NORTHEAST NUCLEAR ENERGY COMPANY

MILLSTONE NUCLEAR POWER STATION

UNITS NO. 1, 2 & 3

SEMIANNUAL RADIOACTIVE EFFLUENTS

RELEASE REPORT

JANUARY-JUNE 1988

OPERATING LICENSE NO's. DPR-21, DPR-65, & NPF-49

DOCKET NO's. 50-245, 50-336. & 50-423

IE48
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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, 1988

Docket No. 50-245
50-336
50-423
B12975
Re: 10CFR50.36a

U.S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, D.C. 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 Safety 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 waste and liquid and gaseous effluents for the period of January - June, 1988. An annual Radioactive Effluents Dose Report (to be submitted in March, 1989) will include an assessment of the radiation doses due to the radioactive liquid and gaseous effluents released during the calendar year (January - December, 1988).

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

E. J. Mroczka
Senior Vice President

cc: W. T. Russell, Region I Administrator
M. L. Boyle, NRC Project Manager, Millstone Unit No. 1
D. H. Jaffe, NRC Project Manager, Millstone Unit Nos. 2 and 3
W. J. Raymond, Senior Resident Inspector, Millstone Unit Nos. 1, 2, and 3

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INTRODUCTION

1.0 This report is being submitted for Northeast Nuclear Energy Company's Millstone Power Station, Units No. 1, 2, and 3 in accordance with the requirements of 10CFR50.36a, and the Radiological Effluent Technical Specifications and in the format outlined by U. S. NRC Regulatory Guide 1.21.

During the period covered by this report, Unit No. 1 operated with a unit capacity factor of 97%, Unit No. 2 with a unit capacity factor of 52%, and Unit 3 with a unit capacity factor of 66%.

Unit 2 and Unit 3 completed their refueling outage in February, 1988. Unit 2 and Unit 3 were shutdown for Reactor Coolant System leak repairs in April, 1988

A single report is being submitted for all units as the three units share a number of items releated to this report. However, effluent release data are presented separately for each unit.

RADIOACTIVE EFFLUENT RELEASES

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

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TABLE 2.1-1

MILLSTONE NUCLEAR POWER STATION

UNIT #1

LIQUID EFFLUENTS - SUMMATION OF ALL RELEASES

YEAR 1988

	UNITS	JANUARY	FEBRUARY	MARCH	QUARTERLY TOTALS
A. Fission and Activation Products					
1. TOTAL ACTIVITY RELEASED	Ci	2.85E-01	2.01E-01	1.12E-01	5.98E-01
2. AVERAGE DILUTED ACTIVITY DURING PERIOD	UCi/ml	3.80E-09	2.86E-09	1.54E-09	2.74E-09
B. Tritium					
1. TOTAL ACTIVITY RELEASED	Ci	9.02E-01	8.84E-01	1.09E+00	2.88E+00
2. AVERAGE DILUTED ACTIVITY DURING PERIOD	UCi/ml	1.20E-08	1.26E-08	1.50E-08	1.32E-08
C. Dissolved and Entrained Gases					
1. TOTAL ACTIVITY RELEASED	Ci	-------	--------	6.69E-05	6.69E-05
2. AVERAGE DILUTED ACTIVITY DURING PERIOD	UCi/ml	-------	--------	9.19E-12	3.07E-13
D. Gross Alpha					
1. TOTAL ACTIVITY RELEASED	Ci	$\leq$ 4.67E-05	$\leq$ 4.29E-05	$\leq$ 3.89E-05	--------
E. Volume					
1. VOLUME OF WASTE RELEASED	LITERS	7.78E+05	8.58E+05	9.72E+05	2.61E+06
2. VOLUME OF DILUTION DURING RELEASES	LITERS	5.15E+09	5.22E+09	6.12E+09	1.65E+10
3. VOLUME OF DILUTION DURING TIME PERIOD	LITERS	7.51E+10	7.02E+10	7.28E+10	2.18E+11

TABLE 2.1-1

MILLSTONE NUCLEAR POWER STATION

UNIT #1

LIQUID EFFLUENTS - SUMMATION OF ALL RELEASES

YEAR 1988

	UNITS	APRIL	MAY	JUNE	QUARTERLY TOTALS
A. Fission and Activation Products					
1. TOTAL ACTIVITY RELEASED	Ci	1.91E-01	4.71E-02	4.16E-02	2.80E-01
2. AVERAGE DILUTED ACTIVITY DURING PERIOD	UCi/ml	2.63E-09	6.28E-10	5.76E-10	1.27E-09
B. Tritium					
1. TOTAL ACTIVITY RELEASED	Ci	2.49E+00	3.28E+00	2.65E+00	8.42E+00
2. AVERAGE DILUTED ACTIVITY DURING PERIOD	UCi/ml	3.43E-08	4.37E-08	3.67E-08	3.83E-08
C. Dissolved and Entrained Gases					
1. TOTAL ACTIVITY RELEASED	Ci	9.84E-05	2.26E-04	5.84E-05	3.83-04
2. AVERAGE DILUTED ACTIVITY DURING PERIOD	UCi/ml	1.36E-12	3.01E-12	8.09E-13	1.74E-12
D. Gross Alpha					
1. TOTAL ACTIVITY RELEASED	Ci	$\leq$4.72E-05	$\leq$6.24E-05	$\leq$4.84E-05	--------
E. Volume					
1. VOLUME OF WASTE RELEASED	LITERS	1.18E+06	1.56E+06	1.21E+06	3.95E+06
2. VOLUME OF DILUTION DURING RELEASES	LITERS	6.58E+09	7.79E+09	6.22E+09	2.06E+10
3. VOLUME OF DILUTION DURING TIME PERIOD	LITERS	7.26E+10	7.50E+10	7.22E+10	2.20E+11

TABLE 2.1-2

MILLSTONE NUCLEAR POWER STATION - UNIT #1

LIQUID EFFLUENTS - BATCH MODE

Year 1988

Nuclides Released	Unit	JANUARY	FEBRUARY	MARCH	Quarterly Total
Cr-51	Ci				
Mn-54	Ci	3.46E-03	5.78E-03	7.32E-03	1.66E-02
Tc-99M	Ci	2.40E-04			2.40E-04
Co-58	Ci				
Co-60	Ci	2.79E-01	1.92E-01	1.04E-01	5.75E-01
I-131	Ci				
I-133	Ci				
I-135	Ci				
Cs-134	Ci	1.43E-05	1.24E-05		2.67E-05
Cs-137	Ci	5.74E-04	7.68E-04	9.48E-04	2.29E-03
Mo-99	Ci				
Ce-141	Ci				
Ce-144	Ci				
Zn-65	Ci				
Fe-59	Ci				
Na-24	Ci	3.09E-05			3.09E-05
	Ci				
	Ci				
	Ci				
	Ci				
Fe-55	Ci	1.91E-03	2.36E-03	$\leq$ 9.74E-04	4.27E-03
Sr-89	Ci	$\leq$ 3.11E-05	$\leq$ 3.43E-05	$\leq$ 3.89E-05	--------
Sr-90	Ci	$\leq$ 1.56E-05	4.29E-05	2.24E-04	2.67E-04
Total Activity	Ci	2.85E-01	2.01E-02	1.12E-01	5.98E-01

Xe-133	Ci	--------	--------	6.69E-05	6.69E-05
Xe-135	Ci				
Xe-135M	Ci				
	Ci				
	Ci				
	Ci				

TABLE 2.1-2

MILLSTONE NUCLEAR POWER STATION - UNIT #1

LIQUID EFFLUENTS - BATCH MODE

Year 1988

Nuclides Released	Unit	APRIL	MAY	JUNE	Quarterly Total
Cr-51	Ci		8.83E-04		8.83E-04
Mn-54	Ci	6.91E-03	1.77E-03	1.70E-03	1.04E-02
Tc-99M	Ci		6.62E-05		6.26E-05
Co-58	Ci	7.84E-04		7.50E-05	8.59E-04
Co-60	Ci	1.57E-01	3.47E-02	3.26E-02	2.24E-01
I-131	Ci	2.00E-04	3.21E-06	1.59E-05	2.19E-04
I-133	Ci		7.36E-05	1.29E-05	8.65E-05
I-135	Ci				
Cs-134	Ci	3.70E-04	3.11E-06		3.73E-04
Cs-137	Ci	1.86E-02	1.73E-03	2.90E-03	2.32E-02
Mo-99	Ci				
Ce-141	Ci				
Ce-144	Ci				
Zn-65	Ci	3.12E-03		1.77E-04	3.30E-03
Fe-59	Ci				
Na-24	Ci	9.61E-05	1.96E-03	1.94E-05	2.08E-03
	Ci				
	Ci				
	Ci				
	Ci				
Fe-55	Ci	2.36E-03	5.85E-03	3.99E-03	1.22E-02
Sr-89	Ci	1.18E-04	$\leq$ 4.68E-05	$\leq$ 3.03E-05	1.18E-04
Sr-90	Ci	1.04E-03	3.59E-05	6.21E-05	1.14E-03
Total Activity	Ci	1.91E-01	4.71E-02	4.16E-02	2.80E-01

Xe-133	Ci	5.90E-05	5.70E-05	3.18E-05	1.48E-04
Xe-135	Ci	3.94E-05	1.69E-04	2.66E-05	2.35E-04
Xe-135M	Ci				
	Ci				
	Ci				
	Ci				

TABLE 2.1-3

MILLSTONE NUCLEAR POWER STATION

UNIT #1

GASEOUS EFFLUENTS - SUMMATION OF ALL RELEASES

YEAR 1988

	UNITS	JANUARY	FEBRUARY	MARCH	QUARTERLY TOTALS
A. Fission and Activation Gases					
1. TOTAL ACTIVITY RELEASED	Ci	3.54E+00	4.72E-01	1.43E+02	1.47E+02
2. AVERAGE RELEASE RATE FOR THE PERIOD	UCi/sec	1.47E+00	1.95E-01	4.75E+01	1.88E+01
B. Iodines					
1. TOTAL I-131 ACTIVITY RELEASED	Ci	4.51E-05	5.20E-05	2.56E-04	3.53E-04
2. AVERAGE RELEASE RATE FOR THE PERIOD	UCi/sec	1.87E-05	2.15E-05	8.50E-05	4.50E-05
C. Particulates					
1. TOTAL PARTICULATE ACTIVITY RELEASED	Ci	1.09E-04	6.25E-05	7.11E-04	8.83E-04
2. AVERAGE RELEASE RATE FOR THE PERIOD	UCi/sec	4.52E-05	2.58E-05	2.36E-04	1.13E-04
3. TOTAL GROSS ALPHA ACTIVITY RELEASED	Ci	$\leq$4.83E-07	$\leq$5.81E-07	$\leq$8.73E-08	--------
D. Tritium					
1. TOTAL ACTIVITY RELEASED	Ci	5.36E+00	5.28E+00	9.66E+00	2.03E+01
2. AVERAGE RELEASE RATE FOR THE PERIOD	UCi/sec	2.22E+00	2.18E+00	3.21E+00	2.59E+00

TABLE 2.1-3

MILLSTONE NUCLEAR POWER STATION

UNIT #1

GASEOUS EFFLUENTS - SUMMATION OF ALL RELEASES

YEAR 1988

	UNITS	APRIL	MAY	JUNE	QUARTERLY TOTALS
A. Fission and Activation Gases					
1. TOTAL ACTIVITY RELEASED	Ci	3.55E+02	2.13E+02	1.09E+00	5.69E+02
2. AVERAGE RELEASE RATE FOR THE PERIOD	UCi/sec	1.47E+02	8.84E+01	3.61E-01	7.25E-01
B. Iodines					
1. TOTAL I-131 ACTIVITY RELEASED	Ci	5.69E-04	3.56E-04	2.01E-04	1.13E-03
2. AVERAGE RELEASE RATE FOR THE PERIOD	UCi/sec	2.35E-04	1.48E-04	6.66E-05	1.44E-04
C. Particulates					
1. TOTAL PARTICULATE ACTIVITY RELEASED	Ci	8.13E-05	7.49E-04	1.65E-04	9.95L-04
2. AVERAGE RELEASE RATE FOR THE PERIOD	UCi/sec	3.36E-05	3.11E-04	5.46E-05	1.27E-04
3. TOTAL GROSS ALPHA ACTIVITY RELEASED	Ci	$\leq$1.94E-07	1.40E-07	$\leq$3.63E-07	1.40E-07
D. Tritium					
1. TOTAL ACTIVITY RELEASED	Ci	8.40E+00	5.26E+00	1.15E+01	2.52E+01
2. AVERAGE RELEASE RATE FOR THE PERIOD	UCi/sec	3.47E+00	2.18E+00	3.81E+00	3.21E+00

