

JAFP-24-0020
April 25, 2024

United States Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, D.C. 20555-0001

James A. FitzPatrick Nuclear Power Plant
Renewed Facility Operating License No. DPR-59
NRC Docket No. 50-333

Subject: 2023 Annual Radioactive Effluent Release Report

Dear Sir or Madam:

This letter transmits the James A. FitzPatrick Nuclear Power Plant's (JAF) Annual Radioactive Effluent Release Report for the period of January 1, 2023 through December 31, 2023. The enclosure is submitted in accordance with 10 CFR 50.36a and the Reporting Requirements of Technical Specifications Section 5.6.3 and Technical Requirements Manual Appendix H, Offsite Dose Calculation Manual (ODCM), Part 1 Section 6.2, Radioactive Effluent Release Report.

This report (Enclosure 1) includes, as an Addendum, an Assessment of the Radiation Doses to the Public due to the radioactive liquid and gaseous effluents released during the 2023 calendar year. The format used for the effluent data is outlined in Appendix B of Regulatory Guide 1.21, Revision 1. Distribution is in accordance with Regulatory Guide 10.1, Revision 4.

There are no new regulatory commitments contained in this letter. If you have any questions concerning the enclosed report, please contact Mr. Kevin Fowler, Chemistry Manager, at (315) 326-2275.

Sincerely,



Mark R. Hawes
Regulatory Assurance

MRH/KF/gg

Enclosure: Annual Radioactive Effluent Release Report, January 1, 2023 – December 31, 2023

cc: next page

cc:

NRC Regional Administrator, Region I
NRC Resident Inspector
NRC Project Manager

Supervisor, Town of Scriba
Route 8, Box 382
Oswego, NY 13126

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Enclosure

Annual Radioactive Effluent Release Report

January 1, 2023 – December 31, 2023

(38 Pages)

CONSTELLATION FITZPATRICK, LLC
JAMES A. FITZPATRICK NUCLEAR POWER PLANT
ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT

JANUARY 1, 2023 - DECEMBER 31, 2023

DOCKET NO. 50-333

LICENSE NO. DPR-59

CONSTELLATION FITZPATRICK, LLC
JAMES A. FITZPATRICK NUCLEAR POWER PLANT
ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT
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SUPPLEMENTAL INFORMATION

FACILITY: JAFNPP LICENSEE: CONSTELLATION FITZPATRICK, LLC

1. Offsite Dose Calculation Manual Part 1 Radiological Effluent Controls

a. Fission and Activation Gases:

- (1) The dose rate at or beyond the site boundary due to radioactive materials released from the plant in gaseous effluent shall be limited as follows:
 - (a) Less than or equal to 500 mrem/year to the whole body and less than or equal to 3000 mrem/year to the skin from noble gases.
- (2) The air dose to areas at or beyond the site boundary from noble gases released from the plant in gaseous effluent shall be limited:
 - (a) During any calendar quarter, to less than or equal to 5 mrad from gamma radiation, and less than or equal to 10 mrad from beta radiation; and,
 - (b) During any calendar year, to less than or equal to 10 mrad from gamma radiation and less than or equal to 20 mrad from beta radiation.

b. Tritium, Iodines and Particulates, Half Lives > 8 days:

- (1) The dose to a member of the public at or beyond the site boundary from Iodine-131, Iodine-133, Tritium, and radionuclides in particulate form with half-lives greater than 8 days released from the plant in gaseous effluent shall be limited:
 - (a) During any calendar quarter to less than or equal to 7.5 mrem to any organ; and,
 - (b) During any calendar year to less than or equal to 15 mrem to any organ.
 - (c) Less than 0.1% of the limits of ODCM Part 1, Section 3.4 Specification 3.4.1.1 and 3.4.1.2 as a result of burning contaminated oil.
- (2) The dose rate at or beyond the site boundary due to radioactive materials released from the plant in gaseous effluents shall be limited as follows:
 - (a) Less than or equal to 1500 mrem/year to any organ from Iodine-131, Iodine-133, Tritium and for radioactive materials in particulate form with half-lives greater than 8 days (inhalation pathway only).

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SUPPLEMENTAL INFORMATION (continued)

c. Liquid Effluents:

- (1) The concentration of radioactive materials released to the unrestricted areas shall not exceed ten times the values specified in 10 CFR 20.1001-20.2402, Appendix B, Table 2, column 2. For dissolved or entrained noble gases the concentration shall be limited to 2.00E-04 $\mu\text{Ci/ml}$.
- (2) The dose to a member of the public from radioactive materials released from the plant in liquid effluents to unrestricted areas shall be limited as follows:
 - (a) During any calendar quarter, limited 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, limited to less than or equal to 3 mrem to the whole body and to less than or equal to 10 mrem to any organ.

2. **10X Effluent Concentrations**

a. Fission and activation gases:	(None specified)			
b. Iodines:	(None specified)			
c. Particulates, half-lives >8 days:	(None specified)			
d. Liquid effluents:	<u>Quarter 1</u>	<u>Quarter 2</u>	<u>Quarter 3</u>	<u>Quarter 4</u>
(1) Fission and activation products (mixture EC) ($\mu\text{Ci/ml}$)	None	None	None	None
(2) Tritium ($\mu\text{Ci/ml}$)	1.00E-02	1.00E-02	1.00E-02	1.00E-02
(3) Dissolved and entrained gases ($\mu\text{Ci/ml}$)	2.00E-04	2.00E-04	2.00E-04	2.00E-04

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SUPPLEMENTAL INFORMATION (continued)

3. Average Energy (None specified)

4. Measurements and Approximations of Total Radioactivity

- a. Fission and Activation Gases: Continuous monitor on each release path calibrated to a marinelli grab sample analyzed by gamma spectroscopy; bubbler grab sample analyzed for Tritium.
- b. Iodines: Gamma spectral analysis of charcoal cartridge and particulate filter on each release path.
- c. Particulates: Gamma spectral analysis of each particulate filter and charcoal cartridge for each release path. A four week per quarter composite of particulate filters for each release path for Strontium-89 and Strontium-90. One week per month particulate filter for each release path for gross alpha.
- d. Liquid Effluents: Gamma spectral analysis of each batch discharged, except composite analysis for Strontium-89, Strontium-90, Iron-55, Tritium, and Alpha.
- e. Solid Waste: Gamma spectral analysis of a representative sample of each waste shipment. Scaling factors established from offsite composite sample analyses to estimate concentration of non-gamma emitters. Low activity trash shipments curie content is estimated by dose rate measurement and application of appropriate scaling factors.
- f. Error Estimation Method: Overall error for sampling and analysis estimated by combining individual errors using error propagation methods. This process is composed of determinate and undeterminate errors.

