transportation

Hittman Transport

Interstate Ventures

Destination

Energy Solutions – Bear Creek

WCS

B. IRRADIATED FUEL SHIPMENTS (Disposition)

Number of Shipments

N/A

Mode of Transportation

N/A

Destination

N/A

## **4.0 Doses to Members of the Public inside the Site Boundary**

### **4.1 Regulatory Requirements**

ODCM 7.2.2.3 states in part:

"The report shall also include assessment of the radiation doses from radioactive liquid and gaseous effluents to MEMBERS OF THE PUBLIC due to their activities inside the SITE BOUNDARY during the report period; this assessment must be performed in accordance with Chapter 6. All assumptions used in making these assessments (i.e., specific activity, exposure time, and location) shall be included in the report".

### **4.2 Demonstration of Compliance**

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 4-1 for this location are the values of the basic data assumed in the dose assessment due to radioactive gaseous effluents. Listed in this table are distance and direction from a point midway between the center of Unit 1 and the Unit 2 reactors, the dispersion and deposition factors for any releases from the plant vent (mixed mode) and from the turbine building (ground level), and the estimated maximum occupancy factor for an individual and the assumed age group of this individual.

The source term is listed in Tables 2-2A, and 2-2B for the mixed mode releases. Similarly, it is listed in Tables 2-3A and 2-3B for the ground level releases.

The maximum doses in units of mrem to a MEMBER OF THE PUBLIC due to their activities inside the site boundary during the reporting period are presented in Table 4-1.

**Table 4-1**

**Vogtle Electric Generating Plant  
 RADIOACTIVE EFFLUENT RELEASE REPORT - 2018  
 Doses to a Member of the Public Due to Activities Inside the Site Boundary**

**Unit: Site**

**Starting: 1-Jan-2018**

**Ending: 31-Dec-2018**

**Location Name:** Visitor's Center Receptor  
**Distance (kilometers):** 4.47E-01  
**Sector:** SE  
**Occupancy Factor:** 4.57E-04

**Age Group:** Child

Ground Level Release	Particulate and Radioiodine	X/Q (sec/m3): 5.58E-06	D/Q (m-2): 2.28E-08
Mixed Mode Release	Particulate and Radioiodine	X/Q (sec/m3): 6.74E-07	D/Q (m-2): 5.77E-09
Mixed Mode Release	Noble Gas	X/Q (sec/m3): 7.12E-07	
Ground Level Release	Noble Gas	X/Q (sec/m3): 5.93E-06	

	<b>Units</b>	<b>1ST Quarter</b>	<b>2ND Quarter</b>	<b>3RD Quarter</b>	<b>4TH Quarter</b>	<b>Year</b>
GI-Lli	mRem	7.04E-10	9.66E-10	4.47E-10	1.95E-09	4.07E-09
Thyroid	mRem	7.04E-10	9.66E-10	4.47E-10	1.95E-09	4.07E-09
Lung	mRem	7.04E-10	9.66E-10	4.47E-10	1.95E-09	4.07E-09
Skin	mRem	0.00E+00	0.00E+00	5.89E-14	1.54E-18	5.89E-14
Kidney	mRem	7.04E-10	9.66E-10	4.47E-10	1.95E-09	4.07E-09
Total Body	mRem	7.04E-10	9.66E-10	4.47E-10	1.95E-09	4.07E-09
Bone	mRem	0.00E+00	0.00E+00	5.53E-13	4.31E-15	5.57E-13
Liver	mRem	7.04E-10	9.66E-10	4.47E-10	1.95E-09	4.07E-09

**Table 4-1**

**Vogtle Electric Generating Plant  
RADIOACTIVE EFFLUENT RELEASE REPORT - 2018  
Doses to a Member of the Public Due to Activities Inside the Site Boundary**

**Unit: Site**

**Starting: 1-Jan-2018**

**Ending: 31-Dec-2018**

**Location Name:** Units 3&4 Construction  
**Distance (kilometers):** 4.83E-01  
**Sector:** SW  
**Occupancy Factor:** 2.37E-01

**Age Group:** Adult

Mixed Mode Release	Noble Gas	X/Q (sec/m3): 9.75E-07	
Mixed Mode Release	Particulate and Radioiodine	X/Q (sec/m3): 0.00E+00	
Ground Level Release	Particulate and Radioiodine	X/Q (sec/m3): 6.96E-06	D/Q (m-2): 2.88E-08
Ground Level Release	Particulate and Radioiodine	X/Q (sec/m3): 6.93E-06	D/Q (m-2): 2.88E-08
Ground Level Release	Noble Gas	X/Q (sec/m3): 1.81E-05	
Mixed Mode Release	Particulate and Radioiodine	X/Q (sec/m3): 9.17E-07	D/Q (m-2): 7.14E-09
Mixed Mode Release	Noble Gas	X/Q (sec/m3): 0.00E+00	

