

**Edwin I. Hatch Nuclear Plant
Joseph M. Farley Nuclear Plant
Vogtle Electric Generating Plant
Annual Radioactive Effluent Release Reports for 2011**

Enclosure 2

Farley Annual Radioactive Effluent Release Report for 2011

SOUTHERN NUCLEAR OPERATING COMPANY
FARLEY NUCLEAR PLANT UNIT NO. ONE
LICENSE NO. NPF-2
AND
FARLEY NUCLEAR PLANT UNIT NO. TWO
LICENSE NO. NPF-8

ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT
CALENDAR YEAR 2011

FARLEY NUCLEAR PLANT
ANNUAL RADIOACTIVE EFFLUENT
RELEASE REPORT

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1.0 LIQUID EFFLUENTS

This section contains applicable ODCM limits for liquid effluents as well as the quantities of radioactive liquid effluents released during 2011. These quantities are summarized on a quarterly basis and include any unplanned releases. A tabulation of the total body and organ doses which were calculated in accordance with ODCM 2.4 are presented to show conformance with the limits of ODCM 2.1.3.

1.1 Regulatory Requirements

1.1.1 Concentration Limits

Technical Specifications 5.5.4.b and 5.5.4.c state that the concentration of radioactive material released in liquid effluents to UNRESTRICTED AREAS (see ODCM Figure 10-1) shall be limited at all times to ten times the concentrations specified in 10CFR20, Appendix B, Table 2, Column 2 for radionuclides other than dissolved or entrained noble gases. For dissolved or entrained noble gases, the concentration shall be limited to 1.0E-04 uCi/ml total activity.

1.1.2 Dose Limits

Technical Specifications 5.5.4.d and 5.5.4.e state that the dose or dose commitment to a MEMBER OF THE PUBLIC from radioactive materials in liquid effluents released, from each unit, to UNRESTRICTED AREAS (see ODCM Figure 10-1) shall be limited:

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

1.2 Effluent Concentration Limit (ECL)

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 10CFR Part 20, Appendix B, Table 2, Column 2. A tolerance factor of up to 10 is utilized to allow flexibility in establishing practical monitor setpoints which can accommodate effluent releases at concentrations higher than the ECL values stated in 10CFR20, Appendix B, Table 2, Column 2.

For dissolved or entrained noble gases in liquid radwaste, the ECL is 1.0E-04 uCi/ml total activity.

For gross alpha in liquid radwaste, the ECL is 2.0E-09 uCi/ml.

Furthermore, for all the above radionuclides, or categories of radioactivity, the overall ECL fraction is determined in accordance with 10CFR Part 20, Appendix B.

1.3 Measurements and Approximation of Total Radioactivity

The radionuclides listed below are considered when evaluating liquid effluents:

MN-54	CS-134
FE-59	CS-137
CO-58	CE-141
CO-60	CE-144
ZN-65	MO-99
SR-89	FE-55
SR-90	H-3
I-131	

1.3.1 Total Radioactivity Determination

Batch Releases: Representative pre-release grab samples are obtained and analyzed in accordance with ODCM Table 2-3. Isotopic analyses are performed using the computerized pulse height analysis system utilizing high resolution germanium detectors. Isotopic values thus obtained are used for release rate calculations as specified in the ODCM. Only those nuclides that are detected are used in the calculations. All Strontium and Iron-55 samples are sent offsite to the Georgia Power Environmental Laboratory for analysis. Gross beta and gross alpha determinations are made using 2 pi gas flow proportional counters. Tritium determinations are made using liquid scintillation techniques. Dissolved gases are determined employing grab sampling techniques and then counting on the pulse height analyzer.

The sample analyses results are used along with the ECL values to determine the ECL fraction for the planned release. The ECL fraction is then used, with the appropriate safety factors, and the expected dilution stream flow, to calculate the 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 automatic termination of the liquid radwaste discharge.

Radionuclide concentrations, safety factors, dilution stream flow rate, and liquid effluent radiation monitor calibration factors are used by the computer to generate a pre-release printout. If the release is not permissible, appropriate warnings will be displayed on the computer screen and on the printout. If the release is permissible, it is approved by a Chemistry Technician. The release permit is transferred from the Chemistry Department to the Operations Department for release. When the release is completed, the actual release data are provided to the Chemistry Department. These release data, including release rate and release duration, are input into the computer and a post-release printout is generated. This printout contains the actual release rates, radionuclide concentrations and quantities, dilution flow, and calculated doses to an individual.

Continuous Releases: Continuous releases are analogous to batch releases except that they are analyzed on a weekly composite basis in accordance with ODCM Table 2-3.

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

1.3.2 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%.

1.4 Liquid Effluent Release Data

Summaries of all radioactive liquid effluents released from Units 1 and 2 during 2011 are presented in accordance with Regulatory Guide 1.21 Tables 2A and 2B. Information required by Table 2A is found in this report in Tables 1-1A, 1-1B, and 1-1C; Table 2-B information is presented in Tables 1-2A, 1-2B, and 1-2C. Data is presented on a quarterly basis as required by Regulatory Guide 1.21 for all four quarters.

1.5 Radiological Impact Due to Liquid Releases

The total body and organ doses for Units 1 and 2 are provided in the following tables in order to show conformance with the limits of ODCM 2.1.3:

Unit 1 2011 Doses to a Member of the Public due to Liquid Releases:
Table 1-3A

Unit 2 2011 Doses to a Member of the Public due to Liquid Releases:
Table 1-3B

1.6 Liquid Effluents - Batch Releases

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

Unit 1 2011 Liquid Effluents - Batch Release Summary: Table 1-5A

Unit 2 2011 Liquid Effluents - Batch Release Summary: Table 1-5B

1.7 Liquid Effluents - Abnormal Releases

There was one abnormal release during 2011. A Unit 1 Component Cooling Water (CCW) heat exchanger experienced a leak of CCW into the service water side. No limits were exceeded due to this abnormal release. The details of this event are included in Condition Report 384280.

Abnormal release information for Units 1 and 2 is summarized in the following tables:

Unit 1 2011 Liquid Effluents - Abnormal Release Summary: Table 1-6A

Unit 2 2011 Liquid Effluents - Abnormal Release Summary: Table 1-6B

Table 1-1A
Joseph M Farley Nuclear Plant
RADIOACTIVE EFFLUENT RELEASE REPORT - 2011
Liquid Effluents - Summation of All Releases
Unit: 1
Starting: 1-Jan- 2011 Ending: 31-Dec-2011

<u>Type of Effluent</u>	<u>Units</u>	<u>1ST Quarter</u>	<u>2ND Quarter</u>	<u>3RD Quarter</u>	<u>4TH Quarter</u>
A. Fission And Activation Products					
1. Total Release (not including tritium, gases, alpha)	Curies	9.24E-03	1.65E-02	2.17E-02	6.90E-03
2. Average diluted concentration during period	uCi/mL	9.38E-09	2.65E-08	2.28E-08	4.66E-09
3. Percent of Applicable Limit	%	*	*	*	*
B. Tritium					
1. Total Release	Curies	7.12E+01	1.14E+02	1.85E+02	1.54E+02
2. Average diluted Concentration during period	uCi/mL	7.23E-05	1.84E-04	1.95E-04	1.04E-04
3. Percent of Applicable Limit	%	*	*	*	*
C. Dissolved and Entrained Gases					
1. Total Release	Curies	6.27E-06	5.67E-05	2.98E-04	2.89E-04
2. Average diluted Concentration during period	uCi/mL	6.37E-12	9.12E-11	3.14E-10	1.95E-10
3. Percent of Applicable Limit	%	*	*	*	*
D: Gross Alpha Radioactivity					
1. Total Release	Curies	0.00E+00	0.00E+00	3.82E-07	0.00E+00
E: Waste Vol Release (Pre-Dilution)					
	Liters	1.31E+06	7.23E+05	9.73E+05	1.06E+06
F. Volume of Dilution Water Used					
	Liters	9.84E+08	6.20E+08	9.48E+08	1.48E+09

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

Table 1-1B
Joseph M Farley Nuclear Plant
RADIOACTIVE EFFLUENT RELEASE REPORT - 2011
Liquid Effluents - Summation of All Releases
Unit: 2
Starting: 1-Jan- 2011 Ending: 31-Dec-2011

Type of Effluent	Units	1ST Quarter	2ND Quarter	3RD Quarter	4TH Quarter
A. Fission And Activation Products					
1. Total Release (not including tritium, gases, alpha)	Curies	3.04E-02	3.10E-02	5.61E-02	9.27E-03
2. Average diluted concentration during period	uCi/mL	3.56E-08	3.42E-08	3.62E-08	8.40E-09
3. Percent of Applicable Limit	%	*	*	*	*
B. Tritium					
1. Total Release	Curies	1.89E+02	1.61E+02	1.77E+02	5.42E+01
2. Average diluted Concentration during period	uCi/mL	2.22E-04	1.78E-04	1.14E-04	4.92E-05
3. Percent of Applicable Limit	%	*	*	*	*
C. Dissolved and Entrained Gases					
1. Total Release	Curies	4.96E-05	5.21E-05	7.15E-04	2.36E-04
2. Average diluted Concentration during period	uCi/mL	5.81E-11	5.75E-11	4.61E-10	2.14E-10
3. Percent of Applicable Limit	%	*	*	*	*
D: Gross Alpha Radioactivity					
1. Total Release	Curies	0.00E+00	0.00E+00	6.30E-07	0.00E+00
E: Waste Vol Release (Pre-Dilution)					
	Liters	1.15E+06	9.66E+05	1.51E+06	1.25E+06
F. Volume of Dilution Water Used					
	Liters	8.53E+08	9.05E+08	1.55E+09	1.10E+09

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

Table 1-1C
Joseph M Farley Nuclear Plant
RADIOACTIVE EFFLUENT RELEASE REPORT - 2011
Liquid Effluents - Summation of All Releases
Unit: Site
Starting: 1-Jan- 2011 Ending: 31-Dec-2011

Type of Effluent	Units	1ST Quarter	2ND Quarter	3RD Quarter	4TH Quarter
A. Fission And Activation Products					
1. Total Release (not including tritium, gases, alpha)	Curies	3.96E-02	4.75E-02	7.78E-02	1.62E-02
2. Average diluted concentration during period	uCi/mL	2.15E-08	3.11E-08	3.11E-08	6.26E-09
3. Percent of Applicable Limit	%	*	*	*	*
B. Tritium					
1. Total Release	Curies	2.60E+02	2.75E+02	3.62E+02	2.08E+02
2. Average diluted Concentration during period	uCi/mL	1.42E-04	1.80E-04	1.45E-04	8.05E-05
3. Percent of Applicable Limit	%	*	*	*	*
C. Dissolved and Entrained Gases					
1. Total Release	Curies	5.59E-05	1.09E-04	1.01E-03	5.25E-04
2. Average diluted Concentration during period	uCi/mL	3.04E-11	7.12E-11	4.05E-10	2.03E-10
3. Percent of Applicable Limit	%	*	*	*	*
D: Gross Alpha Radioactivity					
1. Total Release	Curies	0.00E+00	0.00E+00	1.01E-06	0.00E+00
E: Waste Vol Release (Pre-Dilution)					
	Liters	2.45E+06	1.69E+06	2.48E+06	2.30E+06
F. Volume of Dilution Water Used					
	Liters	1.84E+09	1.53E+09	2.50E+09	2.58E+09

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

Table 1-2A
Joseph M Farley Nuclear Plant
RADIOACTIVE EFFLUENT RELEASE REPORT - 2011
Liquid Effluents
Unit: 1
Starting: 1-Jan- 2011 Ending: 31-Dec-2011

Continuous Mode					
Nuclides Released	Units	1ST Quarter	2ND Quarter	3RD Quarter	4TH Quarter
Fission & Activation Products					
No Nuclides Found	Curies	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Tritium					
No Nuclides Found	Curies	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Dissolved And Entrained Gases					
No Nuclides Found	Curies	0.00E+00	0.00E+00	0.00E+00	0.00E+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
Joseph M Farley Nuclear Plant
RADIOACTIVE EFFLUENT RELEASE REPORT - 2011
Liquid Effluents
Unit: 1
Starting: 1-Jan- 2011 Ending: 31-Dec-2011