Determinate - Pump flowrates, volume measurements and analysis collection yields

Undeterminate - Random counting error estimated using accepted statistical calculations

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SUPPLEMENTAL INFORMATION (continued)

5. Batch Releases

a. <u>Liquid: Canal</u>	<u>Quarter 1</u>	<u>Quarter 2</u>	<u>Quarter 3</u>	<u>Quarter 4</u>
(1) Number of batch releases:	No Release	No Release	No Release	4.50E+01
(2) Total time period for batch release: (min)	No Release	No Release	No Release	7.76E+02
(3) Maximum time period for batch release: (min)	No Release	No Release	No Release	3.84E+01
(4) Average time period for batch release: (min)	No Release	No Release	No Release	1.72E+01
(5) Minimum time period for batch release: (min)	No Release	No Release	No Release	3.60E+00
(6) Total Activity Released (Ci)	No Release	No Release	No Release	1.17E-03
(7) Total Volume Released (liters)	No Release	No Release	No Release	2.94E+05
b. <u>Liquid: Non-Canal</u>	<u>Quarter 1</u>	<u>Quarter 2</u>	<u>Quarter 3</u>	<u>Quarter 4</u>
(1) Number of batch releases:	2.00E+00	1.30E+01	8.30E+01	1.30E+01
(2) Total time period for batch release: (min)	4.93E+03	4.95E+02	4.88E+03	7.52E+02
(3) Maximum time period for batch release: (min)	4.93E+03	3.82E+02	2.44E+03	1.31E+02
(4) Average time period for batch release: (min)	2.47E+03	3.80E+01	5.88E+01	5.78E+01
(5) Minimum time period for batch release: (min)	1.80E+00	1.80E+00	1.20E+00	6.00E-01
(6) Total Activity Released (Ci)	1.54E-05	1.32E-03	1.45E-03	6.90E-04
(7) Total Volume Released (liters)	8.41E+05	1.87E+05	9.45E+05	2.85E+05

c. Gaseous

There were no gaseous batch releases for this report.

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SUPPLEMENTAL INFORMATION (continued)

6. Continuous Releases

a. <u>Liquid: Non-Canal</u>	<u>Quarter 1</u>	<u>Quarter 2</u>	<u>Quarter 3</u>	<u>Quarter 4</u>
(1) Number of releases:	1.40E+01	1.30E+01	1.20E+01	1.30E+01
(2) Total Activity Released (Ci)	5.13E-03	7.95E-03	3.82E-02	9.82E-03
(3) Total Volume Released (liters)	1.10E+07	1.16E+07	1.86E+07	4.89E+06
b. <u>Liquid: Canal</u>	<u>Quarter 1</u>	<u>Quarter 2</u>	<u>Quarter 3</u>	<u>Quarter 4</u>
(1) Number of releases:	No Release	No Release	No Release	No Release
(2) Total Activity Released (Ci)	No Release	No Release	No Release	No Release

7.

CHANGES TO THE OFFSITE DOSE CALCULATION MANUAL (ODCM)

In accordance with the James A. FitzPatrick Nuclear Power Plant Offsite Dose Calculation Manual (ODCM), Part 1 Radiological Effluent Controls (REC) Section 6.2.3, changes made to the Offsite Dose Calculation Manual (ODCM) during the reporting period shall be included in the Annual Radioactive Effluent Release Report.

The latest revision of the ODCM became effective during calendar year 2021. There were no changes to the ODCM in 2023.

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TABLE 1A
GASEOUS EFFLUENTS - SUMMATION OF ALL RELEASES

	<u>UNIT</u>	<u>QTR 1</u>	<u>QTR 2</u>	<u>QTR 3</u>	<u>QTR 4</u>	<u>EST TOTAL ERROR %</u>
A. FISSION AND ACTIVATION GASES						
1. Total Release	Ci	4.66E+00	6.17E+00	9.79E+00	6.42E+00	≤2.50E+01
2. Average release rate for period	μCi/sec	5.99E-01	7.84E-01	1.23E+00	8.08E-01	
3. Percentage ODCM Limit	%	*	*	*	*	
B. IODINE-131						
1. Total Iodine-131	Ci	1.11E-04	1.92E-04	9.58E-05	1.50E-05	≤2.50E+01
2. Average release rate for period	μCi/sec	1.43E-05	2.45E-05	1.21E-05	1.89E-05	
3. Percentage ODCM Limit	%	*	*	*	*	
C. PARTICULATES						
1. Particulates with half-lives >8 days	Ci	1.03E-06	1.53E-06	1.59E-05	1.81E-06	≤3.60E+01
2. Average release rate for period	μCi/sec	1.32E-07	1.94E-07	1.99E-06	2.28E-07	
3. Percentage ODCM Limit	%	*	*	*	*	
4. Gross alpha radioactivity	Ci	1.68E-07	2.34E-07	1.67E-07	1.08E-07	≤2.50E+01
D. TRITIUM						
1. Total Release	Ci	2.14E+00	2.25E+00	2.32E+00	3.29E+00	≤2.50E+01
2. Average release rate for period	μCi/sec	2.75E-01	2.87E-01	2.92E-02	4.14E-01	
3. Percentage ODCM Limit	%	*	*	*	*	
E. CARBON-14 (See Attachment 8)						
*F. PERCENT OF APPLICABLE ODCM LIMITS						
FISSION AND ACTIVATION GASES	<u>UNIT</u>	<u>QTR 1</u>	<u>QTR 2</u>	<u>QTR 3</u>	<u>QTR 4</u>	
1. Quarterly gamma air dose limit	%	2.65E-03	3.66E-03	6.44E-03	4.25E-03	
2. Quarterly beta air dose limit	%	1.42E-04	1.86E-04	2.64E-04	1.90E-04	
3. Yearly gamma air dose limit	%	1.32E-03	3.15E-03	6.37E-03	8.49E-03	
4. Yearly beta air dose limit	%	7.11E-05	1.64E-04	2.96E-04	3.91E-04	
5. Whole body dose rate limit	%	1.02E-04	1.40E-04	2.45E-04	1.61E-04	
6. Skin dose rate limit	%	2.14E-05	2.91E-05	5.00E-05	3.32E-05	
HALOGENS, TRITIUM AND PARTICULATES WITH HALF-LIVES >8 DAYS						
7. Quarterly dose limit (organ)	%	2.73E-03	3.71E-03	1.22E-03	3.84E-03	
8. Yearly dose limit (organ)	%	1.36E-03	3.22E-03	3.83E-03	5.75E-03	
9. Organ dose rate limit	%	4.88E-05	6.61E-05	2.34E-05	6.58E-05	