TABLE 2.1-4

MILLSTONE NUCLEAR POWER STATION - UNIT #1

GASEOUS EFFLUENTS - ELEVATED RELEASE - CONTINUOUS MODE

Nuclides Released	Unit	January	February	March	Quarterly Total
1. Fission gases					
Xe-133	Ci			7.55E+01	7.55E+01
Kr-87	Ci			1.50E+01	1.50E+01
Kr-88	Ci				
Kr-85m	Ci				
Xe-135	Ci	4.83E-01	4.72E-01	2.39E+01	2.49E+01
Xe-133	Ci	1.76E+00		7.58E+00	9.34E+00
Kr-89	Ci				
Xe-137	Ci				
Xe-135m	Ci	1.30E+00		1.81E+01	1.94E+01
Kr-83m	Ci				
Xe-133m	Ci				
Xe-131m	Ci				
Kr-85	Ci			3.31E+00	3.31E+00
Ar-37	Ci				
Total For Period	Ci	3.54E+00	4.72E-01	1.43E+02	1.47E+02
2. Iodines					
Iodine-131	Ci	4.51E-05	5.20E-05	2.56E-04	3.53E-04
Iodine-133	Ci	9.16E-05	3.02E-04	1.38E-03	1.77E-03
3. Particulates					
Cr-51	Ci				
Mn-54	Ci		2.83E-06		2.83E-06
Fe-59	Ci				
Co-58	Ci				
Co-60	Ci	5.68E-05	2.40E-05	2.56E-04	3.37E-04
Zn-65	Ci			1.77E-05	1.77E-05
I-131	Ci				
Cs-134	Ci				
Cs-137	Ci	1.77E-05	6.57E-06	6.04E-06	3.03E-05
Ba-140	Ci			2.74E-04	2.74E-04
Ce-141	Ci				
Ce-144	Ci				
	Ci				
La-140	Ci				
	Ci				
Sr-89	Ci	3.47E-05	2.91E-05	1.57E-04	2.21E-04
Sr-90	Ci	≤9.65E-08	≤3.88E-07	7.49E-07	7.49E-07
	Ci				
TOTAL	Ci	1.09E-04	6.25E-05	7.11E-04	8.83-04

TABLE 2.1-4

MILLSTONE NUCLEAR POWER STATION - UNIT #1

GASEOUS EFFLUENTS - ELEVATED RELEASE - CONTINUOUS MODE

Nuclides Released	Unit	APRIL	MAY	JUNE	Quarterly Total
1. Fission gases					
Xe-133	Ci				
Kr-87	Ci				
Kr-88	Ci				
Kr-85m	Ci				
Xe-135	Ci	3.70E-01	8.36E-01	7.13E-01	1.92E+00
Xe-133	Ci	3.55E+02	1.62E+01	3.78E-01	3.72E+02
Kr-89	Ci				
Xe-137	Ci				
Xe-135m	Ci				
Kr-83m	Ci				
Xe-133m	Ci				
Xe-131m	Ci				
Kr-85	Ci		1.96E+02		1.96E+02
Ar-37	Ci				
Total For Period	Ci	3.55E+02	2.13E+02	1.09E+00	5.69E+02
2. Iodines					
Iodine-131	Ci	5.69E-04	3.56E-04	2.01E-04	1.13E-03
Iodine-133	Ci	2.03E-03	8.19E-04	1.45E-03	4.30E-03
3. Particulates					
Cr-51	Ci		1.32E-04	1.73E-05	1.49E-04
Mn-54	Ci		5.02E-05		5.02E-05
Fe-59	Ci		6.00E-06		6.00E-06
Co-58	Ci		2.68E-05		2.68E-05
Co-60	Ci	3.08E-05	1.47E-04	3.06E-05	2.08E-04
Zn-65	Ci	3.10E-05	3.21E-04	8.59E-05	4.38E-04
I-131	Ci		1.01E-06		1.01E-06
Cs-134	Ci				
Cs-137	Ci	2.96E-06	5.52E-06	4.48E-06	1.30E-05
Ba-140	Ci		7.04E-06		7.04E-06
Ce-141	Ci				
Ce-144	Ci				
	Ci				
La-140	Ci		1.55E-04	1.81E-05	1.73E-04
	Ci				
Sr-89	Ci	1.65E-05	5.21E-05	2.71E-05	9.57E-05
Sr-90	Ci	≤1.37E-07	4.85E-07	≤1.71E-07	4.85E-07
	Ci				
TOTAL	Ci	8.13E-05	7.49E-04	1.65E-04	9.95E-04

Table 2.1-5

MILLSTONE NUCLEAR POWER STATION - UNIT #1

GASEOUS EFFLUENTS - BATCH MODE

Year 88

Nuclides Released	Unit	JAN	FEB	MARCH	Quarterly Total
1. Fission gases			NONE		
Xe-135	Ci				
Kr-87	Ci				
Kr-88	Ci				
Kr-85m	Ci				
Xe-135	Ci				
Xe-133	Ci				
Kr-89	Ci				
Xe-137	Ci				
Xe-135m	Ci				
Kr-83m	Ci				
Xe-133m	Ci				
Xe-131m	Ci				
Kr-85	Ci				
Ar-37	Ci				
Total For Period	Ci				
2. Iodines					
Iodine-131	Ci				
Iodine-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				
	Ci				
	Ci				
	Ci				
Sr-89	Ci				
Sr-90	Ci				
	Ci				
TOTAL	Ci				

Table 2.1-5

MILLSTONE NUCLEAR POWER STATION - UNIT #1

GASEOUS EFFLUENTS - BATCH MODE

Year 88

Nuclides Released	Unit	APRIL	MAY	JUNE	Quarterly Total
1. Fission gases		NONE			
Xe-133	Ci				
Kr-87	Ci				
Kr-88	Ci				
Kr-89m	Ci				
Xe-135	Ci				
Xe-133	Ci				
Kr-89	Ci				
Xe-137	Ci				
Xe-135m	Ci				
Kr-83m	Ci				
Xe-133m	Ci				
Xe-131m	Ci				
Kr-85	Ci				
Ar-37	Ci				
Total For Period	Ci				
2. Iodines					
Iodine-131	Ci				
Iodine-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				
	Ci				
	Ci				
	Ci				
Sr-89	Ci				
Sr-90	Ci				
	Ci				
TOTAL	Ci				

TABLE 2.2-1

MILLSTONE NUCLEAR POWER STATION

UNIT #2

LIQUID EFFLUENT - SUMMATION OF ALL RELEASES

YEAR 1988

	UNITS	JANUARY	FEBRUARY	MARCH	QUARTERLY TOTALS
A. Fission and Activation Products					
1. TOTAL ACTIVITY RELEASED	Ci	2.96	1.25	0.348	4.56
2. AVERAGE DILUTED ACTIVITY DURING PERIOD	UCi/ml	5.91E-08	2.13E-08	3.60E-09	2.21E-08
B. Tritium					
1. TOTAL ACTIVITY RELEASED	Ci	8.43	5.90	6.17	20.5
2. AVERAGE DILUTED ACTIVITY DURING PERIOD	UCi/ml	1.68E-07	1.01E-07	6.37E-08	9.95E-08
C. Dissolved and Entrained Gases					
1. TOTAL ACTIVITY RELEASED	Ci	1.50-01	1.00-02	1.30-02	1.73-01
2. AVERAGE DILUTED ACTIVITY DURING PERIOD	UCi/ml	2.99E-09	1.71E-10	1.34E-10	8.40E-10
D. Gross Alpha					
1. TOTAL ACTIVITY RELEASED	Ci	$\leq$ 1.8-04	$\leq$ 1.7-04	$\leq$ 1.9-04	-------
E. Volume					
1. VOLUME OF WASTE RELEASED	LITERS	2.25+06	1.39+07	1.42+7	3.04+07
2. VOLUME OF DILUTION DURING RELEASES	LITERS	9.69+9	8.78+09	1.15+10	3.00+10
3. VOLUME OF DILUTION DURING TIME PERIOD	LITERS	5.01E+10	5.86E+10	9.68E+10	2.06E+11

TABLE 2.2-1

MILLSTONE NUCLEAR POWER STATION

UNIT 2

LIQUID EFFLUENT - SUMMATION OF ALL RELEASES

YEAR 1988	UNITS	APRIL	MAY	JUNE	QUARTERLY TOTALS
A. Fission and Activation Products					
1. TOTAL ACTIVITY RELEASED	Ci	6.22-01	1.12	1.10	2.84
2. AVERAGE DILUTED ACTIVITY DURING PERIOD	UCi/ml	7.68-09	1.53-08	1.30-08	1.19-08
B. Tritium					
1. TOTAL ACTIVITY RELEASED	Ci	56.0	20.4	20.0	96.4
2. AVERAGE DILUTED ACTIVITY DURING PERIOD	UCi/ml	6.91-07	2.79-07	2.36-07	4.03-07
C. Dissolved and Entrained Gases					
1. TOTAL ACTIVITY RELEASED	Ci	1.13	1.28	0.65	3.06
2. AVERAGE DILUTED ACTIVITY DURING PERIOD	UCi/ml	1.40-08	1.75-08	7.67-09	1.28-08
D. Gross Alpha					
1. TOTAL ACTIVITY RELEASED	Ci	$\leq$1.63-04	$\leq$2.13-04	$\leq$1.66-04	$\leq$2.13-04
E. Volume					
1. VOLUME OF WASTE RELEASED	LITERS	2.99+07	2.31+07	1.72+07	7.02+07
2. VOLUME OF DILUTION DURING RELEASES	LITERS	9.25+09	1.16+10	1.13+10	3.22+10
3. VOLUME OF DILUTION DURING TIME PERIOD	LITERS	8.10+10	7.30+10	8.47+10	2.39+11

TABLE 2.2-2

MILLSTONE NUCLEAR POWER STATION

UNIT #2

Year 1988 LIQUID EFFLUENTS - CONTINUOUS - S/G

Nuclides Released	Unit	JANUARY	FEBRUARY	MARCH	Quarterly Total
Cr-51	Ci				
Mn-54	Ci				
Tc-99M	Ci				
Co-58	Ci	-------	3.06-04	2.47-04	5.53-04
Co-60	Ci	-------	7.74-03	1.03-03	8.77-03
I-131	Ci				
I-133	Ci				
I-135	Ci				
Cs-134	Ci	-------	1.37-03		1.37-03
Cs-137	Ci	-------	3.93-03	1.10-04	4.04-03
Mo-99	Ci				
Ce-141	Ci				
Ce-144	Ci				
Zn-65	Ci				
Fe-59	Ci				
	Ci				
	Ci				
	Ci				
	Ci				
	Ci				
Fe-55	Ci		≤1.09-02	≤ 1.15-02	≤1.15-02
Sr-89	Ci		≤3.27-04	≤ 4.03-04	≤4.03-04
Sr-90	Ci		≤4.36-05	≤ 6.90-05	≤6.90-05
Total Activity	Ci		1.33-02	1.39-03	1.47-02
Xe-133	Ci				
Xe-135	Ci				
Xe-135M	Ci				
H-3	Ci	-------	5.79-02	8.77-02	1.46-01
Gross Alpha	Ci		≤5.45-04	≤ 4.60-04	≤5.45-04
	Ci				

TABLE 2.2-2

MILLSTONE NUCLEAR POWER STATION

UNIT 2

LIQUID EFFLUENTS - CONTINUOUS - S/G

Year 1988

NUCLIDES RELEASED	UNIT	APRIL	MAY	JUNE	QUARTERLY TOTAL
Cr-51	Ci				
Mn-54	Ci				
	Ci				
Co-58	Ci				
Co-60	Ci	4.85-04	5.27-03		5.76-03
I-131	Ci	4.51-03	2.26-03	1.97-03	8.74-03
I-133	Ci	1.58-03			1.58-03
I-135	Ci				
Cs-134	Ci	1.12-03	3.66-04	1.46-03	2.95-03
Cs-137	Ci	3.33-03	2.78-03	2.83-03	8.94-03
Fe-55	Ci	≤ 2.72-02	≤ 2.01-02	≤ 1.44-02	≤ 2.7-02
Ce-141	Ci				
Ce-144	Ci				
Zn-65	Ci				
Fe-59	Ci				
SR 89	Ci	≤ 5.40-04	≤ 5.03-04	≤ 2.88-04	≤ 5.4-04
SR 90	Ci	≤ 1.63-04	≤ 1.21-04	≤ 7.20-05	≤ 1.6-04
Total Act (F/A)	Ci	1.10-02	1.07-02	6.25-03	2.80-02
H-3	Ci	2.17-01	1.49-01	1.39-01	5.05-01
Gross a	Ci	≤ 1.50-03	≤ 8.04-04	≤ 5.76-04	≤ 8.0-04
	L.				
	L.				
	Ci				
	Ci				
	Ci				
Xe-133	Ci				
Xe-131	Ci				
Xe-135	Ci				
Xe-135M	Ci				
	Ci				
	Ci				
Total Dis Gas	Ci				

