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Dominion℠

APR 28 2011

U.S. Nuclear Regulatory Commission
Attention: Document Control Desk
Washington, DC 20555-0001

Serial No.	11-227
MPS Lic/GJC	R0
Docket Nos.	50-245
	50-336
	50-423
License Nos.	DPR-21
	DPR-65
	NPF-49

DOMINION NUCLEAR CONNECTICUT, INC.
MILLSTONE POWER STATION UNITS 1, 2, AND 3
2010 RADIOACTIVE EFFLUENT RELEASE REPORT

In accordance with 10 CFR 50.36a, this letter transmits the annual Radioactive Effluent Release Report (RERR) for the period January 2010 through December 2010. This report meets the provisions of Section 5.7.3 of the Millstone Power Station Unit 1 Permanently Defueled Technical Specifications (PDTS), and Sections 6.9.1.6b and 6.9.1.4 of the Millstone Power Station Units 2 and 3 Technical Specifications, respectively.

Attachment 1 transmits the 2010 RERR, in accordance with Regulatory Guide 1.21. The RERR contains information regarding airborne, liquid, and solid radioactivity released from Millstone Power Station, off-site dose from airborne and liquid effluents.

If you have any questions or require additional information, please contact Mr. William D. Bartron at (860) 444 4301.

Sincerely,

R. K. MacManus
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Attachments: 1

Commitments made in this letter:

1. None.

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Docket Nos. 50-245
50-336
50-423
License Nos. DPR-21
DPR-65
NPF-49

ATTACHMENT 1

2010 RADIOACTIVE EFFLUENTS RELEASE REPORT

MILLSTONE POWER STATION UNITS 1, 2, AND 3
DOMINION NUCLEAR CONNECTICUT, INC. (DNC)

Millstone Power Station

2010 Radioactive Effluents Release Report

Dominion Nuclear Connecticut, Inc.

MILLSTONE UNIT	LICENSE	DOCKET
1	DPR-21	50-245
2	DPR-65	50-336
3	NPF-49	50-423

Dominion

Table of Contents

List of Tables

References

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Introduction

This report, for the period of January through December of 2010, is being submitted by Dominion Nuclear Connecticut, Inc. for Millstone Power Station Units 1, 2, and 3, in accordance with 10CFR50.36a, the REMODCM, and the Station's Technical Specifications. A combined report, written in the US NRC Regulatory Guide 1.21 format, is submitted for all three units.

Volume 1 contains radiological and volumetric information on airborne and liquid effluents, shipments of solid waste & irradiated components, calculated offsite radiological doses, all changes to the REMODCM, information on effluent monitors inoperable for more than 30 consecutive days, and corrections to previous reports.

1.0 Off-Site Doses

This report provides a summary of the 2010 off-site radiation doses from releases of radioactive materials in airborne and liquid effluents from Millstone Power Station Units 1, 2, and 3. This includes the annual maximum dose (mrem) to any real member of the public as well the maximum gamma and beta air doses.

To provide perspective, these doses are compared to the regulatory limits and to the annual average dose that a member of the public could receive from natural background and other sources.

Regulatory Guide 1.21 Revision 2 was issued in June 2009. This guide specifically states that C-14 needs to be reported in airborne effluents from US nuclear power plants. This reporting requirement became effective beginning with reporting year 2010. C-14 is not a new power plant emission. Because the overall quantity of radioactive releases has steadily decreased due to improvements in power plant operations, C-14 now qualifies as a "principle radionuclide" per the revised regulatory guide.

1.1 Dose Calculations

The off-site dose to humans from radioactive airborne and liquid effluents have been calculated using measured radioactive effluent data, measured meteorological data, and the dose computer models DOSAIR and DOSLIQ, which were developed by Millstone Power Station. The methodology and input parameters for DOSAIR are those used in GASPAR II (Reference 12) and NRC Regulatory Guide 1.109 (Reference 3). The methodology and input parameters for DOSLIQ are those used in LADTAP II (Reference 6) and NRC Regulatory Guide 1.109 (Reference 3). The calculated doses generally tend to be conservative due to the conservative model assumptions. More realistic estimates of the off-site dose can be obtained by analysis of environmental monitoring data. A comparison of doses estimated by each of the above methods is presented in the Annual Radiological Environmental Operating Report.

Doses are based upon exposure to the airborne and liquid effluents over a one-year period and an associated dose commitment over a 50-year period from initial exposure. The portion of the doses due to inhalation and ingestion take into account radioactive decay and biological elimination of the radioactive materials.

Maximum individual dose is defined as the dose to the individual who would receive the maximum dose from releases of airborne and liquid effluents. Although the location of the maximum individual may vary each quarterly period, the annual dose is the sum of these quarterly doses. This conservatively assumes that the individual is at the location of maximum dose each quarter.

The dose calculations are based upon three types of input: radioactive source term, site-specific data, and generic factors. The radioactive source terms (Curies) are characterized in Section 2, Effluent Radioactivity, of this report. The site-specific data includes: meteorological data (e.g. wind speed, wind direction, atmospheric stability, etc.) to calculate the transport and dispersion of airborne effluents, and dilution factors for liquid effluents. The generic factors include the average annual consumption rates (for inhalation of air and ingestion of fruits, vegetables, leafy vegetables, grains, milk, poultry, meat, fish, and shellfish) and occupancy factors (for air submersion and ground irradiation, shoreline activity, swimming, boating, etc.). All these inputs are used in the appropriate dose models to calculate the maximum individual dose from radioactive airborne and liquid effluents.

1.1.1 Airborne Effluents

Maximum individual doses due to the release of noble gases, radioiodines, and particulates were calculated using the computer code DOSAIR (Reference 11). This is equivalent to the NRC code, GASPAR II, which uses a semi-infinite cloud model to implement the NRC Regulatory Guide 1.109 (Reference 3) dose models.

The values of average relative effluent concentration (λ/Q) and average relative deposition (D/Q) used in the DOSAIR code were generated using EDAN4, a meteorological computer code which implements the

assumptions cited in NRC Regulatory Guide 1.111 (Reference 5), Section C. The annual summary of hourly meteorological data (in 15-minute increments), which includes wind speed, direction, atmospheric stability, and joint frequency distribution, is not provided in the report but can be retrieved from computer storage.

Millstone Power Station Stack releases are elevated (375 ft) with Pasquill stability classes determined based upon the temperature gradient between the 33 ft and 374 ft meteorological tower levels. However, the doses were conservatively calculated using mixed mode 142 ft meteorology since DOSAIR may underestimate the plume exposure (prior to plume touchdown) for elevated releases from the Millstone Power Station Stack. Only Millstone Power Station Units 2 and 3 discharge to the Millstone Power Station Stack. In March 2001, Millstone Power Station Unit 1 was separated from the stack and two new release points were added to Unit 1, the Spent Fuel Pool Island (SFPI) Vent and the Balance of Plant (BOP) Vent.

Unit 1 Spent Fuel Pool Island Vent (73 ft) and the Balance of Plant Vent (80 ft) releases are considered ground level; therefore these doses were calculated using the 33 ft meteorology. Continuous ventilation of the Spent Fuel Pool Island including H-3 releases due to evaporation from the spent fuel pool water release through the Spent Fuel Pool Island Vent. Continuous ventilation from other Unit 1 buildings and airborne releases from the reactor building evaporator are discharged to the BOP Vent. Doses from these release points were summed to determine the total Unit 1 airborne effluent dose.

Unit 2 Auxiliary Building Ventilation, Steam Generator Blowdown Tank Vent and Containment Purge releases via the Unit 2 Vent at 159 ft are considered mixed mode (partially elevated and partially ground) releases. The first two of these are continuous releases while the Containment Purge is a batch release. Containment Purges can also be released via the Millstone Power Station Stack. Because doses for releases from the Unit 2 Vent and from the Millstone Power Station Stack are calculated using the same meteorology, the Containment Purge releases are not divided between the Unit 2 Vent and Millstone Power Station Stack. Batch releases from the Waste Gas Decay Tanks and Containment Vents are discharged via the Millstone Power Station Stack. The doses for these elevated releases were conservatively calculated using mixed mode 142 ft meteorology for which the Pasquill stability classes are determined based upon the temperature gradient between the 33 ft and 142 ft meteorological tower levels. The Containment Equipment Hatch and the RWST Tank Vent releases are considered ground level where the 33 ft meteorology was used for the dose calculations. Each of the doses for the various release points were summed to determine the total Unit 2 airborne effluent dose.

The Unit 3 Vent (142.5 ft) is considered a mixed mode (partially elevated and partially ground) release point. The Pasquill stability classes are determined based upon the temperature gradient between the 33 ft and 142 ft meteorological tower levels. Auxiliary Building Ventilation is a mixed mode continuous release while Containment Purge and the "initial" Containment Drawdown (released at the roof of the Auxiliary Building) are considered mixed mode batch releases. Gaseous waste and operational containment drawdowns (also called containment vents) are released through the Unit 3 Supplementary Leak Collection and Recovery System (SLCRS) system to the Millstone Power Station Stack (375 ft). The doses for these elevated releases were conservatively calculated using mixed mode 142 ft meteorology. The Engineered Safety Features Building (ESF) Ventilation, the Containment Equipment Hatch, and Refueling Water Storage Tank (RWST) Vent releases are considered ground level where the doses were calculated using 33 ft meteorology. Each of the doses for the various release points were summed to determine the total Unit 3 airborne effluent dose.

1.1.2 Liquid Effluents

Maximum individual doses from the release of radioactive liquid effluents were calculated using the DOSLIQ program (Reference 10). This program uses the dose models and parameters cited in NRC Regulatory Guide 1.109 with site-specific inputs to produce results similar to the LADTAP II code, (Reference 6).

1.2 Dose Results

The calculated maximum off-site doses are presented in Table 1-1 for airborne effluents and Table 1-2 for liquid effluents.

1.2.1 Airborne Effluents

For the dose to the maximum individual, DOSAIR calculates the dose to the whole body, GI-tract, bone, liver, kidney, thyroid, lung, and skin from each of the following pathways: direct exposure from noble gases in the plume and from ground deposition, inhalation, and ingestion of vegetation, cow or goat milk, and meat. The values presented are a total from all pathways. However, only the whole body, skin, thyroid and maximum organ (other than thyroid) doses are presented.

For the plume and inhalation pathways, the maximum individual dose is calculated at the off-site location of the highest decayed χ/Q where a potential for dose exists.

For ground deposition, the maximum individual dose is calculated at both the off-site maximum land location of the highest χ/Q and highest D/Q where a potential for dose exists.

For the vegetation pathway, the maximum individual dose is calculated at the vegetable garden of the highest D/Q. For the vegetation pathway, the calculated dose is included in the maximum individual's dose only at locations and times where these pathways actually exist. Similarly, for meat, cow's milk, and goat's milk pathways, the calculated dose is included in the maximum individual's dose only at locations and times where these pathways actually exist.

To determine compliance with 10CFR50, Appendix I (Reference 7), the maximum individual whole body and organ doses include all applicable external pathways (i.e., plume and ground exposure) as well as the internal pathways (inhalation and ingestion).

1.2.2 Liquid Effluents

The DOSLIQ code performs calculations for the following pathways: fish, shellfish, shoreline activity, swimming, and boating. Doses are calculated for the whole body, skin, thyroid, and maximum organ (GI-LLI, bone, liver, kidney, and lung).

1.2.3 Analysis of Results

Table 1-3 provides a quantitative dose comparison with the limits specified in the REMODCM. The data indicates that the total whole body and organ doses to the maximum offsite individual from Millstone Power Station including all sources of the fuel cycle are well within the limits of 40CFR190 (Reference 8). On-site radioactive waste storage during this year was within storage criteria and the maximum dose to a member of the public was approximately 0.19 mrem/yr. The doses from airborne and liquid effluents were added to the estimated dose from on-site radioactive waste storage to show compliance compared to 40CFR190.

The Offsite Dose Comparison, Table 1-4, provides a perspective on the maximum offsite individual dose received from Millstone Power Station with the natural background radiation dose received by the average Connecticut resident. The total dose to the maximum individual received from Millstone Power Station is small ($< 0.1\%$) in comparison to the dose received from natural background radiation.

Table 1-1
2010 Off-Site Dose Commitments from Airborne Effluents
Millstone Units 1, 2, 3

Unit 1	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter	Annual Total
Max Air	mrad	mrad	mrad	mrad	mrad
Beta	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Gamma	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Max Individual	mrem	mrem	mrem	mrem	mrem
Whole Body	1.04E-04	5.00E-05	1.20E-04	8.96E-05	3.64E-04
Skin	1.18E-04	5.00E-05	1.37E-04	8.96E-05	3.94E-04
Thyroid	1.04E-04	5.00E-05	1.20E-04	8.96E-05	3.64E-04
Max organ+	1.05E-04	5.00E-05	1.96E-04	8.96E-05	4.40E-04

Unit 2	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter	Annual Total
Max Air	mrad	mrad	mrad	mrad	mrad
Beta	1.16E-05	2.04E-03	4.58E-04	5.71E-05	2.56E-03
Gamma	3.14E-05	1.27E-04	7.19E-05	2.40E-05	2.54E-04
Max Individual	mrem	mrem	mrem	mrem	mrem
Whole Body	2.36E-03	7.81E-02	9.18E-02	4.93E-03	1.77E-01
Skin	2.38E-03	7.95E-02	9.22E-02	4.97E-03	1.79E-01
Thyroid	2.39E-03	7.86E-02	9.24E-02	5.04E-03	1.78E-01
Max organ+	1.18E-02	3.91E-01	4.58E-01	2.37E-02	8.84E-01

Unit 3	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter	Annual Total
Max Air	mrad	mrad	mrad	mrad	mrad
Beta	1.44E-04	8.23E-03	9.06E-05	5.09E-05	8.51E-03
Gamma	2.28E-05	2.91E-03	8.34E-06	1.07E-05	2.96E-03
Max Individual	mrem	mrem	mrem	mrem	mrem
Whole Body	2.09E-03	6.24E-02	5.78E-02	8.09E-03	1.30E-01
Skin	2.18E-03	6.61E-02	5.78E-02	8.13E-03	1.34E-01
Thyroid	2.09E-03	1.74E-01	5.78E-02	8.09E-03	2.42E-01
Max organ+	9.17E-03	2.90E-01	2.77E-01	3.68E-02	6.13E-01

[+] Maximum of the following organs (not including thyroid): Bone, GI-LLI, Kidney, Liver, Lung

Table 1-2
2010 Off-Site Dose Commitments from Liquid Effluents
Millstone Power Station Units 1, 2, 3

Unit 1	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter	Annual Total
Max Individual	(mrem)	(mrem)	(mrem)	(mrem)	(mrem)
Whole Body	0.00E+00	2.12E-07	0.00E+00	0.00E+00	2.12E-07
Thyroid	0.00E+00	6.08E-08	0.00E+00	0.00E+00	6.08E-08
Max Organ	0.00E+00	3.01E-07	0.00E+00	0.00E+00	3.01E-07

