

ENCLOSURE 3

Vogtle Electric Generating Plant

Annual Radioactive Effluent Release Report for 2002

**SOUTHERN NUCLEAR OPERATING 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, 2002 TO DECEMBER 31, 2002**

**VOGTLE ELECTRIC GENERATING PLANT  
RADIOACTIVE EFFLUENT RELEASE REPORT - 2002  
TABLE OF CONTENTS**

<b>SECTION</b>	<b>TITLE</b>	<b>PAGE</b>
<b>1.0</b>	<b><i>Liquid Effluents</i></b>	<b>8</b>
<b>1.1</b>	<b><i>Regulatory Requirements</i></b>	<b>8</b>
<b>1.1.1</b>	<b><i>Concentration Limits</i></b>	<b>8</b>
<b>1.1.2</b>	<b><i>Dose Limits</i></b>	<b>8</b>
<b>1.2</b>	<b><i>Effluent Concentration Limit</i></b>	<b>8</b>
<b>1.3</b>	<b><i>Measurement and Approximations of Total Radioactivity</i></b>	<b>9</b>
<b>1.3.1</b>	<b><i>Total Radioactivity Determination</i></b>	<b>9</b>
<b>1.3.2</b>	<b><i>Total Error Estimation</i></b>	<b>11</b>
<b>1.4</b>	<b><i>Liquid Effluent Release Data</i></b>	<b>12</b>
<b>1.5</b>	<b><i>Radiological Impact Due to Liquid Releases</i></b>	<b>12</b>
<b>1.6</b>	<b><i>Liquid Effluents – Batch Releases</i></b>	<b>12</b>
<b>1.7</b>	<b><i>Liquid Effluents – Abnormal Releases</i></b>	<b>12</b>
<b>2.0</b>	<b><i>Gaseous Effluents</i></b>	<b>37</b>
<b>2.1</b>	<b><i>Regulatory Requirements</i></b>	<b>37</b>
<b>2.1.1</b>	<b><i>Dose Rate Limits</i></b>	<b>37</b>

<b>SECTION</b>	<b>TITLE</b>	<b>PAGE</b>
2.1.2	<i>Air Doses Due to Noble Gases in Gaseous Releases</i>	37
2.1.3	<i>Doses to a Member of the Public</i>	37
2.2	<i>Measurements and Approximation of Total Radioactivity</i>	38
2.2.1	<i>Sample Collection and Analysis</i>	38
2.2.2	<i>Total Quantities of Radioactivity, Dose Rates and Cumulative Doses</i>	38
2.2.2.1	<i>Fission and Activation Gases</i>	38
2.2.2.2	<i>Radioiodines, Tritium, and Particulate Releases</i>	39
2.2.2.3	<i>Gross Alpha Release</i>	39
2.2.3	<i>Total Error Estimation</i>	39
2.3	<i>Gaseous Effluent Release Data</i>	41
2.4	<i>Radiological Impact Due to Gaseous Releases</i>	42
2.5	<i>Gaseous Effluents – Batch Releases</i>	42
2.6	<i>Gaseous Effluents – Abnormal Releases</i>	42
3.0	<i>Solid Waste</i>	74
3.1	<i>Regulatory Requirements</i>	74
3.1.1	<i>Solid Radioactive Waste System</i>	74
3.1.2	<i>Reporting Requirements</i>	74
3.2	<i>Solid Waste Data</i>	74

<b>SECTION</b>	<b>TITLE</b>	<b>PAGE</b>
<b>4.0</b>	<b><i>Doses to Members of the Public Inside the Site Boundary</i></b>	<b>79</b>
<b>4.1</b>	<b><i>Regulatory Requirements</i></b>	<b>79</b>
<b>4.2</b>	<b><i>Demonstration of Compliance</i></b>	<b>79</b>
<b>5.0</b>	<b><i>Total Dose from Uranium Fuel Cycle (40CFR190)</i></b>	<b>83</b>
<b>5.1</b>	<b><i>Regulatory Requirements</i></b>	<b>83</b>
<b>5.2</b>	<b><i>Demonstration of Compliance</i></b>	<b>83</b>
<b>6.0</b>	<b><i>Meteorological Data</i></b>	<b>83</b>
<b>7.0</b>	<b><i>Program Deviations</i></b>	<b>83</b>
<b>7.1</b>	<b><i>Inoperable Liquid or Gaseous Effluent Monitoring Instrumentation</i></b>	<b>83</b>
<b>7.1.1</b>	<b><i>Regulatory Requirement</i></b>	<b>83</b>
<b>7.1.2</b>	<b><i>Description of Deviations</i></b>	<b>83</b>
<b>7.2</b>	<b><i>Tanks Exceeding Curie Content Limits</i></b>	<b>84</b>
<b>7.2.1</b>	<b><i>Regulatory Requirements</i></b>	<b>84</b>
<b>7.2.2</b>	<b><i>Description of Deviations</i></b>	<b>84</b>
<b>8.0</b>	<b><i>Changes to the Vogtle Electric Generating Plant Offsite Dose Calculation Manual (ODCM)</i></b>	<b>84</b>
<b>8.1</b>	<b><i>Regulatory Requirement</i></b>	<b>84</b>
<b>8.2</b>	<b><i>Description of Changes</i></b>	<b>84</b>
<b>9.0</b>	<b><i>Major Changes to the Liquid, Gaseous, or Solid Radwaste Treatment System</i></b>	<b>85</b>
<b>9.1</b>	<b><i>Regulatory Requirements</i></b>	<b>85</b>
<b>9.2</b>	<b><i>Description of Major Changes</i></b>	<b>85</b>
<b>Appendix A</b>	<b><i>VEGP Offsite Dose Calculation Manual</i></b>	

**VOGTLE ELECTRIC GENERATING PLANT**  
**RADIOACTIVE EFFLUENT RELEASE REPORT - 2002**

<b>TABLE</b>	<b>LIST OF TABLES</b>	<b>PAGE</b>
<b>1-1A</b>	<b><i>Liquid Effluents – Summation of All Releases Unit 1 (Quarters 1, 2, 3, and 4)</i></b>	<b>13</b>
<b>1-1B</b>	<b><i>Liquid Effluents – Summation of All Releases Unit 2 (Quarters 1, 2, 3, and 4)</i></b>	<b>15</b>
<b>1-1C</b>	<b><i>Liquid Effluents – Summation of All Releases Site (Quarters 1, 2, 3, and 4)</i></b>	<b>17</b>
<b>1-2A</b>	<b><i>Liquid Effluents – Unit 1 (Quarters 1, 2, 3, and 4)</i></b>	<b>19</b>
<b>1-2B</b>	<b><i>Liquid Effluents – Unit 2 (Quarters 1, 2, 3, and 4)</i></b>	<b>21</b>
<b>1-2C</b>	<b><i>Liquid Effluents – Site (Quarters 1, 2, 3, and 4)</i></b>	<b>22</b>
<b>1-3A</b>	<b><i>Doses to a Member of the Public Due to Liquid Releases Unit 1 (Quarters 1, 2, 3, and 4)</i></b>	<b>28</b>
<b>1-3B</b>	<b><i>Doses to a Member of the Public Due to Liquid Releases Unit 2 (Quarters 1, 2, 3, and 4)</i></b>	<b>30</b>
<b>1-4</b>	<b><i>Minimum Detectable Concentration Liquid Sample Analysis</i></b>	<b>32</b>
<b>1-5A</b>	<b><i>Liquid Effluents – Batch Release Summary Unit 1</i></b>	<b>33</b>
<b>1-5B</b>	<b><i>Liquid Effluents – Batch Release Summary Unit 2</i></b>	<b>34</b>
<b>1-6A</b>	<b><i>Liquid Effluents – Abnormal Release Summary Unit 1</i></b>	<b>35</b>

<b>TABLE</b>	<b>LIST OF TABLES</b>	<b>PAGE</b>
<b>1-6B</b>	<b><i>Liquid Effluents – Abnormal Release Summary Unit 2</i></b>	<b>36</b>
<b>2-1A</b>	<b><i>Gaseous Effluents – Summation of All Releases – Unit 1 (Quarters 1, 2, 3, and 4)</i></b>	<b>43</b>
<b>2-1B</b>	<b><i>Gaseous Effluents – Summation of All Releases – Unit 2 (Quarters 1, 2, 3, and 4)</i></b>	<b>45</b>
<b>2-1C</b>	<b><i>Gaseous Effluents – Summation of All Releases – Site (Quarters 1, 2, 3, and 4)</i></b>	<b>47</b>
<b>2-2A</b>	<b><i>Gaseous Effluents – Mixed Mode Releases Unit 1 (Quarters 1, 2, 3, and 4)</i></b>	<b>49</b>
<b>2-2B</b>	<b><i>Gaseous Effluents – Mixed Mode Releases Unit 2 (Quarters 1, 2, 3, and 4)</i></b>	<b>51</b>
<b>2-2C</b>	<b><i>Gaseous Effluents – Mixed Mode Releases Site (Quarters 1, 2, 3, and 4)</i></b>	<b>53</b>
<b>2-3A</b>	<b><i>Gaseous Effluents – Ground Level Releases Unit 1 (Quarters 1, 2, 3, and 4)</i></b>	<b>55</b>
<b>2-3B</b>	<b><i>Gaseous Effluents – Ground Level Releases Unit 2 (Quarters 1, 2, 3, and 4)</i></b>	<b>57</b>
<b>2-3C</b>	<b><i>Gaseous Effluents – Ground Level Releases Site (Quarters 1, 2, 3, and 4)</i></b>	<b>59</b>
<b>2-4A</b>	<b><i>Air Doses Due to Noble Gases in Gaseous Releases Unit 1 (Quarters 1, 2, 3, and 4)</i></b>	<b>61</b>
<b>2-4B</b>	<b><i>Air Doses Due to Noble Gases in Gaseous Releases Unit 2 (Quarters 1, 2, 3, and 4)</i></b>	<b>63</b>
<b>2-5A</b>	<b><i>Doses to a Member of the Public Due to Radioiodines, Tritium, and Particulates in Gaseous Releases Unit 1 (Quarters 1, 2, 3, and 4)</i></b>	<b>65</b>

<b>TABLE</b>	<b>LIST OF TABLES</b>	<b>PAGE</b>
<b>2-5B</b>	<b><i>Doses to a Member of the Public Due to Radioiodines, Tritium, and Particulates in Gaseous Releases Unit 2 (Quarters 1, 2, 3, and 4)</i></b>	<b>67</b>
<b>2-6</b>	<b><i>Minimum Detectable Concentration – Gaseous Sample Analysis</i></b>	<b>69</b>
<b>2-7A</b>	<b><i>Gaseous Effluents – Batch Release Summary Unit 1</i></b>	<b>70</b>
<b>2-7B</b>	<b><i>Gaseous Effluents – Batch Release Summary Unit 2</i></b>	<b>71</b>
<b>2-8A</b>	<b><i>Gaseous Effluents – Abnormal Release Summary Unit 1</i></b>	<b>72</b>
<b>2-8B</b>	<b><i>Gaseous Effluents – Abnormal Release Summary Unit 2</i></b>	<b>73</b>
<b>3-1</b>	<b><i>Solid Waste and Irradiated Fuel Shipments</i></b>	<b>75</b>
<b>4-1</b>	<b><i>Doses to a Member of the Public Due to Activities Inside the Site Boundary</i></b>	<b>81</b>



## **1.0 Liquid Effluents**

### **1.1 Regulatory Requirements**

#### **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 mrem to the whole body and to less than or equal to 5 mrem to any organ, and
- b. During any calendar year to less than or equal to 3 mrem to the whole body and to less than or equal to 10 mrem 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 recirculations, samples are collected and analyzed in accordance with the 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
5. Sr-89 & Sr-90	Quarterly Composite	Chemical separation and gas flow proportional or scintillation counting
6. Fe-55	Quarterly Composite	Chemical separation and liquid scintillation counting

### 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.

Tritium, Gross Alpha, Sr-89, Sr-90 and Fe-55 are, in some cases, analyzed offsite.

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 and Fe-55 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 approval and release. When the release is completed, the necessary data from the release (i.e., release volume, etc.) are provided by the Operations Department to the Chemistry Department. These data are 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 liquid effluents.

- 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%
TOTAL ERROR	40%

- 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%
TOTAL ERROR	40%

- 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%
TOTAL ERROR	50%

- 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%
TOTAL ERROR	40%

**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%
TOTAL ERROR	20%

- 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%
TOTAL ERROR	20%

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

Compositing sample error	5%
--------------------------	----

**1.4 Liquid Effluent Release Data**

Regulatory Guide 1.21 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 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 releases for this reporting period.

TABLE 1-1A  
Vogtle Electric Generating Plant  
RADIOACTIVE EFFLUENT RELEASE REPORT - 2002  
Liquid Effluents - Summation of All Releases  
Unit: 1  
Starting : 1-Jan-2002      Ending : 30-Jun-2002

TYPE OF EFFLUENT	UNITS	QUARTER 1	QUARTER 2	EST. TOT ERROR %
<b>A. FISSION &amp; ACTIVATION PRODUCTS</b>				
1. TOTAL RELEASE (NOT INCLUDING TRITIUM, GASES, ALPHA)	CURIES	2.40E-02	1.16E-02	40
2. AVERAGE DILUTED CONCENTRATION DURING PERIOD	uCi/ML	3.21E-08	2.97E-08	
3. PERCENT OF APPLICABLE LIMIT	%	*	*	
<b>B. TRITIUM</b>				
1. TOTAL RELEASE	CURIES	4.42E+02	1.24E+02	40
2. AVERAGE DILUTED CONCENTRATION DURING PERIOD	uCi/ML	5.91E-04	3.19E-04	
3. PERCENT OF APPLICABLE LIMIT	%	*	*	
<b>C. DISSOLVED AND ENTRAINED GASES</b>				
1. TOTAL RELEASE	CURIES	2.02E-03	4.46E-05	50
2. AVERAGE DILUTED CONCENTRATION DURING PERIOD	uCi/ML	2.70E-09	1.14E-10	
3. PERCENT OF APPLICABLE LIMIT	%	*	*	
<b>D. GROSS ALPHA RADIOACTIVITY</b>				
1. TOTAL RELEASE	CURIES	0.00E+00	0.00E+00	45
<b>E. WASTE VOL RELEASED (PRE-DILUTION)</b>				
	LITERS	9.92E+05	6.34E+05	20
<b>F. VOLUME OF DILUTION WATER USED</b>				
	LITERS	7.48E+08	3.89E+08	20

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

TABLE 1-1A  
Vogtle Electric Generating Plant  
RADIOACTIVE EFFLUENT RELEASE REPORT - 2002  
Liquid Effluents - Summation of All Releases  
Unit: 1  
Starting : 1-Jul-2002      Ending : 31-Dec-2002

TYPE OF EFFLUENT	UNITS	QUARTER 3	QUARTER 4	EST. TOT ERROR %
-----				
A. FISSION & ACTIVATION PRODUCTS				
-----				
1. TOTAL RELEASE (NOT INCLUDING TRITIUM, GASES, ALPHA)	CURIES	1.48E-02	3.91E-02	40
-----				
2. AVERAGE DILUTED CONCENTRATION DURING PERIOD	uCi/ML	3.60E-08	7.98E-08	
-----				
3. PERCENT OF APPLICABLE LIMIT	%	*	*	
-----				
B. TRITIUM				
-----				
1. TOTAL RELEASE	CURIES	3.82E+02	3.30E+02	40
-----				
2. AVERAGE DILUTED CONCENTRATION DURING PERIOD	uCi/ML	9.26E-04	6.74E-04	
-----				
3. PERCENT OF APPLICABLE LIMIT	%	*	*	
-----				
C. DISSOLVED AND ENTRAINED GASES				
-----				
1. TOTAL RELEASE	CURIES	5.33E-04	9.70E-04	50
-----				
2. AVERAGE DILUTED CONCENTRATION DURING PERIOD	uCi/ML	1.29E-09	1.98E-09	
-----				
3. PERCENT OF APPLICABLE LIMIT	%	*	*	
-----				
D. GROSS ALPHA RADIOACTIVITY				
-----				
1. TOTAL RELEASE	CURIES	0.00E+00	0.00E+00	45
-----				
E. WASTE VOL RELEASED (PRE-DILUTION)	LITERS	8.05E+05	9.38E+05	20
-----				
F. VOLUME OF DILUTION WATER USED	LITERS	4.11E+08	4.89E+08	20
-----				

\*      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 - 2002  
Liquid Effluents - Summation of All Releases  
Unit: 2  
Starting : 1-Jan-2002      Ending : 30-Jun-2002

TYPE OF EFFLUENT	UNITS	QUARTER 1	QUARTER 2	EST. TOT ERROR %
-----				
A. FISSION & ACTIVATION PRODUCTS				
-----				
1. TOTAL RELEASE (NOT INCLUDING TRITIUM, GASES, ALPHA)	CURIES	4.83E-03	1.02E-02	40
-----				
2. AVERAGE DILUTED CONCENTRATION DURING PERIOD	uCi/ML	7.50E-08	6.35E-08	
-----				
3. PERCENT OF APPLICABLE LIMIT	%	*	*	
-----				
B. TRITIUM				
-----				
1. TOTAL RELEASE	CURIES	1.88E+01	4.01E+01	40
-----				
2. AVERAGE DILUTED CONCENTRATION DURING PERIOD	uCi/ML	2.92E-04	2.49E-04	
-----				
3. PERCENT OF APPLICABLE LIMIT	%	*	*	
-----				
C. DISSOLVED AND ENTRAINED GASES				
-----				
1. TOTAL RELEASE	CURIES	6.87E-06	0.00E+00	50
-----				
2. AVERAGE DILUTED CONCENTRATION DURING PERIOD	uCi/ML	1.07E-10	0.00E+00	
-----				
3. PERCENT OF APPLICABLE LIMIT	%	*	*	
-----				
D. GROSS ALPHA RADIOACTIVITY				
-----				
1. TOTAL RELEASE	CURIES	0.00E+00	0.00E+00	45
-----				
E. WASTE VOL RELEASED (PRE-DILUTION)	LITERS	1.55E+05	3.26E+05	20
-----				
F. VOLUME OF DILUTION WATER USED	LITERS	6.42E+07	1.60E+08	20
-----				

\* 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 - 2002  
 Liquid Effluents - Summation of All Releases  
 Unit: 2  
 Starting : 1-Jul-2002      Ending : 31-Dec-2002

TYPE OF EFFLUENT	UNITS	QUARTER 3	QUARTER 4	EST. TOT ERROR %
-----				
A. FISSION & ACTIVATION PRODUCTS				
-----				
1. TOTAL RELEASE (NOT INCLUDING TRITIUM, GASES, ALPHA)	CURIES	4.05E-03	2.08E-02	40
-----				
2. AVERAGE DILUTED CONCENTRATION DURING PERIOD	uCi/ML	3.71E-08	3.39E-08	
-----				
3. PERCENT OF APPLICABLE LIMIT	%	*	*	
-----				
B. TRITIUM				
-----				
1. TOTAL RELEASE	CURIES	5.73E+01	1.72E+02	40
-----				
2. AVERAGE DILUTED CONCENTRATION DURING PERIOD	uCi/ML	5.25E-04	2.81E-04	
-----				
3. PERCENT OF APPLICABLE LIMIT	%	*	*	
-----				
C. DISSOLVED AND ENTRAINED GASES				
-----				
1. TOTAL RELEASE	CURIES	0.00E+00	3.70E-04	50
-----				
2. AVERAGE DILUTED CONCENTRATION DURING PERIOD	uCi/ML	0.00E+00	6.03E-10	
-----				
3. PERCENT OF APPLICABLE LIMIT	%	*	*	
-----				
D. GROSS ALPHA RADIOACTIVITY				
-----				
1. TOTAL RELEASE	CURIES	0.00E+00	0.00E+00	45
-----				
E. WASTE VOL RELEASED (PRE-DILUTION)	LITERS	2.68E+05	6.63E+05	20
-----				
F. VOLUME OF DILUTION WATER USED	LITERS	1.09E+08	6.12E+08	20
-----				

\*      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 - 2002  
Liquid Effluents - Summation of All Releases  
Unit: Site  
Starting : 1-Jan-2002      Ending : 30-Jun-2002

TYPE OF EFFLUENT	UNITS	QUARTER 1	QUARTER 2	EST. TOT ERROR %
<b>A. FISSION &amp; ACTIVATION PRODUCTS</b>				
1. TOTAL RELEASE (NOT INCLUDING TRITIUM, GASES, ALPHA)	CURIES	2.89E-02	2.18E-02	40
2. AVERAGE DILUTED CONCENTRATION DURING PERIOD	uCi/ML	3.55E-08	3.96E-08	
3. PERCENT OF APPLICABLE LIMIT	%	*	*	
<b>B. TRITIUM</b>				
1. TOTAL RELEASE	CURIES	4.61E+02	1.64E+02	40
2. AVERAGE DILUTED CONCENTRATION DURING PERIOD	uCi/ML	5.67E-04	2.99E-04	
3. PERCENT OF APPLICABLE LIMIT	%	*	*	
<b>C. DISSOLVED AND ENTRAINED GASES</b>				
1. TOTAL RELEASE	CURIES	2.03E-03	4.46E-05	50
2. AVERAGE DILUTED CONCENTRATION DURING PERIOD	uCi/ML	2.49E-09	8.09E-11	
3. PERCENT OF APPLICABLE LIMIT	%	*	*	
<b>D. GROSS ALPHA RADIOACTIVITY</b>				
1. TOTAL RELEASE	CURIES	0.00E+00	0.00E+00	45
E. WASTE VOL RELEASED (PRE-DILUTION)	LITERS	1.15E+06	9.60E+05	20
F. VOLUME OF DILUTION WATER USED	LITERS	8.12E+08	5.50E+08	20

\*      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 - 2002  
Liquid Effluents - Summation of All Releases  
Unit: Site  
Starting : 1-Jul-2002      Ending : 31-Dec-2002

TYPE OF EFFLUENT	UNITS	QUARTER 3	QUARTER 4	EST. TOT ERROR %
-----				
A. FISSION & ACTIVATION PRODUCTS				
-----				
1. TOTAL RELEASE (NOT INCLUDING TRITIUM, GASES, ALPHA)	CURIES	1.89E-02	5.99E-02	40
-----				
2. AVERAGE DILUTED CONCENTRATION DURING PERIOD	uCi/ML	3.62E-08	5.43E-08	
-----				
3. PERCENT OF APPLICABLE LIMIT	%	*	*	
-----				
B. TRITIUM				
-----				
1. TOTAL RELEASE	CURIES	4.39E+02	5.02E+02	40
-----				
2. AVERAGE DILUTED CONCENTRATION DURING PERIOD	uCi/ML	8.42E-04	4.55E-04	
-----				
3. PERCENT OF APPLICABLE LIMIT	%	*	*	
-----				
C. DISSOLVED AND ENTRAINED GASES				
-----				
1. TOTAL RELEASE	CURIES	5.33E-04	1.34E-03	50
-----				
2. AVERAGE DILUTED CONCENTRATION DURING PERIOD	uCi/ML	1.02E-09	1.22E-09	
-----				
3. PERCENT OF APPLICABLE LIMIT	%	*	*	
-----				
D. GROSS ALPHA RADIOACTIVITY				
-----				
1. TOTAL RELEASE	CURIES	0.00E+00	0.00E+00	45
-----				
E. WASTE VOL RELEASED(PRE-DILUTION)	LITERS	1.07E+06	1.60E+06	20
-----				
F. VOLUME OF DILUTION WATER USED	LITERS	5.20E+08	1.10E+08	20
-----				

\*      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 - 2002  
 Liquid Effluents

Unit: 1  
 Starting : 1-Jan-2002      Ending : 30-Jun-2002

NUCLIDE	UNIT	CONTINUOUS MODE		BATCH MODE	
		QUARTER 1	QUARTER 2	QUARTER 1	QUARTER 2
H-3	CURIES	0.00E+00	0.00E+00	4.42E+02	1.24E+02

FISSION & ACTIVATION PRODUCTS

AG-110M	CURIES	0.00E+00	0.00E+00	9.71E-07	0.00E+00
BE-7	CURIES	0.00E+00	0.00E+00	0.00E+00	2.05E-07
CO-57	CURIES	0.00E+00	0.00E+00	7.47E-05	9.85E-06
CO-58	CURIES	0.00E+00	0.00E+00	2.95E-03	2.80E-03
CO-60	CURIES	0.00E+00	0.00E+00	1.11E-02	2.19E-03
CR-51	CURIES	0.00E+00	0.00E+00	2.13E-03	9.21E-04
CS-134	CURIES	0.00E+00	0.00E+00	6.01E-05	2.23E-06
CS-137	CURIES	0.00E+00	0.00E+00	2.31E-04	9.55E-06
FE-55	CURIES	0.00E+00	0.00E+00	5.62E-04	4.52E-03
FE-59	CURIES	0.00E+00	0.00E+00	1.01E-04	2.32E-05
I-131	CURIES	0.00E+00	0.00E+00	4.42E-05	0.00E+00
I-132	CURIES	0.00E+00	0.00E+00	4.65E-05	0.00E+00
LA-140	CURIES	0.00E+00	0.00E+00	3.54E-06	0.00E+00
MN-54	CURIES	0.00E+00	0.00E+00	1.60E-03	2.96E-04
NA-24	CURIES	0.00E+00	0.00E+00	5.75E-06	0.00E+00
NB-95	CURIES	0.00E+00	0.00E+00	1.85E-04	2.50E-04
NB-97	CURIES	0.00E+00	0.00E+00	3.56E-05	0.00E+00
SB-124	CURIES	0.00E+00	0.00E+00	1.53E-05	0.00E+00
SB-125	CURIES	0.00E+00	0.00E+00	1.96E-03	1.47E-04
SN-113	CURIES	0.00E+00	0.00E+00	1.58E-06	2.03E-06
SR-89	CURIES	0.00E+00	0.00E+00	2.09E-05	4.03E-05
SR-92	CURIES	0.00E+00	0.00E+00	8.81E-07	0.00E+00
TE-125M	CURIES	0.00E+00	0.00E+00	2.68E-03	7.02E-06
TE-132	CURIES	0.00E+00	0.00E+00	5.05E-05	0.00E+00
Y-91	CURIES	0.00E+00	0.00E+00	0.00E+00	2.29E-04
Y-92	CURIES	0.00E+00	0.00E+00	9.26E-06	0.00E+00
ZN-65	CURIES	0.00E+00	0.00E+00	1.88E-06	3.61E-06
ZR-95	CURIES	0.00E+00	0.00E+00	1.36E-04	1.17E-04
TOTALS	CURIES	0.00E+00	0.00E+00	2.40E-02	1.16E-02

DISSOLVED AND ENTRAINED GASES

KR-88	CURIES	0.00E+00	0.00E+00	2.49E-06	0.00E+00
XE-133	CURIES	0.00E+00	0.00E+00	2.02E-03	4.46E-05
TOTALS	CURIES	0.00E+00	0.00E+00	2.02E-03	4.46E-05

-----  
G-ALPHA | 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 1-2A\*  
 Vogtle Electric Generating Plant  
 RADIOACTIVE EFFLUENT RELEASE REPORT - 2002  
 Liquid Effluents  
 Unit: 1  
 Starting : 1-Jul-2002      Ending : 31-Dec-2002

NUCLIDE	UNIT	CONTINUOUS MODE		BATCH MODE	
		QUARTER 3	QUARTER 4	QUARTER 3	QUARTER 4
H-3	CURIES	0.00E+00	0.00E+00	3.82E+02	3.30E+02

FISSION & ACTIVATION PRODUCTS

AG-110M	CURIES	0.00E+00	0.00E+00	0.00E+00	3.52E-05
CE-141	CURIES	0.00E+00	0.00E+00	1.74E-06	0.00E+00
CO-57	CURIES	0.00E+00	0.00E+00	3.67E-06	1.19E-05
CO-58	CURIES	0.00E+00	0.00E+00	9.56E-04	6.56E-03
CO-60	CURIES	0.00E+00	0.00E+00	2.53E-03	5.06E-03
CR-51	CURIES	0.00E+00	0.00E+00	6.22E-05	0.00E+00
CS-134	CURIES	0.00E+00	0.00E+00	1.82E-05	3.36E-04
CS-137	CURIES	0.00E+00	0.00E+00	5.15E-05	1.27E-03
FE-55	CURIES	0.00E+00	0.00E+00	1.02E-02	2.20E-02
FE-59	CURIES	0.00E+00	0.00E+00	1.90E-05	0.00E+00
MN-54	CURIES	0.00E+00	0.00E+00	3.49E-04	4.89E-04
NB-95	CURIES	0.00E+00	0.00E+00	2.30E-04	2.09E-04
NB-97	CURIES	0.00E+00	0.00E+00	0.00E+00	1.71E-05
SB-125	CURIES	0.00E+00	0.00E+00	3.27E-04	6.88E-04
SR-89	CURIES	0.00E+00	0.00E+00	1.32E-06	5.17E-06
SR-90	CURIES	0.00E+00	0.00E+00	3.00E-06	0.00E+00
SR-92	CURIES	0.00E+00	0.00E+00	0.00E+00	2.16E-06
TE-125M	CURIES	0.00E+00	0.00E+00	0.00E+00	2.36E-03
ZR-95	CURIES	0.00E+00	0.00E+00	1.04E-04	5.78E-05
TOTALS	CURIES	0.00E+00	0.00E+00	1.48E-02	3.91E-02