TABLE 2.2-3

MILLSTONE NUCLEAR POWER STATION

UNIT #2

Year 1988 LIQUID EFFLUENTS - BATCH - AWMT/CWMT/TK10-11

Nuclides Released	Unit	JANUARY	FEBRUARY	MARCH	Quarterly Total
Cr-51	Ci	2.22-02	1.21-01	7.81-04	1.44-01
Mn-54	Ci	1.85-02	6.56-03	2.78-03	2.78-02
Tc-99M	Ci				
Co-58	Ci	2.20	6.37-01	5.62-02	2.89+00
Co-60	Ci	4.18-01	3.15-01	2.12-01	9.45-01
I-131	Ci	4.07-02	4.37-03	2.13-03	4.72-02
I-133	Ci	3.08-04	-------	1.88-03	2.19-03
I-135	Ci	-------	-------	4.47-04	4.47-04
Cs-134	Ci	3.44-02	2.09-02	1.39-02	6.92-02
Cs-137	Ci	8.43-02	5.48-02	3.86-02	1.78-01
Mo-99	Ci				
Ce-141	Ci				
Ce-144	Ci	1.48-04	-------	-------	1.48-04
Zn-65	Ci				
Fe-59	Ci	1.22-03	1.82-03	-------	3.04-03
NA-24	Ci	5.24-04	2.68-05	1.90-04	7.41-04
Sb-125	Ci	1.27-02	1.27-02	4.51-03	2.99-02
LA-140	Ci	5.65-04	-------	-------	5.65-04
Sb-124	Ci	3.08-02	7.75-03	1.34-03	3.99-02
LA-141	Ci	6.96-03	-------	-------	6.96-03
Fe-55	Ci	5.18-02	3.57-02	1.06-02	9.81-02
Sr-89	Ci	2.25-03	3.81-04	≤ 1.33-04	2.63-03
Sr-90	Ci	6.98-04	3.57-04	2.21-04	1.28-03
	Ci				
Xe-133	Ci	1.27-01	9.63-03	8.99-03	1.46-01
Xe-135	Ci	6.01-04	3.69-04	2.26-03	3.23-03
Xe-135M	Ci				
Xe-131M	Ci	6.21-03	-------	-------	6.21-03
Xe-133M	Ci	2.75-04	-------	-------	2.75-04
KR-85	Ci	1.61-02	-------	1.75-03	1.79-02

TABLE 2.2-3 (Cont.)

MILLSTONE NUCLEAR POWER STATION

UNIT #2

Year 1988 LIQUID EFFLUENTS AWMT/CWMT/TK

Nuclides Released	Unit	JANUARY	FEBRUARY	MARCH	Quarterly Total
PR-144	Ci	1.71-02	-------	-------	1.71-02
CS-136	Ci	1.96-03	7.22-05	-------	2.03-03
NB-95	Ci	1.41-03	6.82-03	-------	8.23-03
AG-110M	Ci	6.33-04	1.60-03	-------	2.23-03
SR-92	Ci	2.74-04	1.22-03	6.52-05	1.56-03
ZR-95	Ci	8.34-05	3.33-03	-------	3.41-03
NB-97	Ci	1.58-03	5.51-03	4.44-04	7.53-03
CO-57	Ci	3.92-03	1.41-03	2.74-04	5.60-03
RU-103	Ci	-------	4.89-04	-------	4.89-04
	Ci				
	Ci				
Total Act.	Ci	2.96+00	1.24+00	3.47-01	4.54+00
	Ci				
	Ci				
H-3	Ci	8.43	5.84	6.08	2.04+01
Gross A		$\leq$ 1.80-04	$\leq$ 1.67-04	$\leq$ 1.86-04	$\leq$ 1.86-04

TABLE 2.2-3

MILLSTONE NUCLEAR POWER STATION

UNIT 2

LIQUID EFFLUENTS - BATCH - AWMT/CWMT/TK10 AND TK11

Year 1988

NUCLIDES RELEASED	UNIT	APRIL	MAY	JUNE	QUARTERLY TOTAL
Cr-51	Ci	6.02-04	1.08-01	8.50-02	1.94-01
Mn-54	Ci	2.18-02	9.34-03	1.61-02	4.72-02
	Ci	1.51-04	2.68-05	3.72-04	5.50-04
Co-58	Ci	2.01-01	5.98-01	4.29-01	1.23-00
Co-60	Ci	3.30-01	2.49-01	2.25-01	8.04-01
I-131	Ci	1.81-03	1.86-03	7.62-02	7.99-02
I-133	Ci	6.65-05		1.06-03	1.13-03
I-135	Ci			9.39-05	9.39-05
Cs-134	Ci	1.06-02	1.07-02	4.23-02	6.36-02
Cs-137	Ci	3.09-02	3.24-02	6.09-02	1.24-01
La-141	Ci	3.44-04		3.93-03	4.27-03
CS-136	Ci			2.95-03	2.95-03
Ce-144	Ci				
RU-106	Ci			1.96-04	1.96-04
Fe-59	Ci		3.91-03	3.09-03	7.00-03
NB-95	Ci		9.35-03	9.30-03	1.87-02
BA-139	Ci		1.37-03		1.37-03
BA-140	Ci			1.16-02	1.16-02
SB-124	Ci	5.20-03	4.80-03	1.34-02	2.34-02
SB-125	Ci	3.01-03	4.54-03	1.55-02	2.31-02
Co-57	Ci	7.79-04	2.26-03	1.64-03	4.68-03
AG-110M	Ci		5.51-03	6.46-03	1.20-02
NB-97	Ci	4.79-05	8.45-03	1.04-02	1.89-02
SR-92	Ci	3.62-05	2.03-03	2.28-03	4.35-03
LA-140	Ci	3.49-05		1.02-02	1.02-02
ZR-95			4.83-03	4.54-03	9.37-03
RU-103			1.18-03	1.04-03	2.22-03
SR-89		1.09-04	1.49-04	3.05-03	3.20-03
SR-90		2.04-04	2.61-04	2.69-04	7.34-04
Fe-55		6.26-03	5.17-02	4.99-02	1.08-01
Total F/A Prod.		6.11-01	1.11+00	1.09+00	2.81+00

TABLE 2.2-3 (Cont.)

MILLSTONE NUCLEAR POWER STATION

UNIT 2

LIQUID EFFLUENTS - BATCH - AWMT/CWMT/TK10/11

Year 1988

NUCLIDES RELEASED	UNIT	APRIL	MAY	JUNE	QUARTERLY TOTAL
Xe 131	Ci				
Xe 131M	Ci	8.20-03	4.09-02	3.28-02	8.19-02
Xe 133	Ci	1.10	1.11	6.10-01	2.82
Xe 135	Ci	2.98-03	8.09-02	1.31-03	8.52-02
Xe 135M	Ci				
Xe 133M	Ci	9.06-03	2.51-03	1.01-03	1.26-02
KR 85	Ci	9.16-03	4.49-02		5.41-02
KR 85M	Ci		1.58-03		1.58-03
AR 41	Ci			5.89-04	5.89-04
	Ci				
	Ci				
	Ci				
	Ci				
	Ci				
	Ci				
	Ci				
	Ci				
	Ci				
	Ci				
	Ci				
	Ci				
	Ci				
	Ci				
Total Dissolved Gas	Ci	1.13	1.28	6.46-01	3.06

H-3	Ci	5.58+01	2.03+01	1.99+01	9.60+01
Gross a	Ci	≤ 1.63-04	≤ 2.13-04	≤ 1.66-04	≤ 2.13-04

TABLE 2.2-4

MILLSTONE NUCLEAR POWER STATION

UNIT #2

GASEOUS EFFLUENTS - SUMMATION OF ALL RELEASES

YEAR 1988

	UNITS	JANUARY	FEBRUARY	MARCH	QUARTERLY TOTALS
A. Fission and Activation Gases					
1. TOTAL ACTIVITY RELEASED	Ci	6.28	0.27	197.0	204.0
2. AVERAGE RELEASE RATE FOR THE PERIOD	UCi/sec	2.60	8.94-02	81.4	26.0
B. Iodines					
1. TOTAL I-131 ACTIVITY RELEASED	Ci	3.81-03	1.37-04	1.86-04	4.13-03
2. AVERAGE RELEASE RATE FOR THE PERIOD	UCi/sec	1.57-03	4.54-05	7.69-05	5.25-04
C. Particulates					
1. TOTAL PARTICULATE ACTIVITY RELEASED	Ci	6.75-05	6.41-05	1.65-05	1.48-04
2. AVERAGE RELEASE RATE FOR THE PERIOD	UCi/sec	2.79-05	2.12-05	6.74-06	1.88-05
3. TOTAL GROSS ALPHA ACTIVITY RELEASED	Ci	≤ 3.68-08	≤ 2.86-07	≤ 2.09-07	—
D. Tritium					
1. TOTAL ACTIVITY RELEASED	Ci	5.02	6.24	12.3	23.6
2. AVERAGE RELEASE RATE FOR THE PERIOD	UCi/sec	2.07	2.07	5.08	3.00

TABLE 2.2-4

MILLSTONE NUCLEAR POWER STATION

UNIT 2

GASEOUS EFFLUENTS - SUMMATION OF ALL RELEASES

YEAR 1988	UNITS	APRIL	MAY	JUNE	QUARTERLY TOTALS
A. Fission and Activation Gases					
1. TOTAL ACTIVITY RELEASED	Ci	5.05+01	4.75+01	1.11+02	2.09+02
2. AVERAGE RELEASE RATE FOR THE PERIOD	UCi/sec	1.67+01	1.96+01	4.59+01	2.66+01
B. Iodines					
1. TOTAL I-131 ACTIVITY RELEASED	Ci	7.26-03	8.09-03	7.13-04	1.61-02
2. AVERAGE RELEASE RATE FOR THE PERIOD	UCi/sec	7.48-04	3.34-03	2.95-04	2.05-03
C. Particulates					
1. TOTAL PARTICULATE ACTIVITY RELEASED	Ci	3.74-04	9.64-06	≤7.32-08	3.84-04
2. AVERAGE RELEASE RATE FOR THE PERIOD	UCi/sec	1.24-04	3.98-06	≤3.02-08	4.89-05
3. TOTAL GROSS ALPHA ACTIVITY RELEASED	Ci	≤2.7-07	≤2.0-07	≤2.0-07	≤2.23-07
D. Tritium					
1. TOTAL ACTIVITY RELEASED	Ci	1.60+01	1.37+01	5.06+00	3.48+01
2. AVERAGE RELEASE RATE FOR THE PERIOD	UCi/sec	5.30	5.66	2.09	4.43

TABLE 2.2-5

MILLSTONE NUCLEAR POWER STATION - UNIT #2

GASEOUS EFFLUENTS MIXED RELEASE - CONTINUOUS MODE

Year 1988

Nuclides Released	Unit	JANUARY	FEBRUARY	MARCH	Quarterly Total
1. Fission gases					
Xe-138	Ci				
Kr-87	Ci				
Kr-88	Ci				
Kr-85m	Ci				
Xe-135	Ci	-------	-------	8.77	8.77+00
Xe-133	Ci	6.28	2.73-01	1.88+2	1.95+02
Kr-89	Ci				
Xe-137	Ci				
Xe-135m	Ci				
Kr-83m	Ci				
Xe-133m	Ci				
Xe-131m	Ci				
Kr-85	Ci				
Ar-37	Ci				
Total For Period	Ci	6.28	2.73-01	1.97+02	2.04+02
2. Iodines					
Iodine-131	Ci	3.81-03	1.37-04	1.86-04	4.13-03
Iodine-133	Ci	3.16-05	4.30-06	7.61-04	7.97-04
3. Particulates					
Cr-51	Ci	-------	5.98-06	-------	5.98-06
Mn-54	Ci				
Fe-59	Ci				
Co-58	Ci	8.79-06	4.61-05	9.93-06	6.48-05
Co-60	Ci	2.94-06	9.26-06	3.25-06	1.55-05
Zn-65	Ci				
I-131	Ci	5.35-05	-------	-------	5.35-05
Cs-134	Ci	1.01-06	1.22-06	9.80-07	3.21-06
Cs-137	Ci	1.22-06	1.51-06	2.16-06	4.89-06
Ba-140	Ci				
Ce-141	Ci				
Ce-144	Ci				
Total Part.	Ci	6.75-05	6.41-05	1.63-05	1.48-04
H-3	Ci	5.02	6.24	12.3	2.36+01
Gross A.	Ci	≤3.68-08	≤2.86-07	≤2.09-07	≤2.86-07
Sr-89	Ci	≤7.08-08	≤8.41-08	≤6.70-08	≤8.41-08
Sr-90	Ci	≤2.12-08	≤1.68+08	≤2.02-08	≤2.12-08
	Ci				
	Ci				