	<b>Units</b>	<b>1ST Quarter</b>	<b>2ND Quarter</b>	<b>3RD Quarter</b>	<b>4TH Quarter</b>	<b>Year</b>
Thyroid	mRem	5.63E-07	7.73E-07	3.57E-07	1.56E-06	3.25E-06
Liver	mRem	5.63E-07	7.73E-07	3.57E-07	1.56E-06	3.25E-06
Kidney	mRem	5.63E-07	7.73E-07	3.57E-07	1.56E-06	3.25E-06
Lung	mRem	5.63E-07	7.73E-07	3.57E-07	1.56E-06	3.25E-06
GI-Li	mRem	5.63E-07	7.73E-07	3.57E-07	1.56E-06	3.25E-06
Bone	mRem	0.00E+00	0.00E+00	3.82E-10	1.55E-12	3.83E-10
Total Body	mRem	5.63E-07	7.73E-07	3.57E-07	1.56E-06	3.25E-06
Skin	mRem	0.00E+00	0.00E+00	3.79E-11	9.91E-16	3.79E-11

**5.0 Total Dose from Uranium Fuel Cycle (40CFR190)**

**5.1 Regulatory Requirements**

ODCM 5.1 states in part that the annual (calendar year) dose or dose commitment to any MEMBER OF THE PUBLIC due to releases of radioactivity and to radiation from uranium fuel cycle sources shall be limited to less than or equal to 25 mrems to the whole body or to any organ, except the thyroid, which shall be limited to less than or equal to 75 mrems.

**5.2 Demonstration of Compliance**

No dose limits stated in ODCM Sections 2.1.3, 3.1.3, and 3.1.4 were exceeded. Therefore, compliance with 40 CFR 190 dose limits was demonstrated in accordance with the requirements of ODCM Section 5.1.3.

**6.0 Meteorological Data**

ODCM 7.2.2.2 states in part:

The Radioactive Effluent Release Report shall include an annual summary of hourly meteorological data collected over the previous year. This annual summary may be either in the form of an hour-by-hour listing of wind speed, wind direction, atmospheric stability, and precipitation (if measured) on magnetic tape; or in the form of joint frequency distributions of wind speed, wind direction and atmospheric stability.

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.

**7.0 Program Deviations**

**7.1 Inoperable Liquid or Gaseous Effluent Monitoring Instrumentation**

**7.1.1 Regulatory Requirement**

ODCM 7.2.2.6 states in part that the report shall include deviations from the liquid and gaseous effluent monitoring instrumentation operability requirements included in Sections 2.1.1 and 3.1.1, respectively. The report shall include an explanation as to why the inoperability of liquid or gaseous effluent monitoring instrumentation was not corrected within the specified time requirement.

## **7.1.2 Description of Deviations**

(1) The inoperability of liquid and gaseous effluent monitors not corrected within the specified time for this reporting period is detailed below. When applicable, compensatory measures were utilized per ODCM Action Statements:

a. 2FT-021

This flow transmitter was out of service greater than 30 days because the flow transmitter failed and needs to be repaired. It was removed from service December 12, 2016 and remains OOS awaiting parts. Work Order SNC832477.

## **7.2 Tanks Exceeding Curie Content Limits**

### **7.2.1 Regulatory Requirements**

ODCM 7.2.2.6 states in part that the report shall include a description of the events leading to liquid holdup tanks or gas storage tanks exceeding the limits of Technical Specifications 5.5.12.

### **7.2.2 Description of Deviations**

Limits for outdoor liquid hold-up tanks used for radioactive liquids were not exceeded during this reporting period.  
Limits for the gas storage tanks were not exceeded during this reporting period.

## **8.0 Changes to the Vogtle Electric Generating Plant Offsite Dose Calculation Manual (ODCM)**

### **8.1 Regulatory Requirements**

ODCM 7.2.2.5 states in part that changes to the ODCM shall be submitted with the Radioactive Effluent Release Report. These changes may be due to changes in the radiological environmental monitoring program sampling locations as required by ODCM 4.1.1.2.3 or changes to dose calculation locations as required by ODCM 4.1.2.2.2. Land uses and dose calculation locations within five miles of VEGP must be determined by a land use census as required by ODCM 4.1.2.

## 8.2 Description of Changes

The changes made to VEGP ODCM in 2018 are reflected in Version 32, dated January, 2018. The changes are as follows:

"Table 4-1, "Sediment from Shoreline" row, second column, add "One sample from upstream area not influenced by plant discharge."

Table 4-1, "Groundwater" row, second column should read: "On-site groundwater monitoring is not required at Vogtle per NUREG 1301. Groundwater monitoring is performed under NMP-EN-002."

Table 4-1, "Groundwater" row, third column should read: "See NMP-EN-002."

Table 4-1, "Groundwater" row, fourth column should read: "See NMP-EN-002."

Section 4.2 should read: "Table 4-4 and Figure 4-1 through Figure 4-4 specify the location at which the measurement and samples are taken for the REMP required by Section 4.1.1."

Table 4-4 and Figure 4-1, add Locations 110 and 111 for the new vegetation sample locations.

Delete Table 4-5 and delete Figure 4-5 from ODCM.

**Justification:** Regarding the sediment sample, this sample is required by Section 4.1.1 and is a regularly-obtained sample, the table just needs to reflect this.