DISSOLVED AND ENTRAINED GASES

KR-85	CURIES	0.00E+00	0.00E+00	5.33E-04	0.00E+00
XE-133	CURIES	0.00E+00	0.00E+00	0.00E+00	9.70E-04
TOTALS	CURIES	0.00E+00	0.00E+00	5.33E-04	9.70E-04

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

TABLE 1-2B\*  
 Vogtle Electric Generating Plant  
 RADIOACTIVE EFFLUENT RELEASE REPORT - 2002  
 Liquid Effluents

Unit: 2  
 Starting : 1-Jan-2002      Ending : 30-Jun-2002

NUCLIDE	UNIT	CONTINUOUS MODE		BATCH MODE	
		QUARTER 1	QUARTER 2	QUARTER 1	QUARTER 2
H-3	CURIES	0.00E+00	0.00E+00	1.88E+01	4.01E+01

FISSION & ACTIVATION PRODUCTS

CO-57	CURIES	0.00E+00	0.00E+00	0.00E+00	4.84E-06
CO-58	CURIES	0.00E+00	0.00E+00	2.09E-05	2.17E-03
CO-60	CURIES	0.00E+00	0.00E+00	8.17E-04	1.09E-03
CR-51	CURIES	0.00E+00	0.00E+00	0.00E+00	1.79E-03
CS-134	CURIES	0.00E+00	0.00E+00	1.45E-06	4.25E-05
CS-137	CURIES	0.00E+00	0.00E+00	1.11E-05	8.45E-05
FE-55	CURIES	0.00E+00	0.00E+00	3.36E-03	3.22E-03
FE-59	CURIES	0.00E+00	0.00E+00	0.00E+00	4.22E-05
HF-181	CURIES	0.00E+00	0.00E+00	0.00E+00	3.88E-07
I-131	CURIES	0.00E+00	0.00E+00	0.00E+00	1.06E-05
MN-54	CURIES	0.00E+00	0.00E+00	6.19E-05	1.53E-04
NB-95	CURIES	0.00E+00	0.00E+00	0.00E+00	2.68E-04
NB-97	CURIES	0.00E+00	0.00E+00	0.00E+00	3.55E-07
SB-124	CURIES	0.00E+00	0.00E+00	9.05E-06	6.50E-06
SB-125	CURIES	0.00E+00	0.00E+00	5.36E-05	2.97E-04
SR-89	CURIES	0.00E+00	0.00E+00	1.44E-06	1.45E-05
SR-90	CURIES	0.00E+00	0.00E+00	1.17E-07	1.81E-08
TE-125M	CURIES	0.00E+00	0.00E+00	4.86E-04	8.28E-04
ZR-95	CURIES	0.00E+00	0.00E+00	0.00E+00	1.84E-04
TOTALS	CURIES	0.00E+00	0.00E+00	4.83E-03	1.022E-02

DISSOLVED AND ENTRAINED GASES

XE-133	CURIES	0.00E+00	0.00E+00	6.87E-06	0.00E+00
TOTALS	CURIES	0.00E+00	0.00E+00	6.87E-06	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 1-2B\*  
 Vogtle Electric Generating Plant  
 RADIOACTIVE EFFLUENT RELEASE REPORT - 2002  
 Liquid Effluents  
 Unit: 2  
 Starting : 1-Jul-2002      Ending : 31-Dec-2002

NUCLIDE	UNIT	CONTINUOUS MODE		BATCH MODE	
		QUARTER 3	QUARTER 4	QUARTER 3	QUARTER 4
H-3	CURIES	0.00E+00	0.00E+00	5.73E+01	1.72E+02

FISSION & ACTIVATION PRODUCTS

AG-110M	CURIES	0.00E+00	0.00E+00	0.00E+00	2.01E-05
CO-57	CURIES	0.00E+00	0.00E+00	0.00E+00	4.48E-06
CO-58	CURIES	0.00E+00	0.00E+00	2.36E-04	9.62E-03
CO-60	CURIES	0.00E+00	0.00E+00	7.10E-04	2.42E-03
CS-134	CURIES	0.00E+00	0.00E+00	2.53E-05	4.94E-05
CS-137	CURIES	0.00E+00	0.00E+00	3.39E-05	1.82E-04
FE-55	CURIES	0.00E+00	0.00E+00	2.81E-03	7.75E-03
MN-54	CURIES	0.00E+00	0.00E+00	7.63E-05	1.40E-04
NB-95	CURIES	0.00E+00	0.00E+00	6.04E-05	6.00E-05
NB-97	CURIES	0.00E+00	0.00E+00	1.69E-05	0.00E+00
RB-86	CURIES	0.00E+00	0.00E+00	0.00E+00	9.29E-06
SB-122	CURIES	0.00E+00	0.00E+00	0.00E+00	4.22E-07
SB-124	CURIES	0.00E+00	0.00E+00	0.00E+00	1.98E-06
SB-125	CURIES	0.00E+00	0.00E+00	5.62E-05	5.06E-04
SR-89	CURIES	0.00E+00	0.00E+00	0.00E+00	1.47E-05
SR-90	CURIES	0.00E+00	0.00E+00	1.42E-14	5.33E-15
ZR-95	CURIES	0.00E+00	0.00E+00	1.96E-05	1.16E-05
TOTALS	CURIES	0.00E+00	0.00E+00	4.05E-03	2.08E-02

DISSOLVED AND ENTRAINED GASES

XE-133	CURIES	0.00E+00	0.00E+00	0.00E+00	3.70E-04
TOTALS	CURIES	0.00E+00	0.00E+00	0.00E+00	3.70E-04

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



TABLE 1-2C\*  
 Vogtle Electric Generating Plant  
 RADIOACTIVE EFFLUENT RELEASE REPORT - 2002  
 Liquid Effluents  
 Unit: Site  
 Starting : 1-Jan-2002      Ending : 30-Jun-2002

NUCLIDE	UNIT	CONTINUOUS MODE		BATCH MODE	
		QUARTER 1	QUARTER 2	QUARTER 1	QUARTER 2
H-3	CURIES	0.00E+00	0.00E+00	4.61E+02	1.64E+02
FISSION & ACTIVATION PRODUCTS					
AG-110M	CURIES	0.00E+00	0.00E+00	9.71E-07	0.00E+00
BE-7	CURIES	0.00E+00	0.00E+00	0.00E+00	2.05E-07
CO-57	CURIES	0.00E+00	0.00E+00	7.47E-05	1.47E-05
CO-58	CURIES	0.00E+00	0.00E+00	2.97E-03	4.97E-03
CO-60	CURIES	0.00E+00	0.00E+00	1.20E-02	3.29E-03
CR-51	CURIES	0.00E+00	0.00E+00	2.13E-03	2.71E-34
CS-134	CURIES	0.00E+00	0.00E+00	6.16E-05	4.47E-05
CS-137	CURIES	0.00E+00	0.00E+00	2.42E-04	9.41E-05
FE-55	CURIES	0.00E+00	0.00E+00	3.92E-03	7.74E-03
FE-59	CURIES	0.00E+00	0.00E+00	1.01E-04	6.53E-05
HF-181	CURIES	0.00E+00	0.00E+00	0.00E+00	3.88E-07
I-131	CURIES	0.00E+00	0.00E+00	4.42E-05	1.06E-05
I-132	CURIES	0.00E+00	0.00E+00	4.65E-05	0.00E+00
LA-140	CURIES	0.00E+00	0.00E+00	3.54E-06	0.00E+00
MN-54	CURIES	0.00E+00	0.00E+00	1.66E-03	4.49E-04
NA-24	CURIES	0.00E+00	0.00E+00	5.75E-06	0.00E+00
NB-95	CURIES	0.00E+00	0.00E+00	1.85E-04	5.18E-04
NB-97	CURIES	0.00E+00	0.00E+00	3.56E-05	3.55E-07
SB-124	CURIES	0.00E+00	0.00E+00	2.43E-05	6.50E-06
SB-125	CURIES	0.00E+00	0.00E+00	2.01E-03	4.45E-04
SN-113	CURIES	0.00E+00	0.00E+00	1.58E-06	2.03E-06
SR-89	CURIES	0.00E+00	0.00E+00	2.23E-05	5.48E-05
SR-90	CURIES	0.00E+00	0.00E+00	1.17E-07	1.81E-08
SR-92	CURIES	0.00E+00	0.00E+00	8.81E-07	0.00E+00
TE-125M	CURIES	0.00E+00	0.00E+00	3.17E-03	8.35E-04
TE-132	CURIES	0.00E+00	0.00E+00	5.05E-05	0.00E+00
Y-91	CURIES	0.00E+00	0.00E+00	0.00E+00	2.29E-04
Y-92	CURIES	0.00E+00	0.00E+00	9.26E-06	0.00E+00
ZN-65	CURIES	0.00E+00	0.00E+00	1.88E-06	3.61E-06
ZR-95	CURIES	0.00E+00	0.00E+00	1.36E-04	3.00E-04
TOTALS	CURIES	0.00E+00	0.00E+00	2.89E-02	2.18E-02

DISSOLVED AND ENTRAINED GASES

KR-88	CURIES	0.00E+00	0.00E+00	2.49E-06	0.00E+00
XE-133	CURIES	0.00E+00	0.00E+00	2.02E-03	4.46E-05

TOTALS	CURIES	0.00E+00	0.00E+00	2.03E-03	4.46E-05
G-ALPHA	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 1-2C\*  
 Vogtle Electric Generating Plant  
 RADIOACTIVE EFFLUENT RELEASE REPORT - 2002  
 Liquid Effluents  
 Unit: Site  
 Starting : 1-Jul-2002      Ending : 31-Dec-2002

NUCLIDE	UNIT	CONTINUOUS MODE		BATCH MODE	
		QUARTER 3	QUARTER 4	QUARTER 3	QUARTER 4
H-3	CURIES	0.00E+00	0.00E+00	4.39E+02	5.02E+02

FISSION & ACTIVATION PRODUCTS

AG-110M	CURIES	0.00E+00	0.00E+00	0.00E+00	5.53E-05
CE-141	CURIES	0.00E+00	0.00E+00	1.74E-06	0.00E+00
CO-57	CURIES	0.00E+00	0.00E+00	3.67E-06	1.64E-05
CO-58	CURIES	0.00E+00	0.00E+00	1.19E-03	1.62E-02
CO-60	CURIES	0.00E+00	0.00E+00	3.24E-03	7.48E-03
CR-51	CURIES	0.00E+00	0.00E+00	6.22E-05	0.00E+00
CS-134	CURIES	0.00E+00	0.00E+00	4.35E-05	3.85E-04
CS-137	CURIES	0.00E+00	0.00E+00	8.54E-05	1.45E-03
FE-55	CURIES	0.00E+00	0.00E+00	1.30E-02	2.97E-02
FE-59	CURIES	0.00E+00	0.00E+00	1.90E-05	0.00E+00
MN-54	CURIES	0.00E+00	0.00E+00	4.26E-04	6.29E-04
NB-95	CURIES	0.00E+00	0.00E+00	2.90E-04	2.69E-04
NB-97	CURIES	0.00E+00	0.00E+00	1.69E-05	1.71E-05
RB-86	CURIES	0.00E+00	0.00E+00	0.00E+00	9.29E-06
SB-122	CURIES	0.00E+00	0.00E+00	0.00E+00	4.22E-07
SB-124	CURIES	0.00E+00	0.00E+00	0.00E+00	1.98E-06
SB-125	CURIES	0.00E+00	0.00E+00	3.83E-04	1.19E-03
SR-89	CURIES	0.00E+00	0.00E+00	1.32E-06	1.99E-05
SR-90	CURIES	0.00E+00	0.00E+00	3.00E-06	5.33E-15
SR-92	CURIES	0.00E+00	0.00E+00	0.00E+00	2.16E-06
TE-125M	CURIES	0.00E+00	0.00E+00	0.00E+00	2.36E-03
ZR-95	CURIES	0.00E+00	0.00E+00	1.23E-04	6.94E-05
TOTALS	CURIES	0.00E+00	0.00E+00	1.89E-02	5.99E-02

DISSOLVED AND ENTRAINED GASES

KR-85	CURIES	0.00E+00	0.00E+00	5.33E-04	0.00E+00
XE-133	CURIES	0.00E+00	0.00E+00	0.00E+00	1.34E-03
TOTALS	CURIES	0.00E+00	0.00E+00	5.33E-04	1.34E-03

\* Zeroes in this table indicate that no radioactivity was present

at detectable levels.

See Table 1-4 for typical minimum detectable concentrations.

TABLE 1-3A  
Vogtle Electric Generating Plant  
RADIOACTIVE EFFLUENT RELEASE REPORT - 2002  
DOSES TO A MEMBER OF THE PUBLIC DUE TO LIQUID RELEASES  
Unit: 1  
Starting: 01-Jan-2002                      Ending: 30-Jun-2002

Cumulative Doses per Quarter

Organ	ODCM Limit	Units	Quarter 1	% of ODCM Limit	Quarter 2	% of ODCM Limit
Bone	5.0	mrem	1.29E-03	2.58E-02	1.43E-04	2.86E-03
Liver	5.0	mrem	7.32E-03	1.46E-01	4.13E-03	8.25E-02
TBody	1.5	mrem	6.73E-03	4.49E-01	4.07E-03	2.71E-01
Thyroid	5.0	mrem	5.42E-03	1.08E-01	3.98E-03	7.95E-02
Kidney	5.0	mrem	6.24E-03	1.25E-01	4.01E-03	8.01E-02
Lung	5.0	mrem	7.61E-03	1.52E-01	4.16E-03	8.33E-02
GILLI	5.0	mrem	6.73E-03	1.35E-01	4.48E-03	8.95E-02

Cumulative Doses per Year

Organ	ODCM Limit	Units	Year to Ending Date	% of ODCM Limit
Bone	10.0	mrem	1.43E-03	1.43E-02
Liver	10.0	mrem	1.14E-02	1.14E-01
TBody	3.0	mrem	1.08E-02	3.60E-01
Thyroid	10.0	mrem	9.40E-03	9.40E-02
Kidney	10.0	mrem	1.02E-02	1.02E-01
Lung	10.0	mrem	1.18E-02	1.18E-01
GILLI	10.0	mrem	1.12E-02	1.12E-01

TABLE 1-3A  
 Vogtle Electric Generating Plant  
 RADIOACTIVE EFFLUENT RELEASE REPORT - 2002  
 DOSES TO A MEMBER OF THE PUBLIC DUE TO LIQUID RELEASES  
 Unit: 1  
 Starting: 01-Jul-2002                      Ending: 31-Dec-2002

Cumulative Doses per Quarter

Organ	ODCM Limit	Units	Quarter 3	% of ODCM Limit	Quarter 4	% of ODCM Limit
Bone	5.0	mrem	7.30E-04	1.46E-02	1.03E-02	2.05E-01
Liver	5.0	mrem	1.21E-02	2.43E-01	2.38E-02	4.77E-01
TBody	1.5	mrem	1.18E-02	7.87E-01	1.91E-02	1.27E+00
Thyroid	5.0	mrem	1.11E-02	2.23E-01	8.33E-03	1.67E-01
Kidney	5.0	mrem	1.14E-02	2.29E-01	1.38E-02	2.75E-01
Lung	5.0	mrem	1.22E-02	2.43E-01	1.16E-02	2.33E-01
GILLI	5.0	mrem	1.19E-02	2.38E-01	1.02E-02	2.03E-01

Cumulative Doses per Year

Organ	ODCM Limit	Units	Year to Ending Date	% of ODCM Limit
Bone	10.0	mrem	1.24E-02	1.24E-01
Liver	10.0	mrem	4.74E-02	4.74E-01
TBody	3.0	mrem	4.17E-02	1.39E+00
Thyroid	10.0	mrem	2.89E-02	2.89E-01
Kidney	10.0	mrem	3.54E-02	3.54E-01
Lung	10.0	mrem	3.56E-02	3.56E-01
GILLI	10.0	mrem	3.33E-02	3.33E-01

TABLE 1-3B  
 Vogtle Electric Generating Plant  
 RADIOACTIVE EFFLUENT RELEASE REPORT - 2002  
 DOSES TO A MEMBER OF THE PUBLIC DUE TO LIQUID RELEASES  
 Unit: 2  
 Starting: 01-Jan-2002                      Ending: 30-Jun-2002

Cumulative Doses per Quarter

---

Organ	ODCM Limit	Units	Quarter 1	% of ODCM Limit	Quarter 2	% of ODCM Limit
Bone	5.0	mrem	8.28E-05	1.66E-03	7.04E-04	1.41E-02
Liver	5.0	mrem	3.39E-04	6.78E-03	2.07E-03	4.14E-02
TBody	1.5	mrem	3.03E-04	2.02E-02	1.76E-03	1.17E-01
Thyroid	5.0	mrem	2.50E-04	4.99E-03	1.01E-03	2.02E-02
Kidney	5.0	mrem	3.13E-04	6.26E-03	1.46E-03	2.92E-02
Lung	5.0	mrem	3.20E-04	6.40E-03	1.60E-03	3.20E-02
GILLI	5.0	mrem	3.57E-04	7.15E-03	1.45E-03	2.91E-02

---

Cumulative Doses per Year

---

Organ	ODCM Limit	Units	Year to Ending Date	% of ODCM Limit
Bone	10.0	mrem	7.87E-04	7.87E-03
Liver	10.0	mrem	2.41E-03	2.41E-02
TBody	3.0	mrem	2.06E-03	6.86E-02
Thyroid	10.0	mrem	1.26E-03	1.26E-02
Kidney	10.0	mrem	1.78E-03	1.78E-02
Lung	10.0	mrem	1.92E-03	1.92E-02
GILLI	10.0	mrem	1.81E-03	1.81E-02

---

TABLE 1-3B  
 Vogtle Electric Generating Plant  
 RADIOACTIVE EFFLUENT RELEASE REPORT - 2002  
 DOSES TO A MEMBER OF THE PUBLIC DUE TO LIQUID RELEASES  
 Unit: 2  
 Starting: 01-Jul-2002                      Ending: 31-Dec-2002

Cumulative Doses per Quarter

Organ	ODCM Limit	Units	Quarter 3	% of ODCM Limit	Quarter 4	% of ODCM Limit
Bone	5.0	mrem	3.95E-04	7.91E-03	1.95E-03	3.89E-02
Liver	5.0	mrem	2.12E-03	4.25E-02	7.45E-03	1.49E-01
TBody	1.5	mrem	1.94E-03	1.29E-01	6.58E-03	4.39E-01
Thyroid	5.0	mrem	1.47E-03	2.93E-02	4.51E-03	9.02E-02
Kidney	5.0	mrem	1.67E-03	3.35E-02	5.46E-04	1.09E-01
Lung	5.0	mrem	1.67E-03	3.33E-02	6.08E-03	1.22E-01
GILLI	5.0	mrem	1.63E-03	3.26E-02	5.53E-03	1.11E-01

Cumulative Doses per Year

Organ	ODCM Limit	Units	Year to Ending Date	% of ODCM Limit
Bone	10.0	mrem	3.13E-03	3.13E-02
Liver	10.0	mrem	1.20E-02	1.20E-01
TBody	3.0	mrem	1.06E-02	3.53E-01
Thyroid	10.0	mrem	7.24E-03	7.24E-02
Kidney	10.0	mrem	8.91E-03	8.91E-02
Lung	10.0	mrem	9.66E-03	9.66E-02
GILLI	10.0	mrem	8.97E-03	8.97E-02



TABLE 1-4  
 VOGTLE ELECTRIC GENERATING PLANT  
 RADIOACTIVE EFFLUENT RELEASE REPORT - 2002  
 MINIMUM DETECTABLE CONCENTRATIONS - LIQUID SAMPLE ANALYSES

JANUARY 2002 - DECEMBER 2002

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 1-5A  
 Vogtle Electric Generating Plant  
 RADIOACTIVE EFFLUENT RELEASE REPORT - 2002  
 Liquid Effluents - Batch Release Summary  
 Unit: 1  
 Starting : 1-Jan-2002      Ending : 30-Jun-2002

NUMBER OF BATCH RELEASES	:	43	
TOTAL TIME PERIOD FOR BATCH RELEASES	:	5726.58	MINUTES
MAXIMUM TIME PERIOD FOR A BATCH RELEASE	:	336.00	MINUTES
AVERAGE TIME PERIOD FOR BATCH RELEASES	:	133.18	MINUTES
MINIMUM TIME PERIOD FOR A BATCH RELEASE	:	2.00	MINUTES

TABLE 1-5A  
 Vogtle Electric Generating Plant  
 RADIOACTIVE EFFLUENT RELEASE REPORT - 2002  
 Liquid Effluents - Batch Release Summary  
 Unit: 1  
 Starting : 1-Jul-2002      Ending : 31-Dec-2002

NUMBER OF BATCH RELEASES	:	52	
TOTAL TIME PERIOD FOR BATCH RELEASES	:	10886.10	MINUTES
MAXIMUM TIME PERIOD FOR A BATCH RELEASE	:	687.43	MINUTES
AVERAGE TIME PERIOD FOR BATCH RELEASES	:	209.35	MINUTES
MINIMUM TIME PERIOD FOR A BATCH RELEASE	:	53.95	MINUTES

The average flow rate of the Savannah River at Augusta for the Radioactive Effluent Release Report period was obtained from the U.S. Army Corps of Engineers Savannah District Historic Data web page <http://water.sas.usace.army.mil/tdis.html>.  
 The average flow rate for 2002 was 3781 cubic feet per sec.

TABLE 1-5B  
 Vogtle Electric Generating Plant  
 RADIOACTIVE EFFLUENT RELEASE REPORT - 2002  
 Liquid Effluents - Batch Release Summary  
 Unit: 2  
 Starting : 1-Jan-2002      Ending : 30-Jun-2002

NUMBER OF BATCH RELEASES	:	47	
TOTAL TIME PERIOD FOR BATCH RELEASES	:	9524.17	MINUTES
MAXIMUM TIME PERIOD FOR A BATCH RELEASE	:	671.00	MINUTES
AVERAGE TIME PERIOD FOR BATCH RELEASES	:	202.64	MINUTES
MINIMUM TIME PERIOD FOR A BATCH RELEASE	:	2.50	MINUTES

TABLE 1-5B  
 Vogtle Electric Generating Plant  
 RADIOACTIVE EFFLUENT RELEASE REPORT - 2002  
 Liquid Effluents - Batch Release Summary  
 Unit: 2  
 Starting : 1-Jul-2002      Ending : 31-Dec-2002

NUMBER OF BATCH RELEASES	:	34	
TOTAL TIME PERIOD FOR BATCH RELEASES	:	4618.57	MINUTES
MAXIMUM TIME PERIOD FOR A BATCH RELEASE	:	400.10	MINUTES
AVERAGE TIME PERIOD FOR BATCH RELEASES	:	135.84	MINUTES
MINIMUM TIME PERIOD FOR A BATCH RELEASE	:	7.65	MINUTES

The average flow rate of the Savannah River at Augusta for the Radioactive Effluent Release Report period was obtained from the U.S. Army Corps of Engineers Savannah District Historic Data web page <http://water.sas.usace.army.mil/td1s.html>.  
 The average flow rate for 2002 was 3781 cubic feet per sec.

TABLE 1-6A  
 Vogtle Electric Generating Plant  
 RADIOACTIVE EFFLUENT RELEASE REPORT - 2002  
 Liquid Effluents - Abnormal Release Summary  
 Unit: 1  
 Starting : 1-Jan-2002      Ending : 30-Jun-2002

NUMBER OF RELEASES	:	0	
TOTAL TIME FOR ALL RELEASES	:	0.00	MINUTES
MAXIMUM TIME FOR A RELEASE	:	0.00	MINUTES
AVERAGE TIME FOR A RELEASE	:	0.00	MINUTES
MINIMUM TIME FOR A RELEASE	:	0.00	MINUTES
TOTAL ACTIVITY FOR ALL RELEASES	:	0.00E+00	CURIES

TABLE 1-6A  
 Vogtle Electric Generating Plant  
 RADIOACTIVE EFFLUENT RELEASE REPORT - 2002  
 Liquid Effluents - Abnormal Release Summary  
 Unit: 1  
 Starting : 1-Jul-2002      Ending : 31-Dec-2002

NUMBER OF RELEASES	:	0	
TOTAL TIME FOR ALL RELEASES	:	0.00	MINUTES
MAXIMUM TIME FOR A RELEASE	:	0.00	MINUTES
AVERAGE TIME FOR A RELEASE	:	0.00	MINUTES
MINIMUM TIME FOR A RELEASE	:	0.00	MINUTES
TOTAL ACTIVITY FOR ALL RELEASES	:	0.00E+00	CURIES

TABLE 1-6B  
 Vogtle Electric Generating Plant  
 RADIOACTIVE EFFLUENT RELEASE REPORT - 2002  
 Liquid Effluents - Abnormal Release Summary  
 Unit: 2  
 Starting : 1-Jan-2002      Ending : 30-Jun-2002

NUMBER OF RELEASES	:	0	
TOTAL TIME FOR ALL RELEASES	:	0.00	MINUTES
MAXIMUM TIME FOR A RELEASE	:	0.00	MINUTES
AVERAGE TIME FOR A RELEASE	:	0.00	MINUTES
MINIMUM TIME FOR A RELEASE	:	0.00	MINUTES
TOTAL ACTIVITY FOR ALL RELEASES	:	0.00E+00	CURIES

TABLE 1-6B  
 Vogtle Electric Generating Plant  
 RADIOACTIVE EFFLUENT RELEASE REPORT - 2002  
 Liquid Effluents - Abnormal Release Summary  
 Unit: 2  
 Starting : 1-Jul-2002      Ending : 31-Dec-2002

NUMBER OF RELEASES	:	0	
TOTAL TIME FOR ALL RELEASES	:	0.00	MINUTES
MAXIMUM TIME FOR A RELEASE	:	0.00	MINUTES
AVERAGE TIME FOR A RELEASE	:	0.00	MINUTES
MINIMUM TIME FOR A RELEASE	:	0.00	MINUTES
TOTAL ACTIVITY FOR ALL RELEASES	:	0.00E+00	CURIES

## **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 mrems/yr. to the whole body and less than or equal to 3000 mrems/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 mrems/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 mrems to any organ.
- b. During any calendar year: Less than or equal to 15 mrems 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 six paths: plant vents (Unit 1 and Unit 2), the condenser air ejector, the steam packing exhaustor systems (Unit 1 and Unit 2), Radwaste Processing Facility and the DAW (Dry Active Waste Building).

Waste gas decay tanks are batch released through the Unit 1 plant vent. The containment purges are released through their respective plant vents.

All of the paths with the exception of the DAW and 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 exhaustor are equipped with an integrated-type sample collection device for collecting particulates and iodines. Samples of the DAW are collected using portable monitoring equipment during periods of operation. During this reporting period, there were no continuous radioactive releases through the condenser air ejector and the steam packing exhaustor system vents. There were no releases from the DAW. 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 analyses 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 analyses 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,

### **2.2.2.1 Fission and Activation Gases cont'd**

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.



### 2.2.3 Total Error Estimation cont'd

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.

- 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%
TOTAL ERROR	50%

- 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%
TOTAL ERROR	100%

- 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%
TOTAL ERROR	90%

- 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%
TOTAL ERROR	40%

### 2.2.3 Total Error Estimation cont'd

- 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%
TOTAL ERROR	90%

### 2.3 Gaseous Effluent Release Data

Regulatory Guide 1.21 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.

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**

On 3/19/2002 pressure on U-2 WGDT # 5 dropped from 62 psig to 13 psig due to valve ALV-1117 was not closing tightly and allowed water in the phase separator to drain out and then the gas to leak. Based on the isotopic results from follow up sample from GDT, 1.09 Ci of radioactivity was released through the plant vent. This is an unplanned but monitored release. CR 20020942 documents this event. No dose, dose rate or ECL limits were exceeded from this incident.