TABLE 2.2-5

MILLSTONE NUCLEAR POWER STATION - UNIT 2

GASEOUS EFFLUENTS MIXED RELEASE - CONTINUOUS MODE

Year 1988

Fission Gas	Unit	APRIL	MAY	JUNE	Quarterly Total
Xe 133	Ci	4.55+01	4.70+01	1.43+01	1.07+02
Xe 135	Ci	4.67	4.51-01	9.69+01	1.02+02
Xe 131M	Ci				
Xe 135M	Ci				
Kr 85	Ci	0.37			0.37
	Ci				
	Ci				
	Ci				
	Ci				
	Ci				
	Ci				
	Ci				
	Ci				
	Ci				
Total for Period	Ci	5.05+01	4.75+01	1.11+02	2.09+02

2. Iodines

Iodine-131	Ci	7.26-03	8.09-03	7.13-04	1.61-02
Iodine-133	Ci	3.85-03	8.74-03	1.65-03	1.42-02
Iodine Via SG Vent	Ci	2.51-06	2.87-06	2.68-09	5.38-06
Total Iodine	Ci	1.11-02	1.68-02	2.36-03	3.03-02

3. Particulates

Mn-54	Ci	6.34-06			6.34-06
Fe-59	Ci				
Co-58	Ci	3.05-04	2.80-06		3.08-04
Co-60	Ci	2.96-05	9.50-07		3.06-05
I-131	Ci	1.15-05	5.89-06		1.74-07
Cs-134	Ci	9.66-06			9.66-06
Cs-137	Ci	1.09-05			1.09-05
Sr 89	Ci	7.38-07	≤1.69-07	≤7.32-08	7.38-07
Sr 90	Ci	≤2.67-08	≤1.69-08	≤1.46-08	≤2.7-08
Total	Ci	3.74-04	9.64-06	≤7.32-08	3.84-04
H-3	Ci	1.60+01	1.37+01	5.06	3.48+01
Gross a.	Ci	≤ 2.67-07	≤2.02-07	≤1.98-07	≤2.7-07
	Ci				
	Ci				

TABLE 2.2-6

MILLSTONE NUCLEAR POWER STATION - UNIT #2

GASEOUS EFFLUENTS MIXED RELEASE - BATCH MODE - CONTAINMENT PURGE

Year 1986

Nuclides Released	Unit	JANUARY	FEBRUARY	MARCH	Quarterly Total
1. Fission gases					
Xe-133	Ci				
Kr-87	Ci				
Kr-88	Ci				
Kr-85m	Ci				
Xe-135	Ci	5.12-01			5.12-01
Xe-133	Ci	5.76+01			5.76+01
Kr-89	Ci				
Xe-137	Ci				
Xe-135m	Ci				
Kr-83m	Ci				
Xe-133m	Ci	5.76-01			5.76-01
Xe-131m	Ci	1.09+00			1.09+00
Kr-85	Ci				
Ar-37	Ci				
Total For Period	Ci				5.98+01
2. Iodines					
Iodine-131	Ci	1.64-03			1.64-03
Iodine-133	Ci	4.85-04			4.85-04
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				
	Ci				
	Ci				
	Ci				
Sr-89	Ci				
Sr-90	Ci				
H-3	Ci	7.12-02			7.12-02
TOTAL	Ci				

TABLE 2.2-6

MILLSTONE NUCLEAR POWER STATION - UNIT 2

GASEOUS EFFLUENTS - MIXED RELEASE - BATCH MODE - CONTAINMENT PURGE

Year 1988

Nuclides Released	Unit	APRIL	MAY	JUNE	Quarterly Total
1. Fission gases					
Xe 133	Ci	9.05+01	5.56-02		9.06+01
Xe 135	Ci	1.51-00	7.79-04		1.51+00
Xe 131M	Ci	7.36-01	1.56-03		7.38-01
Xe 133M	Ci	1.13-00	6.08-04		1.13-00
Kr-85	Ci	2.67-02			2.67-02
	Ci				
	Ci				
	Ci				
	Ci				
	Ci				
	Ci				
	Ci				
	Ci				
	Ci				
Total Gas	Ci	9.39+1	2.55-02		9.39+01
2. Iodines					
Iodine-131	Ci	2.00-02	6.90-03		2.69-02
Iodine-133	Ci	5.88-03	2.00-03		7.94-03
Total Iodine	Ci	2.69-02	8.96-03		3.49-03
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				
	Ci				
	Ci				
	Ci				
Total Part	Ci	< LLD	< LLD		< LLD
Total H3	Ci	1.55-01	1.55-01		3.10-01
	Ci				

TABLE 2.2-7

MILLSTONE NUCLEAR POWER STATION - UNIT #2

GASEOUS EFFLUENTS - ELEVATED BATCH MODE - WGDT

Year 1988

Nuclides Released	Unit	JANUARY	FEBRUARY	MARCH	Quarterly Total
1. Fission gases					
Xe-133	Ci				
Kr-87	Ci				
Kr-88	Ci				
Kr-85m	Ci				
Xe-135	Ci			6.24-05	6.24-05
Xe-133	Ci		1.70-01	3.22-01	4.90-01
Kr-89	Ci				
Xe-137	Ci				
Xe-135m	Ci				
Kr-83m	Ci				
Xe-133m	Ci			4.54-03	4.54-03
Xe-131m	Ci		1.11-01	5.43-03	1.16-01
Kr-85	Ci		1.08	5.12-02	1.13+00
Ar-37	Ci				
Total For Period	Ci		1.36	3.83-01	1.74+00
2. Iodines					
Iodine-131	Ci				
Iodine-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				
	Ci				
	Ci				
H-3	Ci	-----	9.16	3.73-05	9.16+00
Sr-89	Ci				
Sr-90	Ci				
	Ci				
TOTAL	Ci				

TABLE 2.2-7

MILLSTONE NUCLEAR POWER STATION - UNIT 2

GASEOUS EFFLUENTS ELEVATED RELEASE - BATCH MODE - WGDT

Year 1988

Nuclides Released		APRIL	MAY	JUNE	Quarterly Total
1. Fission Gases					
Xe-131M	Ci	1.19-02	2.18-01	2.00-01	4.30-01
Xe 133	Ci	2.22	8.84	3.26	1.43+01
Xe 133M	Ci	1.73-03	1.65-03	1.50-04	3.53-03
Xe 135	Ci	1.02-04	1.94-03	2.49-03	4.53-03
Xe 135M	Ci				
Kr 85	Ci	3.06-01	8.98-01	3.90-01	1.59+00
	Ci				
	Ci				
	Ci				
	Ci				
	Ci				
	Ci				
	Ci				
	Ci				
	Ci				
Total for Period	Ci	2.54	9.96	3.85	1.64+01
H-3	Ci	4.90-03	1.79-02	2.60-02	4.97-02

TABLE 2.3-1

MILLSTONE UNIT No. 3

SUMMATION OF LIQUID EFFLUENT RELEASES

YEAR 1988

	UNITS	JANUARY	FEBRUARY	MARCH	QUARTERLY TOTALS
A. Fission and Activation Products					
1. TOTAL ACTIVITY RELEASED	Ci	4.71E-01	5.81E-01	4.14E-01	1.46E00
2. AVERAGE DILUTED ACTIVITY DURING PERIOD	UCi/ml	8.38E-09	5.19E-09	2.60E-09	4.46E-09
B. Tritium					
1. TOTAL ACTIVITY RELEASED	Ci	8.89E00	5.49E00	3.76E+01	5.2E+01
2. AVERAGE DILUTED ACTIVITY DURING PERIOD	UCi/ml	1.58E-07	4.90E-08	2.36E-07	1.59E-07
C. Dissolved and Entrained Gases					
1. TOTAL ACTIVITY RELEASED	Ci	5.13E-06	5.16E-05	1.25E-01	1.25E-01
2. AVERAGE DILUTED ACTIVITY DURING PERIOD	UCi/ml	9.13E-14	4.61E-13	7.86E-10	3.82E-10
D. Gross Alpha					
1. TOTAL ACTIVITY RELEASED	Ci	$\leq$3.59E-04	$\leq$2.31E-04	$\leq$5.56E-04	$\leq$1.15E-19
E. Volume					
1. VOLUME OF WASTE RELEASED	LITERS	1.95E06	2.166E06	1.62E06	5.74E06
2. VOLUME OF DILUTION DURING RELEASES	LITERS	6.75E09	1.41E10	1.09E10	3.18E10
3. VOLUME OF DILUTION DURING TIME PERIOD	LITERS	5.62E+10	1.12E+11	1.59E+11	3.27E+11

TABLE 2.3-1

MILLSTONE UNIT No. 3

SUMMATION OF LIQUID EFFLUENT RELEASES

YEAR 1988

	UNITS	APRIL	MAY	JUNE	QUARTERLY TOTALS
A. Fission and Activation Products					
1. TOTAL ACTIVITY RELEASED	Ci	4.5E-01	3.0E-01	4.1E-02	7.2E-01
2. AVERAGE DILUTED ACTIVITY DURING PERIOD	UCi/ml	3.41E-09	1.90E-09	2.77E-10	1.64E-09
B. Tritium					
1. TOTAL ACTIVITY RELEASED	Ci	76.2	41.4	6.6	124.2
2. AVERAGE DILUTED ACTIVITY DURING PERIOD	UCi/ml	5.77E-07	2.62E-07	4.46E-08	2.84E-07
C. Dissolved and Entrained Gases					
1. TOTAL ACTIVITY RELEASED	Ci	4.71E-02	1.29E-02	2.72E-03	8.73E-02
2. AVERAGE DILUTED ACTIVITY DURING PERIOD	UCi/ml	3.57E-10	8.16E-11	1.84E-11	1.99E-10
D. Gross Alpha					
1. TOTAL ACTIVITY RELEASED	Ci	$\leq$ 1.8E-04	$\leq$ 1.4E-04	$\leq$ 1.2E-04	$\leq$ 1.5E-04
E. Volume					
1. VOLUME OF WASTE RELEASED	LITERS	1.83E+06	1.72E+06	1.17E+06	4.72E+06
2. VOLUME OF DILUTION DURING RELEASES	LITERS	1.15E10	1.022E10	1.1E10	3.27E10
3. VOLUME OF DILUTION DURING TIME PERIOD	LITERS	1.32E+11	1.58E+11	1.48E+11	4.38E+11

TABLE 2.3-2

MILLSTONE UNIT No. 3

LIQUID EFFLUENTS - CONTINUOUS

STEAM GENERATOR BLOWDOWN

Year 1988

Nuclides Released	Unit	JANUARY	FEBRUARY	MARCH	Quarterly Total
NO DISCHARGES					
Cr-51	Ci				
Mn-54	Ci				
Tc-99M	Ci				
Co-58	Ci				
Co-60	Ci				
I-131	Ci				
I-133	Ci				
I-135	Ci				
Cs-134	Ci				
Cs-137	Ci				
Mo-99	Ci				
Ce-141	Ci				
Ce-144	Ci				
Zn-65	Ci				
Fe-59	Ci				
	Ci				
	Ci				
	Ci				
	Ci				
	Ci				
Fe-55	Ci				
Sr-89	Ci				
Sr-90	Ci				
Total Activity	Ci				
Xe-133	Ci				
Xe-135	Ci				
Xe-135M	Ci				
	Ci				
	Ci				
H-3	Ci				-

TABLE 2.3-2

MILLSTONE UNIT No. 3

Year 1988

LIQUID EFFLUENTS - CONTINUOUS

STEAM GENERATOR BLOWDOWN

Nuclides Released	Unit	APRIL	MAY	JUNE	Quarterly Total
NO DISCHARGES					
Cr-51	Ci				
Mn-54	Ci				
Tc-99M	Ci				
Co-58	Ci				
Co-60	Ci				
I-131	Ci				
I-133	Ci				
I-135	Ci				
Cs-134	Ci				
Cs-137	Ci				
Mo-99	Ci				
Ce-141	Ci				
Ce-144	Ci				
Zn-65	Ci				
Fe-59	Ci				
	Ci				
	Ci				
	Ci				
	Ci				
	Ci				
Fe-55	Ci				
Sr-89	Ci				
Sr-90	Ci				
Total Activity	Ci				