Regarding the groundwater, the following justification is provided. NEI 07-07 is a guidance document developed by NEI to promote groundwater protection initiatives at each nuclear plant site. This program is separate from the REMP and does not need to be included in these tables as "REMP requirements."

On-site groundwater is not specifically required at Plant Vogtle by NUREG 1301. NUREG 1301 Table 3.12-1 states under the Groundwater section: "Samples from one or two sources (wb1, Wb2), only if likely to be affected<sup>(7)</sup>." Footnote (7) states: "Groundwater samples shall be taken when this source is tapped for drinking or irrigation purposes in areas where the hydraulic gradient or recharge properties are suitable for contamination." Accounting for these provisions, the only aquifer likely to be affected by contamination is the shallow aquifer which is not tapped for drinking or irrigation purposes; the on-site groundwater wells tapped for drinking purposes are sourced in the deep aquifer, hydraulically separated by an aquicludes/aquitards that prevents vertical migration of any potential contamination. Therefore, Vogtle is exempt from on-site groundwater sampling under the REMP, but still performs sampling under the groundwater protection program. This change is overall to clarify the difference between the REMP and groundwater protection program. The groundwater protection program is maintained through NMP-EN-002 and associated procedures/guidelines.

Two vegetation sample locations were added to Vogtle sampling regime to support the addition of the two units at Plant Vogtle. A study of the recent meteorological data indicated the need for additional vegetation sample locations.

Per Tech Spec Section 5.5.1, a determination was made that the changes to the ODCM maintain the levels of radioactive effluent control required by 10 CFR 20.1302, 40 CFR 190, 10



CFR 50.36a, and 10 CFR 50, Appendix I, and do not adversely impact the accuracy or reliability of effluent, dose, or setpoint calculations.”

Ref: LDCR 2017-047.

## **9.0 Major Changes to Liquid, Gaseous, or Solid Radwaste Treatment Systems**

### **9.1 Regulatory Requirements**

ODCM 7.2.2.7 states in part:

As required by Sections 2.1.5 and 3.1.6, licensee initiated MAJOR CHANGES TO RADIOACTIVE WASTE TREATMENT SYSTEMS (liquid and gaseous) shall be reported to the Nuclear Regulatory Commission in the Radioactive Effluent Release Report covering the period in which the change was reviewed and accepted for implementation.

Note 1: In lieu of inclusion in the Radioactive Effluents Release Report, this same information may be submitted as part of the annual FSAR update.

PCP 12.1 states in part:

Licensee major initiated changes to the solid radioactive waste treatment system shall be reported to the Nuclear Regulatory Commission in the Radioactive Effluent Release Report for the period in which the change was implemented.

### **9.2 Description of Major Changes**

#### **Gaseous Radwaste System**

There were no major changes to the gaseous radwaste systems in the 2018 assessment period.

#### **Liquid Radwaste System**

There were no major changes to the liquid radwaste systems occurred during the 2018 assessment period.

#### **Solid Radwaste System**

There were no major changes to the solid radwaste systems in the 2018 assessment period.

## Appendix A Vogtle Electric Generating Plant

### 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.

As nuclear plants have improved gaseous waste processing systems and improved fuel performance, the percentages of "principal radionuclides" in gaseous effluents have changed, and C-14 has become a larger percentage. "Principal radionuclides" are determined based on public dose contribution or the amount of activity discharged compared to other radionuclides of the same effluent type. In Revision 2 (June 2009) of Regulatory Guide 1.21 (RG 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. In 2010 Radioactive Effluent Release Reports, virtually all U. S. nuclear power plants started reporting C-14 amounts released and resulting doses to the maximally exposed member of the public.

Because C-14 is considered a hard-to-detect radionuclide which must be chemically separated from the effluent stream before it can be measured, RG 1.21 provides the option of calculating the C-14 source term based on power generation. The Electric Power Research Institute (EPRI) developed an accepted methodology for calculating C-14, and published the results in Technical Report 1021106 (December 2010), "Estimation of Carbon-14 in Nuclear Power Plant Gaseous Effluents." Evaluation of C-14 in radioactive liquid effluents is not required because the quantity and dose contribution has been determined to be insignificant.

At Plant Vogtle, the annual quantity of C-14 released in gaseous effluents was estimated to be 12.08 Curies (per unit). Approximately 30% of the C-14 released is in the form of  $^{14}\text{CO}_2$  and is incorporated into plants through photosynthesis. Ingestion dose results from this pathway. The remaining 70% is estimated to be organic. Both the organic and inorganic forms of C-14 contribute to inhalation dose. A child is the maximally exposed individual, and bone dose is the highest organ dose. Using the dose calculation methodology from the Vogtle ODCM, the resulting bone dose to a child located at the controlling receptor location would be 8.46E-02 mrem in a year which is 0.56% of the regulatory limit of 15 mrem per year (per unit) to any organ due to gaseous effluents. The resulting total body dose to a child located at the controlling receptor location would be 1.69E-02 mrem in a year which is 0.11% of the regulatory limit of 15 mrem per year (per unit) total body dose due to gaseous effluents