NORTHEAST UTILITIES

THE CONNECTICUT LIGHT AND POWER COMPANY
WESTERN MASSACHUSETTS ELECTRIC COMPANY
HOLYOKE WATER POWER COMPANY
NORTHEAST UTILITIES SERVICE COMPANY
NORTHEAST NUCLEAR ENERGY COMPANY

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August 30, 1993

Docket Nos. 50-245
50-336
50-423
B14599

Re: 10CFR50.36a

U.S. Nuclear Regulatory Commission
Attention: Document Control Desk
Washington, DC 20555

Gentlemen:

Millstone Nuclear Power Station, Unit Nos. 1, 2, and 3
Semiannual Radioactive Effluents Release Report

In accordance with the requirements of 10CFR50.36a, the Millstone Unit Nos. 1, 2, and 3 Technical Specifications, and the Radiological Effluents Monitoring Manual, a copy of the semiannual Radioactive Effluents Release Report is herewith submitted.

This report includes a summary of the quantities of solid radioactive wastes and liquid and gaseous effluents for the period of January through June 1993.

The report has been prepared in accordance with the format of Regulatory Guide 1.21, and copies of the report are being forwarded in accordance with the provisions of 10CFR50.4(b)(1).

Very truly yours,

NORTHEAST NUCLEAR ENERGY COMPANY

J. F. Opeka
Executive Vice President

cc: see page 2

IE48
1/1

cc: T. T. Martin, Region I Administrator
J. W. Andersen, NRC Acting Project Manager, Millstone Unit No. 1
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V. L. Rooney, NRC Project Manager, Millstone Unit No. 3
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NORTHEAST NUCLEAR ENERGY COMPANY

MILLSTONE NUCLEAR POWER STATION
UNITS 1, 2 & 3

RADIOACTIVE EFFLUENTS RELEASE REPORT

JANUARY - JUNE 1993

OPERATING LICENSES DPR-21, DPR-65, & NPF-49

DOCKET 50-245, 50-336, & 50-423

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1.0 Introduction

This report is being submitted for Northeast Nuclear Energy Company's Millstone Power Station Units 1, 2, and 3, in accordance with 10CFR50.36a and the Radiological Effluent Technical Specifications and in the U.S. NRC Regulatory Guide 1.21 format. A combined report is being submitted for all three units because they share some common effluent facilities.

The dose consequences of the radioactive effluents considered in this report will be addressed in the Radioactive Effluents Dose Report. However, based upon previous experience, the dose consequences are anticipated to be well within regulatory limits.

Listed below are the unit capacity factors and major shutdowns for the report period January 1 - June 30, 1993:

Unit	Capacity Factor
1	92.8%
2	86.7%
3	88.5%

2.0 Radioactive Effluent Releases

The plants were operated in accordance with the Technical Specifications. The liquid and airborne effluents are given in the attached tables as follows:

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Table 2.1-1

Millstone Unit No. 1

Liquid Effluents - Release Summary

		First Quarter 1993			
	Units	January	February	March	Total
A. Fission and Activation Products					
1. Total Activity Released	Ci	1.84E-02	1.42E-02	2.44E-02	5.70E-02
2. Average Period Diluted Activity	uCi/ml	2.49E-10	2.13E-10	3.31E-10	2.66E-10
B. Tritium					
1. Total Activity Released	Ci	7.54E-01	1.95E+00	2.47E+00	5.17E+00
2. Average Period Diluted Activity	uCi/ml	1.02E-08	2.92E-08	3.34E-08	2.41E-08
C. Dissolved and Entrained Gases					
1. Total Activity Released	Ci	8.51E-06	N/D	N/D	8.51E-06
2. Average Diluted Activity	uCi/ml	1.15E-13	-	-	3.96E-14
D. Gross Alpha					
1. Total Activity Released	Ci	N/D	N/D	N/D	N/D
		No Activity Detected			
E. Volume					
1. Released Waste Volume	Liters	7.84E+05	7.63E+05	9.92E+05	2.54E+06
2. Dilution Volume During Releases	Liters	2.71E+09	2.64E+09	3.26E+09	8.61E+09
3. Dilution Volume During Period	Liters	7.41E+10	6.68E+10	7.39E+10	2.15E+11

N/D = Not Detected

Table 2.1-1

Millstone Unit No. 1

Liquid Effluents - Release Summary

	Units	Second Quarter 1993			
		April	May	June	Total
A. Fission and Activation Products					
1. Total Activity Released	Ci	1.14E-02	4.81E-03	1.88E-02	3.50E-02
2. Average Period Diluted Activity	uCi/ml	1.78E-10	6.49E-11	2.62E-10	1.67E-10
B. Tritium					
1. Total Activity Released	Ci	1.25E+00	8.59E-01	1.00E+00	3.11E+00
2. Average Period Diluted Activity	uCi/ml	1.95E-08	1.16E-08	1.40E-08	1.48E-08
C. Dissolved and Entrained Gases					
1. Total Activity Released	Ci	7.48E-05	N/D	N/D	7.48E-05
2. Average Diluted Activity	uCi/ml	1.16E-12	-	-	3.56E-13
D. Gross Alpha					
1. Total Activity Released	Ci	N/D	N/D	N/D	N/D
		No Activity Detected			
E. Volume					
1. Released Waste Volume	Liters	9.61E+05	8.18E+05	7.11E+05	2.49E+06
2. Dilution Volume During Releases	Liters	2.75E+09	2.68E+09	2.45E+09	7.88E+09
3. Dilution Volume During Period	Liters	6.42E+10	7.41E+10	7.15E+10	2.10E+11

N/D = Not Detected

Table 2.1-2

Millstone Unit No. 1
Liquid Effluents - Batch

Nuclides Released	Units	First Quarter 1993			
		January	February	March	Total
A. Fission & Activation Products					
Ba-140	Ci		2.80E-05		2.80E-05
Ce-143	Ci			1.60E-05	1.60E-05
Co-60	Ci	1.56E-02	1.19E-02	1.70E-02	4.45E-02
Cs-137	Ci	2.54E-04	7.33E-04	5.12E-03	6.11E-03
Fe-55	Ci	2.67E-04			2.67E-04
I-131	Ci			8.25E-06	8.25E-06
I-133	Ci			8.27E-06	8.27E-06
Mn-54	Ci	2.47E-05		4.60E-05	7.07E-05
Mo-99	Ci			4.93E-05	4.93E-05
Na-24	Ci			7.86E-05	7.86E-05
Tc-99m	Ci			5.41E-05	5.41E-05
Zn-65	Ci	2.27E-03	1.53E-03	2.06E-03	5.86E-03
Total Activity	Ci	1.84E-02	1.42E-02	2.44E-02	5.70E-02
B. Tritium					
H-3	Ci	7.54E-01	1.95E+00	2.47E+00	5.17E+00
C. Dissolved & Entrained Gases					
Xe-135	Ci	8.51E-06			8.51E-06
Total Activity	Ci	8.51E-06			8.51E-06
D. Gross Alpha					
Gross Alpha	Ci				

Table 2.1-2

Millstone Unit No. 1
Liquid Effluents - Batch

Nuclides Released	Units	Second Quarter 1993			
		April	May	June	Total
A. Fission & Activation Products					
Co-60	Ci	7.82E-03	1.96E-03	8.74E-03	1.85E-02
Cr-51	Ci	9.02E-05	2.21E-04		3.11E-04
Cs-134	Ci		9.38E-06		9.38E-06
Cs-137	Ci	1.13E-03		1.99E-03	3.12E-03
Fe-55	Ci	1.09E-03		2.81E-04	1.37E-03
I-131	Ci	2.00E-05			2.00E-05
I-133	Ci	3.30E-05		1.22E-05	4.52E-05
Mn-54	Ci	2.03E-04	2.91E-04	1.39E-04	6.33E-04
Mo-99	Ci	2.40E-04	1.64E-05		2.56E-04
Na-24	Ci		2.34E-05		2.34E-05
Sr-90	Ci		8.02E-05		8.02E-05
Tc-99m	Ci	2.58E-04	1.76E-05		2.76E-04
Zn-65	Ci	5.29E-04	2.19E-03	7.60E-03	1.03E-02
Total Activity	Ci	1.14E-02	4.81E-03	1.88E-02	3.50E-02
B. Tritium					
H-3	Ci	1.25E+00	8.59E-01	1.00E+00	3.11E+00
C. Dissolved & Entrained Gases					
Xe-133	Ci	6.90E-05			6.90E-05
Xe-135	Ci	5.78E-06			5.78E-06
Total Activity	Ci	7.48E-05			7.48E-05
D. Gross Alpha					
Gross Alpha	Ci				

Table 2.1-3

Millstone Unit No. 1

Airborne Effluents - Release Summary

	Units	First Quarter 1993			
		January	February	March	Total
A. Fission & Activation Gases					
1. Total Activity Released	Ci	2.27E+02	3.46E+01	3.82E+01	3.00E+02
2. Average Period Release Rate	uCi/sec	9.40E+01	1.43E+01	1.58E+01	4.14E+01
B. Iodine-131					
1. Total Activity Released	Ci	9.27E-04	1.49E-04	8.79E-05	1.16E-03
2. Average Period Release Rate	uCi/sec	3.83E-04	6.16E-05	3.63E-05	1.60E-04
C. Particulates					
1. Total Activity Released	Ci	3.27E-04	1.53E-04	2.09E-04	6.88E-04
2. Average Diluted Activity	uCi/sec	1.35E-04	6.32E-05	8.64E-05	9.48E-05
D. Gross Alpha					
1. Total Activity Released	Ci	3.59E-07	2.86E-07	4.97E-07	1.14E-06
E. Tritium					
1. Total Activity Released	Ci	2.66E+00	5.08E+00	2.82E+00	1.06E+01
2. Average Period Release Rate	uCi/sec	1.10E+00	2.10E+00	1.17E+00	1.46E+00

N/D = Not Detected

Table 2.1-3

Millstone Unit No. 1

Airborne Effluents - Release Summary

	Units	Second Quarter 1993			
		April	May	June	Total
A. Fission & Activation Gases					
1. Total Activity Released	Ci	N/D	4.97E+00	2.49E-01	5.22E+00
2. Average Period Release Rate	uCi/sec	-	2.05E+00	8.23E-02	6.16E-01
B. Iodine-131					
1. Total Activity Released	Ci	4.58E-05	2.82E-05	4.77E-05	1.22E-04
2. Average Period Release Rate	uCi/sec	1.52E-05	1.17E-05	1.58E-05	1.44E-05
C. Particulates					
1. Total Activity Released	Ci	8.21E-04	7.92E-05	9.09E-04	1.81E-03
2. Average Diluted Activity	uCi/sec	2.72E-04	3.27E-05	3.01E-04	2.14E-04
D. Gross Alpha					
1. Total Activity Released	Ci	1.59E-07	2.00E-07	1.49E-06	1.85E-06
E. Tritium					
1. Total Activity Released	Ci	1.25E+00	1.58E+00	N/D	2.83E+00
2. Average Period Release Rate	uCi/sec	4.14E-01	6.53E-01	-	3.34E-01

N/D = Not Detected

Table 2.1-4

Millstone Unit No. 1

Airborne Effluents - Elevated Continuous

Nuclides Released	Units	First Quarter 1993			
		January	February	March	Total
A. Fission & Activation Gases					
Ar-41	Ci	9.00E-01	1.55E-01	1.05E-01	1.16E+00
Kr-85	Ci	1.29E+01			1.29E+01
Kr-85m	Ci	5.34E+00	9.28E-01	1.01E+00	7.28E+00
Kr-87	Ci	2.85E+01	4.68E+00	4.99E+00	3.82E+01
Kr-88	Ci	1.80E+01	3.31E+00	3.66E+00	2.50E+01
Xe-133	Ci	1.09E+00	1.93E-01	1.15E-01	1.40E+00
Xe-135	Ci	3.38E+01	5.51E+00	6.25E+00	4.56E+01
Xe-135m	Ci	2.58E+01	4.35E+00	4.68E+00	3.48E+01
Xe-138	Ci	1.01E+02	1.55E+01	1.74E+01	1.34E+02
Total Activity	Ci	2.27E+02	3.46E+01	3.82E+01	3.00E+02
B. Iodines					
I-131	Ci	9.27E-04	1.49E-04	8.79E-05	1.16E-03
I-133	Ci	9.64E-03	1.56E-03	6.49E-04	1.18E-02
Total Activity	Ci	1.06E-02	1.71E-03	7.37E-04	1.30E-02
C. Particulates					
I-131	Ci				
Ba-140	Ci	1.77E-04	7.10E-05	7.34E-05	3.21E-04
Co-58	Ci		1.58E-06	1.04E-06	2.62E-06
Co-60	Ci	3.34E-06	7.93E-06	2.77E-05	3.90E-05
Cr-51	Ci	4.81E-05	2.45E-05	3.04E-05	1.03E-04
Cs-137	Ci		2.93E-06	9.63E-06	1.26E-05
Mn-54	Ci			1.04E-06	1.04E-06
Sr-89	Ci	7.16E-05	2.72E-05	2.72E-05	1.26E-04
Sr-90	Ci	3.68E-07			3.68E-07
Zn-65	Ci	2.61E-05	1.77E-05	3.85E-05	8.23E-05
Total Activity	Ci	3.27E-04	1.53E-04	2.09E-04	6.88E-04
D. Gross Alpha					
Gross Alpha	Ci	3.59E-07	2.86E-07	4.97E-07	1.14E-06
E. Tritium					
H-3	Ci	2.66E+00	5.08E+00	2.82E+00	1.06E+01

Table 2.1-4

Millstone Unit No. 1

Airborne Effluents - Elevated Continuous

Nuclides Released	Units	Second Quarter 1993			
		April	May	June	Total
A. Fission & Activation Gases					
Ar-41	Ci		6.48E-02	2.38E-02	8.86E-02
Kr-85m	Ci		1.18E-01		1.18E-01
Kr-87	Ci		6.37E-01		6.37E-01
Kr-88	Ci		4.62E-01		4.62E-01
Xe-133	Ci		9.15E-02	1.20E-01	2.12E-01
Xe-135	Ci		7.70E-01	1.05E-01	8.75E-01
Xe-135m	Ci		5.33E-01		5.33E-01
Xe-138	Ci		2.29E+00		2.29E+00
Total Activity	Ci		4.97E+00	2.49E-01	5.22E+00
B. Iodines					
I-131	Ci	4.58E-05	2.82E-05	4.65E-05	1.21E-04
I-133	Ci	3.54E-04	3.93E-04	2.18E-04	9.65E-04
Total Activity	Ci	4.00E-04	4.21E-04	2.65E-04	1.09E-03
C. Particulates					
I-131	Ci			1.24E-06	1.24E-06
Ba-140	Ci		1.94E-05	4.96E-06	2.44E-05
Ce-141	Ci			9.49E-07	9.49E-07
Co-58	Ci	6.31E-05		1.17E-05	7.48E-05
Co-60	Ci	1.21E-04	1.52E-05	2.58E-04	3.94E-04
Cr-51	Ci	2.68E-04		1.32E-04	4.00E-04
Cs-137	Ci	1.31E-05	5.45E-06	6.35E-06	2.49E-05
Fe-59	Ci	8.44E-06		5.13E-05	5.97E-05
Mn-54	Ci	6.45E-05		2.46E-04	3.11E-04
Sr-89	Ci	2.91E-06	1.32E-05	3.64E-06	1.98E-05
Zn-65	Ci	2.80E-04	2.59E-05	1.93E-04	4.99E-04
Total Activity	Ci	8.21E-04	7.92E-05	9.09E-04	1.81E-03
D. Gross Alpha					
Gross Alpha	Ci	1.59E-07	2.00E-07	1.49E-06	1.85E-06
E. Tritium					
H-3	Ci	1.25E+00	1.58E+00		2.83E+00

Table 2.2-1

Millstone Unit No. 2

Liquid Effluents - Release Summary

		First Quarter 1993			
	Units	January	February	March	Total
A. Fission and Activation Products					
1. Total Activity Released	Ci	3.09E-01	2.62E-01	1.59E-02	5.87E-01
2. Average Period Diluted Activity	uCi/ml	7.22E-09	5.75E-09	2.29E-10	3.72E-09
B. Tritium					
1. Total Activity Released	Ci	2.55E+00	4.89E+00	1.59E+01	2.33E+01
2. Average Period Diluted Activity	uCi/ml	5.95E-08	1.07E-07	2.28E-07	1.47E-07
C. Dissolved and Entrained Gases					
1. Total Activity Released	Ci	2.70E-04	1.08E-02	2.24E-02	3.34E-02
2. Average Diluted Activity	uCi/ml	6.30E-12	2.37E-10	3.21E-10	2.12E-10
D. Gross Alpha					
1. Total Activity Released	Ci	N/D	N/D	N/D	N/D
		No Activity Detected			
E. Volume					
1. Released Waste Volume	Liters	6.07E+07	1.33E+07	1.90E+07	9.30E+07
2. Dilution Volume During Releases	Liters	6.51E+09	8.79E+09	1.36E+10	2.89E+10
3. Dilution Volume During Period	Liters	4.28E+10	4.56E+10	6.96E+10	1.58E+11

N/D = Not Detected

Table 2.2-1

Millstone Unit No. 2

Liquid Effluents - Release Summary

	Units	Second Quarter 1993			
		April	May	June	Total
A. Fission and Activation Products					
1. Total Activity Released	Ci	9.48E-03	1.94E-02	1.44E-02	4.33E-02
2. Average Period Diluted Activity	uCi/ml	1.01E-10	2.07E-10	1.54E-10	1.54E-10
B. Tritium					
1. Total Activity Released	Ci	1.57E+01	3.79E+01	6.17E+01	1.15E+02
2. Average Period Diluted Activity	uCi/ml	1.67E-07	4.04E-07	6.59E-07	4.10E-07
C. Dissolved and Entrained Gases					
1. Total Activity Released	Ci	8.71E-03	9.85E-02	8.84E-02	1.96E-01
2. Average Diluted Activity	uCi/ml	9.29E-11	1.05E-09	9.44E-10	6.96E-10
D. Gross Alpha					
1. Total Activity Released	Ci	N/D	N/D	N/D	N/D
		No Activity Detected			
E. Volume					
1. Released Waste Volume	Liters	1.59E+05	2.27E+07	2.86E+05	2.31E+07
2. Dilution Volume During Releases	Liters	1.14E+10	9.71E+09	8.20E+09	2.93E+10
3. Dilution Volume During Period	Liters	9.37E+10	9.38E+10	9.37E+10	2.81E+11

N/D = Not Detected

Table 2.2-2

Millstone Unit No. 2

Liquid Effluents - Continuous - SGBD

Nuclides Released	Units	First Quarter 1993			
		January	February	March	Total
A. Fission & Activation Products					
I-134	Ci	1.51E-04			1.51E-04
Na-24	Ci	1.42E-04	2.25E-01		2.25E-01
Total Activity	Ci	2.93E-04	2.25E-01		2.25E-01
B. Tritium					
H-3	Ci		3.14E-02	1.01E-02	4.15E-02
C. Dissolved & Entrained Gases					
	Ci				
Total Activity	Ci				
D. Gross Alpha					
Gross Alpha	Ci				