Nuclides Released	Units	Batch Mode			
		1ST Quarter	2ND Quarter	3RD Quarter	4TH Quarter
Fission & Activation Products					
As-76	Curies	3.61E-05	0.00E+00	0.00E+00	6.46E-06
Br-84	Curies	3.30E-06	0.00E+00	0.00E+00	0.00E+00
Co-57	Curies	3.46E-07	0.00E+00	0.00E+00	0.00E+00
Co-58	Curies	2.61E-03	1.36E-03	2.58E-04	3.47E-04
Co-60	Curies	9.04E-04	5.24E-04	1.68E-03	1.28E-03
Cr-51	Curies	2.10E-05	0.00E+00	0.00E+00	8.45E-05
Fe-55	Curies	1.06E-04	4.53E-04	5.16E-04	1.61E-04
Fe-59	Curies	1.90E-06	0.00E+00	0.00E+00	0.00E+00
I-132	Curies	2.63E-05	0.00E+00	5.04E-07	0.00E+00
Mn-54	Curies	5.78E-06	2.46E-06	5.62E-06	1.45E-05
Nb-95	Curies	8.43E-05	1.08E-05	2.06E-06	2.11E-05
Nb-97	Curies	4.63E-07	6.90E-06	0.00E+00	0.00E+00
Ni-56	Curies	4.44E-06	3.61E-06	1.09E-06	1.85E-05
Rb-86	Curies	7.88E-06	0.00E+00	0.00E+00	0.00E+00
Sr-90	Curies	0.00E+00	2.85E-06	0.00E+00	4.75E-06
Sr-92	Curies	0.00E+00	0.00E+00	6.55E-07	0.00E+00
Y-91M	Curies	4.68E-07	0.00E+00	0.00E+00	0.00E+00
Zn-65	Curies	1.60E-05	4.24E-06	9.34E-05	5.31E-05
Zr-95	Curies	2.80E-05	0.00E+00	0.00E+00	5.60E-06
Ba-140	Curies	0.00E+00	0.00E+00	1.99E-06	0.00E+00
Cd-109	Curies	0.00E+00	0.00E+00	2.38E-05	0.00E+00
Cd-115	Curies	0.00E+00	0.00E+00	0.00E+00	2.63E-07
Cs-137	Curies	7.67E-06	4.41E-05	6.02E-05	3.25E-05
La-142	Curies	2.16E-06	0.00E+00	4.30E-06	0.00E+00
Pr-146	Curies	0.00E+00	0.00E+00	9.35E-07	0.00E+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
Joseph M Farley Nuclear Plant
RADIOACTIVE EFFLUENT RELEASE REPORT - 2011

Liquid Effluents

Unit: 1

Starting: 1-Jan- 2011 Ending: 31-Dec-2011

Nuclides Released	Units	Batch Mode			
		1ST Quarter	2ND Quarter	3RD Quarter	4TH Quarter
Rh-105	Curies	0.00E+00	0.00E+00	0.00E+00	4.46E-05
Sb-124	Curies	2.97E-05	2.16E-05	0.00E+00	0.00E+00
Sb-125	Curies	5.28E-04	6.68E-04	3.00E-03	3.93E-04
Te-127	Curies	0.00E+00	0.00E+00	0.00E+00	2.33E-05
Te-132	Curies	8.28E-06	0.00E+00	5.24E-07	0.00E+00
Ag-108M	Curies	0.00E+00	0.00E+00	2.58E-05	9.68E-06
Ag-110M	Curies	3.05E-06	0.00E+00	0.00E+00	0.00E+00
In-115M	Curies	0.00E+00	0.00E+00	0.00E+00	2.73E-07
Sn-117M	Curies	0.00E+00	2.35E-06	0.00E+00	3.86E-06
Te-125M	Curies	4.81E-03	1.34E-02	1.60E-02	4.39E-03
Total For Period	Curies	9.24E-03	1.65E-02	2.17E-02	6.90E-03
Tritium					
H-3	Curies	7.12E+01	1.14E+02	1.85E+02	1.54E+02
Dissolved And Entrained Gases					
Ar-41	Curies	6.27E-06	0.00E+00	0.00E+00	1.45E-05
Xe-133	Curies	0.00E+00	4.58E-05	2.97E-04	2.75E-04
Xe-135	Curies	0.00E+00	0.00E+00	1.08E-06	0.00E+00
Xe-133M	Curies	0.00E+00	1.09E-05	0.00E+00	0.00E+00
Total For Period	Curies	6.27E-06	5.67E-05	2.98E-04	2.89E-04

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

Table 1-2B

**Joseph M Farley Nuclear Plant
RADIOACTIVE EFFLUENT RELEASE REPORT - 2011**

Liquid Effluents

Unit: 2

Starting: 1-Jan-2011 Ending: 31-Dec-2011

Nuclides Released	Unit	Continuous Mode			
		1ST Quarter	2ND Quarter	3RD Quarter	4TH Quarter
Fission & Activation Products					
No Nuclides Found	Curies	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Tritium					
No Nuclides Found	Curies	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Dissolved And Entrained Gases					
No Nuclides Found	Curies	0.00E+00	0.00E+00	0.00E+00	0.00E+00

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

Table 1-2B

**Joseph M Farley Nuclear Plant
RADIOACTIVE EFFLUENT RELEASE REPORT - 2011**

Liquid Effluents

Unit: 2

Starting: 1-Jan-2011 Ending: 31-Dec-2011

Nuclides Released	Unit	Batch Mode			
		1ST Quarter	2ND Quarter	3RD Quarter	4TH Quarter
Fission & Activation Products					
Be-7	Curies	3.44E-05	1.26E-05	5.57E-06	1.86E-05
Y-92	Curies	0.00E+00	0.00E+00	0.00E+00	7.66E-06
Y-93	Curies	0.00E+00	0.00E+00	3.55E-06	0.00E+00
Y-94	Curies	1.91E-06	0.00E+00	0.00E+00	0.00E+00
As-76	Curies	1.99E-04	0.00E+00	0.00E+00	1.26E-06
Br-84	Curies	0.00E+00	1.37E-06	0.00E+00	0.00E+00
Co-57	Curies	3.62E-06	0.00E+00	0.00E+00	2.89E-07
Co-58	Curies	4.02E-03	3.01E-03	9.26E-04	9.00E-04
Co-60	Curies	1.06E-03	1.41E-03	3.79E-03	2.10E-03
Cr-51	Curies	3.19E-05	7.77E-05	2.16E-05	1.33E-04
Fe-55	Curies	1.67E-04	2.69E-05	1.36E-03	2.15E-04
Fe-59	Curies	5.64E-07	0.00E+00	0.00E+00	8.85E-07
I-132	Curies	2.72E-05	0.00E+00	0.00E+00	0.00E+00
I-133	Curies	0.00E+00	4.12E-06	0.00E+00	0.00E+00
Mn-54	Curies	4.92E-06	5.33E-06	1.59E-05	1.12E-05
Mn-56	Curies	0.00E+00	0.00E+00	0.00E+00	1.15E-06
Na-24	Curies	4.19E-05	1.73E-05	0.00E+00	1.35E-06
Nb-95	Curies	4.05E-06	6.56E-06	7.12E-06	9.21E-05
Nb-97	Curies	2.90E-06	1.36E-05	5.87E-06	1.30E-04
Ni-56	Curies	1.86E-05	4.28E-06	9.82E-06	3.17E-05
Rb-86	Curies	2.68E-05	0.00E+00	0.00E+00	0.00E+00
Sr-85	Curies	0.00E+00	0.00E+00	6.01E-07	0.00E+00
Sr-90	Curies	0.00E+00	0.00E+00	9.77E-06	0.00E+00
Sr-92	Curies	0.00E+00	1.94E-06	6.27E-07	0.00E+00
Y-91M	Curies	1.37E-06	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. - 12 -

Table 1-2B

**Joseph M Farley Nuclear Plant
RADIOACTIVE EFFLUENT RELEASE REPORT - 2011**

Liquid Effluents**Unit: 2****Starting: 1-Jan-2011 Ending: 31-Dec-2011**

Nuclides Released	Unit	Batch Mode			
		1ST Quarter	2ND Quarter	3RD Quarter	4TH Quarter
Zn-65	Curies	2.03E-05	5.93E-05	2.35E-04	1.02E-04
Zr-95	Curies	0.00E+00	0.00E+00	0.00E+00	3.27E-05
Zr-97	Curies	0.00E+00	0.00E+00	5.60E-07	0.00E+00
Ba-140	Curies	0.00E+00	5.98E-06	0.00E+00	0.00E+00
Cd-109	Curies	0.00E+00	0.00E+00	7.18E-05	0.00E+00
Cd-115	Curies	0.00E+00	0.00E+00	1.58E-06	0.00E+00
Ce-141	Curies	0.00E+00	0.00E+00	9.73E-07	0.00E+00
Cs-137	Curies	6.34E-05	1.70E-04	5.44E-05	7.12E-06
Eu-155	Curies	0.00E+00	3.31E-06	4.11E-06	0.00E+00
La-142	Curies	2.53E-07	1.73E-06	0.00E+00	0.00E+00
Rh-105	Curies	0.00E+00	3.34E-05	0.00E+00	4.53E-05
Sb-122	Curies	9.87E-06	0.00E+00	0.00E+00	0.00E+00
Sb-124	Curies	8.30E-05	7.99E-05	0.00E+00	2.19E-06
Sb-125	Curies	1.81E-03	1.23E-03	8.22E-03	5.11E-04
Sb-126	Curies	1.07E-06	0.00E+00	0.00E+00	0.00E+00
Sn-113	Curies	0.00E+00	0.00E+00	0.00E+00	2.58E-06
Tc-101	Curies	8.39E-07	0.00E+00	0.00E+00	0.00E+00
Tc-104	Curies	1.43E-06	0.00E+00	0.00E+00	0.00E+00
Tc-99M	Curies	1.33E-05	6.75E-06	0.00E+00	0.00E+00
Te-131	Curies	1.66E-07	0.00E+00	0.00E+00	0.00E+00
Te-132	Curies	3.92E-05	0.00E+00	3.80E-07	0.00E+00
Ag-108M	Curies	0.00E+00	1.11E-06	4.54E-05	1.77E-06
Ag-110M	Curies	0.00E+00	1.31E-05	0.00E+00	1.14E-05
In-115M	Curies	0.00E+00	0.00E+00	1.65E-06	0.00E+00

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

Table 1-2B
Joseph M Farley Nuclear Plant
RADIOACTIVE EFFLUENT RELEASE REPORT - 2011

Liquid Effluents

Unit: 2

Starting: 1-Jan- 2011 Ending: 31-Dec-2011

<u>Nuclides Released</u>	<u>Units</u>	<u>Batch Mode</u>			
		<u>1ST Quarter</u>	<u>2ND Quarter</u>	<u>3RD Quarter</u>	<u>4TH Quarter</u>
Sn-117M	Curies	5.21E-06	1.86E-06	0.00E+00	0.00E+00
Te-125M	Curies	2.27E-02	2.48E-02	4.13E-02	4.91E-03
Total For Period	Curies	3.04E-02	3.10E-02	5.61E-02	9.27E-03
<u>Tritium</u>					
H-3	Curies	1.89E+02	1.61E+02	1.77E+02	5.42E+01
<u>Dissolved And Entrained Gases</u>					
Ar-41	Curies	2.02E-06	0.00E+00	0.00E+00	1.52E-05
Kr-85	Curies	0.00E+00	0.00E+00	1.33E-04	0.00E+00
Xe-133	Curies	3.85E-05	2.19E-05	5.68E-04	2.21E-04
Xe-135	Curies	4.82E-07	0.00E+00	7.36E-07	0.00E+00
Xe-131M	Curies	8.67E-06	3.02E-05	0.00E+00	0.00E+00
Xe-133M	Curies	0.00E+00	0.00E+00	5.59E-06	0.00E+00
Xe-135M	Curies	0.00E+00	0.00E+00	8.21E-06	0.00E+00
Total For Period	Curies	4.96E-05	5.21E-05	7.15E-04	2.36E-04