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TABLE 1B
GASEOUS EFFLUENTS - ELEVATED RELEASE

CONTINUOUS MODE

NUCLIDES RELEASED

1. <u>Fission Gases</u>	<u>UNIT</u>	<u>QUARTER 1</u>	<u>QUARTER 2</u>	<u>QUARTER 3</u>	<u>QUARTER 4</u>
Argon-41	Ci	3.73E+00	3.58E+00	3.70E+00	3.67E+00
Krypton-85	Ci	**	**	**	**
Krypton-85m	Ci	8.97E-01	1.36E+00	2.26E+00	1.19E+00
Krypton-87	Ci	**	**	**	**
Krypton-88	Ci	**	6.46E-01	3.27E+00	1.32E+00
Krypton-89	Ci	**	**	**	**
Xenon-133	Ci	**	**	4.97E-01	**
Xenon-133m	Ci	**	**	**	**
Xenon-135	Ci	**	6.60E-03	**	**
Xenon-135m	Ci	**	4.06E-02	**	**
Xenon-137	Ci	**	**	**	**
Xenon-138	Ci	**	5.01E-01	2.89E-02	2.22E-01
TOTAL	Ci	4.63E+00	6.13E+00	9.75E+00	6.40E+00
2. <u>Iodines</u>					
Iodine-131	Ci	3.24E-05	3.54E-05	2.77E-05	2.88E-05
Iodine-132	Ci	**	**	**	**
Iodine-133	Ci	7.43E-05	9.55E-05	6.80E-05	5.92E-05
Iodine-134	Ci	**	**	**	**
Iodine-135	Ci	**	**	**	**
TOTAL	Ci	1.07E-04	1.31E-04	9.58E-05	8.80E-05
3. <u>Particulates</u>					
Barium-140	Ci	**	**	**	**
Cobalt-60	Ci	**	**	**	**
Cesium-137	Ci	**	**	**	**
Manganese-54	Ci	**	**	**	**
Strontium-89	Ci	1.03E-06	1.53E-06	3.66E-06	1.81E-06
Zinc-65	Ci	**	**	**	**
Chromium-51	Ci	**	**	**	**
Iron-59	Ci	**	**	**	**
Cobalt-58	Ci	**	**	**	**
TOTAL	Ci	1.03E-06	1.53E-06	3.66E-06	1.81E-06
4. <u>Tritium</u>					
Hydrogen-3	Ci	1.82E-01	2.79E-01	3.29E-02	3.44E-01

** Concentrations less than lower limit of detection of the counting system used are indicated with a double asterisk.

Note: There were no batch releases for this report period.

CONSTELLATION FITZPATRICK, LLC
JAMES A. FITZPATRICK NUCLEAR POWER PLANT
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JANUARY 2023 - DECEMBER 2023

TABLE 1C
GASEOUS EFFLUENTS - GROUND LEVEL RELEASES

CONTINUOUS MODE

NUCLIDES RELEASED

1. <u>Fission Gases</u>	<u>UNIT</u>	<u>QUARTER 1</u>	<u>QUARTER 2</u>	<u>QUARTER 3</u>	<u>QUARTER 4</u>
Argon-41	Ci	**	**	**	**
Krypton-85	Ci	**	**	**	**
Krypton-85m	Ci	**	**	**	**
Krypton-87	Ci	**	**	**	**
Krypton-88	Ci	**	**	**	**
Xenon-133	Ci	**	**	**	**
Xenon-133m	Ci	**	**	**	**
Xenon-135	Ci	**	**	**	**
Xenon-135m	Ci	**	**	**	**
Xenon-137	Ci	**	**	**	**
Xenon-138	Ci	**	**	**	**
TOTAL	Ci	**	**	**	**
2. <u>Iodines</u>					
Iodine-131	Ci	**	1.90E-06	**	1.16E-06
Iodine-132	Ci	**	**	**	**
Iodine-133	Ci	4.55E-06	5.95E-05	**	6.09E-05
Iodine-134	Ci	**	**	**	**
Iodine-135	Ci	**	**	**	**
TOTAL	Ci	4.55E-06	6.14E-05	**	6.21E-07
3. <u>Particulates</u>					
Chromium-51	Ci	**	**	**	**
Cobalt-58	Ci	**	**	**	**
Cobalt-60	Ci	**	**	3.18E-05	**
Manganese-54	Ci	**	**	5.23E-06	**
Iron-59	Ci	**	**	**	**
Strontium-89	Ci	**	**	**	**
Zinc-65	Ci	**	**	**	**
TOTAL	Ci	**	**	1.22E-05	**
4. <u>Tritium</u>					
Hydrogen-3	Ci	1.96E+00	1.97E+00	1.99E+00	2.95E+00

** Concentrations less than lower limit of detection of the counting system used are indicated with a double asterisk.

CONSTELLATION FITZPATRICK, LLC
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TABLE 2A
LIQUID EFFLUENTS - SUMMATION OF ALL RELEASES

	<u>UNIT</u>	<u>QTR 1</u>	<u>QTR 2</u>	<u>QTR 3</u>	<u>QTR 4</u>	<u>EST TOTAL ERROR %</u>
A. FISSION AND ACTIVATION PRODUCTS						
1. Total Release (not including tritium, gases and alpha)	Ci	**	**	**	**	NA
2. Average diluted concentration during period	μCi/ml	**	**	**	**	
3. Percentage ODCM Limit	%	NA	NA	NA	NA	
B. TRITIUM						
1. Total Release	Ci	5.14E-03	9.27E-03	3.97E-02	1.17E-02	≤2.50E+01
2. Average diluted concentration during period (Note 1)	μCi/ml	4.35E-07	7.87E-07	2.03E-06	9.30E-09	
3. Percentage ODCM Limit	%	*	*	*	*	
C. DISSOLVED AND ENTRAINED GASES						
1. Total Release	Ci	**	**	**	**	NA
2. Average diluted concentration during period	μCi/ml	**	**	**	**	
3. Percentage ODCM Limit	%	NA	NA	NA	NA	
D. GROSS ALPHA RADIOACTIVITY						
1. Total Release	Ci	**	**	**	**	NA
E. VOLUME OF WASTE RELEASED (PRIOR TO DILUTION)						
	liters	1.18E+07	1.18E+07	1.96E+07	5.47E+06	
F. VOLUME OF DILUTION WATER USED DURING PERIOD						
	liters	0.00E+00	0.00E+00	0.00E+00	1.25E+09	
*G. PERCENT OF APPLICABLE ODCM LIMITS						
1. Quarterly Whole Body Dose	%	1.81E-04	8.00E-05	1.51E-04	4.78E-05	
2. Quarterly Organ Dose	%	5.42E-05	2.40E-05	4.52E-05	1.43E-05	
3. Annual Whole Body Dose	%	9.03E-05	4.00E-05	7.53E-05	2.39E-05	
4. Annual Organ Dose	%	2.71E-05	1.20E-05	2.26E-05	7.17E-06	