Unit 2	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter	Annual Total
Max Individual	(mrem)	(mrem)	(mrem)	(mrem)	(mrem)
Whole Body	3.68E-05	5.81E-05	3.19E-05	1.49E-04	2.76E-04
Thyroid	7.11E-06	3.39E-05	1.45E-05	1.31E-04	1.87E-04
Max Organ	6.20E-04	1.39E-03	4.35E-03	2.67E-03	9.04E-03

Unit 3	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter	Annual Total
Max Individual	(mrem)	(mrem)	(mrem)	(mrem)	(mrem)
Whole Body	2.00E-04	3.17E-04	3.21E-04	1.28E-04	9.66E-04
Thyroid	1.67E-04	3.44E-04	1.32E-04	9.58E-05	7.39E-04
Max Organ	6.79E-04	5.21E-04	1.89E-03	2.24E-04	3.31E-03

Table 1-3

2010 Off-Site Dose Comparison to Limits

Millstone Power Station Units 1, 2, 3

Airborne Effluents Dose

Max Individual Dose vs REMODCM & 10CFR50 Appendix I Limits

	Whole Body (mrem)	Thyroid (mrem)	Max Organ* (mrem)	Skin (mrem)	Beta Air (mrad)	Gamma Air (mrad)
Unit 1	3.64E-04	3.64E-04	4.40E-04	3.94E-04	0.00E+00	0.00E+00
Unit 2	1.77E-01	1.78E-01	8.84E-01	1.79E-01	2.56E-03	2.54E-04
Unit 3	1.30E-01	2.42E-01	6.13E-01	1.34E-01	8.51E-03	2.96E-03
Millstone Power Station	**3.08E-01**	**4.21E-01**	**1.50E+00**	**3.14E-01**	**1.11E-02**	**3.21E-03**
Limits	*5*	*15*	*15*	*15*	*20*	*10*

Liquid Effluents Dose

	Whole Body (mrem)	Thyroid (mrem)	Max Organ* (mrem)
Unit 1	2.12E-07	6.08E-08	3.01E-07
Unit 2	2.76E-04	1.87E-04	9.04E-03
Unit 3	9.66E-04	7.39E-04	3.31E-03
Millstone Power Station	**1.24E-03**	**9.26E-04**	**1.24E-02**
Limits	*3*	*10*	*10*

Max Individual Dose vs REMODCM & 40CFR190 Limits

	Whole Body (mrem)	Thyroid (mrem)	Max Organ * (mrem)
Airborne Effluents	3.08E-01	4.21E-01	1.50E+00
Liquid Effluents	1.24E-03	9.26E-04	1.24E-02
Radwaste Storage	1.90E-01	1.90E-01	1.90E-01
Millstone Power Station	**4.99E-01**	**6.12E-01**	**1.70E+00**
Limits	*25*	*75*	*25*

Note: REMODCM limits are listed in 10CFR50, Appendix I which contains additional limits not listed in the REMODCM

* Maximum of the following organs (not including Thyroid): Bone, GI-LLI, Kidney, Liver, Lung

Table 1-4
2010 Offsite Dose Comparison
Natural Background vs. Millstone Power Station

Average Resident	Natural Background Radiation Dose
Cosmic	27 mrem
Cosmogenic	1 mrem
Terrestial (Atlantic and Gulf Coastal Plain)	16 mrem
Inhaled	200 mrem
In the Body	40 mrem
	~ 284 mrem

Courtesy NCRP Report 94 (1987)

Maximum Off-Site Individual	Millstone Power Station Whole Body Dose
Airborne Effluents	0.3297 mrem
Liquid Effluents	0.0012 mrem
On-site RadWaste Storage	0.1900 mrem
	0.5209 mrem

2.0 Effluent Radioactivity

2.1 Airborne Effluents

2.1.1 Measurement of Airborne Radioactivity

2.1.1.1 Continuous Releases

The following pathways have continuous radiation monitors that include particulate filters and, except for Unit 1, charcoal cartridges for monitoring the activity being released:

Unit 1 Spent Fuel Pool (SFPI) Island (no charcoal cartridge)
Unit 1 Balance of Plant (BOP) Vent (no charcoal cartridge)
Unit 2 Ventilation Vent
Unit 2 Wide Range Gas Monitor (WRGM) to Site Stack
Unit 3 Ventilation Vent
Unit 3 Supplementary Leak Collection and Recovery System (SLCRS) to Site Stack
Unit 3 Emergency Safeguards Facility (ESF) Building Vent

Charcoal cartridges and particulate filters are used to collect iodines and particulates, respectively. These filters are periodically replaced (typically weekly, except every two weeks for Unit 1) and then analyzed for isotopic content using a gamma spectrometer. Particulate filters are also analyzed for Sr-89 (for all but Unit 1), Sr-90 and gross alpha. At least monthly, gaseous grab samples are taken and analyzed for noble gasses and tritium. The gas washing bottle (bubbler) method is utilized for tritium collection. This sample is counted on a liquid scintillation detector. Isotopic concentrations at the release point are multiplied by the total flow to obtain the total activity released for each isotope.

Since a major source of tritium is evaporation of water from the spent fuel pools, tritium releases were also estimated based upon amount of water lost and measured concentrations of the pool water. Grab samples from the Unit 1 SFPI Vent and the Unit 2 and 3 Vents are compared to the measured evaporation technique and the higher amount from either the vent or the measured evaporation technique is used to determine the amount of tritium released.

Another continuous airborne pathway is the Unit 2 Steam Generator Blowdown Tank Vent. A decontamination factor (DF) across the SGBD Tank vent was determined for iodines by comparing the results of gamma spectrometry, HPGe, analysis of the Steam Generator Blowdown water and grab samples of the condensed steam exiting the vent. This DF was applied to the total iodine releases via the Steam Generator Blowdown water to calculate the iodine release out the vent. An additional factor of 0.33 was utilized to account for the fraction of blowdown water actually flashing to steam in the Steam Generator Blowdown Tank.

2.1.1.2 Batch Releases

The following pathways periodically have releases that are considered batches:

- Unit 2 Waste Gas Decay Tanks (via Unit 2 WRGM to Millstone Power Station Stack)
- Unit 2 and 3 Containment Purges (via Unit Ventilation Vents, except for Unit 2 if using Enclosure Building Filtration System (EBFS) via WRGM to Millstone Power Station)
- Unit 2 and 3 Containment Vents (via EBFS to Millstone Power Station Stack for Unit 2 and via SLCRS to Millstone Power Station Stack for Unit 3)
- Unit 2 and 3 Containment Equipment Hatch Openings
- Unit 2 and 3 Refueling Water Storage Tank (RWST) Vents
- Unit 3 Containment Drawdown

Waste Gases from the Unit 2 Gaseous Waste Processing System are held for decay in waste gas decay tanks (6) prior to discharge through the Millstone Power Station Site Stack. Each gas decay tank is analyzed prior to discharge for noble gas and tritium. Calculated volume discharged is multiplied by the isotopic concentrations (noble gas and tritium) from the analysis of grab samples to determine the total activity released.

Containment air is sampled periodically for gamma and tritium to determine the activity released from containment venting. The measured concentrations are multiplied by the containment vent volume to obtain the total activity released. Unit 2 typically performs this process of discharging air from containment to maintain pressure approximately once per week while at Unit 3 it is more often (typically at least daily). Any iodines and particulates discharged would be detected by the continuous monitoring discussed in section 2.1.1.1.

Containment air is sampled prior to each purge for gamma and tritium to determine the activity released from containment purging. Similar to containment venting, the measured concentrations are multiplied by the containment vent volume to obtain the total activity released. Any iodines and particulates discharged would be detected by the continuous monitoring discussed in section 2.1.1.1.

Samples of air near the Containment Equipment Hatch openings are analyzed for particulates and iodines, during refueling outages for the period that the equipment hatch is open. An estimated flow out of the hatch and sample results are used to determine the radioactivity released.

When water is transferred to Refueling Water Storage Tank (RWST) there is a potential for a release of radioactivity through the tank vent. A decontamination factor (DF) was applied to the total iodine contained in the water transferred to the RWST to estimate the iodine released. All noble gases are assumed to be released through the tank vent.

Unit 3 containment is initially drawn down prior to startup. This is accomplished by using the containment vacuum steam jet ejector which releases through an unmonitored vent on the roof of the Auxiliary Building. Grab samples are performed prior to drawdown to document the amount of radioactivity released during these evolutions.

2.1.2 Estimate of Carbon-14

Beginning in 2011 U. S. nuclear utilities are required to report airborne releases of C-14. This nuclide is not typically monitored because of its difficulty in measurement and analysis but the amount released can be estimated based upon its production rate. Reference 2 provides a method for this calculation. Also a key factor in the dose assessment is the percentage of C-14 that is in the form of carbon dioxide. Based on Reference 2, it was conservatively assumed that 30% of the C-14 exists as carbon dioxide (CO_2).

2.1.3 Estimate of Errors

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

Radioactivity Measurement Calibration	10%	Calibration to NBS standards
Sampling/Data Collection	10% - 20%	Variation in sample collection
Sample Line Loss	20% - 40%	Deposition of some nuclides
Sample Counting	10% - 30%	Error for counting statistics
Flow & Level Measurements	10% - 20%	Error for release volumes

2.1.4 Airborne Batch Release Statistics

Unit 1 – None

Unit 2	Ctmt Purges	Ctmt Vents	WGDT
Number of Batches	0	52	5
Total Time (min)	0	8313	2278
Maximum Time (min)	0	224	965
Average Time (min)	0	160	456
Minimum Time (min)	0	77	25

Unit 3	Ctmt Purges	Ctmt Vents*	Ctmt Drawdowns
Number of Batches	1	274	1
Total Time (min)	108	*	79
Maximum Time (min)	108	*	79
Average Time (min)	108	*	79
Minimum Time (min)	108	*	79

* ~ 2-3 hrs per Vent

2.1.5 Abnormal Airborne Releases

An abnormal airborne release of radioactivity is defined as an increase in airborne radioactive material released to the environment that was unplanned or uncontrolled due to an unanticipated event. These do not include normal routine effluent releases from anticipated operational and maintenance occurrences such as power level changes, reactor trip, opening primary system loops, degassing, letdown of reactor coolant or transferring spent resin and do not include non-routine events such as minor leakages from piping, valves, pump seals, tank vents, etc.

2.1.5.1 Unit 1 - None
2.1.5.2 Unit 2 – None
2.1.5.3 Unit 3 – None

2.1.6 Airborne Release Tables

The following tables provide the details of the airborne radioactivity released from each of the Millstone Power Station units obtained from Reference 2. They are categorized by type of release, source(s), and by release point of discharge to the environment.

Table 2.1-A1

Millstone Power Station Unit 1

Airborne Effluents - Release Summary

	Units	2010 1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	Total
A. Fission & Activation Gases						
1. Total Activity Released	Ci	-	-	-	-	-
2. Average Period Release Rate +	uCi/sec	-	-	-	-	-
B. Iodines / Halogens						
1. Total Activity Released	Ci	na	na	na	na	na
2. Average Period Release Rate +	uCi/sec	na	na	na	na	na
C. Particulates						
1. Total Activity Released	Ci	1.07E-06	-	1.91E-06	-	2.99E-06
2. Average Period Release Rate +	uCi/sec	1.38E-07	-	2.40E-07	-	9.47E-08
D. Gross Alpha						
1. Total Activity Released	Ci	-	-	-	-	-
E. Tritium						
1. Total Activity Released	Ci	2.97E-01	5.20E-02	4.10E-02	6.59E-01	1.05E+00
2. Average Period Release Rate +	uCi/sec	3.82E-02	6.61E-03	5.16E-03	8.29E-02	3.33E-02

"na" denotes Not Required to be Analyzed

\+ "Total Activity Released" ÷ Seconds in Quarter

"-" measurements below detectable levels

Table 2.1-A2

Millstone Power Station Unit 1

Airborne Effluents - Ground Continuous - BOP Vent & SFPI Vent

Nuclides Released	Units	2010				
		1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	Total
A. Fission & Activation Gases						
Kr-85	Ci	-	-	-	-	-
Other γ Emitters	Ci	-	-	-	-	-
Total Activity	Ci	-	-	-	-	-
B. Iodines / Halogens						
Total Activity	Ci	na	na	na	na	na
C. Particulates						
Cs-137	Ci	1.07E-06	-	1.91E-06	-	-
Other γ Emitters	Ci	-	-	-	-	-
Sr-90	Ci	-	-	-	-	-
Total Activity	Ci	1.07E-06	-	1.91E-06	-	-
D. Gross Alpha						
Gross Alpha	Ci	-	-	-	-	-
E. Tritium						
H-3	Ci	2.97E-01	5.20E-02	4.10E-02	6.59E-01	1.05E+00

"na" denotes Not Required to be Analyzed

"-" measurements below detectable levels

Table 2.2-A1

Millstone Power Station Unit 2

Airborne Effluents - Release Summary

	Units	2010 1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	Total
A. Fission & Activation Gases						
1. Total Activity Released	Ci	3.28E-02	9.90E-01	5.75E-01	6.73E-01	2.27E+00
2. Average Period Release Rate +	uCi/sec	4.22E-03	1.26E-01	7.24E-02	8.47E-02	7.20E-02
B. Iodines / Halogens						
1. Total Activity Released	Ci	5.34E-05	3.03E-05	4.41E-05	6.22E-04	7.50E-04
2. Average Period Release Rate +	uCi/sec	6.87E-06	3.85E-06	5.55E-06	7.83E-05	2.38E-05
C. Particulates						
1. Total Activity Released	Ci	-	-	-	-	-
2. Average Period Release Rate +	uCi/sec	-	-	-	-	-
D. Gross Alpha						
1. Total Activity Released	Ci	-	-	-	-	-
E. Tritium						
1. Total Activity Released	Ci	1.93E+00	1.21E+00	1.98E+00	6.60E+00	1.17E+01
2. Average Period Release Rate +	uCi/sec	2.48E-01	1.54E-01	2.49E-01	8.31E-01	3.72E-01
F. C-14						
1. Total Activity* Released	Ci	*	*	*	*	1.09E+01
2. Average Period Release Rate *	uCi/sec	*	*	*	*	3.46E-01

+ "Total Activity Released" ÷ Seconds in Quarter

"-" measurements below detectable levels

* Calculated value per "Estimation of Carbon-14 in Nuclear Power Plant Gaseous Effluents" EPRI Final Report, 12/2010. Calculated value is for the year; quarterly releases were not required to be calculated.