Table 2.2-2

Millstone Unit No. 2

Liquid Effluents - Continuous - SGBD

Nuclides Released	Units	Second Quarter 1993			
		April	May	June	Total
A. Fission & Activation Products					
Ce-144	Ci		2.35E-05		2.35E-05
Total Activity	Ci		2.35E-05		2.35E-05
B. Tritium					
H-3	Ci				
C. Dissolved & Entrained Gases					
	Ci				
Total Activity	Ci				
D. Gross Alpha					
Gross Alpha	Ci				

Table 2.2-3
Millstone Unit No. 2
Liquid Effluents - Batch

Nuclides Released	Units	First Quarter 1993			
		January	February	March	Total
A. Fission & Activation Products					
Ag-110m	Ci	2.53E-02	8.01E-03	2.32E-03	3.56E-02
Ce-144	Ci		6.17E-05		6.17E-05
Co-57	Ci	4.68E-05			4.68E-05
Co-58	Ci	1.08E-02	2.53E-03	6.96E-04	1.41E-02
Co-60	Ci	7.60E-02	1.24E-02	5.22E-03	9.36E-02
Cs-134	Ci	1.66E-02	3.13E-04	6.51E-05	1.70E-02
Cs-137	Ci	7.53E-02	1.38E-03	4.40E-04	7.71E-02
Fe-55	Ci	9.40E-02	1.16E-02	6.33E-03	1.12E-01
Fe-59	Ci	3.07E-04			3.07E-04
Fu-105	Ci	6.71E-04			6.71E-04
I-131	Ci		1.70E-05	8.25E-05	9.95E-05
La-140	Ci	2.76E-05	2.18E-05	2.16E-04	2.65E-04
Mn-54	Ci	1.14E-03	9.68E-05	2.81E-05	1.27E-03
Mo-99	Ci		1.55E-05		1.55E-05
Nb-95	Ci	1.13E-03	8.20E-05	8.32E-06	1.22E-03
Sb-124	Ci	4.48E-04	3.52E-05		4.83E-04
Sb-125	Ci	6.60E-03	3.01E-04	5.31E-04	7.43E-03
Sr-89	Ci			1.17E-05	1.17E-05
Sr-90	Ci	1.93E-05	6.71E-06		2.60E-05
Sr-92	Ci	2.63E-04	3.44E-05		2.97E-04
Tc-99m	Ci		1.68E-05		1.68E-05
Zr-95	Ci	3.36E-04			3.36E-04
Total Activity	Ci	3.09E-01	3.70E-02	1.59E-02	3.62E-01
B. Tritium					
H-3	Ci	2.55E+00	4.86E+00	1.59E+01	2.33E+01
C. Dissolved & Entrained Gases					
Kr-85	Ci			1.00E-02	1.00E-02
Kr-88	Ci			1.10E-05	1.10E-05
Xe-133	Ci	2.70E-04	1.04E-02	1.23E-02	2.30E-02
Xe-135	Ci		3.55E-04	2.74E-05	3.82E-04
Total Activity	Ci	2.70E-04	1.08E-02	2.24E-02	3.34E-02
D. Gross Alpha					
Gross Alpha	Ci				

Table 2.2-3
Millstone Unit No. 2
Liquid Effluents - Batch

Nuclides Released	Units	Second Quarter 1993			
		April	May	June	Total
A. Fission & Activation Products					
Ag-110m	Ci	9.17E-04	5.88E-04	7.49E-04	2.25E-03
Be-7	Ci		6.91E-05	6.32E-05	1.32E-04
Co-58	Ci	5.45E-04	1.33E-04	6.52E-04	1.33E-03
Co-60	Ci	3.50E-03	1.52E-02	4.74E-03	2.34E-02
Cs-134	Ci	1.33E-04	1.16E-05	4.91E-04	6.35E-04
Cs-137	Ci	5.07E-04	2.57E-04	1.38E-03	2.14E-03
Fe-55	Ci	3.62E-03	2.51E-03	4.69E-03	1.08E-02
I-131	Ci	4.42E-05	5.55E-05	1.37E-04	2.37E-04
La-140	Ci		8.29E-06	2.74E-04	2.82E-04
Mn-54	Ci	1.06E-05		3.80E-05	4.86E-05
Mo-99	Ci			2.49E-05	2.49E-05
Nb-95	Ci	1.56E-05			1.56E-05
Nb-97	Ci	5.95E-05		1.67E-04	2.27E-04
Sb-124	Ci			7.76E-06	7.76E-06
Sb-125	Ci	1.17E-04	5.21E-04	9.82E-04	1.62E-03
Sr-89	Ci	1.21E-05		2.29E-06	1.44E-05
Sr-90	Ci	2.75E-06		1.44E-06	4.19E-06
Tc-104	Ci		5.94E-05		5.94E-05
Tc-99m	Ci			2.66E-05	2.66E-05
Total Activity	Ci	9.48E-03	1.94E-02	1.44E-02	4.33E-02
B. Tritium					
H-3	Ci	1.57E+01	3.79E+01	6.17E+01	1.15E+02
C. Dissolved & Entrained Gases					
Kr-85	Ci		6.76E-03	9.90E-03	1.67E-02
Xe-133	Ci	8.49E-03	8.22E-02	7.65E-02	1.67E-01
Xe-133m	Ci		1.59E-03	1.20E-03	2.79E-03
Xe-135	Ci	2.21E-04	8.01E-03	8.20E-04	9.05E-03
Total Activity	Ci	8.71E-03	9.85E-02	8.84E-02	1.96E-01
D. Gross Alpha					
Gross Alpha	Ci				

Table 2.2-4

Millstone Unit No. 2

Airborne Effluents - Release Summary

	Units	First Quarter 1993			
		January	February	March	Total
A. Fission & Activation Gases					
1. Total Activity Released	Ci	1.23E-01	9.94E-01	4.36E-01	1.55E+00
2. Average Period Release Rate	uCi/sec	4.07E-02	3.29E-01	1.80E-01	1.84E-01
B. Iodine-131					
1. Total Activity Released	Ci	5.81E-06	2.81E-05	3.28E-05	6.67E-05
2. Average Period Release Rate	uCi/sec	1.92E-06	9.30E-06	1.36E-05	7.89E-06
C. Particulates					
1. Total Activity Released	Ci	4.87E-06	N/D	1.03E-05	1.52E-05
2. Average Diluted Activity	uCi/sec	1.61E-06	-	4.26E-06	1.80E-06
D. Gross Alpha					
1. Total Activity Released	Ci	N/D	N/D	N/D	N/D
		No Activity Detected			
E. Tritium					
1. Total Activity Released	Ci	1.26E+00	2.95E+01	5.53E+00	3.63E+01
2. Average Period Release Rate	uCi/sec	4.17E-01	9.77E+00	2.29E+00	4.29E+00

N/D = Not Detected

Table 2.2-4

Millstone Unit No. 2

Airborne Effluents - Release Summary

		Second Quarter 1993			
	Units	April	May	June	Total
A. Fission & Activation Gases					
1. Total Activity Released	Ci	1.30E-01	5.41E-01	1.76E+00	2.43E+00
2. Average Period Release Rate	uCi/sec	5.37E-02	1.79E-01	7.26E-01	3.09E-01
B. Iodine-131					
1. Total Activity Released	Ci	6.34E-05	1.00E-04	1.30E-04	2.93E-04
2. Average Period Release Rate	uCi/sec	2.62E-05	3.31E-05	5.37E-05	3.73E-05
C. Particulates					
1. Total Activity Released	Ci	N/D	N/D	N/D	N/D
		No Activity Detected			
2. Average Diluted Activity	uCi/sec	-	-	-	-
D. Gross Alpha					
1. Total Activity Released	Ci	N/D	N/D	N/D	N/D
		No Activity Detected			
E. Tritium					
1. Total Activity Released	Ci	5.14E-01	6.13E-01	8.60E-01	1.99E+00
2. Average Period Release Rate	uCi/sec	2.12E-01	2.03E-01	3.55E-01	2.53E-01

N/D = Not Detected

Table 2.2-5

Millstone Unit No. 2

Airborne Effluents - Mixed Continuous - Vent & SGBD Tank Vent

Nuclides Released	Units	First Quarter 1993			
		January	February	March	Total
A. Fission & Activation Gases					
Kr-85	Ci		2.77E-01		2.77E-01
Xe-135	Ci	1.23E-01	2.24E-01	1.27E-01	4.74E-01
Total Activity	Ci	1.23E-01	5.01E-01	1.27E-01	7.51E-01
B. Iodines					
I-131	Ci	5.81E-06	2.81E-05	3.28E-05	6.67E-05
I-133	Ci	8.13E-06	7.03E-05	8.82E-05	1.67E-04
Total Activity	Ci	1.39E-05	9.84E-05	1.21E-04	2.33E-04
C. Particulates					
I-131	Ci				
Ce-144	Ci	2.49E-06			2.49E-06
Co-58	Ci	2.38E-06			2.38E-06
Co-60	Ci			8.68E-06	8.68E-06
Cs-137	Ci			1.64E-06	1.64E-06
Total Activity	Ci	4.87E-06		1.03E-05	1.52E-05
D. Gross Alpha					
Gross Alpha	Ci				
E. Tritium					
H-3	Ci	1.26E+00	2.95E+01	5.53E+00	3.63E+01

Table 2.2-5

Millstone Unit No. 2

Airborne Effluents - Mixed Continuous - Vent & SGBD Tank Vent

Nuclides Released	Units	Second Quarter 1993			
		April	May	June	Total
A. Fission & Activation Gases					
Kr-88	Ci		3.88E-01		3.88E-01
Xe-133	Ci			1.05E+00	1.05E+00
Xe-135	Ci	1.30E-01	1.53E-01	6.89E-01	9.72E-01
Total Activity	Ci	1.30E-01	5.41E-01	1.74E+00	2.41E+00
B. Iodines					
I-131	Ci	6.34E-05	1.00E-04	1.30E-04	2.93E-04
I-133	Ci	1.65E-04	1.02E-04	3.83E-04	6.50E-04
Total Activity	Ci	2.28E-04	2.02E-04	5.13E-04	9.43E-04
C. Particulates					
I-131	Ci				
	Ci				
Total Activity	Ci				
D. Gross Alpha					
Gross Alpha	Ci				
E. Tritium					
H-3	Ci	5.14E-01	6.13E-01	8.60E-01	1.99E+00

Table 2.2-6

Millstone Unit No. 2

Airborne Effluents - Mixed Batch - Containment Purges

<< No Activity Detected >>

Nuclides Released	Units	First Quarter 1993			
		January	February	March	Total
A. Fission & Activation Gases					
	Ci				
Total Activity	Ci				
B. Iodines					
I-131	Ci				
	Ci				
Total Activity	Ci				
C. Particulates					
I-131	Ci				
	Ci				
Total Activity	Ci				
D. Gross Alpha					
Gross Alpha	Ci				
E. Tritium					
H-3	Ci				

Table 2.2-6

Millstone Unit No. 2

Airborne Effluents - Mixed Batch - Containment Purges

<< No Activity Detected >>

Nuclides Released	Units	Second Quarter 1993			
		April	May	June	Total
A. Fission & Activation Gases					
	Ci				
Total Activity	Ci				
B. Iodines					
I-131	Ci				
	Ci				
Total Activity	Ci				
C. Particulates					
I-131	Ci				
	Ci				
Total Activity	Ci				
D. Gross Alpha					
Gross Alpha	Ci				
E. Tritium					
H-3	Ci				

Table 2.2-7

Millstone Unit No. 2

Airborne Effluents - Elevated Batch - WGDT

Nuclides Released	Units	First Quarter 1993			
		January	February	March	Total
A. Fission & Activation Gases					
Kr-85	Ci		4.93E-01	3.09E-01	8.03E-01
Xe-135	Ci		1.21E-05		1.21E-05
Total Activity	Ci		4.93E-01	3.09E-01	8.03E-01
B. Iodines					
I-131	Ci				
	Ci				
Total Activity	Ci				
C. Particulates					
I-131	Ci				
	Ci				
Total Activity	Ci				
D. Gross Alpha					
Gross Alpha	Ci				
E. Tritium					
H-3	Ci		1.36E-04	1.43E-04	2.79E-04

Table 2.2-7

Millstone Unit No. 2

Airborne Effluents - Elevated Batch - WGDT

Nuclides Released	Units	Second Quarter 1993			
		April	May	June	Total
A. Fission & Activation Gases					
Kr-85	Ci			1.70E-02	1.70E-02
Xe-131m	Ci			2.29E-04	2.29E-04
Xe-133	Ci			3.41E-04	3.41E-04
Total Activity	Ci			1.76E-02	1.76E-02
B. Iodines					
I-131	Ci				
	Ci				
Total Activity	Ci				
C. Particulates					
I-131	Ci				
	Ci				
Total Activity	Ci				
D. Gross Alpha					
Gross Alpha	Ci				
E. Tritium					
H-3	Ci			6.36E-05	6.36E-05

Table 2.3-1

Millstone Unit No. 3

Liquid Effluents - Release Summary

	Units	First Quarter 1993			
		January	February	March	Total
A. Fission and Activation Products					
1. Total Activity Released	Ci	2.60E-02	5.50E-02	4.26E-02	1.24E-01
2. Average Period Diluted Activity	uCi/ml	1.65E-10	4.02E-10	2.84E-10	2.78E-10
B. Tritium					
1. Total Activity Released	Ci	1.58E+01	9.02E+01	9.16E+01	1.98E+02
2. Average Period Diluted Activity	uCi/ml	1.00E-07	6.59E-07	6.10E-07	4.45E-07
C. Dissolved and Entrained Gases					
1. Total Activity Released	Ci	9.91E-04	3.25E-03	5.71E-03	9.95E-03
2. Average Diluted Activity	uCi/ml	6.29E-12	2.38E-11	3.80E-11	2.24E-11
D. Gross Alpha					
1. Total Activity Released	Ci	N/D	N/D	N/D	N/D
		No Activity Detected			
E. Volume					
1. Released Waste Volume	Liters	8.37E+05	1.05E+06	1.13E+06	3.02E+06
2. Dilution Volume During Releases	Liters	4.85E+09	5.51E+09	6.17E+09	1.65E+10
3. Dilution Volume During Period	Liters	1.58E+11	1.37E+11	1.50E+11	4.44E+11

N/D = Not Detected

Table 2.3-1

Millstone Unit No. 3

Liquid Effluents - Release Summary

	Units	Second Quarter 1993			
		April	May	June	Total
A. Fission and Activation Products					
1. Total Activity Released	Ci	1.74E-01	2.22E-02	5.01E-02	2.46E-01
2. Average Period Diluted Activity	uCi/ml	1.21E-09	1.40E-10	3.30E-10	5.42E-10
B. Tritium					
1. Total Activity Released	Ci	1.05E+02	1.94E+01	3.28E+01	1.57E+02
2. Average Period Diluted Activity	uCi/ml	7.27E-07	1.22E-07	2.16E-07	3.46E-07
C. Dissolved and Entrained Gases					
1. Total Activity Released	Ci	1.57E-03	4.29E-03	8.05E-03	1.39E-02
2. Average Diluted Activity	uCi/ml	1.08E-11	2.71E-11	5.31E-11	3.06E-11
D. Gross Alpha					
1. Total Activity Released	Ci	N/D	N/D	N/D	N/D
		No Activity Detected			
E. Volume					
1. Released Waste Volume	Liters	1.35E+06	1.23E+06	1.74E+06	4.32E+06
2. Dilution Volume During Releases	Liters	7.10E+09	6.04E+09	8.49E+09	2.16E+10
3. Dilution Volume During Period	Liters	1.45E+11	1.59E+11	1.52E+11	4.55E+11

N/D = Not Detected

Table 2.3-2

Millstone Unit No. 3

Liquid Effluents - Continuous - SGBD

<< No Activity Detected >>

Nuclides Released	Units	First Quarter 1993			
		January	February	March	Total
A. Fission & Activation Products					
	Ci				
Total Activity	Ci				
B. Tritium					
H-3	Ci				
C. Dissolved & Entrained Gases					
	Ci				
Total Activity	Ci				
D. Gross Alpha					
Gross Alpha	Ci				

Table 2.3-2

Millstone Unit No. 3

Liquid Effluents - Continuous - SGBD

<< No Activity Detected >>

Nuclides Released	Units	Second Quarter 1993			
		April	May	June	Total
A. Fission & Activation Products					
	Ci				
Total Activity	Ci				
B. Tritium					
H-3	Ci				
C. Dissolved & Entrained Gases					
	Ci				
Total Activity	Ci				
D. Gross Alpha					
Gross Alpha	Ci				

Table 2.3-3

Millstone Unit No. 3

Liquid Effluents - Batch - LWS

Nuclides Released	Units	First Quarter 1993			
		January	February	March	Total
A. Fission & Activation Products					
Ag-110m	Ci	3.33E-04	1.19E-03	9.53E-04	2.48E-03
Ba-140	Ci		5.64E-06		5.64E-06
Ba-142	Ci	5.02E-05			5.02E-05
Be-7	Ci	1.15E-04		1.32E-04	2.47E-04
Co-57	Ci		4.06E-05	4.98E-05	9.04E-05
Co-58	Ci	3.92E-03	3.48E-03	2.63E-03	1.00E-02
Co-60	Ci	4.10E-03	1.83E-02	2.72E-02	4.96E-02
Cr-51	Ci			1.15E-04	1.15E-04
Cs-134	Ci	4.25E-03	4.68E-03	5.04E-04	9.43E-03
Cs-137	Ci	6.97E-03	8.15E-03	9.95E-04	1.61E-02
Cs-138	Ci		9.87E-05		9.87E-05
Fe-55	Ci	8.37E-04	2.62E-03	1.46E-03	4.92E-03
I-131	Ci	4.98E-05	1.79E-04	4.47E-05	2.74E-04
I-133	Ci	2.65E-05	8.87E-05	1.19E-05	1.27E-04
Mn-54	Ci	7.73E-04	2.71E-03	3.66E-03	7.14E-03
Na-24	Ci	2.52E-04	1.05E-03		1.30E-03
Nb-95	Ci		3.20E-04		3.20E-04
Nb-97	Ci	2.08E-05	4.05E-05	1.50E-03	1.56E-03
Pr-144	Ci		5.69E-03		5.69E-03
Sb-122	Ci	4.90E-04	4.98E-04	1.09E-05	9.99E-04
Sb-124	Ci	5.42E-05	8.31E-06		6.25E-05
Sb-125	Ci	3.75E-03	5.04E-03	3.35E-03	1.21E-02
Sr-89	Ci		8.08E-04		8.08E-04
Te-132	Ci			1.66E-06	1.66E-06
Total Activity	Ci	2.60E-02	5.50E-02	4.26E-02	1.24E-01
B. Tritium					
H-3	Ci	1.58E+01	9.02E+01	9.16E+01	1.98E+02
C. Dissolved & Entrained Gases					
Kr-85m	Ci		3.65E-05	3.30E-06	3.98E-05
Xe-133	Ci	5.40E-04	1.32E-03	9.76E-04	2.84E-03
Xe-135	Ci	4.32E-04	1.26E-03	1.32E-03	3.01E-03
Xe-135m	Ci	1.85E-05		6.81E-06	2.53E-05
Xe-138	Ci		5.32E-05		5.32E-05
Kr-85	Ci		5.85E-04	3.40E-03	3.99E-03
Total Activity	Ci	9.91E-04	3.25E-03	5.71E-03	9.95E-03
D. Gross Alpha					
Gross Alpha	Ci				