On 6/28/02 while attempting to return U-2 recombiner to service, pressure dropped from 32 psig to 15 psig. Based on the isotopic results from follow up sample from GDT, 0.113 Ci of radioactivity was released through the plant vent. This is an unplanned but monitored release. CR 20021925 was written to document this event. No dose, dose rate or ECL limits were exceeded from this incident.

TABLE 2-1A  
 Vogtle Electric Generating Plant  
 RADIOACTIVE EFFLUENT RELEASE REPORT - 2002  
 Gaseous Effluents - Summation of All Releases  
 Unit: 1  
 Starting : 1-Jan-2002      Ending : 30-Jun-2002

TYPE OF EFFLUENT	UNITS	QUARTER 1	QUARTER 2	EST. TOT ERROR %
<hr/>				
A. FISSION & ACTIVATION PRODUCTS				
<hr/>				
1. TOTAL RELEASE	CURIES	2.04E+01	4.47E-01	50
<hr/>				
2. AVERAGE RELEASE RATE FOR PERIOD	uCi/Sec	2.63E+00	5.68E-02	
<hr/>				
3. PERCENT OF APPLICABLE LIMIT	%	*	*	
<hr/>				
B. RADIOIODINES				
<hr/>				
1. TOTAL IODINE-131	CURIES	1.91E-02	1.38E-03	100
<hr/>				
2. AVERAGE RELEASE RATE FOR PERIOD	uCi/Sec	2.45E-03	1.76E-04	
<hr/>				
3. PERCENT OF APPLICABLE LIMIT	%	*	*	
<hr/>				
C. PARTICULATES				
<hr/>				
1. PARTICULATES (HALF-LIVES>8 DAYS)	CURIES	7.30E-06	1.98E-06	90
<hr/>				
2. AVERAGE RELEASE RATE FOR PERIOD	uCi/Sec	9.38E-07	2.52E-07	
<hr/>				
3. PERCENT OF APPLICABLE LIMIT	%	*	*	
<hr/>				
4. GROSS ALPHA RADIOACTIVITY	CURIES	0.00E+00	0.00E+00	
<hr/>				
D. TRITIUM				
<hr/>				
1. TOTAL RELEASE	CURIES	2.22E+01	9.77E+00	40
<hr/>				
2. AVERAGE RELEASE RATE FOR PERIOD	uCi/Sec	2.85E+00	1.24E+00	
<hr/>				
3. PERCENT OF APPLICABLE LIMIT	%	*	*	
<hr/>				

\*      Applicable limits are expressed in terms of dose.  
 See Tables 2-4A, 2-4B, 2-5A, and 2-5B of this report.

TABLE 2-1A  
 Vogtle Electric Generating Plant  
 RADIOACTIVE EFFLUENT RELEASE REPORT - 2002  
 Gaseous Effluents - Summation of All Releases  
 Unit: 1  
 Starting : 1-Jul-2002      Ending : 31-Dec-2002

TYPE OF EFFLUENT	UNITS	QUARTER 3	QUARTER 4	EST. TOT ERROR %
<hr/>				
A. FISSION & ACTIVATION PRODUCTS				
<hr/>				
1. TOTAL RELEASE	CURIES	2.99E+00	5.28E-02	50
<hr/>				
2. AVERAGE RELEASE RATE FOR PERIOD	uCi/Sec	3.76E-01	6.64E-03	
<hr/>				
3. PERCENT OF APPLICABLE LIMIT	%	*	*	
<hr/>				
B. RADIOIODINES				
<hr/>				
1. TOTAL IODINE-131	CURIES	2.47E-05	1.54E-05	100
<hr/>				
2. AVERAGE RELEASE RATE FOR PERIOD	uCi/Sec	3.11E-06	1.93E-06	
<hr/>				
3. PERCENT OF APPLICABLE LIMIT	%	*	*	
<hr/>				
C. PARTICULATES				
<hr/>				
1. PARTICULATES (HALF-LIVES>8 DAYS)	CURIES	0.00E+00	0.00E+00	90
<hr/>				
2. AVERAGE RELEASE RATE FOR PERIOD	uCi/Sec	0.00E+00	0.00E+00	
<hr/>				
3. PERCENT OF APPLICABLE LIMIT	%	*	*	
<hr/>				
4. GROSS ALPHA RADIOACTIVITY	CURIES	0.00E+00	0.00E+00	
<hr/>				
D. TRITIUM				
<hr/>				
1. TOTAL RELEASE	CURIES	7.80E+00	5.41E+00	40
<hr/>				
2. AVERAGE RELEASE RATE FOR PERIOD	uCi/Sec	9.81E-01	6.81E-01	
<hr/>				
3. PERCENT OF APPLICABLE LIMIT	%	*	*	
<hr/>				

\*      Applicable limits are expressed in terms of dose.  
 See Tables 2-4A, 2-4B, 2-5A, and 2-5B of this report.

TABLE 2-1B  
Vogtle Electric Generating Plant  
RADIOACTIVE EFFLUENT RELEASE REPORT - 2002  
Gaseous Effluents - Summation of All Releases  
Unit: 2  
Starting : 1-Jan-2002      Ending : 30-Jun-2002

TYPE OF EFFLUENT	UNITS	QUARTER 1	QUARTER 2	EST. TOT ERROR %
<hr/>				
A. FISSION & ACTIVATION PRODUCTS				
<hr/>				
1. TOTAL RELEASE	CURIES	2.08E+00	1.77E-01	50
<hr/>				
2. AVERAGE RELEASE RATE FOR PERIOD	uCi/Sec	2.67E-01	2.25E-02	
<hr/>				
3. PERCENT OF APPLICABLE LIMIT	%	*	*	
<hr/>				
B. RADIOIODINES				
<hr/>				
1. TOTAL IODINE-131	CURIES	1.55E-04	0.00E+00	100
<hr/>				
2. AVERAGE RELEASE RATE FOR PERIOD	uCi/Sec	1.99E-05	0.00E+00	
<hr/>				
3. PERCENT OF APPLICABLE LIMIT	%	*	*	
<hr/>				
C. PARTICULATES				
<hr/>				
1. PARTICULATES (HALF-LIVES>8 DAYS)	CURIES	1.29E-07	3.58E-09	90
<hr/>				
2. AVERAGE RELEASE RATE FOR PERIOD	uCi/Sec	1.66E-08	4.56E-10	
<hr/>				
3. PERCENT OF APPLICABLE LIMIT	%	*	*	
<hr/>				
4. GROSS ALPHA RADIOACTIVITY	CURIES	0.00E+00	0.00E+00	
<hr/>				
D. TRITIUM				
<hr/>				
1. TOTAL RELEASE	CURIES	2.90E+01	1.41E+01	40
<hr/>				
2. AVERAGE RELEASE RATE FOR PERIOD	uCi/Sec	3.74E+00	1.80E+00	
<hr/>				
3. PERCENT OF APPLICABLE LIMIT	%	*	*	
<hr/>				

\* Applicable limits are expressed in terms of dose.  
See Tables 2-4A, 2-4B, 2-5A, and 2-5B of this report.

TABLE 2-1B  
 Vogtle Electric Generating Plant  
 RADIOACTIVE EFFLUENT RELEASE REPORT - 2002  
 Gaseous Effluents - Summation of All Releases  
 Unit: 2  
 Starting : 1-Jul-2002      Ending : 31-Dec-2002

TYPE OF EFFLUENT	UNITS	QUARTER 3	QUARTER 4	EST. TOT ERROR %
<b>A. FISSION &amp; ACTIVATION PRODUCTS</b>				
1. TOTAL RELEASE	CURIES	4.57E-02	5.53E-02	50
2. AVERAGE RELEASE RATE FOR PERIOD	uCi/Sec	5.76E-03	6.95E-03	
3. PERCENT OF APPLICABLE LIMIT	%	*	*	
<b>B. RADIOIODINES</b>				
1. TOTAL IODINE-131	CURIES	3.31E-05	0.00E+00	100
2. AVERAGE RELEASE RATE FOR PERIOD	uCi/Sec	4.16E-06	0.00E+00	
3. PERCENT OF APPLICABLE LIMIT	%	*	*	
<b>C. PARTICULATES</b>				
1. PARTICULATES (HALF-LIVES>8 DAYS)	CURIES	1.04E-08	7.29E-06	90
2. AVERAGE RELEASE RATE FOR PERIOD	uCi/Sec	1.31E-09	9.17E-07	
3. PERCENT OF APPLICABLE LIMIT	%	*	*	
4. GROSS ALPHA RADIOACTIVITY	CURIES	0.00E+00	0.00E+00	
<b>D. TRITIUM</b>				
1. TOTAL RELEASE	CURIES	7.03E+00	9.76E+00	40
2. AVERAGE RELEASE RATE FOR PERIOD	uCi/Sec	8.85E-01	1.23E+00	
3. PERCENT OF APPLICABLE LIMIT	%	*	*	

\*      Applicable limits are expressed in terms of dose.  
 See Tables 2-4A, 2-4B, 2-5A, and 2-5B of this report.

TABLE 2-1C  
 Vogtle Electric Generating Plant  
 RADIOACTIVE EFFLUENT RELEASE REPORT - 2002  
 Gaseous Effluents - Summation of All Releases  
 Unit: Site  
 Starting : 1-Jan-2002      Ending : 30-Jun-2002

TYPE OF EFFLUENT	UNITS	QUARTER 1	QUARTER 2	EST. TOT ERROR %
<hr/>				
A. FISSION & ACTIVATION PRODUCTS				
<hr/>				
1. TOTAL RELEASE	CURIES	2.25E+01	6.23E+01	50
<hr/>				
2. AVERAGE RELEASE RATE FOR PERIOD	uCi/Sec	2.90E+00	7.98E-02	
<hr/>				
3. PERCENT OF APPLICABLE LIMIT	%	*	*	
<hr/>				
B. RADIOIODINES				
<hr/>				
1. TOTAL IODINE-131	CURIES	1.92E-02	1.38E-03	100
<hr/>				
2. AVERAGE RELEASE RATE FOR PERIOD	uCi/Sec	2.47E-03	1.76E-04	
<hr/>				
3. PERCENT OF APPLICABLE LIMIT	%	*	*	
<hr/>				
C. PARTICULATES				
<hr/>				
1. PARTICULATES (HALF-LIVES > 8 DAYS)	CURIES	7.43E-06	1.99E-06	90
<hr/>				
2. AVERAGE RELEASE RATE FOR PERIOD	uCi/Sec	9.55E-07	2.52E-07	
<hr/>				
3. PERCENT OF APPLICABLE LIMIT	%	*	*	
<hr/>				
4. GROSS ALPHA RADIOACTIVITY	CURIES	0.00E+00	0.00E+00	
<hr/>				
D. TRITIUM				
<hr/>				
1. TOTAL RELEASE	CURIES	5.12E+01	2.39E+01	40
<hr/>				
2. AVERAGE RELEASE RATE FOR PERIOD	uCi/Sec	6.58E+00	3.04E+00	
<hr/>				
3. PERCENT OF APPLICABLE LIMIT	%	*	*	
<hr/>				

\* Applicable limits are expressed in terms of dose.  
 See Tables 2-4A, 2-4B, 2-5A, and 2-5B of this report.



TABLE 2-1C  
 Vogtle Electric Generating Plant  
 RADIOACTIVE EFFLUENT RELEASE REPORT - 2002  
 Gaseous Effluents - Summation of All Releases  
 Unit: Site  
 Starting : 1-Jul-2002      Ending : 31-Dec-2002

TYPE OF EFFLUENT	UNITS	QUARTER 3	QUARTER 4	EST. TOT ERROR %
<hr/>				
A. FISSION & ACTIVATION PRODUCTS				
<hr/>				
1. TOTAL RELEASE	CURIES	3.03E+00	1.08E-01	50
<hr/>				
2. AVERAGE RELEASE RATE FOR PERIOD	uCi/Sec	3.81E-01	1.36E-02	
<hr/>				
3. PERCENT OF APPLICABLE LIMIT	%	*	*	
<hr/>				
B. RADIOIODINES				
<hr/>				
1. TOTAL IODINE-131	CURIES	5.78E-05	1.54E-05	100
<hr/>				
2. AVERAGE RELEASE RATE FOR PERIOD	uCi/Sec	7.28E-06	1.93E-06	
<hr/>				
3. PERCENT OF APPLICABLE LIMIT	%	*	*	
<hr/>				
C. PARTICULATES				
<hr/>				
1. PARTICULATES (HALF-LIVES>8 DAYS)	CURIES	1.04E-08	7.29E-06	90
<hr/>				
2. AVERAGE RELEASE RATE FOR PERIOD	uCi/Sec	1.31E-09	9.17E-07	
<hr/>				
3. PERCENT OF APPLICABLE LIMIT	%	*	*	
<hr/>				
4. GROSS ALPHA RADIOACTIVITY	CURIES	0.00E+00	1.69E-07	
<hr/>				
D. TRITIUM				
<hr/>				
1. TOTAL RELEASE	CURIES	1.48E+01	1.52E+01	40
<hr/>				
2. AVERAGE RELEASE RATE FOR PERIOD	uCi/Sec	1.87E+00	1.91E+00	
<hr/>				
3. PERCENT OF APPLICABLE LIMIT	%	*	*	
<hr/>				

\*      Applicable limits are expressed in terms of dose.  
 See Tables 2-4A, 2-4B, 2-5A, and 2-5B of this report.

TABLE 2-2A\*  
 Vogtle Electric Generating Plant  
 RADIOACTIVE EFFLUENT RELEASE REPORT - 2002  
 Gaseous Effluents-Mixed-Mode Level Releases  
 Unit: 1  
 Starting : 1-Jan-2002      Ending : 30-Jun-2002

		CONTINUOUS MODE		BATCH MODE	
NUCLIDES RELEASED	UNIT	QUARTER 1	QUARTER 2	QUARTER 1	QUARTER 2
<b>FISSION GASES</b>					
AR-41	CURIES	0.00E+00	0.00E+00	2.53E-01	3.51E-02
XE-135	CURIES	0.00E+00	3.98E-01	6.80E-04	0.00E+00
XE-133M	CURIES	0.00E+00	0.00E+00	2.79E-02	0.00E+00
XE-133	CURIES	5.29E+00	0.00E+00	1.48E+01	1.33E-02
XE-131M	CURIES	0.00E+00	0.00E+00	9.19E-02	0.00E+00
TOTAL FOR PERIOD	CURIES	5.29E+00	3.98E-01	1.51E+01	4.84E-02
<b>IODINES</b>					
I-133	CURIES	0.00E+00	1.72E-04	0.00E+00	0.00E+00
I-131	CURIES	1.91E-02	1.38E-03	0.00E+00	0.00E+00
TOTAL FOR PERIOD	CURIES	1.91E-02	1.55E-03	0.00E+00	0.00E+00
<b>PARTICULATES</b>					
I-131	CURIES	3.82E-07	0.00E+00	0.00E+00	0.00E+00
SR-89	CURIES	1.42E-14	0.00E+00	0.00E+00	0.00E+00
CO-58	CURIES	1.44E-06	1.98E-06	0.00E+00	0.00E+00
CO-60	CURIES	5.47E-06	0.00E+00	0.00E+00	0.00E+00
SR-90	CURIES	3.73E-09	0.00E+00	0.00E+00	0.00E+00
TOTAL FOR PERIOD	CURIES	7.30E-06	1.98E-06	0.00E+00	0.00E+00
G-ALPHA	CURIES	0.00E+00	0.00E+00	0.00E+00	0.00E+00
H-3	CURIES	2.17E+01	9.75E+00	4.43E-01	2.51E-02

\* Zeroes in this table indicate that no radioactivity was present at detectable levels.  
 See Table 2-6 for typical minimum detectable concentrations.

TABLE 2-2A\*  
 Vogtle Electric Generating Plant  
 RADIOACTIVE EFFLUENT RELEASE REPORT - 2002  
 Gaseous Effluents-Mixed-Mode Level Releases  
 Unit: 1  
 Starting : 1-Jul-2002      Ending : 31-Dec-2002

		CONTINUOUS MODE		BATCH MODE	
NUCLIDES RELEASED	UNIT	QUARTER 3	QUARTER 4	QUARTER 3	QUARTER 4
FISSION GASES					
AR-41	CURIES	0.00E+00	0.00E+00	5.19E-02	4.81E-02
KR-85M	CURIES	0.00E+00	0.00E+00	3.84E-05	0.00E+00
XE-135	CURIES	0.00E+00	0.00E+00	1.47E-03	0.00E+00
XE-133M	CURIES	0.00E+00	0.00E+00	2.44E-04	0.00E+00
XE-133	CURIES	0.00E+00	0.00E+00	1.69E-02	4.70E-03
KR-85	CURIES	0.00E+00	0.00E+00	2.92E+00	0.00E+00
TOTAL FOR PERIOD	CURIES	0.00E+00	0.00E+00	2.99E+00	5.28E-02
IODINES					
I-131	CURIES	2.47E-05	1.54E-05	0.00E+00	0.00E+00
TOTAL FOR PERIOD	CURIES	2.47E-05	1.54E-05	0.00E+00	0.00E+00
H-3	CURIES	7.79E+00	5.40E+00	1.08E-02	9.89E-03

\* Zeroes in this table indicate that no radioactivity was present at detectable levels.  
 See Table 2-6 for typical minimum detectable concentrations.

TABLE 2-2B\*  
 Vogtle Electric Generating Plant  
 RADIOACTIVE EFFLUENT RELEASE REPORT - 2002  
 Gaseous Effluents-Mixed-Mode Level Releases  
 Unit: 2  
 Starting : 1-Jan-2002      Ending : 30-Jun-2002

		CONTINUOUS MODE		BATCH MODE	
NUCLIDES RELEASED	UNIT	QUARTER 1	QUARTER 2	QUARTER 1	QUARTER 2
FISSION GASES					
AR-41	CURIES	0.00E+00	0.00E+00	2.67E-02	2.60E-02
XE-135	CURIES	0.00E+00	0.00E+00	3.49E-03	4.90E-04
XE-133M	CURIES	0.00E+00	0.00E+00	4.80E-03	0.00E+00
XE-133	CURIES	9.25E-01	0.00E+00	9.27E-01	7.81E-02
XE-131M	CURIES	0.00E+00	0.00E+00	1.82E-02	0.00E+00
KR-85	CURIES	0.00E+00	0.00E+00	1.70E-01	7.20E-02
TOTAL FOR PERIOD	CURIES	9.25E-01	0.00E+00	1.15E+00	1.77E-01
IODINES					
I-131	CURIES	1.55E-04	0.00E+00	0.00E+00	0.00E+00
TOTAL FOR PERIOD	CURIES	1.55E-04	0.00E+00	0.00E+00	0.00E+00
PARTICULATES					
SR-89	CURIES	1.29E-07	3.58E-09	0.00E+00	0.00E+00
TOTAL FOR PERIOD	CURIES	1.29E-07	3.58E-09	0.00E+00	0.00E+00
H-3	CURIES	2.90E+01	1.41E+01	5.03E-03	3.65E-03

\* Zeroes in this table indicate that no radioactivity was present at detectable levels.  
 See Table 2-6 for typical minimum detectable concentrations.

TABLE 2-2B\*  
 Vogtle Electric Generating Plant  
 RADIOACTIVE EFFLUENT RELEASE REPORT - 2002  
 Gaseous Effluents-Mixed-Mode Level Releases  
 Unit: 2  
 Starting : 1-Jul-2002      Ending : 31-Dec-2002

NUCLIDES RELEASED	UNIT	CONTINUOUS MODE		BATCH MODE	
		QUARTER 3	QUARTER 4	QUARTER 3	QUARTER 4
<b>FISSION GASES</b>					
AR-41	CURIES	0.00E+00	0.00E+00	2.52E-02	8.61E-03
XE-135	CURIES	0.00E+00	0.00E+00	4.48E-05	3.11E-04
XE-133	CURIES	0.00E+00	0.00E+00	2.05E-02	4.04E-02
TOTAL FOR PERIOD	CURIES	0.00E+00	0.00E+00	4.57E-02	4.93E-02
<b>IODINES</b>					
I-133	CURIES	3.18E-04	0.00E+00	0.00E+00	0.00E+00
I-131	CURIES	3.31E-05	0.00E+00	0.00E+00	0.00E+00
TOTAL FOR PERIOD	CURIES	3.52E-04	0.00E+00	0.00E+00	0.00E+00
<b>PARTICULATES</b>					
CR-51	CURIES	0.00E+00	3.16E-06	0.00E+00	0.00E+00
SR-89	CURIES	1.04E-08	2.94E-07	0.00E+00	0.00E+00
NB-95	CURIES	0.00E+00	6.19E-07	0.00E+00	0.00E+00
CO-58	CURIES	0.00E+00	2.43E-06	0.00E+00	0.00E+00
CO-60	CURIES	0.00E+00	7.86E-07	0.00E+00	0.00E+00
TOTAL FOR PERIOD	CURIES	1.04E-08	7.29E-06	0.00E+00	0.00E+00
G-ALPHA	CURIES	0.00E+00	1.69E-07	0.00E+00	0.00E+00
H-3	CURIES	7.03E+00	9.51E+00	8.11E-04	2.41E-01

\* Zeroes in this table indicate that no radioactivity was present at detectable levels.  
 See Table 2-6 for typical minimum detectable concentrations.

TABLE 2-2C\*  
 Vogtle Electric Generating Plant  
 RADIOACTIVE EFFLUENT RELEASE REPORT - 2002  
 Gaseous Effluents-Mixed-Mode Level Releases  
 Unit: Site  
 Starting : 1-Jan-2002      Ending : 30-Jun-2002

NUCLIDES RELEASED	UNIT	CONTINUOUS MODE		BATCH MODE		
		QUARTER 1	QUARTER 2	QUARTER 1	QUARTER 2	
FISSION GASES						
AR-41	CURIES	0.00E+00	0.00E+00	2.80E-01	6.11E-02	
XE-135	CURIES	0.00E+00	3.98E-01	4.17E-03	4.90E-04	
XE-133M	CURIES	0.00E+00	0.00E+00	3.27E-02	0.00E+00	
XE-133	CURIES	6.21E+00	0.00E+00	1.57E+01	9.14E-02	
XE-131M	CURIES	0.00E+00	0.00E+00	1.10E-01	0.00E+00	
KR-85	CURIES	0.00E+00	0.00E+00	1.70E-01	7.20E-02	
TOTAL FOR PERIOD	CURIES	6.21E+00	3.98E-01	1.63E+01	2.25E-01	
IODINES						
I-133	CURIES	0.00E+00	1.72E-04	0.00E+00	0.00E+00	
I-131	CURIES	1.92E-02	1.38E-03	0.00E+00	0.00E+00	
TOTAL FOR PERIOD	CURIES	1.92E-02	1.55E-03	0.00E+00	0.00E+00	
PARTICULATES						
I-131	CURIES	3.82E-07	0.00E+00	0.00E+00	0.00E+00	
SR-89	CURIES	1.29E-07	3.58E-09	0.00E+00	0.00E+00	
CO-58	CURIES	1.44E-06	1.98E-06	0.00E+00	0.00E+00	
CO-60	CURIES	5.47E-06	0.00E+00	0.00E+00	0.00E+00	
SR-90	CURIES	3.73E-09	0.00E+00	0.00E+00	0.00E+00	
TOTAL FOR PERIOD	CURIES	7.43E-06	1.99E-06	0.00E+00	0.00E+00	
G-ALPHA	CURIES	0.00E+00	0.00E+00	0.00E+00	0.00E+00	
H-3	CURIES	5.08E+01	2.39E+01	4.48E-01	2.88E-02	

\* Zeroes in this table indicate that no radioactivity was present at detectable levels.

See Table 2-6 for typical minimum detectable concentrations.

TABLE 2-2C\*  
 Vogtle Electric Generating Plant  
 RADIOACTIVE EFFLUENT RELEASE REPORT - 2002  
 Gaseous Effluents-Mixed-Mode Level Releases  
 Unit: Site  
 Starting : 1-Jul-2002      Ending : 31-Dec-2002

NUCLIDES RELEASED	UNIT	CONTINUOUS MODE		BATCH MODE		
		QUARTER 3	QUARTER 4	QUARTER 3	QUARTER 4	
FISSION GASES						
AR-41	CURIES	0.00E+00	0.00E+00	7.71E-02	5.67E-02	
KR-85M	CURIES	0.00E+00	0.00E+00	3.84E-05	0.00E+00	
XE-135	CURIES	0.00E+00	0.00E+00	1.52E-03	3.11E-04	
XE-133M	CURIES	0.00E+00	0.00E+00	2.44E-04	0.00E+00	
XE-133	CURIES	0.00E+00	0.00E+00	3.74E-02	4.51E-02	
KR-85	CURIES	0.00E+00	0.00E+00	3.03E+00	0.00E+00	
TOTAL FOR PERIOD	CURIES	0.00E+00	0.00E+00	3.03E+00	1.02E-01	
IODINES						
I-133	CURIES	3.18E-04	0.00E+00	0.00E+00	0.00E+00	
I-131	CURIES	5.78E-05	1.54E-05	0.00E+00	0.00E+00	
TOTAL FOR PERIOD	CURIES	3.76E-04	1.54E-05	0.00E+00	0.00E+00	
PARTICULATES						
CR-51	CURIES	0.00E+00	3.16E-06	0.00E+00	0.00E+00	
SR-89	CURIES	1.04E-08	2.94E-07	0.00E+00	0.00E+00	
NB-95	CURIES	0.00E+00	6.19E+00	0.00E+00	0.00E+00	
CO-58	CURIES	0.00E+00	2.43E-06	0.00E+00	0.00E+00	
CO-60	CURIES	0.00E+00	7.86E-07	0.00E+00	0.00E+00	
TOTAL FOR PERIOD	CURIES	1.04E-08	7.29E-06	0.00E+00	0.00E+00	
H-3	CURIES	1.48E+01	1.49E+01	1.16E-02	2.51E-01	

\* Zeroes in this table indicate that no radioactivity was present at detectable levels.  
 See Table 2-6 for typical minimum detectable concentrations.

TABLE 2-3A\*  
 Vogtle Electric Generating Plant  
 RADIOACTIVE EFFLUENT RELEASE REPORT - 2002  
 Gaseous Effluents-Ground Level Releases  
 Unit: 1  
 Starting : 1-Jan-2002      Ending : 30-Jun-2002

		CONTINUOUS MODE		BATCH MODE	
NUCLIDES RELEASED	UNIT	QUARTER 1	QUARTER 2	QUARTER 1	QUARTER 2
FISSION GASES					
AR-41	CURIES	0.00E+00	0.00E+00	6.76E-04	0.00E+00
XE-135	CURIES	0.00E+00	0.00E+00	2.38E-06	0.00E+00
XE-133M	CURIES	0.00E+00	0.00E+00	8.16E-05	0.00E+00
XE-133	CURIES	0.00E+00	0.00E+00	2.03E-02	3.06E-05
XE-131M	CURIES	0.00E+00	0.00E+00	1.40E-04	0.00E+00
TOTAL FOR PERIOD	CURIES	0.00E+00	0.00E+00	2.12E-02	3.06E-05
IODINES					
I-131	CURIES	0.00E+00	0.00E+00	2.44E-05	1.53E-06
TOTAL FOR PERIOD	CURIES	0.00E+00	0.00E+00	2.44E-05	1.53E-06
H-3	CURIES	0.00E+00	0.00E+00	1.22E-03	4.19E-05

\* Zeroes in this table indicate that no radioactivity was present at detectable levels.  
 See Table 2-6 for typical minimum detectable concentrations.



TABLE 2-3A\*  
 Vogtle Electric Generating Plant  
 RADIOACTIVE EFFLUENT RELEASE REPORT - 2002  
 Gaseous Effluents-Ground Level Releases  
 Unit: 1  
 Starting : 1-Jul-2002      Ending : 31-Dec-2002

		CONTINUOUS MODE			BATCH MODE		
NUCLIDES RELEASED	UNIT	QUARTER 3	QUARTER 4	QUARTER 3	QUARTER 4		
TOTAL FOR PERIOD		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 2-6 for typical minimum detectable concentrations.

TABLE 2-3B\*  
 Vogtle Electric Generating Plant  
 RADIOACTIVE EFFLUENT RELEASE REPORT - 2002  
 Gaseous Effluents-Ground Level Releases  
 Unit: 2  
 Starting : 1-Jan-2002      Ending : 30-Jun-2002

		CONTINUOUS MODE			BATCH MODE		
NUCLIDES RELEASED	UNIT	QUARTER 1	QUARTER 2	QUARTER 1	QUARTER 2		
TOTAL FOR PERIOD		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 2-6 for typical minimum detectable concentrations.