Table 2.2-A2

Millstone Power Station Unit 2

Airborne Effluents - Mixed Continuous - Aux Bldg Vent & SGBD Tank Vent & Spent Fuel Pool Evaporation

Nuclides Released	Units	2010				
		1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	Total
A. Fission & Activation Gases						
γ Emitters	Ci	-	-	-	-	-
Total Activity	Ci	-	-	-	-	-
B. Iodines / Halogens						
I-131	Ci	7.22E-06	9.41E-06	7.86E-06	4.77E-05	7.22E-05
I-132	Ci	-	-	-	1.21E-04	1.21E-04
I-133	Ci	4.62E-05	2.09E-05	3.62E-05	2.24E-04	3.28E-04
I-135	Ci	-	-	-	2.29E-04	2.29E-04
Total Activity	Ci	5.34E-05	3.03E-05	4.41E-05	6.22E-04	7.50E-04
C. Particulates						
I-131	Ci	-	-	-	-	-
Other γ Emitters	Ci	-	-	-	-	-
Sr-89	Ci	-	-	-	-	-
Sr-90	Ci	-	-	-	-	-
Total Activity	Ci	-	-	-	-	-
D. Gross Alpha						
Gross Alpha	Ci	-	-	-	-	-
E. Tritium						
H-3	Ci	1.78E+00	9.74E-01	1.75E+00	6.42E+00	1.09E+01

"-" measurements below detectable levels

Table 2.2-A3

Millstone Power Station Unit 2

Airborne Effluents - Mixed Batch - Containment Purges

There were no containment purges during 2010.

Nuclides Released	Units	2010				
		1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	Total
A. Fission & Activation Gases						
γ Emitters	Ci	*	*	*	*	*
Total Activity	Ci	*	*	*	*	*
B. Iodines / Halogens						
I-131	Ci	*	*	*	*	*
I-133	Ci	*	*	*	*	*
Total Activity	Ci	*	*	*	*	*
C. Particulates						
Total Activity	Ci	*	*	*	*	*
D. Gross Alpha						
Gross Alpha	Ci	*	*	*	*	*
E. Tritium						
H-3	Ci	*	*	*	*	*

* No activity released

Table 2.2-A4

Millstone Power Station Unit 2

Airborne Effluents - Elevated Batch – WGDT

Nuclides Released	Units	2010				
		1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	Total
A. Fission & Activation Gases						
Kr-85	Ci	*	9.50E-01	5.38E-01	6.27E-01	2.11E+00
Other γ Emitters	Ci	*	-	-	-	-
Total Activity	Ci	*	9.50E-01	5.38E-01	6.27E-01	2.11E+00
B. Iodines / Halogens						
Total Activity	Ci	na	na	na	na	na
C. Particulates						
Total Activity	Ci	na	na	na	na	na
D. Gross Alpha						
Gross Alpha	Ci	na	na	na	na	na
E. Tritium						
H-3	Ci	*	2.53E-04	2.13E-04	2.98E-04	7.64E-04

* No activity released

"na" denotes Not Required to be Analyzed

"-" measurements below detectable levels

Table 2.2-A5

Millstone Power Station Unit 2

Airborne Effluents - Elevated Continuous - Containment Vents/Site Stack

Nuclides Released	Units	2010				
		1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	Total
A. Fission & Activation Gases						
Ar-41	Ci	2.82E-02	3.48E-02	3.12E-02	3.56E-02	1.30E-01
Xe-133	Ci	4.16E-03	5.68E-03	5.70E-03	9.45E-03	2.50E-02
Xe-133m	Ci	-	-	-	-	
Xe-135	Ci	4.17E-04	4.84E-04	4.81E-04	8.61E-04	2.24E-03
Xe-138	Ci	-	-	-	6.63E-05	6.63E-05
Other γ Emitters	Ci	-	-	-	-	-
Total Activity	Ci	3.28E-02	4.09E-02	3.74E-02	4.59E-02	1.57E-01
B. Iodines / Halogens						
I-131	Ci	-	-	-	-	-
I-133	Ci	-	-	-	-	-
Other γ Emitters	Ci	-	-	-	-	-
Total Activity	Ci	-	-	-	-	-
C. Particulates						
γ Emitters	Ci	-	-	-	-	-
Total Activity	Ci	-	-	-	-	-
D. Gross Alpha						
Gross Alpha	Ci	na	na	na	na	na
E. Tritium						
H-3	Ci	1.42E-01	2.39E-01	2.25E-01	1.80E-01	7.86E-01

"-" measurements below detectable levels
"na" denotes Not Required to be Analyzed

Table 2.2-A6

Millstone Power Station Unit 2

Airborne Effluents - Ground Batch - Containment Equipment Hatch

There were no equipment hatch releases during 2010.

Nuclides Released	Units	2010				
		1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	Total
A. Fission & Activation Gases						
γ Emitters	Ci	*	*	*	*	*
Total Activity	Ci	*	*	*	*	*
B. Iodines / Halogens						
I-131	Ci	*	*	*	*	*
I-133	Ci	*	*	*	*	*
Other γ Emitters	Ci	*	*	*	*	*
Total Activity	Ci	*	*	*	*	*
C. Particulates						
γ Emitters	Ci	*	*	*	*	*
Total Activity	Ci	*	*	*	*	*
D. Gross Alpha						
Gross Alpha	Ci	*	*	*	*	*
E. Tritium						
H-3	Ci	*	*	*	*	*

* No activity released

Table 2.2-A7

Millstone Power Station Unit 2

Airborne Effluents - Ground Batch - RWST Vent

There were no RWST releases during 2010.

Nuclides Released	Units	2010				
		1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	Total
A. Fission & Activation Gases						
γ Emitters	Ci	*	*	*	*	*
Total Activity	Ci	*	*	*	*	*
B. Iodines / Halogens						
I-131	Ci	*	*	*	*	*
I-133	Ci	*	*	*	*	*
Other γ Emitters	Ci	*	*	*	*	*
Total Activity	Ci	*	*	*	*	*
C. Particulates						
γ Emitters	Ci	*	*	*	*	*
Total Activity	Ci	*	*	*	*	*
D. Gross Alpha						
Gross Alpha	Ci	*	*	*	*	*
E. Tritium						
H-3	Ci	*	*	*	*	*

* No activity released

Table 2.3-A1

Millstone Power Station Unit 3

Airborne Effluents - Release Summary

	Units	2010 1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	Total
A. Fission & Activation Gases						
1. Total Activity Released	Ci	1.16E+00	2.65E+01	3.10E-01	2.64E-01	2.82E+01
2. Average Period Release Rate +	uCi/sec	1.49E-01	3.36E+00	3.89E-02	3.32E-02	8.96E-01
B. Iodines / Halogens						
1. Total Activity Released	Ci	4.45E-06	2.45E-03	1.69E-06	8.21E-06	2.47E-03
2. Average Period Release Rate +	uCi/sec	5.72E-07	3.12E-04	2.13E-07	1.03E-06	7.83E-05
C. Particulates						
1. Total Activity Released	Ci	1.89E-06	1.84E-04	8.64E-07	8.38E-07	1.88E-04
2. Average Period Release Rate +	uCi/sec	2.43E-07	2.34E-05	1.09E-07	1.05E-07	5.96E-06
D. Gross Alpha						
1. Total Activity Released	Ci	-	-	-	-	-
E. Tritium						
1. Total Activity Released	Ci	7.59E+00	1.35E+01	1.49E+01	1.50E+01	5.09E+01
2. Average Period Release Rate +	uCi/sec	9.76E-01	1.71E+00	1.87E+00	1.89E+00	1.62E+00
F. C-14						
1. Total Activity Released *	Ci	*	*	*	*	1.22E+01
2. Average Period Release Rate *	uCi/sec	*	*	*	*	3.87E-01

+ "Total Activity Released" ÷ Seconds in Quarter

"-" measurements below detectable levels

* Calculated value per "Estimation of Carbon-14 in Nuclear Power Plant Gaseous Effluents" EPRI Final Report, 12/2010
Calculated value is for the year; quarterly releases were not calculated.

Table 2.3-A2

Millstone Power Station Unit 3

Airborne Effluents - Mixed Continuous - Normal Ventilation & Spent Fuel Pool Evaporation

Nuclides Released	Units	2010				
		1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	Total
A. Fission & Activation Gases						
Xe-133	Ci	-	1.52E+01	-	-	1.52E+01
Other γ Emitters	Ci	-	-	-	-	-
Total Activity	Ci	-	1.52E+01	-	-	1.52E+01
B. Iodines / Halogens						
I-131	Ci	-	2.09E-03	-	-	2.09E-03
I-133	Ci	-	6.91E-05	-	-	6.91E-05
Other γ Emitters	Ci	-	-	-	-	-
Total Activity	Ci	-	2.16E-03	-	-	2.16E-03
C. Particulates						
Cr-51	Ci	-	1.56E-05	-	-	1.56E-05
Co-58	Ci	-	1.24E-05	-	-	1.24E-05
Nb-95	Ci	-	1.87E-06	-	-	1.87E-06
Sb-124	Ci	1.27E-06	-	-	-	1.27E-06
Cs-134	Ci	-	1.02E-06	-	-	1.02E-06
Ba-140	Ci	-	8.11E-06	-	-	8.11E-06
Other γ Emitters	Ci	-	-	-	-	-
Sr-89	Ci	-	-	-	-	-
Sr-90	Ci	-	-	-	-	-
Total Activity	Ci	-	-	-	-	-
D. Gross Alpha						
Gross Alpha	Ci	-	-	-	-	-
E. Tritium						
H-3	Ci	7.00E+00	1.30E+01	1.44E+01	1.42E+01	4.86E+01

"-" measurements below detectable levels

Table 2.3-A3

Millstone Power Station Unit 3

Airborne Effluents - Ground Continuous - ESF Building Ventilation

Nuclides Released	Units	2010				
		1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	Total
A. Fission & Activation Gases						
Xe-133	Ci	-	1.22E-02	-	-	1.22E-02
Xe-135	Ci	-	5.81E-03	-	-	5.81E-03
Other γ Emitters	Ci	-	-	-	-	-
Total Activity	Ci	-	1.80E-02	-	-	1.80E-02
B. Iodines / Halogens						
I-131	Ci	-	5.52E-06	-	-	5.52E-06
I-133	Ci	-	2.13E-06	-	-	2.13E-06
Other γ Emitters	Ci	-	-	-	-	-
Total Activity	Ci	-	7.65E-06	-	-	7.65E-06
C. Particulates						
Be-7	Ci	5.82E-07	-	5.95E-07	7.30E-07	1.91E-06
Other γ Emitters	Ci	-	-	-	-	-
Sr-89	Ci	-	-	-	-	-
Sr-90	Ci	-	-	-	-	-
Total Activity	Ci	5.82E-07	-	5.95E-07	7.30E-07	1.91E-06
D. Gross Alpha						
Gross Alpha	Ci	-	-	-	-	-
E. Tritium						
H-3	Ci	2.26E-02	1.32E-01	5.68E-02	1.14E-01	3.25E-01

"-" measurements below detectable levels

Table 2.3-A4

Millstone Power Station Unit 3

Airborne Effluents - Mixed Batch - Containment Drawdowns

Nuclides Released	Units	2010				
		1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	Total
A. Fission & Activation Gases						
Xe-133	Ci	*	1.31E-04	*	*	1.31E-04
Other γ Emitters	Ci	*	-	*	*	-
Total Activity	Ci	*	1.31E-04	*	*	1.31E-04
B. Iodines / Halogens						
I-131	Ci	*	2.07E-07	*	*	2.07E-07
I-133	Ci	*	-	*	*	-
Other γ Emitters	Ci	*	-	*	*	-
Total Activity	Ci	*	2.07E-07	*	*	2.07E-07
C. Particulates						
γ Emitters	Ci	*	-	*	*	-
Total Activity	Ci	*	-	*	*	-
D. Gross Alpha						
Gross Alpha	Ci	*	na	*	*	na
E. Tritium						
H-3	Ci	*	3.00E-03	*	*	3.00E-03

"-" measurements below detectable levels

"na" denotes Not Required to be Analyzed

* No activity released

Table 2.3-A5

Millstone Power Station Unit 3

Airborne Effluents - Mixed Batch - Containment Purges

Nuclides Released	Units	2010				
		1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	Total
A. Fission & Activation Gases						
Ar-41	Ci	*	7.55E-04	*	*	7.55E-04
Xe-133	Ci	*	1.42E-01	*	*	1.42E-01
Xe-135	Ci	*	4.54E-03	*	*	4.54E-03
γ Emitters	Ci	*	-	*	*	-
Total Activity	Ci	*	1.47E-01	*	*	1.47E-01
B. Iodines / Halogens						
I-131	Ci	*	-	*	*	-
I-133	Ci	*	-	*	*	-
Other γ emitters	Ci	*	-	*	*	-
Total Activity	Ci	*	-	*	*	-
C. Particulates						
γ Emitters	Ci	*	-	*	*	-
Total Activity	Ci	*	-	*	*	-
D. Gross Alpha						
Gross Alpha	Ci	na	na	na	na	na
E. Tritium						
H-3	Ci	*	1.10E-02	*	*	1.10E-02

"-" measurements below detectable levels

"na" denotes Not Required to be Analyzed

* No activity released

Table 2.3-A6

Millstone Power Station Unit 3

Airborne Effluents - Elevated Continuous - Gaseous Waste System

Nuclides Released	Units	2010				
		1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	Total
A. Fission & Activation Gases						
Ar-41	Ci	2.89E-04	2.08E-04	-	-	4.97E-04
Kr-85	Ci	6.29E-01	9.84E-01	2.96E-01	2.50E-01	2.16E+00
Kr-85m	Ci	-	2.19E-02	-	-	2.19E-02
Kr-88	Ci	-	1.26E-02	-	-	1.26E-02
Xe-131m	Ci	-	1.09E-03	-	-	1.09E-03
Xe-133	Ci	4.50E-01	6.90E+00	6.17E-03	-	7.36E+00
Xe-133m	Ci	-	1.39E-01	-	-	1.39E-01
Xe-135	Ci	6.39E-05	8.89E-01	-	-	8.89E-01
Other γ Emitters	Ci	-	-	-	-	-
Total Activity	Ci	1.08E+00	8.95E+00	3.02E-01	2.50E-01	1.06E+01
B. Iodines / Halogens						
I-131	Ci	2.20E-07	3.57E-05	-	-	3.59E-05
I-133	Ci	-	1.44E-06	-	-	1.44E-06
Br-82	Ci	4.23E-06	1.53E-06	1.69E-06	8.21E-06	1.57E-05
Other γ Emitters	Ci	-	-	-	-	-
Total Activity	Ci	4.45E-06	3.87E-05	1.69E-06	8.21E-06	5.30E-05
C. Particulates						
Be-7	Ci	-	-	2.47E-07	-	2.47E-07
Co-58	Ci	-	7.04E-07	2.23E-08	-	7.26E-07
Co-60	Ci	3.90E-08	-	-	-	3.90E-08
Ba-140	Ci	-	-	-	1.08E-07	1.08E-07
Other γ Emitters	Ci	-	-	-	-	-
Sr-89	Ci	-	-	-	-	-
Sr-90	Ci	-	-	-	-	-
Total Activity	Ci	3.90E-08	7.04E-07	2.69E-07	1.08E-07	1.12E-06
D. Gross Alpha						
Gross Alpha	Ci	-	-	-	-	-
E. Tritium						
H-3	Ci	5.49E-01	3.04E-01	3.16E-01	6.85E-01	1.85E+00