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
Joseph M Farley Nuclear Plant
RADIOACTIVE EFFLUENT RELEASE REPORT - 2011
Liquid Effluents
Unit: Site
Starting: 1-Jan- 2011 Ending: 31-Dec-2011

Continuous Mode					
Nuclides Released	Units	1ST Quarter	2ND Quarter	3RD Quarter	4TH Quarter
Fission & Activation Products					
No Nuclides Found	Curies	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Tritium					
No Nuclides Found	Curies	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Dissolved And Entrained Gases					
No Nuclides Found	Curies	0.00E+00	0.00E+00	0.00E+00	0.00E+00

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

Table 1-2C
Joseph M Farley Nuclear Plant
RADIOACTIVE EFFLUENT RELEASE REPORT - 2011

Liquid Effluents

Unit: Site

Starting: 1-Jan- 2011 Ending: 31-Dec-2011

Nuclides Released	Units	Batch Mode			
		1ST Quarter	2ND Quarter	3RD Quarter	4TH Quarter
Fission & Activation Products					
Be-7	Curies	3.44E-05	1.26E-05	5.57E-06	1.86E-05
Y-92	Curies	0.00E+00	0.00E+00	0.00E+00	7.66E-06
Y-93	Curies	0.00E+00	0.00E+00	3.55E-06	0.00E+00
Y-94	Curies	1.91E-06	0.00E+00	0.00E+00	0.00E+00
As-76	Curies	2.35E-04	0.00E+00	0.00E+00	7.72E-06
Br-84	Curies	3.30E-06	1.37E-06	0.00E+00	0.00E+00
Co-57	Curies	3.97E-06	0.00E+00	0.00E+00	2.89E-07
Co-58	Curies	6.62E-03	4.36E-03	1.18E-03	1.25E-03
Co-60	Curies	1.97E-03	1.93E-03	5.47E-03	3.37E-03
Cr-51	Curies	5.29E-05	7.77E-05	2.16E-05	2.17E-04
Fe-55	Curies	2.74E-04	4.80E-04	1.87E-03	3.77E-04
Fe-59	Curies	2.47E-06	0.00E+00	0.00E+00	8.85E-07
I-132	Curies	5.34E-05	0.00E+00	5.04E-07	0.00E+00
I-133	Curies	0.00E+00	4.12E-06	0.00E+00	0.00E+00
Mn-54	Curies	1.07E-05	7.79E-06	2.15E-05	2.57E-05
Mn-56	Curies	0.00E+00	0.00E+00	0.00E+00	1.15E-06
Na-24	Curies	4.19E-05	1.73E-05	0.00E+00	1.35E-06
Nb-95	Curies	8.84E-05	1.73E-05	9.19E-06	1.13E-04
Nb-97	Curies	3.37E-06	2.05E-05	5.87E-06	1.30E-04
Ni-56	Curies	2.30E-05	7.89E-06	1.09E-05	5.01E-05
Rb-86	Curies	3.46E-05	0.00E+00	0.00E+00	0.00E+00
Sr-85	Curies	0.00E+00	0.00E+00	6.01E-07	0.00E+00
Sr-90	Curies	0.00E+00	2.85E-06	9.77E-06	4.75E-06
Sr-92	Curies	0.00E+00	1.94E-06	1.28E-06	0.00E+00
Y-91M	Curies	1.84E-06	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
Joseph M Farley Nuclear Plant
RADIOACTIVE EFFLUENT RELEASE REPORT - 2011

Liquid Effluents

Unit: Site

Starting: 1-Jan- 2011 Ending: 31-Dec-2011

Nuclides Released	Units	Batch Mode			
		1ST Quarter	2ND Quarter	3RD Quarter	4TH Quarter
Zn-65	Curies	3.63E-05	6.35E-05	3.28E-04	1.55E-04
Zr-95	Curies	2.80E-05	0.00E+00	0.00E+00	3.83E-05
Zr-97	Curies	0.00E+00	0.00E+00	5.60E-07	0.00E+00
Ba-140	Curies	0.00E+00	5.98E-06	1.99E-06	0.00E+00
Cd-109	Curies	0.00E+00	0.00E+00	9.56E-05	0.00E+00
Cd-115	Curies	0.00E+00	0.00E+00	1.58E-06	2.63E-07
Ce-141	Curies	0.00E+00	0.00E+00	9.73E-07	0.00E+00
Cs-137	Curies	7.11E-05	2.14E-04	1.15E-04	3.97E-05
Eu-155	Curies	0.00E+00	3.31E-06	4.11E-06	0.00E+00
La-142	Curies	2.42E-06	1.73E-06	4.30E-06	0.00E+00
Pr-146	Curies	0.00E+00	0.00E+00	9.35E-07	0.00E+00
Rh-105	Curies	0.00E+00	3.34E-05	0.00E+00	8.99E-05
Sb-122	Curies	9.87E-06	0.00E+00	0.00E+00	0.00E+00
Sb-124	Curies	1.13E-04	1.01E-04	0.00E+00	2.19E-06
Sb-125	Curies	2.34E-03	1.90E-03	1.12E-02	9.04E-04
Sb-126	Curies	1.07E-06	0.00E+00	0.00E+00	0.00E+00
Sn-113	Curies	0.00E+00	0.00E+00	0.00E+00	2.58E-06
Tc-101	Curies	8.39E-07	0.00E+00	0.00E+00	0.00E+00
Tc-104	Curies	1.43E-06	0.00E+00	0.00E+00	0.00E+00
Tc-99M	Curies	1.33E-05	6.75E-06	0.00E+00	0.00E+00
Te-127	Curies	0.00E+00	0.00E+00	0.00E+00	2.33E-05
Te-131	Curies	1.66E-07	0.00E+00	0.00E+00	0.00E+00
Te-132	Curies	4.75E-05	0.00E+00	9.04E-07	0.00E+00
Ag-108M	Curies	0.00E+00	1.11E-06	7.13E-05	1.14E-05
Ag-110M	Curies	3.05E-06	1.31E-05	0.00E+00	1.14E-05
In-115M	Curies	0.00E+00	0.00E+00	1.65E-06	2.73E-07

Zeroes in this table indicates that no radioactivity was present at detectable levels.

See Table 1-4 for typical minimum detectable concentrations. - 17 -

Table 1-2C
Joseph M Farley Nuclear Plant
RADIOACTIVE EFFLUENT RELEASE REPORT - 2011

Liquid Effluents

Unit: Site

Starting: 1-Jan- 2011 Ending: 31-Dec-2011

<u>Nuclides Released</u>	<u>Units</u>	<u>Batch Mode</u>			
		<u>1ST Quarter</u>	<u>2ND Quarter</u>	<u>3RD Quarter</u>	<u>4TH Quarter</u>
Sn-117M	Curies	5.21E-06	4.22E-06	0.00E+00	3.86E-06
Te-125M	Curies	2.75E-02	3.82E-02	5.73E-02	9.31E-03
Total For Period	Curies	3.96E-02	4.75E-02	7.78E-02	1.62E-02
<u>Tritium</u>					
H-3	Curies	2.60E+02	2.75E+02	3.62E+02	2.08E+02
<u>Dissolved And Entrained Gases</u>					
Ar-41	Curies	8.29E-06	0.00E+00	0.00E+00	2.97E-05
Kr-85	Curies	0.00E+00	0.00E+00	1.33E-04	0.00E+00
Xe-133	Curies	3.85E-05	6.77E-05	8.65E-04	4.95E-04
Xe-135	Curies	4.82E-07	0.00E+00	1.82E-06	0.00E+00
Xe-131M	Curies	8.67E-06	3.02E-05	0.00E+00	0.00E+00
Xe-133M	Curies	0.00E+00	1.09E-05	5.59E-06	0.00E+00
Xe-135M	Curies	0.00E+00	0.00E+00	8.21E-06	0.00E+00
Total For Period	Curies	5.59E-05	1.09E-04	1.01E-03	5.25E-04

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

**Joseph M Farley Nuclear Plant
 RADIOACTIVE EFFLUENT RELEASE REPORT - 2011
 Doses to a member of the public due to Liquid Releases
 Unit: 1
 Starting: 1-Jan-2011 Ending: 31-Dec-2011**

Cumulative Doses Per Quarter

Organ	ODCM Lmt	Units	1ST Qtr	% ODCM	2ND Qtr	% ODCM	3RD Qtr	% ODCM	4TH Qtr	% ODCM
Bone	5.00E+00	mRem	2.60E-03	5.20E-02	6.54E-03	1.31E-01	6.23E-03	1.25E-01	2.37E-03	4.75E-02
GI-Lli	5.00E+00	mRem	1.23E-02	2.46E-01	2.71E-02	5.41E-01	2.72E-02	5.44E-01	1.12E-02	2.24E-01
Kidney	5.00E+00	mRem	1.13E-02	2.25E-01	2.67E-02	5.35E-01	2.59E-02	5.17E-01	1.07E-02	2.14E-01
Liver	5.00E+00	mRem	2.08E-03	4.16E-02	3.93E-03	7.85E-02	4.37E-03	8.75E-02	3.03E-03	6.06E-02
Lung	5.00E+00	mRem	4.61E-03	9.23E-02	5.45E-03	1.09E-01	1.70E-02	3.39E-01	4.32E-03	8.63E-02
Thyroid	5.00E+00	mRem	1.81E-03	3.62E-02	3.34E-03	6.68E-02	3.77E-03	7.54E-02	2.76E-03	5.53E-02
Total Body	5.00E+00	mRem	1.52E-03	3.03E-02	2.45E-03	4.90E-02	2.98E-03	5.95E-02	2.56E-03	5.12E-02
Total Body	1.50E+00	mRem	1.52E-03	1.01E-01	2.45E-03	1.63E-01	2.98E-03	1.98E-01	2.56E-03	1.71E-01

Cumulative Doses per Year

Organ	ODCM Lmt	Units	Year to Ending Date	% ODCM	Receptor	Limit
Bone	1.00E+01	mRem	1.77E-02	1.77E-01	Maximum Individual Liquid	Liquid Effluent Organ Annual
GI-Lli	1.00E+01	mRem	7.78E-02	7.78E-01	Maximum Individual Liquid	Liquid Effluent Organ Annual
Kidney	1.00E+01	mRem	7.46E-02	7.46E-01	Maximum Individual Liquid	Liquid Effluent Organ Annual
Liver	1.00E+01	mRem	1.34E-02	1.34E-01	Maximum Individual Liquid	Liquid Effluent Organ Annual
Lung	1.00E+01	mRem	3.13E-02	3.13E-01	Maximum Individual Liquid	Liquid Effluent Organ Annual
Thyroid	1.00E+01	mRem	1.17E-02	1.17E-01	Maximum Individual Liquid	Liquid Effluent Organ Annual
Total Body	1.00E+01	mRem	9.50E-03	9.50E-02	Maximum Individual Liquid	Liquid Effluent Organ Annual
Total Body	3.00E+00	mRem	9.50E-03	3.17E-01	Maximum Individual Liquid	Liquid Effluent TB Annual

Table 1-3B
Joseph M Farley Nuclear Plant
RADIOACTIVE EFFLUENT RELEASE REPORT - 2011
Doses to a member of the public due to Liquid Releases
Unit: 2
Starting: 1-Jan- 2011 Ending: 31-Dec-2011