TABLE 2-3B\*  
 Vogtle Electric Generating Plant  
 RADIOACTIVE EFFLUENT RELEASE REPORT - 2002  
 Gaseous Effluents-Ground Level Releases  
 Unit: 2  
 Starting : 1-Jul-2002      Ending : 31-Dec-2002

		CONTINUOUS MODE		BATCH MODE	
NUCLIDES RELEASED	UNIT	QUARTER 3	QUARTER 4	QUARTER 3	QUARTER 4
FISSION GASES					
XE-133	CURIES	0.00E+00	0.00E+00	0.00E+00	5.98E-03
TOTAL FOR PERIOD	CURIES	0.00E+00	0.00E+00	0.00E+00	5.98E-03
H-3	CURIES	0.00E+00	0.00E+00	0.00E+00	8.23E-03

\* Zeroes in this table indicate that no radioactivity was present at detectable levels.  
 See Table 2-6 for typical minimum detectable concentrations.

TABLE 2-3C\*  
 Vogtle Electric Generating Plant  
 RADIOACTIVE EFFLUENT RELEASE REPORT - 2002  
 Gaseous Effluents-Ground Level Releases  
 Unit: Site  
 Starting : 1-Jan-2002      Ending : 30-Jun-2002

NUCLIDES RELEASED	UNIT	CONTINUOUS MODE		BATCH MODE	
		QUARTER 1	QUARTER 2	QUARTER 1	QUARTER 2
FISSION GASES					
AR-41	CURIES	0.00E+00	0.00E+00	6.76E-04	0.00E+00
XE-135	CURIES	0.00E+00	0.00E+00	2.38E-06	0.00E+00
XE-133M	CURIES	0.00E+00	0.00E+00	8.16E-05	0.00E+00
XE-133	CURIES	0.00E+00	0.00E+00	2.03E-02	3.06E-05
XE-131M	CURIES	0.00E+00	0.00E+00	1.40E-04	0.00E+00
TOTAL FOR PERIOD	CURIES	0.00E+00	0.00E+00	2.12E-02	3.06E-05
IODINES					
I-131	CURIES	0.00E+00	0.00E+00	2.44E-05	1.53E-06
TOTAL FOR PERIOD	CURIES	0.00E+00	0.00E+00	2.44E-05	1.53E-06
H-3	CURIES	0.00E+00	0.00E+00	1.22E-03	4.19E-05

\* Zeroes in this table indicate that no radioactivity was present at detectable levels.  
 See Table 2-6 for typical minimum detectable concentrations.

TABLE 2-3C\*  
 Vogtle Electric Generating Plant  
 RADIOACTIVE EFFLUENT RELEASE REPORT - 2002  
 Gaseous Effluents-Ground Level Releases  
 Unit: Site  
 Starting : 1-Jul-2002      Ending : 31-Dec-2002

		CONTINUOUS MODE		BATCH MODE	
NUCLIDES RELEASED	UNIT	QUARTER 3	QUARTER 4	QUARTER 3	QUARTER 4
FISSION GASES					
Xe-133	CURIES	0.00E+00	0.00E+00	0.00E+00	5.98E-03
TOTAL FOR PERIOD	CURIES	0.00E+00	0.00E+00	0.00E+00	5.98E-03
H-3	CURIES	0.00E+00	0.00E+00	0.00E+00	8.23E-03

\* Zeroes in this table indicate that no radioactivity was present at detectable levels.  
 See Table 2-7 for typical minimum detectable concentrations.

TABLE 2-4A  
 Vogtle Electric Generating Plant  
 RADIOACTIVE EFFLUENT RELEASE REPORT - 2002  
 AIR DOSES DUE TO GASEOUS RELEASES

Unit: 1

Starting: 01-Jan-2002

Ending: 30-Jun-2002

Cumulative Doses per Quarter

Type of Radiation	ODCM Limit	Units	Quarter 1	% of ODCM Limit	Quarter 2	% of ODCM Limit
Gamma	5.0	mrad	1.40E-04	2.79E-03	1.61E-05	3.21E-04
Beta	10.0	mrad	3.25E-04	3.25E-03	1.62E-05	1.62E-04

Cumulative Doses per Year

Type of Radiation	ODCM Limit	Units	Year to Ending Date	% of ODCM Limit
Gamma	10.0	mrad	1.56E-04	1.56E-03
Beta	20.0	mrad	3.41E-04	1.70E-03

TABLE 2-4A  
 Vogtle Electric Generating Plant  
 RADIOACTIVE EFFLUENT RELEASE REPORT - 2002  
 AIR DOSES DUE TO GASEOUS RELEASES

Unit: 1

Starting: 01-Jul-2002

Ending: 31-Dec-2002

Cumulative Doses per Quarter

Type of Radiation	ODCM Limit	Units	Quarter 3	% of ODCM Limit	Quarter 4	% of ODCM Limit
Gamma	5.0	mrad	7.94E-06	1.59E-04	6.57E-06	1.31E-04
Beta	10.0	mrad	8.61E-05	8.61E-04	2.38E-06	2.38E-05

Cumulative Doses per Year

Type of Radiation	ODCM Limit	Units	Year to Ending Date	% of ODCM Limit
Gamma	10.0	mrad	1.70E-04	1.70E-03
Beta	20.0	mrad	4.29E-04	2.15E-03

TABLE 2-4B  
 Vogtle Electric Generating Plant  
 RADIOACTIVE EFFLUENT RELEASE REPORT - 2002  
 AIR DOSES DUE TO GASEOUS RELEASES

Unit: 2

Starting: 01-Jan-2002

Ending: 30-Jun-2002

Cumulative Doses per Quarter

Type of Radiation	ODCM Limit	Units	Quarter 1	% of ODCM Limit	Quarter 2	% of ODCM Limit
Gamma	5.0	mrad	1.34E-05	2.68E-04	3.98E-06	7.96E-05
Beta	10.0	mrad	3.52E-05	3.52E-04	4.53E-06	4.53E-05

Cumulative Doses per Year

Type of Radiation	ODCM Limit	Units	Year to Ending Date	% of ODCM Limit
Gamma	10.0	mrad	1.74E-05	1.74E-04
Beta	20.0	mrad	3.97E-05	1.98E-04



TABLE 2-4B  
 Vogtle Electric Generating Plant  
 RADIOACTIVE EFFLUENT RELEASE REPORT - 2002  
 AIR DOSES DUE TO GASEOUS RELEASES

Unit: 2

Starting: 01-Jul-2002

Ending: 31-Dec-2002

Cumulative Doses per Quarter

Type of Radiation	ODCM Limit	Units	Quarter 3	% of ODCM Limit	Quarter 4	% of ODCM Limit
Gamma	5.0	mrad	3.54E-06	7.08E-05	1.56E-06	3.12E-05
Beta	10.0	mrad	1.53E-06	1.53E-05	1.55E-06	1.55E-05

Cumulative Doses per Year

Type of Radiation	ODCM Limit	Units	Year to Ending Date	% of ODCM Limit
Gamma	10.0	mrad	2.25E-05	2.25E-04
Beta	20.0	mrad	4.28E-05	2.14E-04

TABLE 2-5A  
 Vogtle Electric Generating Plant  
 RADIOACTIVE EFFLUENT RELEASE REPORT - 2002  
 DOSES TO A MEMBER OF THE PUBLIC DUE TO RADIOIODINES, TRITIUM,  
 AND PARTICULATES IN GASEOUS RELEASES  
 Unit: 1  
 Starting: 01-Jan-2002                      Ending: 30-Jun-2002

Cumulative Doses per Quarter

Organ	ODCM Limit	Unit	Quarter 1	% of ODCM Limit	Quarter 2	% of ODCM Limit
Bone	7.5	mrem	2.42E-05	3.23E-04	1.64E-06	2.18E-05
Liver	7.5	mrem	1.67E-04	2.22E-03	6.45E-05	8.60E-04
TBody	7.5	mrem	1.58E-04	2.11E-03	6.39E-05	8.51E-04
Thyroid	7.5	mrem	6.90E-03	9.20E-02	5.54E-04	7.39E-03
Kidney	7.5	mrem	1.80E-04	2.40E-03	6.54E-05	8.73E-04
Lung	7.5	mrem	1.46E-04	1.95E-03	6.30E-05	8.40E-04
GILLI	7.5	mrem	1.48E-04	1.97E-03	6.31E-05	8.42E-04

Cumulative Doses per Year

Organ	ODCM Limit	Units	Year to Ending Date	% of ODCM Limit
Bone	15.0	mrem	2.59E-05	1.72E-04
Liver	15.0	mrem	2.31E-04	1.54E-03
TBody	15.0	mrem	2.22E-04	1.48E-03
Thyroid	15.0	mrem	7.46E-03	4.97E-02
Kidney	15.0	mrem	2.45E-04	1.63E-03
Lung	15.0	mrem	2.09E-04	1.40E-03
GILLI	15.0	mrem	2.11E-04	1.41E-03

TABLE 2-5A  
 Vogtle Electric Generating Plant  
 RADIOACTIVE EFFLUENT RELEASE REPORT - 2002  
 DOSES TO A MEMBER OF THE PUBLIC DUE TO RADIOIODINES, TRITIUM,  
 AND PARTICULATES IN GASEOUS RELEASES

Unit: 1

Starting: 01-Jul-2002

Ending: 31-Dec-2002

Cumulative Doses per Quarter

Organ	ODCM Limit	Unit	Quarter 3	% of ODCM Limit	Quarter 4	% of ODCM Limit
Bone	7.5	mrem	2.90E-08	3.87E-07	1.80E-08	2.40E-07
Liver	7.5	mrem	5.02E-05	6.69E-04	3.48E-05	4.64E-04
TBody	7.5	mrem	5.02E-05	6.69E-04	3.48E-05	4.64E-04
Thyroid	7.5	mrem	5.89E-05	7.85E-04	4.02E-05	5.36E-04
Kidney	7.5	mrem	5.02E-05	6.69E-04	3.48E-05	4.64E-04
Lung	7.5	mrem	5.02E-05	6.69E-04	3.48E-05	4.64E-04
GILLI	7.5	mrem	5.02E-05	6.69E-04	3.48E-05	4.64E-04

Cumulative Doses per Year

Organ	ODCM Limit	Units	Year to Ending Date	% of ODCM Limit
Bone	15.0	mrem	2.59E-05	1.73E-04
Liver	15.0	mrem	3.16E-04	2.11E-03
TBody	15.0	mrem	3.07E-04	2.05E-03
Thyroid	15.0	mrem	7.56E-03	5.04E-02
Kidney	15.0	mrem	3.30E-04	2.20E-03
Lung	15.0	mrem	2.94E-04	1.96E-03
GILLI	15.0	mrem	2.96E-04	1.97E-03

TABLE 2-5B  
 Vogtle Electric Generating Plant  
 RADIOACTIVE EFFLUENT RELEASE REPORT - 2002  
 DOSES TO A MEMBER OF THE PUBLIC DUE TO RADIOIODINES, TRITIUM,  
 AND PARTICULATES IN GASEOUS RELEASES  
 Unit: 2  
 Starting: 01-Jan-2002                      Ending: 30-Jun-2002

Cumulative Doses per Quarter

Organ	ODCM Limit	Unit	Quarter 1	% of ODCM Limit	Quarter 2	% of ODCM Limit
Bone	7.5	mrem	2.12E-07	2.83E-06	8.48E-10	1.13E-08
Liver	7.5	mrem	1.87E-04	2.49E-03	9.08E-05	1.21E-03
TBody	7.5	mrem	1.87E-04	2.49E-03	9.08E-05	1.21E-03
Thyroid	7.5	mrem	2.42E-04	3.22E-03	9.08E-05	1.21E-03
Kidney	7.5	mrem	1.87E-04	2.49E-03	9.08E-05	1.21E-03
Lung	7.5	mrem	1.87E-04	2.49E-03	9.08E-05	1.21E-03
GILLI	7.5	mrem	1.87E-04	2.49E-03	9.08E-05	1.21E-03

Cumulative Doses per Year

Organ	ODCM Limit	Units	Year to Ending Date	% of ODCM Limit
Bone	15.0	mrem	2.13E-07	1.42E-06
Liver	15.0	mrem	2.78E-04	1.85E-03
TBody	15.0	mrem	2.78E-04	1.85E-03
Thyroid	15.0	mrem	3.32E-04	2.22E-03
Kidney	15.0	mrem	2.78E-04	1.85E-03
Lung	15.0	mrem	2.78E-04	1.85E-03
GILLI	15.0	mrem	2.78E-04	1.85E-03

TABLE 2-5B  
 Vogtle Electric Generating Plant  
 RADIOACTIVE EFFLUENT RELEASE REPORT - 2002  
 DOSES TO A MEMBER OF THE PUBLIC DUE TO RADIOIODINES, TRITIUM,  
 AND PARTICULATES IN GASEOUS RELEASES  
 Unit: 2  
 Starting: 01-Jul-2002                      Ending: 31-Dec-2002

Cumulative Doses per Quarter

Organ	ODCM Limit	Unit	Quarter 3	% of ODCM Limit	Quarter 4	% of ODCM Limit
Bone	7.5	mrem	5.96E-08	7.95E-07	1.83E-07	2.44E-06
Liver	7.5	mrem	4.53E-05	6.04E-04	6.29E-05	8.39E-04
TBody	7.5	mrem	4.53E-05	6.03E-04	6.29E-05	8.39E-04
Thyroid	7.5	mrem	6.00E-05	8.01E-04	6.29E-05	8.39E-04
Kidney	7.5	mrem	4.53E-05	6.04E-04	6.29E-05	8.39E-04
Lung	7.5	mrem	4.52E-05	6.03E-04	6.29E-05	8.39E-04
GILLI	7.5	mrem	4.52E-05	6.03E-04	6.29E-05	8.39E-04

Cumulative Doses per Year

Organ	ODCM Limit	Units	Year to Ending Date	% of ODCM Limit
Bone	15.0	mrem	4.55E-07	3.03E-06
Liver	15.0	mrem	3.86E-04	2.57E-03
TBody	15.0	mrem	3.86E-04	2.57E-03
Thyroid	15.0	mrem	4.55E-04	3.04E-03
Kidney	15.0	mrem	3.86E-04	2.57E-03
Lung	15.0	mrem	3.86E-04	2.57E-03
GILLI	15.0	mrem	3.86E-04	2.57E-03

TABLE 2-6  
 VOGTLE ELECTRIC GENERATING PLANT  
 RADIOACTIVE EFFLUENT RELEASE REPORT - 2002  
 MINIMUM DETECTABLE CONCENTRATIONS - GASEOUS SAMPLE ANALYSES  
 JANUARY, 2002 THROUGH DECEMBER, 2002

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

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 ml.

TABLE 2-7A  
 Vogtle Electric Generating Plant  
 RADIOACTIVE EFFLUENT RELEASE REPORT - 2002  
 Gaseous Effluents - Batch Release Summary  
 Unit: 1  
 Starting : 1-Jan-2002      Ending : 30-Jun-2002

-----  
 -----  
 GASEOUS RELEASES  
 -----

NUMBER OF BATCH RELEASES	:	96	
TOTAL TIME PERIOD FOR BATCH RELEASES	:	54480.00	MINUTES
MAXIMUM TIME PERIOD FOR A BATCH RELEASE	:	6992.00	MINUTES
AVERAGE TIME PERIOD FOR BATCH RELEASES	:	567.51	MINUTES
MINIMUM TIME FOR A BATCH RELEASE	:	2.00	MINUTES

-----  
 -----

TABLE 2-7A  
 Vogtle Electric Generating Plant  
 RADIOACTIVE EFFLUENT RELEASE REPORT - 2002  
 Gaseous Effluents - Batch Release Summary  
 Unit: 1  
 Starting : 1-Jul-2002      Ending : 31-Dec-2002

-----  
 -----  
 GASEOUS RELEASES  
 -----

NUMBER OF BATCH RELEASES	:	56	
TOTAL TIME PERIOD FOR BATCH RELEASES	:	6485.00	MINUTES
MAXIMUM TIME PERIOD FOR A BATCH RELEASE	:	1341.00	MINUTES
AVERAGE TIME PERIOD FOR BATCH RELEASES	:	115.80	MINUTES
MINIMUM TIME FOR A BATCH RELEASE	:	40.00	MINUTES

-----  
 -----

TABLE 2-7B  
 Vogtle Electric Generating Plant  
 RADIOACTIVE EFFLUENT RELEASE REPORT - 2002  
 Gaseous Effluents - Batch Release Summary  
 Unit: 2  
 Starting : 1-Jan-2002      Ending : 30-Jun-2002

-----  
 -----  
 GASEOUS RELEASES  
 -----

NUMBER OF BATCH RELEASES	:	29	
TOTAL TIME PERIOD FOR BATCH RELEASES	:	2062.00	MINUTES
MAXIMUM TIME PERIOD FOR A BATCH RELEASE	:	165.00	MINUTES
AVERAGE TIME PERIOD FOR BATCH RELEASES	:	71.10	MINUTES
MINIMUM TIME FOR A BATCH RELEASE	:	10.00	MINUTES

-----  
 -----

TABLE 2-7B  
 Vogtle Electric Generating Plant  
 RADIOACTIVE EFFLUENT RELEASE REPORT - 2002  
 Gaseous Effluents - Batch Release Summary  
 Unit: 2  
 Starting : 1-Jul-2002      Ending : 31-Dec-2002

-----  
 -----  
 GASEOUS RELEASES  
 -----

NUMBER OF BATCH RELEASES	:	54	
TOTAL TIME PERIOD FOR BATCH RELEASES	:	57339.73	MINUTES
MAXIMUM TIME PERIOD FOR A BATCH RELEASE	:	8886.00	MINUTES
AVERAGE TIME PERIOD FOR BATCH RELEASES	:	1061.85	MINUTES
MINIMUM TIME FOR A BATCH RELEASE	:	20.00	MINUTES

-----  
 -----



TABLE 2-8A  
Vogtle Electric Generating Plant  
RADIOACTIVE EFFLUENT RELEASE REPORT - 2002  
Gaseous Effluents - Abnormal Release Summary  
Unit: 1  
Starting : 1-Jan-2002      Ending : 30-Jun-2002

NUMBER OF RELEASES	:	0	
TOTAL TIME FOR ALL RELEASES	:	0.00	MINUTES
MAXIMUM TIME FOR A RELEASE	:	0.00	MINUTES
AVERAGE TIME FOR A RELEASE	:	0.00	MINUTES
MINIMUM TIME FOR A RELEASE	:	0.00	MINUTES
TOTAL ACTIVITY FOR ALL RELEASES	:	0.00E+00	CURIES

TABLE 2-8A  
Vogtle Electric Generating Plant  
RADIOACTIVE EFFLUENT RELEASE REPORT - 2002  
Gaseous Effluents - Abnormal Release Summary  
Unit: 1  
Starting : 1-Jul-2002      Ending : 31-Dec-2002

NUMBER OF RELEASES	:	0	
TOTAL TIME FOR ALL RELEASES	:	0.00	MINUTES
MAXIMUM TIME FOR A RELEASE	:	0.00	MINUTES
AVERAGE TIME FOR A RELEASE	:	0.00	MINUTES
MINIMUM TIME FOR A RELEASE	:	0.00	MINUTES
TOTAL ACTIVITY FOR ALL RELEASES	:	0.00E+00	CURIES

TABLE 2-8B  
 Vogtle Electric Generating Plant  
 RADIOACTIVE EFFLUENT RELEASE REPORT - 2002  
 Gaseous Effluents - Abnormal Release Summary  
 Unit: 2  
 Starting : 1-Jan-2002      Ending : 30-Jun-2002

NUMBER OF RELEASES	:	2	
TOTAL TIME FOR ALL RELEASES	:	1187.00	MINUTES
MAXIMUM TIME FOR A RELEASE	:	1022.00	MINUTES
AVERAGE TIME FOR A RELEASE	:	593.50	MINUTES
MINIMUM TIME FOR A RELEASE	:	165.00	MINUTES
TOTAL ACTIVITY FOR ALL RELEASES	:	1.20E+00	CURIE

TABLE 2-8B  
 Vogtle Electric Generating Plant  
 RADIOACTIVE EFFLUENT RELEASE REPORT - 2002  
 Gaseous Effluents - Abnormal Release Summary  
 Unit: 2  
 Starting : 1-Jul-2002      Ending : 31-Dec-2002

NUMBER OF RELEASES	:	0	
TOTAL TIME FOR ALL RELEASES	:	0.00	MINUTES
MAXIMUM TIME FOR A RELEASE	:	0.00	MINUTES
AVERAGE TIME FOR A RELEASE	:	0.00	MINUTES
MINIMUM TIME FOR A RELEASE	:	0.00	MINUTES
TOTAL ACTIVITY FOR ALL RELEASES	:	0.00E+00	CURIES

### **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.

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

Regulatory Guide 1.21, Table 3 is found in this report as Table 3-1.

TABLE 3-1  
Vogtle Electric Generating Plant  
RADIOACTIVE EFFLUENT RELEASE REPORT - 2002  
SOLID WASTE AND IRRADIATED FUEL SHIPMENTS  
Units 1 and 2

JANUARY 1, 2002 THROUGH JUNE 30, 2002

**A. SOLID WASTE SHIPPED OFFSITE FOR BURIAL OR DISPOSAL (Not Irradiated Fuel)**

1. Type of waste	Unit	6-month Period	Est. Total Error, %
a. Spent resins, filter sludges, evaporator, bottoms, etc.	m3 Ci	None None	N/A
b. Dry compressible waste, contaminated equip, etc.	m3 Ci	14.12 53.67	40
c. Irradiated components, control rods, etc.	m3 Ci	NONE	N/A
d. Other (describe)	m3 Ci	NONE	N/A

**2. Estimate of major nuclide composition (by type of waste)**

a.	N/A	%	N/A
	N/A	%	N/A
	N/A	%	N/A
	N/A	%	N/A
b.	Ni-63	%	49.76
	Cs-137	%	13.29
	Cs-134	%	12.57
	All others	%	24.38
c.	N/A	%	N/A
	N/A	%	N/A
	N/A	%	N/A
	N/A	%	N/A
d.	N/A	%	N/A
	N/A	%	N/A

TABLE 3-1  
 Vogtle Electric Generating Plant  
 RADIOACTIVE EFFLUENT RELEASE REPORT - 2002  
 SOLID WASTE AND IRRADIATED FUEL SHIPMENTS  
 Units 1 and 2

JANUARY 1, 2002 THROUGH JUNE 30, 2002

3. Solid Waste Disposition

<u>Number of Shipments</u>	<u>Mode of Transportation</u>	<u>Destination</u>
1	Tractor/Cask/Trailer	Duratek, Oak Ridge, TN
4	Tractor/Cask/Trailer	Studsvik, Oak Ridge, TN
1	Tractor/Trailer	AERC, Oak Ridge TN
5	Tractor/Trailer	Duratek, Oak Ridge, TN
2	Tractor/Cask/Trailer	ATG, Oak Ridge, TN
1	Tractor/Trailer	ATG, Oak Ridge TN

B. IRRADIATED FUEL SHIPMENTS (Disposition)

<u>Number of Shipments</u>	<u>Mode of Transportation</u>	<u>Destination</u>
None	None	None

ADDITIONAL INFORMATION REQUIRED BY ODCM:

Shipments to a Waste Processor

<u>Shipment No.</u>	<u>Waste Class</u>	<u>Type Container</u>	<u>Shipping Class</u>	<u>Solidification Agent</u>
RVRS-02-001	A UNSTABLE	STRONG TIGHT	LSA (2)	NONE
RVRS-02-002	A UNSTABLE	STRONG TIGHT	LSA (2)	NONE
RVRS-02-003	A UNSTABLE	STRONG TIGHT	LSA (2)	NONE
RVRS-02-004	A UNSTABLE	STRONG TIGHT	LSA (2)	NONE
RVRS-02-005	B	DOT 7A TYPE A	LSA (2)	NONE
RVRS-02-006	B	STRONG TIGHT	LSA (2)	NONE
RVRS-02-007	A UNSTABLE	STRONG TIGHT	LSA (2)	NONE
RVRS-02-008	A UNSTABLE	STRONG TIGHT	LQ	NONE
RVRS-02-009	A UNSTABLE	STRONG TIGHT	LSA (2)	NONE
RVRS-02-010	A-UNSTABLE	STRONG TIGHT	LSA (2)	NONE
RVRS-02-011	A-UNSTABLE	STRONG TIGHT	LSA (2)	NONE
RVRS-02-012	A-UNSTABLE	STRONG TIGHT	LSA (2)	NONE
RVRS-02-013	A-UNSTABLE	STRONG TIGHT	LSA (2)	NONE
RVRS-02-014	A-UNSTABLE	STRONG TIGHT	LSA (2)	NONE

TABLE 3-1  
 Vogtle Electric Generating Plant  
 RADIOACTIVE EFFLUENT RELEASE REPORT - 2002  
 SOLID WASTE AND IRRADIATED FUEL SHIPMENTS  
 Units 1 and 2

JULY 1, 2002 THROUGH DECEMBER 31, 2002.