** Concentrations less than lower limit of detection of the counting system used are indicated with a double asterisk.

CONSTELLATION FITZPATRICK, LLC
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TABLE 2B
LIQUID EFFLUENTS CANAL

BATCH MODE

<u>NUCLIDES RELEASED</u>	<u>UNIT</u>	<u>QUARTER 1</u>	<u>QUARTER 2</u>	<u>QUARTER 3</u>	<u>QUARTER 4</u>
1. <u>Fission and Activation Products</u>					
ND	Ci	**	**	**	**
2. <u>Tritium</u>					
Hydrogen-3	Ci	**	**	**	1.18E-03
3. <u>Dissolved and Entrained Gases</u>					
ND	Ci	**	**	**	**

TABLE 2B
LIQUID EFFLUENTS CANAL

CONTINUOUS MODE

<u>NUCLIDES RELEASED</u>	<u>UNIT</u>	<u>QUARTER 1</u>	<u>QUARTER 2</u>	<u>QUARTER 3</u>	<u>QUARTER 4</u>
1. <u>Fission and Activation Products</u>					
NR	Ci	No Release	No Release	No Release	No Release
2. <u>Tritium</u>					
Hydrogen-3	Ci	No Release	No Release	No Release	No Release
3. <u>Dissolved and Entrained Gases</u>					
NR	Ci	No Release	No Release	No Release	No Release

Note 1: Concentration includes summation from diluted and undiluted values from Canal and Non-Canal releases (Table 2B).

** Concentrations less than lower limit of detection of the counting system used are indicated with a double asterisk.

CONSTELLATION FITZPATRICK, LLC
 JAMES A. FITZPATRICK NUCLEAR POWER PLANT
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**TABLE 2B (SUPPLEMENT)
 LIQUID EFFLUENTS NON-CANAL**

<u>CONTINUOUS MODE</u>					
<u>NUCLIDES RELEASED</u>	<u>UNIT</u>	<u>QUARTER 1</u>	<u>QUARTER 2</u>	<u>QUARTER 3</u>	<u>QUARTER 4</u>
1. <u>Fission and Activation Products</u>					
ND	Ci	**	**	**	**
2. <u>Tritium</u>					
Hydrogen-3	Ci	5.13E-03	7.95E-03	3.82E-02	9.82E-03
3. <u>Dissolved and Entrained Gases</u>					
ND	Ci	**	**	**	**

** Concentrations less than lower limit of detection of the counting system used are indicated with a double asterisk.

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TABLE 2B (SUPPLEMENT)
LIQUID EFFLUENTS NON-CANAL

<u>BATCH MODE</u>					
<u>NUCLIDES RELEASED</u>	<u>UNIT</u>	<u>QUARTER 1</u>	<u>QUARTER 2</u>	<u>QUARTER 3</u>	<u>QUARTER 4</u>
1. <u>Fission and Activation Products</u>					
ND	Ci	**	**	**	**
2. <u>Tritium</u>					
Hydrogen-3	Ci	1.54E-05	1.32E-03	1.45E-03	6.89E-04
3. <u>Dissolved and Entrained Gases</u>					
ND	Ci	**	**	**	**

** Concentrations less than lower limit of detection of the counting system used are indicated with a double asterisk.

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TABLE 2B (continued)
ABNORMAL RELEASE
LIQUID EFFLUENTS CANAL

<u>CONTINUOUS MODE</u>					
<u>NUCLIDES RELEASED</u>	<u>UNIT</u>	<u>QUARTER 1</u>	<u>QUARTER 2</u>	<u>QUARTER 3</u>	<u>QUARTER 4</u>
1. <u>Fission and Activation Products</u>					
NR	Ci	No Release	No Release	No Release	No Release
2. <u>Tritium</u>					
NR	Ci	No Release	No Release	No Release	No Release
3. <u>Dissolved and Entrained Gases</u>					
NR	Ci	No Release	No Release	No Release	No Release

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TABLE 3A
SOLID WASTE AND IRRADIATED FUEL SHIPMENTS

A. SOLID WASTE SHIPPED OFFSITE FOR BURIAL OR DISPOSAL (NOT IRRADIATED FUEL)

1. <u>Type of Waste</u>	<u>UNIT</u>	<u>CLASS A</u>	<u>CLASS B</u>	<u>CLASS C</u>	<u>EST. TOTAL ERROR %</u>
a. Spent resins, filter sludges, evaporator bottoms, etc.	m ³ Ci	5.05E+01 1.64E+02	0.00E+00 0.00E+00	0.00E+00 0.00E+00	1.00E+01 1.00E+01
b. Dry compressible waste, contaminated equipment, etc.	m ³ Ci	2.07E+02 5.36E-02	0.00E+00 0.00E+00	0.00E+00 0.00E+00	1.00E+01 1.00E+01
c. Irradiated components, control rods, etc.	m ³ Ci	0.00E+00 0.00E+00	0.00E+00 0.00E+00	0.00E+00 0.00E+00	0.00E+00 0.00E+00
d. Other: Dry compressible waste, contaminated equipment, spent resins for volume reduction.	m ³ Ci	1.33E+02 4.25E-01	0.00E+00 0.00E+00	0.00E+00 0.00E+00	1.00E+01 1.00E+01

2. Estimate of Major Nuclide Composition (by type of waste)

a. Spent resins, filter sludges, evaporator bottoms, etc.

<u>Isotope</u>	<u>Percent</u>	<u>Curies</u>
Mn-54	4.74%	7.79E+00
Fe-55	55.64%	9.15E+01
Co-60	20.1%	3.30E+01
Ni-63	6.02%	9.90E+00
Zn-65	9.11%	1.50E+01
Cs-137	2.86%	4.71E+00

b. Dry compressible waste, contaminated equipment, etc.

<u>Isotope</u>	<u>Percent</u>	<u>Curies</u>
Cr-51	3.42%	1.83E-03
Mn-54	29.5%	1.58E-02
Fe-55	25.75%	1.38E-02
Fe-59	3.64%	1.95E-03
Co-58	1.85%	9.94E-04
Co-60	29.25%	1.57E-02
Zn-65	5.07%	2.72E-03

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c. Irradiated components, control rods, etc.

<u>Isotope</u>	<u>Percent</u>	<u>Curies</u>	<u>Isotope</u>	<u>Percent</u>	<u>Curies</u>
C-14	0.00E+00	0.00E+00	Co-58	0.00E+00	0.00E+00
Co-60	0.00E+00	0.00E+00	Zn-65	0.00E+00	0.00E+00
Ni-59	0.00E+00	0.00E+00	Fe-55	0.00E+00	0.00E+00
Ni-63	0.00E+00	0.00E+00	Mn-54	0.00E+00	0.00E+00

d. Other: Dry compressible waste, contaminated equipment, spent resins for volume reduction.