Table 2.3-3

Millstone Unit No. 3
Liquid Effluents - Batch - LWS

Nuclides Released	Units	Second Quarter 1993			
		April	May	June	Total
A. Fission & Activation Products					
Ag-110m	Ci	3.55E-03		1.26E-03	4.81E-03
Ba-140	Ci	7.54E-05			7.54E-05
Co-57	Ci	3.46E-04	3.50E-07		3.46E-04
Co-58	Ci	1.53E-02	6.75E-03	1.52E-02	3.73E-02
Co-60	Ci	1.09E-01	6.29E-03	5.97E-03	1.21E-01
Cr-51	Ci	3.26E-04	4.83E-04	4.58E-03	5.39E-03
Cs-134	Ci	2.20E-04	4.57E-04	1.74E-03	2.42E-03
Cs-137	Ci	8.59E-04	8.62E-04	3.84E-03	5.56E-03
Fe-55	Ci	1.11E-02	2.71E-03	8.53E-03	2.23E-02
Fe-59	Ci			1.55E-04	1.55E-04
I-131	Ci	7.04E-05	3.77E-04	6.23E-04	1.07E-03
I-133	Ci	4.31E-05	2.27E-04	4.95E-04	7.65E-04
I-135	Ci			4.09E-05	4.09E-05
La-140	Ci	7.85E-05			7.85E-05
Mn-54	Ci	1.43E-02	1.50E-03	2.45E-03	1.83E-02
Mo-99	Ci			1.30E-05	1.30E-05
Nb-95	Ci	1.38E-05	2.02E-05	6.70E-04	7.04E-04
Nb-97	Ci	5.82E-03	2.21E-04	1.78E-03	7.82E-03
Ru-106	Ci	2.74E-03	2.96E-04		3.04E-03
Sb-122	Ci		2.48E-05	1.04E-04	1.29E-04
Sb-125	Ci	9.52E-03	1.91E-03	2.37E-03	1.38E-02
Sn-113	Ci			1.94E-05	1.94E-05
Sn-117m	Ci			1.54E-05	1.54E-05
Sr-87m	Ci			2.15E-06	2.15E-06
Sr-89	Ci	9.31E-05			9.31E-05
Sr-92	Ci	2.71E-05			2.71E-05
Tc-99m	Ci			1.40E-05	1.40E-05
Te-132	Ci			1.30E-06	1.30E-06
Zn-65	Ci	6.79E-04	2.28E-05		7.02E-04
Zr-95	Ci			1.96E-04	1.96E-04
Total Activity	Ci	1.74E-01	2.22E-02	5.01E-02	2.46E-01
B. Tritium					
H-3	Ci	1.05E+02	1.94E+01	3.28E+01	1.57E+02
C. Dissolved & Entrained Gases					
Xe-131m	Ci			9.46E-05	9.46E-05
Xe-133	Ci	6.42E-04	1.83E-03	3.10E-03	5.57E-03
Xe-133m	Ci			7.55E-06	7.55E-06
Xe-135	Ci	9.25E-04	2.40E-03	4.84E-03	8.17E-03
Xe-135m	Ci			6.40E-06	6.40E-06
Xe-137	Ci		6.43E-05		6.43E-05

Table 2.3-3

Millstone Unit No. 3

Liquid Effluents - Batch - LWS

Nuclides Released	Units	Second Quarter 1993			
		April	May	June	Total
C. Dissolved & Entrained Gases (Continued)					
Total Activity	Ci	1.57E-03	4.29E-03	8.05E-03	1.39E-02
D. Gross Alpha					
Gross Alpha	Ci				

Table 2.3-4

Millstone Unit No. 3

Liquid Effluents - Batch - CPF WN Sumps

<< No Activity Detected >>

Nuclides Released	Units	First Quarter 1993			
		January	February	March	Total
A. Fission & Activation Products					
	Ci				
Total Activity	Ci				
B. Tritium					
H-3	Ci				
C. Dissolved & Entrained Gases					
	Ci				
Total Activity	Ci				
D. Gross Alpha					
Gross Alpha	Ci				

Table 2.3-4

Millstone Unit No. 3

Liquid Effluents - Batch - CPF WN Sumps

<< No Activity Detected >>

Nuclides Released	Units	Second Quarter 1993			
		April	May	June	Total
A. Fission & Activation Products					
	Ci				
Total Activity	Ci				
B. Tritium					
H-3	Ci				
C. Dissolved & Entrained Gases					
	Ci				
Total Activity	Ci				
D. Gross Alpha					
Gross Alpha	Ci				

Table 2.3-5

Millstone Unit No. 3

Airborne Effluents - Release Summary

		First Quarter 1993			
	Units	January	February	March	Total
A. Fission & Activation Gases					
1. Total Activity Released	Ci	N/D	N/D	N/D	N/D
		No Activity Detected			
2. Average Period Release Rate	uCi/sec	-	-	-	-
B. Iodine-131					
1. Total Activity Released	Ci	3.37E-05	2.43E-05	2.95E-05	8.75E-05
2. Average Period Release Rate	uCi/sec	1.09E-05	1.00E-05	1.22E-05	1.10E-05
C. Particulates					
1. Total Activity Released	Ci	N/D	3.12E-06	7.15E-06	1.03E-05
2. Average Diluted Activity	uCi/sec	-	1.29E-06	2.96E-06	1.29E-06
D. Gross Alpha					
1. Total Activity Released	Ci	1.33E-08	4.41E-07	4.63E-07	9.17E-07
E. Tritium					
1. Total Activity Released	Ci	N/D	N/D	2.69E+01	2.69E+01
2. Average Period Release Rate	uCi/sec	-	-	1.11E+01	3.39E+00

N/D = Not Detected

Table 2.3-5

Millstone Unit No. 3

Airborne Effluents - Release Summary

	Units	Second Quarter 1993			
		April	May	June	Total
A. Fission & Activation Gases					
1. Total Activity Released	Ci	N/D	2.93E+01	N/D	2.93E+01
2. Average Period Release Rate	uCi/sec	-	1.21E+01	-	3.72E+00
B. Iodine-131					
1. Total Activity Released	Ci	1.42E-05	1.86E-05	3.78E-05	7.07E-05
2. Average Period Release Rate	uCi/sec	4.69E-06	7.70E-06	1.56E-05	8.98E-06
C. Particulates					
1. Total Activity Released	Ci	1.01E-05	5.45E-06	1.61E-05	3.17E-05
2. Average Diluted Activity	uCi/sec	3.35E-06	2.25E-06	6.65E-06	4.02E-06
D. Gross Alpha					
1. Total Activity Released	Ci	N/D	1.48E-08	1.10E-07	1.25E-07
E. Tritium					
1. Total Activity Released	Ci	N/D	N/D	N/D	N/D
		No Activity Detected			
2. Average Period Release Rate	uCi/sec	-	-	-	-

N/D = Not Detected

Table 2.3-6

Millstone Unit No. 3

Airborne Effluents - Mixed Continuous - Normal Ventilation

Nuclides Released	Units	First Quarter 1993			
		January	February	March	Total
A. Fission & Activation Gases					
	Ci				
Total Activity	Ci				
B. Iodines					
I-131	Ci	3.37E-05	2.43E-05	2.95E-05	8.75E-05
I-133	Ci	6.20E-05	5.08E-05	6.22E-05	1.75E-04
Total Activity	Ci	9.57E-05	7.51E-05	9.17E-05	2.63E-04
C. Particulates					
I-131	Ci				
Cs-134	Ci			6.93E-06	6.93E-06
Ru-103	Ci		2.70E-06		2.70E-06
Total Activity	Ci		2.70E-06	6.93E-06	9.63E-06
D. Gross Alpha					
Gross Alpha	Ci		4.32E-07	4.32E-07	8.64E-07
E. Tritium					
H-3	Ci			2.69E+01	2.69E+01

Table 2.3-6

Millstone Unit No. 3

Airborne Effluents - Mixed Continuous - Normal Ventilation

Nuclides Released	Units	Second Quarter 1993			
		April	May	June	Total
A. Fission & Activation Gases					
Xe-135	Ci		2.93E+01		2.93E+01
Total Activity	Ci		2.93E+01		2.93E+01
B. Iodines					
I-131	Ci	1.41E-05	1.86E-05	3.78E-05	7.05E-05
I-133	Ci	1.71E-05	5.11E-05	6.55E-05	1.34E-04
Total Activity	Ci	3.12E-05	6.97E-05	1.03E-04	2.04E-04
C. Particulates					
I-131	Ci				
Be-7	Ci			1.14E-05	1.14E-05
Ce-144	Ci	9.15E-06			9.15E-06
Co-58	Ci			3.98E-06	3.98E-06
Sb-125	Ci		5.30E-06		5.30E-06
Total Activity	Ci	9.15E-06	5.30E-06	1.54E-05	2.98E-05
D. Gross Alpha					
Gross Alpha	Ci				
E. Tritium					
H-3	Ci				

Table 2.3-7

Millstone Unit No. 3

Airborne Effluents - Mixed Continuous - ESF Building Ventilation

Nuclides Released	Units	First Quarter 1993			
		January	February	March	Total
A. Fission & Activation Gases					
	Ci				
Total Activity	Ci				
B. Iodines					
I-131	Ci				
I-133	Ci				
Total Activity	Ci				
C. Particulates					
I-131	Ci				
Cs-137	Ci			4.59E-08	4.59E-08
Be-7	Ci		4.16E-07	1.76E-07	5.92E-07
Total Activity	Ci		4.16E-07	2.22E-07	6.38E-07
D. Gross Alpha					
Gross Alpha	Ci	1.33E-08	8.90E-09	3.12E-08	5.34E-08
E. Tritium					
H-3	Ci				

Table 2.3-7

Millstone Unit No. 3

Airborne Effluents - Mixed Continuous - ESF Building Ventilation

Nuclides Released	Units	Second Quarter 1993			
		April	May	June	Total
A. Fission & Activation Gases					
	Ci				
Total Activity	Ci				
B. Iodines					
I-131	Ci	1.18E-07	3.70E-08		1.55E-07
I-133	Ci	1.46E-07	1.45E-07		2.91E-07
Total Activity	Ci	2.64E-07	1.82E-07		4.46E-07
C. Particulates					
I-131	Ci				
Co-58	Ci	9.66E-08			9.66E-08
Be-7	Ci	8.89E-07	1.45E-07	6.92E-07	1.73E-06
Sn-117m	Ci			2.02E-08	2.02E-08
Total Activity	Ci	9.86E-07	1.45E-07	7.12E-07	1.84E-06
D. Gross Alpha					
Gross Alpha	Ci		1.48E-08	1.10E-07	1.25E-07
E. Tritium					
H-3	Ci				

Table 2.3-8

Millstone Unit No. 3

Airborne Effluents - Mixed Batch - Containment Drawdown

<< No Activity Detected >>

Nuclides Released	Units	First Quarter 1993			
		January	February	March	Total
A. Fission & Activation Gases					
	Ci				
Total Activity	Ci				
B. Iodines					
I-131	Ci				
I-133	Ci				
Total Activity	Ci				
C. Particulates					
I-131	Ci				
	Ci				
Total Activity	Ci				
D. Gross Alpha					
Gross Alpha	Ci				
E. Tritium					
H-3	Ci				

Table 2.3-8

Millstone Unit No. 3

Airborne Effluents - Mixed Batch - Containment Drawdown

<< No Activity Detected >>

Nuclides Released	Units	Second Quarter 1993			
		April	May	June	Total
A. Fission & Activation Gases					
	Ci				
Total Activity	Ci				
B. Iodines					
I-131	Ci				
I-133	Ci				
Total Activity	Ci				
C. Particulates					
I-131	Ci				
	Ci				
Total Activity	Ci				
D. Gross Alpha					
Gross Alpha	Ci				
E. Tritium					
H-3	Ci				

Table 2.3-9

Millstone Unit No. 3

Airborne Effluents - Mixed Batch - Containment Purges

<< No Activity Detected >>

Nuclides Released	Units	First Quarter 1993			
		January	February	March	Total
A. Fission & Activation Gases					
	Ci				
Total Activity	Ci				
B. Iodines					
I-131	Ci				
I-133	Ci				
Total Activity	Ci				
C. Particulates					
I-131	Ci				
	Ci				
Total Activity	Ci				
D. Gross Alpha					
Gross Alpha	Ci				
E. Tritium					
H-3	Ci				

Table 2.3-9

Millstone Unit No. 3

Airborne Effluents - Mixed Batch - Containment Purges

<< No Activity Detected >>

Nuclides Released	Units	Second Quarter 1993			
		April	May	June	Total
A. Fission & Activation Gases					
	Ci				
Total Activity	Ci				
B. Iodines					
I-131	Ci				
I-133	Ci				
Total Activity	Ci				
C. Particulates					
I-131	Ci				
	Ci				
Total Activity	Ci				
D. Gross Alpha					
Gross Alpha	Ci				
E. Tritium					
H-3	Ci				

3.0 Radioactive Solid Waste

Summaries of solid waste shipment for each unit are given in the attached Tables. The principal radionuclides were considered to be those included on the shipping manifest.

Solidification Agent(s):
Portland 1 Cement

Types and Typical Volumes of Containers:
55 gallon steel drum DOT 17-H container
202 ft^3 steel container
87 ft^3 LSA steel box
132 ft^3 Polyethylene high integrity container
173 ft^3 Polyethylene high integrity container
202 ft^3 Polyethylene high integrity container
92.7 ft^3 steel box

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Solid Waste and Irradiated Component Shipments

Millstone Unit 1
January 1, 1993 - June 31, 1993

1. Type of Waste	Disposition	Units	6-Month Period Totals	Estimated Total Error, %
a) Spent Resin, Filter Sludge, Evaporator Bottoms, Etc.	(CNSI)	m^3	3.09E+01	
	Burial	Ci	3.14E+01	25%
	(SEG)	m^3	0	
	Supercompaction	Ci	0	N/A
b) Dry Compressible Waste, Contaminated Equipment, Etc.	(CNSI)	m^3	8.07E+00	
	Burial	Ci	2.17E-01	25%
	(SEG)	m^3	0	
	Supercompaction	Ci	0	N/A
	(SEG)			
	Burial	m^3	4.41E-01	
	CNSI	Ci	1.29E-03	25%
	(Quadrex)	m^3	2.27E+01	
	Decontamination	Ci	1.34E-02	25%
	(Quadrex)			
	Burial	m^3	1.71E-02	
	CNSI	Ci	2.30E-05	25%
c) Irradiated Components, Control Rods, Etc.	(CNSI)	m^3	0	
	Burial	Ci	0	N/A

Estimates of Major Nuclide Composition (By Type of Waste)

a) Spent Resin, Filter Sludges, Evaporator Bottoms

Millstone to CNSI for Burial

Nuclide	% of Total
H-3	0.03%
C-14	0.36%
Cr-51	0.82%
Mn-54	3.60%
Fe-55	40.45%
Co-58	0.12%
Co-60	9.39%
Ni-63	0.73%
Zn-65	35.67%
Sr-89	0.01%
Sr-90	0.04%
Ag-110m	0.02%
I-131	<0.01%
Cs-137	8.60%
La-140	<0.01%
Ce-141	<0.01%
Np-237	<0.01%
Pu-238	<0.01%
Pu-239	<0.01%
Am-241	0.03%
Pu-241	0.04%
Cm-242	<0.01%
Pu-242	<0.01%
Cm-244	0.05%

Millstone to SEG for Supercompaction

Nuclide	% of Total
None	N/A

b) Dry Compressible Waste, Contaminated Equipment, Etc.

Millstone to CNSI for Burial

Nuclide	% of Total
H-3	0.57%
Cr-51	1.41%
Mn-54	5.27%
Fe-55	69.23%
Co-60	16.68%
Zn-65	4.46%
Pu-241	2.38%

Millstone to SEG for Supercompaction

Nuclide	% of Total
None	N/A

SEG to CNSI for Burial

Nuclide	% of Total
H-3	10.39%
Cr-51	0.25%
Mn-54	0.76%
Fe-55	40.47%
Co-58	0.82%
Co-60	21.16%
Ni-63	6.49%
Zn-65	0.44%
Cs-134	4.65%
Cs-137	14.11%
Pu-241	0.18%

Millstone to Quadrex for Decontamination

Nuclide	% of Total
H-3	15.82%
Cr-51	0.97%
Mn-54	1.56%
Fe-55	47.00%
Co-58	1.94%
Co-60	13.21%
Ni-63	4.21%
Zn-65	0.94%
Nb-95	0.16%
Zr-95	0.08%
Cs-134	4.83%
Cs-137	9.26%

Quadrex to CNSI for Burial

Nuclide	% of Total
H-3	9.83%
Cr-51	0.78%
Mn-54	1.57%
Fe-55	50.43%
Co-58	1.97%
Co-60	15.00%
Ni-63	4.35%
Zn-65	1.17%
Cs-134	4.74%
Cs-137	9.91%

c) Irradiated Components, Control Rods, Etc.

Millstone to CNSI for Burial

Nuclide	% of Total
None	N/A

3. Solid Waste Disposition

Number of Shipments	Mode of Transportation	Destination
5	Truck (Sole Use Vehicle)	Chem-Nuclear Services, Inc. Barnwell, SC
0	Truck (Sole Use Vehicle)	Scientific Ecology Group Oak Ridge, TN
1	Truck (Sole Use Vehicle)	Quadrex Oak Ridge, TN

Effluent and Waste Disposal Semiannual Report
Solid Waste and Irradiated Component Shipments

Millstone Unit 2
January 1, 1993 - June 31, 1993

1. Type of Waste	Disposition	Units	6-Month Period Totals	Estimated Total Error, %
a) Spent Resin, Filter Sludge, Evaporator Bottoms, Etc.	(CNSI)	m^3	3.40E+00	
	Burial	Ci	1.91E+00	25%
	(SEG)	m^3	0	
	Supercompaction	Ci	0	N/A
b) Dry Compressible Waste, Contaminated Equipment, Etc.	(CNSI)	m^3	4.84E+01	
	Burial	Ci	4.52E-01	25%
	(SEG)	m^3	0	
	Supercompaction	Ci	0	N/A
	(SEG)			
	Burial	m^3	3.84E+00	
	CNSI	Ci	1.28E-02	25%
	(Quadrex)	m^3	1.76E+02	
	Decontamination	Ci	7.58E-02	25%
	(Quadrex)			
	Burial	m^3	8.63E-01	
	CNSI	Ci	2.19E-03	25%
c) Irradiated Components, Control Rods, Etc.	(CNSI)	m^3	0	
	Burial	Ci	0	N/A

2. Estimates of Major Nuclide Composition (By Type of Waste)

a) Spent Resin, Filter Sludges, Evaporator Bottoms

Millstone to CNSI for Burial

Nuclide	% of Total
H-3	0.40%
C-14	5.11%
Cr-51	0.60%
Mn-54	0.78%
Fe-55	20.51%
Co-57	0.07%
Co-58	6.73%
Co-60	45.65%
Ni-63	10.42%
Sr-89	<0.01%
Sr-90	0.04%
Nb-95	1.01%
Zr-95	0.68%
Tc-99	0.58%
Ru-103	0.12%
Ru-106	2.62%
Ag-110m	0.55%
Sb-125	1.14%
Cs-134	0.17%
Cs-137	1.59%
Ce-144	0.32%
Pb-210	0.77%
Np-237	<0.01%
Pu-238	<0.01%
Pu-239	<0.01%
Am-241	<0.01%
Pu-241	0.15%
Cm-242	<0.01%
Pu-242	<0.01%
Cm-244	<0.01%

Millstone to SEG for Supercompaction

Nuclide	% of Total
None	N/A

b) Dry Compressible Waste, Contaminated Equipment, Etc.

