

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

**Enclosure 4**

**Edwin I. Hatch Nuclear Plant – Units 1&2  
Annual Radioactive Effluent Release Report for 2018**

**SOUTHERN COMPANY**

**E. I. HATCH NUCLEAR PLANT – UNITS 1 AND 2**

**NRC DOCKET NOS. 50-321 AND 50-366**

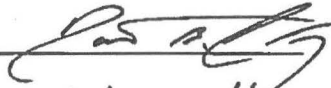
**FACILITY OPERATING LICENSE NOS. DPR-57 AND NPF-5**

**ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT**

**FOR**

**JANUARY 1, 2018 TO DECEMBER 31, 2018**

Prepared by: Daniel B. Carter



Reviewed by:

Adam Morgan / Adam Morgan

4/22/19

## ACKNOWLEDGEMENT OF OWNERSHIP

The contents of this Annual Radioactive Effluent Release Report, contained herein, are true and accurate to the best of my knowledge. I understand that I am ultimately responsible for the information that has been captured within these pages.

Adam Morgan / Adam Morgan

4/22/19

Chemistry Manager

**SOUTHERN COMPANY**  
**E. I. HATCH NUCLEAR PLANT**  
**UNITS NO. 1 & 2**  
**ANNUAL REPORT**  
**PLANT RADIOACTIVE EFFLUENT RELEASES**  
**JANUARY 1, 2018 THROUGH DECEMBER 31, 2018**

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**SOUTHERN COMPANY**  
**E. I. HATCH NUCLEAR PLANT**  
**UNITS NO. 1 & 2**  
**ANNUAL REPORT**

**PLANT RADIOACTIVE EFFLUENT RELEASES**

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## **1.0 Liquid Effluents**

### **1.1 Regulatory Requirements**

#### **1.1.1 Concentration Limits**

The concentration of radioactive material released in liquid effluents to UNRESTRICTED AREAS shall be limited to ten times the concentrations specified in 10 CFR Part 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 1E-04 microcuries/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:

- 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 values used in determining allowable liquid radwaste release rates and concentrations, for 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 uCi/ml total activity.

For gross alpha in liquid radwaste, the ECL is 2E-09 uCi/ml.

Furthermore, 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 liquid radwaste release rates and effluent radiation monitor set points is described in Subsection 1.3 of this report.

The method utilizing the ECL fraction to determine the dose released from groundwater outfalls is described in Subsection 1.4 of this report.

**1.3 Measurements and Approximations of Total Radioactivity for Liquid Radwaste**

Prior to the release of any tank containing liquid radwaste, following the required recirculations, samples are collected and analyzed in accordance with the Edwin I. Hatch Nuclear Plant Offsite Dose Calculation Manual (ODCM) Table 2-3. A sample from each tank 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 released. Liquid radwaste sample analyses are performed as described in Section 1.3.1.

**1.3.1 Total Radioactivity Determination for Liquid Radwaste**

MEASUREMENT	FREQUENCY	METHOD
1. Gamma Isotopic	Each Batch	Gamma Spectroscopy with computerized data reduction.
2. Dissolved or entrained noble gas	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

Gamma isotopic measurements are performed in-house using germanium detectors with a resolution of 2.0 keV or lower. The detectors are shielded by four inches of lead. A liquid radwaste sample is typically counted for 2000 seconds and a peak search of the resulting gamma ray spectrum is performed. Energy and net count data for all significant peaks are determined and a quantitative reduction or MDC calculation is performed to ensure that the MDC's are met for the nuclides specified in the 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. Typically achieved liquid effluent sample analyses minimum detectable concentrations are reported in Table 1-4.

Some tritium analyses are performed on site. Other tritium, Gross Alpha, Sr-89, Sr-90 and Fe-55 are, in some cases, analyzed offsite. The radionuclide concentrations determined by gamma spectroscopic analysis of samples taken from tanks planned for release, in addition to the most current sample analysis results available for tritium, gross alpha, Sr-89, Sr-90 and Fe-55, are used along with the corresponding ECL values to determine the ECL fraction for these tanks. This ECL fraction is then used, with the appropriate safety factors, tolerance factors, and the expected dilution stream flow to calculate maximum permissible release rate and a liquid effluent monitor setpoint. The monitor setpoint is calculated to assure that the limits of the ODCM are not exceeded.

A monitor reading in excess of the calculated setpoint will result 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 the liquid effluent radiation monitor calibration factor, 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 Foreman on duty. The pertinent information is transferred manually from the prerelease printout to a one-page release permit, which is forwarded to Radwaste Operations. When the release is completed, the release permit is returned from Radwaste Operations to Chemistry with the actual release data provided. These data are input into the computer and a post-release printout is generated. The post release printout contains the actual release rates, the actual release concentrations and quantities, the actual dilution flow, and the calculated doses to a Member of the Public.

**1.4 Measurements and Approximations of Total Radioactivity for Groundwater Outfall Y22N008A**

Samples are collected and analyzed in accordance with the Edwin I. Hatch Nuclear Plant Offsite Dose Calculation Manual (ODCM) Table 2-3. Weekly, monthly and quarterly composites are prepared for analysis by extracting aliquots from each outfall's automatic sampler, which collects a composite sample over a seven-day period. Sample analyses are performed as described in Section 1.4.1.

**1.4.1 Total Radioactivity Determination for Groundwater Outfalls**

MEASUREMENT	FREQUENCY	METHOD
1. Gamma Isotopic	Weekly Composite	Gamma Spectroscopy with computerized data reduction.
2. Tritium	Weekly Composite	Distillation and liquid scintillation counting
3. Sr-89 & Sr-90	Quarterly Composite (as required)	Chemical separation and gas flow proportional or scintillation counting

Gamma isotopic measurements are performed in-house using germanium detectors with a resolution of 2.0 keV or lower. The detectors are shielded by four inches of lead. A weekly composite sample is typically counted to Environmental MDC's and a peak search of the resulting gamma ray spectrum is performed. Energy and net count data for all significant peaks are determined and a quantitative reduction or MDC calculation is performed to ensure that the MDC's are met for the nuclides specified in the 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. Typically achieved liquid effluent sample analyses minimum detectable concentrations are reported in Table 1-4.

Tritium, Gross Beta, Sr-89 and Sr-90 are, in some cases, analyzed offsite. The radionuclide concentrations determined by gamma spectroscopic analysis of the weekly composite sample, in addition to the most current sample analysis results available for tritium, gross beta, Sr-89 and Sr-90, are used along with the corresponding ECL values to determine the ECL fraction for these composite samples. This ECL fraction is then used, with the appropriate safety factors, tolerance factors, and the expected dilution stream flow to calculate projected dose released.

Radionuclide concentrations, safety factors and dilution stream flow rate are entered into the computer and a pre-release printout is generated for each release period. When the release period is complete, the release permit is updated with the actual release data collected during the release period. These data are input into the computer and a post-release printout is generated. The post release printout contains the actual release rates, the actual release concentrations and quantities, the actual dilution flow, and the calculated doses to a Member of the Public. Cumulative dose results are tabulated along with the percent of the ODCM limit for each release period, for the current quarter and year.

### **1.5 Total Error Estimation**

The maximum error associated with volume and flow measurements, based upon plant calibration practice, is estimated to be + or - 10%. The average error associated with counting is estimated to be less than + or - 15%. Therefore, the total error estimation is + or - 18%.

## **1.6 Liquid Effluent Release Data**

Regulatory Guide 1.21, Tables 2A and 2B are found in this report as Table 1-1A, for Unit 1, Table 1-1B, for Unit 2 and Table 1-1C, for the site; and Table 1-2A, for Unit 1, 1-2B, for Unit 2, and Table 1-2C, for the site. Typical liquid minimum detectable concentrations (MDC's) used for analyses are found in Table 1-4.

The values for the four categories of Tables 1-1A, and 1-1B, and 1-1C, are calculated and the Tables completed as follows:

1. Fission and activation products - The total release values (not including tritium, gases, and alpha) are comprised of the sum of the measured individual radionuclide activities. This sum is for each batch released to the river for the respective quarter.
2. Tritium - The measured tritium concentrations in the monthly composite samples are used to calculate the total release and average diluted concentration during each period.
3. Dissolved and entrained gases - Concentrations of dissolved and entrained gases in liquid effluents are measured by germanium spectroscopy using a one liter sample from each liquid radwaste batch. The measured concentrations are used to calculate the total release and the average diluted concentration during the period. Radioisotopes of iodine in any form are also determined during the isotopic analysis for each batch; therefore, a separate analysis for possible gaseous forms is not performed because it would not provide additional information.
4. Gross alpha radioactivity - The measured gross alpha concentrations in the monthly composite samples are used to calculate the total release of alpha radioactivity.



### **1.7 Radiological Impact Due to Liquid Releases**

Doses to a Member of the Public due to radioactivity in liquid effluents 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.

### **1.8 Liquid Effluents - Batch Releases**

Batch Release information for Units 1 and 2 is summarized in the following tables:

Unit 1 Liquid Batch Releases: Table 1-5A

Unit 2 Liquid Batch Releases: Table 1-5B

### **1.9 Liquid Effluents - Continuous Releases**

Continuous Release information is summarized in the following tables:

Unit 1 Liquid Continuous Releases: Table 1-2A

Unit 2 Liquid Continuous Releases: Table 1-2B

Hatch Site Continuous Releases: Table 1-2C

### **1.10 Liquid Effluents - Abnormal Releases**

There were no abnormal liquid releases for this reporting period.

**Table 1-1A**  
**Hatch Nuclear Plant**  
**RADIOACTIVE EFFLUENT RELEASE REPORT - 2018**  
**Liquid Effluents - Summation Of All Releases**  
**Unit: 1**  
**Starting: 1-Jan- 2018 Ending: 31-Dec-2018**

<b>Type of Effluent</b>	<b>Units</b>	<b>1ST Quarter</b>	<b>2ND Quarter</b>	<b>3RD Quarter</b>	<b>4TH Quarter</b>
<b>A. Fission And Activation Products</b>					
1. Total Release (not including tritium, gases, alpha)	Curies	3.05E-04	3.26E-04	5.40E-04	1.09E-04
2. Average diluted concentration during period	uCi/mL	1.53E-09	9.85E-10	5.17E-10	2.56E-10
3. Percent of Applicable Limit	%	*	*	*	*
<b>B. Tritium</b>					
1. Total Release	Curies	2.52E+00	4.10E+00	1.09E+01	4.34E+00
2. Average diluted Concentration during period	uCi/mL	1.26E-05	1.24E-05	1.05E-05	1.02E-05
3. Percent of Applicable Limit	%	*	*	*	*
<b>C. Dissolved and Entrained Gases</b>					
1. Total Release	Curies	3.20E-06	2.43E-05	1.06E-04	3.90E-05
2. Average diluted Concentration during period	uCi/mL	1.60E-11	7.34E-11	1.02E-10	9.21E-11
3. Percent of Applicable Limit	%	*	*	*	*
<b>D: Gross Alpha Radioactivity</b>					
1. Total Release	Curies	0.00E+00	0.00E+00	0.00E+00	0.00E+00
<b>E: Waste Vol Release (Pre-Dilution)</b>					
	Liters	9.65E+05	1.53E+06	4.47E+06	1.85E+06
<b>F. Volume of Dilution Water Used</b>					
	Liters	2.00E+08	3.31E+08	1.05E+09	4.24E+08

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

**Table 1-1B**  
**Hatch Nuclear Plant**  
**RADIOACTIVE EFFLUENT RELEASE REPORT - 2018**  
**Liquid Effluents - Summation Of All Releases**  
**Unit: 2**  
**Starting: 1-Jan- 2018 Ending: 31-Dec-2018**

<b>Type of Effluent</b>	<b>Units</b>	<b>1ST Quarter</b>	<b>2ND Quarter</b>	<b>3RD Quarter</b>	<b>4TH Quarter</b>
<b>A. Fission And Activation Products</b>					
1. Total Release (not including tritium, gases, alpha)	Curies	2.71E-04	5.59E-04	1.59E-05	8.07E-05
2. Average diluted concentration during period	uCi/mL	6.13E-11	1.07E-10	2.54E-12	1.68E-11
3. Percent of Applicable Limit	%	*	*	*	*
<b>B. Tritium</b>					
1. Total Release	Curies	1.56E+00	2.29E+00	4.22E-01	4.51E-01
2. Average diluted Concentration during period	uCi/mL	3.53E-07	4.36E-07	6.72E-08	9.39E-08
3. Percent of Applicable Limit	%	*	*	*	*
<b>C. Dissolved and Entrained Gases</b>					
1. Total Release	Curies	5.11E-06	3.67E-06	0.00E+00	0.00E+00
2. Average diluted Concentration during period	uCi/mL	1.16E-12	7.01E-13	0.00E+00	0.00E+00
3. Percent of Applicable Limit	%	*	*	*	*
<b>D: Gross Alpha Radioactivity</b>					
1. Total Release	Curies	1.36E-08	1.58E-07	0.00E+00	0.00E+00
<b>E: Waste Vol Release (Pre-Dilution)</b>					
	Liters	3.75E+06	4.77E+06	4.90E+06	4.15E+06
<b>F. Volume of Dilution Water Used</b>					
	Liters	4.43E+09	5.24E+09	6.29E+09	4.80E+09