<u>Isotope</u>	<u>Percent</u>	<u>Curies</u>
H-3	2.45%	1.04E-02
Cr-51	3.43%	1.46E-02
Mn-54	7.38%	3.13E-02
Fe-55	29.53%	1.25E-01
Fe-59	3.85%	1.64E-02
Co-58	1.91%	8.11E-03
Co-60	33.62%	1.43E-01
Ni-63	11.88%	5.05E-02
Zn-65	4.27%	1.81E-02

Percentage of nuclides and total activities are based on a combination of direct measurements and scaling for non-gamma emitting nuclides.

3. Solid Waste Disposition

<u>No. of Shipments</u>	<u>Mode of Transportation</u>	<u>Destination</u>
5	Trucks	Energy Solutions, Clive, Bulk Waste Facility, UT
8	Trucks	Energy Solutions, Clive, Containerized Waste Facility, UT
1	Trucks	Energy Solutions, Oak Ridge, TN

B. IRRADIATED FUEL SHIPMENTS (Disposition)

<u>No. of Shipments</u>	<u>Mode of Transportation</u>	<u>Destination</u>
NONE	-----	-----

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TABLE 3B
SOLID WASTE AND IRRADIATED FUEL SHIPMENTS

A. NRC CLASS A

SOURCE OF WASTE	PROCESSING EMPLOYED	CONTAINER VOLUME		TYPE OF CONTAINER	NUMBER OF CONTAINER	(#manifest, just for reference)
		ft ³	m ³			
Dry Compressible Waste (DAW), Contaminated Equipment, etc.	Non-Processed	2560	72.49	Metal box	2	1895
Dry Compressible Waste (DAW), Contaminated Equipment, etc.	Non-Processed	2560	72.49	Metal box	2	1899
Dry Compressible Waste (DAW), Contaminated Equipment, etc.	Non-Processed	7.70	0.22	Metal Drum	2	1909
Dry Compressible Waste (DAW), Contaminated Equipment, etc.	Non-Processed	2560	72.49	Metal box	1	1910
Dry Compressible Waste (DAW), Contaminated Equipment, etc.	Non-Processed	1280	36.25	Metal box	1	1911
Dry Compressible Waste (DAW), Contaminated Equipment, etc.	Non-Processed	210	5.95	Demineralizer	1	1913
Dry Compressible Waste (DAW), Contaminated Equipment, etc.	Non-Processed	0.70	0.02	Metal Drum	1	1915
Dry Compressible Waste (DAW),	Non-Processed	3.00	0.08	Metal Drum	1	1916

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Contaminated Equipment, etc.						
Dry Compressible Waste (DAW), Contaminated Equipment, etc.	Non-Processed	1280	36.25	Metal box	2	1919
Dry Compressible Waste (DAW), Contaminated Equipment, etc.	TOTAL	7901.4	296.24		15	
Resin, Filters, and Evaporator Bottoms	Non-Processed	205.8	5.83	Polyethylene tank/Liner	1	1074-09-0039
Resin, Filters, and Evaporator Bottoms	Non-Processed	205.8	5.83	Polyethylene tank/Liner	1	1074-C-0013
Resin, Filters, and Evaporator Bottoms	Non-Processed	205.8	5.83	Polyethylene tank/Liner	1	1074-C-0014
Resin, Filters, and Evaporator Bottoms	Non-Processed	205.8	5.83	Polyethylene tank/Liner	1	1074-09-0040
Resin, Filters, and Evaporator Bottoms	Non-Processed	205.8	5.83	Polyethylene tank/Liner	1	1074-C-0015
Resin, Filters, and Evaporator Bottoms	Non-Processed	205.8	5.83	Polyethylene tank/Liner	1	1074-C-0016
Resin, Filters, and Evaporator Bottoms	Non-Processed	120.30	3.41	Polyethylene tank/Liner	1	1074-C-0017
Resin, Filters, and Evaporator Bottoms	Non-Processed	120.30	3.41	Polyethylene tank/Liner	1	1074-C-0018
Resin, Filters, and Evaporator Bottoms	Non-Processed	120.30	3.41	Polyethylene tank/Liner	1	1074-09-0041
Resin, Filters, and Evaporator Bottoms	Non-Processed	120.30	3.41	Polyethylene tank/Liner	1	1074-09-0042

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Resin, Filters, and Evaporator Bottoms	Non-Processed	120.30	3.41	Polyethylene tank/Liner	1	1074-09-0043
Resin, Filters, and Evaporator Bottoms	Non-Processed	205.80	5.83	Polyethylene tank/Liner	1	1074-09-0043
Resin, Filters, and Evaporator Bottoms	Non-Processed	205.80	5.83	Polyethylene tank/Liner	1	1074-C-0019
Resin, Filters, and Evaporator Bottoms	TOTAL	2247.9	63.69		13	

B. NRC CLASS B

<u>SOURCE OF WASTE</u>	<u>PROCESSING EMPLOYED</u>	<u>CONTAINER VOLUME</u>	<u>TYPE OF CONTAINER</u>	<u>NUMBER OF CONTAINERS</u>
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NONE

C. NRC CLASS C

<u>SOURCE OF WASTE</u>	<u>PROCESSING EMPLOYED</u>	<u>CONTAINER VOLUME</u>	<u>TYPE OF CONTAINER</u>	<u>NUMBER OF CONTAINERS</u>
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NONE

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ATTACHMENT NO. 2

SUMMARY OF CHANGES TO THE PROCESS CONTROL PROGRAM

In accordance with the James A. FitzPatrick Nuclear Power Plant Offsite Dose Calculation Manual (ODCM), Part 1 Radiological Effluent Controls Section 6.2.3, changes made to the Process Control Program (PCP) during the reporting period shall be included in the Annual Radioactive Effluent Release Report.

No change in PCP.

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ATTACHMENT NO. 3

**SUMMARY OF CHANGES TO THE ENVIRONMENTAL
MONITORING AND DOSE CALCULATION LOCATIONS**

In accordance with the James A. FitzPatrick Nuclear Power Plant Offsite Dose Calculation Manual (ODCM), Part 1, Radiological Effluent Controls Section 6.2.3 a listing of new locations for dose calculation and/or environmental monitoring identified by the land use census shall be included in the Annual Radioactive Effluent Release Report.

During the reporting period, no changes in Dose Calculation Receptor Locations and/or the Environmental Monitoring were required based on the results of the land use census.

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ATTACHMENT NO. 4

**DEVIATIONS FROM THE REQUIRED
ENVIRONMENTAL SAMPLING SCHEDULE**

In accordance with the James A. FitzPatrick Nuclear Power Plant Offsite Dose Calculation Manual (ODCM), Part 1, Radiological Effluent Controls Section 6.2.7, the cause for the unavailability of any environmental samples required during the report period shall be included in the Annual Radioactive Effluent Release Report.