Millstone to CNSI for Burial

Nuclide	% of Total
H-3	0.72%
Fe-55	20.24%
Co-58	1.40%
Co-60	30.92%
Ni-63	10.79%
Cs-134	10.42%
Cs-137	25.51%

Millstone to SEG for Supercompaction

Nuclide	% of Total
None	N/A

SEG to CNSI for Burial

Nuclide	% of Total
H-3	12.50%
Cr-51	0.30%
Mn-54	0.94%
Fe-55	31.25%
Co-58	1.09%
Co-60	24.22%
Ni-63	7.42%
Zn-65	0.53%
Cs-134	6.17%
Cs-137	15.63%
Pu-241	0.21%

Millstone to Quadrex for Decontamination

Nuclide	% of Total
H-3	15.75%
Cr-51	0.92%
Mn-54	1.59%
Fe-55	47.22%
Co-58	1.79%
Co-60	13.46%
Ni-63	4.25%
Zn-65	1.00%
Nb-95	0.09%
Zr-95	0.05%
Cs-134	4.70%
Cs-137	9.19%

Quadrex to CNSI for Burial

Nuclide	% of Total
H-3	16.48%
Cr-51	0.08%
Mn-54	1.76%
Fe-55	55.25%
Co-58	0.29%
Co-60	16.80%
Ni-63	2.68%
Zn-65	0.99%
Cs-134	1.35%
Cs-137	4.25%

c) Irradiated Components, Control Rods, Etc.

Millstone to CNSI for Burial

Nuclide	% of Total
None	N/A

3. Solid Waste Disposition

Number of Shipments	Mode of Transportation	Destination
4	Truck (Sole Use Vehicle)	Chem-Nuclear Services, Inc. Barnwell, SC
0	Truck (Sole Use Vehicle)	Scientific Ecology Group Oak Ridge, TN
6	Truck (Sole Use Vehicle)	Quadrex Oak Ridge, TN

Effluent and Waste Disposal Semiannual Report
Solid Waste and Irradiated Component Shipments

Millstone Unit 3
January 1, 1993 - June 31, 1993

1. Type of Waste	Disposition	Units	6-Month Period Totals	Estimated Total Error, %
a) Spent Resin, Filter Sludge, Evaporator Bottoms, Etc.	(CNSI)	m^3	0	
	Burial	Ci	0	N/A
	(SEG)	m^3	0	
	Supercompaction	Ci	0	N/A
b) Dry Compressible Waste, Contaminated Equipment, Etc.	(CNSI)	m^3	2.69E+00	
	Burial	Ci	9.52E-03	25%
	(SEG)	m^3	0	
	Supercompaction	Ci	0	N/A
	(SEG)			
	Burial	m^3	9.10E-02	
	CNSI	Ci	3.21E-04	25%
	(Quadrex)	m^3	1.00E+01	
	Decontamination	Ci	1.02E-02	25%
	(Quadrex)			
	Burial	m^3	5.73E-03	
	CNSI	Ci	6.43E-06	25%
c) Irradiated Components, Control Rods, Etc.	(CNSI)	m^3	0	
	Burial	Ci	0	N/A

2. Estimates of Major Nuclide Composition (By Type of Waste)

a) Spent Resin, Filter Sludges, Evaporator Bottoms

Millstone to CNSI for Burial

Nuclide	% of Total
None	N/A

Millstone to SEG for Supercompaction

Nuclide	% of Total
None	N/A

b) Dry Compressible Waste, Contaminated Equipment, Etc.

Millstone to CNSI for Burial

Nuclide	% of Total
H-3	2.73%
Cr-51	2.61%
Mn-54	1.75%
Fe-55	59.36%
Co-58	6.06%
Co-60	5.35%
Ni-63	2.44%
Nb-95	1.94%
Zr-95	0.97%
Cs-134	8.16%
Cs-137	8.62%

Millstone to SEG for Supercompaction

Nuclide	% of Total
None	N/A

SEG to CNSI for Burial

Nuclide	% of Total
H-3	9.84%
Cr-51	0.13%
Mn-54	0.40%
Fe-55	40.81%
Co-58	0.76%
Co-60	20.78%
Ni-63	6.64%
Zn-65	0.23%
Cs-134	4.77%
Cs-137	15.45%
Pu-241	0.09%

Millstone to Quadrex for Decontamination

Nuclide	% of Total
H-3	13.91%
Cr-51	1.09%
Mn-54	1.60%
Fe-55	48.45%
Co-58	2.24%
Co-60	12.84%
Ni-63	4.14%
Zn-65	0.89%
Nb-95	0.28%
Zr-95	0.14%
Cs-134	5.09%
Cs-137	9.32%

Quadrex to CNSI for Burial

Nuclide	% of Total
H-3	9.82%
Cr-51	0.78%
Mn-54	1.56%
Fe-55	50.59%
Co-58	1.97%
Co-60	15.12%
Ni-63	4.37%
Zn-65	1.17%
Cs-134	4.76%
Cs-137	9.95%

c) Irradiated Components, Control Rods, Etc.

Millstone to CNSI for Burial

Nuclide	% of Total
None	N/A

Solid Waste Disposition

Number of Shipments	Mode of Transportation	Destination
0	Truck (Sole Use Vehicle)	Chem-Nuclear Services, Inc. Barnwell, SC
0	Truck (Sole Use Vehicle)	Scientific Ecology Group Oak Ridge, TN
0	Truck (Sole Use Vehicle)	Quadrex Oak Ridge, TN

4.0 Measurements of Radioactivity

4.1 Gaseous Releases

a. Unit 1 Stack

(1) Fission and Activation Gases

Stack monitors continuously record the effluent activity and flow rate. During periods when the augmented off-gas system is not operable, the radiation monitor reading is related to μCi by off-gas sampling at the steam air ejectors and subsequent isotopic analysis. The isotopic activity at the SJAE is mathematically decayed to establish the activity in the stack using the known holdup time. During periods of augmented off-gas system operation, samples are taken directly from the stack with a subsequent isotopic analysis. In both cases, the calculated activity in the stack is then correlated to the monitor reading. The isotopic concentrations at the release point are multiplied by the total stack flow to obtain total μCi release for each isotope.

(2) Iodines and Particulates

Charcoal cartridges and particulate filters are used to collect iodines and particulates, respectively. The filters are then analyzed for isotopic content using a gamma spectrometer;

particulate filters are also analyzed for strontium. Isotopic concentrations are multiplied by the release flow rate to determine the total amount of activity released.

b. Unit 2 Vent

Total effluent volume from the Unit 2 Vent per month is multiplied by the isotopic concentrations as measured by gamma spectrometer Ge(Li) analysis of grab samples of gases, iodine and particulates to obtain total μCi released from the Vent.

c. Unit 2 Containment Purges

Grab samples are taken for gaseous, particulate, and iodine. These are analyzed on Ge(Li) gamma spectrometer and concentrations computed. Computed concentrations are then multiplied by the purge volume for total μCi released.

Tritium collection is accomplished by the gas washing bottle method. The sample is counted on a liquid scintillation counter. Concentration is computed using worst possible case, 100% humidity. Concentration is multiplied by volume purged to give total μCi released.

d. Unit 2 Steam Generator Blowdown Tank Vent

A decontamination factor (DF) across the steam generator blowdown tank vent has been determined for iodines by

comparison of the results of gamma spectrometry, Ge(Li), analysis of steam generator blowdown water and grab samples of condensed steam exiting the blowdown tank vent. This DF was then applied to the total iodine releases via the steam generator blowdown water to determine the iodine releases out of the blowdown tank vent. An additional factor of 0.33 was utilized to account for the fraction of blowdown volume actually flashing to steam in the blowdown tank.

e. Unit 3 Vent and ESF Building Vent

The Unit 3 Ventilation Vent collects gas streams from the Auxiliary, Fuel, Waste Disposal, and Service Building exhausts, containment purge and gaseous waste process vent. The Unit 3 Vent is located on the roof of the turbine building and discharges 133 feet above grade. The Unit 3 ESF Building Vent collects gas streams from the Engineered Safety Features Building Ventilation System. This vent is located on the south wall and discharges 23 feet above grade. Total Effluent Volume per month is multiplied by isotopic concentrations from the analysis of grab samples to obtain the total activity released. These grab samples are obtained monthly for fission gas and tritium, weekly filters for iodines and particulates, monthly composites of particulate filters for gross alpha and strontium.

f. Unit 3 Containment Drawdown and Purge

Unit 3 Containment is drawn down and purged intermittently. The drawdown is accomplished by using the containment vacuum steam jet ejector and releases through an unmonitored vent on the roof of the Auxiliary Building. The containment vacuum pump discharge, which maintains subatmospheric pressure following the initial drawdown, is released through the Unit 1 Stack. The purge is the process of discharging air from containment to maintain temperature humidity, pressure, concentration, etc., where air is replaced. Purges are filtered and normally released through the Unit 3 Vent but may use the Unit 1 Stack. Purges and Drawdowns are intermittent and are therefore considered batch releases. Calculated volume discharged is multiplied by isotopic concentrations from the analysis of grab samples to obtain activity released.

4.2 Liquid Effluents

a. Liquid Tanks

There are numerous tanks which are used to discharge liquids containing radioactivity to the environs; they are:

Unit 1 - Decontamination Solution Tank
Unit 1 - Floor Drain Sample Tanks (2)
Unit 1 - Waste Sample Tanks (2)
Unit 2 - Clean Waste Monitor Tanks (2)
Unit 2 - Aerated Waste Monitor Tank
Unit 3 - High Level Waste Test Tanks (2)
Unit 3 - Low Level Waste Tanks (2)

Prior to release, a tank is recirculated for two equivalent tank volumes, a sample is drawn and analyzed on the Ge(Li) gamma spectrometer for individual radionuclide composition. An aliquot of the sample is composited and analyzed for H-3, Fe-55, Sr-89/90. Isotopic concentrations are multiplied by the volume released to obtain the total activity released. A proportional aliquot of each discharge is retained for composite analysis for strontium and gross alpha.

b. Unit 2 and Unit 3 Steam Generator Blowdown

Grab samples are taken to steam generator blowdown water, and are analyzed by gamma spectrometry, Ge(Li). Total volume of blowdown is multiplied by the isotopic concentrations to determine the total activity released via blowdown. The calculated activity released out of the blowdown tank vent is accounted for pending the point of blowdown sampling.

Tritium is determined through liquid scintillation counting and strontiums are analyzed by radiochemical separations and appropriate counting techniques.

4.3 Estimate of Errors

Estimates of errors associated with radioactivity measurements were made using the following guidelines:

Sampling/Data Collection	10%	Variation in data collection
Calibration	5%	Calibration to NBS standards
Sample Counting	10%	Maximum error for counting statistics
Flow & Level Measurements	10%	Maximum error for release volumes

4.4 Batch Releases

Liquid	Unit 1	Unit 2	Unit 3
a. Number of Batches	146	229	289
b. Total Time (Minutes)	10,729	41,220	20,713
c. Maximum Time (Minutes)	126	629	225
d. Average Time (Minutes)	73	180	72
e. Minimum Time (Minutes)	45	5	5
f. Average Stream Flow	Not Applicable-Ocean Site		

Airborne	Unit 2 Purge	Unit 2 WGDT	Unit 3 Purge	Unit 3 Drawdown
a. Number of Batches	0	4	0	0
b. Total Time (Minutes)	0	1,042	0	0
c. Maximum Time (Minutes)	0	430	0	0
d. Average Time (Minutes)	0	260	0	0
e. Minimum Time (Minutes)	0	139	0	0

4.5 Abnormal Releases - None

5.0 Changes

The following change to the REMM/ODCM/PCP was issued during this report of January 1 - June 30, 1993.

Docket Nos. 50-245
50-336
50-423

License Nos. DPR-21
DPR-65
NPF-44

RADIOLOGICAL EFFLUENT MONITORING AND OFFSITE DOSE CALCULATION MANUAL AND PROCESS CONTROL PROGRAM

MILLSTONE UNIT NOS. 1, 2, & 3

Northeast Nuclear
Energy Company

May 1993
Revision 5

SECTION I

RADIOLOGICAL EFFLUENT

MONITORING MANUAL

FOR THE
MILLSTONE NUCLEAR POWER STATION
UNIT NOS. 1, 2, & 3

DOCKET NO. 50-245
50-336
50-423

May 1993
Revision 4

TABLE E-1

MILLSTONE RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM

Exposure Pathway and/or Sample	Number of Locations	Sampling and Collection Frequency	Type and Frequency of Analysis
1.a. **Gamma Dose - Environmental TLD**	17	Monthly	Gamma Dose - Monthly
1.b. **Gamma Dose - Accident TLD**	22	Quarterly(a)	N/A(a)
2. **Airborne Particulate**	8	Continuous sampler - weekly filter change	Gross Beta - Weekly Gamma Spectrum - Quarterly on composite (by location), and on individual sample if gross beta is greater than 10 times the mean of the weekly control station's gross beta results.
3. **Airborne Iodine**	8	Continuous sampler - weekly canister change	I-131 - Weekly
4. **Vegetation**	5	One sample near middle and one near end of growing season	Gamma Isotopic on each sample
5. **Milk**	6	Monthly	Gamma Isotopic, I-131, Sr-89 and Sr-90 on each sample
6. **Sea Water**	2	Quarterly - Composite of 6 weekly grab samples	Quarterly - Gamma Isotopic, and Tritium on each composite
7. **Bottom Sediment**	5	Semiannual	Gamma Isotopic on each sample

SECTION II

OFFSITE DOSE

CALCULATION MANUAL

FOR THE

MILLSTONE NUCLEAR POWER STATION

UNIT NOS. 1, 2, & 3

DOCKETS: No. 50-245
50-336
50-423

May 1993
Revision 5

OFFSITE DOSE CALCULATION MANUAL

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D. GASEOUS DOSE CALCULATIONS

D.1. 10CFR20 Limits ("Instantaneous")

a. Instantaneous Noble Gas Release Rate Limits - All Units

The instantaneous noble gas release rate limit from the site shall be:

$$\frac{Q_1}{1{,}100{,}000} + \frac{Q_2}{290{,}000} + \frac{Q_3}{290{,}000} \leq 1$$

Where:

Q_1 = Noble gas release rate from MP1 Stack (µCi/sec)

Q_2 = Noble gas release rate from MP2 Vent (µCi/sec)

Q_3 = Noble gas release rate from MP3 Vent (µCi/sec)

See *Appendix D* for derivation of this limit.

As long as the above is less than or equal to 1, the doses will be less than or equal to 500 mrem to the total body and less than 3000 mrem to the skin.

b. Release Rate Limit - I-131, I-133, Particulates With Half Lives Greater Than 8 Days, and Radionuclides Other Than Noble Gases With Half Lives Greater Than 8 Days - All Units

$_{131}Q_{I1}$ = Release rate of I-131 from MP1 Stack - (µCi/sec)

$_{133}Q_{I1}$ = Release rate of I-133 from MP1 Stack - (µCi/sec)

$_{131}Q_{I2}$ = Release rate of I-131 from MP2 Vent - (µCi/sec)*

$_{133}Q_{I2}$ = Release rate of I-133 from MP2 Vent - (µCi/sec)*

$_{131}Q_{I3}$ = Release rate of I-131 from MP3 Vent - (µCi/sec)*

$_{133}Q_{I3}$ = Release rate of I-133 from MP3 Vent - (µCi/sec)*

Q_{H1} = Release rate of tritium from MP1 Stack - (µCi/sec)

Q_{H2} = Release rate of tritium from MP2 Vent - (µCi/sec)*

Q_{H3} = Release rate of tritium from MP3 Vent - (µCi/sec)*

Q_{P1} = Release rate of total particulates with half-lives greater than 8 days from the MP1 Stack (µCi/sec)

Q_{P2} = Release rate of total particulates with half-lives greater than 8 days from the MP2 Vent (µCi/sec)

Q_{P3} = Release rate of total particulates with half-lives greater than 8 days from the MP3 Vent (µCi/sec)

*Includes releases via the steam generator blowdown tank vent.

(1) The release rate limit of I-131, I-133, and tritium from the site shall be:

i. Method 1

Assuming milk animals on pasture, harvest season, and milk animals at maximum resident D/Q locations:

$$1.17_{131}Q_{I1} + 43.5_{131}Q_{I2} + 43.5_{131}Q_{I3} + .011_{133}Q_{I1} + .413_{133}Q_{I2} + + .413_{133}Q_{I3} + 3.47 \times 10^{-7} Q_{H1} + 3.27 \times 10^{-5} Q_{H2} + 3.27 \times 10^{-5} Q_{H3} \leq 1$$

ii. Method 2

(a) First Quarter - Inhalation doses only

$$5.5 \times 10^{-4}\ {}_{131}Q_{I1} + 5.1 \times 10^{-2}\ {}_{131}Q_{I2} + 5.1 \times 10^{-2}\ {}_{131}Q_{I3} + 1.33 \times 10^{-4}\ {}_{133}Q_{I1} + 1.25 \times 10^{-2}\ {}_{133}Q_{I2} + 1.25 \times 10^{-2}\ {}_{133}Q_{I3}\ 4.4 \times 10^{-8} Q_{H1} + 4.2 \times 10^{-6} Q_{H2} + 4.2 \times 10^{-6} Q_{H3} \leq 1$$

(b) Fourth Quarter - Inhalation and milk doses

$$1.13\ {}_{131}Q_{I1} + 42\ {}_{131}Q_{I2} + 42\ {}_{131}Q_{I3} + .01\ {}_{133}Q_{I1} + .39\ {}_{133}Q_{I2} + .39\ {}_{133}Q_{I3} + 2.11 \times 10^{-7} Q_{H1} + 1.98 \times 10^{-5} Q_{H2} + 1.98 \times 10^{-5} Q_{H3} \leq 1$$

(c) If it can be verified that milk and/or vegetation doses need not be considered, use one of the above, or for

Inhalation and vegetation doses only:

$$4.0 \times 10^{-2}\ {}_{131}Q_{I1} + 1.5\ {}_{131}Q_{I2} + 1.5\ {}_{131}Q_{I3} + 8.53 \times 10^{-4}\ {}_{133}Q_{I1} + 3.92 \times 10^{-2}\ {}_{133}Q_{I2} + 3.92 \times 10^{-2}\ {}_{133}Q_{I3} + 1.8 \times 10^{-7} Q_{H1} + 1.7 \times 10^{-5} Q_{H2} + 1.7 \times 10^{-5} Q_{H3} \leq 1$$

iii. Method 3

If it can be verified that the *Appendix D.1* D/Q data for milk animals is acceptable (Note: If not, see guidance in *Appendix D*):

(a) Second and Third Quarter - All Pathways

$$0.31\ {}_{131}Q_{I1} + 3.2\ {}_{131}Q_{I2} + 3.2\ {}_{131}Q_{I3} + 3.28 \times 10^{-3}\ {}_{133}Q_{I1} + .4\ {}_{133}Q_{I2} + .4\ {}_{133}Q_{I3} + 3.5 \times 10^{-7} Q_{H1} + 3.3 \times 10^{-5} Q_{H2} + 3.3 \times 10^{-5} Q_{H3} \leq 1$$

(b) Fourth Quarter - Inhalation and milk pathways

$$0.27\ {}_{131}Q_{I1} + 1.7\ {}_{131}Q_{I2} + 1.7\ {}_{131}Q_{I3} + 2.56 \times 10^{-3}\ {}_{133}Q_{I1} + 3.86 \times 10^{-1}\ {}_{133}Q_{I2} + 3.86 \times 10^{-1}\ {}_{133}Q_{I3} + 2.1 \times 10^{-7} Q_{H1} + 2.0 \times 10^{-5} Q_{H2} + 2.0 \times 10^{-5} Q_{H3} \leq 1$$

(2) If the detailed calculations are not complete for a particular quarter, use the results as determined above in *Section D.2.a* or *D.2.b*.