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

**Table 1-1C**  
**Hatch Nuclear Plant**  
**RADIOACTIVE EFFLUENT RELEASE REPORT - 2018**  
**Liquid Effluents - Summation Of All Releases**  
**Unit: Site**  
**Starting: 1-Jan- 2018 Ending: 31-Dec-2018**

<b>Type of Effluent</b>	<b>Units</b>	<b>1ST Quarter</b>	<b>2ND Quarter</b>	<b>3RD Quarter</b>	<b>4TH Quarter</b>
<b>A. Fission And Activation Products</b>					
1. Total Release (not including tritium, gases, alpha)	Curies	5.77E-04	8.85E-04	5.56E-04	1.89E-04
2. Average diluted concentration during period	uCi/mL	1.25E-10	1.59E-10	7.59E-11	3.62E-11
3. Percent of Applicable Limit	%	*	*	*	*
<b>B. Tritium</b>					
1. Total Release	Curies	4.08E+00	6.38E+00	1.14E+01	4.79E+00
2. Average diluted Concentration during period	uCi/mL	8.82E-07	1.15E-06	1.55E-06	9.17E-07
3. Percent of Applicable Limit	%	*	*	*	*
<b>C. Dissolved and Entrained Gases</b>					
1. Total Release	Curies	8.31E-06	2.80E-05	1.06E-04	3.90E-05
2. Average diluted Concentration during period	uCi/mL	1.80E-12	5.02E-12	1.45E-11	7.47E-12
3. Percent of Applicable Limit	%	*	*	*	*
<b>D: Gross Alpha Radioactivity</b>					
1. Total Release	Curies	1.36E-08	1.58E-07	0.00E+00	0.00E+00
<b>E: Waste Vol Release (Pre-Dilution)</b>					
	Liters	4.72E+06	6.30E+06	9.36E+06	6.00E+06
<b>F. Volume of Dilution Water Used</b>					
	Liters	4.62E+09	5.57E+09	7.33E+09	5.23E+09

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

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

<b>Nuclides Released</b>	<b>Unit</b>	<b>Continuous Mode</b>			
		<b>1ST Quarter</b>	<b>2ND Quarter</b>	<b>3RD Quarter</b>	<b>4TH Quarter</b>
<b>Fission &amp; Activation Products</b>					
No Nuclides Found	Curies	0.00E+00	0.00E+00	0.00E+00	0.00E+00
<b>Tritium</b>					
No Nuclides Found	Curies	0.00E+00	0.00E+00	0.00E+00	0.00E+00
<b>Dissolved And Entrained Gases</b>					
No Nuclides Found	Curies	0.00E+00	0.00E+00	0.00E+00	0.00E+00
<b>Gross Alpha Radioactivity</b>					
No Nuclides Found	Curies	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Zeros in this table indicates that no radioactivity was present at detectable levels.  
 See Table 1-4 for typical minimum detectable concentrations.

**Table 1-2A**

**Hatch Nuclear Plant  
RADIOACTIVE EFFLUENT RELEASE REPORT - 2018**

**Liquid Effluents**

**Unit: 1**

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

<b>Nuclides Released</b>	<b>Unit</b>	<b>Batch Mode</b>			
		<b>1ST Quarter</b>	<b>2ND Quarter</b>	<b>3RD Quarter</b>	<b>4TH Quarter</b>
<b>Fission &amp; Activation Products</b>					
Co-58	Curies	1.44E-05	2.95E-05	1.67E-06	0.00E+00
Nb-97	Curies	2.39E-06	1.63E-06	0.00E+00	0.00E+00
Cs-137	Curies	1.55E-05	2.35E-05	1.73E-05	4.96E-06
Na-24	Curies	6.52E-06	0.00E+00	0.00E+00	0.00E+00
Sr-89	Curies	0.00E+00	0.00E+00	0.00E+00	6.73E-05
Zn-65	Curies	2.53E-05	2.81E-05	1.09E-05	2.13E-06
Ce-144	Curies	0.00E+00	0.00E+00	2.25E-06	0.00E+00
Cr-51	Curies	2.73E-05	3.37E-05	0.00E+00	0.00E+00
Sb-124	Curies	1.81E-06	2.09E-06	0.00E+00	0.00E+00
Fe-55	Curies	2.42E-05	0.00E+00	2.80E-04	0.00E+00
Sr-90	Curies	5.92E-06	0.00E+00	0.00E+00	0.00E+00
Ag-110M	Curies	3.25E-06	1.17E-05	0.00E+00	0.00E+00
Zr-97	Curies	0.00E+00	0.00E+00	4.22E-07	0.00E+00
Mn-54	Curies	3.62E-05	3.76E-05	2.72E-05	1.85E-06
As-76	Curies	0.00E+00	0.00E+00	0.00E+00	8.26E-06
Co-60	Curies	1.43E-04	1.54E-04	2.00E-04	2.41E-05
Zn-69M	Curies	0.00E+00	4.09E-06	0.00E+00	0.00E+00
<b>Total For Period</b>	<b>Curies</b>	<b>3.05E-04</b>	<b>3.26E-04</b>	<b>5.40E-04</b>	<b>1.09E-04</b>
<b>Tritium</b>					
H-3	Curies	2.52E+00	4.10E+00	1.09E+01	4.34E+00

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

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

<b>Nuclides Released</b>	<b>Unit</b>	<b>Batch Mode</b>			
		<b>1ST Quarter</b>	<b>2ND Quarter</b>	<b>3RD Quarter</b>	<b>4TH Quarter</b>
<b>Dissolved And Entrained Gases</b>					
Xe-135	Curies	3.20E-06	2.23E-05	9.02E-05	3.76E-05
Xe-133	Curies	0.00E+00	2.01E-06	1.62E-05	1.38E-06
<b>Total For Period</b>	<b>Curies</b>	<b>3.20E-06</b>	<b>2.43E-05</b>	<b>1.06E-04</b>	<b>3.90E-05</b>
<b>Gross Alpha Radioactivity</b>					
No Nuclides Found	Curies	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Zeros in this table indicates that no radioactivity was present at detectable levels.  
See Table 1-4 for typical minimum detectable concentrations.

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

<b>Nuclides Released</b>	<b>Unit</b>	<b>Continuous Mode</b>			
		<b>1ST Quarter</b>	<b>2ND Quarter</b>	<b>3RD Quarter</b>	<b>4TH Quarter</b>
<b>Fission &amp; Activation Products</b>					
Sr-89	Curies	0.00E+00	0.00E+00	1.59E-05	6.48E-05
Sr-90	Curies	1.42E-05	0.00E+00	0.00E+00	0.00E+00
<b>Total For Period</b>	<b>Curies</b>	<b>1.42E-05</b>	<b>0.00E+00</b>	<b>1.59E-05</b>	<b>6.48E-05</b>
<b>Tritium</b>					
H-3	Curies	8.79E-03	1.01E-02	1.09E-02	9.25E-03
<b>Dissolved And Entrained Gases</b>					
No Nuclides Found	Curies	0.00E+00	0.00E+00	0.00E+00	0.00E+00
<b>Gross Alpha Radioactivity</b>					
No Nuclides Found	Curies	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Zeros in this table indicates that no radioactivity was present at detectable levels.  
See Table 1-4 for typical minimum detectable concentrations.



**Table 1-2B**

**Hatch Nuclear Plant  
RADIOACTIVE EFFLUENT RELEASE REPORT - 2018**

**Liquid Effluents**

**Unit: 2**

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

<b>Nuclides Released</b>	<b>Unit</b>	<b>Batch Mode</b>			
		<b>1ST Quarter</b>	<b>2ND Quarter</b>	<b>3RD Quarter</b>	<b>4TH Quarter</b>
<b>Fission &amp; Activation Products</b>					
Co-58	Curies	3.47E-06	5.13E-05	0.00E+00	0.00E+00
Fe-55	Curies	1.79E-04	4.06E-05	0.00E+00	0.00E+00
Co-60	Curies	5.09E-05	2.84E-04	0.00E+00	0.00E+00
Mn-54	Curies	7.26E-06	7.65E-05	0.00E+00	0.00E+00
Cs-137	Curies	2.50E-06	4.00E-05	0.00E+00	3.70E-06
Zn-65	Curies	3.71E-06	4.58E-05	0.00E+00	0.00E+00
Sr-89	Curies	1.03E-05	0.00E+00	0.00E+00	2.41E-06
Zn-69M	Curies	0.00E+00	2.08E-06	0.00E+00	0.00E+00
Cr-51	Curies	0.00E+00	3.75E-06	0.00E+00	0.00E+00
Ag-110M	Curies	0.00E+00	1.25E-06	0.00E+00	0.00E+00
Na-24	Curies	0.00E+00	1.35E-05	0.00E+00	9.80E-06
<b>Total For Period</b>	<b>Curies</b>	<b>2.57E-04</b>	<b>5.59E-04</b>	<b>0.00E+00</b>	<b>1.59E-05</b>
<b>Tritium</b>					
H-3	Curies	1.55E+00	2.28E+00	4.12E-01	4.42E-01
<b>Dissolved And Entrained Gases</b>					
Xe-133	Curies	1.46E-06	1.09E-06	0.00E+00	0.00E+00
Xe-135	Curies	3.65E-06	2.58E-06	0.00E+00	0.00E+00
<b>Total For Period</b>	<b>Curies</b>	<b>5.11E-06</b>	<b>3.67E-06</b>	<b>0.00E+00</b>	<b>0.00E+00</b>
<b>Gross Alpha Radioactivity</b>					
G-Alpha	Curies	1.36E-08	1.58E-07	0.00E+00	0.00E+00

Zeros in this table indicates that no radioactivity was present at detectable levels.  
See Table 1-4 for typical minimum detectable concentrations.

**Table 1-2C**

**Hatch Nuclear Plant  
RADIOACTIVE EFFLUENT RELEASE REPORT - 2018**

**Liquid Effluents**

**Unit: Site**

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

<b>Nuclides Released</b>	<b>Unit</b>	<b>Continuous Mode</b>			
		<b>1ST Quarter</b>	<b>2ND Quarter</b>	<b>3RD Quarter</b>	<b>4TH Quarter</b>
<b>Fission &amp; Activation Products</b>					
Sr-89	Curies	0.00E+00	0.00E+00	1.59E-05	6.48E-05
Sr-90	Curies	1.42E-05	0.00E+00	0.00E+00	0.00E+00
<b>Total For Period</b>	<b>Curies</b>	<b>1.42E-05</b>	<b>0.00E+00</b>	<b>1.59E-05</b>	<b>6.48E-05</b>
<b>Tritium</b>					
H-3	Curies	8.79E-03	1.01E-02	1.09E-02	9.25E-03
<b>Dissolved And Entrained Gases</b>					
No Nuclides Found	Curies	0.00E+00	0.00E+00	0.00E+00	0.00E+00
<b>Gross Alpha Radioactivity</b>					
No Nuclides Found	Curies	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Zeros in this table indicates that no radioactivity was present at detectable levels.  
See Table 1-4 for typical minimum detectable concentrations.

**Table 1-2C**

**Hatch Nuclear Plant  
RADIOACTIVE EFFLUENT RELEASE REPORT - 2018**

**Liquid Effluents**

**Unit: Site**

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

<b>Nuclides Released</b>	<b>Unit</b>	<b>Batch Mode</b>			
		<b>1ST Quarter</b>	<b>2ND Quarter</b>	<b>3RD Quarter</b>	<b>4TH Quarter</b>
<b>Fission &amp; Activation Products</b>					
Zr-97	Curies	0.00E+00	0.00E+00	4.22E-07	0.00E+00
Sr-89	Curies	1.03E-05	0.00E+00	0.00E+00	6.97E-05
As-76	Curies	0.00E+00	0.00E+00	0.00E+00	8.26E-06
Cr-51	Curies	2.73E-05	3.74E-05	0.00E+00	0.00E+00
Ag-110M	Curies	3.25E-06	1.30E-05	0.00E+00	0.00E+00
Sr-90	Curies	5.92E-06	0.00E+00	0.00E+00	0.00E+00
Na-24	Curies	6.52E-06	1.35E-05	0.00E+00	9.80E-06
Co-60	Curies	1.94E-04	4.38E-04	2.00E-04	2.41E-05
Mn-54	Curies	4.34E-05	1.14E-04	2.72E-05	1.85E-06
Fe-55	Curies	2.03E-04	4.06E-05	2.80E-04	0.00E+00
Cs-137	Curies	1.80E-05	6.36E-05	1.73E-05	8.66E-06
Co-58	Curies	1.79E-05	8.08E-05	1.67E-06	0.00E+00
Zn-65	Curies	2.90E-05	7.38E-05	1.09E-05	2.13E-06
Zn-69M	Curies	0.00E+00	6.17E-06	0.00E+00	0.00E+00
Sb-124	Curies	1.81E-06	2.09E-06	0.00E+00	0.00E+00
Ce-144	Curies	0.00E+00	0.00E+00	2.25E-06	0.00E+00
Nb-97	Curies	2.39E-06	1.63E-06	0.00E+00	0.00E+00
<b>Total For Period</b>	<b>Curies</b>	<b>5.62E-04</b>	<b>8.85E-04</b>	<b>5.40E-04</b>	<b>1.24E-04</b>
<b>Tritium</b>					
H-3	Curies	4.07E+00	6.37E+00	1.13E+01	4.78E+00

Zeros in this table indicates that no radioactivity was present at detectable levels.  
See Table 1-4 for typical minimum detectable concentrations.