"-" measurements below detectable levels

Table 2.3-A7
Millstone Power Station Unit 3
Airborne Effluents - Elevated Batch - Containment Vents

Nuclides Released	Units	2010				
		1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	Total
A. Fission & Activation Gases						
Ar-41	Ci	9.14E-03	2.90E-03	5.06E-03	1.12E-02	2.83E-02
Xe-133	Ci	7.14E-02	1.02E-02	2.06E-03	2.38E-03	8.60E-02
Xe-133m	Ci	1.44E-04	1.36E-04	-	-	2.80E-04
Xe-135	Ci	1.60E-03	3.40E-04	2.86E-04	6.33E-04	2.86E-03
Xe-135m	Ci	9.21E-05	6.14E-05	-	-	1.54E-04
Other γ Emitters	Ci	-	-	-	-	-
Total Activity	Ci	8.24E-02	1.36E-02	7.41E-03	1.42E-02	1.18E-01
B. Iodines / Halogens						
I-131	Ci	-	-	-	-	-
I-133	Ci	-	-	-	-	-
Other γ Emitters	Ci	-	-	-	-	-
Total Activity	Ci	-	-	-	-	-
C. Particulates						
γ Emitters	Ci	-	-	-	-	-
Total Activity	Ci	-	-	-	-	-
D. Gross Alpha						
Gross Alpha	Ci	na	na	na	na	na
E. Tritium						
H-3	Ci	2.06E-02	1.94E-02	8.25E-02	1.57E-02	1.38E-01

"na" denotes Not Required to be Analyzed
"-" measurements below detectable levels

Table 2.3-A8

Millstone Power Station Unit 3

Airborne Effluents - Ground Batch - Containment Equipment Hatch

Nuclides Released	Units	2010				
		1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	Total
A. Fission & Activation Gases						
Xe-133	Ci	*	2.10E+00	*	*	2.10E+00
Other γ Emitters	Ci	*	-	*	*	-
Total Activity	Ci	*	*	*	*	*
B. Iodines / Halogens						
I-131	Ci	*	3.70E-05	*	*	3.70E-05
I-132	Ci	*	3.87E-06	*	*	3.87E-06
I-133	Ci	*	2.04E-07	*	*	2.04E-07
Total Activity	Ci	*	4.11E-05	*	*	4.11E-05
C. Particulates						
Cr-51	Ci	*	8.05E-06	*	*	8.05E-06
Mn-54	Ci	*	1.75E-06	*	*	1.75E-06
Co-58	Ci	*	8.57E-06	*	*	8.57E-06
Fe-59	Ci	*	2.15E-07	*	*	2.15E-07
Co-60	Ci	*	3.37E-06	*	*	3.37E-06
Nb-95	Ci	*	1.54E-06	*	*	1.54E-06
Zr-95	Ci	*	8.78E-07	*	*	8.78E-07
Other γ Emitters	Ci	*	-	*	*	-
Total Activity	Ci	*	2.44E-05	*	*	2.44E-05
D. Gross Alpha						
Gross Alpha	Ci	na	na	na	na	na
E. Tritium						
H-3	Ci	na	na	na	na	na

"-" measurements below detectable levels

* No activity released

"na" denotes Not Required to be Analyzed

Table 2.3-A9
Millstone Power Station Unit 3
Airborne Effluents - Ground Batch - RWST Vent

Nuclides Released	Units	2010				
		1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	Total
A. Fission & Activation Gases						
Xe-133	Ci	na	8.42E-02	na	na	8.42e-02
Other γ Emitters	Ci	na	-	na	na	-
Total Activity	Ci	na	8.42E-02	na	na	1.18E-01
B. Iodines / Halogens						
I-131	Ci	na	2.07E-04	na	na	2.07E-04
Other γ Emitters	Ci	na	-	na	na	-
Total Activity	Ci	na	2.07E-04	na	na	2.07E-04
C. Particulates						
Cr-51	Ci	na	2.18E-05	na	na	2.18E-05
Mn-54	Ci	na	3.22E-06	na	na	3.22E-06
Co-57	Ci	na	1.66E-07	na	na	1.66E-07
Co-58	Ci	na	7.35E-05	na	na	7.35E-05
Fe-59	Ci	na	5.24E-07	na	na	5.24E-07
Co-60	Ci	na	2.77E-06	na	na	2.77E-06
Zr-95	Ci	na	1.32E-06	na	na	1.32E-06
Nb-95	Ci	na	1.91E-06	na	na	1.91E-06
Ag-11m	Ci	na	7.19E-07	na	na	7.19E-07
Sb-124	Ci	na	7.65E-08	na	na	7.65E-08
Sb-125	Ci	na	1.77E-06	na	na	1.77E-06
Cs-134	Ci	na	7.33E-06	na	na	7.33E-06
Cs-136	Ci	na	2.43E-07	na	na	2.43E-07
Cs-137	Ci	na	4.71E-06	na	na	4.71E-06
La-140	Ci	na	1.12E-07	na	na	1.12E-07
Other γ Emitters	Ci	na	-	na	na	-
Total Activity	Ci	na	1.20E-04	na	na	1.20E-04
D. Gross Alpha						
Gross Alpha	Ci	na	na	na	na	na
E. Tritium						
H-3	Ci	na	na	na	na	na

"na" denotes not required to be analyzed
"-" measurements below detectable levels

2.2 Liquid Effluents

2.2.1 Measurement of Liquid Radioactivity

2.2.1.1 Continuous Liquid Releases

Grab samples are taken for continuous liquid release pathways and analyzed on the HPGe gamma spectrometer and liquid scintillation detector (for tritium) if required by the conditional action requirements of the REMODCM. Total estimated volume is multiplied by the isotopic concentrations (if any) to determine the total activity released. A proportional aliquot of each discharge is retained for composite analysis for Sr-89, Sr-90, Fe-55 and gross alpha if required by the conditional action requirements of the REMODCM. Pathways for continuous liquid effluent releases include, Steam Generator Blowdown, Service Water Effluent, and Turbine Building Sump discharge from Units 2 & 3.

2.2.1.2 Liquid Tanks/Sumps

There are numerous sources from which liquids containing radioactivity are discharged to the environs; they are:

Unit 1 Underground ventilation duct

Unit 2 Clean Waste Monitor Tanks (2)
Aerated Waste Monitor Tanks
CPF Waste Neutralization Sump & Turbine Building Sump
Steam Generator Bulk

Unit 3 High Level Waste Test Tanks (2)
Low Level Waste Drain Tanks (2)
Boron Test Tanks
CPF Waste Neutralization Sump & Turbine Building Sump
Steam Generator Bulk

Prior to release, a tank is re-circulated for two equivalent tank volumes, a sample is drawn and then analyzed on the HPGe gamma spectrometer and liquid scintillation detector (H-3) for individual radionuclide composition. Isotopic concentrations are multiplied by the volume released to obtain the total activity released. For bulk releases, several samples are taken during the discharge to verify the amount of radioactivity released. A proportional aliquot of each discharge is retained for composite analysis for Sr-89, Sr-90, Fe-55, and gross alpha.

2.2.2 Estimate of Errors

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

Radioactivity Measurement Calibration	10%	Calibration to NBS standards
Sampling/Data Collection	10% - 20%	Variation in sample collection
Sample Line Loss	20% - 40%	Deposition of some nuclides
Sample Counting	10% - 30%	Error for counting statistics
Flow & Level Measurements	10% - 20%	Error for release volumes

2.2.3 Liquid Batch Release Statistics

	Unit 1	Unit 2	Unit 3
Number of Batches	1	51	57
Total Time (min)	330	4438	7670
Maximum Time (min)	330	244	272
Average Time (min)	330	87	135
Minimum Time (min)	330	2	66
Average Stream Flow	Not Applicable - Ocean Site		

2.2.4 Abnormal Liquid Releases

An abnormal release of radioactivity is the discharge of a volume of liquid radioactive material to the environment that was unplanned or uncontrolled.

In 2010, the following abnormal liquid releases occurred:

2.2.4.1 Unit 1 - None

2.2.4.2 Unit 2 - None

2.2.4.3 Unit 3 - None

2.2.5 Liquid Release Tables

The following tables provide the details of the liquid radioactivity released from each of the Millstone Power Station units obtained from Reference 2. They are categorized by type of release, source(s), and by release point of discharge to the environment.

Table 2.1-L1

Millstone Power Station Unit 1

Liquid Effluents - Release Summary

(Release Point - Quarry)

		2010				
	Units	1st Qtr	**2nd Qtr**	3rd Qtr	4th Qtr	Total
A. Fission and Activation Products						
1. Total Activity Released	Ci	*	1.37E-05	*	*	1.37E-05
2. Average Period Diluted Activity +	uCi/ml	*	5.37E-14	*	*	5.37E-14
B. Tritium						
1. Total Activity Released	Ci	*	-	*	*	-
2. Average Period Diluted Activity +	uCi/ml	*	-	*	*	-
C. Dissolved and Entrained Gases						
1. Total Activity Released	Ci	*	-	*	*	-
2. Average Period Diluted Activity +	uCi/ml	*	-	*	*	-
D. Gross Alpha						
1. Total Activity Released	Ci	*	-	*	*	-
E. Volume						
1. Released Waste Volume	Liters	*	1.16E+05	*	*	1.16E+05
2. Dilution Volume During Releases+++	Liters	*	6.49E+08	*	*	6.49E+08
3. Dilution Volume During Period++	Liters	*	2.55E+11	*	*	2.55E+11

"-" measurements below detectable levels

* No activity released

\+ "Total Activity Released" ÷ ("Released Waste Volume" + "Dilution Volume During Period")

++ Unit 2 E.3 quarterly dilution used because there is no more Unit 1 dilution

+++ E.3 quarterly dilution x (Total release time ÷ Total quarter time)

Table 2.1-L2

Millstone Power Station Unit 1

Liquid Effluents - Batch

(Release Point - Quarry)

Nuclides Released	Units	2010				
		1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	Total
A. Fission & Activation Products						
Cs-137	Ci	*	1.37E-05	*	*	1.37E-05
Sr-90	Ci	*	-	*	*	-
Fe-55	Ci	*	-	*	*	-
Total Activity	Ci	*	1.37E-05	*	*	1.37E-05
B. Tritium						
H-3	Ci	*	-	*	*	-
C. Dissolved & Entrained Gases						
Kr-85	Ci	*	-	*	*	-
Total Activity	Ci					
D. Gross Alpha						
Gross Alpha	Ci	*	-	*	*	-

"-" measurements below detectable levels

* No activity released

Table 2.2-L1

Millstone Power Station Unit No. 2

Liquid Effluents - Release Summary

(Release Point - Quarry)

	Units	2010 1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	Total
A. Fission and Activation Products						
1. Total Activity Released	Ci	4.85E-03	3.13E-03	3.28E-03	6.04E-03	1.73E-02
2. Average Period Diluted Activity +	uCi/ml	2.17E-11	1.23E-11	1.27E-11	2.38E-11	1.75E-11
B. Tritium						
1. Total Activity Released	Ci	1.10E+01	5.67E+01	2.31E+01	3.36E+02	4.27E+02
2. Average Period Diluted Activity +	uCi/ml	4.94E-08	2.22E-07	8.95E-08	1.32E-06	4.31E-07
C. Dissolved and Entrained Gases						
1. Total Activity Released	Ci	7.01E-02	5.79E-02	-	3.35E-01	4.63E-01
2. Average Period Diluted Activity +	uCi/ml	3.14E-10	2.27E-10	-	1.32E-09	4.68E-10
D. Gross Alpha						
1. Total Activity Released	Ci	-	-	-	-	-
E. Volume						
1. Released Waste Volume						
Primary	Liters	2.82E+05	2.57E+05	1.35E+05	6.81E+05	1.35E+06
Secondary	Liters	4.05E+03	5.52E+07	4.08E+10	6.48E+03	4.08E+10
2. Dilution Volume During Releases						
Primary	Liters	1.63E+09	1.61E+09	1.72E+09	3.01E+09	7.96E+09
Secondary	Liters					
3. Dilution Volume During Period	Liters	2.23E+11	2.55E+11	2.58E+11	2.54E+11	9.90E+11

"-" measurements below detectable levels

+ "Total Activity Released" ÷ (Primary "Released Waste Volume" + "Dilution Volume During Period")

++ No release of secondary waste

Table 2.2-L2

Millstone Power Station Unit 2

Liquid Effluents - Continuous - SGBD, SW, RBCCW

(Release Point - Quarry)

Nuclides Released	Units	2010				
		1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	Total
A. Fission & Activation Products						
γ Emitters	Ci	-	-	-	-	-
Sr-89	Ci	na	na	na	na	na
Sr-90	Ci	na	na	na	na	na
Fe-55	Ci	na	na	na	na	na
Total Activity	Ci	-	-	-	-	-
B. Tritium						
H-3	Ci	1.40E-05	7.04E-03	4.02E-03	3.74E-04	1.14E-02
C. Dissolved & Entrained Gases						
γ Emitters	Ci	-	-	-	-	-
Total Activity	Ci	-	-	-	-	-
D. Gross Alpha						
Gross Alpha	Ci	na	na	na	na	na

"-" measurements below detectable levels

"na" denotes not required to be analyzed

Table 2.2-L3

Millstone Power Station Unit 2

Liquid Effluents - Batch - LWS

(Release Point - Quarry)