(3) If $D_{YG1, 2, or 3}$, are greater than 10 mrad or $D_{YB1, 2, or 3}$, are greater than 20 mrad and any corresponding quarterly dose was not calculated using *Section D.2.b* - real-time meteorology, recalculate the quarterly dose using real-time meteorology.

D.3. 10 CFR50 Appendix I - Iodine and Particulate Doses

Doses from tritium (for Methods 1-4 only) for Unit 1 may be neglected if the total tritium curies from the quarter are less than 500.

a. Quarterly Doses - Unit 1

(1) Method 1 - Unit 1

Step 1 - Determine $_{131}C_I$ which is the total curies of I-131 and $_{133}C_I$ which is the total curies of I-133 released in gaseous effluents from Unit 1 during the quarter.

Step 2 - Determine C_P which is the total curies of particulates with half-lives greater than 8 days released in gaseous effluents from Unit 1 during the calendar quarter.

Step 3 - Determine C_H which is the total curies of tritium released in gaseous effluents from Unit 1 during the quarter.

Step 4 - Determine D_{QT} which equals the quarterly thyroid dose as follows:

$$D_{QT} = 1.22 \times 10^2 \, {}_{131}C_I + 1.13 \, {}_{133}C_I + 2.0 \times 10^{-5} \, C_H$$

Step 5 - Determine D_{QO} which equals the quarterly dose to the maximum organ other than the thyroid:

$$D_{QO} = 42.3 \, C_P + 2.0 \times 10^{-5} \, C_H$$

Step 6 - The maximum organ dose is the greater of D_{QT} or D_{QO}. If it is greater than 2.5 mrem, go to *Method 2*.

(2) Method 2 - Unit 1

Doses from vegetation consumption can be neglected during the 1st and 4th quarters and doses from milk consumption can be neglected during the 1st quarter. These time frames can be extended for short term releases (batch releases and weekly continuous, if necessary) if it can be verified that the milk animals were not on pasture and/or vegetation is not available for harvest. Therefore, calculate doses to the thyroid and maximum organ for pathways that actually exist. Sum pathways if necessary.

Perform *Steps 1 through 3* as in *Method 1*, above. Then:

Step 4 -

i. Inhalation Pathway

$$D_{QT} = 3.2 \times 10^{-2} \, {}_{131}C_I + 7.8 \times 10^{-3} \, {}_{133}C_I + 2.6 \times 10^{-6} \, C_H$$

$$D_{QO} = 3.2 \times 10^{-2} \, C_P + 2.6 \times 10^{-6} \, C_H$$

ii. Vegetation Pathway

$D_{QT} = 4.1\ {}_{131}C_I + 7.48 \times 10^{-2}\ {}_{133}C_I + 8.0 \times 10^{-6}\ C_H$

$D_{QO} = 4.9\ C_P + 8.0 \times 10^{-6}\ C_H$

iii. Milk Pathway

$D_{QT} = 118\ {}_{131}C_I + 1.05\ {}_{133}C_I + 9.8 \times 10^{-6}\ C_H$

$D_{QO} = 38\ C_P + 9.8 \times 10^{-6}\ C_H$

Sum above pathways, as appropriate (*Note*: sum of all three pathways is *Method 1*)

Step 5 - The maximum organ dose is the greater of D_{QT} or D_{QO}. If it is greater than 2.5 mrem, go to the next method.

(3) Method 3 - Unit 1

After reviewing the existing cow and goat farms, if it can be determined that the 1983-1987 D/Q data is acceptable (Note: If not, see guidance in *Appendix D*), then follow *Method 2* above, *except* for *iii.* where milk pathway dose is:

$D_{QT} = 28\ {}_{131}C_I + .249\ {}_{133}C_I + 9.8 \times 10^{-6}\ C_H$

$D_{QO} = 8.9\ C_P + 9.8 \times 10^{-6}\ C_H$

Note: During the 2nd and 3rd quarters also add (to the above) the Inhalation and Vegetation Pathways from *Step 4 of Method 2*; during the 4th quarter add Inhalation and Milk (above) *only*.

(4) Method 4 - Unit 1

Use the GASPAR code to determine the maximum organ dose. For the Special Location, enter the following worst case quarterly average meteorology as taken from *Appendix D*:

$X/Q = 6.1 \times 10^{-8}\ sec/m^3$

$D/Q = 5.9 \times 10^{-9}\ m^{-2}$ (Milk and Vegetation) and/or

$D/Q = 1.4 \times 10^{-9}\ m^{-2}$ (If 1983-1987 D/Q data is acceptable for existing milk locations. If not, see guidance in *Appendix D*.)

Use the Inhalation, Milk and Vegetation pathways (If applicable) in totaling the dose. If the maximum organ dose is greater than 3.8 mrem, go to *Method 5*.

(5) Method 5 - Unit 1

Use the GASPAR code with actual locations, real-time meteorology and the pathways which actually exist at the time at those locations.

b. Quarterly Doses - Unit 2 and Unit 3

(1) Method 1 - Unit 2 and Unit 3

Step 1 - Determine C_I which is the total curies of I-131 and $_{133}C_I$ which is the total curies of I-133 in gaseous effluents from Unit 2 or 3 during the quarter.

Step 2 - Determine C_P which is the total curies of particulates with half-lives greater than 8 days released in gaseous effluents from Unit 2 or 3 during the calendar quarter.

Step 3 - Determine C_H which is the total curies of tritium released in gaseous effluents from Unit 2 or 3 during the calendar quarter.

Step 4 - Determine D_{QT} which equals the quarterly thyroid dose as follows:

$$D_{QT} = 3.1 \times 10^3 \, {}_{131}C_I + 29.53 \, {}_{133}C_I + 2.6 \times 10^{-3} \, C_H$$

Step 5 - Determine D_{QO} which equals the quarterly dose to the maximum organ other than the thyroid:

$$D_{QO} = 1.1 \times 10^3 \, C_P + 2.6 \times 10^{-3} \, C_H$$

Step 6 - The maximum organ dose is the greater of D_{QT} or D_{QO}. If greater than 2.5 mrem, go to *Method 2*.

(2) Method 2 - Unit 2 and Unit 3

Doses from vegetation consumption can be neglected during the 1st and 4th quarters and doses from milk consumption can be neglected during the 1st quarter. These time frames can be extended for short term releases (batch releases and weekly continuous, if necessary) if it can be verified that the milk animals were not on pasture and/or vegetation was not available for harvest. Therefore, calculate doses to the thyroid and maximum organ for pathways that actually exist. Sum pathways if necessary.

Perform *Steps 1 through 3* as in *Method 1*, then:

Step 4 -

i. Inhalation Pathway

$$D_{QT} = 4.1 \, {}_{131}C_I + 1.0 \, {}_{133}C_I + 3.3 \times 10^{-4} \, C_H$$

$$D_{QO} = 4.1 \, C_P + 3.3 \times 10^{-4} \, C_H$$

ii. Vegetation Pathway

$$D_{QT} = 105 \, {}_{133}C_I + 1.9 \, {}_{133}C_I + 1.0 \times 10^{-3} \, C_H$$

$$D_{QO} = 124 \, C_P + 1.0 \times 10^{-3} \, C_H$$

iii. Milk Pathway

$$D_{QT} = 3000 \, {}_{131}C_I + 26.6 \, {}_{133}C_I + 1.3 \times 10^{-3} \, C_H$$

$$D_{QO} = 951 \, C_P + 1.3 \times 10^{-3} \, C_H$$

Sum above pathways, as appropriate (*Note*: sum of all three pathways is *Method 1*)

Step 5 - The maximum organ dose is the greater of D_{QT} or D_{QO}. If it is greater than 2.5 mrem, go to the next method.

(3) Method 3 - Unit 2 and Unit 3

After reviewing the existing cow and goat farms, if it can be determined that the 1983-1987 D/Q data is acceptable (Note: If not, see guidance in *Appendix D*), then follow *Method 2*, above, except for *iii*, where the milk pathway dose is:

$$D_{QT} = 122\ {}_{131}C_I + 1.08\ {}_{133}C_I + 1.3 \times 10^{-3}\ C_H$$

$$D_{QO} = 40\ C_P + 1.3 \times 10^{-3}\ C_H$$

Note: During the 2nd and 3rd quarters also add (to the above) the Inhalation and Vegetation Pathways from *Step 4 of Method 2*; during the 4th quarter add Inhalation and Milk (above) *only*.

(4) Method 4 - Unit 2 and Unit 3

Use the GASPAR code to determine the maximum organ dose. For the Special Location, enter the following worst case quarterly average meteorology as taken from *Appendix D*:

$X/Q = 8.1 \times 10^{-6}$ sec/m^3

$D/Q = 1.5 \times 10^{-7}$ m^{-2} (Milk and Vegetation) and/or

$D/Q = 6.1 \times 10^{-9}$ m^{-2} (If 1983-1987 D/Q data is acceptable for existing milk locations. If not, see guidance in *Appendix D*.)

As shown in *Appendix D*, the same meteorology can be used for both continuous and batch releases. Therefore, the program need only be run once using the total curies from all releases from Unit 2 or 3.

Use the Inhalation, Milk and Vegetation pathways (if applicable) in totaling the dose. If the maximum organ dose is greater than 3.8 mrem, go to *Method 5*.

(5) Method 5 - Unit 2

Use the GASPAR code with the actual locations, real-time meteorology and the pathways which actually exist at the time at these locations. The code should be run separately for steam generator blowdown tank vents and ventilation releases, containment purges and waste gas tank releases.

(5) Method 5 - Unit 3

Use the GASPAR code with the actual locations, real-time meteorology and the pathways which actually exist at these locations. The code should be run separately for ventilation, process gas, containment vacuum system, aerated ventilation and containment purges.

It would also be unnecessarily restrictive to assume the worst possible mixture and use that as the limit for all situations. Therefore, a practical solution is to use a conservatively determined empirical method as given above.

3. **Section D.1.b - Release Rate Limit - Iodine and Particulates**

Doses are calculated using the methods of *NUREG-0133* dated October 1978 and *NRC Regulatory Guide 1.109, Revision 1*. Note that the equation of *page 27* of *NUREG-0133* (for all radionuclides, except tritium) has been corrected for the elemental iodine fraction, as in *Regulatory Guide 1.109, Revision 1*. Since the doses are dependent on the season, (i.e., milk animals on pasture, harvest season), and the exact locations of milking animals, use three methods when performing these calculations.

Method 1

Assume milk animals are on pasture, vegetation is being harvested, and milk animals are at maximum land D/Q location.

Method 2

Assume annual average X/Q and D/Q as above, however:

i. If 1st quarter, neglect vegetation and milk doses.

ii. If 4th quarter, neglect vegetation doses.

iii. For batch releases (including weekly continuous releases, if necessary), if it can be verified that milk animals are not on pasture and/or vegetation is not being harvested, these may be neglected.

Method 3

Review existing cow and goat locations. Determine if the average of the maximum quarterly D/Q data from *Appendix D.1* is acceptable to use (i.e., no milk animal likely to be more critical than the data for 1983-1987). If acceptable, use the calculated average D/Q. If not, determine an acceptable D/Q by averaging at least 10 quarters of meteorological data.

Dose formula for iodine is:

$$D_{T_I} = \underbrace{\left[X/Q \cdot P_i \cdot {}_{131}Q_I\right]}_{\text{Inhalation}} + \underbrace{\left[D/Q \cdot P_i \cdot {}_{131}Q_I\right]}_{\text{Vegetation}} + \underbrace{\left[D/Q \cdot P_i \cdot {}_{131}Q_I\right]}_{\text{Milk}} + \underbrace{\left[X/Q \cdot P_i \cdot {}_{133}Q_I\right]}_{\text{Inhalation}} + \underbrace{\left[D/Q \cdot P_i \cdot {}_{133}Q_I\right]}_{\text{Vegetation}} + \underbrace{\left[D/Q \cdot P_i \cdot {}_{133}Q_I\right]}_{\text{Milk}}$$

where: D_{T_I} = thyroid dose rate from iodine releases

$_{131}Q_I$ = release rate of I131, µCi/sec

$_{133}Q_I$ = release rate of I133, µCi/sec

X/Q = meteorological dispersion factor, sec/m^3

D/Q = deposition factor, m^{-2}

P_i = values derived from *NUREG-0133* and *Regulatory Guide 1.109 (see Table 1)*.

Dose formula for tritium is:

$$D_{T_H} = \left[X/Q \cdot P_i \cdot Q_H\right] + \left[X/Q \cdot P_i \cdot Q_H\right] + \left[X/Q \cdot P_i \cdot Q_H\right]$$

Inhalation Vegetation Milk

where: D_{T_H} = thyroid (or any other organ) dose rate from tritium releases

Q_H = release rate of H-3, µCi/sec

other parameters as described above, except units for P_i. Since milk and vegetable doses from tritium are related to X/Q and not D/Q, use the units for inhalation (see *NUREG-0133* and/or *Regulatory Guide 1.109, Revision 1* for details).

Dose formula for particulates is:

$$D_{O_P} = \left[X/Q \cdot P_i \cdot Q_P\right] + \left[D/Q \cdot P_i \cdot Q_P\right] + \left[D/Q \cdot P_i \cdot Q_P\right]$$

Inhalation Vegetation Milk

where: D_{O_P} = maximum organ dose rate from particulate releases

Q_P = release rate of particulates, µCi/sec

other parameters as described for iodine, above.

a. <u>Thyroid Doses</u>

Release rate limit is 1500 mrem/year, using the average worst case x/Q and D/Q's and P_i values from *Table 1* results in:

i. Method 1

<u>UNIT 1</u>

$$D_T = \left(.82\,{}_{131}Q_{I1} + .20\,{}_{133}Q_{I1} + 6.63 \times 10^{-5} Q_{H1}\right) + \left(59.4\,{}_{131}Q_{I1} + 1.08\,{}_{1.33}Q_{I1} + 2.04 \times 10^{-4} Q_{H1}\right)$$

Inhalation Vegetation

$$+ \left(1700\,{}_{131}Q_{I1} + 15.12\,{}_{133}Q_{I1} + 2.50 \times 10^{-4} Q_{H1}\right) =$$

Milk

$$D_T = 1760\,{}_{131}Q_{I1} + 16.40\,{}_{133}Q_{I1} + 5.20 \times 10^{-4} Q_{H1}$$

<u>UNIT 2 and UNIT 3</u>

$$D_T = \left(76.8\,{}_{131}Q_I + 18.72\,{}_{133}Q_I + 6.24 \times 10^{-3} Q_H\right) + \left(2200\,{}_{131}Q_I + 40\,{}_{133}Q_I + 1.92 \times 10^{-2} Q_H\right)$$

Inhalation Vegetation

$$+ \left(63{,}000\,{}_{131}Q_I + 560\,{}_{133}Q_I + 2.35 \times 10^{-2} Q_H\right) =$$

Milk

$$D_T = 65{,}280\,{}_{131}Q_I + 618.7\,{}_{133}Q_I + 4.90 \times 10^{-2} Q_H$$

Summing all three units, and setting ≤ 1500 mrem/year results in:

$1760\ {}_{131}Q_{I1} + 16.4\ {}_{133}Q_{I1} + 5.20 \times 10^{-4}\ Q_{H1} + 65{,}280\ {}_{131}Q_{I2} + 618.7\ {}_{133}Q_{I2} + 4.90 \times 10^{-2}\ Q_{H2} + 65{,}280\ {}_{131}Q_{I3} + 618.7\ {}_{133}Q_{I3} + 4.90 \times 10^{-2}\ Q_{H3} \leq 1500$ mrem/yr

dividing by 1500 gives:

$1.17\ {}_{131}Q_{I1} + .011\ {}_{133}Q_{I1} + 43.5\ {}_{133}Q_{I2} + .413\ {}_{133}Q_{I2} + 43.5\ {}_{131}Q_{I3} + .413\ {}_{133}Q_{I3} + 3.47 \times 10^{-7}\ Q_{H1} + 3.27 \times 10^{-5}\ Q_{H2} + 3.27 \times 10^{-5}\ Q_{H3} \leq 1$

ii. ***Method 2***

For the 1st quarter, neglect both milk and vegetation doses (i.e., do inhalation dose calculations only).

UNIT 1

$D_T = 0.82\ {}_{131}Q_I + .20\ {}_{133}Q_I + 6.63 \times 10^{-5}\ Q_H$

UNIT 2 and UNIT 3

$D_T = 76.8\ {}_{131}Q_I + 18.72\ {}_{133}Q_I + 6.24 \times 10^{-3}\ Q_H$

Summing all three units, and setting ≤ 1500 mrem/year results in:

$0.82\ {}_{131}Q_{I1} + .20\ {}_{133}Q_{I1} + 6.63 \times 10^{-5}\ Q_{H1} + 76.8\ {}_{131}Q_{I2} + 18.72\ {}_{133}Q_{I2} + 6.24 \times 10^{-3}\ Q_{H2} + 76.8\ {}_{131}Q_{I3} + 18.72\ {}_{133}Q_{I3} + 6.24 \times 10^{-3}\ Q_{H3} \leq 1500$ mrem/yr

dividing by 1500 gives:

$5.5 \times 10^{-4}\ {}_{131}Q_{I1} + 5.1 \times 10^{-2}\ {}_{131}Q_{I2} + 5.1 \times 10^{-2}\ {}_{131}Q_{I3} + 1.33 \times 10^{-4}\ {}_{133}Q_{I1} + 1.25 \times 10^{-2}\ {}_{133}Q_{I2} + 1.25 \times 10^{-2}\ {}_{133}Q_{I3} + 4.4 \times 10^{-8}\ Q_{H1} + 4.2 \times 10^{-6}\ Q_{H2} + 4.2 \times 10^{-6}\ Q_{H3} \leq 1$

For the 4th quarter, neglect vegetation doses.