**Table 1-2C**  
**Hatch Nuclear Plant**  
**RADIOACTIVE EFFLUENT RELEASE REPORT - 2018**  
**Liquid Effluents**  
**Unit: Site**  
**Starting: 1-Jan-2018 Ending: 31-Dec-2018**

<b>Nuclides Released</b>	<b>Unit</b>	<b>Batch Mode</b>			
		<b>1ST Quarter</b>	<b>2ND Quarter</b>	<b>3RD Quarter</b>	<b>4TH Quarter</b>
<b>Dissolved And Entrained Gases</b>					
Xe-135	Curies	6.85E-06	2.49E-05	9.02E-05	3.76E-05
Xe-133	Curies	1.46E-06	3.10E-06	1.62E-05	1.38E-06
<b>Total For Period</b>	<b>Curies</b>	<b>8.31E-06</b>	<b>2.80E-05</b>	<b>1.06E-04</b>	<b>3.90E-05</b>
<b>Gross Alpha Radioactivity</b>					
G-Alpha	Curies	1.36E-08	1.58E-07	0.00E+00	0.00E+00

Zeros in this table indicates that no radioactivity was present at detectable levels.  
 See Table 1-4 for typical minimum detectable concentrations.

**Table 1-3A**

**Hatch Nuclear Plant**

**RADIOACTIVE EFFLUENT RELEASE REPORT - 2018**

**Doses to a member of the public due to Liquid Releases**

**Unit: 1**

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

**Cumulative Doses Per Quarter**

<b>Organ</b>	<b>ODCM Lmt</b>	<b>Units</b>	<b>1ST Qtr</b>	<b>% ODCM</b>	<b>2ND Qtr</b>	<b>% ODCM</b>	<b>3RD Qtr</b>	<b>% ODCM</b>	<b>4TH Qtr</b>	<b>% ODCM</b>
Total Body	1.50E+00	mRem	7.91E-05	5.27E-03	1.05E-04	6.97E-03	1.23E-04	8.19E-03	4.66E-05	3.11E-03
Liver	5.00E+00	mRem	1.02E-04	2.03E-03	1.40E-04	2.80E-03	1.44E-04	2.87E-03	5.52E-05	1.10E-03
GI-Lli	5.00E+00	mRem	1.02E-04	2.04E-03	1.29E-04	2.58E-03	1.60E-04	3.20E-03	4.12E-05	8.24E-04
Lung	5.00E+00	mRem	2.52E-05	5.05E-04	3.70E-05	7.40E-04	7.35E-05	1.47E-03	3.05E-05	6.10E-04
Thyroid	5.00E+00	mRem	1.72E-05	3.43E-04	2.56E-05	5.12E-04	6.56E-05	1.31E-03	2.75E-05	5.50E-04
Kidney	5.00E+00	mRem	4.71E-05	9.42E-04	6.58E-05	1.32E-03	9.14E-05	1.83E-03	3.69E-05	7.37E-04
Bone	5.00E+00	mRem	6.69E-05	1.34E-03	7.65E-05	1.53E-03	5.21E-05	1.04E-03	2.48E-05	4.95E-04

**Cumulative Doses per Year**

<b>Organ</b>	<b>ODCM Lmt</b>	<b>Units</b>	<b>Year to Ending Date</b>	<b>% ODCM</b>	<b>Receptor</b>	<b>Limit</b>
Bone	1.00E+01	mRem	2.20E-04	2.20E-03	MAX INDIVIDUAL LIQUID / Adult	Ann Cum Organ Liq Dose
Liver	1.00E+01	mRem	4.40E-04	4.40E-03	MAX INDIVIDUAL LIQUID / Adult	Ann Cum Organ Liq Dose
Thyroid	1.00E+01	mRem	1.36E-04	1.36E-03	MAX INDIVIDUAL LIQUID / Adult	Ann Cum Organ Liq Dose
Kidney	1.00E+01	mRem	2.41E-04	2.41E-03	MAX INDIVIDUAL LIQUID / Adult	Ann Cum Organ Liq Dose
Lung	1.00E+01	mRem	1.66E-04	1.66E-03	MAX INDIVIDUAL LIQUID / Adult	Ann Cum Organ Liq Dose
GI-Lli	1.00E+01	mRem	4.32E-04	4.32E-03	MAX INDIVIDUAL LIQUID / Adult	Ann Cum Organ Liq Dose
Total Body	3.00E+00	mRem	3.53E-04	1.18E-02	MAX INDIVIDUAL LIQUID / Adult	Ann Cum Tot Body Liq Dose

**Table 1-3B**

**Hatch Nuclear Plant**

**RADIOACTIVE EFFLUENT RELEASE REPORT - 2018**

**Doses to a member of the public due to Liquid Releases**

**Unit: 2**

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

**Cumulative Doses Per Quarter**

<b>Organ</b>	<b>ODCM Lmt</b>	<b>Units</b>	<b>1ST Qtr</b>	<b>% ODCM</b>	<b>2ND Qtr</b>	<b>% ODCM</b>	<b>3RD Qtr</b>	<b>% ODCM</b>	<b>4TH Qtr</b>	<b>% ODCM</b>
Total Body	1.50E+00	mRem	3.66E-05	2.44E-03	2.00E-04	1.34E-02	3.26E-06	2.17E-04	1.50E-05	1.00E-03
Lung	5.00E+00	mRem	1.27E-05	2.55E-04	4.51E-05	9.03E-04	3.22E-06	6.43E-05	5.32E-06	1.06E-04
Liver	5.00E+00	mRem	2.90E-05	5.79E-04	2.80E-04	5.60E-03	3.22E-06	6.43E-05	2.08E-05	4.16E-04
GI-Lli	5.00E+00	mRem	4.54E-05	9.09E-04	2.35E-04	4.70E-03	3.45E-06	6.90E-05	5.03E-06	1.01E-04
Kidney	5.00E+00	mRem	1.70E-05	3.39E-04	1.10E-04	2.21E-03	3.22E-06	6.43E-05	9.27E-06	1.85E-04
Thyroid	5.00E+00	mRem	1.10E-05	2.20E-04	1.93E-05	3.86E-04	3.22E-06	6.43E-05	3.35E-06	6.69E-05
Bone	5.00E+00	mRem	5.99E-05	1.20E-03	1.73E-04	3.47E-03	1.46E-06	2.93E-05	2.12E-05	4.24E-04

**Cumulative Doses per Year**

<b>Organ</b>	<b>ODCM Lmt</b>	<b>Units</b>	<b>Year to Ending Date</b>	<b>% ODCM</b>	<b>Receptor</b>	<b>Limit</b>
Bone	1.00E+01	mRem	2.56E-04	2.56E-03	MAX INDIVIDUAL LIQUID / Adult	Ann Cum Organ Liq Dose
Liver	1.00E+01	mRem	3.33E-04	3.33E-03	MAX INDIVIDUAL LIQUID / Adult	Ann Cum Organ Liq Dose
Thyroid	1.00E+01	mRem	3.68E-05	3.68E-04	MAX INDIVIDUAL LIQUID / Adult	Ann Cum Organ Liq Dose
Kidney	1.00E+01	mRem	1.40E-04	1.40E-03	MAX INDIVIDUAL LIQUID / Adult	Ann Cum Organ Liq Dose
Lung	1.00E+01	mRem	6.64E-05	6.64E-04	MAX INDIVIDUAL LIQUID / Adult	Ann Cum Organ Liq Dose
GI-Lli	1.00E+01	mRem	2.89E-04	2.89E-03	MAX INDIVIDUAL LIQUID / Adult	Ann Cum Organ Liq Dose
Total Body	3.00E+00	mRem	2.55E-04	8.51E-03	MAX INDIVIDUAL LIQUID / Adult	Ann Cum Tot Body Liq Dose



**Table 1-5A**  
**Hatch Nuclear Plant**  
**RADIOACTIVE EFFLUENT RELEASE REPORT - 2018**  
**Liquid Effluents - Batch Release Summary**  
**Unit: 1**  
**Starting: 1-Jan-2018 Ending: 31-Dec-2018**

<b>Liquid Releases</b>	<b>Units</b>	<b>1ST Quarter</b>	<b>2ND Quarter</b>	<b>3RD Quarter</b>	<b>4TH Quarter</b>	<b>Year Totals</b>
1. Number of batch releases		28	46	130	52	256
2. Total time period for Batch releases	( Minutes )	3.42E+03	5.41E+03	1.66E+04	7.02E+03	3.24E+04
3. Maximum time period for a batch release	( Minutes )	1.56E+02	1.42E+02	2.19E+02	1.81E+02	2.19E+02
4. Average time period for a batch release	( Minutes )	1.22E+02	1.18E+02	1.27E+02	1.35E+02	1.27E+02
5. Minimum time period for a batch release	( Minutes )	9.00E+01	1.10E+01	6.00E+00	1.05E+02	6.00E+00
6. Average stream flow during periods of release of liquid effluent into a flowing stream *	( CFS )	9.51E+03	10.58E+03	6.51E+03	16.49E+03	10.78E+03

\* Data obtained from United States Geological Survey (USGS) website



**Table 1-5B**  
**Hatch Nuclear Plant**  
**RADIOACTIVE EFFLUENT RELEASE REPORT - 2018**  
**Liquid Effluents - Batch Release Summary**  
**Unit: 2**  
**Starting: 1-Jan-2018 Ending: 31-Dec-2018**

<b>Liquid Releases</b>	<b>Units</b>	<b>1ST Quarter</b>	<b>2ND Quarter</b>	<b>3RD Quarter</b>	<b>4TH Quarter</b>	<b>Year Totals</b>
1. Number of batch releases		18	29	4	5	56
2. Total time period for Batch releases	( Minutes )	2.09E+03	3.05E+03	4.37E+02	5.64E+02	6.14E+03
3. Maximum time period for a batch release	( Minutes )	1.47E+02	1.38E+02	1.15E+02	1.18E+02	1.47E+02
4. Average time period for a batch release	( Minutes )	1.16E+02	1.05E+02	1.09E+02	1.13E+02	1.10E+02
5. Minimum time period for a batch release	( Minutes )	8.50E+01	2.00E+01	1.05E+02	1.07E+02	2.00E+01
6. Average stream flow during periods of release of liquid effluent into a flowing stream *	( CFS )	9.51E+03	10.58E+03	6.51E+03	16.49E+03	10.78E+03

\* Data obtained from United States Geological Survey (USGS) website

**Table 1-6A**

**Hatch Nuclear Plant**  
**RADIOACTIVE EFFLUENT RELEASE REPORT - 2018**  
**Liquid Effluents - Abnormal Release Summary**  
**Unit: 1**  
**Starting: 1-Jan-2018 Ending: 31-Dec-2018**

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

**Table 1-6B**

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

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

**Table 1-6C**

**Hatch Nuclear Plant  
RADIOACTIVE EFFLUENT RELEASE REPORT - 2018**

**Liquid Effluents - Abnormal Release Summary**

**Unit: Site**

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

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

## **2.0 Gaseous Effluents**

### **2.1 Regulatory Requirements**

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

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

The dose rate due to radioactive materials released in gaseous effluents from the site to areas at and beyond the SITE BOUNDARY shall be limited to the following:

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

#### **2.1.2 Air Doses Due To Noble Gases in Gaseous Effluents**

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

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

#### **2.1.3 Doses To A Member of the Public**

The dose to a MEMBER OF THE PUBLIC from Iodine-131, Iodine-133, tritium and all radionuclides in particulate form with half-lives greater than 8 days, in gaseous effluents released from each unit, to areas at and beyond the SITE BOUNDARY, shall be limited to the following.

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

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

Waste gas release at Plant Hatch is confined to four paths: main stack (also called the offgas vent), Unit 1 reactor building vent; Unit 2 reactor building vent, and the recombiner building vent. Each of these four paths is continuously monitored for gaseous radioactivity.

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

Each of the four gaseous effluent paths is equipped with an integrating-type sample collection device for collecting particulates and iodines. Unless required more frequently under certain circumstances, samples are collected as follows:

1. Noble gas samples are collected by grab sampling monthly.
2. Tritium samples are collected by grab sampling monthly.
3. Radioiodine samples are collected by pulling the sample stream through a charcoal cartridge over a 7-day period.
4. Particulates are collected by pulling the sample stream through a particulate filter over a 7-day period.
5. The 7-day particulate filters above are analyzed for gross alpha activity.
6. Quarterly composite samples are prepared from the particulate filters collected over the previous quarter and the samples are analyzed for Sr-89 and Sr-90.

Sample analyses results and release flow rates from the four release points form the basis for calculating released quantities of radionuclide-specific radioactivity, the dose rates associated with gaseous releases, and the cumulative doses for the current quarter and year. This task is normally performed with computer assistance.

The noble gas grab sample analysis results are used along with maximum expected release flow rates from each of the four vents to calculate monitor setpoints for the gaseous effluent monitors serving the four release points. Calculation of monitor setpoints is described in the ODCM. Typically achieved minimum detectable concentrations for gaseous effluents sample and analyses are reported in Table 2-6.