**A. SOLID WASTE SHIPPED OFFSITE FOR BURIAL OR DISPOSAL (Not Irradiated Fuel)**

1. Type of waste	Unit	6-month Period	Est. Total Error, %
a. Spent resins, filter sludges, evaporator bottoms, etc.	m3 Ci	NONE NONE	
b. Dry compressible waste, contaminated equip, etc.	m3 Ci	40.33 73.96	40
c. Irradiated components, control rods, etc.	m3 Ci	NONE NONE	N/A
d. Other (describe)	m3 Ci	NONE	N/A

**2. Estimate of major nuclide composition (by type of waste)**

a.	N/A	%	N/A
	N/A	%	N/A
	N/A	%	N/A
	N/A	%	N/A
b.	Ni-63	%	34.9
	Fe-55	%	19.0
	Co-60	%	16.0
	All others	%	30.1
c.	N/A	%	N/A
	N/A	%	N/A
	N/A	%	N/A
	N/A	%	N/A
d.	N/A	%	N/A
	N/A	%	N/A
	N/A	%	N/A

TABLE 3-1  
 Vogtle Electric Generating Plant  
 RADIOACTIVE EFFLUENT RELEASE REPORT - 2002  
 SOLID WASTE AND IRRADIATED FUEL SHIPMENTS  
 Units 1 and 2

JULY 1, 2002 THROUGH DECEMBER 31, 2002

3. Solid Waste Disposition

<u>Number of Shipments</u>	<u>Mode of Transportation</u>	<u>Destination</u>
2	Tractor/Trailer/Cask	Studsvik, Erwin, TN
2	Tractor/Trailer	Duratek, Oak Ridge, TN
5	Tractor/Trailer	Duratek, Oak Ridge, TN
2	Tractor/Trailer	AERC, Oak Ridge, TN

B. IRRADIATED FUEL SHIPMENTS (Disposition)

<u>Number of Shipments</u>	<u>Mode of Transportation</u>	<u>Destination</u>
None	None	None

ADDITIONAL INFORMATION REQUIRED BY ODCM:

Shipments Sent Directly to Disposal at Barnwell, SC

<u>Shipment No.</u>	<u>Waste Class</u>	<u>Type Container</u>	<u>Shipping Class</u>	<u>Solidification Agent</u>	<u>Volume (Direct disposal only)</u>
---------------------	--------------------	-----------------------	-----------------------	-----------------------------	--------------------------------------

NONE

Shipments to a waste processor:

<u>Shipment No.</u>	<u>Waste Class</u>	<u>Type Container</u>	<u>Shipping Class</u>	<u>Solidification Agent</u>
RVRS-02-015	B	DOT 7A TYPE A	LSA (2)	NONE
RVRS-02-016	A UNSTABLE	STRONG TIGHT	LSA (2)	NONE
RVRS-02-017	A UNSTABLE	STRONG TIGHT	LQ	NONE
RVRS-02-018	A UNSTABLE	STRONG TIGHT	LQ	NONE
RVRS-02-019	A UNSTABLE	STRONG TIGHT	LSA (2)	NONE
RVRS-02-020	C	STRONG TIGHT	LSA (2)	NONE
RVRS-02-021	C	STRONG TIGHT	LSA (2)	NONE
RVRS-02-022	A UNSTABLE	STRONG TIGHT	LSA (2)	NONE
RVRS-02-023	A UNSTABLE	STRONG TIGHT	LSA (2)	NONE
RVRS-02-024	B	DOT 7A TYPE A	LSA (2)	NONE
RVRS-02-025	A UNSTABLE	STRONG TIGHT	LSA (2)	NONE

## **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.



## 4.2 Demonstration of Compliance cont'd

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 were assessed to be as follows:

	<u>VISITOR CENTER</u>			
	Quarter 1	Quarter 2	Quarter 3	Quarter 4
Total Body: (Direct Radiation from Plume)	7.00E-07	2.83E-07	1.79E-07	1.59E-07

	<u>VISITOR CENTER</u>			
	Quarter 1	Quarter 2	Quarter 3	Quarter 4
Maximum Organ (Thyroid) Quarters 1,2,3,4 (Inhalation Ground Plane)	3.81E-06	4.78E-07	2.01E-07	1.61E-07

TABLE 4-1

Vogtle Electric Generating Plant  
 RADIOACTIVE EFFLUENT RELEASE REPORT - 2002  
 DOSE TO A MEMBER OF THE PUBLIC  
 DUE TO ACTIVITIES INSIDE THE SITE BOUNDARY  
 Unit: Site

Starting: 01-Jan-2002

Ending: 30-Jun-2002

Page: 2

Location Name VISITOR CENTER  
 Distance (kilometers) 4.47E-01  
 Sector SE  
 Occupancy Factor 4.57E-04 (4.00E+00 hr/yr)  
 Age Group CHILD

Ground Level Releases:

Noble Gas X/Q (sec/m3) 5.93E-06  
 Particulate X/Q (sec/m3) 5.58E-06  
 Particulate D/Q (m-2) 2.28E-08

Mixed Mode Releases:

Noble Gas X/Q (sec/m3) 7.12E-07  
 Particulate X/Q (sec/m3) 6.74E-07  
 Particulate D/Q (m-2) 5.77E-09

Elevated Releases:

Noble Gas X/Q (sec/m3) N/A  
 Particulate X/Q (sec/m3) N/A  
 Particulate D/Q (m-2) N/A

	Units	Quarter 1	Quarter 2	Quarters 1 and 2	Year to Ending Date
Bone	mrem	1.40E-07	1.57E-08	1.56E-07	1.26E-07
Liver	mrem	7.04E-07	2.84E-07	9.88E-07	9.88E-07
TBody	mrem	7.00E-07	2.83E-07	9.84E-07	9.84E-07
Thyroid	mrem	3.81E-06	4.78E-07	4.28E-06	4.28E-06
Kidney	mrem	7.10E-07	2.84E-07	9.94E-07	9.94E-07
Lung	mrem	6.96E-07	2.83E-07	9.78E-07	9.78E-07
GI-LLI	mrem	6.96E-07	2.83E-07	9.79E-07	9.79E-07

TABLE 4-1

Vogtle Electric Generating Plant  
 RADIOACTIVE EFFLUENT RELEASE REPORT - 2002  
 DOSE TO A MEMBER OF THE PUBLIC  
 DUE TO ACTIVITIES INSIDE THE SITE BOUNDARY

Unit: Site

Starting: 01-Jul-2002

Ending: 31-Dec-2002

Page: 2

Location Name VISITOR CENTER  
 Distance (kilometers) 4.47E-01  
 Sector SE  
 Occupancy Factor 4.57E-04 (4.00E+00 hr/yr)  
 Age Group CHILD

Ground Level Releases:

Noble Gas X/Q (sec/m3) 5.93E-06  
 Particulate X/Q (sec/m3) 5.58E-06  
 Particulate D/Q (m-2) 2.28E-08

Mixed Mode Releases:

Noble Gas X/Q (sec/m3) 7.12E-07  
 Particulate X/Q (sec/m3) 6.74E-07  
 Particulate D/Q (m-2) 5.77E-09

Elevated Releases:

Noble Gas X/Q (sec/m3) N/A  
 Particulate X/Q (sec/m3) N/A  
 Particulate D/Q (m-2) N/A

	Units	Quarter 3	Quarter 4	Quarters 3 and 4	Year to Ending Date
Bone	mrem	7.89E-09	6.99E-09	1.49E-08	1.71E-07
Liver	mrem	1.80E-07	1.59E-07	3.38E-07	1.32E-06
TBody	mrem	1.79E-07	1.59E-07	3.38E-07	1.32E-06
Thyroid	mrem	2.01E-07	1.61E-07	3.62E-07	4.65E-06
Kidney	mrem	1.80E-07	1.59E-07	3.38E-07	1.33E-06
Lung	mrem	1.79E-07	1.59E-07	3.38E-07	1.32E-06
GI-LLI	mrem	1.79E-07	1.59E-07	3.38E-07	1.32E-06

## **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**

The requirements of 40CFR190 were met.

## **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**

The inoperability of liquid and gaseous effluent monitors was corrected within the specified time for this reporting period.

## **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**

There were no outdoor liquid hold-up tanks used for radioactive liquids 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**

There was one changes made to the Vogtle Electric Generating Plant ODCM for the period January 1, 2002 through December 31, 2002. Revision 20 is attached. The change corrected an instrument number.

The Land Use Census was conducted November 12, 2002 by Georgia Power Company Environmental Lab personnel. The results of the census for 2002 require no changes to the REMP sampling locations or to the dose calculation locations.

**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 2002 assessment period.

**Liquid Radwaste System**

There were no major changes to the liquid radwaste systems in the 2002 assessment period.

**Solid Radwaste System**

There were no major changes to the solid radwaste systems in the 2002 assessment period.

ENCLOSURE 3

Vogtle Electric Generating Plant

Appendix A

OFFSITE DOSE CALCULATION MANUAL  
FOR  
SOUTHERN NUCLEAR OPERATING COMPANY  
VOGTLE ELECTRIC GENERATING PLANT

Revision 20  
April 25, 2003



**Distribution List**

)

)

)

DISTRIBUTION LIST

<u>Copy Number</u>	<u>Manual Holder</u>
1	George R. Frederick
3	Training Center Simulator
6	VEGP Main Control Room Podium
7	Rebecca H. Parker
8	Manager, Engineering Support
10	Primary Chemistry Lab
12	Manager, Health Physics & Chemistry
14	Manager, Training & Emergency Preparedness
16	John Aufdenkampe
18	VEGP Document Control
19	QA Supervisor
20	Chemistry Superintendent
21	Joe B. Sils
22	Dwight Hostetter
23	Michael C. Nichols
24	Shan Sundaram
28	Terry G. Lamb
29	Steve White

s:\vogtlelodcm\dl.doc

**Revision Log**

REVISION LOG

<u>Revision Number</u>	<u>Date</u>
0	8/85
1	8/86
2	11/86
3	3/87
4	7/87
5	10/87
6	9/88
7	3/91
8	2/93
9	1/94
10	2/96
11	12/96
12	2/97
13	6/97
14	12/97
15	1/99
16	7/99
17	10/00
18	8/01
19	11/01
20	4/03

s:\vogtle\odcm\revision log.doc

**Table of Contents**

TABLE OF CONTENTS

	<u>PAGE</u>
DISTRIBUTION LIST .....	i
REVISION LOG.....	ii
TABLE OF CONTENTS .....	iii
LIST OF TABLES.....	viii
LIST OF FIGURES.....	x
REFERENCES.....	xi
CHAPTER 1: INTRODUCTION.....	1-1
CHAPTER 2: LIQUID EFFLUENTS.....	2-1
2.1 LIMITS OF OPERATION	2-1
2.1.1 <u>Liquid Effluent Monitoring Instrumentation Control</u>	2-1
2.1.2 <u>Liquid Effluent Concentration Control</u>	2-7
2.1.3 <u>Liquid Effluent Dose Control</u>	2-10
2.1.4 <u>Liquid Radwaste Treatment System Control</u>	2-11
2.1.5 <u>Major Changes to Liquid Radioactive Waste Treatment Systems</u>	2-12
2.2 LIQUID RADWASTE TREATMENT SYSTEM	2-13
2.3 LIQUID EFFLUENT MONITOR SETPOINTS	2-17
2.3.1 <u>General Provisions Regarding Setpoints</u>	2-17
2.3.2 <u>Setpoints for Radwaste System Discharge Monitors</u>	2-19
2.3.3 <u>Setpoints for Monitors on Normally Low-Radioactivity Streams</u>	2-25
2.4 LIQUID EFFLUENT DOSE CALCULATIONS	2-26
2.4.1 <u>Calculation of Dose</u>	2-26
2.4.2 <u>Calculation of <math>A_r</math></u>	2-27
2.4.3 <u>Calculation of <math>CF_v</math></u>	2-28
2.5 LIQUID EFFLUENT DOSE PROJECTIONS	2-37
2.5.1 <u>Thirty-One Day Dose Projections</u>	2-37
2.5.2 <u>Dose Projections for Specific Releases</u>	2-37
2.6 DEFINITIONS OF LIQUID EFFLUENT TERMS	2-38
CHAPTER 3: GASEOUS EFFLUENTS.....	3-1
3.1 LIMITS OF OPERATION	3-1
3.1.1 <u>Gaseous Effluent Monitoring Instrumentation Control</u>	3-1
3.1.2 <u>Gaseous Effluent Dose Rate Control</u>	3-7

---

**TABLE OF CONTENTS (continued)**

	<u>PAGE</u>
3.1.3 <u>Gaseous Effluent Air Dose Control</u>	3-10
3.1.4 <u>Control on Gaseous Effluent Dose to a Member of the Public</u>	3-11
3.1.5 <u>Gaseous Radwaste Treatment System Control</u>	3-12
3.1.6 <u>Major Changes to Gaseous Radioactive Waste Treatment Systems</u>	3-13
3.2 GASEOUS WASTE PROCESSING SYSTEM	3-14
3.3 GASEOUS EFFLUENT MONITOR SETPOINTS	3-20
3.3.1 <u>General Provisions Regarding Noble Gas Monitor Setpoints</u>	3-20
3.3.2 <u>Setpoint for the Final Noble Gas Monitor on Each Release Pathway</u>	3-22
3.3.3 <u>Setpoints for Noble Gas Monitors on Effluent Source Streams</u>	3-25
3.3.4 <u>Determination of Allocation Factors, AG</u>	3-27
3.3.5 <u>Setpoints for Noble Gas Monitors with Special Requirements</u>	3-29
3.3.6 <u>Setpoints for Particulate and Iodine Monitors</u>	3-29
3.4 GASEOUS EFFLUENT COMPLIANCE CALCULATIONS	3-30
3.4.1 <u>Dose Rates at and Beyond the Site Boundary</u>	3-30
3.4.2 <u>Noble Gas Air Dose at or Beyond Site Boundary</u>	3-31
3.4.3 <u>Dose to a Member of the Public at or Beyond Site Boundary</u>	3-35
3.4.4 <u>Dose Calculations to Support Other Requirements</u>	3-38
3.5 GASEOUS EFFLUENT DOSE PROJECTIONS	3-44
3.5.1 <u>Thirty-One Day Dose Projections</u>	3-44
3.5.2 <u>Dose Projections for Specific Releases</u>	3-45
3.6 DEFINITIONS OF GASEOUS EFFLUENT TERMS	3-46
CHAPTER 4: RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM.....	4-1
4.1 LIMITS OF OPERATION	4-1
4.1.1 <u>Radiological Environmental Monitoring</u>	4-1
4.1.2 <u>Land Use Census</u>	4-9
4.1.3 <u>Interlaboratory Comparison Program</u>	4-10
4.2 RADIOLOGICAL ENVIRONMENTAL MONITORING LOCATIONS	4-11
CHAPTER 5: TOTAL DOSE DETERMINATIONS.....	5-1
5.1 LIMIT OF OPERATION	5-1
5.1.1 <u>Applicability</u>	5-1
5.1.2 <u>Actions</u>	5-1
5.1.3 <u>Surveillance Requirements</u>	5-1
5.1.4 <u>Basis</u>	5-1
5.2 DEMONSTRATION OF COMPLIANCE	5-3

---

TABLE OF CONTENTS (continued)

	<u>PAGE</u>
CHAPTER 6: POTENTIAL DOSES TO MEMBERS OF THE PUBLIC DUE TO THEIR ACTIVITIES INSIDE THE SITE BOUNDARY .....	6-1
6.1    REQUIREMENT FOR CALCULATION	6-1
6.2    CALCULATIONAL METHOD	6-1
CHAPTER 7: REPORTS .....	7-1
7.1    ANNUAL RADIOLOGICAL ENVIRONMENTAL SURVEILLANCE REPORT	7-1
7.1.1 <u>Requirement for Report</u>	7-1
7.1.2 <u>Report Contents</u>	7-1
7.2    RADIOACTIVE EFFLUENT RELEASE REPORT	7-3
7.2.1 <u>Requirement for Report</u>	7-3
7.2.2 <u>Report Contents</u>	7-3
7.3    MONTHLY OPERATING REPORT	7-6
7.4    SPECIAL REPORTS	7-6
CHAPTER 8: METEOROLOGICAL MODELS .....	8-1
8.1    ATMOSPHERIC DISPERSION	8-1
8.1.1 <u>Ground-Level Releases</u>	8-1
8.1.2 <u>Elevated Releases</u>	8-2
8.1.3 <u>Mixed-Mode Releases</u>	8-4
8.2    RELATIVE DEPOSITION	8-5
8.2.1 <u>Ground-Level Releases</u>	8-5
8.2.2 <u>Elevated Releases</u>	8-5
8.2.3 <u>Mixed-Mode Releases</u>	8-6
8.3    ELEVATED PLUME DOSE FACTORS	8-6
CHAPTER 9: METHODS AND PARAMETERS FOR CALCULATION OF GASEOUS EFFLUENT PATHWAY DOSE FACTORS, $R_{a pj}$ .....	9-1
9.1    INHALATION PATHWAY FACTOR	9-1
9.2    GROUND PLANE PATHWAY FACTOR	9-2
9.3    GARDEN VEGETATION PATHWAY FACTOR	9-3
9.4    GRASS-COW-MILK PATHWAY FACTOR	9-6
9.5    GRASS-GOAT-MILK PATHWAY FACTOR	9-9
9.6    GRASS-COW-MEAT PATHWAY FACTOR	9-12
CHAPTER 10: DEFINITIONS OF EFFLUENT CONTROL TERMS .....	10-1
10.1    TERMS SPECIFIC TO THE ODCM	10-1
10.2    TERMS DEFINED IN THE TECHNICAL SPECIFICATIONS	10-5



LIST OF TABLES

	<u>PAGE</u>
Table 2-1. Radioactive Liquid Effluent Monitoring Instrumentation	2-3
Table 2-2. Radioactive Liquid Effluent Monitoring Instrumentation Surveillance Requirements	2-5
Table 2-3. Radioactive Liquid Waste Sampling and Analysis Program	2-8
Table 2-4. Applicability of Liquid Monitor Setpoint Methodologies	2-18
Table 2-5. Parameters for Calculation of Doses Due to Liquid Effluent Releases	2-30
Table 2-6. Element Transfer Factors	2-31
Table 2-7. Adult Ingestion Dose Factors	2-32
Table 2-8. Site-Related Ingestion Dose Factors, $A_r$	2-35
Table 3-1. Radioactive Gaseous Effluent Monitoring Instrumentation	3-3
Table 3-2. Radioactive Gaseous Effluent Monitoring Instrumentation Surveillance Requirements	3-5
Table 3-3. Radioactive Gaseous Waste Sampling and Analysis Program	3-8
Table 3-4. Applicability of Gaseous Monitor Setpoint Methodologies	3-21
Table 3-5. Dose Factors for Exposure to a Semi-Infinite Cloud of Noble Gases	3-33
Table 3-6. Dose Factors for Exposure to Direct Radiation from Noble Gases in an Elevated Finite Plume	3-34
Table 3-7. Attributes of the Controlling Receptor	3-37
Table 3-8. $R_{a pj}$ for Ground Plane Pathway, All Age Groups	3-39
Table 3-9. $R_{a pj}$ for Inhalation Pathway, Child Age Group	3-40
Table 3-10. $R_{a pj}$ for Inhalation Pathway, Adult Age Group	3-41
Table 3-11. $R_{a pj}$ for Cow Meat Pathway, Child Age Group	3-42
Table 3-12. $R_{a pj}$ for Garden Vegetation, Child Age Group	3-43
Table 4-1. Radiological Environmental Monitoring Program	4-3

LIST OF TABLES (Continued)

	<u>PAGE</u>
Table 4-2. Reporting Levels for Radioactivity Concentrations in Environmental Samples	4-7
Table 4-3. Values for the Minimum Detectable Concentration (MDC)	4-8
Table 4-4. Radiological Environmental Monitoring Locations	4-12
Table 6-1. Attributes of Member of the Public Receptor Locations Inside the Site Boundary	6-2
Table 8-1. Terrain Elevation Above Plant Site Grade	8-7
Table 9-1. Miscellaneous Parameters for the Garden Vegetation Pathway	9-5
Table 9-2. Miscellaneous Parameters for the Grass-Cow-Milk Pathway	9-8
Table 9-3. Miscellaneous Parameters for the Grass-Goat-Milk Pathway	9-11
Table 9-4. Miscellaneous Parameters for the Grass-Cow-Meat Pathway	9-14
Table 9-5. Individual Usage Factors	9-15
Table 9-6. Stable Element Transfer Data	9-16
Table 9-7. Inhalation Dose Factors for the Infant Age Group	9-17
Table 9-8. Inhalation Dose Factors for the Child Age Group	9-20
Table 9-9. Inhalation Dose Factors for the Teenager Age Group	9-23
Table 9-10. Inhalation Dose Factors for the Adult Age Group	9-26
Table 9-11. Ingestion Dose Factors for the Infant Age Group	9-29
Table 9-12. Ingestion Dose Factors for the Child Age Group	9-32
Table 9-13. Ingestion Dose Factors for the Teenager Age Group	9-35
Table 9-14. Ingestion Dose Factors for the Adult Age Group	9-38
Table 9-15. External Dose Factors for Standing on Contaminated Ground	9-41

LIST OF FIGURES

	<u>PAGE</u>
Figure 2-1. Unit 1 Liquid Radwaste Treatment System	2-14
Figure 2-2. Unit 2 Liquid Radwaste Treatment System	2-15
Figure 2-3. Liquid Radwaste Discharge Pathways	2-16
Figure 3-1. Schematic Diagram of the Gaseous Radwaste Treatment System	3-15
Figure 3-2. Schematic Diagram of the Unit 1 Plant Vent Release Pathway	3-16
Figure 3-3. Schematic Diagram of the Unit 2 Plant Vent Release Pathway	3-17
Figure 3-4. Schematic Diagram of the Turbine Building Vent Release Pathway (Typical of Both Units)	3-18
Figure 3-5. Schematic Diagram of the Dry Active Waste Processing Building Ventilation Release Pathway	3-19
Figure 3-6. Schematic Diagram of the Radwaste Processing Facility Ventilation Release Pathway	3-19a
Figure 4-1. Terrestrial Stations Near Site Boundary	4-15
Figure 4-2. Terrestrial Stations and Aquatic Stations, 0-5 Miles	4-16
Figure 4-3. Terrestrial Stations Beyond 5 Miles	4-17
Figure 4-4. Drinking Water Stations	4-18
Figure 8-1. Vertical Standard Deviation of Material in a Plume ( $\sigma_z$ )	8-8
Figure 8-2. Terrain Recirculation Factor ( $K_r$ )	8-9
Figure 8-3. Plume Depletion Effect for Ground Level Releases	8-10
Figure 8-4. Plume Depletion Effect for 30-Meter Releases	8-11
Figure 8-5. Plume Depletion Effect for 60-Meter Releases	8-12
Figure 8-6. Plume Depletion Effect for 100-Meter Releases	8-13
Figure 8-7. Relative Deposition for Ground-Level Releases	8-14
Figure 8-8. Relative Deposition for 30-Meter Releases	8-15
Figure 8-9. Relative Deposition for 60-Meter Releases	8-16
Figure 8-10. Relative Deposition for 100-Meter (or Greater) Releases	8-17

---

REFERENCES

1. J.S. Boegli, R.R. Bellamy, W.L. Britz, and R.L. Waterfield, "Preparation of Radiological Effluent Technical Specifications for Nuclear Power Plants," NUREG-0133, October 1978.
2. "Calculation of Annual Doses to Man from Routine Releases of Reactor Effluents for the Purpose of Evaluating Compliance with 10 CFR 50, Appendix I," U.S. NRC Regulatory Guide 1.109, March 1976.
3. "Calculation of Annual Doses to Man from Routine Releases of Reactor Effluents for the Purpose of Evaluating Compliance with 10 CFR 50, Appendix I," U.S. NRC Regulatory Guide 1.109, Revision 1, October 1977.
4. "Methods for Estimating Atmospheric Transport and Dispersion of Gaseous Effluents in Routine Releases from Light-Water-Cooled Reactors," U.S. NRC Regulatory Guide 1.111, March 1976.
5. "Methods for Estimating Atmospheric Transport and Dispersion of Gaseous Effluents in Routine Releases from Light-Water-Cooled Reactors," U.S. NRC Regulatory Guide 1.111, Revision 1, July 1977.
6. "Estimating Aquatic Dispersion of Effluents from Accidental and Routine Reactor Releases for the Purpose of Implementing Appendix I," U.S. NRC Regulatory Guide 1.113, April 1977.
7. W.R. Stokes III, T.W. Hale, J.L. Pearman, and G.R. Buell, "Water Resources Data, Georgia, Water Year 1983," U.S. Geological Survey Water Data Report GA-83-1, June 1984.
8. Direct communication with the Water Resources Division, U.S. Geological Survey, U.S. Department of the Interior, February 1985.
9. Bernd Kahn, *et al.*, "Bioaccumulation of P-32 in Bluegill and Catfish," NUREG/CR-3981, February 1985.
10. Memo from S.E. Ewald, Georgia Power Company, to C.C. Eckert, Georgia Power Company, May 9, 1988.
11. Vogtle Electric Generating Plant Units 1 and 2 Final Safety Analysis Report, Georgia Power Company.
12. Vogtle Electric Generating Plant Units 1 and 2 Environmental Report - Operating License Stage, Georgia Power Company.
13. Memo from A.C. Stalker, Georgia Power Company, to D.F. Hallman, Georgia Power Company, May 9, 1988.
14. Vogtle Electric Generating Plant Land Use Survey - 1988, Georgia Power Company, April 1988.

15. Letter to Southern Company Services from Pickard, Lowe, and Garrick, Inc., Washington, D.C., April 27, 1988.
16. Letter to Bill Ollinger, Georgia Power Company, from T.L. Broadwell, Georgia Power Company, Atlanta, Georgia, June 22, 1988.
17. Letter to Bill Ollinger, Georgia Power Company, from R.D. Just, Georgia Power Company, Atlanta, Georgia, July 8, 1988.
18. L.A. Currie, Lower Limit of Detection: Definition and Elaboration of a Proposed Position of Radiological Effluent and Environmental Measurements, U.S. NRC Report NUREG/CR-4007, 1984.
19. "Radiological Assessment Branch Technical Position," U.S. Nuclear Regulatory Commission, Revision 1, November 1979.
20. D.C. Kocher, "Radioactive Decay Data Tables," U.S. DOE Report DOE/TIC-11026, 1981.
21. J.E. Till and H.R. Meyer, eds., Radiological Assessment, U.S. NRC Report NUREG/CR-3332, 1983.
22. Letter to Bill Ollinger, Southern Nuclear Operating Company, from Gary D. Johnson, Georgia Power Company, December 21, 1995.



## CHAPTER 1

INTRODUCTION

The Offsite Dose Calculation Manual is a supporting document of the Technical Specifications. As such, it describes the methodology and parameters to be used in the calculation of offsite doses due to radioactive liquid and gaseous effluents, and in the calculation of liquid and gaseous effluent monitoring instrumentation alarm setpoints. In addition, it contains the following:

- The controls required by the Technical Specifications, governing the radioactive effluent and radiological environmental monitoring programs.
- Schematics of liquid and gaseous radwaste effluent treatment systems, which include designation of release points to UNRESTRICTED AREAS.
- A list and maps indicating the specific sample locations for the Radiological Environmental Monitoring Program.
- Specifications and descriptions of the information that must be included in the Annual Radiological Environmental Operating Report and the Radioactive Effluent Release Report required by the Technical Specifications.

The ODCM will be maintained at the plant for use as a reference guide and training document of accepted methodologies and calculations. Changes in the calculational methods or parameters will be incorporated into the ODCM in order to ensure that it represents current methodology in all applicable areas. Any computer software used to perform the calculations described will be maintained current with the ODCM.

Equations and methods used in the ODCM are based on those presented in NUREG-0133 (Reference 1), in Regulatory Guide 1.109 (References 2 and 3), in Regulatory Guide 1.111 (References 4 and 5), and in Regulatory Guide 1.113 (Reference 6).

)

)

)



f

Faint, illegible text at the bottom right of the page, possibly bleed-through from the reverse side.

✓

✓

✓

## CHAPTER 2

LIQUID EFFLUENTS

## 2.1 LIMITS OF OPERATION

The following Liquid Effluent Controls implement requirements established by Technical Specifications Section 5.0. Terms printed in all capital letters are defined in Chapter 10.

2.1.1 Liquid Effluent Monitoring Instrumentation Control

In accordance with Technical Specification 5.5.4.a, the radioactive liquid effluent monitoring instrumentation channels shown in Table 2-1 shall be OPERABLE with their alarm/trip setpoints set to ensure that the limits specified in Section 2.1.2 are not exceeded. The alarm/trip setpoints of these channels shall be determined in accordance with Section 2.3.

## 2.1.1.1 Applicability

This limit applies at all times.

## 2.1.1.2 Actions

With a radioactive liquid effluent monitoring instrumentation channel alarm/trip setpoint less conservative than required by the above control, immediately suspend the release of radioactive liquid effluents monitored by the affected channel, declare the channel inoperable, or change the setpoint to a conservative value.

With less than the minimum number of radioactive liquid effluent monitoring instrumentation channels OPERABLE, take the ACTION shown in Table 2-1. Restore the INOPERABLE instrumentation to OPERABLE status within 30 days, or if unsuccessful, explain in the next Radioactive Effluent Release Report, per Technical Specification 5.6.3, why this inoperability was not corrected in a timely manner.

This control does not affect shutdown requirements or MODE changes.

## 2.1.1.3 Surveillance Requirements

Each radioactive liquid effluent monitoring instrumentation channel shall be demonstrated OPERABLE by performance of the CHANNEL CHECK, SOURCE CHECK, CHANNEL CALIBRATION, and CHANNEL OPERATIONAL TEST operations at the frequencies shown in Table 2-2. Specific instrument numbers are provided in parentheses for information only. The numbers apply to each unit. These numbers will help to identify associated channels or loops and are not intended to limit the requirements to the specific instruments associated with the number.

#### 2.1.1.4 Basis

The radioactive liquid effluent instrumentation is provided to monitor and control, as applicable, the releases of radioactive materials in liquid effluents during actual or potential releases of liquid effluents. The Alarm/Trip Setpoints for these instruments shall be calculated and adjusted in accordance with the methodology and parameters in Section 2.3 to ensure that the alarm/trip will occur prior to exceeding the limits of Section 2.1.2. The OPERABILITY and use of this instrumentation is consistent with the requirements of General Design Criteria 60, 63, and 64 of Appendix A to 10 CFR Part 50.

Table 2-1. Radioactive Liquid Effluent Monitoring Instrumentation

Instrument	OPERABILITY Requirements <sup>a</sup>	
	Minimum Channels Operable	ACTION
<b>1. Radwaste Monitors Providing Alarm and Automatic Termination of Release</b>		
a. Liquid Radwaste Effluent Line (RE-0018)	1	37
b. Steam Generator Blowdown Effluent Line (RE-0021)	1	38
c. Turbine Building Effluent Line (RE-0848)	1	38
<b>2. Radwaste Monitors Providing Alarm, but Not Automatic Termination of Release</b>		
NSCW Effluent Line (RE-0020 A&B)	1	39
<b>3. Flowrate Measurement Devices</b>		
a. Liquid Radwaste Effluent Line (FT-0018), (FT-1084A/B), or (FT-1085A/B)	1	40
b. Steam Generator Blowdown Effluent Line (FT-0021)	1	40
c. Flow to Blowdown Sump (AFQI-7620, FI7620A)	1	40

a. All requirements in this table apply to each unit.