UNIT 1

$D_T = 0.82\ {}_{131}Q_I + 1700\ {}_{131}Q_I + .20\ {}_{133}Q_I + 15.12\ {}_{133}Q_I + 6.63 \times 10^{-5}\ Q_H + 2.50 \times 10^{-4}\ Q_H$

$D_T = 1701\ {}_{131}Q_I + 15.32\ {}_{133}Q_I + 3.16 \times 10^{-4}\ Q_H$

UNIT 2 and UNIT 3

$D_T = 76.8\ {}_{131}Q_I + 63000\ {}_{131}Q_I + 18.72\ {}_{133}Q_I + 560\ {}_{133}Q_I + 6.24 \times 10^{-3}\ Q_H + 2.35 \times 10^{-2}\ Q_H$

$D_T = 63{,}000\ {}_{131}Q_I + 578.72\ {}_{133}Q_I + 2.97 \times 10^{-2}\ Q_H$

Summing all three units, and setting ≤ 1500 mrem/year results in:

$1701\ {}_{131}Q_{I1} + 63{,}000\ {}_{131}Q_{I2} + 63{,}000\ {}_{131}Q_{I3} + 15.32\ {}_{133}Q_{I1} + 578.72\ {}_{133}Q_{I2} + 578.72\ {}_{133}Q_{I3} + 3.16 \times 10^{-4}\ Q_{H1} + 2.97 \times 10^{-2}\ Q_{H2} + 2.97 \times 10^{-2}\ Q_{H3} \leq 1500$ mrem/yr

dividing by 1500 gives:

$1.13\ {}_{131}Q_{I1} + 42\ {}_{131}Q_{I2} + 42\ {}_{131}Q_{I3} + .01\ {}_{133}Q_{I1} + .39\ {}_{133}Q_{I2} + .39\ {}_{133}Q_{I3} + 2.11 \times 10^{-7}\ Q_{H1} + 1.98 \times 10^{-5}\ Q_{H2} + 1.98 \times 10^{-5}\ Q_{H3} \leq 1$

iii. ***Method 3***

2nd and 3rd Quarters

Assuming *Appendix D.1* D/Q data for milk animals is acceptable.

UNIT 1

$D_T = 0.82\ {}_{131}Q_I + 59.4\ {}_{131}Q_I + 409.5\ {}_{131}Q_I + .20\ {}_{133}Q_I + 1.08\ {}_{133}Q_I + 3.64\ {}_{133}Q_I + 5.2 \times 10^{-4}\ Q_H$

$D_T = 470\ {}_{131}Q_I + 4.92\ {}_{133}Q_I + 5.2 \times 10^{-4}\ Q_H$

UNIT 2 AND UNIT 3

$D_T = 76.8\ {}_{131}Q_I + 2200\ {}_{131}Q_I + 2460\ {}_{131}Q_I + 18.72\ {}_{133}Q_I + 21.84\ {}_{133}Q_I + 560\ {}_{133}Q_I + 4.90 \times 10^{-2}\ Q_H$

$D_T = 4740\ {}_{131}Q_I + 600.6\ {}_{133}Q_I + 4.90 \times 10^{-2}\ Q_H$

Summing all three units, and setting ≤ 1500 mrem/year results in:

$470\ {}_{131}Q_{I1} + 4740\ {}_{131}Q_{I2} + 4740\ {}_{131}Q_{I3} + 4.92\ {}_{133}Q_{I1} + 600.6\ {}_{133}Q_{I2} + 600.6\ {}_{133}Q_{I3} + 5.2 \times 10^{-4}\ Q_{H1} + 4.90 \times 10^{-2}\ Q_{H2} + 4.90 \times 10^{-2}\ Q_{H3} \leq 1500$ mrem/yr

dividing by 1500 gives:

$0.31\ {}_{131}Q_{I1} + 3.2\ {}_{131}Q_{I2} + 3.2\ {}_{131}Q_{I3} + 3.28 \times 10^{-3}\ {}_{133}Q_{I1} + 0.40\ {}_{133}Q_{I2} + 0.40\ {}_{133}Q_{I3} + 3.5 \times 10^{-7}\ Q_{H1} + 3.3 \times 10^{-5}\ Q_{H2} + 3.3 \times 10^{-5}\ Q_{H3} \leq 1$

4th Quarter - Inhalation and milk pathways same as above, however delete vegetation contribution.

UNIT 1

$D_T = 410.3\ {}_{131}Q_I + 3.84\ {}_{133}Q_I + 3.16 \times 10^{-4}\ Q_H$

UNIT 2 and UNIT 3

$D_T = 2536.8\ {}_{131}Q_I + 579\ {}_{133}Q_I + 2.97 \times 10^{-2}\ Q_H$

Summing all three units, and setting ≤ 1500 mrem/year:

$410.3\ {}_{131}Q_{I1} + 2537\ {}_{131}Q_{I2} + 2537\ {}_{131}Q_{I3} + 3.84\ {}_{133}Q_{I1} + 579\ {}_{133}Q_{I2} + 579\ {}_{133}Q_{I3} + 3.16 \times 10^{-4}\ Q_{H1} + 2.97 \times 10^{-2}\ Q_{H2} + 2.97 \times 10^{-2}\ Q_{H3} \leq 1500$ mrem/yr

Dividing by 1500 gives:

$0.27\ {}_{131}Q_{I1} + 1.7\ {}_{131}Q_{I2} + 1.7\ {}_{131}Q_{I3} + 2.56 \times 10^{-3}\ {}_{133}Q_{I1} + 3.86 \times 10^{-1}\ {}_{133}Q_{I2} + 3.86 \times 10^{-1}\ {}_{133}Q_{I3} + 2.1 \times 10^{-7}\ Q_{H1} + 2.0 \times 10^{-5}\ Q_{H2} + 2.0 \times 10^{-5}\ Q_{H3} \leq 1$

b. Maximum Organ *(other than thyroid)* Doses

Release rate limit is 1500 mrem/year. Using the 1980-1987 average worst case X/Q and D/Q's and P_i values (conservative mix)* from *Table 1* results in:

i. *Method 1*

UNIT 1

$$D_O = \underbrace{\left(5.1 \times 10^{-8} \cdot 1.6 \times 10^{7} \cdot Q_P\right)}_{\text{Inhalation}} + \underbrace{\left(2.7 \times 10^{-9} \cdot 2.6 \times 10^{10} \cdot Q_P\right)}_{\text{Vegetation}}$$

$$+ \underbrace{\left(2.7 \times 10^{-9} \cdot 2.0 \times 10^{11} \cdot Q_P\right)}_{\text{Milk}} + \underbrace{\left(5.1 \times 10^{-8} \cdot 1.3 \times 10^{3} \cdot Q_H\right)}_{\text{Inhalation}}$$

$$+ \underbrace{\left(5.1 \times 10^{-8} \cdot 4.0 \times 10^{3} \cdot Q_H\right)}_{\text{Vegetation}} + \underbrace{\left(5.1 \times 10^{-8} \cdot 4.9 \times 10^{3} \cdot Q_H\right)}_{\text{Milk}}$$

$$D_O = \underbrace{\left(0.82\, Q_P\right)}_{\text{Inh}} + \underbrace{\left(70.2\, Q_P\right)}_{\text{Veg}} + \underbrace{\left(540\, Q_P\right)}_{\text{Milk}} + \underbrace{\left(6.63 \times 10^{-5}\, Q_H\right)}_{\text{Inh}}$$

$$+ \underbrace{\left(2.04 \times 10^{-4}\, Q_H\right)}_{\text{Vegetation}} + \underbrace{\left(2.50 \times 10^{-4}\, Q_H\right)}_{\text{Milk}}$$

$$D_O = 611\, Q_P + 5.2 \times 10^{-4}\, Q_H$$

* Sr-90 values are too conservative. Review of the 1978-1988 effluent data shows Sr-90 has never contributed to greater than 2% of the total curies; use the next limiting nuclide (other than Sr-89). Comparison with *ODCM Rev. 0*, shows this results in a conservative calculation.

Method 3

Determine if the maximum quarterly D/Q data from *Appendix D.1* is acceptable to use (i.e., no milk animal likely to be more critical than the data for 1983-1987). If acceptable, use worst case year D/Q for milk locations. If not, an acceptable D/Q for use is the worst case quarter of at least the past three years.

Dose formula for iodine is:

$$D_{QT_I} = \left[X/Q \cdot O_i \cdot C_I\right] + \left[D/Q \cdot O_i \cdot C_I\right] + \left[D/Q \cdot O_i \cdot C_I\right]$$

Inhalation Vegetation Milk

where: D_{QT_I} = quarterly thyroid dose from iodine releases

$_{131}C_I$ = curies of iodine-131 released

$_{133}C_I$ = curies of iodine-133 released

X/Q = meteorological dispersion factor, sec/m^3

D/Q = deposition factor, m^{-2}

O_i = P_i x 3.17 x 10^{-2}*, mrem • m^3/Ci • sec. for inhalation and mrem • m^2/Ci for food consumption

P_i = values derived from *NUREG-0133* and *Regulatory Guide 1.109* (see *Table 1*).

* μCi/sec per Ci/yr conversion factor

Dose formula for tritium is:

$$D_{QT_H} = \left[X/Q \cdot O_i \cdot C_H\right] + \left[X/Q \cdot O_i \cdot C_H\right] + \left[X/Q \cdot O_i \cdot C_H\right]$$

Inhalation Vegetation Milk

where: D_{QT_H} = quarterly thyroid (or any other organ) dose from tritium releases

C_H = curies of tritium released

Other parameters as described above, except units for O_i and P_i. Since milk and vegetable doses from tritium are related to X/Q and not D/Q, use the units for inhalation (see *NUREG-0133* and/or *Regulatory Guide 1.109, Revision 1* for details).

Dose formula for particulates is:

$$D_{QO_P} = \left[X/Q \cdot O_i \cdot C_P\right] + \left[D/Q \cdot O_i \cdot C_P\right] + \left[D/Q \cdot O_i \cdot C_P\right]$$

Inhalation Vegetation Milk

where: D_{QO_P} = quarterly maximum organ dose from particulate releases

C_P = curies of particulates released and other parameters as described for iodine, above.

a. **UNIT 1**

i. ***Method 1***

Using the worst case quarters as explained earlier and P_i's* from *Table 1* results in:

* For particulates, Sr-90 P_i values are too conservative. Review of the 1978-1988 effluent data shows that Sr-90 has not contributed to greater than 2% of the total curies. Therefore use the next most limiting nuclide (other than Sr-89). Comparison with *ODCM Rev. 0* shows that this still results in a conservative calculation.

$$D_{QT_I} = \left|\left(0.032\right) + \left(4.1\right) + \left(118\right)\right|_{131}C_I + \left|\left(.0078\right) + \left(.0748\right) + \left(1.047\right)\right|_{133}C_I$$

Inhalation Veg Milk Inhalation Veg Milk

$$D_{QT_H} = \left|\left(2.60 \times 10^{-6}\right) + \left(7.99 \times 10^{-6}\right) + \left(9.79 \times 10^{-6}\right)\right| C_{H_3}$$

Inhalation Vegetation Milk

$$D_{QO_P} = \left|\left(0.032\right) + \left(4.86\right) + \left(37.41\right)\right| C_P \cdot$$

Inhalation Vegetation Milk

$$D_{QT_I} = 122\,{}_{131}C_I + 1.13\,{}_{133}C_I$$

$$D_{QT_H} = 2.04 \times 10^{-5}\, C_H$$

$$D_{QO_P} = 42.3\, C_P$$

ii. ***Method 2***

Use same formulas as for *Method 1*, however, delete vegetables and/or milk when applicable.

iii. ***Method 3***

After review of existing cow and goat farms, if the 1983-1987 milk animal D/Q data is determined to be acceptable, then:

Milk Pathway Doses:

$$D_{QT_I} = 28\ {}_{131}C_I + .249\ {}_{133}C_I$$

$$D_{QT_H} = 9.8 \times 10^{-6}\ C_H$$

$$D_{QO_P} = 8.9\ C_P$$

b. UNIT 2 and UNIT 3

i. *Method 1*

Using the worst case quarters as explained earlier and P_i's from *Table 1* results in:

$$D_{QT_I} = \underbrace{\left[\left(4.1\right)}_{\text{Inhalation}} + \underbrace{\left(105\right)}_{\text{Vegetation}} + \underbrace{\left(2996\right)\right]}_{\text{Milk}}\ {}_{131}C_I + \underbrace{\left[\left(1.0\right)}_{\text{Inhalation}} + \underbrace{\left(1.9\right)}_{\text{Vegetation}} + \underbrace{\left(26.63\right)\right]}_{\text{Milk}}\ {}_{131}C_I$$

$$D_{QT_H} = \underbrace{\left[\left(3.33 \times 10^{-4}\right)}_{\text{Inhalation}} + \underbrace{\left(1.03 \times 10^{-3}\right)}_{\text{Vegetation}} + \underbrace{\left(1.26 \times 10^{-3}\right)\right]}_{\text{Milk}}\ C_H$$

$$D_{QO_P} = \underbrace{\left[\left(4.1\right)}_{\text{Inhalation}} + \underbrace{\left(124\right)}_{\text{Vegetation}} + \underbrace{\left(951\right)\right]}_{\text{Milk}}\ C_P$$

$$D_{QT_I} = 3.1 \times 10^{-3}\ {}_{131}C_I + 29.53\ {}_{133}C_I$$

$$D_{QT_H} = 2.62 \times 10^{-3}\ C_H$$

$$D_{QO_P} = 1{,}080\ C_P$$

ii. *Method 2*

Use same formulas as for *Method 1*, however, delete vegetables and/or milk when applicable.

iii. *Method 3*

After review of existing cow and goat farms, if the D/Q for milk animals for the 1983-1987 data is determined to be acceptable, then:

Milk Pathway Doses:

$$D_{QT_I} = 122\ {}_{131}C_I + 1.08\ {}_{133}C_I$$

$$D_{QT_H} = 1.3 \times 10^{-3}\ C_H$$

$$D_{QO_P} = 40\ C_P$$

TABLE 1

DOSE FACTORS FOR IODINES & PARTICULATES

P_i*

Radionuclide	(mrem/yr per µCi/m³) Inhalation	(m² mrem/yr per µCi/sec) Vegetables	Goat Milk	Cow Milk
H-3	1.3 (3)	4.0 (3)**	4.9 (3)**	
Cr-51	2.1 (4)	6.4 (6)		
Mn-54	2.0 (6)	3.0 (9)		
Fe-59	1.5 (6)	6.8 (8)		
Co-58	1.3 (6)	3.8 (8)		
Co-60	8.7 (6)	2.1 (9)		
Zn-65	1.2 (6)	2.2 (9)		1.9 (10)
Rb-86	2.0 (5)			
Sr-89	2.4 (6)	3.7 (10)	2.7 (10)	1.3 (10)
Sr-90	1.1 (8)	1.25 (12)	2.6 (11)	1.2 (11)
Y-91	2.9 (6)			
Zr-95	2.7 (6)			
Nb-95	7.5 (5)			
Ru-103	7.8 (5)			
Ru-106	1.6 (7)	1.2 (10)		
Ag-110m	6.8 (6)			
Te-127m	1.7 (6)			
Te-129m	2.0 (6)			
Cs-134	1.1 (6)	2.6 (10)	2.0 (11)	6.8 (10)
Cs-136	1.9 (5)			
Cs-137	9.1 (5)	2.4 (10)	1.8 (11)	6.0 (10)
Ba-140	2.0 (6)			
Ce-141	6.1 (5)			
Ce-144	1.3 (7)	1.0 (10)		
I-131	1.6 (7)	2.2 (10)	6.3 (11)	5.3 (11)
I-133	3.9 (6)	4.0 (8)	5.6 (9)	4.7 (9)

* P_i are the inhalation and consumption factors derived from *NRC Regulatory Guide1.109, Rev. 1.* For inhalation, the teen is the critical age group for all nuclides except Rb-86, Cs-137, I-131, and I-133, which are for the child. For vegetables, the child is critical; for milk, the infant. Maximum organs are: whole body for H-3, bone for Sr-90 and thyroid for I-131, 133.

** Same units as for Inhalation for H-3, based on *NUREG 0133* assumptions.

APPENDIX G

ENVIRONMENTAL MONITORING PROGRAM

Sampling Locations

The following lists the environmental sampling locations and the types of samples obtained at each location. Sampling locations are also shown on *Figures G-1, G-2* and *G-3.*

Location Number	Name	Direction & Distance From Release Point***	Sample Types
1-I*	On-site - Old Millstone Rd.	0.6 Mi, NNW	TLD, Air Particulate, Iodine, Vegetation
2-I	On-site - Weather Shack	0.3 Mi, S	TLD, Air Particulate, Iodine
3-I	On-site - Bird Sanctuary	0.3 Mi, NE	TLD, Air Particulate, Iodine
4-I	On-site - Albacore Drive	1.0 Mi, N	TLD, Air Particulate, Iodine
5-I	MP3 Discharge	0.1 Mi, SSE	TLD
6-I	Quarry Discharge	0.3 Mi, SSE	TLD
7-I	Environmental Lab Dock	0.3 Mi, SE	TLD
8-I	Environmental Lab	0.3 Mi, SE	TLD
9-I	Bay Point Beach	0.4 Mi, W	TLD
10-I	Pleasure Beach	1.2 Mi, E	TLD, Air Particulate, Iodine
11-I	New London Country Club	1.6 Mi, ENE	TLD, Air Particulate, Iodine
12-C	Fisher's Island, NY	8.7 Mi, ESE	TLD
13-C	Mystic, CT	11.5 Mi, ENE	TLD
14-C	Ledyard, CT	12.0 Mi, NE	TLD
15-C	Norwich, CT	14.0 Mi, N	TLD, Air Particulate, Iodine
16-C	Old Lyme, CT	8.8 Mi, W	TLD
17-I	Site Boundary	0.5 Mi, NE	Vegetation
18-I	Pleasure Beach	1.2 Mi, E	Vegetation
19-I	Cow Location #1	9.5 Mi, WNW	Milk
20-C	Cow Location #2	16.0 Mi, NNW	Milk
21-I	Goat Location #1	2.0 Mi, N	Milk
22-I	Goat Location #2	5.2 Mi, NNE	Milk
23-I	Goat Location #3	2.0 Mi, ENE	Milk
24-C	Goat Location #4	14.0 Mi, NE	Milk
25-I	Fruits & Vegetables	Within 10 Miles	Vegetation
26-C	Fruits & Vegetables	Beyond 10 Miles	Vegetation
27-I	Niantic	1.7 Mi, WNW	TLD, Air Particulate, Iodine
28-I	Two Tree Island	0.8 Mi, SSE	Mussels
29-I	West Jordan Cove	0.4 Mi, NNE	Clams
30-C	Golden Spur	4.7 Mi, NNW	----------
31-I	Niantic Shoals	1.8 Mi, NW	Bottom Sediment, Oysters
		1.5 Mi, NNW	Mussels
32-I	Vicinity of Discharge		Bottom Sediment, Oysters, Lobster, Fish, Seawater
33-I	Seaside Point	1.8 Mi, ESE	Bottom Sediment

6.0 Effluent Monitor Inoperability

During this report period, January 1 through June 30, 1993, the following monitors were inoperable for more than 30 days.

6.1 Unit 3 Liquid Waste Discharge Monitor (3LWS-70)

The Liquid Waste Discharge Monitor was administratively declared inoperable on June 13, 1992. The inoperability is a result of a check source failure because the built-in check source no longer has sufficient strength to exceed the increased monitor background. This is a result of plateout of contamination on the sample line. Based on functional checks and calibrations, the monitor will perform its intended function and has sufficient sensitivity to detect actively well below release rate limits. The monitor is in service during all discharges. Because of the administrative inoperability, redundant sampling and valve line-ups are performed in accordance with Technical Specification action statements. Options to eliminate the check source failure are being evaluated.

6.2 Unit 3 Steam Generator Blowdown Monitor (3SSR-RE-08)

The Steam Generator Blowdown Monitor was declared inoperable on September 14, 1992 due to low flow alarms. The monitor remains in service and based on functional checks and calibrations would perform its intended function. During the period there was no detectable activity released to the environment from blowdown. Normally, all blowdown is recovered. The monitor was returned to service on May 21, 1993. Options to eliminate the low flow alarms are being evaluated.