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

## **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 follow:

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

The released radioactivity is determined using sample analyses results collected as described above and the average release flow rates over the period represented by the collected sample.

Dose rates due to noble gases, radioiodines, tritium, and particulates are calculated (with computer assistance). The calculated dose rates are compared to the dose rate limits specified in ODCM 3.1.2 for noble gases, radioiodine, 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 to the dose limits specified in ODCM 3.1.3. The 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 Radioiodine, Tritium and Particulate Releases**

Released quantities of radioiodines are determined using the weekly samples and release flow rates for the four release points. Radioiodine concentrations are determined by gamma spectroscopy.

Release quantities of particulates are determined using the weekly (filter) samples and release flow rates for the four release points. Gamma spectroscopy is used to quantify concentrations of principal gamma emitters.

After each quarter, the particulate filters from each vent are combined, fused, and a strontium separation is performed. Since sample flows and vent flows are almost constant over each quarterly period the filters from each vent can be dissolved together. Decay corrections are performed back to the middle of the quarterly collection period. If Sr-89 or Sr-90 is not detected, MDC's are calculated. Strontium concentrations are input into the composite file of the computer and used for release dose rate and dose calculations for a Member of the Public.

Tritium samples are obtained monthly from each vent by passing the sample stream through a cold trap. The grams of water vapor/cubic foot is measured upstream of the cold trap in order to alleviate the difficulties in determining water vapor collection efficiencies. The tritium samples are analyzed by an independent laboratory and the results are furnished in uCi/ml of water. The tritium concentration in water is converted to the tritium concentration in air and this value is input into the composite file of the computer and used in release, dose rate, and individual dose calculations.

Dose rates due to radioiodine, tritium and particulates are calculated for a hypothetical child exposed to the inhalation pathway at the location in the unrestricted area where the potential dose rate is expected to be the highest. Dose rates are calculated, for each release point for each release period, and the dose rates from each release point are compared to the dose rate limits as described in ODCM 3.1.2 Doses due to radioiodine, tritium and particulates are calculated for the controlling receptor, which is described in the ODCM. Doses to a Member of the Public 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. The current percent of ODCM limits are shown on the printout for each release period.

### ***2.2.2.3 Gross Alpha Release***

The gross alpha release is computed each month by counting the particulate filters, for each week for gross alpha activity in a proportional counter. The four or five weeks' numbers are then recorded on a data sheet and the activity is summed at the end of the month. The summed activity is then divided by the total monthly volume to determine the concentration. This concentration is input into the composite file of the computer and 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 process of sampling and measurement. Due to the difficulty with assigning error terms for each parameter affecting the final measurement, detailed statistical evaluation of error is not suggested. The objective is 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 associated with 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.



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

Statistical error	60%
Counting equipment calibration	10%
Vent flow rates	10%
Non-steady release rates	20%
TOTAL ERROR	65%

I-131 releases were calculated from each weekly sample.

Statistical error	60%
Counting equipment calibration	10%
Vent flow rates	10%
Vent sample flow rates	10%
Non-steady release rates	10%
Losses from charcoal cartridges	10%
TOTAL ERROR	64%

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

Statistical error	60%
Counting equipment calibration	10%
Vent flow rates	10%
Vent sample flow rates	10%
Non-steady release rates	10%
TOTAL ERROR	63%

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

Water vapor in sample stream determination	20%
Vent flow rates	10%
Counting calibration and statistics	10%
Non-steady release rates	50%
TOTAL ERROR	56%

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

Statistical error	60%
Counting equipment calibration	10%
Vent flow rates	10%
Vent sample flow rates	10%
Non-steady release rates	10%
TOTAL ERROR	63%

### **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, 2-3C. Data is presented on a quarterly basis as required by Regulatory Guide 1.21 for all quarters.

To complete table 2-1A, 2-1B, and 2-1C, 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 uCi/second for each category for each quarter. However, the percent of the ODCM limits are not applicable because we have 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 radioiodine, tritium, and particulates were calculated as part of the pre-release and post-release permits on individual permits. No limits were exceeded for this reporting period.

Gross alpha radioactivity is reported in Table 2-1A, 2-1B, and 2-1C, 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 percent of ODCM limits.

Limits for cumulative doses to a Member of the Public due to radioiodine, tritium and particulates, are specified in ODCM 3.1.4. Cumulative doses to a Member of the Public doses 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 noble gas release were calculated for the site in accordance with ODCM 3.1.2. Dose rates due to radioiodine, tritium, and particulates in gaseous releases were calculated in accordance with ODCM 3.1.2.

These dose rates were calculated as part of the pre-release and post release on individual 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 3.1.3. These results are presented in Tables 2-4A and 2-4B.

Cumulative doses to a Member of the Public due to radioiodine, tritium and particulates in gaseous releases were calculated for each unit in accordance with ODCM 3.1.4. These results are presented in Tables 2-5A and 2-5B.

Dose rates and doses were calculated using the methodology presented in the ODCM.

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

There are no gaseous batch releases from Plant Hatch.

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

There were no unplanned or uncontrolled gaseous releases during this reporting period.

**Table 2-1A**

**Hatch Nuclear Plant  
RADIOACTIVE EFFLUENT RELEASE REPORT - 2018**

**Gaseous Effluents - Summation Of All Releases**

**Unit: 1**

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

<b>Type of Effluent</b>	<b>Units</b>	<b>1ST Quarter</b>	<b>2ND Quarter</b>	<b>3RD Quarter</b>	<b>4TH Quarter</b>
<b>A. Fission And Activation Gases</b>					
1. Total Release	Curies	0.00E+00	8.16E-01	2.63E-01	0.00E+00
2. Average Release rate for period	uCi/sec	0.00E+00	1.04E-01	3.34E-02	0.00E+00
3. Percent of Applicable Limit	%	*	*	*	*
<b>B. Radioiodines</b>					
1. Total Iodine-131	Curies	8.77E-06	2.38E-05	6.57E-06	6.23E-06
2. Average Release rate for period	uCi/sec	1.11E-06	3.02E-06	8.33E-07	7.90E-07
3. Percent of Applicable Limit	%	*	*	*	*
<b>C. Particulates</b>					
1. Particulates ( Half-Lives > 8 Days )	Curies	3.34E-06	3.86E-06	2.82E-06	3.28E-06
2. Average Release rate for period	uCi/sec	4.23E-07	4.90E-07	3.57E-07	4.159E-07
3. Percent of Applicable Limit	%	*	*	*	*
<b>D. Tritium</b>					
1. Total Release	Curies	2.11E+00	2.33E+00	2.67E+00	3.07E+00
2. Average Release rate for period	uCi/sec	2.67E-01	2.96E-01	3.39E-01	3.90E-01
3. Percent of Applicable Limit	%	*	*	*	*
<b>E. Gross Alpha</b>					
1. Total Release	Curies	4.92E-07	5.63E-07	2.03E-07	1.30E-07
2. Average Release rate for period	uCi/sec	6.24E-08	7.14E-08	2.58E-08	1.65E-08

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

**Table 2-1B**

**Hatch Nuclear Plant  
RADIOACTIVE EFFLUENT RELEASE REPORT - 2018**

**Gaseous Effluents - Summation Of All Releases**

**Unit: 2**

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

<b>Type of Effluent</b>	<b>Units</b>	<b>1ST Quarter</b>	<b>2ND Quarter</b>	<b>3RD Quarter</b>	<b>4TH Quarter</b>
<b>A. Fission And Activation Gases</b>					
1. Total Release	Curies	0.00E+00	6.09E-01	2.63E-01	0.00E+00
2. Average Release rate for period	uCi/sec	0.00E+00	7.73E-02	3.34E-02	0.00E+00
3. Percent of Applicable Limit	%	*	*	*	*
<b>B. Radioiodines</b>					
1. Total Iodine-131	Curies	1.71E-05	2.86E-05	2.63E-05	1.26E-05
2. Average Release rate for period	uCi/sec	2.16E-06	3.63E-06	3.34E-06	1.60E-06
3. Percent of Applicable Limit	%	*	*	*	*
<b>C. Particulates</b>					
1. Particulates ( Half-Lives > 8 Days )	Curies	1.18E-05	1.27E-05	1.02E-05	1.04E-05
2. Average Release rate for period	uCi/sec	1.50E-06	1.60E-06	1.30E-06	1.322E-06
3. Percent of Applicable Limit	%	*	*	*	*
<b>D. Tritium</b>					
1. Total Release	Curies	3.73E+00	5.05E+00	5.61E+00	4.75E+00
2. Average Release rate for period	uCi/sec	4.73E-01	6.40E-01	7.11E-01	6.02E-01
3. Percent of Applicable Limit	%	*	*	*	*
<b>E. Gross Alpha</b>					
1. Total Release	Curies	3.33E-07	3.12E-07	2.16E-07	2.05E-07
2. Average Release rate for period	uCi/sec	4.22E-08	3.95E-08	2.74E-08	2.59E-08

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

**Table 2-1C**

**Hatch Nuclear Plant  
RADIOACTIVE EFFLUENT RELEASE REPORT - 2018**

**Gaseous Effluents - Summation Of All Releases**

**Unit: Site**

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

<b>Type of Effluent</b>	<b>Units</b>	<b>1ST Quarter</b>	<b>2ND Quarter</b>	<b>3RD Quarter</b>	<b>4TH Quarter</b>
<b>A. Fission And Activation Gases</b>					
1. Total Release	Curies	0.00E+00	1.43E+00	5.26E-01	0.00E+00
2. Average Release rate for period	uCi/sec	0.00E+00	1.81E-01	6.68E-02	0.00E+00
3. Percent of Applicable Limit	%	*	*	*	*
<b>B. Radioiodines</b>					
1. Total Iodine-131	Curies	2.58E-05	5.24E-05	3.29E-05	1.88E-05
2. Average Release rate for period	uCi/sec	3.28E-06	6.65E-06	4.17E-06	2.39E-06
3. Percent of Applicable Limit	%	*	*	*	*
<b>C. Particulates</b>					
1. Particulates ( Half-Lives > 8 Days )	Curies	1.52E-05	1.65E-05	1.30E-05	1.37E-05
2. Average Release rate for period	uCi/sec	1.92E-06	2.09E-06	1.65E-06	1.738E-06
3. Percent of Applicable Limit	%	*	*	*	*
<b>D. Tritium</b>					
1. Total Release	Curies	5.84E+00	7.38E+00	8.28E+00	7.82E+00
2. Average Release rate for period	uCi/sec	7.40E-01	9.36E-01	1.05E+00	9.92E-01
3. Percent of Applicable Limit	%	*	*	*	*
<b>E. Gross Alpha</b>					
1. Total Release	Curies	8.25E-07	8.75E-07	4.19E-07	3.34E-07
2. Average Release rate for period	uCi/sec	1.05E-07	1.11E-07	5.32E-08	4.24E-08

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

Table 2-2A

**Hatch Nuclear Plant**  
**RADIOACTIVE EFFLUENT RELEASE REPORT - 2018**  
**Gaseous Effluents - Elevated Level Releases**  
**Unit: 1**  
**Starting: 1-Jan- 2018 Ending: 31-Dec-2018**

		<b>Continuous Mode</b>			
<b>Nuclides Released</b>	<b>Unit</b>	<b>1ST Quarter</b>	<b>2ND Quarter</b>	<b>3RD Quarter</b>	<b>4TH Quarter</b>
<b>Fission Gases</b>					
Ar-41	Curies	0.00E+00	8.16E-01	2.63E-01	0.00E+00
<b>Total For Period</b>	<b>Curies</b>	<b>0.00E+00</b>	<b>8.16E-01</b>	<b>2.63E-01</b>	<b>0.00E+00</b>
<b>Iodines</b>					
I-131	Curies	2.87E-06	9.98E-06	2.11E-06	2.26E-06
I-133	Curies	5.90E-06	1.38E-05	4.46E-06	3.97E-06
<b>Total For Period</b>	<b>Curies</b>	<b>8.77E-06</b>	<b>2.38E-05</b>	<b>6.57E-06</b>	<b>6.23E-06</b>
<b>Particulates</b>					
Mn-54	Curies	5.81E-08	0.00E+00	0.00E+00	0.00E+00
Co-58	Curies	0.00E+00	0.00E+00	0.00E+00	6.12E-08
Co-60	Curies	2.55E-07	5.07E-08	0.00E+00	1.77E-07
Zn-65	Curies	5.56E-08	0.00E+00	0.00E+00	6.72E-08
Sr-89	Curies	1.42E-06	1.56E-06	1.19E-06	9.48E-07
Sr-90	Curies	2.43E-09	0.00E+00	8.46E-09	3.86E-09
Cs-137	Curies	2.60E-08	0.00E+00	0.00E+00	5.34E-08
Ba-140	Curies	6.64E-08	0.00E+00	3.47E-07	0.00E+00
<b>Total For Period</b>	<b>Curies</b>	<b>1.89E-06</b>	<b>1.61E-06</b>	<b>1.55E-06</b>	<b>1.31E-06</b>
<b>Tritium</b>					
H-3	Curies	7.64E-02	1.09E-01	9.42E-02	1.80E-01

If Not Detected, Nuclide is Not Reported. Zeroes in this table indicates that no radioactivity was present at detectable levels. See Table 2-6 for typical minimum detectable concentrations.