Cumulative Doses Per Quarter

Organ	ODCM Lmt	Units	1ST Qtr	% ODCM	2ND Qtr	% ODCM	3RD Qtr	% ODCM	4TH Qtr	% ODCM
Bone	5.00E+00	mRem	9.86E-03	1.97E-01	8.95E-03	1.79E-01	1.43E-02	2.87E-01	2.16E-03	4.33E-02
GI-Lli	5.00E+00	mRem	4.29E-02	8.59E-01	3.77E-02	7.54E-01	5.92E-02	1.18E+00	9.79E-03	1.96E-01
Kidney	5.00E+00	mRem	4.15E-02	8.29E-01	3.71E-02	7.42E-01	5.62E-02	1.12E+00	9.01E-03	1.80E-01
Liver	5.00E+00	mRem	6.08E-03	1.22E-01	5.07E-03	1.01E-01	6.84E-03	1.37E-01	1.44E-03	2.88E-02
Lung	5.00E+00	mRem	1.26E-02	2.52E-01	7.45E-03	1.49E-01	3.65E-02	7.31E-01	2.94E-03	5.87E-02
Thyroid	5.00E+00	mRem	5.19E-03	1.04E-01	4.25E-03	8.49E-02	5.63E-03	1.13E-01	1.21E-03	2.42E-02
Total Body	5.00E+00	mRem	3.84E-03	7.67E-02	3.05E-03	6.10E-02	3.74E-03	7.48E-02	9.73E-04	1.95E-02
Total Body	1.50E+00	mRem	3.84E-03	2.56E-01	3.05E-03	2.03E-01	3.74E-03	2.49E-01	9.73E-04	6.49E-02

Cumulative Doses per Year

Organ	ODCM Lmt	Units	Year to Ending Date	% ODCM	Receptor	Limit
Bone	1.00E+01	mRem	3.53E-02	3.53E-01	Maximum Individual Liquid	Liquid Effluent Organ Annual
GI-Lli	1.00E+01	mRem	1.50E-01	1.50E+00	Maximum Individual Liquid	Liquid Effluent Organ Annual
Kidney	1.00E+01	mRem	1.44E-01	1.44E+00	Maximum Individual Liquid	Liquid Effluent Organ Annual
Liver	1.00E+01	mRem	1.94E-02	1.94E-01	Maximum Individual Liquid	Liquid Effluent Organ Annual
Lung	1.00E+01	mRem	5.95E-02	5.95E-01	Maximum Individual Liquid	Liquid Effluent Organ Annual
Thyroid	1.00E+01	mRem	1.63E-02	1.63E-01	Maximum Individual Liquid	Liquid Effluent Organ Annual
Total Body	1.00E+01	mRem	1.16E-02	1.16E-01	Maximum Individual Liquid	Liquid Effluent Organ Annual
Total Body	3.00E+00	mRem	1.16E-02	3.87E-01	Maximum Individual Liquid	Liquid Effluent TB Annual

TABLE 1-4
Joseph M. Farley Nuclear Plant
ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT - 2011
MINIMUM DETECTABLE CONCENTRATION - LIQUID SAMPLE ANALYSES

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

Nuclide	MDC (uCi/ML)
MN-54	4.01E-08
CO-58	3.12E-08
FE-59	9.04E-08
CO-60	1.76E-08
ZN-65	1.19E-07
MO-99	2.98E-07
I-131	3.05E-08
CS-134	4.01E-08
CS-137	3.84E-08
CE-141	4.21E-08
CE-144	1.51E-07

Table 1-5A

**Joseph M Farley Nuclear Plant
RADIOACTIVE EFFLUENT RELEASE REPORT - 2011**

Liquid Effluents - Batch Release Summary

Unit: 1

Starting: 1-Jan-2011 Ending: 31-Dec-2011

Liquid Releases	Units	1ST Quarter	2ND Quarter	3RD Quarter	4TH Quarter	Year Totals
1. Number of batch releases		98	54	73	80	305
2. Total time period for Batch releases	(Minutes)	1.16E+04	6.56E+03	8.42E+03	1.76E+04	4.42E+04
3. Maximum time period for a batch release	(Minutes)	1.35E+02	1.48E+02	1.37E+02	8.62E+03	8.62E+03
4. Average time period for a batch release	(Minutes)	1.18E+02	1.21E+02	1.15E+02	2.20E+02	1.45E+02
5. Minimum time period for a batch release	(Minutes)	1.02E+02	1.09E+02	1.00E+02	9.80E+01	9.80E+01
6. Average stream flow during periods of release of liquid effluent into a flowing stream *	(CFS)	8.46E+03	5.61E+03	3.32E+03	2.46E+03	4.94E+03

*Average River Flow Rate, taken at Walter F. George Lock and Dam, located 30.7 miles above Farley Nuclear Plant.

Table 1-5B
Joseph M Farley Nuclear Plant
RADIOACTIVE EFFLUENT RELEASE REPORT - 2011
Liquid Effluents - Batch Release Summary
Unit: 2
Starting: 1-Jan- 2011 Ending: 31-Dec-2011

Liquid Releases	Units	1ST Quarter	2ND Quarter	3RD Quarter	4TH Quarter	Year Totals
1. Number of batch releases		88	76	114	94	372
2. Total time period for Batch releases	(Minutes)	8.37E+03	7.43E+03	1.15E+04	9.62E+03	3.69E+04
3. Maximum time period for a batch release	(Minutes)	1.29E+02	1.30E+02	1.34E+02	1.45E+02	1.45E+02
4. Average time period for a batch release	(Minutes)	9.51E+01	9.77E+01	1.01E+02	1.02E+02	9.93E+01
5. Minimum time period for a batch release	(Minutes)	6.70E+01	2.00E+00	8.50E+01	8.50E+01	2.00E+00
6. Average stream flow during periods of release of liquid effluent into a flowing stream *	(CFS)	8.46E+03	5.61E+03	3.32E+03	2.46E+03	4.94E+03

*Average River Flow Rate, taken at Walter F. George Lock and Dam, located 30.7 miles above Farley Nuclear Plant.

Table 1-6A
Joseph M Farley Nuclear Plant
RADIOACTIVE EFFLUENT RELEASE REPORT - 2011
Liquid Effluents - Abnormal Release Summary
Unit: 1
Starting: 1-Jan- 2011 Ending: 31-Dec-2011

Liquid Releases	Units	1ST Quarter	2ND Quarter	3RD Quarter	4TH Quarter	Year Totals
1. Number of Releases		0	0	0	1	1
2. Total Time For All Releases	(Minutes)	0.00E+00	0.00E+00	0.00E+00	8.62E+03	8.62E+03
3. Maximum Time For A Release	(Minutes)	0.00E+00	0.00E+00	0.00E+00	8.62E+03	8.62E+03
4. Average Time For A Release	(Minutes)	0.00E+00	0.00E+00	0.00E+00	8.62E+03	8.62E+03
5. Minimum Time For A Release	(Minutes)	0.00E+00	0.00E+00	0.00E+00	8.62E+03	8.62E+03
6. Total activity for all releases	(Curies)	0.00E+00	0.00E+00	0.00E+00	1.16E-04	1.16E-04

Table 1-6B
Joseph M Farley Nuclear Plant
RADIOACTIVE EFFLUENT RELEASE REPORT - 2011
Liquid Effluents - Abnormal Release Summary
Unit: 2
Starting: 1-Jan- 2011 Ending: 31-Dec-2011

Liquid Releases	Units	1ST Quarter	2ND Quarter	3RD Quarter	4TH Quarter	Year Totals
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

This section contains applicable ODCM limits for gaseous effluents as well as the quantities of radioactive gaseous effluents released during 2011. These quantities are summarized on a quarterly basis and include any unplanned releases. Tabulations are provided of the offsite air doses calculated in accordance with ODCM 3.4.2 to show conformance with the limits of ODCM 3.1.3, and the offsite organ doses to a member of the public calculated in accordance with ODCM 3.4.3 to show conformance with ODCM 3.1.4.

2.1 Regulatory Requirements

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

2.1.1 Dose Rate Limits

The dose rates 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 Releases

Technical Specifications 5.5.4.e and 5.5.4.h state that the air dose due to noble gases released in gaseous effluents, from each reactor unit, to areas at and beyond the SITE BOUNDARY (see ODCM Figure 10-1) 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

Technical Specifications 5.5.4.e and 5.5.4.i state that the dose to a MEMBER OF THE PUBLIC from I-131, I-133, tritium, and all radionuclides in particulate form with half-lives greater than 8 days in gaseous effluents released, from each reactor unit, to areas at and beyond the SITE BOUNDARY (see ODCM Figure 10-1) shall be limited to the following:

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

2.2 Measurements and Approximation of Total Radioactivity

The following noble gases are considered in evaluating gaseous effluents:

KR-87	XE-133
KR-88	XE-135
XE-133M	XE-138

The following radioiodines and radioactive materials in particulate form are specifically considered in evaluating gaseous effluents:

MN-54	MO-99
FE-59	I-131
CO-58	CS-134
CO-60	CS-137
ZN-65	CE-141
SR-89	CE-144
SR-90	H-3

2.2.1 Sample collection and Analysis

Periodic grab samples from plant effluent streams are analyzed by a computerized pulse height analyzer system utilizing high resolution germanium detectors. Samples are obtained and analyzed in accordance with ODCM Table 3-3. Isotopic values thus obtained are used for release rate calculations as specified in ODCM 3.4.2 and ODCM 3.4.3. Only those nuclides which are detected are used in calculations. For radioiodines and particulates, in addition to the nuclides listed above other nuclides with half-lives greater than 8 days which are identified are also considered.

Continuous Releases: Continuous sampling is performed on the continuous release points (i.e. the Plant Vent Stack, Containment Purge when in continuous mode, and the Turbine Building Vent). Particulate material is collected by filtration. Periodically these filters are removed and analyzed on the pulse height analyzer to identify and quantify radioactive materials collected on the filters. Particulate filters are then analyzed for gross alpha and strontium as required. All gross alpha, Sr-89 and SR-90 samples are sent offsite to the Georgia Power Environmental Laboratory for analysis.

Batch Releases: The processing of batch type releases (from Containment when in batch mode, or Waste Gas Decay Tanks) is analogous to continuous releases, except that the release is not commenced until samples have been obtained and analyzed. Containment Purge batch releases were commenced at FNP beginning in 2006 in order to take advantage of additional decay time for short lived radionuclides.

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

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

The methods for determining release quantities of radioactivity, dose rates, and cumulative doses follow:

2.2.2.1 Fission and Activation Gases

The released radioactivity is determined using sample analyses results collected as described in section 2.2.1 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 applicable 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 applicable release points. Gamma spectroscopy is used to quantify the concentrations of principal gamma emitters.

After each quarter, the particulate filters from each applicable vent (plant vent stack and containment purge) 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 individual dose calculations.

Tritium samples are obtained monthly from the Plant Vent Stack, the Containment Purge when in batch mode, and the Turbine Building Vent (and weekly for Containment Purge when in continuous mode) by passing the sample stream through a cold trap or by using the bubble method. The grams of water vapor/cubic meter is measured upstream of the cold trap in order to alleviate the difficulties in determining water vapor collection efficiencies. The tritium samples are analyzed onsite and the results 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 is compared to the dose rate limits specified in ODCM 3.1.2, allocated for each release point as described in ODCM 3.3.2.

Doses to a Member of the Public (individual doses) due to radioiodine, tritium and particulates are calculated for the controlling receptor, which is described in the ODCM. Individual doses are calculated for each release period, and cumulative totals are kept for each unit, for the current calendar quarter and year. Cumulative individual 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 highest concentration calculated for any of these weeks is used for the monthly value. This value is input into the composite file of the computer and used for release calculations.

2.2.3 Total Error Estimation

The maximum errors associated with monitor readings, sample flow, vent flow, sample collection, monitor calibration and laboratory procedure are collectively estimated to be:

Fission and Activation Gases	Iodine	Particulates	Tritium
75%	60%	50%	45%

The average error associated with counting is estimated to be:

Fission and Activation Gases	Iodine	Particulates	Tritium
19%	28%	20%	8%

2.3 Gaseous Effluent Release Data

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

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

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

Gross alpha radioactivity is reported in Tables 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 presented in Tables 2-4A and 2-4B along with the percent of ODCM limits.

Limits for cumulative doses to an individual due to radioiodines, tritium and particulates are specified in ODCM 3.1.4. Cumulative individual doses are presented in Tables 2-5A and 2-5B along with percent of ODCM limits.