The following reports samples that were a deviation in 2023 from the requirements of ODCM Part 1, Table 5.1-1. ODCM Part Section 5.1.3.1 of the JAFNPP ODCM, Section D 6.9.1.d of the NMP1 ODCM and Section D 4.1.2 of the NMP2 ODCM. allows for deviations from the program due to hazardous conditions, seasonal unavailability, theft, uncooperative residents, or to a malfunction of automatic sampling equipment.

A. ODCM Program Deviations

The following are deviations from the program specified by the ODCM:

Air Station R-3 Offsite had a loss of continuous sampling during the following time periods:

- 113 hours between 10/17/23 and 10/24/23
- 2 hours between 11/07/23 and 11/14/23
- 13 hours between 11/21/23 and 11/28/23
- 73 hours between 12/27/23 and 01/02/24

Air Station R-4 Offsite had a loss of continuous sampling during the following time periods:

- 165 hours between 07/15/23 and 07/31/23, which resulted in the required lower limit of detection (LLD) for the sample of 1.0E-02 pCi/m3 not being met. The issue was due to a tripped breaker which was reset and replaced by the station.
- 2 hours between 11/07/23 and 11/14/23

Air Station R-5 Offsite has a loss of continuous sampling for 48 hours between 10/08/23 and 10/10/23.

At optional Air Station E Offsite, no sampling occurred between 07/11/23 and 07/26/23 due to work being performed in the area by National Grid that required de-energizing the power supply.

At optional Air Station K-ON, no sampling occurred between 03/20/23 and 03/28/23 due to an equipment malfunction.

Action requests pertaining to effluents were submitted for tracking purposes.

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Air Sampling Station Operability Assessment:

The ODCM required air sampling program consists of five individual sampling locations. The collective operable time period for the air monitoring stations was 43,384 hours out of a possible 43,800 hours. The air sampling availability factor for the report period was 99.1%.

Air sampling equipment found inoperable were returned to service. Identification of locations for obtaining replacement samples were not required.

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ATTACHMENT NO. 5

ANNUAL SUMMARY OF HOURLY METEOROLOGICAL DATA

The James A. FitzPatrick Nuclear Power Plant Offsite Dose Calculation Manual (ODCM), Part 1, Radiological Effluent Controls Section 6.2 and 6.2.2 states in part: The Annual Radioactive Effluent Release Report submitted prior to May 1 of each year may include an annual summary of meteorological data collected over the previous year. If the meteorological data is not included, the licensee shall retain it on file and provide it to the U.S. Nuclear Regulatory Commission upon request.

In accordance with the aforementioned ODCM requirement, meteorological data is not included in this report. It is retained on file and is available upon request.

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ATTACHMENT NO. 6

**MAJOR MODIFICATIONS TO RADIOACTIVE LIQUID,
GASEOUS AND SOLID WASTE TREATMENT SYSTEMS**

In accordance with the James A. FitzPatrick Nuclear Power Plant Offsite Dose Calculation Manual (ODCM), Part 1 Radiological Effluent Controls Section 7.0, Major Modifications to Radioactive Waste Treatment Systems (liquid, gaseous and solid) shall be reported in the Annual Radioactive Effluent Release Report for the period in which the modification is completed and made operational.

There were no major modifications to any liquid, gaseous, or solid radioactive waste treatment systems.

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ATTACHMENT NO. 7

ONSITE GROUNDWATER MONITORING

In response to the Nuclear Energy Institute (NEI) Groundwater Protection Initiative, James A. FitzPatrick (JAF) instituted a groundwater monitoring program in 2007. JAF's Groundwater Monitoring Well Program consists of twenty-two wells which are sampled quarterly.

The current JAF RGPP sample location designations include Background, Long-Term Shutdown, Mid-Field, Perimeter, Source, and Idle wells. Sample frequency and analyses are outlined below:

- Background – Annually for tritium; and every two years for gamma-radionuclide analyses.
- Long-Term Shutdown – Quarterly for tritium; annually for Fe-55, Ni-63, Sr-89, and Sr-90 analyses; and every two years for gamma-radionuclide and gross-alpha (dissolved and suspended).
- Midfield – Semi-annually for tritium, and every two years for gamma-radionuclide analysis.
- Perimeter - Annually for tritium, and every two years for gamma-radionuclide analyses.
- Source – Quarterly for tritium analysis; annually for Sr- 89, and Sr-90 analyses; every two years for gamma-radionuclide, and gross-alpha (dissolved and suspended); and every five years for Fe-55 and Ni-63.
- Idle – Groundwater monitoring well locations that are currently not actively being sampled but are available for future use.

The JAF modified RGPP sampling network consists of twenty-two wells (seven Background wells, eleven Source wells, two Midfield wells, and two Perimeter wells). The changes account for historic tritium results, location of wells and SSCs, additional wells in close proximity, groundwater flow, and lithology.

All Groundwater Monitoring Well samples collected in 2023 yielded results less than the detection limits established in the JAF Offsite Dose Calculation Manual (ODCM) Part 1, Table 5.1-3. Gross beta analysis is not required per EN-AA-408-4000 and EN-JF-408-4160.

A summary of the RGPP required analyses are below:

- The maximum tritium concentration reported in 2023 was 355 pCi/L (MW-4A in 4th quarter).
- Gamma-radionuclide, analysis was most recently performed during the 2nd quarter 2022 RGPP sampling round. The next time gamma-radionuclide analysis will be performed is 2024.
- Sr-89 and Sr-90 analysis was performed on samples collected from source designated wells during the 3rd quarter 2023 RGPP sampling round. No detections of Sr-89 and Sr-90 were reported in the samples collected during the 3rd quarter 2023 RGPP sampling round.
- Gross-alpha analysis was most recently performed during the 1st quarter 2022 RGPP sampling round. The next time gross-alpha analysis will be performed is 2024.

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- Samples collected from Source designated wells were analyzed for hard-to-detects (Fe-55 and Ni-63) in 2021. Source designated wells will have Fe-55 and Ni-63 analysis performed again in 2026.
- There are no indications of an active source of tritium to groundwater.

No drinking water pathway exists at the JAF site under normal operating conditions due to the direction and distance of the nearest water intake (Oswego, 8.5 miles west of the JAF discharge). There is no potential to influence any offsite drinking well.

In conclusion, there were no plant related isotopes detected in groundwater monitoring wells during 2023 that are attributable to James A. FitzPatrick, and all concentrations were below any reporting criteria.

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ATTACHMENT NO. 7 (continued)

ONSITE GROUNDWATER MONITORING

A) Gamma Isotopic Monitoring

Monitoring wells were most recently sampled for gamma emitting radionuclides in 2022. All sample results were below the required lower limits of detection in accordance with the Offsite Dose Calculation Manual (ODCM) Part 1, Table 5.1-3 as provided below.