Xe-133	Ci				
Xe-135	Ci				
Xe-135M	Ci				
	Ci				
	Ci				
H-3	Ci				

TABLE 2.3-3

MILLSTONE UNIT No. 3

Year 1988 LIQUID RAD WASTE EFFLUENTS - BATCH - LWS

Nuclides Released	Unit	JANUARY	FEBRUARY	MARCH	Quarterly Total
Cr-51	Ci	1.29E-02	1.69E-02	2.22E-03	3.20E-02
Mn-54	Ci	6.02E-02	8.41E-02	5.35E-02	1.98E-01
Tc-99M	Ci				
Co-58	Ci	2.39E-01	1.94E-01	9.35E-02	5.27E-01
Co-60	Ci	7.30E-02	1.18E-01	8.03E-02	2.71E-01
I-131	Ci	5.17E-05		2.50E-02	2.51E-02
I-133	Ci			3.85E-02	3.85E-02
I-135	Ci			1.14E-04	1.14E-04
Cs-134	Ci	2.95E-03	3.85E-02	1.84E-02	5.99E-02
Cs-137	Ci	4.10E-03	4.33E-02	2.20E-02	6.94E-02
Mo-99	Ci				
Ce-141	Ci				
Ce-144	Ci				
Zn-65	Ci		1.12E-03	6.84E-04	1.80E-03
Fe-59	Ci	6.51E-03	1.03E-02	2.83E-03	1.96E-02
Zr-95	Ci	4.66E-03	7.23E-03	5.18E-03	1.71E-02
Nb-95	Ci	1.14E-02	1.79E-02	1.24E-02	4.17E-02
Nb-97	Ci	7.84E-03	1.73E-02	1.57E-02	4.05E-02
Sr-92	Ci	1.48E-03	4.07E-03	2.37E-03	7.92E-03
Sb-125	Ci	3.66E-03	4.49E-03	2.80E-03	1.10E-03
Fe-55	Ci	3.90E-02	1.34E-02	1.33E-02	6.57E-02
Sr-89	Ci	$\leq$5.85E-05	9.96E-05	$\leq$8.09E-05	9.96E-05
Sr-90	Ci	$\leq$1.56E-04	1.73E-05	2.27E-05	4.00E-05
Total Activity	Ci				
Kr-87				1.84E-03	1.84E-03
Xe-133	Ci		4.97E-06	4.03E-02	4.03E-02
Xe-135	Ci		4.66E-05	2.95E-02	2.95E-02
Xe-135M	Ci			4.94E-02	4.94E-02
Ar-41	Ci			2.97E-04	2.97E-04
Kr-85m	Ci	5.13E-06		3.24E-03	3.25E-03
Total	Ci	5.13E-06	5.16E-05	1.25E-01	1.25E-01
H-3		8.89E+00	5.49E+00	3.75E+01	5.20E+01

TABLE 2.3-3 (Cont.)

MILLSTONE UNIT No. 3

Year 1988 LIQUID RAD WASTE EFFLUENTS - BATCH - LWS

Nuclides Released	Unit	JANUARY	FEBRUARY	MARCH	Quarterly Total
Ag-110M	Ci	3.07E-03	1.12E-02	5.19E-03	1.95E-02
Na-24	Ci		3.18E-04	9.71E-04	1.29E-03
Co-57	Ci	1.06E-03	1.38E-03	7.18E-04	3.16E-03
I-132	Ci			1.33E-02	1.33E-02
I-134	Ci			1.78E-03	1.78E-03
Ru-106	Ci			2.72E-03	2.72E-03
Sb-124	Ci	2.35E-04			2.35E-04
	Ci				
	Ci				
	Ci				
	Ci				
	Ci				
	Ci				
	Ci				
	Ci				
	Ci				
	Ci				
	Ci				
	Ci				
	Ci				
	Ci				
	Ci				
	Ci				
	Ci				
Total Activity	Ci	4.71E-01	5.81E-01	4.14E-01	1.46E00

Xe-133	Ci				
Xe-135	Ci				
Xe-135M	Ci				
	Ci				
	Ci				
	Ci				

TABLE 2.3-3

MILLSTONE UNIT No. 3

Year 1988 LIQUID RAD WASTE EFFLUENTS - BATCH - LWS

Nuclides Released	Unit	APRIL	MAY	JUNE	Quarterly Total
Cr-51	Ci	2.471E-03	1.157E-03	1.105E-04	3.739E-03
Mn-54	Ci	4.35E-02	3.816E-02	5.001E-03	8.666E-02
Tc-99M	Ci	1.906E-03	2.090E-04	---------	2.115E-03
Co-58	Ci	7.229E-02	5.888E-02	8.401E-03	1.396E-01
Co-60	Ci	6.001E-02	6.900E-02	7.372E-03	1.364E-01
I-131	Ci	6.508E-02	2.486E-02	5.080E-03	9.502E-02
I-133	Ci	7.087E-03	1.511E-04	4.545E-05	7.284E-03
I-135	Ci	2.528E-04	---------	---------	2.528E-04
Cs-134	Ci	1.581E-02	2.159E-02	1.599E-03	3.900E-02
Cs-137	Ci	2.216E-02	3.178E-02	2.604E-03	5.654E-02
Sb-125	Ci	8.171E-03	6.334E-03	3.909E-04	1.490E-02
Zr-95	Ci	2.112E-03	1.481E-03	1.137E-04	3.707E-03
Sb-124	Ci	3.282E-03	4.289E-04	--------	3.711E-03
Zn-65	Ci	---------	1.268E-05	--------	1.286E-05
Fe-59	Ci	8.108E-04	4.862E-04	1.495E-05	1.312E-03
Co-57	Ci	4.682E-04	7.301E-04	1.610E-05	1.214E-03
Na-24	Ci	2.464E-03	4.378E-03	7.880E-04	7.630E-03
Ag-110M	Ci	4.120E-03	1.134E-03	---------	5.254E-03
Nb-95	Ci	6.360E-03	4.199E-03	5.486E-04	1.111E-02
Nb-97	Ci	9.011E-03	3.141E-03	9.947E-04	1.315E-02
Cs-136	Ci	1.714E-03	1.217E-03	---------	2.931E-03
I-132	Ci	8.761E-05	---------	---------	8.761E-05
Sr-92	Ci	1.720E-03	6.933E-04	6.353E-05	2.477E-03
Xe-133	Ci	3.601E-02	6.271E-03	2.012E-03	4.429E-02
Xe-135	Ci	7.727E-03	1.043E-03	6.735E-04	9.444E-03
Xe-135M	Ci	2.849E-04	---------	---------	2.849E-04
Kr-85	Ci	2.698E-03	5.590E-03	---------	8.288E-03
	Ci				
H-3	Ci	7.621E+01	4.135E+01	6.564E+00	1.241E+02

TABLE 2.3-4

MILLSTONE UNIT No. 3

Year 1988 LIQUID RAD WASTE EFFLUENTS - BATCH

CPF WASTE NEUTRALIZING SUMPS

Nuclides Released	Unit	JANUARY	FEBRUARY	MARCH	Quarterly Total
NO ACTIVITY DISCHARGED					
Cr-51	Ci				
Mn-54	Ci				
Tc-99M	Ci				
Co-58	Ci				
Co-60	Ci				
I-131	Ci				
I-133	Ci				
I-135	Ci				
Cs-134	Ci				
Cs-137	Ci				
Mo-99	Ci				
Ce-141	Ci				
Ce-144	Ci				
Zn-65	Ci				
Fe-59	Ci				
	Ci				
	Ci				
	Ci				
	Ci				
	Ci				
Fe-55	Ci				
Sr-89	Ci				
Sr-90	Ci				
Total Activity	Ci				

Xe-133	Ci				
Xe-135	Ci				
Xe-135M	Ci				
	Ci				
	Ci				
H-3	Ci				

TABLE 2.3-4

MILLSTONE UNIT No. 3

LIQUID RAD WASTE EFFLUENTS - BATCH

Year 1988

CPF WASTE NEUTRALIZING SUMPS

Nuclides Released	Unit	APRIL	MAY	JUNE	Quarterly Total
NO ACTIVITY DISCHARGED					
Cr-51	Ci				
Mn-54	Ci				
Tc-99M	Ci				
Co-58	Ci				
Co-60	Ci				
I-131	Ci				
I-133	Ci				
I-135	Ci				
Cs-134	Ci				
Cs-137	Ci				
Mo-99	Ci				
Ce-141	Ci				
Ce-144	Ci				
Zn-65	Ci				
Fe-59	Ci				
	Ci				
	Ci				
	Ci				
	Ci				
	Ci				
Fe-55	Ci				
Sr-89	Ci				
Sr-90	Ci				
Total Activity	Ci				

Xe-133	Ci				
Xe-135	Ci				
Xe-135M	Ci				
	Ci				
	Ci				
H-3	Ci				

TABLE 2.3-3 (Cont.)

MILLSTONE UNIT No. 3

Year 1988 LIQUID RAD WASTE EFFLUENTS - BATCH - LWS

Nuclides Released	Unit	APRIL	MAY	JUNE	Quarterly Total
	Ci				
	Ci				
	Ci				
	Ci				
	Ci				
	Ci				
	Ci				
	Ci				
	Ci				
	Ci				
	Ci				
	Ci				
	Ci				
	Ci				
	Ci				
Rb-88	Ci	-------	-------	1.927E-04	1.927E-04
Y-88	Ci	------	-------	1.743E-05	1.743E-05
	Ci				
	Ci				
	Ci				
Fe-55	Ci	7.1E-02	1.2E-02	7.1E-03	9.0E-02
Sr-89	Ci	8.58E-05	1.9E-04	≤4.7E-05	2.8E-04
Sr-90	Ci	2.37E-05	≤3.4E-05	≤1.1E-05	2.37E-05
Total Activity	Ci	4.5E-01	3.0E-01	4.1E-02	7.2E-01

Ar-41	Ci	3.843E-04			3.843E-04
Kr-85M	Ci			2.634E-05	2.634E-05
Kr-87	Ci			9.801E-06	9.801E-06
	Ci				
	Ci				
	Ci				

TABLE 2.3-5

MILLSTONE UNIT No. 3

SUMMATION OF GASEOUS EFFLUENT RELEASES

YEAR 1988

	UNITS	JANUARY	FEBRUARY	MARCH	QUARTERLY TOTALS
A. Fission and Activation Gases					
1. TOTAL ACTIVITY RELEASED	Ci	-0-	-0-	6.49E+00	6.49E+00
2. AVERAGE RELEASE RATE FOR THE PERIOD	UCi/sec	-0-	-0-	2.68	8.26E-01
B. Iodines					
1. TOTAL I-131 ACTIVITY RELEASED	Ci	-0-	3.02E-08	5.21E-04	5.21E-04
2. AVERAGE RELEASE RATE FOR THE PERIOD	UCi/sec	-0-	1.25E-8	2.15E-04	6.63E-05
C. Particulates					
1. TOTAL PARTICULATE ACTIVITY RELEASED	Ci	2.95E-04	2.66E-05	1.23E-05	3.34E-04
2. AVERAGE RELEASE RATE FOR THE PERIOD	UCi/sec	9.77E-05	1.10E-05	5.08E-06	4.25E-05
3. TOTAL GROSS ALPHA ACTIVITY RELEASED	Ci	$\leq$1.2E-06	$\leq$6.4E-07	4.43E-09	4.43E-09
D. Tritium					
1. TOTAL ACTIVITY RELEASED	Ci	-0-	6.58E+00	5.76E+00	1.23E+01
2. AVERAGE RELEASE RATE FOR THE PERIOD	UCi/sec	-0-	2.72	2.38	1.57

TABLE 2.3-5

MILLSTONE UNIT No. 3

SUMMATION OF GASEOUS EFFLUENT RELEASES

YEAR 1988

	UNITS	APRIL	MAY	JUNE	QUARTERLY TOTALS
A. Fission and Activation Gases					
1. TOTAL ACTIVITY RELEASED	Ci	21.18	2.62	-0-	23.8
2. AVERAGE RELEASE RATE FOR THE PERIOD	UCi/sec	8.17	9.8E-01	-0-	3.03
B. Iodines					
1. TOTAL I-131 ACTIVITY RELEASED	Ci	4.17E-03	8.10E-04	8.92E-04	5.87E-03
2. AVERAGE RELEASE RATE FOR THE PERIOD	UCi/sec	1.61E-03	3.03E-04	3.44E-04	7.47E-04
C. Particulates					
1. TOTAL PARTICULATE ACTIVITY RELEASED	Ci	1.18E-04	4.98E-08	4.66E-07	1.12E-04
2. AVERAGE RELEASE RATE FOR THE PERIOD	UCi/sec	4.56E-05	1.86E-08	1.79E-07	1.43E-05
3. TOTAL GROSS ALPHA ACTIVITY RELEASED	Ci	$\leq$ 6.4E-07	$\leq$ 3.2E-06	$\leq$ 7.8E-07	$\leq$ 1.54E-06
D. Tritium					
1. TOTAL ACTIVITY RELEASED	Ci	1.99	8.38E-02	1.18E-01	2.19
2. AVERAGE RELEASE RATE FOR THE PERIOD	UCi/sec	7.68E-01	3.14E-02	4.56E-02	2.79E-01