2.4 Radiological Impact Due to Gaseous Releases

The air doses due to noble gases and doses to a Member of the Public due to radioiodines, tritium and particulates in gaseous effluents for Units 1 and 2 are provided in the following tables in order to show conformance with the limits of ODCM 3.1.3 and ODCM 3.1.4:

Unit 1 2011 Air Doses Due to Noble Gases in Gaseous Releases: Table 2-4A

Unit 2 2011 Air Doses Due to Noble Gases in Gaseous Releases: Table 2-4B

Unit 1 2011 Doses to a Member of the Public Due to Radioiodines, Tritium, and Particulates in Gaseous Releases: Table 2-5A

Unit 2 2011 Doses to a Member of the Public Due to Radioiodines, Tritium, and Particulates in Gaseous Releases: Table 2-5B

2.5 Gaseous Effluents - Batch Releases

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

Unit 1 2011 Gaseous Effluents - Batch Release Summary: Table 2-7A

Unit 2 2011 Gaseous Effluents - Batch Release Summary: Table 2-7B

2.6 Gaseous Effluents - Abnormal Releases

There were no abnormal releases on Unit 1 or Unit 2 during 2011.

Abnormal release information for Units 1 and 2 is summarized in the following tables:

Unit 1 2011 Gaseous Effluents - Abnormal Release Summary: Table 2-8A

Unit 2 2011 Gaseous Effluents - Abnormal Release Summary: Table 2-8B

Table 2-1A

**Joseph M Farley Nuclear Plant
RADIOACTIVE EFFLUENT RELEASE REPORT - 2011
Gaseous Effluents - Summation Of All Releases**

Unit: 1

Starting: 1-Jan-2011 Ending: 31-Dec-2011

Type of Effluent	Units	1ST Quarter	2ND Quarter	3RD Quarter	4TH Quarter
A. Fission And Activation Gases					
1. Total Release	Curies	2.37E-01	7.87E-01	8.62E-01	1.52E+00
2. Average Release rate for period	uCi/sec	3.00E-02	9.99E-02	1.09E-01	1.93E-01
3. Percent of Applicable Limit	%	*	*	*	*
B. Radioiodines					
1. Total Iodine-131	Curies	1.92E-06	0.00E+00	0.00E+00	0.00E+00
2. Average Release rate for period	uCi/sec	2.44E-07	0.00E+00	0.00E+00	0.00E+00
3. Percent of Applicable Limit	%	*	*	*	*
C. Particulates					
1. Particulates (Half-Lives > 8 Days)	Curies	2.77E-04	0.00E+00	1.46E-06	2.74E-07
2. Average Release rate for period	uCi/sec	3.51E-05	0.00E+00	1.85E-07	3.48E-08
3. Percent of Applicable Limit	%	*	*	*	*
D. Tritium					
1. Total Release	Curies	1.35E+00	1.40E+00	1.97E+00	1.41E+00
2. Average Release rate for period	uCi/sec	1.71E-01	1.78E-01	2.50E-01	1.78E-01
3. Percent of Applicable Limit	%	*	*	*	*
E. Gross Alpha					
1. Total Release	Curies	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2. Average Release rate for period	uCi/sec	0.00E+00	0.00E+00	0.00E+00	0.00E+00

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

Table 2-1B
Joseph M Farley Nuclear Plant
RADIOACTIVE EFFLUENT RELEASE REPORT - 2011
Gaseous Effluents - Summation Of All Releases
Unit: 2

Starting: 1-Jan- 2011 Ending: 31-Dec-2011

Type of Effluent	Units	1ST Quarter	2ND Quarter	3RD Quarter	4TH Quarter
A. Fission And Activation Gases					
1. Total Release	Curies	8.77E-01	8.25E-01	3.86E-01	1.06E+00
2. Average Release rate for period	uCi/sec	1.11E-01	1.05E-01	4.90E-02	1.35E-01
3. Percent of Applicable Limit	%	*	*	*	*
B. Radioiodines					
1. Total Iodine-131	Curies	5.86E-07	0.00E+00	0.00E+00	2.44E-07
2. Average Release rate for period	uCi/sec	7.43E-08	0.00E+00	0.00E+00	3.09E-08
3. Percent of Applicable Limit	%	*	*	*	*
C. Particulates					
1. Particulates (Half-Lives > 8 Days)	Curies	1.26E-08	3.79E-09	0.00E+00	2.39E-09
2. Average Release rate for period	uCi/sec	1.59E-09	4.81E-10	0.00E+00	3.03E-10
3. Percent of Applicable Limit	%	*	*	*	*
D. Tritium					
1. Total Release	Curies	3.67E+00	3.62E+00	3.81E+00	8.56E+00
2. Average Release rate for period	uCi/sec	4.65E-01	4.60E-01	4.83E-01	1.09E+00
3. Percent of Applicable Limit	%	*	*	*	*
E. Gross Alpha					
1. Total Release	Curies	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2. Average Release rate for period	uCi/sec	0.00E+00	0.00E+00	0.00E+00	0.00E+00

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

Table 2-1C

**Joseph M Farley Nuclear Plant
RADIOACTIVE EFFLUENT RELEASE REPORT - 2011**

Gaseous Effluents - Summation Of All Releases

Unit: Site

Starting: 1-Jan-2011 Ending: 31-Dec-2011

Type of Effluent	Units	1ST Quarter	2ND Quarter	3RD Quarter	4TH Quarter
A. Fission And Activation Gases					
1. Total Release	Curies	1.11E+00	1.61E+00	1.25E+00	2.59E+00
2. Average Release rate for period	uCi/sec	1.41E-01	2.04E-01	1.58E-01	3.28E-01
3. Percent of Applicable Limit	%	*	*	*	*
B. Radioiodines					
1. Total Iodine-131	Curies	2.51E-06	0.00E+00	0.00E+00	2.44E-07
2. Average Release rate for period	uCi/sec	3.18E-07	0.00E+00	0.00E+00	3.09E-08
3. Percent of Applicable Limit	%	*	*	*	*
C. Particulates					
1. Particulates (Half-Lives > 8 Days)	Curies	2.77E-04	3.79E-09	1.46E-06	2.77E-07
2. Average Release rate for period	uCi/sec	3.51E-05	4.81E-10	1.85E-07	3.51E-08
3. Percent of Applicable Limit	%	*	*	*	*
D. Tritium					
1. Total Release	Curies	5.01E+00	5.03E+00	5.78E+00	9.97E+00
2. Average Release rate for period	uCi/sec	6.36E-01	6.38E-01	7.33E-01	1.26E+00
3. Percent of Applicable Limit	%	*	*	*	*
E. Gross Alpha					
1. Total Release	Curies	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2. Average Release rate for period	uCi/sec	0.00E+00	0.00E+00	0.00E+00	0.00E+00

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

Table 2-2A

**Joseph M Farley Nuclear Plant
RADIOACTIVE EFFLUENT RELEASE REPORT - 2011
Gaseous Effluents - Mixed Mode Level Releases**

Unit: 1

Starting: 1-Jan- 2011 Ending: 31-Dec-2011

Nuclides Released	Unit	Continuous Mode			
		1ST Quarter	2ND Quarter	3RD Quarter	4TH Quarter
Fission Gases					
Ar-41	Curies	0.00E+00	5.13E-01	2.64E-01	6.56E-01
Total For Period	Curies	0.00E+00	5.13E-01	2.64E-01	6.56E-01
Iodines					
I-131	Curies	1.92E-06	0.00E+00	0.00E+00	0.00E+00
Total For Period	Curies	1.92E-06	0.00E+00	0.00E+00	0.00E+00
Particulates					
Be-7	Curies	0.00E+00	0.00E+00	1.44E-06	0.00E+00
Sr-89	Curies	0.00E+00	0.00E+00	2.27E-08	2.74E-07
Total For Period	Curies	0.00E+00	0.00E+00	1.46E-06	2.74E-07
Tritium					
H-3	Curies	1.33E+00	1.35E+00	1.79E+00	1.29E+00
Gross Alpha					
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

**Joseph M Farley Nuclear Plant
RADIOACTIVE EFFLUENT RELEASE REPORT - 2011
Gaseous Effluents - Mixed Mode Level Releases**

Unit: 1

Starting: 1-Jan- 2011 Ending: 31-Dec-2011

Nuclides Released	Unit	Batch Mode			
		1ST Quarter	2ND Quarter	3RD Quarter	4TH Quarter
Fission Gases					
Ar-41	Curies	2.35E-01	2.49E-01	5.92E-01	8.67E-01
Xe-133	Curies	1.81E-03	2.60E-02	5.81E-03	1.25E-03
Total For Period	Curies	2.37E-01	2.75E-01	5.98E-01	8.68E-01
Iodines					
No Nuclides Found	Curies	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Particulates					
Ag-108M	Curies	2.77E-04	0.00E+00	0.00E+00	0.00E+00
Total For Period	Curies	2.77E-04	0.00E+00	0.00E+00	0.00E+00
Tritium					
H-3	Curies	1.22E-02	5.57E-02	1.82E-01	1.16E-01
Gross Alpha					
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

**Joseph M Farley Nuclear Plant
 RADIOACTIVE EFFLUENT RELEASE REPORT - 2011
 Gaseous Effluents - Mixed Mode Level Releases
 Unit: 2
 Starting: 1-Jan- 2011 Ending: 31-Dec-2011**

Nuclides Released	Unit	Continuous Mode			
		1ST Quarter	2ND Quarter	3RD Quarter	4TH Quarter
Fission Gases					
Ar-41	Curies	5.67E-01	5.64E-01	0.00E+00	9.84E-01
Total For Period	Curies	5.67E-01	5.64E-01	0.00E+00	9.84E-01
Iodines					
I-131	Curies	5.78E-07	0.00E+00	0.00E+00	2.41E-07
Total For Period	Curies	5.78E-07	0.00E+00	0.00E+00	2.41E-07
Particulates					
Sr-89	Curies	9.56E-09	0.00E+00	0.00E+00	0.00E+00
Total For Period	Curies	9.56E-09	0.00E+00	0.00E+00	0.00E+00
Tritium					
H-3	Curies	2.02E+00	3.20E+00	3.51E+00	8.55E+00
Gross Alpha					
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

**Joseph M Farley Nuclear Plant
 RADIOACTIVE EFFLUENT RELEASE REPORT - 2011
 Gaseous Effluents - Mixed Mode Level Releases**

Unit: 2

Starting: 1-Jan- 2011 Ending: 31-Dec-2011

Nuclides Released	Unit	Batch Mode			
		1ST Quarter	2ND Quarter	3RD Quarter	4TH Quarter
Fission Gases					
Ar-41	Curies	2.99E-01	2.57E-01	3.85E-01	7.31E-02
Xe-133M	Curies	0.00E+00	8.72E-05	0.00E+00	0.00E+00
Xe-133	Curies	1.11E-02	4.08E-03	8.84E-04	7.53E-03
Total For Period	Curies	3.10E-01	2.61E-01	3.86E-01	8.07E-02
Iodines					
I-131	Curies	7.45E-09	0.00E+00	0.00E+00	2.61E-09
Total For Period	Curies	7.45E-09	0.00E+00	0.00E+00	2.61E-09
Particulates					
Co-58	Curies	3.02E-09	0.00E+00	0.00E+00	0.00E+00
Co-60	Curies	0.00E+00	0.00E+00	0.00E+00	2.39E-09
Sn-113	Curies	0.00E+00	3.79E-09	0.00E+00	0.00E+00
Total For Period	Curies	3.02E-09	3.79E-09	0.00E+00	2.39E-09
Tritium					
H-3	Curies	1.65E+00	4.21E-01	2.98E-01	8.14E-03
Gross Alpha					
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

**Joseph M Farley Nuclear Plant
RADIOACTIVE EFFLUENT RELEASE REPORT - 2011
Gaseous Effluents - Mixed Mode Level Releases**