**Table 2-2A**

**Hatch Nuclear Plant  
RADIOACTIVE EFFLUENT RELEASE REPORT - 2018  
Gaseous Effluents - Elevated Level Releases**

**Unit: 1**

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

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<b>Nuclides Released</b>	<b>Unit</b>	<b>Continuous Mode</b>			
		<b>1ST Quarter</b>	<b>2ND Quarter</b>	<b>3RD Quarter</b>	<b>4TH Quarter</b>
<b>Gross Alpha</b>					
G-Alpha	Curies	2.85E-08	3.72E-08	1.66E-08	2.27E-08
<b>Total For Period</b>	<b>Curies</b>	<b>2.85E-08</b>	<b>3.72E-08</b>	<b>1.66E-08</b>	<b>2.27E-08</b>

If Not Detected, Nuclide is Not Reported. Zeroes in this table indicates that no radioactivity was present at detectable levels.  
See Table 2-6 for typical minimum detectable concentrations.



**Table 2-2A**

**Hatch Nuclear Plant**  
**RADIOACTIVE EFFLUENT RELEASE REPORT - 2018**  
**Gaseous Effluents - Elevated Level Releases**  
**Unit: 1**  
**Starting: 1-Jan- 2018 Ending: 31-Dec-2018**

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

If Not Detected, Nuclide is Not Reported. Zeroes in this table indicates that no radioactivity was present at detectable levels. See Table 2-6 for typical minimum detectable concentrations.

**Table 2-2A**

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

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

If Not Detected, Nuclide is Not Reported. Zeroes in this table indicates that no radioactivity was present at detectable levels. See Table 2-6 for typical minimum detectable concentrations.

**Table 2-2A**

**Hatch Nuclear Plant  
RADIOACTIVE EFFLUENT RELEASE REPORT - 2018  
Gaseous Effluents - Mixed Mode Level Releases**

**Unit: 1**

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

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

If Not Detected, Nuclide is Not Reported. Zeroes in this table indicates that no radioactivity was present at detectable levels. See Table 2-6 for typical minimum detectable concentrations.

**Table 2-2B**

**Hatch Nuclear Plant**  
**RADIOACTIVE EFFLUENT RELEASE REPORT - 2018**  
**Gaseous Effluents - Elevated Level Releases**  
**Unit: 2**  
**Starting: 1-Jan- 2018 Ending: 31-Dec-2018**

		<b>Continuous Mode</b>			
<b>Nuclides Released</b>	<b>Unit</b>	<b>1ST Quarter</b>	<b>2ND Quarter</b>	<b>3RD Quarter</b>	<b>4TH Quarter</b>
<b>Fission Gases</b>					
Ar-41	Curies	0.00E+00	6.09E-01	2.63E-01	0.00E+00
<b>Total For Period</b>	<b>Curies</b>	<b>0.00E+00</b>	<b>6.09E-01</b>	<b>2.63E-01</b>	<b>0.00E+00</b>
<b>Iodines</b>					
I-131	Curies	4.84E-06	5.27E-06	2.11E-06	2.26E-06
I-133	Curies	9.86E-06	9.62E-06	4.46E-06	3.97E-06
<b>Total For Period</b>	<b>Curies</b>	<b>1.47E-05</b>	<b>1.49E-05</b>	<b>6.57E-06</b>	<b>6.23E-06</b>
<b>Particulates</b>					
Mn-54	Curies	5.81E-08	0.00E+00	0.00E+00	0.00E+00
Co-58	Curies	0.00E+00	0.00E+00	0.00E+00	6.12E-08
Co-60	Curies	2.55E-07	5.07E-08	0.00E+00	1.77E-07
Zn-65	Curies	5.56E-08	0.00E+00	0.00E+00	6.72E-08
Sr-89	Curies	2.36E-06	1.26E-06	1.19E-06	9.48E-07
Sr-90	Curies	4.04E-09	0.00E+00	8.46E-09	3.86E-09
Cs-137	Curies	2.60E-08	0.00E+00	0.00E+00	5.34E-08
Ba-140	Curies	6.64E-08	0.00E+00	3.47E-07	0.00E+00
<b>Total For Period</b>	<b>Curies</b>	<b>2.83E-06</b>	<b>1.31E-06</b>	<b>1.55E-06</b>	<b>1.31E-06</b>
<b>Tritium</b>					
H-3	Curies	1.12E-01	8.89E-02	9.42E-02	1.80E-01

If Not Detected, Nuclide is Not Reported. Zeroes in this table indicates that no radioactivity was present at detectable levels. See Table 2-6 for typical minimum detectable concentrations.

**Table 2-2B**

**Hatch Nuclear Plant**  
**RADIOACTIVE EFFLUENT RELEASE REPORT - 2018**  
**Gaseous Effluents - Elevated Level Releases**  
**Unit: 2**  
**Starting: 1-Jan- 2018 Ending: 31-Dec-2018**

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<b>Nuclides Released</b>	<b>Unit</b>	<b>Continuous Mode</b>			
		<b>1ST Quarter</b>	<b>2ND Quarter</b>	<b>3RD Quarter</b>	<b>4TH Quarter</b>
<b>Gross Alpha</b>					
G-Alpha	Curies	4.18E-08	2.86E-08	1.66E-08	2.27E-08
<b>Total For Period</b>	<b>Curies</b>	<b>4.18E-08</b>	<b>2.86E-08</b>	<b>1.66E-08</b>	<b>2.27E-08</b>

If Not Detected, Nuclide is Not Reported. Zeroes in this table indicates that no radioactivity was present at detectable levels.  
See Table 2-6 for typical minimum detectable concentrations.

**Table 2-2B**

**Hatch Nuclear Plant**  
**RADIOACTIVE EFFLUENT RELEASE REPORT - 2018**  
**Gaseous Effluents - Elevated Level Releases**  
**Unit: 2**  
**Starting: 1-Jan- 2018 Ending: 31-Dec-2018**

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

If Not Detected, Nuclide is Not Reported. Zeroes in this table indicates that no radioactivity was present at detectable levels.  
 See Table 2-6 for typical minimum detectable concentrations.

**Table 2-2B**

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

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

If Not Detected, Nuclide is Not Reported. Zeroes in this table indicates that no radioactivity was present at detectable levels.  
See Table 2-6 for typical minimum detectable concentrations.

**Table 2-2B**

**Hatch Nuclear Plant  
RADIOACTIVE EFFLUENT RELEASE REPORT - 2018  
Gaseous Effluents - Mixed Mode Level Releases**

**Unit: 2**

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

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

If Not Detected, Nuclide is Not Reported. Zeroes in this table indicates that no radioactivity was present at detectable levels. See Table 2-6 for typical minimum detectable concentrations.



Table 2-2C

Hatch Nuclear Plant  
**RADIOACTIVE EFFLUENT RELEASE REPORT - 2018**

**Gaseous Effluents - Elevated Level Releases**

Unit: Site

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

		Continuous Mode			
Nuclides Released	Unit	1ST Quarter	2ND Quarter	3RD Quarter	4TH Quarter
<b>Fission Gases</b>					
Ar-41	Curies	0.00E+00	1.43E+00	5.26E-01	0.00E+00
<b>Total For Period</b>	<b>Curies</b>	<b>0.00E+00</b>	<b>1.43E+00</b>	<b>5.26E-01</b>	<b>0.00E+00</b>
<b>Iodines</b>					
I-131	Curies	7.71E-06	1.52E-05	4.22E-06	4.52E-06
I-133	Curies	1.58E-05	2.34E-05	8.92E-06	7.94E-06
<b>Total For Period</b>	<b>Curies</b>	<b>2.35E-05</b>	<b>3.87E-05</b>	<b>1.31E-05</b>	<b>1.25E-05</b>
<b>Particulates</b>					
Mn-54	Curies	1.16E-07	0.00E+00	0.00E+00	0.00E+00
Co-58	Curies	0.00E+00	0.00E+00	0.00E+00	1.22E-07
Co-60	Curies	5.09E-07	1.01E-07	0.00E+00	3.54E-07
Zn-65	Curies	1.11E-07	0.00E+00	0.00E+00	1.34E-07
Sr-89	Curies	3.79E-06	2.82E-06	2.39E-06	1.90E-06
Sr-90	Curies	6.48E-09	0.00E+00	1.69E-08	7.72E-09
Cs-137	Curies	5.20E-08	0.00E+00	0.00E+00	1.07E-07
Ba-140	Curies	1.33E-07	0.00E+00	6.94E-07	0.00E+00
<b>Total For Period</b>	<b>Curies</b>	<b>4.71E-06</b>	<b>2.92E-06</b>	<b>3.10E-06</b>	<b>2.62E-06</b>
<b>Tritium</b>					
H-3	Curies	1.89E-01	1.97E-01	1.88E-01	3.59E-01

If Not Detected, Nuclide is Not Reported. Zeroes in this table indicates that no radioactivity was present at detectable levels. See Table 2-6 for typical minimum detectable concentrations.

**Table 2-2C**

**Hatch Nuclear Plant  
RADIOACTIVE EFFLUENT RELEASE REPORT - 2018**

**Gaseous Effluents - Elevated Level Releases**

**Unit: Site**

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

<b>Nuclides Released</b>	<b>Unit</b>	<b>Continuous Mode</b>			
		<b>1ST Quarter</b>	<b>2ND Quarter</b>	<b>3RD Quarter</b>	<b>4TH Quarter</b>
<b>Gross Alpha</b>					
G-Alpha	Curies	7.03E-08	6.58E-08	3.32E-08	4.55E-08
<b>Total For Period</b>	<b>Curies</b>	<b>7.03E-08</b>	<b>6.58E-08</b>	<b>3.32E-08</b>	<b>4.55E-08</b>

If Not Detected, Nuclide is Not Reported. Zeroes in this table indicates that no radioactivity was present at detectable levels. See Table 2-6 for typical minimum detectable concentrations.

**Table 2-2C**

**Hatch Nuclear Plant**  
**RADIOACTIVE EFFLUENT RELEASE REPORT - 2018**  
**Gaseous Effluents - Elevated Level Releases**  
**Unit: Site**  
**Starting: 1-Jan- 2018 Ending: 31-Dec-2018**

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

If Not Detected, Nuclide is Not Reported. Zeroes in this table indicates that no radioactivity was present at detectable levels.  
 See Table 2-6 for typical minimum detectable concentrations.

**Table 2-2C**

**Hatch Nuclear Plant  
RADIOACTIVE EFFLUENT RELEASE REPORT - 2018  
Gaseous Effluents - Mixed Mode Level Releases**

**Unit: Site**

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

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

If Not Detected, Nuclide is Not Reported. Zeroes in this table indicates that no radioactivity was present at detectable levels.  
See Table 2-6 for typical minimum detectable concentrations.

**Table 2-2C**

**Hatch Nuclear Plant  
RADIOACTIVE EFFLUENT RELEASE REPORT - 2018  
Gaseous Effluents - Mixed Mode Level Releases**

**Unit: Site**

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

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

If Not Detected, Nuclide is Not Reported. Zeroes in this table indicates that no radioactivity was present at detectable levels. See Table 2-6 for typical minimum detectable concentrations.

**Table 2-3A**

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

<b>Nuclides Released</b>	<b>Unit</b>	<b>Continuous Mode</b>			
		<b>1ST Quarter</b>	<b>2ND Quarter</b>	<b>3RD Quarter</b>	<b>4TH Quarter</b>
<b>Fission Gases</b>					
No Nuclides Found	Curies	0.00E+00	0.00E+00	0.00E+00	0.00E+00
<b>Iodines</b>					
No Nuclides Found	Curies	0.00E+00	0.00E+00	0.00E+00	0.00E+00
<b>Particulates</b>					
Co-60	Curies	1.22E-06	0.00E+00	0.00E+00	0.00E+00
Sr-89	Curies	0.00E+00	2.25E-06	1.27E-06	1.97E-06
Sr-90	Curies	2.33E-07	0.00E+00	0.00E+00	3.85E-10
<b>Total For Period</b>	<b>Curies</b>	<b>1.45E-06</b>	<b>2.25E-06</b>	<b>1.27E-06</b>	<b>1.97E-06</b>
<b>Tritium</b>					
H-3	Curies	2.03E+00	2.22E+00	2.58E+00	2.89E+00
<b>Gross Alpha</b>					
G-Alpha	Curies	4.64E-07	5.26E-07	1.87E-07	1.07E-07
<b>Total For Period</b>	<b>Curies</b>	<b>4.64E-07</b>	<b>5.26E-07</b>	<b>1.87E-07</b>	<b>1.07E-07</b>

If Not Detected, Nuclide is Not Reported. Zeroes in this table indicates that no radioactivity was present at detectable levels. See Table 2-6 for typical minimum detectable concentrations.

**Table 2-3A**

**Hatch Nuclear Plant  
RADIOACTIVE EFFLUENT RELEASE REPORT - 2018  
Gaseous Effluents - Ground Level Releases**

**Unit: 1**

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

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

If Not Detected, Nuclide is Not Reported. Zeroes in this table indicates that no radioactivity was present at detectable levels. See Table 2-6 for typical minimum detectable concentrations.