Nuclides Released	Units	2010				
		1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	Total
A. Fission & Activation Products						
Cr-51	Ci	1.41E-05	-	-	-	1.41E-05
Mn-54	Ci	2.68E-05	4.02E-05	4.96E-05	3.39E-06	1.20E-04
Co-57	Ci	4.12E-06	-	-	-	4.12E-06
Co-58	Ci	6.62E-04	2.77E-04	6.82E-05	2.30E-04	1.24E-03
Co-60	Ci	1.97E-04	5.71E-04	6.55E-04	1.86E-03	3.29E-03
Nb-95	Ci	1.31E-04	1.44E-04	-	-	2.75E-04
Zr-95	Ci	4.37E-05	8.38E-05	6.85E-06	-	1.34E-04
Ru-106	Ci	-	-	-	3.37E-05	3.37E-05
Ag-110m	Ci	9.28E-05	2.58E-04	1.37E-03	7.71E-04	2.49E-03
Sn-113	Ci	7.83E-06	-	-	-	7.83E-06
Sn-117m	Ci	5.29E-06	-	-	-	5.29E-06
Sb-124	Ci	8.45E-06	-	9.71E-06	-	1.82E-05
Sb-125	Ci	3.50E-04	4.00E-04	1.92E-04	8.78E-04	1.82E-03
I-131	Ci	-	-	-	1.89E-05	1.89E-05
Cs-134	Ci	3.48E-05	3.05E-05	-	3.32E-05	9.84E-05
Cs-136	Ci	-	-	1.18E-07	-	1.18E-07
Cs-137	Ci	1.44E-04	8.68E-05	2.06E-06	1.89E-04	4.22E-04
Fe-55	Ci	1.76E-03	7.25E-04	8.45E-04	2.17E-04	3.54E-03
Ni-63	Ci	1.37E-03	5.09E-04	8.30E-05	1.80E-03	3.76E-03
Sr-89	Ci	-	4.63E-06	-	-	4.63E-06
Sr-90	Ci	-	-	-	-	-
Total Activity	Ci	4.85E-03	3.13E-03	3.28E-03	6.04E-03	1.73E-02
B. Tritium						
H-3	Ci	1.10E+01	5.67E+01	2.31E+01	3.36E+02	4.27E+02
C. Dissolved & Entrained Gases						
Ar-41	Ci	-	-	-	3.27E-05	3.27E-05
Kr-85	Ci	6.99E-02	5.78E-02	-	1.83E-01	3.11E-01
Kr-85m	Ci	-	-	-	4.77E-05	4.77E-05
Xe-131m	Ci	-	-	-	6.10E-03	6.10E-03
Xe-133	Ci	2.00E-04	1.59E-04	-	1.40E-01	1.40E-01
Xe-133m	Ci	-	-	-	9.15E-04	9.15E-04
Xe-135	Ci	1.92E-05	-	-	5.20E-03	5.22E-03
Total Activity	Ci	7.01E-02	5.79E-02	-	3.35E-01	4.63E-01
D. Gross Alpha						
Gross Alpha	Ci	-	-	-	-	-

"-" measurements below detectable levels

Table 2.2-L4

Millstone Power Station Unit 2

Liquid Effluents - Release Summary

(Release Point - Yard Drain - DSN 006)

	Units	2010				
		1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	Total
Fission Activation Products						
Total Activity Released	Ci	-	1.75E-06	-	3.67E-08	1.79E-06
Average Period Diluted Activity [+]	uCi/ml	-	5.21E-11	-	9.91E-13	1.31E-11
Tritium						
Total Activity Released	Ci	3.65E-03	1.36E-03	9.32E-04	1.25E-02	1.84E-02
Average Period Diluted Activity [+]	uCi/ml	8.25E-08	4.03E-08	4.31E-08	3.38E-07	1.35E-07
Dissolved and Entrained Gases						
Total Activity Released	Ci	-	-	-	-	-
Average Period Diluted Activity [+]	uCi/ml	-	-	-	-	-
Gross Alpha						
Total Activity Released	Ci	-	-	-	-	-
Volume						
Released Waste Volume	Liters	1.43E+06	8.81E+04	4.37E+05	1.55E+06	3.50E+06
Dilution Volume During Releases	Liters	[+++]	[+++]	[+++]	[+++]	[+++]
Dilution Volume During Period [++]	Liters	4.28E+07	3.35E+07	2.12E+07	3.55E+07	1.33E+08

"-" measurements below detectable levels

[+] "Total Activity Released" ÷ ("Released Waste Volume" + "Dilution Volume During Period")

[++] Includes all station dilution sources via Yard Drain - DSN 006

[+++] Continuous "Dilution Volume During Releases" is not quantified

Table 2.2-L5

Millstone Power Station Unit 2

Liquid Effluents -Continuous-Turbine Building Sump/Totes

(Release Point - Yard Drain - DSN 006)

Nuclides Released	Units	2010				
		1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	Total
A. Fission & Activation Products						
Co-60	Ci	-	1.37E-06	-	-	1.37E-06
Cs-137	Ci	-	3.83E-07	-	3.67E-08	4.20E-07
Other γ Emitters	Ci	-	-	-	-	-
Sr-89	Ci	na	na	na	na	na
Sr-90	Ci	na	na	na	na	na
Fe-55	Ci	na	na	na	na	na
Total Activity	Ci	-	-	-	-	-
B. Tritium						
H-3	Ci	3.65E-03	1.36E-03	9.32E-04	1.25E-02	1.84E-02
C. Dissolved & Entrained Gases						
γ Emitters	Ci	-	-	-	-	-
Total Activity	Ci	-	-	-	-	-
D. Gross Alpha						
Gross Alpha	Ci	na	na	na	na	na

"-" measurements below detectable levels

"na" denotes Not Required to be Analyzed

Table 2.3-L1

Millstone Power Station Unit 3

Liquid Effluents - Release Summary

(Release Point - Quarry)

	Units	2010 1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	Total
A. Fission and Activation Products						
1. Total Activity Released	Ci	8.43E-03	3.07E-02	3.07E-02	6.96E-03	7.68E-02
2. Average Period Diluted Activity +	uCi/ml	2.10E-11	1.05E-10	7.22E-11	1.67E-11	5.00E-11
B. Tritium						
1. Total Activity Released	Ci	4.04E+02	1.12E+02	1.62E+02	2.15E+02	8.93E+02
2. Average Period Diluted Activity +	uCi/ml	1.01E-06	3.81E-07	3.81E-07	5.16E-07	5.81E-07
C. Dissolved and Entrained Gases						
1. Total Activity Released	Ci	2.16E-05	9.81E-05	-	-	1.20E-04
2. Average Period Diluted Activity +	uCi/ml	5.39E-14	3.34E-13	-	-	7.79E-14
D. Gross Alpha						
1. Total Activity Released	Ci	-	-	-	-	-
E. Volume						
1. Released Waste Volume						
Primary	Liters	7.87E+05	1.33E+06	1.06E+06	7.37E+05	3.91E+06
Secondary	Liters	4.37E+06	3.44E+06	6.88E+06	5.77E+06	2.05E+07
2. Dilution Volume During Releases						
Primary	Liters	3.08E+09	2.33E+09	4.45E+09	3.39E+09	1.33E+10
Secondary	Liters	7.72E+09	4.59E+08	1.32E+10	1.41E+10	3.55E+10
3. Dilution Volume During Period	Liters	4.01E+11	2.94E+11	4.25E+11	4.17E+11	1.54E+12

"-" measurements below detectable levels

+ "Total Activity Released" ÷ (Primary "Released Waste Volume" + "Dilution Volume During Period")

Table 2.3-L2

Millstone Power Station Unit 3

Liquid Effluents - Continuous - SGBD & SW

(Release Point - Quarry)

Nuclides Released	Units	2010				
		1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	Total
A. Fission & Activation Products						
γ Emitters	Ci	-	-	-	-	-
Sr-89	Ci	na	na	na	na	na
Sr-90	Ci	na	na	na	na	na
Fe-55	Ci	na	na	na	na	na
Total Activity	Ci	-	-	-	-	-
B. Tritium						
H-3	Ci	1.38E-02	1.16E-02	4.70E-02	6.59E-02	1.38E-01
C. Dissolved & Entrained Gases						
γ Emitters	Ci	-	-	-	-	-
Total Activity	Ci	-	-	-	-	-
D. Gross Alpha						
Gross Alpha	Ci	na	na	na	na	na

"-" measurements below detectable levels

"na" denotes Not Required to be Analyzed

Table 2.3-L3

Millstone Power Station Unit 3

Liquid Effluents - Batch - LWS

(Release Point - Quarry)

Nuclides Released	Units	2010				
		1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	Total
A. Fission & Activation Products						
Mn-54	Ci	1.65E-04	1.58E-04	1.05E-03	4.43E-05	1.42E-03
Co-58	Ci	1.57E-04	1.08E-03	3.01E-03	4.30E-04	4.68E-03
Fe-59	Ci	-	3.57E-05	1.30E-04	2.86E-05	1.94E-04
Co-60	Ci	1.92E-03	8.99E-04	8.00E-03	8.85E-04	1.17E-02
As-76	Ci	-	-	-	6.53E-06	6.53E-06
Nb-95	Ci	-	9.41E-05	5.08E-04	-	6.02E-04
Zr-95	Ci	-	-	2.67E-04	-	2.67E-04
Ag-110m	Ci	1.10E-04	-	5.94E-05	-	1.69E-04
Sb-122	Ci	-	7.17E-05	-	-	7.17E-05
Sb-124	Ci	-	3.61E-05	-	2.91E-05	6.52E-05
Sb-125	Ci	3.91E-03	1.29E-02	2.39E-03	2.93E-03	2.21E-02
I-131	Ci	-	1.81E-03	-	-	1.81E-03
I-133	Ci	-	2.94E-05	-	-	2.94E-05
Cs-134	Ci	7.96E-05	6.34E-03	1.68E-03	3.05E-05	8.13E-03
Cs-136	Ci	-	6.81E-05	-	-	6.81E-05
Cs-137	Ci	8.26E-05	4.23E-03	1.15E-03	4.22E-05	5.50E-03
Fe-55	Ci	2.01E-03	2.99E-03	1.03E-02	2.53E-03	1.78E-02
Ni-63	Ci	-	-	2.12E-03	-	2.12E-03
Sr-89	Ci	-	-	-	-	-
Sr-90	Ci	-	-	-	-	-
Total Activity	Ci	8.43E-03	3.07E-02	3.07E-02	6.96E-03	7.68E-02
B. Tritium						
H-3	Ci	4.04E+02	1.12E+02	1.62E+02	2.15E+02	8.93E+02
C. Dissolved & Entrained Gases						
Xe-133	Ci	2.16E-05	9.81E-05	-	-	1.20E-04
Other γ Emitters	Ci	-	-	-	-	-
Total Activity	Ci	2.16E-05	9.81E-05	-	-	1.20E-04
D. Gross Alpha						
Gross Alpha	Ci	-	-	-	-	-

"-" measurements below detectable levels

Table 2.3-L4

Millstone Power Station Unit 3

Liquid Effluents - Batch - CPF Waste Neutralization Sumps, Hotwell, S/G Bulk

(Release Point - Quarry)

Nuclides Released	Units	2010				
		1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	Total
A. Fission & Activation Products						
γ Emitters	Ci	-	-	-	-	-
Fe-55	Ci	na	na	na	na	na
Sr-89	Ci	na	na	na	na	na
Sr-90	Ci	na	na	na	na	na
Total Activity	Ci	-	-	-	-	-
B. Tritium						
H-3	Ci	3.24E-03	4.15E-03	6.12E-03	1.10E-02	2.45E-02
C. Dissolved & Entrained Gases						
γ Emitters	Ci	-	-	-	-	-
Total Activity	Ci	-	-	-	-	-
D. Gross Alpha						
Gross Alpha	Ci	na	na	na	na	na

"-" measurements below detectable levels

"na" denotes Not Required to be Analyzed

Table 2.3-L5

Millstone Power Station Unit 3

Liquid Effluents - Release Summary

(Release Point - Yard Drain - DSN 006)

		2010				
	Units	1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	Total
A. Fission and Activation Products						
Total Activity Released	Ci	-	-	-	-	-
Average Period Diluted Activity [+]	uCi/ml	-	-	-	-	-
B. Tritium						
Total Activity Released	Ci	6.14E-02	5.87E-03	4.33E-02	9.63E-02	2.07E-01
Average Period Diluted Activity [+]	uCi/ml	1.39E-06	1.75E-07	2.01E-06	2.60E-06	1.52E-06
C. Dissolved and Entrained Gases						
Total Activity Released	Ci	-	-	-	-	-
Average Period Diluted Activity [+]	uCi/ml	-	-	-	-	-
D. Gross Alpha						
Total Activity Released	Ci	-	-	-	-	-
E. Volume						
Released Waste Volume	Liters	6.08E+06	1.95E+06	5.23E+06	6.91E+06	2.02E+07
Dilution Volume During Releases	Liters	+++	+++	+++	+++	+++
Dilution Volume During Period [++]	Liters	3.81E+07	3.17E+07	1.64E+07	3.01E+07	1.16E+08

"-" measurements below detectable levels

[+] "Total Activity Released" ÷ ("Released Waste Volume" + "Dilution Volume During Period")

[++] Includes all station dilution sources via Yard Drain - DSN 006

[+++] Continuous "Dilution Volume During Releases" is not quantified

Table 2.3-L6

Millstone Power Station Unit 3

Liquid Effluents - Continuous - TB Sump, WTT Berm

(Release Point - Yard Drain - DSN 006)

Nuclides Released	Units	2010				
		1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	Total
A. Fission & Activation Products						
γ Emitters	Ci	-	-	-	-	-
Sr-89	Ci	na	na	na	na	na
Sr-90	Ci	na	na	na	na	na
Fe-55	Ci	na	na	na	na	na
Total Activity	Ci	-	-	-	-	-
B. Tritium						
H-3	Ci	2.21E-02	1.85E-03	3.69E-02	9.23E-02	1.53E-01
C. Dissolved & Entrained Gases						
γ Emitters	Ci	-	-	-	-	-
Total Activity	Ci	-	-	-	-	-
D. Gross Alpha						
Gross Alpha	Ci	na	na	na	na	na

"-" measurements below detectable levels

"na" denotes Not Required to be Analyzed

Table 2.3-L7

Millstone Power Station Unit 3

Liquid Effluents - Continuous - Foundation Drain Sumps

(Release Point - Yard Drain - DSN 006)

Nuclides Released	Units	2010				
		1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	Total
A. Fission & Activation Products						
γ Emitters	Ci	-	-	-	-	-
Sr-89	Ci	na	na	na	na	na
Sr-90	Ci	na	na	na	na	na
Fe-55	Ci	na	na	na	na	na
Total Activity	Ci	-	-	-	-	-
B. Tritium						
H-3	Ci	3.93E-02	4.02E-03	6.44E-03	3.98E-03	5.37E-02
C. Dissolved & Entrained Gases						
γ Emitters	Ci	-	-	-	-	-
Total Activity	Ci	-	-	-	-	-
D. Gross Alpha						
Gross Alpha	Ci	na	na	na	na	na

"-" measurements below detectable levels

"na" denotes Not Required to be Analyzed

2.3 Solid Waste

Solid waste shipment summaries for each unit are given in the following tables (Reference 13):

Table 2.1-S Unit 1 Solid Waste and Irradiated Component Shipments
Table 2.2-S Unit 2 Solid Waste and Irradiated Component Shipments
Table 2.3-S Unit 3 Solid Waste and Irradiated Component Shipments

The principal radionuclides in these tables were from shipping manifests.