TABLE 2.3-6

MILLSTONE UNIT No. 3 - GASEOUS EFFLUENT - CONTINUOUS

NORMAL VENTILATION

Year 1988

Nuclides Released	Unit	January	February	March	Quarterly Total
1. Fission gases					
Xe-138	Ci				
Kr-87	Ci				
Kr-88	Ci				
Kr-85m	Ci				
Xe-135	Ci			7.00E-02	7.00E-02
Xe-133	Ci			6.42E+00	6.42E+00
Kr-89	Ci				
Xe-137	Ci				
Xe-135m	Ci				
Kr-83m	Ci				
Xe-133m	Ci				
Xe-131m	Ci				
Kr-85	Ci				
Ar-37	Ci				
Total For Period	Ci			6.49E+00	6.49E+00
2. Iodines					
Iodine-131	Ci	-0-	-0-	5.21E-04	5.21E-04
Iodine-133	Ci	-0-	-0-	9.12E-04	9.12E-04
3. Particulates					
Cr-51	Ci				
Mn-54	Ci				
Fe-59	Ci				
Co-58	Ci	2.79E-04	2.59E-05		2.87E-04
Co-60	Ci	1.52E-05			1.52E-05
Zn-65	Ci				
I-131	Ci				
Cs-134	Ci				
Cs-137	Ci				
Ba-140	Ci				
Ce-141	Ci				
Ce-144	Ci				
Nd-147	Ci			1.14E-05	1.14E-05
	Ci				
Alpha	Ci	≤1.2E-06	≤6.4E-07	≤2.11E-06	≤3.95E-06
Sr-89	Ci	≤1.6E-06	≤1.28E-07	≤1.61E-06	≤3.34E-06
Sr-90	Ci	≤4.0E-07	≤2.24E-07	≤2.58E-07	≤8.82E-07
H-3	Ci	-0-	6.53E00	5.60E00	1.21E+01
TOTAL	Ci	2.94E-04	2.59E-05	1.14E-05	3.31E-04

TABLE 2.3-6

MILLSTONE UNIT No. 3 - GASEOUS EFFLUENT - CONTINUOUS

NORMAL VENTILATION

Year 1988

Nuclides Released	Unit	APRIL	MAY	JUNE	Quarterly Total
1. Fission gases					
Xe-138	Ci				
Kr-87	Ci				
Kr-88	Ci				
Kr-85m	Ci				
Xe-135	Ci	7.9E-01			7.9E-01
Xe-133	Ci	5.47	2.62		8.09
Kr-89	Ci				
Xe-137	Ci				
Xe-135m	Ci				
Kr-83m	Ci				
Xe-133m	Ci				
Xe-131m	Ci				
Kr-85	Ci				
Ar-37	Ci				
Total For Period	Ci	6.26	2.62	-0-	8.88
2. Iodines					
Iodine-131	Ci	4.149E-03	8.09E-04	8.92E-04	5.85E-03
Iodine-133	Ci	2.501E-03	3.37E-04	1.97E-04	3.02E-03
3. Particulates					
Cr-51	Ci				
Mn-54	Ci				
Fe-59	Ci				
Co-58	Ci	1.92E-05			1.92E-05
Co-60	Ci				
Zn-65	Ci				
I-131	Ci	8.84E-05			8.84E-05
Cs-134	Ci				
Cs-137	Ci				
Ba-140	Ci				
Ce-141	Ci				
Ce-144	Ci				
	Ci				
	Ci				
Alpha	Ci	≤6.41E-07	≤3.2E-06	≤6.37E-07	≤1.49E-06
Sr-89	Ci	≤1.282E-06	≤2.89E-06	≤1.59E-06	≤1.92E-06
Sr-90	Ci	≤2.24E-07	≤6.42E-07	≤3.18E-07	≤2.99E-06
Total	Ci	1.1E-04	≤2.2E-06	≤8.84E-07	1.1E-04
H_3	Ci	1.98E+00	5.86E+00	2.993E+01	3.777E+01

TABLE 2.3-7

MILLSTONE UNIT No. 3 - GASEOUS EFFLUENT - CONTINUOUS

ESF BUILDING VENTILATION

Year 1988

Nuclides Released	Unit	JANUARY	FEBRUARY	MARCH	Quarterly Total
1. Fission gases					
Xe-133	Ci				
Kr-87	Ci				
Kr-88	Ci				
Kr-85m	Ci				
Xe-135	Ci				
Xe-133	Ci				
Kr-89	Ci				
Xe-137	Ci				
Xe-135m	Ci				
Kr-83m	Ci				
Xe-133m	Ci				
Xe-131m	Ci				
Kr-85	Ci				
Ar-37	Ci				
Total For Period	Ci				
2. Iodines					
Iodine-131	Ci	-0-	3.02E-08	2.89E-07	3.19E-07
Iodine-133	Ci				
3. Particulates					
Cr-51	Ci				
Mn-54	Ci			1.29E-07	1.29E-07
Fe-59	Ci				
Co-58	Ci	1.21E-06	6.28E-07	1.85E-07	2.02E-06
Co-60	Ci		9.40E-08		9.40E-08
Zn-65	Ci				
I-131	Ci				
Cs-134	Ci				
Cs-137	Ci				
Ba-140	Ci				
Ce-141	Ci				
Ce-144	Ci				
Y-88	Ci			6.31E-07	6.31E-07
	Ci				
Alpha	Ci	≤1.48E-08	≤7.75E-08	4.43E-09	4.43E-09
Sr-89	Ci	≤1.86E-08	≤7.14E-08	≤1.86E-08	≤1.09E-07
Sr-90	Ci	≤6.51E-09	≤9.52E-09	≤3.72E-09	≤1.98E-08
H-3	Ci	-0-	5.21E-02	1.62E-01	2.14E-01
TOTAL	Ci	1.21E-06	7.22E-07	9.49E-07	2.88E-06

TABLE 2.3-7

MILLSTONE UNIT No. 3 - GASEOUS EFFLUENT - CONTINUOUS

ESF BUILDING VENTILATION

Year 1988

Nuclides Released	Unit	APRIL	MAY	JUNE	Quarterly Total
1. Fission gases					
Xe-138	Ci				
Kr-87	Ci				
Kr-88	Ci				
Kr-85m	Ci				
Xe-135	Ci				
Xe-133	Ci				
Kr-89	Ci				
Xe-137	Ci				
Xe-135m	Ci				
Kr-83m	Ci				
Xe-133m	Ci				
Xe-131m	Ci				
Kr-85	Ci				
Ar-37	Ci				
Total For Period	Ci				
2. Iodines					
Iodine-131	Ci	9.80E-06	1.35E-06	8.94E-08	1.12E-05
Iodine-133	Ci	1.33E-05	6.36E-07	1.03E-07	1.40E-05
3. Particulates					
Cr-51	Ci				
Mn-54	Ci	1.77E-07			1.77E-07
Fe-59	Ci				
Co-58	Ci	1.38E-06	4.98E-08	4.66E-07	1.9E-06
Co-60	Ci	2.64E-07			2.64E-07
Zn-65	Ci				
I-131	Ci				
Cs-134	Ci				
Cs-137	Ci				
Ba-140	Ci				
Ce-141	Ci				
Ce-144	Ci				
	Ci				
	Ci				
Alpha	Ci	≤ 6.58E-09	≤ 4.4E-08	≤ 1.48E-07	≤ 6.62E-08
Sr-89	Ci	≤ 1.46E-08	≤ 1.47E-08	≤ 1.48E-08	≤ 1.47E-08
Sr-90	Ci	≤ 2.93E-09	≤ 5.15E-09	≤ 2.97E-09	≤ 3.68E-09
Total	Ci	1.82E-06	4.98E-08	4.66E-07	4.66E-06
H_3	Ci	≤ 8.9E-01	8.38E-02	1.18E-01	2.02E-01

TABLE 2.3-8

MILLSTONE UNIT No. 3 - BATCH

CONTAINMENT DRAWDOWN

Year 1988

Nuclides Released	Unit	JANUARY	FEBRUARY	MARCH	Quarterly Total
1. Fission gases					
Xe-133	Ci				
Kr-87	Ci				
Kr-88	Ci				
Kr-85m	Ci				
Xe-135	Ci				
Xe-133	Ci				
Kr-89	Ci				
Xe-137	Ci				
Xe-135m	Ci				
Kr-83m	Ci				
Xe-133m	Ci				
Xe-131m	Ci				
Kr-85	Ci				
Ar-37	Ci				
Total For Period	Ci				
2. Iodines					
Iodine-131	Ci				
Iodine-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				
	Ci				
	Ci				
TOTAL	Ci				
	Ci				
	Ci				
H-3	Ci	7.7E-02			7.70E-02
	Ci				

TABLE 2.3-8

MILLSTONE UNIT No. 3 - BATCH

CONTAINMENT DRAWDOWN

Year 1988

Nuclides Released	Unit	APRIL	MAY	JUNE	Quarterly Total
1. Fission gases					
Xe-133	Ci				
Kr-87	Ci				
Kr-88	Ci				
Kr-85m	Ci				
Xe-135	Ci				
Xe-133	Ci	2.03E-02			
Kr-89	Ci				
Xe-137	Ci				
Xe-135m	Ci				
Kr-83m	Ci				
Xe-133m	Ci				
Xe-131m	Ci				
Kr-85	Ci				
Ar-37	Ci				
Total For Period	Ci	2.03E-02			
2. Iodines					
Iodine-131	Ci	1.5E-06			
Iodine-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				
	Ci				
	Ci				
TOTAL	Ci				
	Ci				
	Ci				
H-3	Ci	3.15E-04			
	Ci				

TABLE 2.3-9

MILLSTONE UNIT No. 3 - BATCH

CONTAINMENT PURGES

Year 1988

Nuclides Released	Unit	JANUARY	FEBRUARY	MARCH	Quarterly Total
1. Fission gases	NO DISCHARGES				
Xe-138	Ci				
Kr-87	Ci				
Kr-88	Ci				
Kr-85m	Ci				
Xe-135	Ci				
Xe-133	Ci				
Kr-89	Ci				
Xe-137	Ci				
Xe-135m	Ci				
Kr-83m	Ci				
Xe-133m	Ci				
Xe-131m	Ci				
Kr-85	Ci				
Ar-37	Ci				
Total For Period	Ci				
2. Iodines					
Iodine-131	Ci				
Iodine-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				
	Ci				
	Ci				
TOTAL	Ci				
	Ci				
	Ci				
H-3	Ci				
	Ci				

TABLE 2.3-9

MILLSTONE UNIT No. 3 - BATCH

CONTAINMENT PURGES

Year 1988

Nuclides Released	Unit	APRIL	MAY	JUNE	Quarterly Total
1. Fission gases					
Xe-138	Ci				
Kr-87	Ci				
Kr-88	Ci				
Kr-85m	Ci				
Xe-135	Ci	8.98E-02			
Xe-133	Ci	14.5			
Kr-89	Ci				
Xe-137	Ci				
Xe-135m	Ci				
Kr-83m	Ci				
Xe-133m	Ci	1.97E-01			
Xe-131m	Ci	8.85E-02			
Kr-85	Ci				
Ar-37	Ci				
Total For Period	Ci	14.9			
2. Iodines					
Iodine-131	Ci	7.33E-06			
Iodine-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				
	Ci				
	Ci				
TOTAL	Ci				
	Ci				
	Ci				
H-3	Ci	1.86E-02			
	Ci				

TABLE 2.3-10

MILLSTONE UNIT No. 3 - CONTINUOUS

TURBINE GLAND SEALING SYSTEM EXHAUST

Year 1988

Nuclides Released	Unit	JANUARY	FEBRUARY	MARCH	Quarterly Total
1. Fission gases	NO ACTIVITY DISCHARGED				
Xe-133	Ci				
Kr-87	Ci				
Kr-88	Ci				
Kr-85m	Ci				
Xe-135	Ci				
Xe-133	Ci				
Kr-89	Ci				
Xe-137	Ci				
Xe-135m	Ci				
Kr-83m	Ci				
Xe-133m	Ci				
Xe-131m	Ci				
Kr-85	Ci				
Ar-37	Ci				
Total For Period	Ci				
2. Iodines					
Iodine-131	Ci				
Iodine-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				
	Ci				
	Ci				
TOTAL	Ci				
	Ci				
	Ci				
	Ci				
	Ci				