**Table 2-3B**

**Hatch Nuclear Plant  
RADIOACTIVE EFFLUENT RELEASE REPORT - 2018  
Gaseous Effluents - Ground Level Releases**

**Unit: 2**

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

<b>Nuclides Released</b>	<b>Unit</b>	<b>Continuous Mode</b>			
		<b>1ST Quarter</b>	<b>2ND Quarter</b>	<b>3RD Quarter</b>	<b>4TH Quarter</b>
<b>Fission Gases</b>					
No Nuclides Found	Curies	0.00E+00	0.00E+00	0.00E+00	0.00E+00
<b>Iodines</b>					
I-131	Curies	7.75E-07	2.84E-06	3.69E-06	1.58E-06
I-133	Curies	1.59E-06	1.09E-05	1.60E-05	4.81E-06
<b>Total For Period</b>	<b>Curies</b>	<b>2.36E-06</b>	<b>1.37E-05</b>	<b>1.97E-05</b>	<b>6.38E-06</b>
<b>Particulates</b>					
Co-57	Curies	0.00E+00	0.00E+00	2.69E-07	0.00E+00
Sr-89	Curies	8.99E-06	1.13E-05	8.40E-06	9.11E-06
<b>Total For Period</b>	<b>Curies</b>	<b>8.99E-06</b>	<b>1.13E-05</b>	<b>8.67E-06</b>	<b>9.11E-06</b>
<b>Tritium</b>					
H-3	Curies	3.62E+00	4.96E+00	5.51E+00	4.57E+00
<b>Gross Alpha</b>					
G-Alpha	Curies	2.91E-07	2.83E-07	2.00E-07	1.82E-07
<b>Total For Period</b>	<b>Curies</b>	<b>2.91E-07</b>	<b>2.83E-07</b>	<b>2.00E-07</b>	<b>1.82E-07</b>

If Not Detected, Nuclide is Not Reported. Zeroes in this table indicates that no radioactivity was present at detectable levels. See Table 2-6 for typical minimum detectable concentrations.



**Table 2-3B**

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

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

If Not Detected, Nuclide is Not Reported. Zeroes in this table indicates that no radioactivity was present at detectable levels. See Table 2-6 for typical minimum detectable concentrations.

**Table 2-3C**

**Hatch Nuclear Plant  
RADIOACTIVE EFFLUENT RELEASE REPORT - 2018  
Gaseous Effluents - Ground Level Releases**

**Unit: Site**

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

<b>Nuclides Released</b>	<b>Unit</b>	<b>Continuous Mode</b>			
		<b>1ST Quarter</b>	<b>2ND Quarter</b>	<b>3RD Quarter</b>	<b>4TH Quarter</b>
<b>Fission Gases</b>					
No Nuclides Found	Curies	0.00E+00	0.00E+00	0.00E+00	0.00E+00
<b>Iodines</b>					
I-131	Curies	7.75E-07	2.84E-06	3.69E-06	1.58E-06
I-133	Curies	1.59E-06	1.09E-05	1.60E-05	4.81E-06
<b>Total For Period</b>	<b>Curies</b>	<b>2.36E-06</b>	<b>1.37E-05</b>	<b>1.97E-05</b>	<b>6.38E-06</b>
<b>Particulates</b>					
Co-57	Curies	0.00E+00	0.00E+00	2.69E-07	0.00E+00
Co-60	Curies	1.22E-06	0.00E+00	0.00E+00	0.00E+00
Sr-89	Curies	8.99E-06	1.36E-05	9.67E-06	1.11E-05
Sr-90	Curies	2.33E-07	0.00E+00	0.00E+00	3.85E-10
<b>Total For Period</b>	<b>Curies</b>	<b>1.04E-05</b>	<b>1.36E-05</b>	<b>9.94E-06</b>	<b>1.11E-05</b>
<b>Tritium</b>					
H-3	Curies	5.65E+00	7.18E+00	8.09E+00	7.46E+00
<b>Gross Alpha</b>					
G-Alpha	Curies	7.55E-07	8.09E-07	3.86E-07	2.89E-07
<b>Total For Period</b>	<b>Curies</b>	<b>7.55E-07</b>	<b>8.09E-07</b>	<b>3.86E-07</b>	<b>2.89E-07</b>

If Not Detected, Nuclide is Not Reported. Zeroes in this table indicates that no radioactivity was present at detectable levels.  
See Table 2-6 for typical minimum detectable concentrations.

**Table 2-3C**

**Hatch Nuclear Plant  
RADIOACTIVE EFFLUENT RELEASE REPORT - 2018  
Gaseous Effluents - Ground Level Releases**

**Unit: Site**

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

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

If Not Detected, Nuclide is Not Reported. Zeroes in this table indicates that no radioactivity was present at detectable levels. See Table 2-6 for typical minimum detectable concentrations.

**Table 2-4A**

**Hatch Nuclear Plant  
RADIOACTIVE EFFLUENT RELEASE REPORT - 2018**

**Air Doses Due to Gaseous Releases**

**Unit: 1**

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

**Cumulative Doses Per Quarter**

<b>Type of Radiation</b>	<b>ODCM Lmt</b>	<b>Units</b>	<b>1ST Qtr</b>	<b>% ODCM</b>	<b>2ND Qtr</b>	<b>% ODCM</b>	<b>3RD Qtr</b>	<b>% ODCM</b>	<b>4TH Qtr</b>	<b>% ODCM</b>
Gamma Air	5.00E+00	mRad	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Gamma Air	5.00E+00	mRad	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Beta Air	1.00E+01	mRad	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Beta Air	1.00E+01	mRad	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

**Cumulative Doses Per Year**

<b>Type of Radiation</b>	<b>ODCM Lmt</b>	<b>Units</b>	<b>Year to End Date</b>	<b>% ODCM</b>	<b>Receptor</b>	<b>Limit</b>
Gamma Air	1.00E+01	mRad	0.00E+00	0.00E+00	SITE BOUNDARY / Child	U1 Ann Cum Gamma Airdose
Gamma Air	1.00E+01	mRad	0.00E+00	0.00E+00	SITE BOUNDARY / Child	U2 Ann Cum Gamma Airdose
Beta Air	2.00E+01	mRad	0.00E+00	0.00E+00	SITE BOUNDARY / Child	U1 Ann Cum Beta Airdose
Beta Air	2.00E+01	mRad	0.00E+00	0.00E+00	SITE BOUNDARY / Child	U2 Ann Cum Beta Airdose

**Table 2-4B**

**Hatch Nuclear Plant  
RADIOACTIVE EFFLUENT RELEASE REPORT - 2018**

**Air Doses Due to Gaseous Releases**

**Unit: 2**

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

**Cumulative Doses Per Quarter**

<b>Type of Radiation</b>	<b>ODCM Lmt</b>	<b>Units</b>	<b>1ST Qtr</b>	<b>% ODCM</b>	<b>2ND Qtr</b>	<b>% ODCM</b>	<b>3RD Qtr</b>	<b>% ODCM</b>	<b>4TH Qtr</b>	<b>% ODCM</b>
Gamma Air	5.00E+00	mRad	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Gamma Air	5.00E+00	mRad	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Beta Air	1.00E+01	mRad	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Beta Air	1.00E+01	mRad	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

**Cumulative Doses Per Year**

<b>Type of Radiation</b>	<b>ODCM Lmt</b>	<b>Units</b>	<b>Year to End Date</b>	<b>% ODCM</b>	<b>Receptor</b>	<b>Limit</b>
Gamma Air	1.00E+01	mRad	0.00E+00	0.00E+00	SITE BOUNDARY / Child	U1 Ann Cum Gamma Airdose
Gamma Air	1.00E+01	mRad	0.00E+00	0.00E+00	SITE BOUNDARY / Child	U2 Ann Cum Gamma Airdose
Beta Air	2.00E+01	mRad	0.00E+00	0.00E+00	SITE BOUNDARY / Child	U1 Ann Cum Beta Airdose
Beta Air	2.00E+01	mRad	0.00E+00	0.00E+00	SITE BOUNDARY / Child	U2 Ann Cum Beta Airdose

**Table 2-5A**

**Hatch Nuclear Plant**

**RADIOACTIVE EFFLUENT RELEASE REPORT - 2018**

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

**Unit: 1**

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

**Cumulative Doses Per Quarter**

<b>Organ</b>	<b>ODCM Lmt</b>	<b>Units</b>	<b>1ST Qtr</b>	<b>% ODCM</b>	<b>2ND Qtr</b>	<b>% ODCM</b>	<b>3RD Qtr</b>	<b>% ODCM</b>	<b>4TH Qtr</b>	<b>% ODCM</b>
Bone	7.50E+00	mRem	9.32E-05	1.24E-03	2.53E-05	3.37E-04	1.52E-05	2.02E-04	2.20E-05	2.93E-04
Liver	7.50E+00	mRem	1.06E-03	1.41E-02	1.15E-03	1.54E-02	1.34E-03	1.78E-02	1.50E-03	2.00E-02
Total Body	7.50E+00	mRem	1.08E-03	1.44E-02	1.15E-03	1.54E-02	1.34E-03	1.78E-02	1.50E-03	2.00E-02
Thyroid	7.50E+00	mRem	1.07E-03	1.42E-02	1.17E-03	1.57E-02	1.34E-03	1.79E-02	1.51E-03	2.01E-02
Kidney	7.50E+00	mRem	1.06E-03	1.41E-02	1.15E-03	1.54E-02	1.34E-03	1.78E-02	1.50E-03	2.00E-02
Lung	7.50E+00	mRem	1.06E-03	1.42E-02	1.15E-03	1.54E-02	1.34E-03	1.78E-02	1.50E-03	2.00E-02
GI-Lli	7.50E+00	mRem	1.06E-03	1.42E-02	1.15E-03	1.54E-02	1.34E-03	1.78E-02	1.50E-03	2.00E-02

**Cumulative Doses per Year**

<b>Organ</b>	<b>ODCM Lmt</b>	<b>Units</b>	<b>Year to Ending Date</b>	<b>% ODCM</b>	<b>Receptor</b>	<b>Limit</b>
Bone	1.500E+01	mRem	1.556E-04	1.037E-03	MAX IND. AIRBORNE / Child	Ann Cum Iod/Part Airdose
Liver	1.500E+01	mRem	5.049E-03	3.366E-02	MAX IND. AIRBORNE / Child	Ann Cum Iod/Part Airdose
Total Body	1.500E+01	mRem	5.072E-03	3.381E-02	MAX IND. AIRBORNE / Child	Ann Cum Iod/Part Airdose
Thyroid	1.500E+01	mRem	5.086E-03	3.391E-02	MAX IND. AIRBORNE / Child	Ann Cum Iod/Part Airdose
Kidney	1.500E+01	mRem	5.049E-03	3.366E-02	MAX IND. AIRBORNE / Child	Ann Cum Iod/Part Airdose
Lung	1.500E+01	mRem	5.051E-03	3.367E-02	MAX IND. AIRBORNE / Child	Ann Cum Iod/Part Airdose
GI-Lli	1.500E+01	mRem	5.053E-03	3.369E-02	MAX IND. AIRBORNE / Child	Ann Cum Iod/Part Airdose

**Table 2-5B**

**Hatch Nuclear Plant**

**RADIOACTIVE EFFLUENT RELEASE REPORT - 2018**

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

**Unit: 2**

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

**Cumulative Doses Per Quarter**

<b>Organ</b>	<b>ODCM Lmt</b>	<b>Units</b>	<b>1ST Qtr</b>	<b>% ODCM</b>	<b>2ND Qtr</b>	<b>% ODCM</b>	<b>3RD Qtr</b>	<b>% ODCM</b>	<b>4TH Qtr</b>	<b>% ODCM</b>
Bone	7.50E+00	mRem	9.56E-05	1.27E-03	1.19E-04	1.58E-03	8.90E-05	1.19E-03	9.43E-05	1.26E-03
Liver	7.50E+00	mRem	1.87E-03	2.50E-02	2.57E-03	3.43E-02	2.86E-03	3.81E-02	2.37E-03	3.16E-02
Total Body	7.50E+00	mRem	1.88E-03	2.50E-02	2.57E-03	3.43E-02	2.86E-03	3.81E-02	2.37E-03	3.16E-02
Thyroid	7.50E+00	mRem	1.90E-03	2.53E-02	2.63E-03	3.51E-02	2.92E-03	3.90E-02	2.40E-03	3.20E-02
Kidney	7.50E+00	mRem	1.87E-03	2.50E-02	2.57E-03	3.43E-02	2.86E-03	3.81E-02	2.37E-03	3.16E-02
Lung	7.50E+00	mRem	1.88E-03	2.50E-02	2.57E-03	3.43E-02	2.86E-03	3.81E-02	2.37E-03	3.16E-02
GI-Lli	7.50E+00	mRem	1.88E-03	2.51E-02	2.59E-03	3.45E-02	2.87E-03	3.82E-02	2.38E-03	3.17E-02