Unit: Site

Starting: 1-Jan- 2011 Ending: 31-Dec-2011

Nuclides Released	Unit	Continuous Mode			
		1ST Quarter	2ND Quarter	3RD Quarter	4TH Quarter
Fission Gases					
Ar-41	Curies	5.67E-01	1.08E+00	2.64E-01	1.64E+00
Total For Period	Curies	5.67E-01	1.08E+00	2.64E-01	1.64E+00
Iodines					
I-131	Curies	2.50E-06	0.00E+00	0.00E+00	2.41E-07
Total For Period	Curies	2.50E-06	0.00E+00	0.00E+00	2.41E-07
Particulates					
Be-7	Curies	0.00E+00	0.00E+00	1.44E-06	0.00E+00
Sr-89	Curies	9.56E-09	0.00E+00	2.27E-08	2.74E-07
Total For Period	Curies	9.56E-09	0.00E+00	1.46E-06	2.74E-07
Tritium					
H-3	Curies	3.35E+00	4.55E+00	5.30E+00	9.84E+00
Gross Alpha					
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

**Joseph M Farley Nuclear Plant
RADIOACTIVE EFFLUENT RELEASE REPORT - 2011
Gaseous Effluents - Mixed Mode Level Releases**

Unit: Site

Starting: 1-Jan- 2011 Ending: 31-Dec-2011

Nuclides Released	Unit	Batch Mode			
		1ST Quarter	2ND Quarter	3RD Quarter	4TH Quarter
Fission Gases					
Ar-41	Curies	5.34E-01	5.05E-01	9.77E-01	9.40E-01
Xe-133M	Curies	0.00E+00	8.72E-05	0.00E+00	0.00E+00
Xe-133	Curies	1.29E-02	3.00E-02	6.69E-03	8.77E-03
Total For Period	Curies	5.47E-01	5.35E-01	9.84E-01	9.49E-01
Iodines					
I-131	Curies	7.45E-09	0.00E+00	0.00E+00	2.61E-09
Total For Period	Curies	7.45E-09	0.00E+00	0.00E+00	2.61E-09
Particulates					
Co-58	Curies	3.02E-09	0.00E+00	0.00E+00	0.00E+00
Co-60	Curies	0.00E+00	0.00E+00	0.00E+00	2.39E-09
Ag-108M	Curies	2.77E-04	0.00E+00	0.00E+00	0.00E+00
Sn-113	Curies	0.00E+00	3.79E-09	0.00E+00	0.00E+00
Total For Period	Curies	2.77E-04	3.79E-09	0.00E+00	2.39E-09
Tritium					
H-3	Curies	1.66E+00	4.77E-01	4.80E-01	1.24E-01
Gross Alpha					
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

**Joseph M Farley Nuclear Plant
RADIOACTIVE EFFLUENT RELEASE REPORT - 2011**

Gaseous Effluents - Ground Level Releases

Unit: 1

Starting: 1-Jan-2011 Ending: 31-Dec-2011

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

**Joseph M Farley Nuclear Plant
RADIOACTIVE EFFLUENT RELEASE REPORT - 2011**

Gaseous Effluents - Ground Level Releases

Unit: 1

Starting: 1-Jan-2011 Ending: 31-Dec-2011

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

**Joseph M Farley Nuclear Plant
 RADIOACTIVE EFFLUENT RELEASE REPORT - 2011
 Gaseous Effluents - Ground Level Releases**

Unit: 2

Starting: 1-Jan-2011 Ending: 31-Dec-2011

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

**Joseph M Farley Nuclear Plant
RADIOACTIVE EFFLUENT RELEASE REPORT - 2011**

Gaseous Effluents - Ground Level Releases

Unit: 2

Starting: 1-Jan-2011 Ending: 31-Dec-2011

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

**Joseph M Farley Nuclear Plant
RADIOACTIVE EFFLUENT RELEASE REPORT - 2011
Gaseous Effluents - Ground Level Releases**

Unit: Site

Starting: 1-Jan-2011 Ending: 31-Dec-2011

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

**Joseph M Farley Nuclear Plant
RADIOACTIVE EFFLUENT RELEASE REPORT - 2011**

Gaseous Effluents - Ground Level Releases

Unit: Site

Starting: 1-Jan-2011 Ending: 31-Dec-2011

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

**Joseph M Farley Nuclear Plant
RADIOACTIVE EFFLUENT RELEASE REPORT - 2011**

Air Doses Due to Gaseous Releases

Unit: 1

Starting: 1-Jan-2011 Ending: 31-Dec-2011

Cumulative Doses Per Quarter

Type of Radiation	ODCM Lmt	Units	1ST Qtr	% ODCM	2ND Qtr	% ODCM	3RD Qtr	% ODCM	4TH Qtr	% ODCM
Gamma Air	5.00E+00	mRad	7.49E-05	1.50E-03	2.43E-04	4.86E-03	2.73E-04	5.45E-03	4.85E-04	9.70E-03
Beta Air	1.00E+01	mRad	2.65E-05	2.65E-04	8.65E-05	8.65E-04	9.63E-05	9.63E-04	1.71E-04	1.71E-03

Cumulative Doses Per Year

Type of Radiation	ODCM Lmt	Units	Year to End Date	% ODCM	Receptor	Limit
Gamma Air	1.00E+01	mRad	1.08E-03	1.08E-02	Site Boundary SSE Mixed Mode R	Air Dose Gamma Annual
Beta Air	2.00E+01	mRad	3.80E-04	1.90E-03	Site Boundary SSE Mixed Mode R	Air Dose Beta Annual

Table 2-4B

**Joseph M Farley Nuclear Plant
RADIOACTIVE EFFLUENT RELEASE REPORT - 2011**

Air Doses Due to Gaseous Releases

Unit: 2

Starting: 1-Jan-2011 Ending: 31-Dec-2011

Cumulative Doses Per Quarter

Type of Radiation	ODCM Lmt	Units	1ST Qtr	% ODCM	2ND Qtr	% ODCM	3RD Qtr	% ODCM	4TH Qtr	% ODCM
Gamma Air	5.00E+00	mRad	2.76E-04	5.52E-03	2.61E-04	5.23E-03	1.23E-04	2.46E-03	3.37E-04	6.74E-03
Beta Air	1.00E+01	mRad	9.77E-05	9.77E-04	9.23E-05	9.23E-04	4.33E-05	4.33E-04	1.19E-04	1.19E-03

Cumulative Doses Per Year

Type of Radiation	ODCM Lmt	Units	Year to End Date	% ODCM	Receptor	Limit
Gamma Air	1.00E+01	mRad	9.97E-04	9.97E-03	Site Boundary SSE Mixed Mode R	Air Dose Gamma Annual
Beta Air	2.00E+01	mRad	3.52E-04	1.76E-03	Site Boundary SSE Mixed Mode R	Air Dose Beta Annual

Table 2-5A

**Joseph M Farley Nuclear Plant
RADIOACTIVE EFFLUENT RELEASE REPORT - 2011**

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

Unit: 1

Starting: 1-Jan-2011 Ending: 31-Dec-2011

Cumulative Doses Per Quarter

Organ	ODCM Lmt	Units	1ST Qtr	% ODCM	2ND Qtr	% ODCM	3RD Qtr	% ODCM	4TH Qtr	% ODCM
Bone	7.50E+00	mRem	1.16E-07	1.54E-06	0.00E+00	0.00E+00	2.76E-07	3.68E-06	3.33E-06	4.45E-05
GI-Lli	7.50E+00	mRem	1.84E-04	2.45E-03	1.92E-04	2.56E-03	2.70E-04	3.60E-03	1.92E-04	2.57E-03
Kidney	7.50E+00	mRem	1.84E-04	2.46E-03	1.92E-04	2.56E-03	2.70E-04	3.60E-03	1.92E-04	2.56E-03
Liver	7.50E+00	mRem	1.84E-04	2.46E-03	1.92E-04	2.56E-03	2.70E-04	3.60E-03	1.92E-04	2.56E-03
Lung	7.50E+00	mRem	1.84E-04	2.45E-03	1.92E-04	2.56E-03	2.70E-04	3.60E-03	1.92E-04	2.56E-03
Thyroid	7.50E+00	mRem	2.19E-04	2.92E-03	1.92E-04	2.56E-03	2.70E-04	3.60E-03	1.92E-04	2.56E-03
Total Body	7.50E+00	mRem	1.84E-04	2.45E-03	1.92E-04	2.56E-03	2.70E-04	3.60E-03	1.92E-04	2.57E-03

Cumulative Doses per Year

Organ	ODCM Lmt	Units	Year to Ending Date	% ODCM	Receptor	Limit
Bone	1.500E+01	mRem	3.726E-06	2.484E-05	Gas Controlling Receptor	Iodine/Part Dose Annual
GI-Lli	1.500E+01	mRem	8.387E-04	5.591E-03	Gas Controlling Receptor	Iodine/Part Dose Annual
Kidney	1.500E+01	mRem	8.387E-04	5.591E-03	Gas Controlling Receptor	Iodine/Part Dose Annual
Liver	1.500E+01	mRem	8.386E-04	5.591E-03	Gas Controlling Receptor	Iodine/Part Dose Annual
Lung	1.500E+01	mRem	8.385E-04	5.590E-03	Gas Controlling Receptor	Iodine/Part Dose Annual
Thyroid	1.500E+01	mRem	8.733E-04	5.822E-03	Gas Controlling Receptor	Iodine/Part Dose Annual
Total Body	1.500E+01	mRem	8.387E-04	5.591E-03	Gas Controlling Receptor	Iodine/Part Dose Annual

Table 2-5B

**Joseph M Farley Nuclear Plant
RADIOACTIVE EFFLUENT RELEASE REPORT - 2011**

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

Unit: 2

Starting: 1-Jan-2011 Ending: 31-Dec-2011

Cumulative Doses Per Quarter

<u>Organ</u>	<u>ODCM Lmt</u>	<u>Units</u>	<u>1ST Qtr</u>	<u>% ODCM</u>	<u>2ND Qtr</u>	<u>% ODCM</u>	<u>3RD Qtr</u>	<u>% ODCM</u>	<u>4TH Qtr</u>	<u>% ODCM</u>
Bone	7.50E+00	mRem	1.52E-07	2.02E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.18E-08	4.23E-07
GI-Lli	7.50E+00	mRem	5.01E-04	6.69E-03	4.96E-04	6.61E-03	5.21E-04	6.94E-03	1.17E-03	1.56E-02
Kidney	7.50E+00	mRem	5.02E-04	6.69E-03	4.96E-04	6.61E-03	5.21E-04	6.94E-03	1.17E-03	1.56E-02
Liver	7.50E+00	mRem	5.02E-04	6.69E-03	4.96E-04	6.61E-03	5.21E-04	6.94E-03	1.17E-03	1.56E-02
Lung	7.50E+00	mRem	5.01E-04	6.69E-03	4.96E-04	6.61E-03	5.21E-04	6.94E-03	1.17E-03	1.56E-02
Thyroid	7.50E+00	mRem	5.12E-04	6.83E-03	4.96E-04	6.61E-03	5.21E-04	6.94E-03	1.18E-03	1.57E-02
Total Body	7.50E+00	mRem	5.02E-04	6.69E-03	4.96E-04	6.61E-03	5.21E-04	6.94E-03	1.17E-03	1.56E-02

Cumulative Doses per Year

<u>Organ</u>	<u>ODCM Lmt</u>	<u>Units</u>	<u>Year to Ending Date</u>	<u>% ODCM</u>	<u>Receptor</u>	<u>Limit</u>
Bone	1.500E+01	mRem	1.835E-07	1.224E-06	Gas Controlling Receptor	Iodine/Part Dose Annual
GI-Lli	1.500E+01	mRem	2.689E-03	1.793E-02	Gas Controlling Receptor	Iodine/Part Dose Annual
Kidney	1.500E+01	mRem	2.689E-03	1.793E-02	Gas Controlling Receptor	Iodine/Part Dose Annual
Liver	1.500E+01	mRem	2.689E-03	1.793E-02	Gas Controlling Receptor	Iodine/Part Dose Annual
Lung	1.500E+01	mRem	2.689E-03	1.793E-02	Gas Controlling Receptor	Iodine/Part Dose Annual
Thyroid	1.500E+01	mRem	2.704E-03	1.803E-02	Gas Controlling Receptor	Iodine/Part Dose Annual
Total Body	1.500E+01	mRem	2.689E-03	1.793E-02	Gas Controlling Receptor	Iodine/Part Dose Annual