TABLE 2.3-10

MILLSTONE UNIT No. 3 - CONTINUOUS

TURBINE GLAND SEALING SYSTEM EXHAUST

Year 1988

Nuclides Released	Unit	APRIL	MAY	JUNE	Quarterly Total
1. Fission gases	NO ACTIVITY DISCHARGED				
Xe-133	Ci				
Kr-87	Ci				
Kr-88	Ci				
Kr-85m	Ci				
Xe-135	Ci				
Xe-133	Ci				
Kr-89	Ci				
Xe-137	Ci				
Xe-135m	Ci				
Kr-83m	Ci				
Xe-133m	Ci				
Xe-131m	Ci				
Kr-85	Ci				
Ar-37	Ci				
Total For Period	Ci				
2. Iodines					
Iodine-131	Ci				
Iodine-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				
	Ci				
	Ci				
TOTAL	Ci				
	Ci				
	Ci				
	Ci				
	Ci				

TABLE 2.3-11

MILLSTONE UNIT No. 3 - BATCH

MAIN CONDENSER MECHANICAL VACUUM PUMP EXHAUST

Year 1988

Nuclides Released	Unit	JANUARY	FEBRUARY	MARCH	Quarterly Total
1. Fission gases		NO ACTIVITY DISCHARGED			
Xe-133	Ci				
Kr-87	Ci				
Kr-88	Ci				
Kr-85m	Ci				
Xe-135	Ci				
Xe-133	Ci				
Kr-89	Ci				
Xe-137	Ci				
Xe-135m	Ci				
Kr-83m	Ci				
Xe-133m	Ci				
Xe-131m	Ci				
Kr-85	Ci				
Ar-37	Ci				
Total For Period	Ci				
2. Iodines					
Iodine-131	Ci				
Iodine-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				
	Ci				
	Ci				
TOTAL	Ci				
	Ci				
	Ci				
	Ci				
	Ci				

TABLE 2.3-11

MILLSTONE UNIT No. 3 - BATCH

MAIN CONDENSER MECHANICAL VACUUM PUMP EXHAUST

Year 1988

Nuclides Released	Unit	APRIL	MAY	JUNE	Quarterly Total
1. Fission gases	NO ACTIVITY DISCHARGED				
Xe-133	Ci				
Kr-87	Ci				
Kr-88	Ci				
Kr-85m	Ci				
Xe-135	Ci				
Xe-133	Ci				
Kr-89	Ci				
Xe-137	Ci				
Xe-135m	Ci				
Kr-83m	Ci				
Xe-133m	Ci				
Xe-131m	Ci				
Kr-85	Ci				
Ar-37	Ci				
Total For Period	Ci				
2. Iodines					
Iodine-131	Ci				
Iodine-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				
	Ci				
	Ci				
TOTAL	Ci				
	Ci				
	Ci				
	Ci				
	Ci				

* NO ACTIVITY

3.0 Radioactive Solid Waste

Summaries of solid waste shipments 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 I 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 Polyurethane high integrity container

202 ft^3 Polyurethane high integriry container

92.7 ft^3 steel box

TABLE 3

EFFLUENT AND WASTE DISPOSAL SEMI ANNUAL REPORT -

SOLID WASTE AND IRRADIATED FUEL SHIPMENTS

MILLSTONE UNIT 1

JANUARY 1, 1988 - JUNE 30, 1988

1. Type of Waste		Unit	6-Month Period	Est. Total Error, %
a) Spent Resins, Filter Sludges, Evaporator Bottoms, Etc.	(CNSI) Burial	M^3	9.25E1	
		Ci	6.76E2	2.5E1
	(SEG) Super Compaction Filters Only	M^3	8.00E-1	
		Ci	1.29E-2	2.5E1
b) Dry Compressible Waste Contaminated Equipment, Etc.	(CNSI) Burial	M^3	1.22E1	
		Ci	8.68E-1	2.5E1
	(SEG) Super Compaction	M^3	3.56E1	
		Ci	5.83E-1	2.5E1
	See Page 13 (SEG) Burial Data			
c) Irradiated Components, Control Rods, Etc.		M^3	2.80E0	
		Ci	7.44E4	2.5E1
d) Other (Describe)		M^3		
		Ci	N/A	N/A

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

a) Spent Resins, Filter Sludges, Evaporator Bottoms, Etc. (Burial)

Nuclide	(%)
H^3	2.00E-2
C^{14}	1.54E0
Cr^{51}	4.89E0
Mn^{54}	2.56E1
Fe^{55}	8.42E0

Co^{57}	<1.00E-2
Co^{58}	7.20E-1
Fe^{59}	6.20E-1
Co^{60}	4.49E1
Ni^{63}	5.63E0
Zn^{65}	4.28E0
Sr^{89}	1.00E-2
Sr^{90}	5.00E-2
Nb^{95}	<1.00E-2
Zr^{95}	<1.00E-2
Tc^{99}	<1.00E-2
Ag^{110m}	1.00E-2
Sb^{125}	<1.00E-2
I^{129}	<1.00E-2
I^{131}	1.00E-2
Cs^{134}	7.00E-2
Cs^{137}	3.04E0
Ba^{140}	2.00E-2
La^{140}	1.00E-2
Ce^{141}	<1.00E-2
Pu^{238}	<1.00E-2
Pu^{239}	<1.00E-2
Pu^{241}	1.20E-1
Am^{241}	<1.00E-2
Cm^{242}	<1.00E-2
Cm^{244}	1.00E-2

a) Spent Resins, Filter Sludges

Evaporator Bottoms, Etc., (Super Compaction - Filters Only)

Nuclide	(%)
H^3	1.90E0
C^{14}	4.00E-2
Mn^{54}	1.70E0

Fe^{55}	3.20E1
Co^{60}	5.43E1
Ni^{63}	1.93E0
Sr^{89}	7.10E-1
Sr^{90}	5.60E-1
Tc^{99}	2.00E-2
Cs^{137}	6.36E0
Pu^{238}	1.00E-2
Pu^{241}	4.20E-1
Am^{241}	2.00E-2
Cm^{242}	1.00E-2
Cm^{244}	1.00E-2

b) Dry Compressible Waste,
Contaminated Equipment, Etc. (Burial)

Nuclide	(%)
Mn^{54}	2.80E1
Fe^{55}	2.93E0
Co^{58}	6.90E-1
Co^{60}	6.57E1
Ni^{63}	1.70E-1
Zn^{65}	5.00E-2
Sr^{90}	1.00E-2
Tc^{99}	1.00E-2
Cs^{137}	2.39E0

b) Dry Compressible Waste,
Contaminated Equipment, Etc. (Super Compaction)

Nuclide	(%)
Mn^{54}	8.51E0
Fe^{55}	2.49E0
Co^{58}	1.00E-2

Co^{60}	5.99E1
Ni^{63}	8.04E0
Zn^{65}	8.15E0
Sr^{90}	<1.00E-2
Tc^{99}	<1.00E-2
Cs^{134}	2.00E-2
Cs^{137}	1.29E1

c) Irradiated Components,
Control Rods, Etc.

Nuclide	(%)
H^{3}	2.50E-1
C^{14}	<1.00E-2
Cr^{51}	5.00E-2
Mn^{54}	1.85E1
Fe^{55}	5.69E1
Ni^{59}	1.00E-2
Co^{60}	2.25E1
Ni^{63}	1.79E0
Nb^{95}	<1.00E-2
Tc^{99}	<1.00E-2
Np^{237}	<1.00E-2
Pu^{238}	<1.00E-2
Pu^{239}	<1.00E-2
Pu^{240}	<1.00E-2
Pu^{241}	<1.00E-2
Pu^{242}	<1.00E-2
Am^{241}	<1.00E-2
Am^{243}	<1.00E-2
Cm^{242}	<1.00E-2
Cm^{243}	<1.00E-2
Cm^{244}	<1.00E-2

Solid Waste Disposition

Number of Shipments	Mode of Transportation	Destination
23	Truck (Sole Use Vehicle)	Chem Nuclear Barnwell, S.C.
2	Truck (Sole Use Vehicle)	Scientific Ecology Group Oakridge, Tenn.

TABLE 3

EFFLUENT AND WASTE DISPOSAL SEMI ANNUAL REPORT -

SOLID WASTE AND IRRADIATED FUEL SHIPMENTS

MILLSTONE UNIT 2

JANUARY 1, 1988 - JUNE 30, 1988

1. Type of Waste		Unit	6-Month Period	Est. Total Error, %
a) Spent Resins, Filter Sludges, Evaporator Bottoms, Etc.	(CNSI)	M^3	3.74E1	
	Burial	Ci	3.52E1	2.5E1
Filters Only	(SEG) Super Compaction	M^3	1.39E1	
		Ci	1.42E-2	2.5E1
b) Dry Compressible Waste, Contaminated Equipment, Etc.	(CNSI)	M^3	7.50E1	
	Burial	Ci	1.13E0	2.5E1
	(SEG) Super Compaction	M^3	9.85E1	
		Ci	5.12E-1	2.5E1
	See Page 13 (SEG) Burial Data			
c) Irradiated Components, Control Rods, Etc.		M^3		
		Ci	N/A	N/A
d) Other (Describe)		M^3		
		Ci	N/A	N/A

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

a) Spent Resins, Filter Sludges, Evaporator Bottoms, Etc.

Nuclide	(%)
H^3	3.00E-2
C^{14}	2.00E-2
Cr^{51}	1.70E-1
Mn^{54}	6.30E-1

Fe^{55}	4.33E1
Co^{57}	7.00E-2
Co^{58}	1.53E0
Co^{60}	3.03E1
Ni^{63}	1.44E1
Sr^{90}	3.30E-1
Tc^{99}	2.00E-2
Ag^{110m}	1.30E-1
I^{129}	<1.00E-2
Cs^{134}	1.18E0
Cs^{137}	7.80E0
Pu^{238}	<1.00E-2
Pu^{239}	<1.00E-2
Pu^{241}	6.00E-2
Am^{241}	<1.00E-2
Cm^{242}	<1.00E-2
Cm^{244}	<1.00E-2

a) Spent Resins, Filter Sludges,
Evaporator Bottoms, Etc. (Super Compaction - Filters Only)

Nuclide	(%)
H^3	2.39E0
C^{14}	2.21E0
Mn^{54}	5.10E-1
Fe^{55}	5.45E1
Co^{60}	3.32E1
Ni^{63}	4.66E0
Cs^{137}	4.80E-1
Am^{241}	6.50E-1
Cm^{242}	1.30E0
Cm^{244}	1.00E-1

b) Dry Compressible Waste,
Contaminated Equipment, Etc. (Burial)

Nuclide	(%)
Fe^{55}	4.36E0
Co^{58}	2.43E1
Co^{60}	5.16E1
Ni^{63}	7.08E0
Sr^{90}	1.00E-2
Tc^{99}	1.00E-2
Cs^{134}	2.71E0
Cs^{137}	9.99E0

b) Dry Compressible Waste,
Contaminated Equipment, Etc. (Super Compaction)

Nuclide	(%)
Fe^{55}	5.05E0
Co^{58}	2.57E1
Co^{60}	4.76E1
Ni^{63}	1.00E1
Sr^{90}	<1.00E-2
Tc^{99}	<1.00E-2
Cs^{134}	2.53E0
Cs^{137}	9.06E0

3. Solid Waste Disposition

Number of Shipments	Mode of Transportation	Destination
10	Truck (Sole Use Vehicle)	Chem Nuclear Barnwell, S.C.
2	Truck (Sole Use Vehicle)	Scientific Ecology Group Oakridge, Tenn.

TABLE 3

EFFLUENT AND WASTE DISPOSAL SEMI ANNUAL REPORT -

SOLID WASTE AND IRRADIATED FUEL SHIPMENTS

MILLSTONE UNIT 3

JANUARY 1, 1988 - JUNE 30, 1988

1. Type of Waste		Unit	6-Month Period	Est. Total Error, %
a) Spent Resins, Filter Sludges, Evaporator Bottoms, Etc.	(CNSI) Burial	M^3	5.81E1	
		Ci	5.24E2	2.5E1
Filters Only	(SEG) Super Compaction	M^3	9.90E0	
		Ci	1.27E-1	2.5E1
b) Dry Compressible Waste, Contaminated Equipment, Etc.	(CNSI) Burial	M^3	2.94E1	
		Ci	7.88E-1	2.5E1
	(SEG) Super Compaction	M^3	3.38E1	
		Ci	2.64E-1	2.5E1
		See Page 13 (SEG) Burial Data		
c) Irradiated Components, Control Rods, Etc.		M^3		
		Ci	N/A	N/A
d) Other (Describe)		M^3		
		Ci	N/A	N/A

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

a) Spent Resins, Filter Sludges, Evaporator Bottoms, Etc. (Burial)

Nuclide	(%)
H^3	4.00E-2
C^{14}	<1.00E-2
Cr^{51}	4.10E-1

Mn^{54}	9.14E0
Fe^{55}	5.48E0
Co^{57}	3.50E-1
Co^{58}	6.92E1
Fe^{59}	2.80E-1
Co^{60}	6.57E0
Ni^{63}	6.11E0
Zn^{65}	<1.00E-2
Sr^{89}	1.00E-2
Sr^{90}	1.00E-2
Nb^{95}	1.00E-2
Zr^{95}	1.00E-2
Tc^{99}	<1.00E-2
Ag^{110m}	1.00E-2
Sb^{124}	<1.00E-2
Sb^{125}	<1.00E-2
I^{129}	<1.00E-2
Cs^{134}	1.12E0
Cs^{137}	1.25E0
Pu^{238}	<1.00E-2
Pu^{239}	<1.00E-2
Pu^{241}	1.00E-2
Am^{241}	<1.00E-2
Cm^{242}	<1.00E-2
Cm^{244}	<1.00E-2

a) Spent Resins, Filter Sludges,
Evaporator Bottoms, Etc. (Super Compaction - Filters Only).