**Cumulative Doses per Year**

<b>Organ</b>	<b>ODCM Lmt</b>	<b>Units</b>	<b>Year to Ending Date</b>	<b>% ODCM</b>	<b>Receptor</b>	<b>Limit</b>
Bone	1.500E+01	mRem	3.976E-04	2.651E-03	MAX IND. AIRBORNE / Child	Ann Cum Iod/Part Airdose
Liver	1.500E+01	mRem	9.668E-03	6.445E-02	MAX IND. AIRBORNE / Child	Ann Cum Iod/Part Airdose
Total Body	1.500E+01	mRem	9.678E-03	6.452E-02	MAX IND. AIRBORNE / Child	Ann Cum Iod/Part Airdose
Thyroid	1.500E+01	mRem	9.849E-03	6.566E-02	MAX IND. AIRBORNE / Child	Ann Cum Iod/Part Airdose
Kidney	1.500E+01	mRem	9.668E-03	6.445E-02	MAX IND. AIRBORNE / Child	Ann Cum Iod/Part Airdose
Lung	1.500E+01	mRem	9.677E-03	6.451E-02	MAX IND. AIRBORNE / Child	Ann Cum Iod/Part Airdose
GI-Lli	1.500E+01	mRem	9.718E-03	6.479E-02	MAX IND. AIRBORNE / Child	Ann Cum Iod/Part Airdose

**TABLE 2-6**  
**E. I. HATCH NUCLEAR PLANT**  
**RADIOACTIVE EFFLUENT RELEASE REPORT - 2018**  
**MINIMUM DETECTABLE CONCENTRATIONS - GASEOUS SAMPLE**  
**ANALYSES STARTING: 1-Jan-2018** **ENDING: 31-Dec-2018**

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

<b>RADIONUCLIDE</b>	<b>MDC</b>	<b>UNITS</b>
Kr-87	2.94E-08	uCi/cc
Kr-88	3.22E-08	uCi/cc
Xe-133	2.30E-08	uCi/cc
Xe-133m	7.30E-08	uCi/cc
Xe-135	8.73E-09	uCi/cc
Xe-138	1.99E-07	uCi/cc
I-131	1.34E-13*	uCi/cc
I-133	1.53E-13*	uCi/cc
Mn-54	1.62E-13*	uCi/cc
Fe-59	3.42E-13*	uCi/cc
Co-58	1.30E-13*	uCi/cc
Co-60	1.54E-13*	uCi/cc
Zn-65	2.54E-13*	uCi/cc
Mo-99	9.61E-13*	uCi/cc
Cs-134	1.42E-13*	uCi/cc
Cs-137	1.28E-13*	uCi/cc
Ce-141	1.26E-13*	uCi/cc
Ce-144	5.64E-13*	uCi/cc
Sr-89	1.10E-16	uCi/cc
Sr-90	6.70E-16	uCi/cc
H-3	4.00E-07	uCi/cc

\* Based on an estimated sample quantity of 4.078E+07 cc's.



**Table 2-7A**

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

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<b>Gaseous Releases</b>	<b>Units</b>	<b>1ST Quarter</b>	<b>2ND Quarter</b>	<b>3RD Quarter</b>	<b>4TH Quarter</b>	<b>Year Totals</b>
1. Number of batch releases		0	0	0	0	0
2. Total time period for batch releases	( Minutes )	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
3. Maximum time period for a batch release	( Minutes )	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
4. Average time period for a batch release	( Minutes )	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
5. Minimum time period for a batch release	( Minutes )	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

**Table 2-7B**

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

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<b>Gaseous Releases</b>	<b>Units</b>	<b>1ST Quarter</b>	<b>2ND Quarter</b>	<b>3RD Quarter</b>	<b>4TH Quarter</b>	<b>Year Totals</b>
1. Number of batch releases		0	0	0	0	0
2. Total time period for batch releases	( Minutes )	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
3. Maximum time period for a batch release	( Minutes )	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
4. Average time period for a batch release	( Minutes )	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
5. Minimum time period for a batch release	( Minutes )	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

**Table 2-8A**  
**Hatch Nuclear Plant**  
**RADIOACTIVE EFFLUENT RELEASE REPORT - 2018**  
**Gaseous Effluents - Abnormal Release Summary**  
**Unit: 1**  
**Starting: 1-Jan-2018 Ending: 31-Dec-2018**

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

**Table 2-8B**  
**Hatch Nuclear Plant**  
**RADIOACTIVE EFFLUENT RELEASE REPORT - 2018**  
**Gaseous Effluents - Abnormal Release Summary**  
**Unit: 2**  
**Starting: 1-Jan-2018 Ending: 31-Dec-2018**

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

**Table 2-8C**

**Hatch Nuclear Plant**

**RADIOACTIVE EFFLUENT RELEASE REPORT - 2018**

**Gaseous Effluents - Abnormal Release Summary**

**Unit: Site**

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

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

### **3.0 Solid Waste**

#### **3.1 Regulatory Requirements**

The Process Control Program (PCP) and the ODCM requirements presented in this section are for Unit 1 and Unit 2 and are stated in part.

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

PCP Section A.3.1 Solid Radioactive Waste System control states:

The solid radwaste system shall be used in accordance with the PROCESS CONTROL PROGRAM to provide for the SOLIDIFICATION of wet solid wastes and for the SOLIDIFICATION and packaging of other radioactive wastes, as required, to ensure that they meet requirements of 10 CFR Parts 20 and 71, prior to shipment of radioactive wastes from the site.

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

Technical Specification 5.6.3 requires in part:

The Radioactive Effluent Release Report covering the operation of the unit shall be submitted in accordance with 10 CFR 50.36a. The report shall include a summary of the quantities of radioactive liquid and gaseous effluents and solid waste released from the unit. The material provided shall be consistent with the objectives outlined in the ODCM and the Process Control Program and in conformance with 10 CFR 50.36a and 10 CFR 50, Appendix I, Section IV.B.1.

PCP Section A.4.1 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, "Measuring, Evaluating, and Reporting Radioactivity in Solid Wastes and Releases of Radioactive Materials in Liquid and Gaseous Effluents from Light-Water-Cooled Nuclear Power Plants," Revision 1, June 1974, with data summarized on a 6 month basis following the format of Appendix B thereof.

For each type of solid radwaste shipped offsite during the report period, the report shall include the following information:

- a. Container volume.
- b. Total curie quantity (specify whether determined by measurement or estimate).
- c. Principal radionuclides (specify whether determined by measurement or estimate).
- d. Type of waste (such as spent resin, compacted dry waste, evaporator bottoms).
- e. Type of container (such as LSA, type A, type B, large quantity).
- f. Solidification agent (such as cement).

Major 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 evaluation was reviewed and accepted by the PRB.

### **3.2 Solid Waste Data**

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

**TABLE 3-1**  
**E. I. HATCH NUCLEAR PLANT**  
**RADIOACTIVE EFFLUENT RELEASE REPORT - 2018**  
**SOLID WASTE AND IRRADIATED FUEL SHIPMENTS**  
**UNIT 1 AND 2**

**STARTING: 1-Jan-2018**

**ENDING: 30-Jun-2018**

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.	m <sup>3</sup>	6.25E+01	
	Ci	3.98E+02	1.00 E 01
b. Dry compressible waste, contaminated equip. etc.	m <sup>3</sup>	5.01E+02	
	Ci	2.57E+01	2.00 E 01
c. Irradiated components, control rods,	m <sup>3</sup>	8.56E-01	
	Ci	3.20E+04	2.00 E 01
d. Control Rod Drive Filters	m <sup>3</sup>		
	Ci		
e. Other (describe) Equip. etc.	m <sup>3</sup>		
	Ci		

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

ISOTOPE	PERCENT	CURIES
a. Fe-55	20.2	7.97E+01
Co-60	44.6	1.78E+02
Zn-65	11.87	4.72E+01
Mn-54	12.84	5.11E+01
Cr-51	2.49	9.91E+00
Other	8.18	3.26E+01
b. Fe-55	45.0	1.15E-01
Co-60	35.7	9.16E-02
Mn-54	6.97	1.79E-02
Zn-65	1.95	5.01E-03
Other	10.4	2.66E-02
c. Fe-55	41.5	1.33E+04
Co-60	46.8	1.50E+04
Ni-63	11.1	3.56E+03
Other	0.60	1.83E+02
d.		
e.		

3. Solid Waste Disposition

Number of Shipments

Mode of Transportation

Destination

All waste sent to processors

N/A

N/A

B. IRRADIATED FUEL SHIPMENTS (Disposition)

Number of Shipments

Mode of Transportation

Destination

0

N/A

N/A



**TABLE 3-1**  
**E. I. HATCH NUCLEAR PLANT**  
**RADIOACTIVE EFFLUENT RELEASE REPORT - 2018**  
**SOLID WASTE AND IRRADIATED FUEL SHIPMENTS**  
**UNIT 1 AND 2**

**STARTING: 1-Jul-2018**

**ENDING: 31-Dec-2018**

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.	m <sup>3</sup>	6.86E+01	
	Ci	3.50E+01	1.00 E 01
b. Dry compressible waste, contaminated equip. etc.	m <sup>3</sup>	2.55E+02	
	Ci	1.13E-01	2.00 E 01
c. Irradiated components, control rods,	m <sup>3</sup>		
	Ci		
d. Control Rod Drive Filters	m <sup>3</sup>		
	Ci		
e. Other (describe) Equip. etc.	m <sup>3</sup>		
	Ci		

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

ISOTOPE	PERCENT	CURIES
a.Fe-55	22.2	7.76E+00
Co-60	37.6	1.32E+01
Zn-65	9.6	3.36E+00
Mn-54	8.7	3.03E+00
Other	21.9	7.67E+00
b.Fe-55	46.3	5.24E-02
Co-60	37.9	4.30E-02
Mn-54	6.2	6.98E-03
Zn-65	1.6	1.83E-03
Other	8.0	9.10E-03
c.		
d.		
e.		

3. Solid Waste Disposition

Number of Shipments

Mode of Transportation

Destination

All waste sent to processors

N/A

N/A

B. IRRADIATED FUEL SHIPMENTS (Disposition)

Number of Shipments

Mode of Transportation

Destination

0

N/A

N/A

**TABLE 3-1**  
**E. I. HATCH NUCLEAR PLANT**  
**RADIOACTIVE EFFLUENT RELEASE REPORT - 2018**  
**SOLID WASTE AND IRRADIATED FUEL SHIPMENTS**  
**UNIT 1 AND 2**

**STARTING: 1-Jan-2018**

**ENDING: 30-Jun-2018**

TYPE OF WASTE	CURIE QUANTITY/ DETERMINED	PRINCIPAL NUCLIDES/ DETERMINATION	BURIAL CONTAINER DESCRIPTION	NUMBER OF CONTAINERS SHIPPED	VOLUME OF EACH CONTAINER CUBIC FEET (FT 3)	TYPE SHIPMENT/ CONTAINER	SOLIDIFICATION AGENT
Dewatered Resins	398	Zn-65, Fe-55, Co-60 Mn-54, Cr-51, Co-58	High Integrity Container	13 * See Note	207	LSA II; Type B	N/A
Dry Active Waste	2.57E-01	Fe-55, Co-60, Mn-54 Zn-65, Ag-110m, Cs-137, Cr-51, Ni-63	B-25 Boxes/High Integrity Container	9 * See Note	1040/2080/ 2080	LSA-I; LSA-II SCO-II	N/A
Irradiated Components	3.20E+04	Fe-55, Co-60, Ni-63	High Integrity Container	5 * See Note	60/125	Type B	N/A

\* Note: The actual size and number of the containers may vary from the recorded values due to the use of different containers by waste processors.

\*\* STC-Strong Tight Container

**TABLE 3-1**  
**E. I. HATCH NUCLEAR PLANT**  
**RADIOACTIVE EFFLUENT RELEASE REPORT - 2018**  
**SOLID WASTE AND IRRADIATED FUEL SHIPMENTS**  
**UNIT 1 AND 2**

**STARTING: 1-JUL-2018**

**ENDING: 31-DEC-2018**

TYPE OF WASTE	CURIE QUANTITY/ DETERMINED	PRINCIPAL NUCLIDES/ DETERMINATION	BURIAL CONTAINER DESCRIPTION	NUMBER OF CONTAINERS SHIPPED	VOLUME OF EACH CONTAINER CUBIC FEET (FT 3)	TYPE SHIPMENT/ CONTAINER	SOLIDIFICATION AGENT
Dewatered Resins	35	Zn-65, Fe-55, Co-60 Mn-54, Cs-137, H-3, Co-58, C-14, Ni-63 Sr-90, Cr-51	High Integrity Container	13 * See Note	207.4	LSA-II	N/A
Dry Active Waste	1.13E-01	Fe-55, Co-60, Mn-54 Zn-65, Cs-137, Ni-63 Ag-110m, Cr-51, Co-58	High Integrity Container	43 * See Note	96/2080/96	LSA-I LSA-II SCO-II	N/A

\* Note: The actual type, size and number of the containers may vary from the recorded values due to the use of different containers by waste processors for final disposal of processed resin and DAW.

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

##### **4.1 Regulatory Requirements**

ODCM 7.2.2.3 states in part that the Radioactive Effluent Release Report shall also include an 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 the ODCM.

##### **4.2 Demonstration of Compliance**

The locations of concern within the site boundary are the Roadside Park, the Camping Area, the Recreation Area, and the Visitors Center. Listed in Table 4-1 are: The 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 Main Stack (elevated) and from the reactor building (ground level); and the estimated maximum occupancy factor for an individual and the assumed age group of this individual.