Radionuclide	LLD Value (pCi/L)
Gross Beta	4
Tritium (H-3)	3000
Manganese-54	15
Cobalt-58	15
Iron-59	30
Cobalt-60	15

Radionuclide	LLD Value (pCi/L)
Zinc-65	30
Zirconium /Niobium-95	15
Iodine-131	15
Cesium-134	15
Cesium-137	18
Barium/Lanthanum-140	15

There were no plant related gamma emitting nuclides detected in 2022 samples.

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ATTACHMENT NO. 7 (continued)

ONSITE GROUNDWATER MONITORING

B) 2023 Tritium Summary

Well Name	# Samples	# Samples >3000 pCi/L	Minimum Positive Concentration	Maximum Positive Concentration
MW-1A	4	0	<182	<195
MW-1B	1	0	<189	<189
MW-2A	4	0	<193	274
MW-2B	2	0	<190	<195
MW-3A	4	0	255	345
MW-3B	2	0	224	268
MW-4A	4	0	<185	355
MW-4B	4	0	<181	<195
MW-5	1	0	203	203
MW-6	4	0	277	325
MW-7	4	0	<197	284
MW-8	1	0	<181	<181
MW-9	1	0	<182	<182
MW-10A	1	0	<177	<177
MW-10B	1	0	<178	<178
MW-13	4	0	<178	303
MW-14	4	0	<182	193
MW-15	4	0	<184	<193
MW-16	4	0	<179	300
MW-19	1	0	<180	<180
MW-20	1	0	<182	<182
MW-21	1	0	<184	<184

Note 1: All results are in pCi/L.

Note 2: A total of 57 samples were analyzed for H-3 in 2023, all results were <LLD in accordance with the ODCM limits in Table 5.1-3.

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ATTACHMENT NO. 8

GASEOUS EFFLUENTS – CARBON-14

- a) **Date:** January 01, 2023 – December 31, 2023
- b) **Location:** Elevated Release – Main Stack
- c) **Duration:** 365 Days
- d) **Flow rate:** NA
- e) **Volume Released:** NA
- f) **Nuclides Released:** Carbon-14
- g) **Curies Released⁽¹⁾:**
- | <u>UNIT</u> | <u>QTR 1</u> | <u>QTR 2</u> | <u>QTR 3</u> | <u>QTR 4</u> |
|-------------|--------------|--------------|--------------|--------------|
| Ci | 2.67E+00 | 2.69E+00 | 2.73E+00 | 2.72E+00 |
| μCi/sec | 3.44E-01 | 3.44E-01 | 3.44E-01 | 3.44E-01 |
- h) **Resultant Doses:** See Addendum 1—Assessment of Radiation Doses to the Public
January-December 2023 Table 1, Section D
- i) **Dose Calculations:** Doses were calculated in accordance with the Offsite Dose
Calculation Manual (ODCM) Part 2, Section 11.4.1

⁽¹⁾Curies released calculated using the methodology in EPRI Technical Report 1021106
“Estimation of Carbon-14 in Nuclear Power Plant Gaseous Effluents”.

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ATTACHMENT NO. 9

**EVENTS LEADING TO CONDITIONS WHICH RESULTED IN EXCEEDING
RADIOACTIVITY LIMITS.**

In accordance with the James A. FitzPatrick Nuclear Power Plant Offsite Dose Calculation Manual (ODCM), Part 1 Radiological Effluent Controls Section 6.2.9, the report shall contain the events leading to the conditions which resulted in exceeding the radioactivity limits for the specified outdoor radioactive radwaste tanks specified in the Technical Requirements Manual, TRM 3.7.E

The radioactivity limits for the specified outdoor radioactive radwaste tanks were not exceeded.

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ADDENDUM 1

**ASSESSMENT OF RADIATION DOSES TO THE PUBLIC
JANUARY 2023- DECEMBER 2023**

1. INTRODUCTION

The James A. FitzPatrick Nuclear Power Plant Offsite Dose Calculation Manual (ODCM), Part 1 Radiological Effluent Controls, requires an assessment of the radiation doses to the likely most exposed member of the public due to radioactive liquid and gaseous effluents. This assessment of doses to the likely most exposed member of the public is based on accepted methodologies found in the Offsite Dose Calculation Manual (ODCM).

2. DOSE LIMITS

A. DOSE FROM LIQUID EFFLUENTS (ODCM, Part 1, Section 2.3)

Applicability

Applies to doses from radioactive material in liquid effluents.

Objective

To ensure that the dose limitations of 10 CFR 50, Appendix I, are met.

Controls

The dose to a member of the public from radioactive materials released from the plant in liquid effluents to Unrestricted Areas shall be limited as follows:

1. During any calendar quarter, limited 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.
2. During any calendar year, limited to less than or equal to 3 mrem to the whole body and to less than or equal to 10 mrem to any organ.

B. GASEOUS DOSE RATES (ODCM, Part 1, Section 3.2)

Applicability

Applies to the radiation dose from radioactive material in gaseous effluents.

Objective

To ensure that the dose rates at or beyond the site boundary from gaseous effluents do not exceed the annual dose limits of 10 CFR 20 for Unrestricted Areas.

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ADDENDUM 1 (continued)

Controls

The dose rate at or beyond the Site Boundary due to radioactive materials released from the plant in gaseous effluents shall be limited as follows:

1. Less than or equal to 500 mrem/year to the whole body and less than or equal to 3000 mrem/year to the skin from noble gases; and,
2. Less than or equal to 1500 mrem/year to any organ from Iodine-131, Iodine-133, Tritium and for radioactive materials in particulate form with half-lives greater than 8 days (inhalation pathway only).

C. AIR DOSE, NOBLE GASES (ODCM, Part 1, Section 3.3)

Applicability

Applies to the air dose due to noble gases in gaseous effluents.

Objective

To ensure that the noble gas dose limitations of 10 CFR 50, Appendix I, are met.

Control

The air dose to areas at or beyond the Site Boundary from noble gases released from the plant in gaseous effluents shall be limited:

1. During any calendar quarter, to less than or equal to 5 mrad from gamma radiation, and less than or equal to 10 mrad from beta radiation; and,
2. During any calendar year, to less than or equal to 10 mrad from gamma radiation and less than or equal to 20 mrad from beta radiation.

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ADDENDUM 1 (continued)

D. DOSE DUE TO IODINE-131, IODINE-133, TRITIUM AND RADIONUCLIDES IN PARTICULATE FORM (ODCM, Part 1, Section 3.4)

Applicability

Applies to the cumulative dose from Iodine-131, Iodine-133, Tritium, and radionuclides in particulate form with half-lives greater than 8 days in gaseous effluents.