7.0 Errata

The attached pages provide corrections to the data in previous reports. Most of the changes to the data were minor in nature; however, a few data numbers changed significantly.

For example, previously reported values of Millstone Unit 2 Spent Resin for the period July 1, 1992 through December 31, 1992 were reported for the entire year rather than just for the 6-month period. In addition, Millstone Unit 3 Tritium analyses were reported low by 20 percent due to the loss of the quench curve from the analyzer memory for the fourth quarter 1992.

Overall, the corrections do not significantly impact the total reported radioactive effluents released from Millstone Station.

Table 2.1-2
Millstone Unit No. 1
Liquid Effluents - Batch

Nuclides Released	Unit	Fourth Quarter 1991			
		October	November	December	Total
Cr-51	Ci		4.62E-06		4.62E-06
Mn-54	Ci	1.06E-03	2.55E-02	5.12E-02	7.78E-02
Tc-99m	Ci				
Co-58	Ci		2.84E-04	5.82E-04	8.66E-04
Co-60	Ci	4.26E-02	4.20E-02	4.61E-02	1.31E-01
I-131	Ci	3.92E-05	3.91E-05		7.83E-05
I-133	Ci				
I-135	Ci				
Cs-134	Ci	2.76E-05			2.76E-05
Cs-137	Ci	6.55E-03	2.24E-03	7.30E-04	9.52E-03
Mo-99	Ci				
Ce-141	Ci				
Ce-144	Ci				
Zn-65	Ci	8.29E-03	1.17E-02	1.91E-02	3.91E-02
Fe-59	Ci		1.32E-03		1.32E-03
Ag-110m	Ci		4.94E-06	3.40E-04	3.45E-04
Sb-124	Ci		1.00E-06		1.00E-06
	Ci				
	Ci				
Fe-55	Ci	2.47E-03	6.80E-02	2.42E-02	9.47E-02
Sr-89	Ci				
Sr-90	Ci	1.61E-05	6.72E-06		2.28E-05
Total Activity	Ci	6.11E-02	1.51E-01	1.42E-01	3.54E-01

Xe-133	Ci				
Xe-135	Ci				
Xe-135m	Ci				
Xe-131m	Ci				
	Ci				
	Ci				
Total Activity	Ci				

Table 2.1-3
Millstone Unit No. 1
Airborne Effluents - Sum Of All Releases

	Unit	Second Quarter 1991 April	May	June	Total
A. Fission and Activation Gases					
1. Total Activity Released	Ci	2.07E+01	N/D	N/D	2.07E+01
2. Average Period Release Rate	uCi/sec	8.56E+00	-	-	2.64E+00
B. Iodines					
1. Total I-131 Activity Released	Ci	6.28E-05	2.33E-05	7.43E-06	9.35E-05
2. Average Period Release Rate	uCi/sec	2.60E-05	7.72E-06	3.07E-06	1.19E-05
C. Particulates					
1. Total Particulate Activity Released	Ci	2.85E-04	1.26E-04	1.56E-04	5.66E-04
2. Average Diluted Activity	uCi/sec	1.18E-04	4.16E-05	6.43E-05	7.20E-05
3. Total Gross Alpha Activity Released	Ci	2.78E-06	3.74E-07	3.27E-07	3.48E-06
D. Tritium					
1. Total Activity Released	Ci	7.06E+00	8.81E+00	N/D	1.59E+01
2. Average Period Release Rate	uCi/sec	2.92E+00	2.92E+00	-	2.02E+00

N/D = Not Detected

Table 2.1-4
Millstone Unit No. 1
Airborne Effluents - Elevated Continuous

Nuclides Released	Unit	Second Quarter 1991			
		April	May	June	Total
Xe-138	Ci	4.12E+00			4.12E+00
Kr-87	Ci	8.88E-01			8.88E-01
Kr-88	Ci	7.16E-01			7.16E-01
Kr-85m	Ci	1.73E-01			1.73E-01
Xe-135	Ci	1.48E+00			1.48E+00
Xe-133	Ci	1.23E+01			1.23E+01
Xe-135m	Ci	9.54E-01			9.54E-01
Xe-133m	Ci				
Xe-131m	Ci				
Kr-85	Ci				
Ar-41	Ci	8.30E-02			8.30E-02
	Ci				
Total Activity	Ci	2.07E+01			2.07E+01
I-131	Ci	6.28E-05	2.33E-05	7.43E-06	9.35E-05
I-133	Ci	1.64E-04			1.64E-04
Cr-51	Ci	4.22E-05			4.22E-05
Mn-54	Ci	1.09E-05	3.58E-06	1.72E-05	3.17E-05
Fe-59	Ci				
Co-58	Ci	1.77E-06			1.77E-06
Co-60	Ci	5.82E-05	6.60E-05	7.20E-05	1.96E-04
Zn-65	Ci	1.37E-04	4.86E-05	5.96E-05	2.45E-04
I-131	Ci				
Cs-134	Ci				
Cs-137	Ci	1.05E-05	6.88E-06	6.87E-06	2.43E-05
Ba-140	Ci				
Ce-141	Ci				
Ce-144	Ci	6.64E-06			6.64E-06
La-140	Ci				
	Ci				
Sr-89	Ci	1.72E-05			1.72E-05
Sr-90	Ci	1.65E-07	5.58E-07		7.23E-07
Total Activity	Ci	2.85E-04	1.26E-04	1.56E-04	5.66E-04

Table 2.2-1

Millstone Unit No. 2

Liquid Effluents - Sum Of All Releases

	Unit	Fourth Quarter 1992			
		October	November	December	Total
A. Fission and Activation Products					
1. Total Activity Released	Ci	4.86E-03	3.81E-01	2.40E-01	6.26E-01
2. Average Period Diluted Activity	uCi/ml	1.00E-10	8.13E-09	4.91E-09	4.34E-09
B. Tritium					
1. Total Activity Released	Ci	1.54E-01	9.04E-01	3.50E-01	1.41E+00
2. Average Period Diluted Activity	uCi/ml	3.19E-09	1.93E-08	7.15E-09	9.77E-09
C. Dissolved and Entrained Gases					
1. Total Activity Released	Ci	7.72E-05		2.02E-06	7.93E-05
2. Average Diluted Activity	uCi/ml	1.60E-12		4.13E-14	5.50E-13
D. Gross Alpha					
1. Total Activity Released	Ci	No Activity Detected			
E. Volume					
1. Released Waste Volume	Liters	1.05E+06	5.68E+05	1.11E+06	2.72E+06
2. Dilution Volume During Releases	Liters	3.50E+09	2.09E+09	4.65E+09	1.02E+10
3. Dilution Volume During Period	Liters	4.84E+10	4.68E+10	4.90E+10	1.44E+11

Table 2.2-3
Millstone Unit No. 2
Liquid Effluents - Batch

Nuclides Released	Unit	Fourth Quarter 1992			
		October	November	December	Total
Co-58	Ci	2.58E-04	6.20E-02	2.44E-02	8.66E-02
Co-60	Ci	3.69E-04	1.44E-01	1.06E-01	2.50E-01
Ag-110m	Ci	8.41E-06	1.11E-02	5.41E-03	1.65E-02
Sb-125	Ci	1.76E-04	7.64E-03	1.25E-02	2.03E-02
Cs-134	Ci	3.12E-05	2.69E-02	1.39E-02	4.09E-02
Cs-137	Ci	1.28E-04	8.73E-02	6.04E-02	1.48E-01
Nb-97	Ci	3.62E-06	8.18E-06	8.02E-04	8.14E-04
La-142	Ci	2.68E-05			2.68E-05
Mn-54	Ci		3.09E-03	1.99E-03	5.08E-03
Cr-51	Ci		2.23E-04		2.23E-04
Sr-92	Ci		7.05E-06	3.52E-04	3.59E-04
Nb-95	Ci		2.86E-03	2.94E-03	5.80E-03
Zr-95	Ci		1.25E-03	1.18E-03	2.43E-03
Ru-105	Ci		1.08E-03	1.05E-03	2.12E-03
Sb-124	Ci		1.40E-03	1.48E-03	2.88E-03
Co-57	Ci		2.71E-05	1.77E-05	4.47E-05
Ru-103	Ci		5.83E-04		5.83E-04
Ru-106	Ci		1.09E-02		1.09E-02
Ba-142	Ci			1.30E-04	1.30E-04
Sr-89	Ci		8.25E-05		8.25E-05
Sr-90	Ci		8.76E-05	3.04E-05	1.18E-04
Fe-55	Ci	3.86E-03	2.04E-02	7.93E-03	3.22E-02
Total Activity	Ci	4.86E-03	3.81E-01	2.40E-01	6.26E-01
Gross Alpha	Ci				
H-3	Ci	1.54E-01	9.04E-01	3.50E-01	1.41E+00
Ar-41	Ci			2.02E-06	2.02E-06
Xe-133m	Ci	9.89E-06			9.89E-06
Xe-138	Ci	6.74E-05			6.74E-05
Total Activity	Ci	7.72E-05		2.02E-06	7.93E-05

Table 2.2-4
Millstone Unit No. 2
Airborne Effluents - Sum Of All Releases

	Unit	Second Quarter 1991			
		April	May	June	Total
A. Fission and Activation Gases					
1. Total Activity Released	Ci	1.68E+02	4.31E+01	1.43E+01	2.25E+02
2. Average Period Release Rate	uCi/sec	5.55E+01	1.78E+01	4.74E+00	2.66E+01
B. Iodines					
1. Total Activity Released	Ci	4.25E-03	1.50E-03	1.58E-03	7.33E-03
2. Average Period Release Rate	uCi/sec	1.41E-03	6.20E-04	5.23E-04	8.66E-04
C. Particulates					
1. Total Activity Released	Ci	1.22E-05	N/D	N/D	1.22E-05
2. Average Diluted Activity	uCi/sec	4.04E-06	-	-	1.44E-06
3. Total Gross Alpha Activity Released	Ci	No Activity Detected			
D. Tritium					
1. Total Activity Released	Ci	8.06E+00	1.53E+00	2.44E+00	1.20E+01
2. Average Period Release Rate	uCi/sec	2.67E+00	6.31E-01	8.08E-01	1.42E+00

N/D = Not Detected

Table 2.2-4

Millstone Unit No. 2

Airborne Effluents - Sum Of All Releases

		Third Quarter 1991			
	Unit	July	August	September	Total
A. Fission and Activation Gases					
1. Total Activity Released	Ci	1.35E+01	2.00E+01	1.18E+01	4.53E+01
2. Average Period Release Rate	uCi/sec	5.58E+00	7.46E+00	4.42E+00	5.83E+00
B. Iodines					
1. Total Activity Released	Ci	2.00E-04	1.03E-03	1.70E-04	1.40E-03
2. Average Period Release Rate	uCi/sec	8.26E-05	3.84E-04	6.34E-05	1.80E-04
C. Particulates					
1. Total Particulate Activity Released	Ci	No Activity Detected			
2. Average Diluted Activity	uCi/sec				
3. Total Gross Alpha Activity Released	Ci	No Activity Detected			
D. Tritium					
1. Total Activity Released	Ci	3.30E-01	2.29E+00	1.30E+00	3.92E+00
2. Average Period Release Rate	uCi/sec	1.36E-01	8.55E-01	4.85E-01	5.04E-01

Table 2.2-4
Millstone Unit No. 2
Airborne Effluents - Sum Of All Releases

		Fourth Quarter 1991			
	Unit	October	November	December	Total
A. Fission and Activation Gases					
1. Total Activity Released	Ci	1.56E+01	9.66E+00	2.13E+01	4.65E+01
2. Average Period Release Rate	uCi/sec	6.44E+00	3.20E+00	8.80E+00	5.92E+00
B. Iodines					
1. Total Activity Released	Ci	6.18E-04	3.65E-04	1.23E-04	1.11E-03
2. Average Period Release Rate	uCi/sec	2.55E-04	1.21E-04	5.07E-05	1.41E-04
C. Particulates					
1. Total Particulate Activity Released	Ci	No Activity Detected			
2. Average Diluted Activity	uCi/sec				
3. Total Gross Alpha Activity Released	Ci	No Activity Detected			
D. Tritium					
1. Total Activity Released	Ci	1.68E+00	1.38E+00	8.38E+00	1.14E+01
2. Average Period Release Rate	uCi/sec	6.94E-01	4.57E-01	3.46E+00	1.46E+00

Table 2.3-1
Millstone Unit No. 3
Liquid Effluents - Sum Of All Releases

	Unit	Second Quarter 1991			
		April	May	June	Total
A. Fission and Activation Products					
1. Total Activity Released	Ci	5.99E-01	2.33E-01	7.40E-02	9.05E-01
2. Average Period Diluted Activity	uCi/ml	4.64E-09	1.46E-09	5.56E-10	2.15E-09
B. Tritium					
1. Total Activity Released	Ci	5.80E+00	2.20E+01	3.94E+01	6.72E+01
2. Average Period Diluted Activity	uCi/ml	4.50E-08	1.38E-07	2.96E-07	1.60E-07
C. Dissolved and Entrained Gases					
1. Total Activity Released	Ci	6.14E-04	4.40E-03	4.61E-03	9.63E-03
2. Average Diluted Activity	uCi/ml	4.76E-12	2.77E-11	3.47E-11	2.29E-11
D. Gross Alpha					
1. Total Activity Released	Ci	No Activity Detected			
E. Volume					
1. Released Waste Volume	Liters	1.17E+06	1.38E+06	1.55E+06	4.10E+06
2. Dilution Volume During Releases	Liters	4.84E+09	5.76E+09	7.29E+09	1.79E+10
3. Dilution Volume During Period	Liters	1.29E+11	1.59E+11	1.33E+11	4.21E+11

Table 2.3-1
Millstone Unit No. 3
Liquid Effluents - Sum Of All Releases

	Unit	Fourth Quarter 1991			
		October	November	December	Total
A. Fission and Activation Products					
1. Total Activity Released	Ci	1.25E-01	1.84E-01	2.91E-01	6.00E-01
2. Average Period Diluted Activity	uCi/ml	5.39E-09	2.48E-09	5.15E-09	3.90E-09
B. Tritium					
1. Total Activity Released	Ci	9.28E+00	6.52E+01	1.23E+01	8.68E+01
2. Average Period Diluted Activity	uCi/ml	4.00E-07	8.80E-07	2.18E-07	5.64E-07
C. Dissolved and Entrained Gases					
1. Total Activity Released	Ci	N/D	2.61E-05	7.92E-06	3.40E-05
2. Average Diluted Activity	uCi/ml	-	3.52E-13	1.40E-13	2.21E-13
D. Gross Alpha					
1. Total Activity Released	Ci	N/D	N/D	8.10E-05	8.10E-05
E. Volume					
1. Released Waste Volume	Liters	4.99E+05	9.17E+05	7.34E+05	2.15E+06
2. Dilution Volume During Releases	Liters	1.52E+09	5.02E+09	2.07E+09	8.62E+09
3. Dilution Volume During Period	Liters	2.32E+10	7.41E+10	5.65E+10	1.54E+11

N/D = Not Detected

Table 2.3-3
Millstone Unit No. 3
Liquid Effluents - Batch - LWS

Nuclides Released	Unit	Second Quarter 1991			
		April	May	June	Total
Cr-51	Ci	2.32E-02	1.23E-03	1.16E-04	2.45E-02
Mn-54	Ci	9.64E-03	4.29E-03	9.60E-04	1.49E-02
Tc-99m	Ci		4.99E-05		4.99E-05
Co-58	Ci	4.01E-02	1.42E-02	4.15E-03	5.85E-02
Co-60	Ci	4.23E-02	2.31E-02	5.33E-03	7.07E-02
I-131	Ci	3.27E-05	6.03E-05	2.69E-05	1.20E-04
I-133	Ci		6.73E-04	6.47E-04	1.32E-03
I-135	Ci		7.75E-04	1.55E-04	9.30E-04
Cs-134	Ci	1.88E-01	7.61E-02	2.12E-02	2.85E-01
Cs-137	Ci	1.76E-01	7.21E-02	2.08E-02	2.69E-01
Mo-99	Ci				
Ce-141	Ci				
Ce-144	Ci	2.15E-03			2.15E-03
Zn-65	Ci	4.04E-04	2.69E-04		6.73E-04
Fe-59	Ci	1.19E-03			1.19E-03
Nb-95	Ci	4.71E-03	1.86E-03	4.30E-04	7.00E-03
Nb-97	Ci	5.33E-03	1.18E-02	2.60E-03	1.97E-02
Sb-124	Ci	1.14E-03	1.77E-04	1.86E-04	1.50E-03
Sb-125	Ci	1.47E-02	3.27E-03	6.64E-03	2.46E-02
Sr-92	Ci	1.16E-03	3.02E-03	3.83E-04	4.56E-03
Zr-95	Ci	1.94E-03	1.87E-04	2.23E-06	2.13E-03
Ag-110m	Ci	2.75E-03	9.30E-03	1.59E-03	1.36E-02
Hf-181	Ci	5.52E-04			5.52E-04
Co-57	Ci	1.28E-04		5.37E-06	1.33E-04
Na-24	Ci	1.26E-03	2.15E-03	1.74E-04	3.58E-03
I-132	Ci		1.78E-04	1.49E-04	3.27E-04
Sb-122	Ci			2.62E-03	2.62E-03
I-134	Ci			2.56E-04	2.56E-04
Rb-88	Ci			9.84E-05	9.84E-05
Rb-89	Ci			8.38E-05	8.38E-05
Cs-138	Ci			2.85E-04	2.85E-04
Ba-139	Ci			3.21E-05	3.21E-05
Ru-106	Ci			2.40E-04	2.40E-04
Fe-55	Ci	8.19E-02	7.73E-03	4.81E-03	9.44E-02
Sr-89	Ci				
Sr-90	Ci				
Total Activity	Ci	5.99E-01	2.33E-01	7.40E-02	9.05E-01
Gross Alpha	Ci				
H-3	Ci	5.80E+00	2.20E+01	3.94E+01	6.72E+01
Xe-138	Ci			1.09E-04	1.09E-04
Xe-133	Ci		1.50E-03	1.75E-03	3.25E-03
Xe-135	Ci	6.14E-04	2.38E-03	2.62E-03	5.61E-03
Xe-135m	Ci		3.89E-04	7.12E-05	4.60E-04
Ar-41	Ci		1.35E-04		1.35E-04

Table 2.3-3
Millstone Unit No. 3
Liquid Effluents - Batch - LWS

Nuclides Released	Unit	Second Quarter 1991			
		April	May	June	Total
Kr-85m	Ci			8.09E-06	8.09E-06
Kr-87	Ci			2.68E-05	2.68E-05
Kr-88	Ci			2.80E-05	2.80E-05
Total Activity	Ci	6.14E-04	4.40E-03	4.61E-03	9.63E-03