---

Table 2-1 (contd).                      Notation for Table 2-1 — ACTION Statements

---

**ACTION 37** — With the number of channels OPERABLE less than required by the Minimum Channels OPERABLE requirement, effluent releases may continue provided that prior to initiating a release:

- a.        At least two independent samples are analyzed in accordance with Section 2.1.2.3, and
- b.        At least two technically qualified members of the Facility Staff independently verify the discharge line valving and the release rate calculations.

Otherwise, suspend release of radioactive effluents via this pathway.

**ACTION 38** — With the number of channels OPERABLE less than required by the Minimum Channels OPERABLE requirement, effluent releases via this pathway may continue provided grab samples are analyzed for gross radioactivity at a MINIMUM DETECTABLE CONCENTRATION no higher than  $1 \times 10^{-7}$   $\mu\text{Ci}/\text{mL}$  using gross beta/gamma counting or  $5 \times 10^{-7}$   $\mu\text{Ci}/\text{mL}$  for the principal gamma emitters using gamma-ray spectroscopy.

- a.        At least once per 12 hours when the specific activity of the secondary coolant is greater than 0.01  $\mu\text{Ci}/\text{gram}$  DOSE EQUIVALENT I-131.
- b.        At least once per 24 hours when the specific activity of the secondary coolant is less than or equal to 0.01  $\mu\text{Ci}/\text{gram}$  DOSE EQUIVALENT I-131.

**ACTION 39** — With the number of channels OPERABLE less than required by the Minimum Channels OPERABLE requirement, effluent releases via this pathway may continue provided that, at least once per 12 hours, grab samples are collected and analyzed for radioactivity at a MINIMUM DETECTABLE CONCENTRATION no higher than  $1 \times 10^{-7}$   $\mu\text{Ci}/\text{mL}$  using gross beta/gamma counting or  $5 \times 10^{-7}$   $\mu\text{Ci}/\text{mL}$  for the principal gamma emitters using gamma-ray spectroscopy.

**ACTION 40** — With the number of channels OPERABLE less than required by the Minimum Channels OPERABLE requirement, effluent releases via this pathway may continue provided the flowrate is estimated at least once per 4 hours during actual releases. Pump curves generated in place may be used to estimate flow.

Table 2-2. Radioactive Liquid Effluent Monitoring Instrumentation Surveillance Requirements

Instrument	Surveillance Requirements <sup>d</sup>			
	CHANNEL CHECK	SOURCE CHECK	CHANNEL CALIBRATION	CHANNEL OPERATIONAL TEST
<b>1. Radwaste Monitors Providing Alarm and Automatic Termination of Release</b>				
a. Liquid Radwaste Effluent Line (RE-0018)	D	P	R <sup>b</sup>	Q <sup>a(1)</sup>
b. Steam Generator Blowdown Effluent Line (RE-0021)	D	M	R <sup>b</sup>	Q <sup>a(1)</sup>
c. Turbine Building Effluent Line (RE-0848)	D	M	R <sup>b</sup>	Q <sup>a(1)</sup>
<b>2. Radwaste Monitors Providing Alarm, but Not Automatic Termination of Release</b>				
NSCW Effluent Line (RE-0020 A&B)	D	M	R <sup>b</sup>	Q <sup>a(2)</sup>
<b>3. Flowrate Measurement Devices</b>				
a. Liquid Radwaste Effluent Line (FT-0018), (FT-1084A/B), or (FT-1085A/B)	D <sup>c</sup>	NA	R	NA
b. Steam Generator Blowdown Effluent Line (FT-0021)	D <sup>c</sup>	NA	R	NA
c. Flow to Blowdown Sump (AFQI-7620, FI7620A)	D <sup>c</sup>	NA	R	Q

Table 2-2 (contd).                      Notation for Table 2-2

- a.      In addition to the basic functions of a CHANNEL OPERATIONAL TEST (Section 10.2):
- (1)      The CHANNEL OPERATIONAL TEST shall also demonstrate that automatic isolation of this pathway and control room annunciation occurs (for item a. below only); and control room CRT indication occurs (if any of the following conditions exist):
- (a)              Instrument indicates measured levels above the alarm/trip setpoint;
- (b)              Instrument indicates an "Equipment Trouble" alarm;
- (c)              Instrument indicates a "Low" alarm; or
- (d)              Instrument indicates channel "Deactivated".
- (2)      The CHANNEL OPERATIONAL TEST shall also demonstrate that control room annunciation occurs (for item a. below only); and that control room CRT indication occurs (if any of the following conditions exist):
- (a)              Instrument indicates measured levels above the alarm/trip setpoint;
- (b)              Instrument indicates an "Equipment Trouble" alarm;
- (c)              Instrument indicates a "Low" alarm; or
- (d)              Instrument indicates channel "Deactivated".
- b.      The initial CHANNEL CALIBRATION shall be performed using one or more of the reference standards certified by the National Institute of Standards and Technology or using standards that have been obtained from suppliers that participate in measurements assurance activities with NIST. These standards shall permit calibrating the system over its intended range of energy and measurement range. For subsequent CHANNEL CALIBRATION, sources that have been related to the initial calibration shall be used.
- c.      CHANNEL CHECK shall consist of verifying indication of flow during periods of release. CHANNEL CHECK shall be made at least once per 24 hours on days on which continuous, periodic, or batch releases are made.
- d.      All requirements in this table apply to each unit.

## 2.1.2 Liquid Effluent Concentration Control

In accordance with Technical Specifications 5.5.4.b and 5.5.4.c, 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  $1 \times 10^{-4}$   $\mu\text{Ci/mL}$  total activity.

### 2.1.2.1 Applicability

This limit applies at all times.

### 2.1.2.2 Actions

With the concentration of radioactive material released in liquid effluents to UNRESTRICTED AREAS exceeding the limits stated in Section 2.1.2, immediately restore the concentration to within the stated limits.

This control does not affect shutdown requirements or MODE changes.

### 2.1.2.3 Surveillance Requirements

The radioactivity content of each batch of radioactive liquid waste shall be determined by sampling and analysis in accordance with Table 2-3. The results of radioactive analyses shall be used with the calculational methods in Section 2.3 to assure that the concentration at the point of release is maintained within the limits of Section 2.1.2.

### 2.1.2.4 Basis

This control is provided to ensure that the concentration of radioactive materials released in liquid waste effluents to UNRESTRICTED AREAS will be less than ten times the concentration levels specified in 10 CFR 20, Appendix B, Table 2, Column 2. This limitation provides additional assurance that the levels of radioactive materials in bodies of water in UNRESTRICTED AREAS will result in exposures within (1) the Section II.A design objectives of Appendix I, 10 CFR 50, to a MEMBER OF THE PUBLIC, and (2) the limits of 10 CFR 20.1301 to the population. The concentration limit for dissolved or entrained noble gases is based upon the assumption that Xe-135 is the controlling radioisotope and its MPC in air (submersion) was converted to an equivalent concentration in water using the methods described in International Commission on Radiological Protection (ICRP) Publication 2 (1959). The resulting concentration of  $2 \times 10^{-4}$  was then multiplied by the ratio of the effluent concentration limit for Xe-135, stated in Appendix B, Table 2, Column 1 of 10 CFR 20 (paragraphs 20.1001 to 20.2401), to the MPC for Xe-135, stated in Appendix B, Table II, Column 1 of 10 CFR 20 (paragraphs 20.1 to 20.601), to obtain the limiting concentration of  $1 \times 10^{-4}$   $\mu\text{Ci/mL}$ .



Table 2-3. Radioactive Liquid Waste Sampling and Analysis Program

Liquid Release Type	Sampling and Analysis Requirements <sup>a,b</sup>			
	Sampling FREQUENCY	Minimum Analysis FREQUENCY	Type of Activity Analysis	MINIMUM DETECTABLE CONCENTRATION (MDC) ( $\mu\text{Ci/mL}$ )
<b>A. BATCH RELEASES</b>				
1. Waste Monitor Tank  2. Drainage of System	P Each BATCH	P Each BATCH	PRINCIPAL GAMMA EMITTERS	5 E-7
	P One BATCH/M	M	I-131	1 E-6
	P One BATCH/M	M	Dissolved and Entrained Gases (Gamma Emitters)	1 E-5
	P Each BATCH	M COMPOSITE	H-3	1 E-5
	P Each BATCH	Q COMPOSITE	Gross Alpha	1 E-7
	P Each BATCH	Q COMPOSITE	Sr-89, Sr-90	5 E-8
	P Each BATCH	Q COMPOSITE	Fe-55	1 E-6
<b>B. CONTINUOUS RELEASES</b>				
Waste Water Retention Basin <sup>c</sup>	Continuous	W COMPOSITE	PRINCIPAL GAMMA EMITTERS	5 E-7
	M Grab Sample	M	I-131	1 E-6
	M Grab Sample	M	Dissolved and Entrained Gases (Gamma Emitters)	1 E-5
	Continuous	M COMPOSITE	H-3	1 E-5
	Continuous	M COMPOSITE	Gross Alpha	1 E-7
	Continuous	Q COMPOSITE	Sr-89, Sr-90	5 E-8
	Continuous	Q COMPOSITE	Fe-55	1 E-6

---

**Table 2-3 (contd).                      Notation for Table 2-3**

---

- a.     All requirements in this table apply to each unit.
- b.     Terms printed in all capital letters are defined in Chapter 10.
- c.     The WWRB will not be considered a release point until there is a confirmed primary to secondary leak. Once a primary to secondary leak has been confirmed, this composite shall be analyzed as specified until the leak is repaired. This surveillance will continue until three consecutive weekly composite samples have shown no activity above the MDC.

### 2.1.3 Liquid Effluent Dose Control

In accordance with Technical Specifications 5.5.4.d and 5.5.4.e, 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:

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

#### 2.1.3.1 Applicability

These limits apply at all times.

#### 2.1.3.2 Actions

With the calculated dose from the release of radioactive materials in liquid effluents exceeding any of the limits of Section 2.1.3., prepare and submit to the Nuclear Regulatory Commission within 30 days a special report which identifies the cause(s) for exceeding the limit(s); defines the corrective actions to be taken to reduce the releases; and defines the proposed corrective actions to be taken to assure that subsequent releases will be in compliance with the limits of Section 2.1.3.

This control does not affect shutdown requirements or MODE changes.

#### 2.1.3.3 Surveillance Requirements

At least once per 31 days, cumulative dose contributions from liquid effluents for the current calendar quarter and the current calendar year shall be determined, for each unit, in accordance with Section 2.4.

#### 2.1.3.4 Basis

This control is provided to implement the requirements of Sections II.A, III.A and IV.A of Appendix I, 10 CFR Part 50. The limits stated in Section 2.1.3 implement the guides set forth in Section II.A of Appendix I. The ACTIONS stated in Section 2.1.3.2 provide the required operating flexibility and at the same time implement the guides set forth in Section IV.A of Appendix I to assure that the releases of radioactive material in liquid effluents will be kept "as low as is reasonably achievable." Also, for fresh water sites with drinking water supplies that can be potentially affected by plant operations, there is reasonable assurance that the operation of the facility will not result in radionuclide concentrations in the finished drinking water that are in excess of the requirements of 40 CFR Part 141. The dose calculations in Section 2.4 implement the requirements in Section III.A of Appendix I, which state that conformance with the guides of Appendix I be shown by calculational procedures based on models and data, such that the actual exposure of a MEMBER OF THE PUBLIC through appropriate pathways is unlikely to be substantially underestimated. The equations specified in Section 2.4 for calculating the doses due to the actual release rates of radioactive materials in liquid effluents are consistent with the

methodology provided in Regulatory Guide 1.109 (Reference 3) and Regulatory Guide 1.113 (Reference 6).

This control applies to the release of liquid effluents from each unit at the site. The liquid effluents from shared LIQUID RADWASTE TREATMENT SYSTEMS are to be proportioned between the units.

#### 2.1.4 Liquid Radwaste Treatment System Control

In accordance with Technical Specification 5.5.4.f, the LIQUID RADWASTE TREATMENT SYSTEM shall be OPERABLE. The appropriate portions of the system shall be used to reduce radioactivity in liquid wastes prior to their discharge when the projected doses due to the liquid effluent, from each unit, to UNRESTRICTED AREAS would exceed 0.06 mrem to the total body or 0.2 mrem to any organ of a MEMBER OF THE PUBLIC in 31 days.

##### 2.1.4.1 Applicability

This limit applies at all times.

##### 2.1.4.2 Actions

With radioactive liquid waste being discharged without treatment and in excess of the above limits and any portion of the LIQUID RADWASTE TREATMENT SYSTEM not in operation, prepare and submit to the Nuclear Regulatory Commission within 30 days a special report which includes the following information:

- a. Explanation of why liquid radwaste was being discharged without treatment, identification of any inoperable equipment or subsystems and the reason for the inoperability,
- b. Action(s) taken to restore the inoperable equipment to OPERABLE status, and
- c. Summary description of action(s) taken to prevent a recurrence.

This control does not affect shutdown requirements or MODE changes.

##### 2.1.4.3 Surveillance Requirements

Doses due to liquid releases to UNRESTRICTED AREAS shall be projected at least once per 31 days, in accordance with Section 2.5, during periods in which the LIQUID RADWASTE TREATMENT SYSTEMS are not being fully utilized.

The LIQUID RADWASTE TREATMENT SYSTEM shall be demonstrated OPERABLE by meeting the controls of Sections 2.1.2 and 2.1.3.

##### 2.1.4.4 Basis

The OPERABILITY of the LIQUID RADWASTE TREATMENT SYSTEM ensures that this system will be available for use whenever liquid effluents require treatment prior to release to the UNRESTRICTED AREAS. The requirement that the appropriate portions of this system be used when specified provides assurance that the releases of radioactive materials in liquid effluents will

be kept "as low as is reasonably achievable." This control implements the requirements of 10 CFR Part 50.36a, General Design Criterion 60 of Appendix A to 10 CFR Part 50, and the design objective given in Section II.D of Appendix I to 10 CFR Part 50. The specified limits governing the use of appropriate portions of the LIQUID RADWASTE TREATMENT SYSTEM were specified as a suitable fraction of the dose design objectives set forth in Section II.A of Appendix I, 10 CFR Part 50, for liquid effluents.

This control applies to the release of radioactive materials in liquid effluents from each unit at the site. For units with shared radwaste systems, the liquid effluents from the shared system are to be proportioned among the units sharing that system.

#### 2.1.5 Major Changes to Liquid Radioactive Waste Treatment Systems

Licensee initiated MAJOR CHANGES TO LIQUID RADIOACTIVE WASTE TREATMENT SYSTEMS:

- a. Shall be reported to the Nuclear Regulatory Commission in the Radioactive Effluent Release Report for the period in which the change was implemented. The discussion of each change shall contain the information described in Section 7.2.2.7.
- b. Shall become effective upon review and approval by the General Manager — Nuclear Plant.

2

2

2

## 2.2 LIQUID RADWASTE TREATMENT SYSTEM

The Vogtle Electric Generating Plant is located on the west bank of the Savannah River approximately 151 river miles from the Atlantic Ocean. There are two pressurized water reactors on the site. Each unit is served by a separate LIQUID RADWASTE TREATMENT SYSTEM; however, certain components are shared between the two systems. Schematics of the LIQUID RADWASTE TREATMENT SYSTEMS are presented in Figure 2-1 and Figure 2-2. Liquid discharge pathways are shown in Figure 2-3.

All liquid radwastes treated by the LIQUID RADWASTE TREATMENT SYSTEM are collected in 5,000-gallon or 20,000-gallon waste monitor tanks. Releases from the waste monitor tanks are to the discharge line from the blowdown sump, and from there to the Savannah River. The blowdown sump also receives input from the waste water retention basins, turbine plant cooling water blowdown, and nuclear service cooling water blowdown. Additional dilution water is available from the cooling tower makeup water bypass line.

Although no significant quantities of radioactivity are expected in the nuclear service cooling water, the steam generator blowdown processing system, or the turbine building drain system, these effluent pathways are monitored as a precautionary measure. The monitors serving the latter two pathways provide for automatic termination of releases from these systems in the event that radioactivity is detected above predetermined levels. These two systems discharge to the waste water retention basin. Sampling and analysis of releases via all three of these pathways must be sufficient to ensure that the liquid effluent dose limits specified in the controls of Section 2.1.3 are not exceeded.

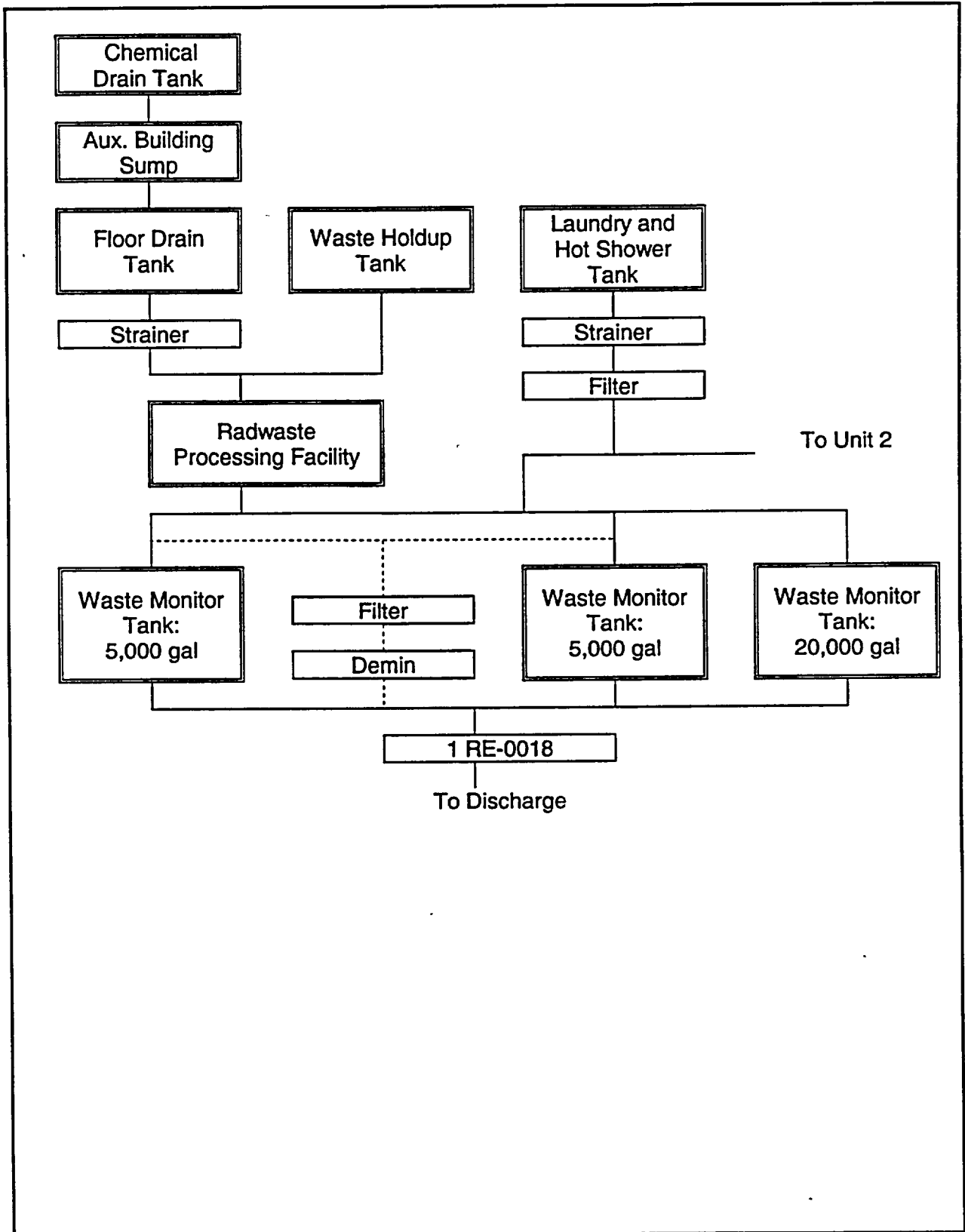


Figure 2-1. Unit 1 Liquid Radwaste Treatment System



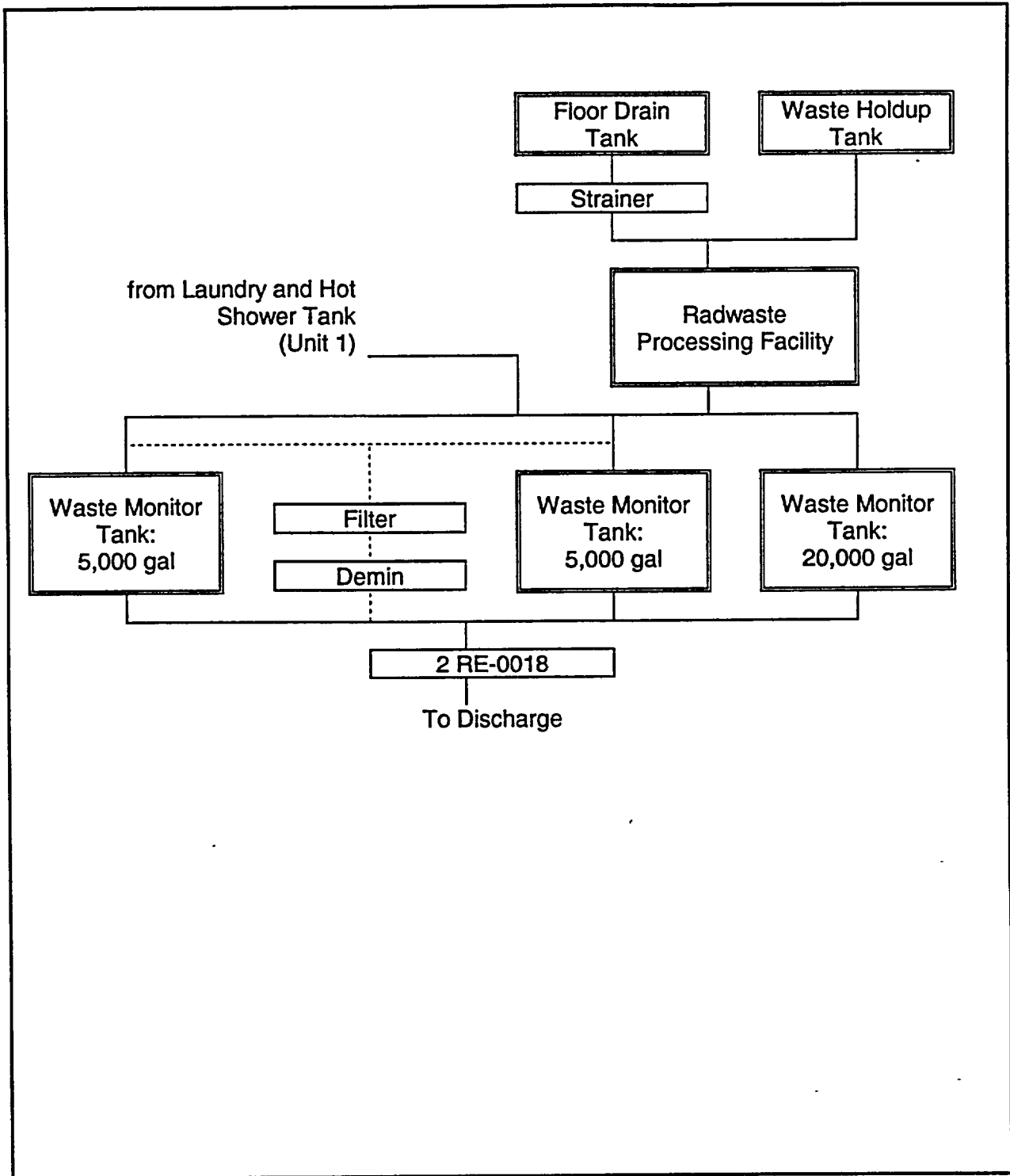


Figure 2-2. Unit 2 Liquid Radwaste Treatment System

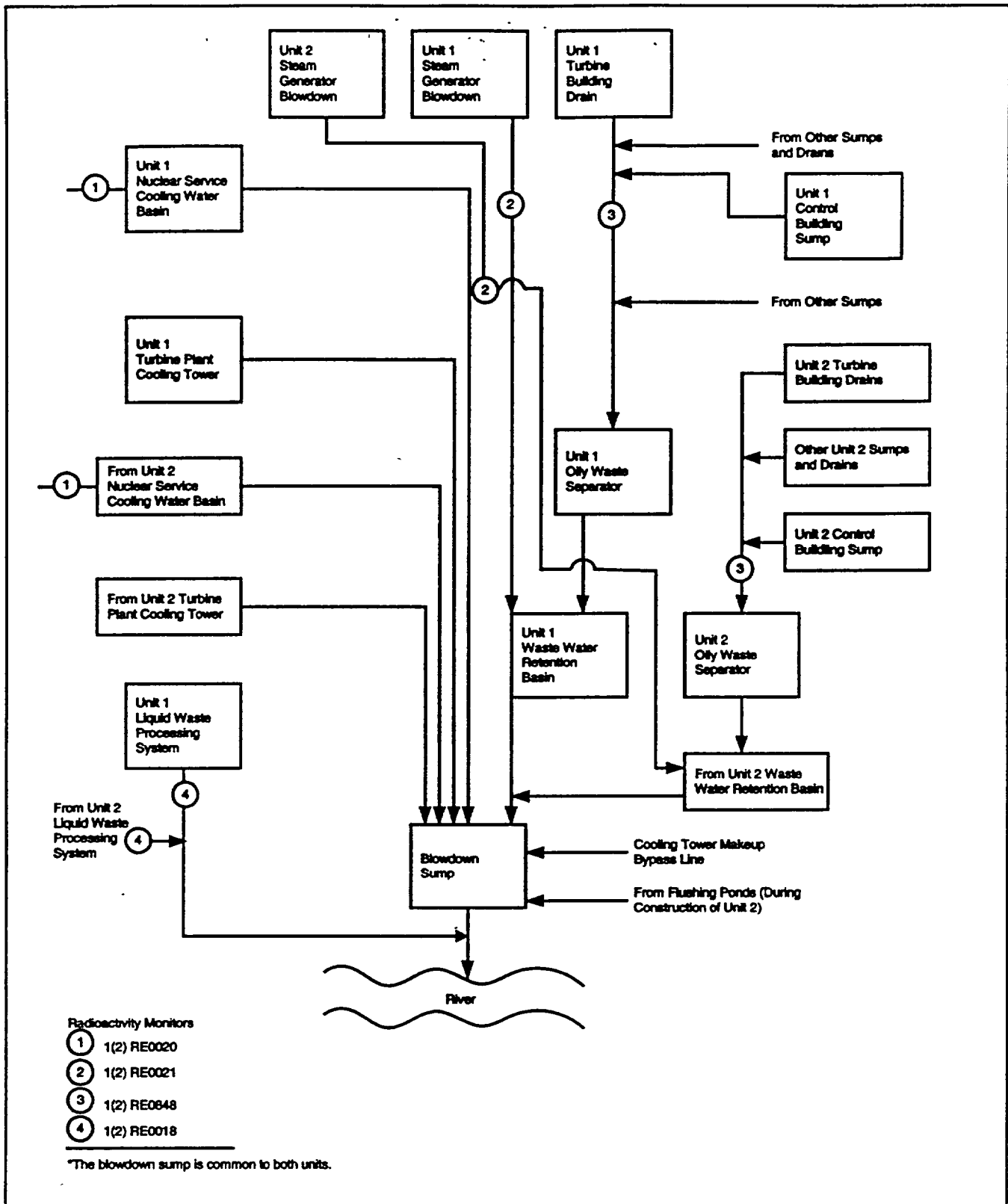


Figure 2-3. Liquid Radwaste Discharge Pathways



## 2.3 LIQUID EFFLUENT MONITOR SETPOINTS

### 2.3.1 General Provisions Regarding Setpoints

Liquid monitor setpoints calculated in accordance with the methodology presented in this section will be regarded as upper bounds for the actual high alarm setpoints. That is, a lower value for the high alarm setpoint may be established or retained on the monitor, if desired. Intermediate level setpoints should be established at an appropriate level to give sufficient warning prior to reaching the high alarm setpoint. If no release is planned for a particular pathway, or if there is no detectable activity in the planned release, the monitor setpoint should be established as close to background as practical to prevent spurious alarms, and yet alarm should an inadvertent release occur.

Two basic setpoint methodologies are presented below. For radwaste system discharge monitors, setpoints are determined to assure that the limits of Section 2.1.2 are not exceeded. For monitors on streams that are not expected to contain significant radioactivity, the purpose of the monitor setpoints is to cause an alarm on low levels of radioactivity, and to terminate the release where this is possible. Section 2.1.1 establishes the requirements for liquid effluent monitoring instrumentation. Table 2-4 lists the monitors for which each of the setpoint methodologies is applicable.