Objective

To ensure that the dose limitations of 10 CFR 50, Appendix I, are met.

Controls

The dose to a member of the public at or beyond the Site Boundary from Iodine-131, Iodine-133, Tritium, and radionuclides in particulate form with half-lives greater than 8 days released from the plant in gaseous effluents shall be limited:

- a. During any calendar quarter to less than or equal to 7.5 mrem to any organ; and,
- b. During any calendar year to less than or equal to 15 mrem to any organ.
- c. Less than 0.1% of the limits of ODCM Part 1, Section 3.4, Specifications 3.4.1.1 and 3.4.1.2 as a result of burning contaminated oil.

E. TOTAL DOSE FROM URANIUM FUEL CYCLE (ODCM, Part 1, Section 4.1)

Applicability

Applies to radiation dose from releases of radioactivity and radiation from uranium fuel cycle sources.

Objective

1. To assure that the requirements of 40 CFR 190 are met.
2. To assure that the requirements of 10 CFR 72.104 are met in accordance with Section 3.2.3, Required Action A.2, Certificate of Compliance 1014 Appendix A, Technical Specifications for the Hi-Storm 100 Cask System.

Controls

The dose or dose commitment to any member of the public, due to releases of radioactivity and radiation, from uranium fuel cycle sources shall be limited as follows:

1. Less than or equal to 25 mrem/year to the whole body; and,
2. Less than or equal to 25 mrem/year to any organ except the thyroid which shall be limited to less than or equal to 75 mrem/year.

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ADDENDUM 1 (continued)

3. DOSE ASSESSMENT

A. METHODOLOGY

The assessment of radiation doses to the public due to radioactive liquid and gaseous effluents is performed in accordance with the ODCM. The ODCM is based on methodologies and models suggested by the Guidance Manual For "Preparation of Radiological Effluent Technical Specifications for Nuclear Power Plants" (NUREG-0133) and "Calculation of Annual Doses to Man from Routine Releases of Reactor Effluents for the Purpose of Evaluating Compliance with 10CFR50, Appendix I" (Regulatory Guide 1.109).

B. ASSUMPTIONS

Dose calculations are performed using formulas and constants defined in the ODCM. Specific radioactive release activities used in the dose calculations are listed in the Annual Radioactive Effluent Release Report (1.21 Report) for the period of January 1, 2023 to December 31, 2023. Historical meteorological data was used to generate tables of average dispersion factors. Locations of interest were identified from the 2023 land use census. These tables are available upon request.

C. ASSESSMENT RESULTS SUMMARY

The calculated doses to the public due to radioactive effluents are listed in Table 1. The calculated doses are small fractions of their respective dose limits.

4. 40 CFR 190 DOSE ASSESSMENT

A. METHODOLOGY

Evaluation to demonstrate compliance with the 40 CFR 190 dose limits must be performed when the doses calculated for 10 CFR 50 compliance exceed twice their respective limits. When additional dose assessment is required to demonstrate compliance with 40 CFR 190 it is performed in accordance with the ODCM.

B. RESULTS SUMMARY

The cumulative dose contribution from liquid and gaseous effluents for this report period were calculated and are listed in Table 1. The cumulative dose contribution from direct radiation from the reactor unit and from radwaste storage tanks is measured by environmental thermoluminescent dosimeters for the report period. This data is contained in the Annual Environmental Operating Report. The calculated doses from liquid and gaseous effluents are less than twice their respective 10 CFR 50 limits; therefore, additional calculations are not necessary to demonstrate compliance with 40 CFR 190 dose limits.

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ADDENDUM 1 (continued)

TABLE 1
ANNUAL DOSE ASSESSMENT 2023

A. LIQUIDS

<u>QUARTER</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>ANNUAL</u>
	(a)	(a)	(a)	(a)	(a)
Organ (mrem)	2.71E-06	1.20E-06	2.26E-06	7.17E-07	6.89E-06
% of Limit	5.42E-05	2.40E-05	4.53E-05	1.43E-05	6.89E-05
	(b)	(b)	(b)	(b)	(b)
Whole Body (mrem)	2.71E-06	1.20E-06	2.26E-06	7.17E-07	6.89E-06
% of Limit	1.81E-04	8.00E-05	1.51E-04	4.78E-05	4.59E-04

(a) Dose to the Child Liver.

(b) Dose to the Child Whole Body.

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ADDENDUM 1 (continued)

TABLE 1 (cont)
ANNUAL DOSE ASSESSMENT 2023

B. NOBLE GASES

<u>QUARTER</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>ANNUAL</u>
Total Body (mrem/yr)	2.07E-03	4.41E-03	2.49E-03	1.81E-03	1.08E-02
% of Limit	4.13E-04	8.82E-04	4.97E-04	3.62E-04	2.15E-03
Skin (mrem/yr)	4.63E-03	6.26E-03	4.37E-03	4.05E-03	4.00E-02
% of Limit	1.54E-04	2.09E-04	1.46E-04	1.35E-04	1.33E-03
Gamma (mrad)	1.32E-04	1.83E-04	3.22E-04	2.13E-04	8.49E-04
% of Limit	2.65E-03	3.66E-03	6.44E-03	4.25E-03	8.49E-03
Beta (mrad)	1.42E-05	1.86E-05	2.64E-05	1.90E-05	7.82E-05
% of Limit	1.42E-04	1.86E-04	2.64E-04	1.90E-04	3.91E-04

C. IODINES AND PARTICULATES

<u>QUARTER</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>ANNUAL</u>
	(a)	(a)	(a)	(a)	(a)
Organ (mrem)	2.04E-04	2.78E-04	9.14E-05	2.88E-04	8.62E-04
% of Limit	2.73E-03	3.71E-03	1.22E-03	3.84E-03	5.75E-03
	(a)	(a)	(a)	(a)	(a)
Organ Dose Rate (mrem/yr)	4.86E-04	2.23E-03	4.19E-04	1.19E-03	4.33E-03
% of Limit	3.24E-05	1.49E-04	2.79E-05	7.93E-05	2.89E-04

(a) Dose to the Child Thyroid.

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ADDENDUM 1 (continued)

TABLE 1 (cont)
ANNUAL DOSE ASSESSMENT 2023

D. CARBON 14

<u>QUARTER</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>ANNUAL</u>
	(a)	(a)	(a)	(a)	(a)
Organ (mrem)	8.42E-03	8.48E-03	8.61E-03	8.59E-03	3.41E-02
% of Limit	1.14E-01	1.13E-01	1.15E-01	1.15E-01	2.27E-01
					(a)
Organ Dose Rate (mrem/yr)	NA	NA	NA	NA	3.41E-02
% of Limit	NA	NA	NA	NA	2.27E-03

(a) Dose to the Child Bone.