Nuclide	(%)
H^3	2.20E1
C^{14}	1.00E-2
Mn^{54}	9.63E0
Fe^{55}	3.92E1

Co^{57}	1.30E-1
Co^{58}	1.24E0
Co^{60}	1.87E1
Ni^{63}	8.72E0
Tc^{99}	1.60E-1
I^{129}	1.40E-1
Pu^{238}	<1.00E-2
Pu^{239}	<1.00E-2
Pu^{241}	1.40E-1
Am^{241}	<1.00E-2
Cm^{242}	<1.00E-2

b) Dry Compressible Waste,
Contaminated Equipment, Etc. (Burial)

Nuclide	(%)
Cr^{51}	3.28E0
Mn^{54}	4.23E0
Fe^{55}	5.48E0
Co^{58}	7.99E1
Fe^{59}	1.25E0
Co^{60}	3.90E0
Ni^{63}	6.70E-1
Nb^{95}	8.10E-1
Zr^{95}	4.80E-1

b) Dry Compressible Waste,
Contaminated Equipment, Etc. (Super Compaction)

Nuclide	(%)
C^{14}	3.00E-2
Cr^{51}	3.28E0
Mn^{54}	4.23E0

Fe^{55}	5.24E0
Co^{58}	8.02E1
Fe^{59}	1.26E0
Co^{60}	3.89E0
Ni^{63}	5.90E-1
Nb^{95}	8.10E-1
Zr^{95}	4.80E-1

3. Solid Waste Disposition

Number of Shipments	Mode of Transportation	Destination
11	Truck (Sole Use Vehicle)	Chem Nuclear Barnwell, S.C.
2	Truck (Sole Use Vehicle)	Scientific Ecology Group Oakridge, Tenn.

Scientific Ecology Group
Burial Data

The burial data received from Scientific Ecology Group (SEG) is listed.

The following is a breakdown per unit of the volume of DAW buried in 1988.

	M^3 SHIPPED TO SEG	REDUCED M^3 BURIED	Ci BURIED
Unit 1	1.27E0	9.97E-1	4.35E-3
Unit 2	1.10E1	8.62E0	1.60E-1
Unit 3	1.27E1	9.93E0	1.42E-1

4.0 SUPPLEMENTAL INFORMATION

A. MEASUREMENTS AND APPROXIMATIONS OF TOTAL RADIOACTIVITY

4.1 Gaseous Releases

a. Unit 1 Stack - Gaseous Releases

(1) Fission and Activiation 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 uCi by off-gas sampling at the steam jet 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 uCi 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 uCi 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 uCi 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 uCi 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 Ventillation 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 Ventillation 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 sub-atmospheric 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.

g. Unit 3 Turbine Gland Sealing System Exhaust

The turbine gland sealing system prevents air leakage into the turbine and valve stems and collects steam leakage. A mixture of air and steam drawn from the turbine shaft packing is condensed and the noncondensable gases are vented to the atmosphere at a point above the condensate polishing building. This vent is at an elevation of 48 feet above grade. Noble Gas Activity released is calculated using the air ejector monitor activity concentration and the percentage of steam to the gland sealing condenser. Iodine and particulate activity is calculated using the steam generator blowdown activity concentration and appropriate carry over fraction. (See Appendix H, ODCM).

h. Unit 3 Main Condensor Mechanical Vacuum Pump Exhaust

The Main Condensor Evacuation System draws the initial vacuum in the condensor during startup and maintains vacuum during startup. The Main Condensor mechanical vacuum pumps exhaust through the vent on the condensate polishing building roof. Steam Jet Air Ejectors maintains condensor vacuum during normal operation. Air and noncondensable gases removed from the condensor by the steam jet air ejectors are discharged to the Unit 1 Stack.

Noble Gas Activity released during startup by the Main Condensor Vacuum Pumps is obtained by multiplying the condensor volume by a grab sample of the air ejector decay corrected for time of shutdown. Iodine and particulate activity is obtained from a grab sample of the mechanical vacuum pump exhaust and volume discharged. (See Appendix H, ODCM).

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 indivdual 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 of 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 Estimates of Errors

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

(1) Sampling and Data Collection - 10% accounts for variation in personnel obtaining required data.

(2) Calibration - 5% instrument calibration to NBS standards.

(3) Counting of Samples - 10% maximum error due to counting statistics.

(4) Flow and Level Measurements - 10% maximum errors on volumes released.

4.4 BATCH RELEASES

Liquid

		Unit 1	Unit 2	Unit 3
a.	Number of Batches:	229	298	301
b.	Total Time: (Min.)	23,525	54,200	36,270
c.	Maximum Time: (Min.)	552	1,246	1,625
d.	Average Time: (Min.)	103	182	120
e.	Minimum Time: (Min.)	3	7	7

Average Stream Flow - Not Applicable - Ocean Site

Gaseous

		Unit 1 Purge	Unit 2 Purge	Unit 2 WGDT	Unit 3 Purge	Unit 3 Drawdown
a.	Number of Batches:	0	3	24	1	2
b.	Total Time: (Min.)	-	720	9,987	270	240
c.	Maximum Time: (Min.)	-	240	480	270	120
d.	Average Time: (Min.)	-	240	416	270	120
E.	Minimum Time: (Min.)	-	240	2	270	120

4.5 ABNORMAL RELEASES

None

5.0 CHANGES TO THE REMM/ODCM/PCP

There were no changes to the REMM/ODCM/PCP during the period.

6.0 EFFLUENT MONITOR INOPERABILITY

During the period covered by this report, the following monitors were inoperable for greater then 30 days:

1. Unit 3 Steam Generator Blowdown Monitor

   This monitor has not been placed in initial service yet. Until this monitor is in-service, Steam Generator Blowdown is being recovered without discharge to the environment.

APPENDIX A - UPDATED TABLES

Table 2.2-3

MILLSTONE NUCLEAR POWER STATION

UNIT #2

Year 1987 LIQUID EFFLUENTS - BATCH - AWMT/CWMT/TK

Nuclides Released	Unit	OCTOBER	NOVEMBER	DECEMBER	Quarterly Total
Co-57			1.33-03	8.32-04	2.16-03
Cs-136			8.25-05	8.21-04	9.04-04
Cr-51	**Ci**		7.23-04	6.69-04	1.39-03
Mn-54	**Ci**	4.51-05	5.07-03	5.59-03	1.07-02
Nb-97	Ci	4.82-04	9.48-03	9.34-03	6.70-02
Co-58	**Ci**	5.30-04	3.68-02	2.33-02	6.06-02
Co-60	**Ci**	1.57-02	2.29-01	2.62-01	5.07-01
I-131	**Ci**	1.24-03	1.53-02	1.92-02	3.57-02
I-133	**Ci**	2.90-04	4.21-03	6.17-03	1.07-02
Ce-144	Ci		5.33-04		5.33-04
Cs-134	**Ci**	6.93-04	9.86-03	2.41-02	3.47-02
Cs-137	**Ci**	4.29-03	4.14-02	7.12-02	1.17-01
Sb-125	Ci	5.07-04	2.70-02	6.03-02	8.78-02
Sb-124	Ci		8.29-06	4.70-04	4.78-04
Ru-106	Ci		5.16-03	6.31-03	1.15-02
Rb-88	Ci		5.57-03		5.57-03
Nb-95	Ci		3.99-04	2.01-04	6.00-04
La-140	Ci	3.55-04	1.09-04		4.64-04
AG-110M	Ci	9.71-05	4.71-03	4.77-03	9.58-03
Sr-92	Ci	3.13-05	1.89-03	2.04-03	3.96-03
Ba-139	Ci	2.16-04			2.16-04
Na-24	Ci	1.92-05	5.47-04	7.04-04	1.27-03
Fe-55	**Ci**	1.02-02	1.16-01	2.24-01	3.50-01
Sr-89	**Ci**	4.03-03	1.16-04	≤1.22-04	4.15-03
Sr-90	**Ci**	4.03-04	≤2.53-05	≤2.43-05	4.03-04
Total Activity	Ci	4.28-02	5.23-01	7.22-01	1.32+00
Gross α		≤1.27-04	≤2.53-04	≤2.43-04	≤2.53-04
Xe-133	**Ci**	1.83-01	6.60+00	3.61+00	1.04+01
Xe-135	**Ci**	1.82-02	4.48-02	2.71-02	9.01-02
Xe-135M	**Ci**	6.46-05			6.46-05
Xe-133M	Ci	1.71-03	7.11-02	2.85-02	1.01-01
Xe-131M	Ci	3.82-03	9.74-02	8.33-02	1.85-01
Kr-85	Ci		5.57-02	7.09-02	1.27-01
H-3	Ci	2.07E+01	3.72E+01	1.09E+01	6.88E+01

TABLE 3

EFFLUENT AND WASTE DISPOSAL SEMI ANNUAL REPORT -

SOLID WASTE AND IRRADIATED FUEL SHIPMENTS

MILLSTONE UNIT 1

JANUARY 1, 1987 - JUNE 30, 1987

1. Type of Waste		Unit	6-Month Period	Est. Total Error, %
a) Spent Resins, Filter Sludges, Evaporator Bottoms, Etc.		M^3 Ci	7.44E1 3.81E1	2.5E1
b) Dry Compressable Waste, Contaminated Equipment, Etc.	Burial	M^3 Ci	2.55E0 2.19E-2	2.5E1
	Super Compaction	M^3 Ci	3.14E1 2.23E-1	2.5E1
c) Irradiated Components, Control Rods, Etc.		M^3 Ci	N/A	N/A
d) Other (Describe)		M^3 Ci	N/A	N/A

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

a) Spent Resins, Filter Sludges, Evaporator Bottoms, Etc.

Nuclide	(%)
H^3	1.22E-1
C^{14}	2.47E-1
Cr^{51}	2.47E-1
Mn^{54}	5.06E0
Fe^{55}	4.08E1
Co^{58}	2.94E-1
Co^{60}	4.28E1
Ni^{63}	1.07E0
Sr^{90}	5.68E-1

TABLE 3

EFFLUENT AND WASTE DISPOSAL SEMI ANNUAL REPORT -

SOLID WASTE AND IRRADIATED FUEL SHIPMENTS

MILLSTONE UNIT 2

JANUARY 1, 1987 - JUNE 30, 1987

1. Type of Waste		Unit	6-Month Period	Est. Total Error, %
a) Spent Resins, Filter Sludges, Evaporator Bottoms, Etc.		M^3 Ci	1.51E1 1.42E0	2.5E1
b) Dry Compressable Waste, Contaminated Equipment, Etc.	Burial	M^3 Ci	1.43E1 3.03E-1	2.5E1
	Super Compaction	M^3 Ci	2.06E+1 1.72E-1	2.5E1
c) Irradiated Components, Control Rods, Etc.		M^3 Ci	1.61E0 2.12E4	N/A
d) Other (Describe)		M^3 Ci	N/A	N/A

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

a) Spent Resins, Filter Sludges, Evaporator Bottoms, Etc.

Nuclide	(%)
H^3	1.09E-2
C^{14}	2.20E-3
Cr^{51}	8.95E-3
Mn^{54}	2.31E0
Fe^{55}	5.86E0
Fe^{59}	1.82E-3
Co^{57}	2.57E-3
Co^{58}	4.00E1
Co^{60}	3.51E1

Scientific Ecology Group
Burial Data

SEG does not designate waste as Unit 1, 2 or 3. SEG designates waste as from Millstone. RMHD has broken down waste burial as proportional to waste shipped, from each unit.

The following breakdown is of (5) shipments that were Unit 1 completely:

M^3 SHIPPED TO SEG	REDUCED M^3 BURIED	Ci BURIED
2.76E2	6.05E+1	2.37E-1

The following breakdown is of (11) shipments that contained waste from the (3) station units:

M^3 SHIPPED TO SEG	REDUCED M^3 BURIED	Ci BURIED
3.55E2	1.88E+2	1.76E+0