Table 2.3-5
Millstone Unit No. 3
Airborne Effluents - Sum Of All Releases

	Unit	First Quarter 1991			
		January	February	March	Total
A. Fission and Activation Gases					
1. Total Activity Released	Ci	3.82E+01	1.35E+01	4.70E+01	9.87E+01
2. Average Period Release Rate	uCi/sec	1.26E+01	5.59E+00	1.94E+01	1.25E+01
B. Iodines					
1. Total I-131 Activity Released	Ci	1.34E-03	2.55E-03	1.41E-04	4.03E-03
2. Average Period Release Rate	uCi/sec	4.42E-04	1.05E-03	5.83E-05	5.12E-04
C. Particulates					
1. Total Particulate Activity Released	Ci	1.09E-05	1.77E-05	3.72E-04	4.01E-04
2. Average Diluted Activity	uCi/sec	3.60E-06	7.31E-06	1.54E-04	5.10E-05
3. Total Gross Alpha Activity Released	Ci	2.20E-08	7.20E-09	N/D	2.92E-08
D. Tritium					
1. Total Activity Released	Ci	No Activity Detected			
2. Average Period Release Rate	uCi/sec				

N/D = Not Detected

Table 2.3-5
Millstone Unit No. 3
Airborne Effluents - Sum Of All Releases

	Unit	Second Quarter 1991 April	May	June	Total
A. Fission and Activation Gases					
1. Total Activity Released	Ci	2.07E+01	N/D	1.75E-02	2.07E+01
2. Average Period Release Rate	uCi/sec	8.63E+00	-	7.20E-03	2.64E+00
B. Iodines					
1. Total I-131 Activity Released	Ci	1.15E-05	2.87E-05	7.45E-06	4.77E-05
2. Average Period Release Rate	uCi/sec	4.79E-06	9.53E-06	3.07E-06	6.08E-06
C. Particulates					
1. Total Particulate Activity Released	Ci	1.52E-05	1.57E-05	9.00E-06	3.99E-05
2. Average Diluted Activity	uCi/sec	6.35E-06	5.22E-06	3.70E-06	5.10E-06
3. Total Gross Alpha Activity Released	Ci	No Activity Detected			
D. Tritium					
1. Total Activity Released	Ci	1.41E-03	N/D	N/D	1.41E-03
2. Average Period Release Rate	uCi/sec	5.88E-04	-	-	1.80E-04

N/D = Not Detected

Table 2.3-5
Millstone Unit No. 3
Airborne Effluents - Sum Of All Releases

	Unit	Third Quarter 1991			
		July	August	September	Total
A. Fission and Activation Gases					
1. Total Activity Released	Ci	1.12E-01	5.78E+00	N/D	5.89E+00
2. Average Period Release Rate	uCi/sec	4.32E-02	2.39E+00	-	7.93E-01
B. Iodines					
1. Total I-131 Activity Released	Ci	6.29E-05	N/D	N/D	6.29E-05
2. Average Period Release Rate	uCi/sec	2.43E-05	-	-	8.46E-06
C. Particulates					
1. Total Particulate Activity Released	Ci	2.35E-05	4.03E-06	2.32E-07	2.78E-05
2. Average Diluted Activity	uCi/sec	9.07E-06	1.67E-06	9.59E-08	3.74E-06
3. Total Gross Alpha Activity Released	Ci	7.04E-07	3.70E-08	1.90E-08	7.60E-07
D. Tritium					
1. Total Activity Released	Ci	1.29E-02	N/D	N/D	1.29E-02
2. Average Period Release Rate	uCi/sec	4.98E-03	-	-	1.74E-03

N/D = Not Detected

Table 2.3-5
Millstone Unit No. 3
Airborne Effluents - Sum Of All Releases

		Fourth Quarter 1991			
	Unit	October	November	December	Total
A. Fission and Activation Gases					
1. Total Activity Released	Ci	No Activity Detected			
2. Average Period Release Rate	uCi/sec				
B. Iodines					
1. Total I-131 Activity Released	Ci	No Activity Detected			
2. Average Period Release Rate	uCi/sec				
C. Particulates					
1. Total Particulate Activity Released	Ci	N/D	N/D	1.07E-05	1.07E-05
2. Average Diluted Activity	uCi/sec	-	-	4.42E-06	1.44E-06
3. Total Gross Alpha Activity Released	Ci	6.59E-06	8.90E-09	4.43E-07	7.04E-06
D. Tritium					
1. Total Activity Released	Ci	No Activity Detected			
2. Average Period Release Rate	uCi/sec				

N/D = Not Detected

Table 2.3-6

Millstone Unit No. 3

Airborne Effluents - Mixed Continuous - Normal Ventilation

Nuclides Released	Unit	First Quarter 1991			
		January	February	March	Total
1. Fission Gases					
Kr-85	Ci				
Kr-85m	Ci				
Kr-87	Ci				
Kr-88	Ci				
Kr-89	Ci				
Xe-131m	Ci				
Xe-133	Ci	3.80E+01	1.12E+01	4.70E+01	9.62E+01
Xe-133m	Ci				
Xe-135	Ci				
Xe-135m	Ci				
Xe-138	Ci				
Ar-41	Ci				
	Ci				
	Ci				
Total Activity	Ci	3.80E+01	1.12E+01	4.70E+01	9.62E+01
2. Iodines					
I-131	Ci	1.33E-03	2.54E-03	1.41E-04	4.01E-03
I-133	Ci	1.10E-03	4.19E-04	1.73E-04	1.69E-03
3. Particulates					
Cr-51	Ci			1.04E-04	1.04E-04
Mn-54	Ci			1.93E-05	1.93E-05
Fe-59	Ci				
Co-58	Ci		1.77E-05	1.67E-04	1.85E-04
Co-60	Ci			3.27E-05	3.27E-05
Zn-65	Ci				
I-131	Ci	1.09E-05			1.09E-05
Cs-134	Ci				
Cs-137	Ci			1.07E-05	1.07E-05
Ba-140	Ci				
Ce-141	Ci				
Ce-144	Ci			1.05E-05	1.05E-05
Nb-95	Ci			2.15E-05	2.15E-05
Zr-95	Ci			6.65E-06	6.65E-06
Sr-89	Ci				
Sr-90	Ci				
Total Activity	Ci	1.09E-05	1.77E-05	3.72E-04	4.01E-04
H-3	Ci				
Gross Alpha	Ci				

Table 2.3-6

Millstone Unit No. 3

Airborne Effluents - Mixed Continuous - Normal Ventilation

Nuclides Released	Unit	Second Quarter 1991			
		April	May	June	Total
1. Fission Gases					
Kr-85	Ci				
Kr-85m	Ci				
Kr-87	Ci				
Kr-88	Ci				
Kr-89	Ci				
Xe-131m	Ci				
Xe-133	Ci	2.07E+01		1.75E-02	2.07E+01
Xe-133m	Ci				
Xe-135	Ci				
Xe-135m	Ci				
Xe-138	Ci				
Ar-41	Ci				
	Ci				
	Ci				
Total Activity	Ci	2.07E+01		1.75E-02	2.07E+01
2. Iodines					
I-131	Ci	1.15E-05	2.87E-05	7.45E-06	4.77E-05
I-133	Ci	7.21E-06	3.22E-05	1.38E-06	4.08E-05
3. Particulates					
Cr-51	Ci				
Mn-54	Ci				
Fe-59	Ci				
Co-58	Ci	6.51E-06			6.51E-06
Co-60	Ci				
Zn-65	Ci				
I-131	Ci				
Cs-134	Ci				
Cs-137	Ci				
Ba-140	Ci				
Ce-141	Ci				
Ce-144	Ci				
Nd-147	Ci	8.66E-06	1.57E-05	9.00E-06	3.34E-05
	Ci				
Sr-89	Ci				
Sr-90	Ci				
Total Activity	Ci	1.52E-05	1.57E-05	9.00E-06	3.99E-05
H-3	Ci				
Gross Alpha	Ci				

Table 2.3-6

Millstone Unit No. 3

Airborne Effluents - Mixed Continuous - Normal Ventilation

Nuclides Released	Unit	Third Quarter 1991			
		July	August	September	Total
1. Fission Gases					
Kr-85	Ci				
Kr-85m	Ci				
Kr-87	Ci				
Kr-88	Ci				
Kr-89	Ci				
Xe-131m	Ci		5.78E+00		5.78E+00
Xe-133	Ci				
Xe-133m	Ci				
Xe-135	Ci				
Xe-135m	Ci				
Xe-138	Ci				
Ar-41	Ci				
	Ci				
	Ci				
Total Activity	Ci		5.78E+00		5.78E+00
2. Iodines					
I-131	Ci	6.19E-05			6.19E-05
I-133	Ci	9.34E-05			9.34E-05
3. Particulates					
Cr-51	Ci				
Mn-54	Ci				
Fe-59	Ci				
Co-58	Ci				
Co-60	Ci				
Zn-65	Ci				
I-131	Ci				
Cs-134	Ci	5.38E-06			5.38E-06
Cs-137	Ci	4.87E-06	4.03E-06		8.90E-06
Ba-140	Ci				
Ce-141	Ci				
Ce-144	Ci				
Nd-147	Ci	1.30E-05			1.30E-05
	Ci				
Sr-89	Ci				
Sr-90	Ci				
Total Activity	Ci	2.33E-05	4.03E-06		2.73E-05
H-3	Ci				
Gross Alpha	Ci	6.88E-07			6.88E-07

Table 2.3-6

Millstone Unit No. 3

Airborne Effluents - Mixed Continuous - Normal Ventilation

Nuclides Released	Unit	Fourth Quarter 1991			
		October	November	December	Total
1. Fission Gases					
Kr-85	Ci				
Kr-85m	Ci				
Kr-87	Ci				
Kr-88	Ci				
Kr-89	Ci				
Xe-131m	Ci				
Xe-133	Ci				
Xe-133m	Ci				
Xe-135	Ci				
Xe-135m	Ci				
Xe-138	Ci				
Ar-41	Ci				
	Ci				
	Ci				
Total Activity	Ci				
2. Iodines					
I-131	Ci				
I-133	Ci				
3. Particulates					
Cr-51	Ci				
Mn-54	Ci				
Fe-59	Ci				
Co-58	Ci				
Co-60	Ci				
Zn-65	Ci				
I-131	Ci				
Cs-134	Ci				
Cs-137	Ci				
Ba-140	Ci				
Ce-141	Ci				
Ce-144	Ci				
Nd-147	Ci				
Be-7	Ci			1.07E-05	1.07E-05
Sr-89	Ci				
Sr-90	Ci				
Total Activity	Ci			1.07E-05	1.07E-05
H-3	Ci				
Gross Alpha	Ci	6.58E-06		4.32E-07	7.01E-06

Table 2.3-7
Millstone Unit No. 3
Airborne Effluents - Mixed Continuous - ESF Building Ventilation

Nuclides Released	Unit	First Quarter 1991			
		January	February	March	Total
1. Fission Gases					
Kr-85	Ci				
Kr-85m	Ci				
Kr-87	Ci				
Kr-88	Ci				
Kr-89	Ci				
Xe-131m	Ci				
Xe-133	Ci	1.75E-01	5.94E-01		7.69E-01
Xe-133m	Ci				
Xe-135	Ci				
Xe-135m	Ci				
Xe-138	Ci				
Ar-41	Ci				
	Ci				
	Ci				
Total Activity	Ci	1.75E-01	5.94E-01		7.69E-01
2. Iodines					
I-131	Ci	8.18E-06	7.41E-06		1.56E-05
I-133	Ci	7.54E-06	1.24E-06		8.78E-06
3. Particulates					
Cr-51	Ci				
Mn-54	Ci				
Fe-59	Ci				
Co-58	Ci			9.01E-08	9.01E-08
Co-60	Ci				
Zn-65	Ci				
I-131	Ci				
Cs-134	Ci				
Cs-137	Ci				
Ba-140	Ci				
Ce-141	Ci				
Ce-144	Ci				
	Ci				
	Ci				
Sr-89	Ci				
Sr-90	Ci				
Total Activity	Ci			9.01E-08	9.01E-08
H-3	Ci				
Gross Alpha	Ci	2.20E-08	7.20E-09		2.92E-08

Table 2.3-7

Millstone Unit No. 3

Airborne Effluents - Mixed Continuous - ESF Building Ventilation

Nuclides Released	Unit	Second Quarter 1991			
		April	May	June	Total
1. Fission Gases					
Kr-85	Ci				
Kr-85m	Ci				
Kr-87	Ci				
Kr-88	Ci				
Kr-89	Ci				
Xe-131m	Ci				
Xe-133	Ci				
Xe-133m	Ci				
Xe-135	Ci				
Xe-135m	Ci				
Xe-138	Ci				
Ar-41	Ci				
	Ci				
	Ci				
Total Activity	Ci				
2. Iodines					
I-131	Ci				
I-133	Ci				
3. Particulates					
Cr-51	Ci				
Mn-54	Ci				
Fe-59	Ci				
Co-58	Ci	4.78E-08			4.78E-08
Co-60	Ci				
Zn-65	Ci				
I-131	Ci				
Cs-134	Ci				
Cs-137	Ci				
Ba-140	Ci				
Ce-141	Ci				
Ce-144	Ci				
	Ci				
	Ci				
Sr-89	Ci	1.50E-08	9.40E-09		2.44E-08
Sr-90	Ci	2.90E-09	3.80E-09		6.70E-09
Total Activity	Ci	6.57E-08	1.32E-08		7.89E-08
H-3	Ci				
Gross Alpha	Ci				

Table 2.3-7

Millstone Unit No. 3

Airborne Effluents - Mixed Continuous - ESF Building Ventilation

Nuclides Released	Unit	Third Quarter 1991			
		July	August	September	Total
1. Fission Gases					
Kr-85	Ci				
Kr-85m	Ci				
Kr-87	Ci				
Kr-88	Ci				
Kr-89	Ci				
Xe-131m	Ci				
Xe-133	Ci				
Xe-133m	Ci				
Xe-135	Ci				
Xe-135m	Ci				
Xe-138	Ci				
Ar-41	Ci				
	Ci				
	Ci				
Total Activity	Ci				
2. Iodines					
I-131	Ci	3.46E-07			3.46E-07
I-133	Ci	7.90E-07			7.90E-07
3. Particulates					
Cr-51	Ci			2.32E-07	2.32E-07
Mn-54	Ci				
Fe-59	Ci				
Co-58	Ci				
Co-60	Ci				
Zn-65	Ci				
I-131	Ci				
Cs-134	Ci				
Cs-137	Ci				
Ba-140	Ci				
Ce-141	Ci				
Ce-144	Ci				
Be-7	Ci	2.36E-07			2.36E-07
Co-57	Ci	1.47E-08			1.47E-08
Sr-89	Ci				
Sr-90	Ci				
Total Activity	Ci	2.51E-07		2.32E-07	4.83E-07
H-3	Ci				
Gross Alpha	Ci	1.57E-08	3.70E-08	1.90E-08	7.17E-08

Table 2.3-7

Millstone Unit No. 3

Airborne Effluents - Mixed Continuous - ESF Building Ventilation

Nuclides Released	Unit	Fourth Quarter 1991			
		October	November	December	Total
1. Fission Gases					
Kr-85	Ci				
Kr-85m	Ci				
Kr-87	Ci				
Kr-88	Ci				
Kr-89	Ci				
Xe-131m	Ci				
Xe-133	Ci				
Xe-133m	Ci				
Xe-135	Ci				
Xe-135m	Ci				
Xe-138	Ci				
Ar-41	Ci				
	Ci				
	Ci				
Total Activity	Ci				
2. Iodines					
I-131	Ci				
I-133	Ci				
3. Particulates					
Cr-51	Ci				
Mn-54	Ci				
Fe-59	Ci				
Co-58	Ci				
Co-60	Ci				
Zn-65	Ci				
I-131	Ci				
Cs-134	Ci				
Cs-137	Ci				
Ba-140	Ci				
Ce-141	Ci				
Ce-144	Ci				
Be-7	Ci				
Co-57	Ci				
Sr-89	Ci				
Sr-90	Ci				
Total Activity	Ci				
H-3	Ci				
Gross Alpha	Ci	1.30E-08	8.90E-09	1.10E-08	3.29E-08

Table 2.3-9

Millstone Unit No. 3

Airborne Effluents - Mixed Batch - Containment Purges

Nuclides Released	Unit	Third Quarter 1991			
		July	August	September	Total
1. Fission Gases					
Xe-138	Ci				
Kr-87	Ci				
Kr-88	Ci				
Kr-85m	Ci				
Xe-135	Ci	1.70E-02			1.70E-02
Xe-133	Ci	9.24E-02			9.24E-02
Kr-89	Ci				
Xe-137	Ci				
Xe-135m	Ci				
Kr-83m	Ci				
Xe-133m	Ci	2.57E-03			2.57E-03
Xe-131m	Ci				
Kr-85	Ci				
Ar-37	Ci				
Total Activity	Ci	1.12E-01			1.12E-01
2. Iodines					
I-131	Ci	6.25E-07			6.25E-07
I-133	Ci				
3. Particulates					
Cr-51	Ci				
Mn-54	Ci				
Fe-59	Ci				
Co-58	Ci				
Co-60	Ci				
Zn-65	Ci				
I-131	Ci				
Cs-134	Ci				
Cs-137	Ci				
Ba-140	Ci				
Ce-141	Ci				
Ce-144	Ci				
Mo-99	Ci				
Be-7	Ci				
Sr-89	Ci				
Sr-90	Ci				
Total Activity	Ci				
H-3	Ci	1.29E-02			1.29E-02
Gross Alpha	Ci				

Effluent and Waste Disposal Semiannual Report
Solid Waste and Irradiated Component Shipments

Millstone Unit 2
July 1, 1992 - December 31, 1992

1. Type of Waste	Disposition	Units	6-Month Period Totals	Estimated Total Error, %
a) Spent Resin, Filter Sludge, Evaporator Bottoms, Etc.	(CNSI)	m^3	10.8	
	Burial	Ci	2.80E+01	25%
	(SEG)	m^3	2.5	
	Supercompaction	Ci	2.54E-04	25%
b) Dry Compressible Waste, Contaminated Equipment, Etc.	(CNSI)	m^3	640.3	
	Burial	Ci	2.70E+03	25%
	(SEG)	m^3	116.9	
	Supercompaction	Ci	9.29E-02	25%
	(SEG)			
	Burial	m^3	0	
	CNSI	Ci	0	N/A
	(SEG)			
	Burial	m^3	22.4	
	US Ecology	Ci	2.17E-01	25%
	(Quadrex)	m^3	139.6	
	Decontamination	Ci	8.81E-02	25%
	(Quadrex)			
	Burial	m^3	3.0	
	CNSI	Ci	1.32E-01	25%
	(Quadrex)			
	Burial	m^3	0.1	
	USEcology	Ci	3.74E-03	25%
c) Irradiated Components, Control Rods, Etc.	(CNSI)	m^3	2.0	
	Burial	Ci	1.44E+00	25%

2. Estimates of Major Nuclide Composition (By Type of Waste)

a) Spent Resin, Filter Sludges, Evaporator Bottoms

Millstone to CNSI for Burial

Nuclide	% of Total
H-3	0.03%
C-14	1.74%
Mn-54	1.35%
Fe-55	19.75%
Co-58	7.39%
Co-60	52.12%
Ni-63	11.41%
Sr-89	<0.01%
Sr-90	0.08%
Nb-95	0.10%
Zr-95	0.32%
Tc-99	1.20%
Ag-110m	0.17%
Sb-125	3.86%
Cs-134	0.06%
Cs-137	0.23%
Np-237	<0.01%
Pu-238	<0.01%
Pu-239	<0.01%
Am-241	<0.01%
Pu-241	0.17%
Cm-242	<0.01%
Pu-242	<0.01%
Cm-244	<0.01%

Millstone to SEG for Supercompaction

Nuclide	% of Total
Co-60	100.00%