The source term is not listed in Table 4-1 . The source term is listed in Tables 2-2A and 2-2B, for the elevated releases. Similarly the source term is listed in Tables 2-3A and 2-3B for the ground level releases.

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

**Table 4-1**

**Hatch Nuclear Plant**

**RADIOACTIVE EFFLUENT RELEASE REPORT - 2018**

**Doses to a Member of the Public Due to Activities Inside the Site Boundary**

**Unit: Site**

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

**Location Name:** ROADSIDE PARK  
**Distance (kilometers):** 1.18E+00  
**Sector:** WNW  
**Occupancy Factor:** 2.28E-04  
**Age Group:** Child

Elevated Release	Particulate and Radioiodine	X/Q (sec/m3): 2.37E-08	D/Q (m-2): 1.29E-09
Elevated Release	Noble Gas	X/Q (sec/m3): 2.42E-08	
Ground Level Release	Particulate and Radioiodine	X/Q (sec/m3): 7.00E-06	D/Q (m-2): 2.01E-08
Ground Level Release	Noble Gas	X/Q (sec/m3): 7.83E-06	

	<u>Units</u>	<u>1ST Quarter</u>	<u>2ND Quarter</u>	<u>3RD Quarter</u>	<u>4TH Quarter</u>	<u>Year</u>
Lung	mRem	3.28E-09	4.13E-09	4.63E-09	4.27E-09	1.63E-08
GI-Lli	mRem	3.29E-09	4.19E-09	4.66E-09	4.28E-09	1.64E-08
Bone	mRem	5.70E-11	1.52E-11	1.17E-11	5.71E-12	8.97E-11
Kidney	mRem	3.26E-09	4.11E-09	4.62E-09	4.26E-09	1.62E-08
Liver	mRem	3.26E-09	4.11E-09	4.62E-09	4.26E-09	1.62E-08
Total Body	mRem	3.26E-09	4.11E-09	4.62E-09	4.26E-09	1.62E-08
Thyroid	mRem	3.27E-09	4.15E-09	4.68E-09	4.28E-09	1.64E-08
Skin	mRem	4.84E-11	8.14E-12	6.33E-12	2.11E-12	6.50E-11

**Table 4-1****Hatch Nuclear Plant****RADIOACTIVE EFFLUENT RELEASE REPORT - 2018****Doses to a Member of the Public Due to Activities Inside the Site Boundary****Unit: Site****Starting: 1-Jan-2018 Ending: 31-Dec-2018**

**Location Name:** CAMPING AREA  
**Distance (kilometers):** 1.27E+00  
**Sector:** WNW  
**Occupancy Factor:** 5.48E-03  
**Age Group:** Child

Elevated Release Noble Gas X/Q (sec/m3): 2.38E-08  
Ground Level Release Noble Gas X/Q (sec/m3): 7.03E-06  
Elevated Release Particulate and Radioiodine X/Q (sec/m3): 2.33E-08 D/Q (m-2): 2.01E-08  
Ground Level Release Particulate and Radioiodine X/Q (sec/m3): 6.27E-06 D/Q (m-2): 1.80E-08

	<b>Units</b>	<b>1ST Quarter</b>	<b>2ND Quarter</b>	<b>3RD Quarter</b>	<b>4TH Quarter</b>	<b>Year</b>
Liver	mRem	7.07E-08	8.86E-08	9.96E-08	9.20E-08	3.51E-07
Kidney	mRem	7.07E-08	8.85E-08	9.95E-08	9.20E-08	3.51E-07
GI-Lli	mRem	7.13E-08	9.03E-08	1.00E-07	9.25E-08	3.55E-07
Thyroid	mRem	7.08E-08	8.94E-08	1.01E-07	9.24E-08	3.53E-07
Bone	mRem	1.65E-09	4.59E-10	3.22E-10	4.58E-10	2.89E-09
Total Body	mRem	7.07E-08	8.85E-08	9.95E-08	9.20E-08	3.51E-07
Lung	mRem	7.10E-08	8.89E-08	9.98E-08	9.23E-08	3.52E-07
Skin	mRem	1.54E-09	3.28E-10	2.15E-10	4.38E-10	2.52E-09

**Table 4-1**

**Hatch Nuclear Plant**

**RADIOACTIVE EFFLUENT RELEASE REPORT - 2018**

**Doses to a Member of the Public Due to Activities Inside the Site Boundary**

**Unit: Site**

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

**Location Name:** RECREATION AREA  
**Distance (kilometers):** 1.03E+00  
**Sector:** SSE  
**Occupancy Factor:** 2.37E-02  
**Age Group:** Child

Ground Level Release	Particulate and Radioiodine	X/Q (sec/m3): 5.73E-06	D/Q (m-2): 2.36E-08
Elevated Release	Noble Gas	X/Q (sec/m3): 3.30E-08	
Ground Level Release	Noble Gas	X/Q (sec/m3): 6.42E-06	
Elevated Release	Particulate and Radioiodine	X/Q (sec/m3): 3.21E-08	D/Q (m-2): 1.56E-09

	<u>Units</u>	<u>1ST Quarter</u>	<u>2ND Quarter</u>	<u>3RD Quarter</u>	<u>4TH Quarter</u>	<u>Year</u>
Bone	mRem	6.38E-09	1.56E-09	1.21E-09	5.58E-10	9.70E-09
Total Body	mRem	2.79E-07	3.50E-07	3.93E-07	3.62E-07	1.38E-06
Thyroid	mRem	2.80E-07	3.53E-07	3.98E-07	3.64E-07	1.40E-06
GI-Lli	mRem	2.82E-07	3.57E-07	3.97E-07	3.65E-07	1.40E-06
Liver	mRem	2.79E-07	3.50E-07	3.93E-07	3.62E-07	1.38E-06
Skin	mRem	5.91E-09	9.95E-10	7.73E-10	2.62E-10	7.94E-09
Lung	mRem	2.81E-07	3.51E-07	3.94E-07	3.63E-07	1.39E-06
Kidney	mRem	2.79E-07	3.50E-07	3.93E-07	3.62E-07	1.38E-06

**Table 4-1****Hatch Nuclear Plant****RADIOACTIVE EFFLUENT RELEASE REPORT - 2018****Doses to a Member of the Public Due to Activities Inside the Site Boundary****Unit: Site****Starting: 1-Jan-2018 Ending: 31-Dec-2018****Location Name:** VISITORS CENTER**Distance (kilometers):** 6.94E-01**Sector:** WSW**Occupancy Factor:** 4.57E-04**Age Group:** Child

Elevated Release	Particulate and Radioiodine	X/Q (sec/m3): 4.97E-08	D/Q (m-2): 2.26E-09
Elevated Release	Noble Gas	X/Q (sec/m3): 5.00E-08	
Ground Level Release	Particulate and Radioiodine	X/Q (sec/m3): 1.72E-05	D/Q (m-2): 5.47E-08
Ground Level Release	Noble Gas	X/Q (sec/m3): 1.87E-05	

	<u>Units</u>	<u>1ST Quarter</u>	<u>2ND Quarter</u>	<u>3RD Quarter</u>	<u>4TH Quarter</u>	<u>Year</u>
Lung	mRem	1.62E-08	2.03E-08	2.28E-08	2.10E-08	8.03E-08
Thyroid	mRem	1.61E-08	2.04E-08	2.30E-08	2.11E-08	8.07E-08
GI-Lli	mRem	1.62E-08	2.06E-08	2.30E-08	2.11E-08	8.09E-08
Bone	mRem	3.00E-10	7.81E-11	6.04E-11	2.73E-11	4.66E-10
Kidney	mRem	1.61E-08	2.02E-08	2.28E-08	2.10E-08	8.00E-08
Skin	mRem	2.61E-10	4.36E-11	3.41E-11	9.37E-12	3.48E-10
Liver	mRem	1.61E-08	2.02E-08	2.28E-08	2.10E-08	8.00E-08
Total Body	mRem	1.61E-08	2.02E-08	2.28E-08	2.10E-08	8.00E-08

## **5.0 Total Dose from Uranium Fuel Cycle (40 CFR 190)**

### **5.1 Regulatory Requirements**

*The annual 2018 dose or dose commitment to any MEMBER OF THE PUBLIC due to releases of radioactivity and to radiation from uranium fuel cycle sources shall be limited to less than or equal to 25 mrems to the whole body or to any organ, except the thyroid, which shall be limited to less than or equal to 75 mrems.*

### **5.2 Demonstration of Compliance**

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

## **6.0 Meteorological Data**

The Radioactive Effluent Release Report, to be submitted by May 1 of each year, 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 retained this summary of required meteorological data on site in a file. It will be provided to the NRC upon request.

## **7.0 Program Deviations**

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

#### **7.1.1 Regulatory Requirements**

ODCM, Chapter 7, Section 7.2.2.6.2 states that the Radioactive Effluent Release 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.



### **7.1.2 Description of Deviations**

There were no deviations from the liquid and gaseous effluent monitoring instrumentation operability requirements during 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 notifications if the contents within any outside temporary tank, for liquids, exceed the limit of Technical Specification 5.5.8.b.

### **7.2.2 Description of Deviations**

There were no outside temporary tanks, for liquids, that exceeded the limit of Technical Specification 5.5.8.b during this reporting period.

## **7.3 Effluent Sample Analysis Exceeding Minimum Detectable Concentration (MDC)**

### **7.3.1 Regulatory Requirements**

ODCM 7.2.2.6 states in part that deviations from MDC(s) required in Table 3-3 shall be included in the Radioactive Effluent Release Report.

### **7.3.2 Description of Deviation**

There were no deviations from MDC(s) required in Table 3-3 during this reporting period.

## **8.0 Changes to the Plant Hatch Offsite Dose Calculation Manual (ODCM)**

### **8.1 Regulatory Requirements**

Pursuant to Technical Specification 5.5.1 and ODCM Section 7.2.2.5, licensee initiated changes shall be submitted to the NRC in the form of a complete, legible copy of the entire ODCM as part of or concurrent with the Radioactive Effluent Release Report for the period of the report in which any change in the ODCM was made. Each change shall be identified by markings in the margin of the affected pages, clearly indicating the area of the page that was changed, and shall indicate the date (i.e., month and year) the change was implemented.

## **8.2 Description of Changes**

**The following changes were made to the Hatch ODCM in 2018.**

Table 4-1 was modified to move groundwater sampling to the sites Radiological Groundwater Protection Program.

Table 4-1 Notes were modified to remove references to table and figures listed below.

Table 4-5 "Groundwater Monitoring Locations" removed.

Figure 4-6 "Groundwater Monitoring Wells" removed.

Figure 4-7 "Deep Wells" removed.

Table 4-4 location #116 distance changed from 1.6 to 2.0 miles.

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

No major changes were made to the Liquid, Gaseous, or Solid Radwaste Treatment Systems.

## **9.1 Regulatory Requirements**

The Radioactive Effluent Release Report shall include any major change to liquid, gaseous, or solid radwaste treatment systems pursuant to ODCM Chapter 7, Section 7.2.2.7.

## **9.2 Description of Major Changes**

### **Gaseous Radwaste System**

There were no major changes to the gaseous radwaste system during this reporting period.

### **Solid Radwaste System**

There were no major changes to the solid radwaste system during this reporting period.

### **Liquid Radwaste System**

There were no major changes to the Liquid Radwaste Treatment System during this reporting period.

**SOUTHERN COMPANY**  
**E. I. HATCH NUCLEAR PLANT**  
**UNITS NO. 1 & 2**  
**ANNUAL REPORT**

**JANUARY 1, 2018 - DECEMBER 31, 2018**

**APPENDIX A**

Hatch Nuclear Plant  
Appendix A

CARBON-14

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

As nuclear plants have improved gaseous waste processing systems and improved fuel performance, the percentages of “principal radionuclides” in gaseous effluents have changed, and C-14 has become a larger percentage. “Principal radionuclides” are determined based on public dose contribution or the amount of activity discharged compared to other radionuclides of the same effluent type. In Revision 2 (June 2009) of Regulatory Guide 1.21 (RG 1.21), “Measuring, Evaluating, and Reporting Radioactive Material in Liquid and Gaseous Effluents and Solid Waste,” the NRC recommended re-evaluating “principal radionuclides” and reporting C-14 as appropriate. In 2010 Radioactive Effluent Release Reports, virtually all U. S. nuclear power plants will report C-14 amounts released and resulting doses to the maximally exposed member of the public.

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

At Plant Hatch, the quantity of C-14 released in gaseous effluents in 2010 was estimated to be 14.16 Curies (per unit). Approximately 95% of the C-14 released is in the form of  $^{14}\text{CO}_2$  and is incorporated into plants through photosynthesis. Ingestion dose results from this pathway. The remaining 5% is estimated to be organic. Both the organic and inorganic forms of C-14 contribute to inhalation dose. A child is the maximally exposed individual, and bone dose is the highest organ dose. Using the dose calculation methodology from the Hatch ODCM, the resulting bone dose to a child located at the controlling receptor location would be 1.59E-01 mrem in a year which is 1.06% of the regulatory limit of 15 mrem per year (per unit) to any organ due to gaseous effluents. The resulting total body dose to a child located at the controlling receptor location would be 3.18E-02 mrem in a year which is 0.21% of the regulatory limit of 15 mrem per year (per unit) total body dose due to gaseous effluents.