Solidification Agent(s): No solidification on site

Containers routinely used for radioactive waste shipment include:

55-gal Steel Drum DOT 17-H container	7.5 ft^3
Steel Boxes	45 ft^3
	87 ft^3
	95 ft^3
	122 ft^3
Steel Container	202.1 ft^3
Steel "Sea Van"	1280 ft^3
Polyethylene High Integrity Containers	120.3 ft^3
	132.4 ft^3
	173.4 ft^3
	202.1 ft^3

Table 2.1-S
Solid Waste and Irradiated Component Shipments
Millstone Power Station Unit 1

January 1, 2010 through December 31, 2010

A. SOLID WASTE SHIPPED OFFSITE FOR BURIAL OR DISPOSAL (Not irradiated fuel)

Resins, Filters, and Evaporator Bottoms	Volume		Curies Shipped
Waste Class	ft^3	m^3	Curies
A	N/A	N/A	N/A
B	N/A	N/A	N/A
C	N/A	N/A	N/A
ALL	**N/A**	**N/A**	**N/A**

Major Nuclides for the Above Table:

Radionuclide	% of Total	Curies
CURIES (TOTAL)		0

Dry Active Waste	Volume		Curies Shipped
Waste Class	ft^3	m^3	Curies
A	1.8500E+02	5.2392E+00	4.6123E-03
B	N/A	N/A	N/A
C	N/A	N/A	N/A
ALL	**1.8500E+02**	**5.2392E+00**	**4.6123E-03**

Major Nuclides for the Above Table:

Radionuclide	% of Total	Curies
Fe-55	45.92%	2.1179E-03
Co-60	13.91%	6.4154E-04
Ni-63	17.65%	8.1412E-04
Cs-137	22.36%	1.0311E-03
Pu-238	< 0.01%	3.3164E-07
Pu-239	< 0.01%	1.7755E-07
Pu-241	0.13%	6.1511E-06
Am-241	0.02%	7.4245E-07
Cm-244	< 0.01%	2.4953E-07
CURIES (TOTAL)		4.6123E-03

Table 2.1-S (continued)
Solid Waste and Irradiated Component Shipments
Millstone Power Station Unit 1

Irradiated Components	Volume		Curies Shipped
Waste Class	ft^3	m^3	Curies
A	N/A	N/A	N/A
B	N/A	N/A	N/A
C	N/A	N/A	N/A
ALL	**N/A**	**N/A**	**N/A**

Major Nuclides for the Above Table:

Radionuclide	% of Total	Curies
CURIES (TOTAL)		0

Other Waste	Volume		Curies Shipped
Waste Class	ft^3	m^3	Curies
A	1.1092E+02	3.1414E+00	4.2182E-03
B	N/A	N/A	N/A
C	N/A	N/A	N/A
ALL	**1.1092E+02**	**3.1414E+00**	**4.2182E-03**

Major Nuclides for the Above Table:

Radionuclide	% of Total	Curies
H-3	77.34%	3.2623E-03
Cr-51	< 0.01%	8.3212E-08
Mn-54	0.08%	3.4447E-06
Fe-55	3.32%	1.4019E-04
Fe-59	< 0.01%	2.3828E-09
Co-58	0.06%	2.5846E-06
Co-60	0.98%	4.1246E-05
Ni-63	1.57%	6.6310E-05
Zr-95	< 0.01%	3.7255E-08
Nb-95	< 0.01%	5.1558E-08
Sb-124	< 0.01%	2.5894E-09
Sb-125	0.04%	1.5919E-06
Cs-134	0.06%	2.7052E-06
Cs-137	16.54%	6.9764E-04
Pu-238	< 0.01%	7.1357E-09
Am-241	< 0.01%	1.0353E-08
CURIES (TOTAL)		4.2182E-03

Table 2.1-S (continued)
Solid Waste and Irradiated Component Shipments
Millstone Power Station Unit 1

Sum of All Low-Level Waste Shipped from Site	Volume		Curies Shipped
Waste Class	ft^3	m^3	Curies
A	2.9592E+02	8.3806E+00	8.8305E-03
B	N/A	N/A	N/A
C	N/A	N/A	N/A
ALL	**2.9592E+02**	**8.3806E+00**	**8.8305E-03**

Major Nuclides for the Above Table:

Radionuclide	% of Total	Curies
H-3	36.94%	3.2623E-03
Cr-51	< 0.01%	8.3212E-08
Mn-54	0.04%	3.4447E-06
Fe-55	25.57%	2.2581E-03
Fe-59	< 0.01%	2.3828E-09
Co-58	0.03%	2.5846E-06
Co-60	7.73%	6.8279E-04
Ni-63	9.97%	8.8043E-04
Zr-95	< 0.01%	3.7255E-08
Nb-95	< 0.01%	5.1558E-08
Sb-124	< 0.01%	2.5894E-09
Sb-125	0.02%	1.5919E-06
Cs-134	0.03%	2.7052E-06
Cs-137	19.58%	1.7288E-03
Pu-238	< 0.01%	3.3878E-07
Pu-239	< 0.01%	1.7755E-07
Pu-241	0.07%	6.1511E-06
Am-241	< 0.01%	7.5280E-07
Cm-244	< 0.01%	2.4953E-07
CURIES (TOTAL)		**8.8305E-03**

Table 2.2-S
Solid Waste and Irradiated Component Shipments
Millstone Power Station Unit 2

January 1, 2010 through December 31, 2010

A. SOLID WASTE SHIPPED OFFSITE FOR BURIAL OR DISPOSAL (Not irradiated fuel)

Resins, Filters, and Evaporator Bottoms	Volume		Curies Shipped
Waste Class	ft^3	m^3	Curies
A	7.3500E+01	2.0815E+00	1.3262E-01
B	2.4060E+02	6.8138E+00	5.4368E+01
C	8.9632E+01	2.5384E+00	6.1960E+00
ALL	**4.0373E+02**	**1.1434E+01**	**6.0697E+01**

Major Nuclides for the Above Table:

Radionuclide	% of Total	Curies
H-3	0.14%	8.7107E-02
C-14	< 0.01%	5.1132E-03
Cr-51	< 0.01%	3.9156E-04
Mn-54	1.89%	1.1473E+00
Fe-55	14.83%	9.0001E+00
Fe-59	< 0.01%	3.1310E-04
Co-57	0.27%	1.6547E-01
Co-58	1.11%	6.7526E-01
Co-60	9.14%	5.5464E+00
Ni-63	60.64%	3.6809E+01
Zn-65	< 0.01%	4.9324E-04
Sr-89	< 0.01%	4.0883E-04
Sr-90	0.03%	1.9967E-02
Nb-94	< 0.01%	3.9142E-04
Zr-95	< 0.01%	3.5842E-03
Nb-95	< 0.01%	3.3718E-03
Ru-103	< 0.01%	5.7491E-15
Ru-106	< 0.01%	9.1738E-04
Ag-110m	< 0.01%	4.7262E-03
Sn-113	< 0.01%	1.5022E-03
Sb-124	< 0.01%	1.6837E-04
Sb-125	4.24%	2.5715E+00
Cs-134	2.36%	1.4344E+00
Cs-137	5.27%	3.1994E+00
Ce-141	< 0.01%	1.7864E-17
Ce-144	< 0.01%	1.3012E-04
Hf-181	< 0.01%	9.2337E-06
Pu-238	< 0.01%	6.2105E-04
Pu-239	< 0.01%	2.3653E-04
Pu-241	0.03%	1.7590E-02
Am-241	< 0.01%	4.0275E-04
Cm-242	< 0.01%	8.0932E-05
Cm-244	< 0.01%	8.3436E-04
CURIES (TOTAL)		**6.0697E+01**

Table 2.2-S (continued)
Solid Waste and Irradiated Component Shipments
Millstone Power Station Unit 2

A. SOLID WASTE SHIPPED OFFSITE FOR BURIAL OR DISPOSAL (Not irradiated fuel)

Dry Active Waste	Volume		Curies Shipped
Waste Class	ft^3	m^3	Curies
A	2.9815E+03	8.4436E+01	3.3978E-01
B	N/A	N/A	N/A
C	N/A	N/A	N/A
ALL	**2.9815E+03**	**8.4436E+01**	**3.3978E-01**

Major Nuclides for the Above Table:

Radionuclide	% of Total	Curies
H-3	0.09%	3.0846E-04
Mn-54	0.42%	1.4198E-03
Fe-55	43.73%	1.4860E-01
Co-58	3.17%	1.0780E-02
Co-60	9.52%	3.2332E-02
Ni-63	36.35%	1.2352E-01
Zr-95	0.67%	2.2911E-03
Nb-95	0.95%	3.2275E-03
Ag-110m	0.38%	1.2995E-03
Sb-125	1.12%	3.7918E-03
Cs-134	0.57%	1.9229E-03
Cs-137	2.99%	1.0151E-02
Pu-238	< 0.01%	3.7233E-06
Pu-239	< 0.01%	4.8878E-08
Pu-241	0.04%	1.1952E-04
Am-241	< 0.01%	2.8997E-06
Cm-244	< 0.01%	4.2732E-06
CURIES (TOTAL)		**3.3978E-01**

Table 2.2-S (continued)
Solid Waste and Irradiated Component Shipments
Millstone Power Station Unit 2

Irradiated Components	Volume		Curies Shipped
Waste Class	ft^3	m^3	Curies
A	N/A	N/A	N/A
B	N/A	N/A	N/A
C	N/A	N/A	N/A
ALL	**N/A**	**N/A**	**N/A**

Major Nuclides for the Above Table:

Radionuclide	% of Total	Curies
CURIES (TOTAL)		**0**

Other Waste	Volume		Curies Shipped
Waste Class	ft^3	m^3	Curies
A	2.1871E+03	6.1938E+01	3.3511E-02
B	N/A	N/A	N/A
C	N/A	N/A	N/A
ALL	**2.1871E+03**	**6.1938E+01**	**3.3511E-02**

Major Nuclides for the Above Table:

Radionuclide	% of Total	Curies
H-3	88.91%	2.9793E-02
C-14	< 0.01%	1.1000E-08
Cr-51	< 0.01%	3.5885E-07
Mn-54	0.02%	6.3825E-06
Fe-55	0.67%	2.2495E-04
Fe-59	< 0.01%	1.0276E-08
Co-58	0.03%	1.0667E-05
Co-60	0.19%	6.2421E-05
Ni-63	0.34%	1.1529E-04
Zn-65	< 0.01%	4.7087E-08
Zr-95	< 0.01%	8.7266E-07
Nb-95	< 0.01%	1.3323E-06
Tc-99	< 0.01%	1.9712E-09
Ag-110m	< 0.01%	1.3105E-08
Sb-124	< 0.01%	3.1655E-07
Sb-125	0.03%	1.0999E-05
I-129	< 0.01%	2.8473E-10
Cs-134	0.02%	7.2583E-06
Cs-137	9.78%	3.2767E-03
Pu-238	< 0.01%	7.8303E-09
Pu-239	< 0.01%	9.1989E-12
Am-241	< 0.01%	1.0870E-08
Cm-242	< 0.01%	2.6346E-11
Cm-244	< 0.01%	8.3261E-10
CURIES (TOTAL)		**3.3511E-02**

Table 2.2-S (continued)
Solid Waste and Irradiated Component Shipments
Millstone Power Station Unit 2

Sum of All Low-Level Waste Shipped from Site	Volume		Curies Shipped
Waste Class	ft^3	m^3	Curies
A	5.2421E+03	1.4846E+02	5.0591E-01
B	2.4060E+02	6.8138E+00	5.4368E+01
C	8.9632E+01	2.5384E+00	6.1960E+00
ALL	**5.5723E+03**	**1.5781E+02**	**6.1070E+01**

Major Nuclides for the Above Table:

Radionuclide	% of Total	Curies
H-3	0.19%	1.1721E-01
C-14	< 0.01%	5.1133E-03
Cr-51	< 0.01%	3.9192E-04
Mn-54	1.88%	1.1488E+00
Fe-55	14.98%	9.1489E+00
Fe-59	< 0.01%	3.1311E-04
Co-57	0.27%	1.6547E-01
Co-58	1.12%	6.8605E-01
Co-60	9.14%	5.5788E+00
Ni-63	60.48%	3.6932E+01
Zn-65	< 0.01%	4.9329E-04
Sr-89	< 0.01%	4.0883E-04
Sr-90	0.03%	1.9967E-02
Nb-94	< 0.01%	3.9142E-04
Zr-95	< 0.01%	5.8762E-03
Nb-95	0.01%	6.6007E-03
Tc-99	< 0.01%	1.9712E-09
Ru-103	< 0.01%	5.7491E-15
Ru-106	< 0.01%	9.1738E-04
Ag-110m	< 0.01%	6.0257E-03
Sn-113	< 0.01%	1.5022E-03
Sb-124	< 0.01%	1.6869E-04
Sb-125	4.22%	2.5753E+00
I-129	< 0.01%	2.8473E-10
Cs-134	2.35%	1.4363E+00
Cs-137	5.26%	3.2129E+00
Ce-141	< 0.01%	1.7864E-17
Ce-144	< 0.01%	1.3012E-04
Hf-181	< 0.01%	9.2337E-06
Pu-238	< 0.01%	6.2478E-04
Pu-239	< 0.01%	2.3658E-04
Pu-241	0.03%	1.7710E-02
Am-241	< 0.01%	4.0566E-04
Cm-242	< 0.01%	8.0932E-05
Cm-244	< 0.01%	8.3863E-04
CURIES (TOTAL)		**6.1070E+01**

Table 2.3-S
Solid Waste and Irradiated Component Shipments
Millstone Power Station Unit 3
January 1, 2010 through December 31, 2010

A. SOLID WASTE SHIPPED OFFSITE FOR BURIAL OR DISPOSAL (Not irradiated fuel)

Resins, Filters, and Evaporator Bottoms	Volume		Curies Shipped
Waste Class	ft^3	m^3	Curies
A	2.4500E+02	6.9384E+00	2.7214E-01
B	N/A	N/A	N/A
C	1.1247E+02	3.1851E+00	1.4758E+01
ALL	**3.5747E+02**	**1.0124E+01**	**1.5030E+01**

Major Nuclides for the Above Table:

Radionuclide	% of Total	Curies
H-3	1.22%	1.8312E-01
C-14	0.08%	1.1785E-02
Cr-51	< 0.01%	2.3928E-06
Mn-54	0.61%	9.0977E-02
Fe-55	54.72%	8.2245E+00
Fe-59	< 0.01%	6.2770E-04
Co-57	0.02%	2.5999E-03
Co-58	0.20%	3.0612E-02
Co-60	17.54%	2.6362E+00
Ni-63	24.25%	3.6440E+00
Zn-65	< 0.01%	1.1750E-03
Sr-89	< 0.01%	2.0280E-06
Sr-90	< 0.01%	9.2662E-04
Nb-94	< 0.01%	9.7033E-04
Zr-95	0.02%	2.4160E-03
Nb-95	0.02%	2.8866E-03
Ru-103	< 0.01%	1.3693E-14
Ru-106	0.01%	2.1850E-03
Ag-110m	0.07%	1.0229E-02
Sn-113	0.02%	2.6105E-03
Sb-124	< 0.01%	2.4329E-04
Sb-125	0.65%	9.7076E-02
Cs-134	0.06%	9.3419E-03
Cs-137	0.33%	4.9019E-02
Ce-141	< 0.01%	4.2549E-17
Ce-144	< 0.01%	3.1046E-04
Pu-238	< 0.01%	6.3027E-04
Pu-239	< 0.01%	2.9361E-04
Pu-241	0.15%	2.3289E-02
Am-241	< 0.01%	6.3561E-04
Cm-242	< 0.01%	6.0920E-05
Cm-244	< 0.01%	1.1574E-03
CURIES (TOTAL)		**1.5030E+01**