TABLE 2-6
Joseph M. Farley Nuclear Plant
ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT - 2011
MINIMUM DETECTABLE CONCENTRATIONS - GASEOUS EFFLUENT ANALYSES

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

<u>Nuclide</u>	<u>MDC (uCi/ML)</u>	<u>Nuclide</u>	<u>MDC (uCi/ML)</u>
MN-54	4.17E-14	KR-87	4.64E-08
CO-58	7.65E-14	KR-88	7.46E-08
FE-59	2.53E-14	XE-133	4.71E-08
CO-60	6.01E-14	XE-133M	1.42E-07
ZN-65	2.40E-13	XE-135	1.58E-08
MO-99	4.46E-13	XE-138	1.21E-07
CS-134	5.17E-14	I-131	5.95E-14
CS-137	6.95E-15	I-133	8.96E-14
CE-141	4.28E-14		
CE-144	1.64E-13		

Table 2-7A
Joseph M Farley Nuclear Plant
RADIOACTIVE EFFLUENT RELEASE REPORT - 2011
Gaseous Effluents - Batch Release Summary
Unit: 1
Starting: 1-Jan- 2011 Ending: 31-Dec-2011

Gaseous Releases	Units	1ST Quarter	2ND Quarter	3RD Quarter	4TH Quarter	Year Totals
1. Number of batch releases		63	68	134	182	447
2. Total time period for batch releases	(Minutes)	3.07E+03	4.99E+03	6.99E+03	8.20E+03	2.32E+04
3. Maximum time period for a batch release	(Minutes)	4.88E+02	4.95E+02	6.42E+02	2.47E+02	6.42E+02
4. Average time period for a batch release	(Minutes)	4.87E+01	7.33E+01	5.21E+01	4.51E+01	5.20E+01
5. Minimum time period for a batch release	(Minutes)	5.00E+00	4.00E+00	3.00E+00	1.00E+00	1.00E+00

Table 2-7B
Joseph M Farley Nuclear Plant
RADIOACTIVE EFFLUENT RELEASE REPORT - 2011
Gaseous Effluents - Batch Release Summary
Unit: 2
Starting: 1-Jan- 2011 Ending: 31-Dec-2011

Gaseous Releases	Units	1ST Quarter	2ND Quarter	3RD Quarter	4TH Quarter	Year Totals
1. Number of batch releases		63	62	82	25	232
2. Total time period for batch releases	(Minutes)	4.58E+03	4.09E+03	1.04E+04	3.42E+03	2.25E+04
3. Maximum time period for a batch release	(Minutes)	4.05E+02	3.03E+02	8.10E+02	5.25E+02	8.10E+02
4. Average time period for a batch release	(Minutes)	7.27E+01	6.59E+01	1.27E+02	1.37E+02	9.69E+01
5. Minimum time period for a batch release	(Minutes)	6.00E+00	5.00E+00	5.00E+00	6.00E+00	5.00E+00

Table 2-8A
Joseph M Farley Nuclear Plant
RADIOACTIVE EFFLUENT RELEASE REPORT - 2011
Gaseous Effluents - Abnormal Release Summary
Unit: 1
Starting: 1-Jan- 2011 Ending: 31-Dec-2011

Gaseous Releases	Units	1ST Quarter	2ND Quarter	3RD Quarter	4TH Quarter	Year Totals
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

**Joseph M Farley Nuclear Plant
RADIOACTIVE EFFLUENT RELEASE REPORT - 2011
Gaseous Effluents - Abnormal Release Summary
Unit: 2
Starting: 1-Jan-2011 Ending: 31-Dec-2011**

Gaseous Releases	Units	1ST Quarter	2ND Quarter	3RD Quarter	4TH Quarter	Year Totals
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

3.1.1 Solid Radioactive Waste System

FNP-0-M-30 step B.3.1 states that the radwaste solidification system shall be OPERABLE and used, as applicable in accordance with a PROCESS CONTROL PROGRAM, for the SOLIDIFICATION and packaging of radioactive wastes to ensure meeting the requirements of 10 CFR Part 20 and 10 CFR Part 71 prior to shipment of radioactive wastes from the site.

3.1.2 Reporting Requirements

FNP-0-M-30 step B.5.1 states that the Annual Radioactive Effluent Release Report, submitted in accordance with Technical Specifications 5.6.2 and 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 Radioactive Material in Liquid and Gaseous Effluents and Solid Waste," Revision 2, June 2009, with data summarized on an annual basis following the format of Table A-3 thereof.

3.2 Solid Waste Data

Regulatory Guide 1.21 Revision 2 Table A-3 is found in the report as Table 3-1.

TABLE 3-1
Joseph M. Farley Nuclear Plant
ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT – 2011
SOLID RADIOACTIVE WASTE SHIPPED FOR PROCESSING OR DISPOSAL
Starting 01-Jan-2011 Ending 31-Dec-2011

Resins, Filters, and Evaporator Bottoms	Volume		Curies Shipped
	ft ³	m ³	
Waste Class			
A	3.84E+02	1.09E+01	1.12E+01
B	0.00E+00	0.00E+00	0.00E+00
C	0.00E+00	0.00E+00	0.00E+00
ALL	3.84E+02	1.09E+01	1.12E+01

Major Nuclides for the Above Table:

Waste Class A	Co-60 27.627%	Ni-63 20.374%	C-14 20.365%	Fe-55 10.652%
	Zn-65 4.706%	Co-58 3.918%	Cr-51 3.043%	Sb-125 2.628%
	Zr-95 1.929%	Nb-95 1.812%		

Waste Class B N/A

Waste Class C N/A

ALL	Co-60 27.627%	Ni-63 20.374%	C-14 20.365%	Fe-55 10.652%
	Zn-65 4.706%	Co-58 3.918%	Cr-51 3.043%	Sb-125 2.628%
	Zr-95 1.929%	Nb-95 1.812%		

Dry Active Waste	Volume		Curies Shipped
	ft ³	m ³	
Waste Class			
A	1.67E+04	4.74E+02	7.70E-01
B	0.00E+00	0.00E+00	0.00E+00
C	0.00E+00	0.00E+00	0.00E+00
ALL	1.67E+04	4.74E+02	7.70E-01

Major Nuclides for the Above Table:

Waste Class A	Fe-55 24.829%	Nb-95 17.880%	Zr-95 14.106%	Co-60 10.205%
	Co-58 9.815%	Ni-63 8.094%	Cr-51 4.497%	H-3 2.501%
	Zn-65 1.632%	Sb-125 1.619%	C-14 1.323%	Be-7 1.203%

Waste Class B N/A

Waste Class C N/A

ALL	Fe-55 24.829%	Nb-95 17.880%	Zr-95 14.106%	Co-60 10.205%
	Co-58 9.815%	Ni-63 8.094%	Cr-51 4.497%	H-3 2.501%
	Zn-65 1.632%	Sb-125 1.619%	C-14 1.323%	Be-7 1.203%

Irradiated Components	Volume		Curies Shipped
	ft ³	m ³	
Waste Class			
A	0.00E+00	0.00E+00	0.00E+00
B	0.00E+00	0.00E+00	0.00E+00
C	0.00E+00	0.00E+00	0.00E+00
ALL	0.00E+00	0.00E+00	0.00E+00

Major Nuclides for the Above Table:

Waste Class A N/A

Waste Class B N/A

Waste Class C N/A

ALL N/A

TABLE 3-1
Joseph M. Farley Nuclear Plant
ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT – 2011
SOLID RADIOACTIVE WASTE SHIPPED FOR PROCESSING OR DISPOSAL
Starting 01-Jan-2011 Ending 31-Dec-2011
(Continued)

Other Waste	Volume		Curies Shipped
	ft ³	m ³	
Waste Class			
A	2.85E+02	8.07E+00	1.46E-04
B	0.00E+00	0.00E+00	0.00E+00
C	0.00E+00	0.00E+00	0.00E+00
ALL	2.85E+02	8.07E+00	1.46E-04

Major Nuclides for the Above Table:

Waste Class A H-3 99.786%
Waste Class B N/A
Waste Class C N/A
ALL H-3 99.786%

Sum of All Low-Level Waste Shipped from Site	Volume		Curies Shipped
	ft ³	m ³	
Waste Class			
A	1.74E+04	4.93E+02	1.20E+01
B	0.00E+00	0.00E+00	0.00E+00
C	0.00E+00	0.00E+00	0.00E+00
ALL	1.74E+04	4.93E+02	1.20E+01

Major Nuclides for the Above Table:

Waste Class A	Co-60 26.508%	Ni-63 19.585%	C-14 19.142%	Fe-55 11.562%
	Zn-65 4.509%	Co-58 4.297%	Cr-51 3.136%	Nb-95 2.845%
	Zr-95 2.712%	Sb-125 2.563%	H-3 1.006%	
Waste Class B	N/A			
Waste Class C	N/A			
ALL	Co-60 26.508%	Ni-63 19.585%	C-14 19.142%	Fe-55 11.562%
	Zn-65 4.509%	Co-58 4.297%	Cr-51 3.136%	Nb-95 2.845%
	Zr-95 2.712%	Sb-125 2.563%	H-3 1.006%	

4.0 DOSES TO MEMBERS OF THE PUBLIC INSIDE THE SITE BOUNDARY

4.1 Regulatory Requirements

Current FNP effluent controls as established by ODCM 6.1 do not require assessment of the radiation doses from radioactive liquid and gaseous effluents to MEMBERS OF THE PUBLIC due to their activities inside the SITE BOUNDARY (ODCM Figure 10-1).

4.2 Demonstration of Compliance

However, this assessment has been performed for 2011 using the methods described in ODCM 6.2 and is included in this section as Table 4-1.

Table 4-1

Joseph M Farley Nuclear Plant
RADIOACTIVE EFFLUENT RELEASE REPORT - 2011
Doses to a Member of the Public Due to Activities Inside the Site Boundary
Unit: Site
Starting: 1-Jan-2011 Ending: 31-Dec-2011

Location Name: Visitor Center
Distance (kilometers): 3.06E-01
Sector: N
Occupancy Factor: 1.37E-03
Age Group: Child

Ground Level Release	Noble Gas	X/Q (sec/m3): 1.04E-04	
Ground Level Release	Particulate and Radioiodine	X/Q (sec/m3): 1.04E-04	D/Q (m-2): 4.80E-07
Mixed Mode Release	Noble Gas	X/Q (sec/m3): 8.80E-06	
Mixed Mode Release	Particulate and Radioiodine	X/Q (sec/m3): 8.80E-06	D/Q (m-2): 6.20E-08

	Units	1ST Quarter	2ND Quarter	3RD Quarter	4TH Quarter	Year
Bone	mRem	1.68E-10	0.00E+00	5.21E-12	2.17E-10	3.90E-10
Liver	mRem	2.15E-06	2.16E-06	2.48E-06	4.27E-06	1.11E-05
Total Body	mRem	2.15E-06	2.16E-06	2.48E-06	4.27E-06	1.11E-05
Thyroid	mRem	2.16E-06	2.16E-06	2.48E-06	4.28E-06	1.11E-05
Kidney	mRem	2.15E-06	2.16E-06	2.48E-06	4.27E-06	1.11E-05
Lung	mRem	2.15E-06	2.16E-06	2.48E-06	4.28E-06	1.11E-05
GI-Lli	mRem	2.15E-06	2.16E-06	2.48E-06	4.27E-06	1.11E-05
NG Total Body	mRem	3.72E-06	5.35E-06	4.20E-06	8.72E-06	2.20E-05
Whole Body Dose	mRem	5.87E-06	7.50E-06	6.68E-06	1.30E-05	3.30E-05

Table 4-1

Joseph M Farley Nuclear Plant
RADIOACTIVE EFFLUENT RELEASE REPORT - 2011
Doses to a Member of the Public Due to Activities Inside the Site Boundary
Unit: Site
Starting: 1-Jan-2011 Ending: 31-Dec-2011