---

**Table 2-4. Applicability of Liquid Monitor Setpoint Methodologies**

---

**Liquid Radwaste Discharge Monitors**

Setpoint Method: Section 2.3.2

Release Type: BATCH

Unit 1 or Unit 2 Liquid Waste Treatment System Effluent  
Monitor: 1RE-0018 / 2RE-0018**Normally Low-Radioactivity Streams with Termination or Diversion upon Alarm**

Setpoint Method: Section 2.3.3

Release Type: CONTINUOUS

Unit 1 or Unit 2 Steam Generator Blowdown Effluent  
Monitor: 1RE-0021 / 2RE-0021Unit 1 or Unit 2 Turbine Building Drain Effluent  
Monitor: 1RE-0848 / 2RE-0848**Normally Low-Radioactivity Streams with Alarm Only**

Setpoint Method: Section 2.3.3

Release Type: CONTINUOUS

Unit 1 or Unit 2 Nuclear Service Cooling Water System Effluent  
Monitors (2 per unit): 1RE-0020 A and B  
2RE-0020 A and B

## 2.3.2 Setpoints for Radwaste System Discharge Monitors

### 2.3.2.1 Overview of Method

LIQUID RADWASTE TREATMENT SYSTEM effluent line radioactivity monitors are intended to provide alarm and automatic termination of release prior to exceeding the limits specified in Section 2.1.2 at the point of release of the diluted effluent into the UNRESTRICTED AREA. Therefore, their alarm/trip setpoints are established to ensure compliance with the following equation (equation adapted from Addendum to Reference 1):

$$\frac{c \cdot f}{F + f} \leq TF \cdot C_{ECL} \quad (2.1)$$

where:

- $C_{ECL}$  = the Effluent Concentration Limit corresponding to the mix of radionuclides in the effluent being considered for discharge, in  $\mu\text{Ci/mL}$ .
- $c$  = the setpoint, in  $\mu\text{Ci/mL}$ , of the radioactivity monitor measuring the concentration of radioactivity in the effluent line prior to dilution and subsequent release. The setpoint represents a concentration which, if exceeded, could result in concentrations exceeding the limits of Section 2.1.2 in the UNRESTRICTED AREA.
- $f$  = the effluent flowrate at the location of the radioactivity monitor, in gpm.
- $F$  = the dilution stream flowrate which can be assured prior to the release point to the UNRESTRICTED AREA, in gpm. A predetermined dilution flowrate must be assured for use in the calculation of the radioactivity monitor setpoint.
- $TF$  = the tolerance factor selected to allow flexibility in the establishment of a practical monitor setpoint which could accommodate effluent releases at concentrations higher than the ECL values stated in 10 CFR 20, Appendix B, Table 2, Column 2; the tolerance factor must not exceed a value of 10.

While equation (2.1) shows the relationships of the critical parameters that determine the setpoint, it cannot be applied practically to a mixture of radionuclides with different Effluent Concentration Limits (ECLs). For a mixture of radionuclides, equation (2.1) is satisfied in a practicable manner based on the calculated ECL fraction of the radionuclide mixture and the dilution stream flowrate that can be assured for the duration of the release ( $F_d$ ), by calculating the maximum permissible effluent flowrate ( $f_m$ ) and the radioactivity monitor setpoint ( $c$ ).

The setpoint method presented below is applicable to the release of only one tank of liquid radwaste per reactor unit at a given time. Liquid releases must be controlled administratively to ensure that this condition is met; otherwise, the setpoint method may not ensure that the limits of Section 2.1.2 are not exceeded.

### 2.3.2.2 Setpoint Calculation Steps

**Step 1:** Determine the radionuclide concentrations in the liquid waste being considered for release in accordance with the sampling and analysis requirements of Section 2.1.2.

All liquid radwastes treated by the LIQUID RADWASTE TREATMENT SYSTEM are collected in waste monitor tanks for sampling and analysis. The 5,000-gallon waste monitor tanks are recirculated for a minimum of 30 minutes, and the 20,000-gallon waste monitor tanks are recirculated for a minimum of 45 minutes. This mixing assures that a representative sample can be taken from the tank.

The total concentration of the liquid waste is determined by the results of all required analyses on the collected sample, as follows:

$$\sum_i C_i = C_a + \sum_s C_s + C_f + C_t + \sum_g C_g \quad (2.2)$$

where:

- $C_a$  = the gross concentration of alpha emitters in the liquid waste, not less than that measured in the most recent applicable composite sample.
- $C_s$  = the concentration of strontium radioisotope s (Sr-89 or Sr-90) in the liquid waste, not less than that measured in the most recent applicable composite sample.
- $C_f$  = the concentration of Fe-55 in the liquid waste, not less than that measured in the most recent applicable composite sample.
- $C_t$  = the concentration of H-3 in the liquid waste, not less than that measured in the most recent applicable composite sample.
- $C_g$  = the concentration of gamma emitter g in the liquid waste as measured by gamma ray spectroscopy performed on the sample for the release under consideration.

The  $C_g$  term will be included in the analysis of each waste sample; terms for gross concentrations of alpha emitters, Sr-89, Sr-90, Fe-55, and tritium will be included in accordance with the sampling and analysis program required for the waste stream (see Section 2.1.2). For each analysis, only radionuclides identified and detected above background for the given measurement should be included in the calculation. When using the alternate setpoint methodology of step 5.b, the historical maximum values of  $C_a$ ,  $C_s$ ,  $C_f$ , and  $C_t$  shall be used.

**Step 2:** Determine the required dilution factor for the mix of radionuclides detected in the waste.

Measured radionuclide concentrations are used to calculate ECL fractions. The ECL fractions are used along with a safety factor to calculate the required dilution factor; this is the minimum ratio of dilution flowrate to waste flowrate that must be maintained throughout the release to ensure that the limits of Section 2.1.2 are not exceeded at the point of discharge into the UNRESTRICTED

AREA. The required dilution factor, RDF, is calculated as the sum of the dilution factors required for gamma emitters ( $RDF_\gamma$ ) and for non-gamma-emitters ( $RDF_{n\gamma}$ ):

$$RDF = \left[ \sum_i \frac{C_i}{ECL_i} \right] + [(SF)(TF)] \quad (2.3)$$

$$= RDF_\gamma + RDF_{n\gamma}$$

$$RDF_\gamma = \frac{\left[ \sum_\gamma \frac{C_\gamma}{ECL_\gamma} \right]}{(SF)(TF)} \quad (2.4)$$

where:

$$RDF_{n\gamma} = \frac{\left[ \frac{C_a}{ECL_a} + \sum_s \frac{C_s}{ECL_s} + \frac{C_f}{ECL_f} + \frac{C_t}{ECL_t} \right]}{(SF)(TF)} \quad (2.5)$$

- $C_i$  = the measured concentration of radionuclide  $i$  as defined in step 1, in  $\mu\text{Ci/mL}$ . The  $C_a$ ,  $C_s$ ,  $C_f$ , and  $C_t$  terms will be included in the calculation as appropriate.
- $ECL_i$  = the Effluent Concentration Limit for radionuclide  $i$  from 10 CFR Part 20, Appendix B, Table 2, Column 2 (except for noble gases as discussed below). In the absence of information regarding the solubility classification of a given radionuclide in the waste stream, the solubility class with the lowest ECL shall be assumed. For dissolved or entrained noble gases, the concentration shall be limited to  $1 \times 10^{-4} \mu\text{Ci/mL}$ . For gross alpha, the ECL shall be  $2 \times 10^{-9} \mu\text{Ci/mL}$ ; if specific alpha-emitting radionuclides are measured, the ECL for the specific radionuclide(s) should be used.
- SF = the safety factor selected to compensate for statistical fluctuations and errors of measurement. The value for the safety factor must be between 0 and 1. A value of 0.5 is reasonable for liquid releases; a more precise value may be developed if desired.
- TF = the tolerance factor (as defined in Section 2.3.2.1).

**Step 3:** Determine the release-specific assured dilution stream flowrate.

Determine the dilution stream flowrate that can be assured during the release period, designated  $F_d$ ; this value is the setpoint for the dilution stream flowrate measurement device.

If simultaneous radioactive releases are planned from the same or different reactor units, the dilution stream must be allocated among all the simultaneous releases. There will only be one such release per unit at a given time, unless there is detectable radioactivity in one of the normally low-radioactivity streams (see Section 2.3.3). Allocation of the dilution stream to multiple release paths is accomplished as follows:



$$F_{dp} = F_d (AF_p) \quad (2.6)$$

where:

$F_{dp}$  = the dilution flowrate allocated to release pathway p, in gpm.

$AF_p$  = the dilution allocation factor for release pathway p.  $AF_p$  may be assigned any value between 0 and 1 for each active release pathway, under the condition that the sum of the  $AF_p$  for all active release pathways for the entire plant site does not exceed 1.

$F_d$  = the assured minimum dilution flow for the unit, in gpm.

In the normal case in which the only release pathways with detectable radioactivity are the LIQUID RADWASTE TREATMENT SYSTEMS of each unit,  $AF_p$  for each unit may be assigned the value of 0.5 to permit releases from either unit to be made without regard to any releases from the other unit; if only one unit's LIQUID RADWASTE TREATMENT SYSTEM is releasing at a given time, its  $AF_p$  may be increased proportionately. If more precise allocation factor values are desired, they may be determined based on the relative radiological impact of each active release pathway; this may be approximated by multiplying the RDF of each effluent stream by its respective planned release flowrate, and comparing these values. If only one simultaneous release is being made, its  $AF_p$  may be assigned the value of 1, making  $F_{dp}$  equal to  $F_d$ .

For the case where  $RDF \leq 1$ , the planned release meets the limits of Section 2.1.2 without dilution, and *could* be released with any desired effluent flowrate and dilution flowrate. However, in order to maintain individual doses due to liquid effluent releases as low as is reasonably achievable, no releases with detectable radioactivity *should* be made if the assured dilution flowrate,  $F_d$ , is less than 12,000 gpm.

**Step 4:** Determine the maximum allowable waste discharge flowrate.

For the case where  $RDF > 1$ , the maximum permissible effluent discharge flowrate for this release pathway,  $f_{mp}$  (in gpm), is calculated as follows:

$$f_{mp} = \frac{F_{dp}}{(RDF - 1)} \quad (2.7)$$

For the case  $RDF \leq 1$ , equation (2.7) is not valid. However, as discussed above, when  $RDF \leq 1$ , the release may be made at full discharge pump capacity; the radioactivity monitor setpoint must still be calculated in accordance with Step 5 below.

**NOTE 1:** Discharge flowrates are actually limited by the discharge pump capacity. When the calculated maximum permissible release flowrate exceeds the pump capacity, the release may be made at full capacity. Discharge flowrates less than the pump capacity must be achieved by throttling if this is available; if throttling is not available, the release may not be made as planned.

**NOTE 2:** If, at the time of the planned release, there is detectable radioactivity due to plant operations in the dilution stream, the diluting capacity of the dilution stream is diminished. (In addition, sampling and analysis of the other radioactive effluents affecting the dilution stream must be sufficient to ensure that the liquid effluent

dose limits specified in the controls of Section 2.1.3 are not exceeded.) Under these conditions, equation (2.7) must be modified to account for the radioactivity present in the dilution stream prior to the introduction of the planned release:

$$f_{mp} = \frac{F_{dp}}{(RDF - 1)} \left( 1 - \sum_r \left[ \frac{f_r}{F_d} \sum_i \left( \frac{C_{ir}}{ECL_i} \right) \right] \right) \quad (2.8)$$

where:

$C_{ir}$  = the measured concentration of radionuclide  $i$  in release pathway  $r$  that is contributing to radioactivity in the dilution stream.

$f_r$  = the effluent discharge flowrate of release pathway  $r$ .

If the entire dilution stream contains detectable activity due to plant operations, whether or not its source is identified,  $f_r = F_d$ , and  $C_{ir}$  is the concentration in the total dilution system. This note does not apply: a) if the RDF of the planned release is  $\leq 1$ ; or b) if the release contributing radioactivity to the dilution stream has been accounted for by the assignment of an allocation factor.

**Step 5:** Determine the maximum radioactivity monitor setpoint concentration.

Based on the values determined in previous steps, the radioactivity monitor setpoint for the planned release is calculated to ensure that the limits of Section 2.1.2 will not be exceeded. Because the radioactivity monitor responds primarily to gamma radiation, the monitor setpoint  $c_p$  for release pathway  $p$  (in  $\mu\text{Ci/mL}$ ) is based on the concentration of gamma emitters in the waste stream, as follows:

$$c_p = A_p \sum_g c_g \quad (2.9)$$

where:

$A_p$  = an adjustment factor which will allow the setpoint to be established in a practical manner to prevent spurious alarms while allowing a margin between measured concentrations and the limits of Section 2.1.2.

**Step 5.a.** If the concentration of gamma emitters in the effluent to be released is sufficient that the high alarm setpoint can be established at a level that will prevent spurious alarms,  $A_p$  should be calculated as follows:

$$\begin{aligned} A_p &= \frac{1}{RDF} \times ADF \\ &= \frac{1}{RDF} \times \frac{(F_{dp} + f_{ap})}{f_{ap}} \end{aligned} \quad (2.10)$$

where:

- ADF = the assured dilution factor.
- $f_{ap}$  = the anticipated actual discharge flowrate for the planned release (in gpm), a value less than  $f_{mp}$ . The release must then be controlled so that the actual effluent discharge flowrate does not exceed  $f_{ap}$  at any time.

Step 5.b. Alternatively,  $A_p$  may be calculated as follows:

$$A_p = \frac{ADF - RDF_{ny}}{RDF_{\gamma}} \quad (2.11)$$

Step 5.c. Evaluate the computed value of  $A_p$  as follows:

If  $A_p \geq 1$ , calculate the monitor setpoint,  $c_p$ . However, if  $c_p$  is within about 10 percent of  $C_g$ , it may be impractical to use this value of  $c_p$ . This situation indicates that measured concentrations are approaching values which would cause limits of Section 2.1.2 to be exceeded. Therefore, steps should be taken to reduce potential concentrations at the point of discharge; these steps may include decreasing the planned effluent discharge flowrate, increasing the dilution stream flowrate, postponing simultaneous releases, and/or decreasing the effluent concentrations by further processing the liquid planned for release. Alternatively, allocation factors for the active liquid release pathways may be reassigned. When one or more of these actions has been taken, repeat Steps 1–5 to calculate a new radioactivity monitor setpoint.

If  $A_p < 1$ , the release may not be made as planned. Consider the alternatives discussed in the paragraph above, and calculate a new setpoint based on the results of the actions taken.

### 2.3.2.3 Use of the Calculated Setpoint

The setpoint calculated above is in the units  $\mu\text{Ci/mL}$ . The monitor actually measures a count rate, subtracts a predetermined background count rate, and multiplies by a calibration factor to convert from count rate to  $\mu\text{Ci/mL}$ .

Initial calibration of the monitors by the manufacturer and Georgia Power Company utilized NIST-traceable liquid solutions with gamma ray emissions over the range 0.08 to 1.33 MeV, in the exact geometry of each production monitor. The calibration factor is a function of the radionuclide mix in the liquid to be released, and will be calculated for the monitor based on the results of the pre-release sample results from the laboratory gamma-ray spectrometer system. The mix-dependent calibration factor will be used as the gain factor in the PERMS monitor, or used to modify the

calculated base monitor setpoint so that the default calibration factor in the PERMS monitor can be left unchanged.

Notwithstanding the initial calibration, monitor calibration data for conversion between count rate and concentration *may* include operational data obtained from determining the monitor response to stream concentrations measured by liquid sample analysis. In all cases, monitor background must be controlled so that the monitor is capable of responding to concentrations in the range of the setpoint value.

### 2.3.3 Setpoints for Monitors on Normally Low-Radioactivity Streams

Radioactivity in these streams (listed in Table 2-4 above) is expected to be at very low levels, generally below detection limits. Accordingly, the purpose of these monitors is to alarm upon the occurrence of significant radioactivity in these streams, and to terminate or divert the release where this is possible.

#### 2.3.3.1 Normal Conditions

When radioactivity in one of these streams is at its normal low level, its radioactivity monitor setpoint should be established as close to background as practical to prevent spurious alarms, and yet alarm should an inadvertent release occur.

#### 2.3.3.2 Conditions Requiring an Elevated Setpoint

Under the following conditions, radionuclide concentrations must be determined and an elevated radioactivity monitor setpoint determined for these pathways:

- For streams that can be diverted or isolated, a new monitor setpoint must be established when it is desired to discharge the stream directly to the dilution water even though the radioactivity in the stream exceeds the level which would normally be diverted or isolated.
- For streams that cannot be diverted or isolated, a new monitor setpoint must be established whenever: the radioactivity in the stream becomes detectable above the background levels of the applicable laboratory analyses; or the associated radioactivity monitor detects activity in the stream at levels above the established alarm setpoint.

When an elevated monitor setpoint is required for any of these effluent streams, it should be determined in the same manner as described in Section 2.3.2. However, special consideration must be given to Step 3. An allocation factor must be assigned to the normally low-radioactivity release pathway under consideration, and allocation factors for other release pathways discharging simultaneously must be adjusted downward (if necessary) to ensure that the sum of the allocation factors does not exceed 1. Sampling and analysis of the normally low-radioactivity streams must be sufficient to ensure that the liquid effluent dose limits specified in the controls of Section 2.1.3 are not exceeded.



## 2.4 LIQUID EFFLUENT DOSE CALCULATIONS

The following sub-sections present the methods required for liquid effluent dose calculations, in deepening levels of detail. Applicable site-specific pathways and parameter values for the calculation of  $D_\tau$ ,  $A_{\tau i}$ , and  $CF_{\nu}$  are summarized in Table 2-5.

### 2.4.1 Calculation of Dose

The dose limits for a MEMBER OF THE PUBLIC specified in Section 2.1.3 are on a per-unit basis. Therefore, the doses calculated in accordance with this section must be determined and recorded on a per-unit basis, including apportionment of releases shared between the two units.

For the purpose of implementing Section 2.1.3, the dose to the maximum exposed individual due to radionuclides identified in liquid effluents released from each unit to UNRESTRICTED AREAS will be calculated as follows (equation from Reference 1, page 15):

$$D_\tau = \sum_i A_{\tau i} \left[ \sum_{l=1}^m (\Delta t_l C_{il} F_l) \right] \quad (2.12)$$

where:

- $D_\tau$  = the cumulative dose commitment to the total body or to any organ  $\tau$ , in mrem, due to radioactivity in liquid effluents released during the total of the  $m$  time periods  $\Delta t_l$ .
- $A_{\tau i}$  = the site-related adult ingestion dose commitment factor, for the total body or for any organ  $\tau$ , due to identified radionuclide  $i$ , in (mrem·mL)/(h· $\mu$ Ci). Methods for the calculation of  $A_{\tau i}$  are presented below in Section 2.4.2. The values of  $A_{\tau i}$  to be used in dose calculations for releases from the plant site are listed in Table 2-8.
- $\Delta t_l$  = the length of time period  $l$ , over which  $C_{il}$  and  $F_l$  are averaged for liquid releases, in h.
- $C_{il}$  = the average concentration of radionuclide  $i$  in undiluted liquid effluent during time period  $l$ , in  $\mu$ Ci/mL. Only radionuclides identified and detected above background in their respective samples should be included in the calculation.
- $F_l$  = the near-field average dilution factor in the receiving water of the UNRESTRICTED AREA:

$$F_l = \frac{f_l}{F_l \times Z} \quad (2.13)$$

where:

- $f_l$  = the average undiluted liquid waste flowrate actually observed during the period of radioactivity release, in gpm.

- $F_i$  = the average dilution stream flowrate actually observed during the period of radioactivity release, in gpm. If simultaneous releases from both units occur, the dilution stream flowrate  $F_i$  must be allocated between them. In such cases,  $F_i$  is unit-specific.
- $Z$  = the applicable dilution factor for the receiving water body, in the near field of the discharge structure, during the period of radioactivity release, from Table 2-5.

NOTE: In equation (2.13), the product ( $F_i \times Z$ ) is limited to 1000 cfs (= 448,000 gpm) or less. (Reference 1, Section 4.3.)

#### 2.4.2 Calculation of $A_{ir}$

The site-related adult ingestion dose commitment factor,  $A_{ir}$ , is calculated as follows (equation adapted from Reference 1, page 16, by addition of the irrigated garden vegetation pathway):

$$A_{ir} = 1.14 \times 10^5 \left( \frac{U_w}{D_w} e^{-\lambda_i t_w} + U_f B F_i e^{-\lambda_i t_f} + U_v C F_{iv} \right) D F_{ir} \quad (2.14)$$

where:

$1.14 \times 10^5$  = a units conversion factor, determined by:

$$10^6 \text{ pCi}/\mu\text{Ci} \times 10^3 \text{ mL/L} + 8760 \text{ h/y.}$$

- $U_w$  = the adult drinking water consumption rate applicable to the plant site (L/y).
- $D_w$  = the dilution factor from the near field of the discharge structure for the plant site to the potable water intake location.
- $\lambda_i$  = the decay constant for radionuclide  $i$  ( $\text{h}^{-1}$ ). Values of  $\lambda_i$  used in effluent calculations should be based on decay data from a recognized and current source, such as Reference 20.
- $t_w$  = the transit time from release to receptor for potable water consumption (h).
- $U_f$  = the adult rate of fish consumption applicable to the plant site (kg/y).
- $B F_i$  = the bioaccumulation factor for radionuclide  $i$  applicable to freshwater fish in the receiving water body for the plant site, in  $(\text{pCi/kg})/(\text{pCi/L}) = (\text{L/kg})$ . For specific values applicable to the plant site, see Table 2-6.
- $t_f$  = the transit time from release to receptor for fish consumption (h).
- $U_v$  = the adult consumption rate for irrigated garden vegetation applicable to the plant site (kg/y).

- $CF_{iv}$  = the concentration factor for radionuclide  $i$  in irrigated garden vegetation, as applicable to the vicinity of the plant site, in (pCi/kg)/(pCi/L). Methods for calculation of  $CF_{iv}$  are presented below in Section 2.4.3.
- $DF_{it}$  = the dose conversion factor for radionuclide  $i$  for adults, in organ  $\tau$  (mrem/pCi). For specific values, see Table 2-7.

### 2.4.3 Calculation of $CF_{iv}$

The concentration factor for radionuclide  $i$  in irrigated garden vegetation,  $CF_{iv}$  in (L/kg), is calculated as follows:

- For radionuclides other than tritium (equation adapted from Reference 3, equations A-8 and A-9):

$$CF_{iv} = M \cdot I \left[ \frac{r(1 - e^{-\lambda_{EI}t_a})}{Y_v \lambda_{EI}} + \frac{f_I B_{iv}(1 - e^{-\lambda_i t_a})}{P \lambda_i} \right] e^{-\lambda_i t_a} \quad (2.15)$$

- For tritium (equation adapted from Reference 3, equations A-9 and A-10):

$$CF_{iv} = M \cdot L_v \quad (2.16)$$

where:

- $M$  = the additional river dilution factor from the near field of the discharge structure for the plant site to the point of irrigation water usage.
- $I$  = the average irrigation rate during the growing season (L)/(m<sup>2</sup>·h).
- $r$  = the fraction of irrigation-deposited activity retained on the edible portions of leafy garden vegetation.
- $Y_v$  = the areal density (agricultural productivity) of leafy garden vegetation (kg/m<sup>2</sup>).
- $f_I$  = the fraction of the year that garden vegetation is irrigated.
- $B_{iv}$  = the crop to soil concentration factor applicable to radionuclide  $i$  (pCi/kg garden vegetation)/(pCi/kg soil).
- $P$  = the effective surface density of soil (kg/m<sup>2</sup>).
- $\lambda_i$  = the decay constant for radionuclide  $i$  (h<sup>-1</sup>). Values of  $\lambda_i$  used in effluent calculations should be based on decay data from a recognized and current source, such as Reference 20.
- $\lambda_w$  = the rate constant for removal of activity from plant leaves by weathering (h<sup>-1</sup>).
- $\lambda_{EI}$  = the effective removal rate for activity deposited on crop leaves (h<sup>-1</sup>) calculated as:  $\lambda_{EI} = \lambda_i + \lambda_w$ .



- $t_e$  = the period of leafy garden vegetation exposure during the growing season (h).
- $t_b$  = the period of long-term buildup of activity in soil (h).
- $t_h$  = the time between harvest of garden vegetation and human consumption (h).
- $L_v$  = the water content of leafy garden vegetation edible parts (L/kg).

Table 2-5. Parameters for Calculation of Doses Due to Liquid Effluent Releases

**Dose Calculation Receptor Locations:**

<u>Fish:</u>	Vicinity of plant discharge
<u>Drinking Water:</u>	112 miles downstream, at Beaufort, SC (Reference 12)
<u>Irrigated Garden Vegetation:</u>	None (Reference 12)

**Numerical Parameters:**

<u>Parameter</u>	<u>Value</u>	<u>Reference</u>
Z	10, for May through December 20, for January through April	Ref. 11
$U_w$	730 L/y	Ref 3
$D_w$	8	Ref. 7
$t_w$	48 h	Ref. 3, Sec. A.2; Ref. 8
$U_f$	21 kg/y	Ref. 3, Table E-5
$t_f$	24 h	Ref. 3, Sec. A.2
$U_v$	0 kg/y *	Ref. 12
M	1.0 +	
I	No value **	
r	0.25	Ref. 3, Table E-15.
$Y_v$	2.0 kg/m <sup>2</sup>	Ref. 3, Table E-15
$f_f$	1.0 +	
P	240 kg/m <sup>2</sup>	Ref. 3, Table E-15
$\lambda_w$	0.0021 h <sup>-1</sup> (i.e., half-life of 14 d)	Ref. 3, Table E-15
$t_e$	1440 h (= 60 d)	Ref. 3, Table E-15
$t_b$	1.31 x 10 <sup>5</sup> h (= 15 y)	Ref. 3, Table E-15
$t_h$	24 h	Ref. 3, Table E-15
$L_v$	0.92 L/kg	Based on Ref. 21, Table 5.16 (for lettuce, cabbage, etc.)

\* - Because there is no irrigated garden vegetation pathway downstream of the plant site, the consumption of irrigated garden vegetation is set to zero, and the other pathway parameters are defaults.

+ - There is no established default value for this parameter. The most conservative physically realistic value is 1.0.

Table 2-6. Element Transfer Factors

Element	Freshwater Fish
	BF <sub>i</sub> *
H	9.0 E-01
C	4.6 E+03
Na	1.0 E+02
P	3.0 E+03
Cr	2.0 E+02
Mn	4.0 E+02
Fe	1.0 E+02
Co	5.0 E+01
Ni	1.0 E+02
Cu	5.0 E+01
Zn	2.0 E+03
Br	4.2 E+02
Rb	2.0 E+03
Sr	3.0 E+01
Y	2.5 E+01
Zr	3.3 E+00
Nb	5.5 E+02
Mo	1.0 E+01
Tc	1.5 E+01
Ru	1.0 E+01
Rh	1.0 E+01
Ag	2.3 E+00
Sb	2.0 E+02
Te	4.0 E+02
I	1.5 E+01
Cs	2.0 E+03
Ba	4.0 E+00
La	2.5 E+01
Ce	1.0 E+00
Pr	2.5 E+01
Nd	2.5 E+01
W	1.2 E+03
Np	1.0 E+01

\* - Bioaccumulation Factors for freshwater fish, in (pCi/kg)/(pCi/L). They are obtained from Reference 3 (Table A-1), except as follows: Reference 9 for P; Reference 2 (Table A-8) for Ag; and Reference 10 for Nb and Sb.