Table 2.3-S (continued)
Solid Waste and Irradiated Component Shipments
Millstone Power Station Unit 3

Dry Active Waste	Volume		Curies Shipped
Waste Class	ft^3	m^3	Curies
A	9.8850E+03	2.7994E+02	7.6138E-01
B	N/A	N/A	N/A
C	N/A	N/A	N/A
ALL	**9.8850E+03**	**2.7994E+02**	**7.6138E-01**

Major Nuclides for the Above Table:

Radionuclide	% of Total	Curies
H-3	4.76%	3.6243E-02
Mn-54	1.76%	1.3414E-02
Fe-55	52.10%	3.9670E-01
Co-58	2.48%	1.8852E-02
Co-60	14.79%	1.1260E-01
Ni-63	19.16%	1.4584E-01
Nb-95	< 0.01%	3.0416E-05
Cs-134	2.24%	1.7032E-02
Cs-137	2.71%	2.0664E-02
Pu-238	< 0.01%	1.3453E-07
Pu-239	< 0.01%	4.8878E-08
Pu-241	< 0.01%	3.0960E-06
Am-241	< 0.01%	2.3648E-07
CURIES (TOTAL)		**7.6138E-01**

Irradiated Components	Volume		Curies Shipped
Waste Class	ft^3	m^3	Curies
A	N/A	N/A	N/A
B	N/A	N/A	N/A
C	N/A	N/A	N/A
ALL	**N/A**	**N/A**	**N/A**

Major Nuclides for the Above Table:

Radionuclide	% of Total	Curies
CURIES (TOTAL)		**0**

Table 2.3-S (continued)
Solid Waste and Irradiated Component Shipments
Millstone Power Station Unit 3

Other Waste	Volume		Curies Shipped
Waste Class	ft^3	m^3	Curies
A	3.7900E+03	1.0733E+02	3.7915E-02
B	N/A	N/A	N/A
C	N/A	N/A	N/A
ALL	**3.7900E+03**	**1.0733E+02**	**3.7915E-02**

Major Nuclides for the Above Table:

Radionuclide	% of Total	Curies
H-3	96.29%	3.6509E-02
C-14	< 0.01%	1.6809E-08
Cr-51	< 0.01%	8.8413E-08
Mn-54	0.02%	7.4813E-06
Fe-55	0.56%	2.1380E-04
Fe-59	< 0.01%	2.5318E-09
Co-58	0.02%	8.9364E-06
Co-60	0.17%	6.2909E-05
Ni-63	0.28%	1.0652E-04
Zn-65	< 0.01%	5.2205E-08
Zr-95	< 0.01%	3.9584E-08
Nb-95	< 0.01%	9.7209E-07
Tc-99	< 0.01%	3.2618E-07
Ag-110m	< 0.01%	1.4529E-08
Sb-124	< 0.01%	1.5017E-07
Sb-125	0.03%	9.5101E-06
I-129	< 0.01%	1.4615E-08
Cs-134	0.04%	1.3327E-05
Cs-137	2.48%	9.4089E-04
Th-232	< 0.01%	2.9301E-11
U (nat)	0.03%	1.1900E-05
Pu-238	0.02%	7.7066E-06
Pu-239	0.04%	1.3700E-05
Am-241	0.02%	7.3106E-06
Cm-242	< 0.01%	2.9209E-11
Cm-244	< 0.01%	9.5926E-10
CURIES (TOTAL)		**3.7915E-02**

Table 2.3-S (continued)
Solid Waste and Irradiated Component Shipments
Millstone Power Station Unit 3

Sum of All Low-Level Waste Shipped from Site	Volume		Curies Shipped
Waste Class	ft^3	m^3	Curies
A	1.3920E+04	3.9421E+02	1.0714E+00
B	N/A	N/A	N/A
C	1.1247E+02	3.1851E+00	1.4758E+01
ALL	**1.4032E+04**	**3.9740E+02**	**1.5829E+01**

Major Nuclides for the Above Table:

Radionuclide	% of Total	Curies
H-3	1.62%	2.5587E-01
C-14	0.07%	1.1785E-02
Cr-51	< 0.01%	2.4812E-06
Mn-54	0.66%	1.0440E-01
Fe-55	54.47%	8.6214E+00
Fe-59	< 0.01%	6.2770E-04
Co-57	0.02%	2.5999E-03
Co-58	0.31%	4.9473E-02
Co-60	17.37%	2.7488E+00
Ni-63	23.94%	3.7900E+00
Zn-65	< 0.01%	1.1750E-03
Sr-89	< 0.01%	2.0280E-06
Sr-90	< 0.01%	9.2662E-04
Nb-94	< 0.01%	9.7033E-04
Zr-95	0.02%	2.4160E-03
Nb-95	0.02%	2.9180E-03
Tc-99	< 0.01%	3.2618E-07
Ru-103	< 0.01%	1.3693E-14
Ru-106	0.01%	2.1850E-03
Ag-110m	0.06%	1.0230E-02
Sn-113	0.02%	2.6105E-03
Sb-124	< 0.01%	2.4344E-04
Sb-125	0.61%	9.7086E-02
I-129	< 0.01%	1.4615E-08
Cs-134	0.17%	2.6387E-02
Cs-137	0.45%	7.0624E-02
Ce-141	< 0.01%	4.2549E-17
Ce-144	< 0.01%	3.1046E-04
Th-232	< 0.01%	2.9301E-11
U (nat)	< 0.01%	1.1900E-05
Pu-238	< 0.01%	6.3811E-04
Pu-239	< 0.01%	3.0735E-04
Pu-241	0.15%	2.3292E-02
Am-241	< 0.01%	6.4316E-04
Cm-242	< 0.01%	6.0920E-05
Cm-244	< 0.01%	1.1574E-03
CURIES (TOTAL)		**1.5829E+01**

2.4 Groundwater Monitoring

The Groundwater Protection Program (GPP) describes the means by which Millstone Power Station implements the actions cited in the Nuclear Energy's Institute's (NEI) Groundwater Protection Initiative. The purpose of the GPP is to establish a program to assure timely and effective management of situations involving potential releases of radioactive material to groundwater. A key element in the GPP is on-site groundwater monitoring. The results of the onsite monitoring programs required by the Radiological Environmental Monitoring Program are documented in the Annual Radiological Environmental Monitoring Report; the remaining monitoring programs are documented on the following pages (Tables 2.4-GW1 – 2.4-GW5).

Another key element in the GPP is site hydrological characterization. The general trend of groundwater flow at the station is toward the Long Island Sound. Although positive measurements of plant related activity are noted in the Tables 2.4-GW-2 – 2.4-GW5, there are no pathways to any offsite drinking water supplies. The underdrain system effectively captures groundwater in the area around Unit 3 and channels this water via the storm drain system to Long Island Sound. The consequences of these measurements have been used to determine releases listed in Section 2.2 and the dose calculations listed in Section 1.0.

Table 2.4-GW1 Environmental Well Monitoring Results

Location	Well ID	Laboratory Analysis			
		March-10	June-10	Sept.-10	Dec.-10
T1 - Unit 1 Tank Farm	MW-9B	*		*	
	MW-9D	*		*	
	T1-MW-1	*		*	
T5 - Abandoned Heating Oil UST - Building 512	T5-MW-1	*	*	*	
	T5-MW-2	*	*	*	
T7 - Former Stone & Webster USTs	T7-MW-1	*		*	
	T7-MW-2	*		*	
	T7-MW-3	*		*	
S1 - Unit 1 Transformer Switchyard	S1-MW-1	*		*	
S2 - Unit 2 Transformer Switchyard	MW-7C	*		*	
	MW-7D	*		*	
	S2-MW-1			*	
S5 - Former Batch Plant	ME-9	*	*	*	*
	S5-MW-1	*	*	*	*
	MW-1	*	*	*	*
S11 - Fueling Station	S11-MW-1	*		*	
	S11-MW-2	*		*	
S13 - Recycling Area Waste Oil AST	S13-MW-1	*		*	
	S13-MW-2	*			
	MW-6B	*		*	
M2 - Settling Pond	ME-2	*	*	*	
M5 - Excavation Pile	M5-MW-7	*		*	
	M5-MW-8	*		*	
	M5-MW-9S	*		*	
	M5-MW-9D	*		*	

* sampled, gamma and H-3 (tritium) were LLD (Wells are typically sampled for chemical pollutants; they are also analyzed for radioactivity.)

Table 2.4-GW2 Catch Basin/Underdrain Monitoring Results

Type	Location	Identification	Frequency	Results
Yard Drains	Catch Basin 1-3	CB 1-3	Monthly	Gamma and H-3 < LLD
	Catch Basin 1-5	CB 1-5	Monthly	Gamma and H-3 < LLD
	Catch Basin 1-7	CB 1-7	Monthly	Gamma and H-3 < LLD
	Catch Basin 1-13	CB 1-13	Monthly	Gamma and H-3 < LLD
	Catch Basin 1-14	CB 1-14	Monthly	Gamma and H-3 < LLD
	Catch Basin 1-22	CB 1-22	Monthly	Gamma and H-3 < LLD
	Catch Basin 2-9	CB 2-9	Monthly	Gamma and H-3 < LLD
	NPDES Discharge DSN 006		Monthly	Gamma < LLD and, occasionally H-3 at ~2000 pCi/liter *
	ROB Yard Drain		Monthly	Gamma and H-3 < LLD
	ISFSI Yard Drain	DMH#11	Monthly	Gamma and H-3 < LLD
Sumps	Unit 3 Containment Underdrains		Weekly	Gamma and H-3 < LLD
	Unit 3 Foundation Underdrains**	3 SRW Sump 2	Quarterly***	See next page
		3 SRW Sump 3	Quarterly***	See next page

* Turbine building sumps are discharged via DSN-006. These sumps normally have detectable H-3 (tritium), which is monitored and reported in the effluent section of this report. Unit 3 Foundation Underdrains (3SRW sumps 2 & 3) are also discharged via DSN-006

** New locations added in 2007. See Table 2.3 – L7 for the effluent release results for these locations.

*** Minimum frequency

Table 2.4-GW3 Foundation Drains Monitoring Results

Sump 2		Sump 3			
Date	Tritium (pCi/liter)	Date	Tritium (pCi/liter)	Date	Tritium (pCi/liter)
1/1/10	<1730	1/1/10	2,240	8/23/10	4,930
2/23/10	3590	2/24/10	<1730	8/28/10	7,870
2/23/10	3300	2/25/10	<1730	9/1/10	7,070
2/24/10	3600	3/4/10	1,840	9/4/10	4,050
2/25/10	3440	3/9/10	2,820	9/7/10	7,210
2/26/010	5780	3/9/10	2,410	9/8/10	6,520
2/27/10	5720	3/11/10	2,660	9/11/10	5,580
2/28/10	4680	3/16/10	2,310	9/13/10	6,280
3/1/10	3790	4/5/10	2,340	9/21/10	7,930
3/2/10	5720	4/8/10	2,600	9/22/10	6,510
3/2/10	8700	5/10/10	<1730	9/25/10	5,710
3/3/10	14200	5/11/10	<1730	9/27/10	3,770
3/4/10	21900	6/7/10	3,500	9/28/10	5,650
3/5/10	25700	6/10/10	3,040	9/29/10	4,040
3/6/10	26500	7/1/10	5,290	9/30/10	5,190
3/7/10	26700	7/14/10	9,100	10/4/10	5,520
3/8/10	25300	7/16/10	9,830	10/6/10	5,490
3/9/10	26400	7/21/10	10,300	10/12/10	5,560
3/10/10	23400	7/22/10	6,150	10/14/10	4,950
3/11/10	23200	7/23/10	7,030	10/18/10	4,990
3/12/10	22400	7/24/10	10,600	10/20/10	4,900
3/13/10	20800	7/25/10	10,800	10/23/10	4,960
3/14/10	20400	7/27/10	9,120	10/26/10	4,610
3/15/10	14900	7/28/10	12,500	10/30/10	4,080
3/16/10	16000	7/29/10	13,100	11/1/10	5,060
3/17/10	11000	7/30/10	10,300	11/2/10	3,730
3/18/10	7580	7/31/10	10,000	11/6/10	4,610
3/19/10	5810	8/1/10	10,600	11/9/10	5,240
3/20/10	4220	8/3/10	9,120	11/13/10	4,710
3/21/10	3710	8/4/10	11,000	11/15/10	4,620
3/22/10	3850	8/6/10	9,710	11/18/10	3,690
3/23/10	3300	8/7/10	14,000	11/20/10	5,280
3/24/10	3460	8/8/10	9,920	11/22/10	4,810
3/29/10	<1730	8/10/10	8,370	11/29/10	4,450
4/1/10	<1730	8/11/10	8,600	12/1/10	4,090
4/5/10	<1730	8/12/10	8,680	12/7/10	3,660
5/12/10	<1730	8/13/10	8,760	12/14/10	4,780
6/7/10	1910	8/14/10	7,800	12/21/10	3,090
6/10/10	<1730	8/16/10	10,500		
6/10/10	<1780	8/17/10	6,730		
7/1/10	<1730	8/18/10	7,520		
7/19/10	<1730	8/19/10	5,970		
12/9/10	<1730	8/20/10	7,260		
12/13/10	<1730	8/21/10	6,470		

Table 2.4-GW4 Manhole and WTT Berm Results

Manhole D4		WTT Berm		
Date	Tritium (pCi/L)	Date	Tritium (pCi/L)	Gamma* (pCi/L)
2/25/10	15600	2/23/10	1050000	43
2/26/10	21600	2/23/10	1740000	
2/27/10	20800	2/24/10	18700	
2/28/10	15400	2/25/10	120000	29.3
3/1/10	12000	2/26/10	33700	
3/2/10	28500	2/27/10	46100	21.7
3/3/10	68700	2/28/10	52600	
3/4/10	106000	3/1/10	952000	158
3/5/10	113000	3/1/10		103
3/6/10	121000	3/2/10	909000	
3/7/10	110000	3/3/10	848000	
3/8/10	102000	3/4/10	158000	58.5
3/9/10	99600	3/5/10	150000	68.9
3/10/10	96600	3/7/10	209000	161
3/11/10	90600	3/8/10	191000	104.3
3/12/10	83300	3/9/10	169000	107.0
3/13/10	76300	3/10/10	165000	74.1
3/14/10	70300	3/11/10	159000	96.4
3/15/10	66900	3/12/10	142000	89.8
3/16/10	54700	3/13/10	97900	72.3
3/17/10	39900	3/14/10	15900	
3/18/10	25100	3/15/10	8300	
3/19/10	13900	3/17/10	26900	
3/20/10	13300	3/23/10	5500	
3/21/10	10300	7/1/10	4150	
3/22/10	10500	8/18/10	<1.73E-6	
3/23/10	11600	9/3/10	<1.73E-6	
3/24/10	12200	9/17/10	<1.73E-6	
3/29/10	3280	9/29/10	<1.73E-6	
4/1/10	2290	10/6/10	<1.73E-6	
4/5/10	2160	10/17/10	<1.73E-6	
5/12/10	<1730			
6/10/10	2590			

* Gamma activity was Sb-125; no other plant related nuclides identified.