Location Name: Service Water Pond
Distance (kilometers): 9.66E-01
Sector: N
Occupancy Factor: 7.57E-03
Age Group: Child

Ground Level Release	Noble Gas	X/Q (sec/m3): 4.74E-05	
Ground Level Release	Particulate and Radioiodine	X/Q (sec/m3): 4.74E-05	D/Q (m-2): 1.31E-07
Mixed Mode Release	Noble Gas	X/Q (sec/m3): 9.75E-07	
Mixed Mode Release	Particulate and Radioiodine	X/Q (sec/m3): 9.75E-07	D/Q (m-2): 2.78E-08

	Units	1ST Quarter	2ND Quarter	3RD Quarter	4TH Quarter	Year
Bone	mRem	3.25E-10	0.00E+00	3.19E-12	4.12E-10	7.41E-10
Liver	mRem	1.32E-06	1.32E-06	1.52E-06	2.62E-06	6.77E-06
Total Body	mRem	1.32E-06	1.32E-06	1.52E-06	2.62E-06	6.77E-06
Thyroid	mRem	1.33E-06	1.32E-06	1.52E-06	2.62E-06	6.78E-06
Kidney	mRem	1.32E-06	1.32E-06	1.52E-06	2.62E-06	6.77E-06
Lung	mRem	1.32E-06	1.32E-06	1.52E-06	2.62E-06	6.77E-06
GI-Lli	mRem	1.32E-06	1.32E-06	1.52E-06	2.62E-06	6.77E-06
NG Total Body	mRem	2.28E-06	3.28E-06	2.57E-06	5.34E-06	1.35E-05
Whole Body Dose	mRem	3.59E-06	4.59E-06	4.09E-06	7.96E-06	2.02E-05

Table 4-1

Joseph M Farley Nuclear Plant
RADIOACTIVE EFFLUENT RELEASE REPORT - 2011
Doses to a Member of the Public Due to Activities Inside the Site Boundary
Unit: Site
Starting: 1-Jan-2011 Ending: 31-Dec-2011

Location Name: River Water Discharge - Air
Distance (kilometers): 1.64E+00
Sector: N
Occupancy Factor: 1.14E-02
Age Group: Child

Ground Level Release	Noble Gas	X/Q (sec/m3): 1.63E-05	
Ground Level Release	Particulate and Radioiodine	X/Q (sec/m3): 1.63E-05	D/Q (m-2): 4.55E-08
Mixed Mode Release	Noble Gas	X/Q (sec/m3): 7.05E-07	
Mixed Mode Release	Particulate and Radioiodine	X/Q (sec/m3): 7.05E-07	D/Q (m-2): 1.39E-08

	Units	1ST Quarter	2ND Quarter	3RD Quarter	4TH Quarter	Year
Bone	mRem	2.55E-10	0.00E+00	3.47E-12	3.24E-10	5.83E-10
Liver	mRem	1.43E-06	1.44E-06	1.65E-06	2.85E-06	7.37E-06
Total Body	mRem	1.43E-06	1.44E-06	1.65E-06	2.85E-06	7.37E-06
Thyroid	mRem	1.44E-06	1.44E-06	1.65E-06	2.85E-06	7.38E-06
Kidney	mRem	1.43E-06	1.44E-06	1.65E-06	2.85E-06	7.37E-06
Lung	mRem	1.43E-06	1.44E-06	1.65E-06	2.85E-06	7.37E-06
GI-Lli	mRem	1.43E-06	1.44E-06	1.65E-06	2.85E-06	7.37E-06
NG Total Body	mRem	2.48E-06	3.57E-06	2.80E-06	5.81E-06	1.47E-05
Whole Body Dose	mRem	3.91E-06	5.00E-06	4.45E-06	8.66E-06	2.20E-05

Table 4-1

**Joseph M Farley Nuclear Plant
RADIOACTIVE EFFLUENT RELEASE REPORT - 2011**

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

Unit: Site

Starting: 1-Jan-2011 Ending: 31-Dec-2011

Location Name: New Construction Activity
Distance (kilometers): 3.22E-01
Sector: S
Occupancy Factor: 2.28E-01
Age Group: Adult

Ground Level Release	Noble Gas	X/Q (sec/m3): 1.85E-04	D/Q (m-2): 9.26E-08
Ground Level Release	Particulate and Radioiodine	X/Q (sec/m3): 6.66E-05	D/Q (m-2): 9.26E-08
Mixed Mode Release	Noble Gas	X/Q (sec/m3): 2.42E-06	D/Q (m-2): 8.66E-09
Mixed Mode Release	Particulate and Radioiodine	X/Q (sec/m3): 2.23E-06	D/Q (m-2): 8.66E-09

	Units	1ST Quarter	2ND Quarter	3RD Quarter	4TH Quarter	Year
Bone	mRem	3.84E-09	0.00E+00	1.12E-10	4.93E-09	8.88E-09
Liver	mRem	1.02E-04	1.03E-04	1.18E-04	2.04E-04	5.27E-04
Total Body	mRem	1.02E-04	1.03E-04	1.18E-04	2.04E-04	5.27E-04
Thyroid	mRem	1.03E-04	1.03E-04	1.18E-04	2.04E-04	5.27E-04
Kidney	mRem	1.02E-04	1.03E-04	1.18E-04	2.04E-04	5.27E-04
Lung	mRem	1.02E-04	1.03E-04	1.18E-04	2.04E-04	5.27E-04
GI-Lli	mRem	1.02E-04	1.03E-04	1.18E-04	2.04E-04	5.27E-04
NG Total Body	mRem	1.70E-04	2.45E-04	1.92E-04	3.99E-04	1.01E-03
Whole Body Dose	mRem	2.73E-04	3.48E-04	3.10E-04	6.03E-04	1.53E-03

5.0 TOTAL DOSE FROM URANIUM FUEL CYCLE (40CFR190)

5.1 Regulatory Requirements

Technical Specification 5.5.4.j states that the dose or dose commitment to any MEMBER OF THE PUBLIC over a calendar year, due to releases of radioactivity and to radiation from uranium fuel cycle sources, shall be limited to less than or equal to 25 mrem to the total body or to any organ, except the thyroid, which shall be limited to less than or equal to 75 mrem (as stated in ODCM 5.1).

With the calculated doses from the release of radioactive materials in liquid or gaseous effluents exceeding twice the limits of ODCM 2.1.3, 3.1.3, or 3.1.4, calculations shall be made according to ODCM 5.2 methods to determine whether the above (ODCM 5.1) limits have been exceeded (as stated in ODCM 5.1.2).

5.2 Demonstration of Compliance

Since none of the ODCM 2.1.3, 3.1.3, or 3.1.4 limits were exceeded during 2011, no calculations were required.

6.0 METEOROLOGICAL DATA

Meteorological data are retained onsite; these data are available to the NRC upon request. The meteorological data include annual as well as quarterly summaries of hourly measurements of wind speed, wind direction and atmospheric stability in the form of joint frequency distribution tables.

7.0 PROGRAM DEVIATIONS

7.1 Inoperable Liquid or Gaseous Effluent Monitoring Instrumentation

7.1.1 Regulatory Requirements

ODCM 7.2.2.6 states in part that the Annual Radioactive Effluent Release Report (the report) shall include deviations from the liquid and gaseous effluent monitoring instrumentation operability requirements included in Sections 2.1.1 and 3.1.1 of the ODCM. The report must also include an explanation as to why the inoperability was not corrected in a timely manner.

7.1.2 Description of Deviations

There were no deviations during 2011.

7.2 Effluent Sample Analysis Exceeding Minimum Detectable Concentration (MDC)

7.2.1 Regulatory Requirements

ODCM 7.2.2.6 states in part that the report shall include deviations from the MDC requirements included in ODCM Tables 2-3 and 3-3.

7.2.2 Description of Deviations

There were no deviations during 2011.

7.3 Incorrect Compositing of Liquid or Gaseous Effluent Samples

7.3.1 Regulatory Requirements

ODCM 7.2.2.6 states in part that the report shall include deviations from composite sampling requirements included in ODCM Tables 2-3 and 3-3.

7.3.2 Description of Deviations

There were no deviations during 2011.

8.0 CHANGES TO THE PLANT FARLEY ODCM

8.1 Regulatory Requirements

Pursuant to Technical Specification 5.5.1.c and ODCM 7.2.2.5, licensee initiated changes to the ODCM shall be submitted to the Nuclear Regulatory Commission as a part of or concurrent with the Annual Radioactive Effluent Release Report for the period in which any changes were made. Included are changes to the radiological environmental monitoring program sampling locations or dose calculation locations or pathways, including any changes made pursuant to ODCM 4.1.2.2.2 (land use census).

8.2 Description of Changes

There were no changes to the ODCM during 2011.

9.0 MAJOR CHANGES TO LIQUID, GASEOUS, OR SOLID RADWASTE TREATMENT SYSTEMS

9.1 Regulatory Requirements

ODCM 7.2.2.7 states in part that, as required by ODCM 2.1.5 and 3.1.6, licensee initiated MAJOR CHANGES TO RADIOACTIVE WASTE TREATMENT SYSTEMS (liquid and gaseous) shall be reported to the Nuclear Regulatory Commission in the Annual Radioactive Effluents Release Report covering the period in which the change was reviewed and accepted for implementation.

Process Control Program (PCP) B.5.1.2 states that licensee initiated major changes to the solid radioactive waste treatment system shall be reported to the Nuclear Regulatory Commission in the Annual Radioactive Effluent Release Report for the period in which the change was implemented. The discussion of each change shall include the information specified in PCP B.4.1.

9.2 Description of Major Changes

There were no changes to the Process Control Program during 2011.

10.0 CORRECTIONS TO PREVIOUSLY SUBMITTED REPORTS

There were two deviations in 2010 which were not reported in section 7.3.2 of the 2010 Annual Radiological Effluent Release Report (ARERR). The deviations had been inadvertently assigned to be reviewed for inclusion in the Radiological Environmental Monitoring Program report. Two Turbine Building Sump (TBS) samples were missed due to communication issues, the details of these deviations is included in Condition Reports 2010100272 and 2010100832. Historically, the Turbine Building Sumps have not shown radioactivity, therefore it is unlikely that any ODCM limits were exceeded.

The Average River Flow Rates previously reported in the 2009 ARERR and 2010 ARERR Tables 1-5A and 1-5B were incorrectly determined using improper monthly flow data. Condition Reports 435310 and 435326 were written to document and correct this event. The Average River Flow Rates are not used in ODCM calculations, and no other previously reported values were impacted. The Average River Flow Rates for 2009 and 2010 were as follows:

Quarter 1, 2009 = 1.09E+04 CFS	Quarter 1, 2010 = 2.22E+04 CFS
Quarter 2, 2009 = 1.04E+04 CFS	Quarter 2, 2010 = 8.32E+03 CFS
Quarter 3, 2009 = 6.05E+03 CFS	Quarter 3, 2010 = 2.75E+03 CFS
Quarter 4, 2009 = 2.47E+04 CFS	Quarter 4, 2010 = 3.77E+03 CFS
Annual, 2009 = 1.30E+04 CFS	Annual, 2010 = 9.19E+03 CFS

CARBON-14

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

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

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

At Plant Farley, the annual quantity of C-14 released in gaseous effluents was estimated to be 9.28 Curies (per unit). Approximately 30% of the C-14 released is in the form of $^{14}\text{CO}_2$ and is incorporated into plants through photosynthesis. Ingestion dose results from this pathway. The remaining 70% is estimated to be organic. Both the organic and inorganic forms of C-14 contribute to inhalation dose. A child is the maximally exposed individual, and bone dose is the highest organ dose. Using the dose calculation methodology from the Farley ODCM, the resulting bone dose to a child located at the controlling receptor location would be 4.11E-01 mrem in a year which is 2.74% 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 8.21E-02 mrem in a year which is 0.54% of the regulatory limit of 15 mrem per year (per unit) total body dose due to gaseous effluents.