Table 2-7. Adult Ingestion Dose Factors

Nuclide	Bone	Liver	T. Body	Thyroid	Kidney	Lung	GI-LLI
H-3	No Data	1.05E-07	1.05E-07	1.05E-07	1.05E-07	1.05E-07	1.05E-07
C-14	2.84E-06	5.68E-07	5.68E-07	5.68E-07	5.68E-07	5.68E-07	5.68E-07
Na-24	1.70E-06	1.70E-06	1.70E-06	1.70E-06	1.70E-06	1.70E-06	1.70E-06
P-32	1.93E-04	1.20E-05	7.46E-06	No Data	No Data	No Data	2.17E-05
Cr-51	No Data	No Data	2.66E-09	1.59E-09	5.86E-10	3.53E-09	6.69E-07
Mn-54	No Data	4.57E-06	8.72E-07	No Data	1.36E-06	No Data	1.40E-05
Mn-56	No Data	1.15E-07	2.04E-08	No Data	1.46E-07	No Data	3.67E-06
Fe-55	2.75E-06	1.90E-06	4.43E-07	No Data	No Data	1.06E-06	1.09E-06
Fe-59	4.34E-06	1.02E-05	3.91E-06	No Data	No Data	2.85E-06	3.40E-05
Co-58	No Data	7.45E-07	1.67E-06	No Data	No Data	No Data	1.51E-05
Co-60	No Data	2.14E-06	4.72E-06	No Data	No Data	No Data	4.02E-05
Ni-63	1.30E-04	9.01E-06	4.36E-06	No Data	No Data	No Data	1.88E-06
Ni-65	5.28E-07	6.86E-08	3.13E-08	No Data	No Data	No Data	1.74E-06
Cu-64	No Data	8.33E-08	3.91E-08	No Data	2.10E-07	No Data	7.10E-06
Zn-65	4.84E-06	1.54E-05	6.96E-06	No Data	1.03E-05	No Data	9.70E-06
Zn-69	1.03E-08	1.97E-08	1.37E-09	No Data	1.28E-08	No Data	2.96E-09
Br-83	No Data	No Data	4.02E-08	No Data	No Data	No Data	5.79E-08
Br-84	No Data	No Data	5.21E-08	No Data	No Data	No Data	4.09E-13
Br-85	No Data	No Data	2.14E-09	No Data	No Data	No Data	No Data
Rb-86	No Data	2.11E-05	9.83E-06	No Data	No Data	No Data	4.16E-06
Rb-88	No Data	6.05E-08	3.21E-08	No Data	No Data	No Data	8.36E-19
Rb-89	No Data	4.01E-08	2.82E-08	No Data	No Data	No Data	2.33E-21
Sr-89	3.08E-04	No Data	8.84E-06	No Data	No Data	No Data	4.94E-05
Sr-90	7.58E-03	No Data	1.86E-03	No Data	No Data	No Data	2.19E-04
Sr-91	5.67E-06	No Data	2.29E-07	No Data	No Data	No Data	2.70E-05

All values are in (mrem/pCi ingested). They are obtained from Reference 3 (Table E-11), except as follows: Reference 2 (Table A-3) for Rh-105, Sb-124, and Sb-125.

Table 2-7 (contd). Adult Ingestion Dose Factors

Nuclide	Bone	Liver	T.Body	Thyroid	Kidney	Lung	GI-LLI
Sr-92	2.15E-06	No Data	9.30E-08	No Data	No Data	No Data	4.26E-05
Y-90	9.62E-09	No Data	2.58E-10	No Data	No Data	No Data	1.02E-04
Y-91m	9.09E-11	No Data	3.52E-12	No Data	No Data	No Data	2.67E-10
Y-91	1.41E-07	No Data	3.77E-09	No Data	No Data	No Data	7.76E-05
Y-92	8.45E-10	No Data	2.47E-11	No Data	No Data	No Data	1.48E-05
Y-93	2.68E-09	No Data	7.40E-11	No Data	No Data	No Data	8.50E-05
Zr-95	3.04E-08	9.75E-09	6.60E-09	No Data	1.53E-08	No Data	3.09E-05
Zr-97	1.68E-09	3.39E-10	1.55E-10	No Data	5.12E-10	No Data	1.05E-04
Nb-95	6.22E-09	3.46E-09	1.86E-09	No Data	3.42E-09	No Data	2.10E-05
Mo-99	No Data	4.31E-06	8.20E-07	No Data	9.76E-06	No Data	9.99E-06
Tc-99m	2.47E-10	6.98E-10	8.89E-09	No Data	1.06E-08	3.42E-10	4.13E-07
Tc-101	2.54E-10	3.66E-10	3.59E-09	No Data	6.59E-09	1.87E-10	1.10E-21
Ru-103	1.85E-07	No Data	7.97E-08	No Data	7.06E-07	No Data	2.16E-05
Ru-105	1.54E-08	No Data	6.08E-09	No Data	1.99E-07	No Data	9.42E-06
Ru-106	2.75E-06	No Data	3.48E-07	No Data	5.31E-06	No Data	1.78E-04
Rh-105	1.22E-07	8.86E-08	5.83E-08	No Data	3.76E-07	No Data	1.41E-05
Ag-110m	1.60E-07	1.48E-07	8.79E-08	No Data	2.91E-07	No Data	6.04E-05
Sb-124	2.81E-06	5.30E-08	1.11E-06	6.79E-09	No Data	2.18E-06	7.95E-05
Sb-125	2.23E-06	2.40E-08	4.48E-07	1.98E-09	No Data	2.33E-04	1.97E-05
Te-125m	2.68E-06	9.71E-07	3.59E-07	8.06E-07	1.09E-05	No Data	1.07E-05
Te-127m	6.77E-06	2.42E-06	8.25E-07	1.73E-06	2.75E-05	No Data	2.27E-05
Te-127	1.10E-07	3.95E-08	2.38E-08	8.15E-08	4.48E-07	No Data	8.68E-06
Te-129m	1.15E-05	4.29E-06	1.82E-06	3.95E-06	4.80E-05	No Data	5.79E-05
Te-129	3.14E-08	1.18E-08	7.65E-09	2.41E-08	1.32E-07	No Data	2.37E-08
Te-131m	1.73E-06	8.46E-07	7.05E-07	1.34E-06	8.57E-06	No Data	8.40E-05
Te-131	1.97E-08	8.23E-09	6.22E-09	1.62E-08	8.63E-08	No Data	2.79E-09

Table 2-7 (contd). Adult Ingestion Dose Factors

Nuclide	Bone	Liver	T.Body	Thyroid	Kidney	Lung	GI-LLI
Te-132	2.52E-06	1.63E-06	1.53E-06	1.80E-06	1.57E-05	No Data	7.71E-05
I-130	7.56E-07	2.23E-06	8.80E-07	1.89E-04	3.48E-06	No Data	1.92E-06
I-131	4.16E-06	5.95E-06	3.41E-06	1.95E-03	1.02E-05	No Data	1.57E-06
I-132	2.03E-07	5.43E-07	1.90E-07	1.90E-05	8.65E-07	No Data	1.02E-07
I-133	1.42E-06	2.47E-06	7.53E-07	3.63E-04	4.31E-06	No Data	2.22E-06
I-134	1.06E-07	2.88E-07	1.03E-07	4.99E-06	4.58E-07	No Data	2.51E-10
I-135	4.43E-07	1.16E-06	4.28E-07	7.65E-05	1.86E-06	No Data	1.31E-06
Cs-134	6.22E-05	1.48E-04	1.21E-04	No Data	4.79E-05	1.59E-05	2.59E-06
Cs-136	6.51E-06	2.57E-05	1.85E-05	No Data	1.43E-05	1.96E-06	2.92E-06
Cs-137	7.97E-05	1.09E-04	7.14E-05	No Data	3.70E-05	1.23E-05	2.11E-06
Cs-138	5.52E-08	1.09E-07	5.40E-08	No Data	8.01E-08	7.91E-09	4.65E-13
Ba-139	9.70E-08	6.91E-11	2.84E-09	No Data	6.46E-11	3.92E-11	1.72E-07
Ba-140	2.03E-05	2.55E-08	1.33E-06	No Data	8.67E-09	1.46E-08	4.18E-05
Ba-141	4.71E-08	3.56E-11	1.59E-09	No Data	3.31E-11	2.02E-11	2.22E-17
Ba-142	2.13E-08	2.19E-11	1.34E-09	No Data	1.85E-11	1.24E-11	3.00E-26
La-140	2.50E-09	1.26E-09	3.33E-10	No Data	No Data	No Data	9.25E-05
La-142	1.28E-10	5.82E-11	1.45E-11	No Data	No Data	No Data	4.25E-07
Ce-141	9.36E-09	6.33E-09	7.18E-10	No Data	2.94E-09	No Data	2.42E-05
Ce-143	1.65E-09	1.22E-06	1.35E-10	No Data	5.37E-10	No Data	4.56E-05
Ce-144	4.88E-07	2.04E-07	2.62E-08	No Data	1.21E-07	No Data	1.65E-04
Pr-143	9.20E-09	3.69E-09	4.56E-10	No Data	2.13E-09	No Data	4.03E-05
Pr-144	3.01E-11	1.25E-11	1.53E-12	No Data	7.05E-12	No Data	4.33E-18
Nd-147	6.29E-09	7.27E-09	4.35E-10	No Data	4.25E-09	No Data	3.49E-05
W-187	1.03E-07	8.61E-08	3.01E-08	No Data	No Data	No Data	2.82E-05
Np-239	1.19E-09	1.17E-10	6.45E-11	No Data	3.65E-10	No Data	2.40E-05

Table 2-8. Site-Related Ingestion Dose Factors,  $A_{ir}$ 

Nuclide	Bone	Liver	T. Body	Thyroid	Kidney	Lung	GI-LLI
H-3	0.00	1.32E+00	1.32E+00	1.32E+00	1.32E+00	1.32E+00	1.32E+00
C-14	3.13E+04	6.26E+03	6.26E+03	6.26E+03	6.26E+03	6.26E+03	6.26E+03
Na-24	1.36E+02	1.36E+02	1.36E+02	1.36E+02	1.36E+02	1.36E+02	1.36E+02
P-32	1.32E+06	8.22E+04	5.11E+04	0.00	0.00	0.00	1.49E+05
Cr-51	0.00	0.00	1.27E+00	7.58E-01	2.79E-01	1.68E+00	3.19E+02
Mn-54	0.00	4.41E+03	8.42E+02	0.00	1.31E+03	0.00	1.35E+04
Mn-56	0.00	1.74E-01	3.08E-02	0.00	2.21E-01	0.00	5.55E+00
Fe-55	6.86E+02	4.74E+02	1.11E+02	0.00	0.00	2.65E+02	2.72E+02
Fe-59	1.07E+03	2.51E+03	9.61E+02	0.00	0.00	7.01E+02	8.36E+03
Co-58	0.00	9.59E+01	2.15E+02	0.00	0.00	0.00	1.94E+03
Co-60	0.00	2.78E+02	6.14E+02	0.00	0.00	0.00	5.23E+03
Ni-63	3.25E+04	2.25E+03	1.09E+03	0.00	0.00	0.00	4.70E+02
Ni-65	1.72E-01	2.23E-02	1.02E-02	0.00	0.00	0.00	5.66E-01
Cu-64	0.00	2.75E+00	1.29E+00	0.00	6.94E+00	0.00	2.35E+02
Zn-65	2.32E+04	7.37E+04	3.33E+04	0.00	4.93E+04	0.00	4.64E+04
Zn-69	7.88E-07	1.51E-06	1.05E-07	0.00	9.79E-07	0.00	2.26E-07
Br-83	0.00	0.00	3.83E-02	0.00	0.00	0.00	5.52E-02
Br-84	0.00	0.00	1.22E-12	0.00	0.00	0.00	9.61E-18
Br-85	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rb-86	0.00	9.75E+04	4.54E+04	0.00	0.00	0.00	1.92E+04
Rb-88	0.00	1.29E-22	6.82E-23	0.00	0.00	0.00	1.78E-33
Rb-89	0.00	1.61E-26	1.14E-26	0.00	0.00	0.00	0.00
Sr-89	2.49E+04	0.00	7.16E+02	0.00	0.00	0.00	4.00E+03
Sr-90	6.23E+05	0.00	1.53E+05	0.00	0.00	0.00	1.80E+04
Sr-91	7.25E+01	0.00	2.93E+00	0.00	0.00	0.00	3.45E+02
Sr-92	3.33E-01	0.00	1.44E-02	0.00	0.00	0.00	6.60E+00
Y-90	5.04E-01	0.00	1.35E-02	0.00	0.00	0.00	5.34E+03
Y-91m	1.04E-11	0.00	4.01E-13	0.00	0.00	0.00	3.04E-11
Y-91	9.77E+00	0.00	2.61E-01	0.00	0.00	0.00	5.38E+03
Y-92	4.61E-04	0.00	1.35E-05	0.00	0.00	0.00	8.07E+00
Y-93	3.19E-02	0.00	8.82E-04	0.00	0.00	0.00	1.01E+03
Zr-95	5.47E-01	1.75E-01	1.19E-01	0.00	2.75E-01	0.00	5.56E+02
Zr-97	7.40E-03	1.49E-03	6.83E-04	0.00	2.26E-03	0.00	4.62E+02
Nb-95	8.09E+00	4.50E+00	2.42E+00	0.00	4.45E+00	0.00	2.73E+04
Mo-99	0.00	1.07E+02	2.04E+01	0.00	2.43E+02	0.00	2.49E+02
Tc-99m	5.70E-04	1.61E-03	2.05E-02	0.00	2.44E-02	7.89E-04	9.53E-01

All values are in (mrem·mL)/(h· $\mu$ Ci). They are calculated using equation (2.14), and data from Table 2-5, Table 2-6, and Table 2-7. When "No Data" is shown for a radionuclide-organ combination in Table 2-7,  $A_{ir}$  factors in this table are presented as zero.

Table 2-8 (contd). Site-Related Ingestion Dose Factors,  $A_{\text{r}}$ 

Nuclide	Bone	Liver	T. Body	Thyroid	Kidney	Lung	GI-LLI
Tc-101	2.71E-33	3.91E-33	3.83E-32	0.00	7.03E-32	2.00E-33	0.00
Ru-103	6.21E+00	0.00	2.68E+00	0.00	2.37E+01	0.00	7.25E+02
Ru-105	8.79E-03	0.00	3.47E-03	0.00	1.14E-01	0.00	5.38E+00
Ru-106	9.42E+01	0.00	1.19E+01	0.00	1.82E+02	0.00	6.10E+03
Rh-105	2.32E+00	1.69E+00	1.11E+00	0.00	7.15E+00	0.00	2.68E+02
Ag-110m	2.53E+00	2.34E+00	1.39E+00	0.00	4.61E+00	0.00	9.56E+02
Sb-124	1.36E+03	2.56E+01	5.37E+02	3.28E+00	0.00	1.05E+03	3.84E+04
Sb-125	1.09E+03	1.17E+01	2.19E+02	9.68E-01	0.00	1.14E+05	9.63E+03
Te-125m	2.56E+03	9.29E+02	3.43E+02	7.71E+02	1.04E+04	0.00	1.02E+04
Te-127m	6.51E+03	2.33E+03	7.93E+02	1.66E+03	2.64E+04	0.00	2.18E+04
Te-127	1.78E+01	6.40E+00	3.85E+00	1.32E+01	7.25E+01	0.00	1.41E+03
Te-129m	1.09E+04	4.07E+03	1.73E+03	3.74E+03	4.55E+04	0.00	5.49E+04
Te-129	1.78E-05	6.68E-06	4.33E-06	1.36E-05	7.47E-05	0.00	1.34E-05
Te-131m	9.57E+02	4.68E+02	3.90E+02	7.42E+02	4.74E+03	0.00	4.65E+04
Te-131	8.64E-17	3.61E-17	2.73E-17	7.10E-17	3.78E-16	0.00	1.22E-17
Te-132	1.97E+03	1.27E+03	1.19E+03	1.41E+03	1.23E+04	0.00	6.02E+04
I-130	7.60E+00	2.24E+01	8.85E+00	1.90E+03	3.50E+01	0.00	1.93E+01
I-131	1.73E+02	2.48E+02	1.42E+02	8.13E+04	4.25E+02	0.00	6.55E+01
I-132	5.27E-03	1.41E-02	4.93E-03	4.93E-01	2.24E-02	0.00	2.65E-03
I-133	2.59E+01	4.51E+01	1.37E+01	6.62E+03	7.86E+01	0.00	4.05E+01
I-134	2.18E-08	5.94E-08	2.12E-08	1.03E-06	9.44E-08	0.00	5.17E-11
I-135	1.31E+00	3.44E+00	1.27E+00	2.27E+02	5.52E+00	0.00	3.89E+00
Cs-134	2.98E+05	7.10E+05	5.80E+05	0.00	2.30E+05	7.62E+04	1.24E+04
Cs-136	2.96E+04	1.17E+05	8.42E+04	0.00	6.51E+04	8.92E+03	1.33E+04
Cs-137	3.82E+05	5.23E+05	3.43E+05	0.00	1.78E+05	5.90E+04	1.01E+04
Cs-138	9.12E-12	1.80E-11	8.92E-12	0.00	1.32E-11	1.31E-12	7.68E-17
Ba-139	5.64E-06	4.02E-09	1.65E-07	0.00	3.76E-09	2.28E-09	1.00E-05
Ba-140	3.74E+02	4.69E-01	2.45E+01	0.00	1.60E-01	2.69E-01	7.69E+02
Ba-141	8.47E-25	6.40E-28	2.86E-26	0.00	5.95E-28	3.63E-28	3.99E-34
Ba-142	0.00	0.00	0.00	0.00	0.00	0.00	0.00
La-140	1.10E-01	5.56E-02	1.47E-02	0.00	0.00	0.00	4.08E+03
La-142	2.19E-07	9.96E-08	2.48E-08	0.00	0.00	0.00	7.27E-04
Ce-141	1.15E-01	7.79E-02	8.84E-03	0.00	3.62E-02	0.00	2.98E+02
Ce-143	8.65E-03	6.39E+00	7.08E-04	0.00	2.81E-03	0.00	2.39E+02
Ce-144	6.22E+00	2.60E+00	3.34E-01	0.00	1.54E+00	0.00	2.10E+03
Pr-143	6.10E-01	2.44E-01	3.02E-02	0.00	1.41E-01	0.00	2.67E+03
Pr-144	1.48E-28	6.14E-29	7.51E-30	0.00	3.46E-29	0.00	2.13E-35
Nd-147	4.11E-01	4.75E-01	2.84E-02	0.00	2.78E-01	0.00	2.28E+03
W-187	1.47E+02	1.23E+02	4.31E+01	0.00	0.00	0.00	4.04E+04
Np-239	2.81E-02	2.76E-03	1.52E-03	0.00	8.62E-03	0.00	5.67E+02





## 2.5 LIQUID EFFLUENT DOSE PROJECTIONS

### 2.5.1 Thirty-One Day Dose Projections

In order to meet the requirements for operation of the LIQUID RADWASTE TREATMENT SYSTEM (see Section 2.1.4), dose projections must be made at least once each 31 days; this applies during periods in which a discharge to UNRESTRICTED AREAS of liquid effluents containing radioactive materials occurs or is expected.

Projected 31-day doses to individuals due to liquid effluents may be determined as follows:

$$D_{\tau p} = \left( \frac{D_{\tau c}}{t} \right) \times 31 + D_{\tau a} \quad (2.17)$$

where:

- $D_{\tau p}$  = the projected dose to the total body or organ  $\tau$ , for the next 31 days of liquid releases.
- $D_{\tau c}$  = the cumulative dose to the total body or organ  $\tau$ , for liquid releases that have occurred in the elapsed portion of the current quarter, plus the release under consideration.
- $t$  = the number of whole or partial days elapsed into the current quarter, including the time to the end of the release under consideration (even if the release continues into the next quarter).
- $D_{\tau a}$  = the anticipated dose contribution to the total body or any organ  $\tau$ , due to any planned activities during the next 31-day period, if those activities will result in liquid releases that are in addition to routine liquid effluents. If only routine liquid effluents are anticipated,  $D_{\tau a}$  may be set to zero.

### 2.5.2 Dose Projections for Specific Releases

Dose projections may be performed for a particular release by performing a pre-release dose calculation assuming that the planned release will proceed as anticipated. For individual dose projections due to liquid releases, follow the methodology of Section 2.4, using sample analysis results for the source to be released, and parameter values expected to exist during the release period.



## 2.6 DEFINITIONS OF LIQUID EFFLUENT TERMS

The following symbolic terms are used in the presentation of liquid effluent calculations in the subsections above.

<u>Term</u>	<u>Definition</u>	<u>Section of Initial Use</u>
$A_p =$	the adjustment factor used in calculating the effluent monitor setpoint for liquid release pathway p: the ratio of the assured dilution to the required dilution [unitless].	2.3.2.2
ADF =	the assured dilution factor for a planned release [unitless].	2.3.2.2
$AF_p =$	the dilution allocation factor for liquid release pathway p [unitless].	2.3.2.2
$A_{\tau} =$	the site-related adult ingestion dose commitment factor, for the total body or for any organ $\tau$ , due to identified radionuclide i [(mrem · mL)/(h · $\mu$ Ci)]. The values of $A_{\tau}$ are listed in Table 2-8.	2.4.1
$B_N =$	the crop to soil concentration factor applicable to radionuclide i, [(pCi/kg garden vegetation)/(pCi/kg soil)].	2.4.3
$BF_i =$	the bioaccumulation factor for radionuclide i for freshwater fish [(pCi/kg)/(pCi/L)]. Values are listed in Table 2-6.	2.4.2
c =	the setpoint of the radioactivity monitor measuring the concentration of radioactivity in the effluent line, prior to dilution and subsequent release [ $\mu$ Ci/mL].	2.3.2.1
$c_p =$	the calculated effluent radioactivity monitor setpoint for liquid release pathway p [ $\mu$ Ci/mL].	2.3.2.2
$C_a =$	the gross concentration of alpha emitters in the liquid waste as measured in the applicable composite sample [ $\mu$ Ci/mL].	2.3.2.2
$C_{ECL} =$	the Effluent Concentration Limit stated in 10 CFR 20, Appendix B, Table 2, Column 2 [ $\mu$ Ci/mL].	2.3.2.1
$C_f =$	the concentration of Fe-55 in the liquid waste as measured in the applicable composite sample [ $\mu$ Ci/mL].	2.3.2.2
$C_g =$	the concentration of gamma emitter g in the liquid waste as measured by gamma ray spectroscopy performed on the applicable pre-release waste sample [ $\mu$ Ci/mL].	2.3.2.2
$C_i =$	the measured concentration of radionuclide i in a sample of liquid effluent [ $\mu$ Ci/mL].	2.3.2.2

<u>Term</u>	<u>Definition</u>	<u>Section of Initial Use</u>
$C_{iI}$ =	the average concentration of radionuclide $i$ in undiluted liquid effluent during time period $I$ [ $\mu\text{Ci}/\text{mL}$ ].	2.4.1
$C_{ir}$ =	the measured concentration of radionuclide $i$ in release pathway $r$ that is contributing to radioactivity in the dilution stream [ $\mu\text{Ci}/\text{mL}$ ].	2.3.2.2
$C_s$ =	the concentration of strontium radioisotope $s$ (Sr-89 or Sr-90) in the liquid waste as measured in the applicable composite sample [ $\mu\text{Ci}/\text{mL}$ ].	2.3.2.2
$C_1$ =	the concentration of H-3 in the liquid waste as measured in the applicable composite sample [ $\mu\text{Ci}/\text{mL}$ ].	2.3.2.2
$CF_{iv}$ =	the concentration factor for radionuclide $i$ in irrigated garden vegetation [ $(\text{pCi}/\text{kg})/(\text{pCi}/\text{L})$ ].	2.4.2
$D_w$ =	the dilution factor from the near field of the discharge structure to the potable water intake location [unitless].	2.4.2
$D_\tau$ =	the cumulative dose commitment to the total body or to any organ $\tau$ , due to radioactivity in liquid effluents released during a given time period [mrem].	2.4.1
$D_{\tau a}$ =	the anticipated dose contribution to the total body or any organ $\tau$ , due to any planned activities during the next 31-day period [mrem].	2.5.1
$D_{\tau c}$ =	the cumulative dose to the total body or organ $\tau$ , for liquid releases that have occurred in the elapsed portion of the current quarter, plus the release under consideration [mrem].	2.5.1
$D_{\tau p}$ =	the projected dose to the total body or organ $\tau$ , for the next 31 days of liquid releases [mrem].	2.5.1
$DF_{\tau i}$ =	the dose conversion factor for radionuclide $i$ for adults, in organ $\tau$ [mrem/pCi]. Values are listed in Table 2-7.	2.4.2
$ECL_i$ =	the liquid Effluent Concentration Limit for radionuclide $i$ from 10 CFR Part 20, Appendix B, Table 2, Column 2 [ $\mu\text{Ci}/\text{mL}$ ].	2.3.2.2
$f$ =	the effluent flowrate at the location of the radioactivity monitor [gpm].	2.3.2.1
$f_{ap}$ =	the anticipated actual discharge flowrate for a planned release from liquid release pathway $p$ [gpm].	2.3.2.2

<u>Term</u>	<u>Definition</u>	<u>Section of Initial Use</u>
$f_i =$	the fraction of the year that garden vegetation is irrigated [unitless].	2.4.3
$f_{mp} =$	the maximum permissible effluent discharge flowrate for release pathway p [gpm].	2.3.2.2
$f_r =$	the effluent discharge flowrate of release pathway r [gpm].	2.3.2.2
$f_t =$	the average undiluted liquid waste flowrate actually observed during the period of a liquid release [gpm].	2.4.1
$F =$	the dilution stream flowrate which can be assured prior to the release point to the UNRESTRICTED AREA [gpm].	2.3.2.1
$F_d =$	the entire assured dilution flowrate for the plant site during the release period [gpm].	2.3.2.2
$F_{\phi} =$	the dilution flowrate allocated to release pathway p [gpm].	2.3.2.2
$F_f =$	the near-field average dilution factor in the receiving water of the UNRESTRICTED AREA [unitless].	2.4.1
$F_t =$	the average dilution stream flowrate actually observed during the period of a liquid release [gpm].	2.4.1
$I =$	the average irrigation rate during the growing season [ $L/(m^2 \cdot h)$ ].	2.4.3
$L_v =$	the water content of leafy garden vegetation edible parts [L/kg].	2.4.3
$M =$	the additional river dilution factor from the near field of the discharge structure for the plant site to the point of irrigation water usage [unitless].	2.4.3
$P =$	the effective surface density of soil [ $kg/m^2$ ].	2.4.3
$r =$	the fraction of irrigation-deposited activity retained on the edible portions of leafy garden vegetation.	2.4.3
$RDF =$	the required dilution factor: the minimum ratio by which liquid effluent must be diluted before reaching the UNRESTRICTED AREA, in order to ensure that the limits of Section 2.1.2 are not exceeded [unitless].	2.3.2.2
$RDF_{\gamma} =$	the RDF for a liquid release due only to its concentration of gamma-emitting radionuclides [unitless].	2.3.2.2

<u>Term</u>	<u>Definition</u>	<u>Section of Initial Use</u>
$RDF_{\text{nr}}$ =	the RDF for a liquid release due only to its concentration of non-gamma-emitting radionuclides [unitless].	2.3.2.2
SF =	the safety factor selected to compensate for statistical fluctuations and errors of measurement [unitless].	2.3.2.2
t =	the number of whole or partial days elapsed into the current quarter, including the time to the end of the release under consideration.	2.5.1
$t_b$ =	the period of long-term buildup of activity in soil [h].	2.4.3
$t_e$ =	the period of leafy garden vegetation exposure during the growing season [h].	2.4.3
$t_f$ =	the transit time from release to receptor for fish consumption [h].	2.4.2
$t_h$ =	the time between harvest of garden vegetation and human consumption [h].	2.4.3
$t_w$ =	the transit time from release to receptor for potable water consumption [h].	2.4.2
TF =	the tolerance factor selected to allow flexibility in the establishment of a practical monitor setpoint which could accommodate effluent releases at concentrations higher than the ECL values stated in 10 CFR 20, Appendix B, Table 2, Column 2 [unitless]; the tolerance factor must not exceed a value of 10.	2.3.2.1
$U_f$ =	the adult rate of fish consumption [kg/y].	2.4.2
$U_v$ =	the adult consumption rate for irrigated garden vegetation [kg/y].	2.4.2
$U_w$ =	the adult drinking water consumption rate applicable to the plant site [L/y].	2.4.2
$Y_v$ =	the areal density (agricultural productivity) of leafy garden vegetation [kg/m <sup>2</sup> ].	2.4.3
Z =	the applicable dilution factor for the receiving water body, in the near field of the discharge structure, during the period of radioactivity release [unitless].	2.4.1
$\Delta t_1$ =	the length of time period 1, over which $C_{t1}$ and $F_1$ are averaged for liquid releases [h].	2.4.1

---

<u>Term</u>	<u>Definition</u>	<u>Section of Initial Use</u>
$\lambda_{EI} =$	the effective removal rate for activity deposited on crop leaves [ $h^{-1}$ ].	2.4.3
$\lambda_i =$	the decay constant for radionuclide i [ $h^{-1}$ ].	2.4.2
$\lambda_w =$	the rate constant for removal of activity from plant leaves by weathering [ $h^{-1}$ ].	2.4.3