Table 2.4-GW5 Special Well Samples

Name	Date	Tritium (pCi/L)	Name	Date	Tritium (pCi/L)
MW-6A	3/16/10	<1,780	DP-003A	7/26/10	10,300
MW-6A	9/15/10	<1,730	DP-003A	8/23/10	12,100
MW-6B	3/16/10	<1,780	DP-003A	9/2/10	10,500
MW-6B	9/15/10	<1,730	DP-003A	10/21/10	3,350
MW-7A	7/27/10	<1,730	DP-004A	7/26/10	2,900
MW-7A	7/27/10	<1,730	DP-004A	9/2/10	2,480
MW-7A	11/9/10	<1,780	DP-004A	10/21/10	2,710
MW-7B (Note 1)	7/27/10	<1,730	DP-007	7/28/10	2,180
MW-7C	7/27/10	<1,730	DP-007	10/21/10	4,920
MW-7C	7/27/10	<1,730	MW-GPI-1	9/15/10	<1,780
MW-7C	11/9/10	2,680	MW-GPI-2	8/5/10	<1,780
MW-7C (Note 2)	11/9/10	2,740	MW-GPI-2	9/15/10	<1,780
MW-7C	11/15/10	<1,730	MW-GPI-3	9/15/10	<1,780
MW-7D	7/27/10	<1,730	MW-GPI-4	9/20/10	<1,780
MW-7D	11/9/10	<1,780	MW-GPI-5	8/5/10	<1,730
S2-MW-1	9/20/10	<1,780	MW-GPI-5	9/2/10	1,900
S12-MW-1	8/5/10	<1,780	MW-GPI-5	9/8/10	<1,730
S12-MW-2	8/5/10	<1,780	MW-GPI-5	9/16/10	<1,730
S13-MW-1	3/16/10	<1,780	MW-GPI-5	9/22/10	<1,730
S13-MW-2	3/16/10	<1,780	MW-GPI-5	10/21/10	<1,730
DP-001B (Note 2)	7/26/10	5,420	MW-GPI-6	2/24/10	<1,730
DP-002A	7/26/10	5,890	MW-GPI-6	9/2/10	<1,730
DP-002A	9/2/10	6,030	MW-GPI-8	9/20/10	<1,780
DP-002A	10/21/10	5,250	M3-MW-1	9/15/10	<1,780
			1MW-XFMR-03	9/20/10	<1,780

Notes:
1. Well dry on 11/9/10
2. Filtered sample
3. No longer in service

3.0 Inoperable Effluent Monitors

During the period January 1 through December 31, 2010, the following effluent monitors were inoperable for more than 30 consecutive days:

3.1 Unit 1 – None

3.2 Unit 2 – CPF liquid radwaste flow rate measurement instrument (FR-246)
On November 18, 2010 at 11:45 the flow rate measurement instrument was declared inoperable because the CPF Flow Recorder was not responding during discharge. Although repairs to FR-246 were completed on 12/15/2010 under Work Order 53102395259, the flow recorder could not be declared operable until a successful retest of the recorder. The post maintenance testing required that a channel check be done during an actual CPF discharge. The next CPF discharge did not occur until 12/22/2010 which started at 10:34 and ended at 13:13. Based on data from the actual discharge on 12/22/2010, the retest requirement was met and FR-246 was declared operable at 16:00 on 12/22/2010. Best efforts were made to restore the flow rate instrument within 30 days, but the instrument could not be declared operable until an actual CPF discharge was performed. The actual discharge occurred 4 days after the 30 day window.

Unit 2 – Waste Gas noble gas radiation monitor
On August 3, 2010 at 12:29 Radiation Monitor RM-9095 was taken out of service to perform a modification to the detector assembly. During the modification there was a problem discovered with the extender module which delayed the work for over a week. Subsequently, the qualified I&C technician was utilized to perform higher priority work. After completion of the modification, the radiation monitor could not be declared operable until a discharge was performed to verify the relationship between the sampled activity and the indicated activity. This was accomplished and the radiation monitor was restored to operability on September 8, 2010.

3.3 Unit 3 – None

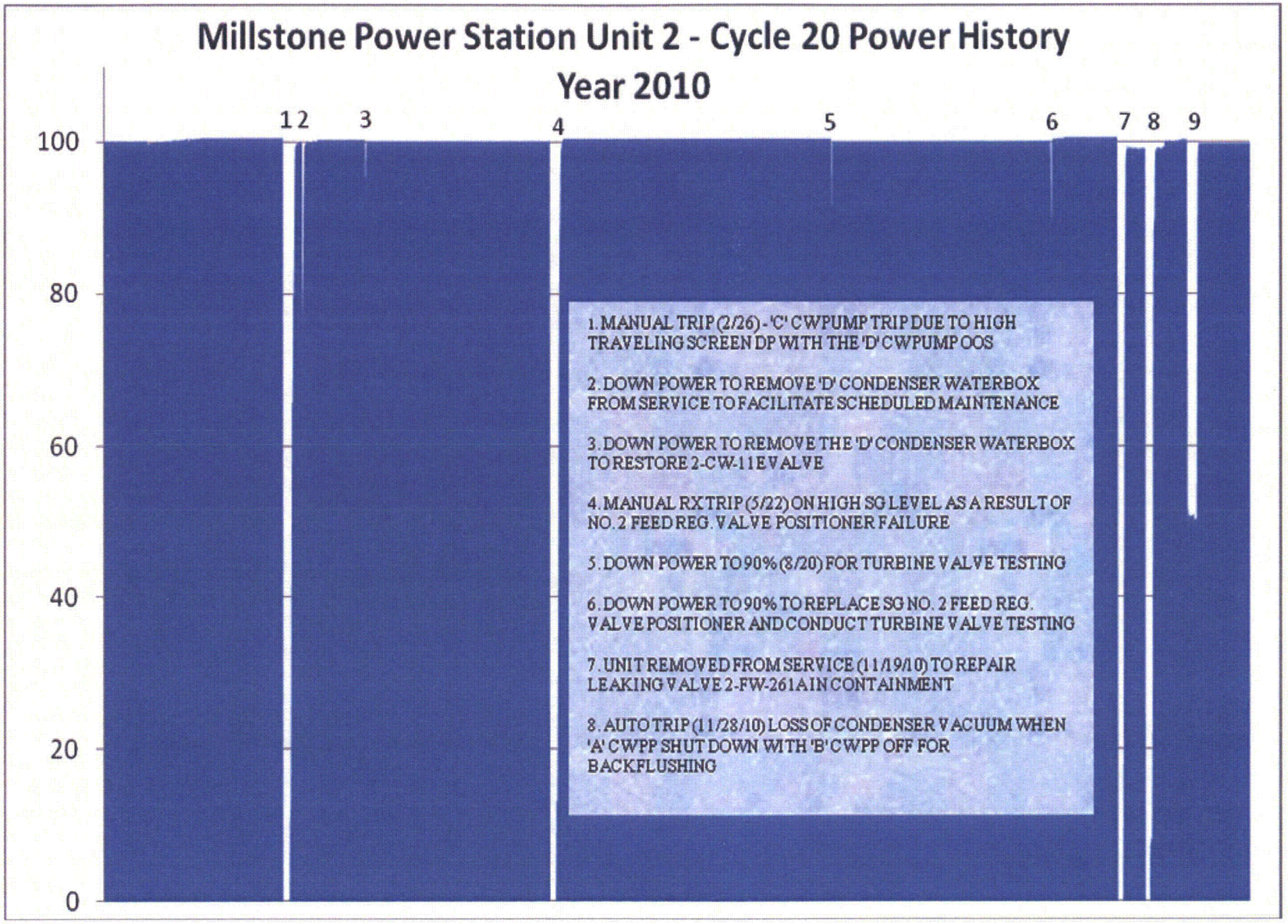
4.0 Operating History

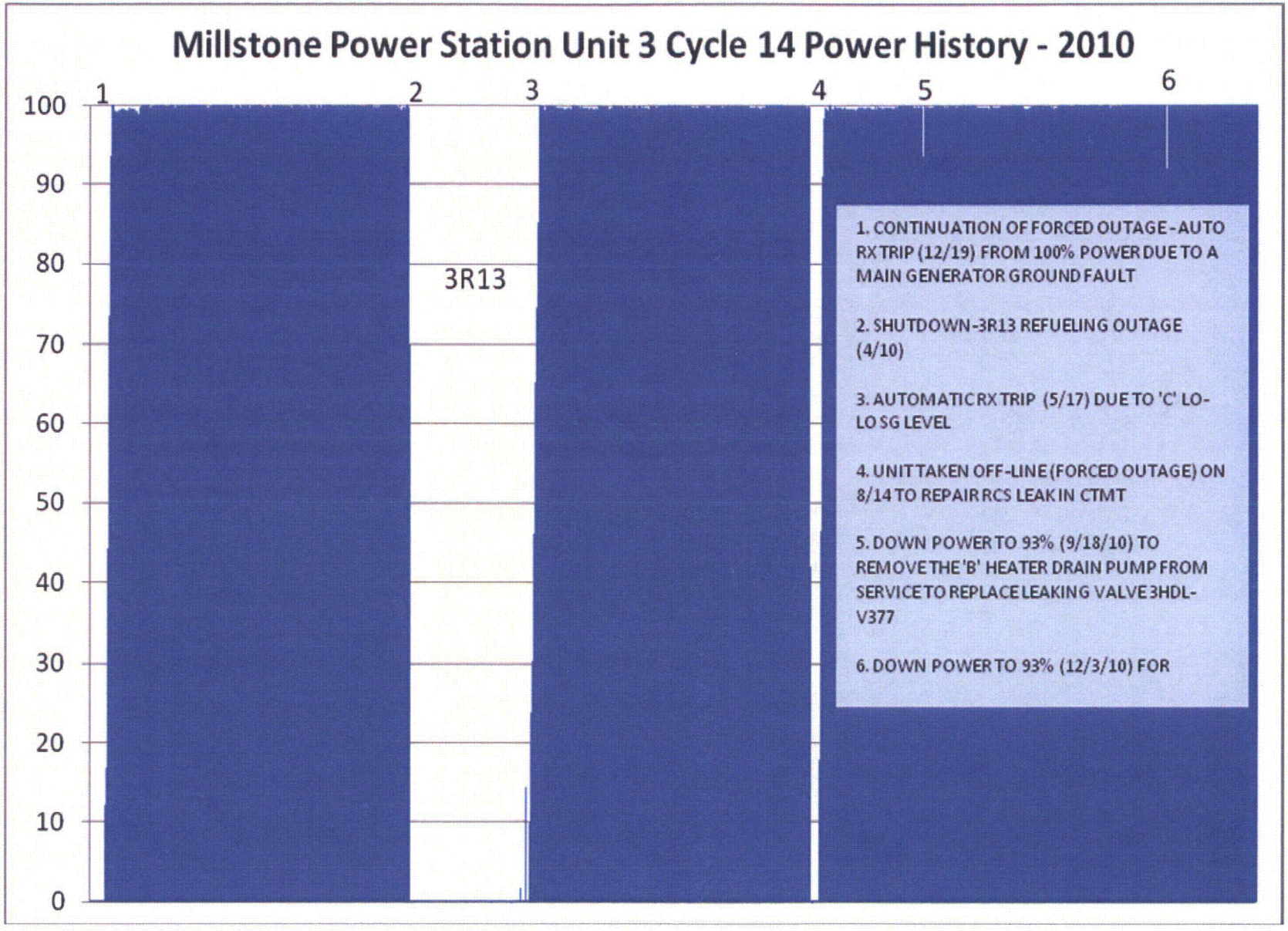
The operating history of the Millstone Power Station Units during this reporting period was as follows:

Unit 1 was shut down November 11, 1995 with a cessation of operation declared in July 1998.

Unit 2 operated with a capacity factor of 96.4% and Unit 3 operated with a capacity factor of 87.5%

The power histograms for 2010 are on the following pages.


Millstone Power Station Unit 2 - Cycle 20 Power History
Year 2010
100
80
60
40
20
0
1 2
3
4
5
6
7
8
9
1. MANUAL TRIP (2/26) - 'C' CWPUMP TRIP DUE TO HIGH TRAVELING SCREEN DP WITH THE 'D' CWPUMP OOS
2. DOWN POWER TO REMOVE 'D' CONDENSER WATERBOX FROM SERVICE TO FACILITATE SCHEDULED MAINTENANCE
3. DOWN POWER TO REMOVE THE 'D' CONDENSER WATERBOX TO RESTORE 2-CW-11E VALVE
4. MANUAL RX TRIP (5/22) ON HIGH SG LEVEL AS A RESULT OF NO. 2 FEED REG. VALVE POSITIONER FAILURE
5. DOWN POWER TO 90% (8/20) FOR TURBINE VALVE TESTING
6. DOWN POWER TO 90% TO REPLACE SG NO. 2 FEED REG. VALVE POSITIONER AND CONDUCT TURBINE VALVE TESTING
7. UNIT REMOVED FROM SERVICE (11/19/10) TO REPAIR LEAKING VALVE 2-FW-261A IN CONTAINMENT
8. AUTO TRIP (11/28/10) LOSS OF CONDENSER VACUUM WHEN 'A' CWPP SHUT DOWN WITH 'B' CWPP OFF FOR BACKFLUSHING


Millstone Power Station Unit 3 Cycle 14 Power History - 2010
100
90
80
70
60
50
40
30
20
10
0
1
2
3
4
5
6
3R13
1. CONTINUATION OF FORCED OUTAGE - AUTO RX TRIP (12/19) FROM 100% POWER DUE TO A MAIN GENERATOR GROUND FAULT
2. SHUTDOWN-3R13 REFUELING OUTAGE (4/10)
3. AUTOMATIC RX TRIP (5/17) DUE TO 'C' LO-LO SG LEVEL
4. UNIT TAKEN OFF-LINE (FORCED OUTAGE) ON 8/14 TO REPAIR RCS LEAK IN CTMT
5. DOWN POWER TO 93% (9/18/10) TO REMOVE THE 'B' HEATER DRAIN PUMP FROM SERVICE TO REPLACE LEAKING VALVE 3HDL-V377
6. DOWN POWER TO 93% (12/3/10) FOR

5.0 Errata

None

6.0 REMODCM Changes

In 2010, there were no revisions made to the Millstone Power Station REMODCM.