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Enclosure 1

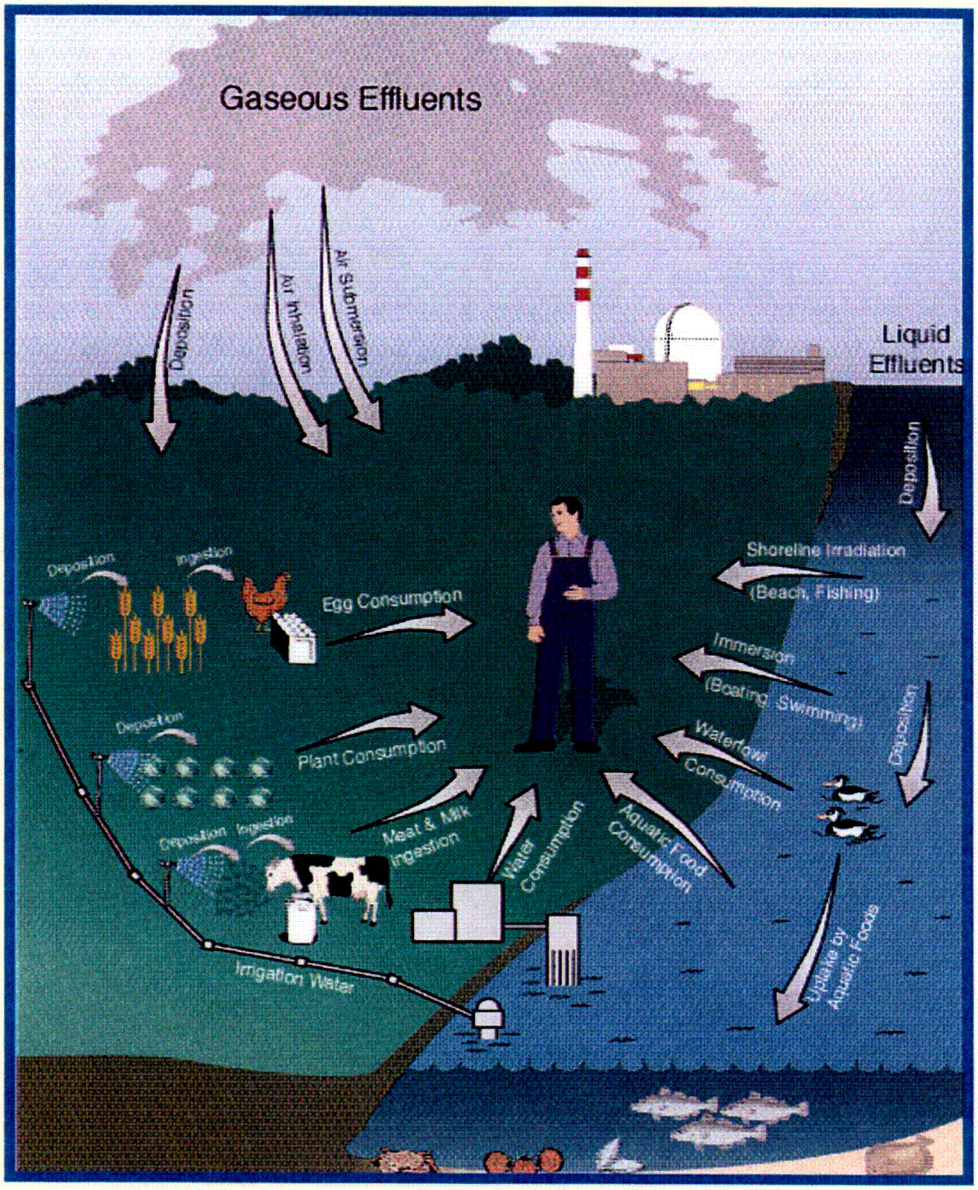
<u>2003 Radioactive Effluent Release Report, Volume I</u>

Millstone Power Station Units 1, 2 and 3
Dominion Nuclear Connecticut, Inc. (DNC)

Millstone Power Station

2003 Radioactive Effluent Release Report

Volume I



Dominion

Dominion Nuclear Connecticut, Inc.

MILLSTONE UNIT	LICENSE	DOCKET
1	DPR-21	50-245
2	DPR-65	50-336
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Introduction

This report, for the period of January through December of 2003, is being submitted by Dominion Nuclear Connecticut, Inc. for Millstone Power Station's 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.

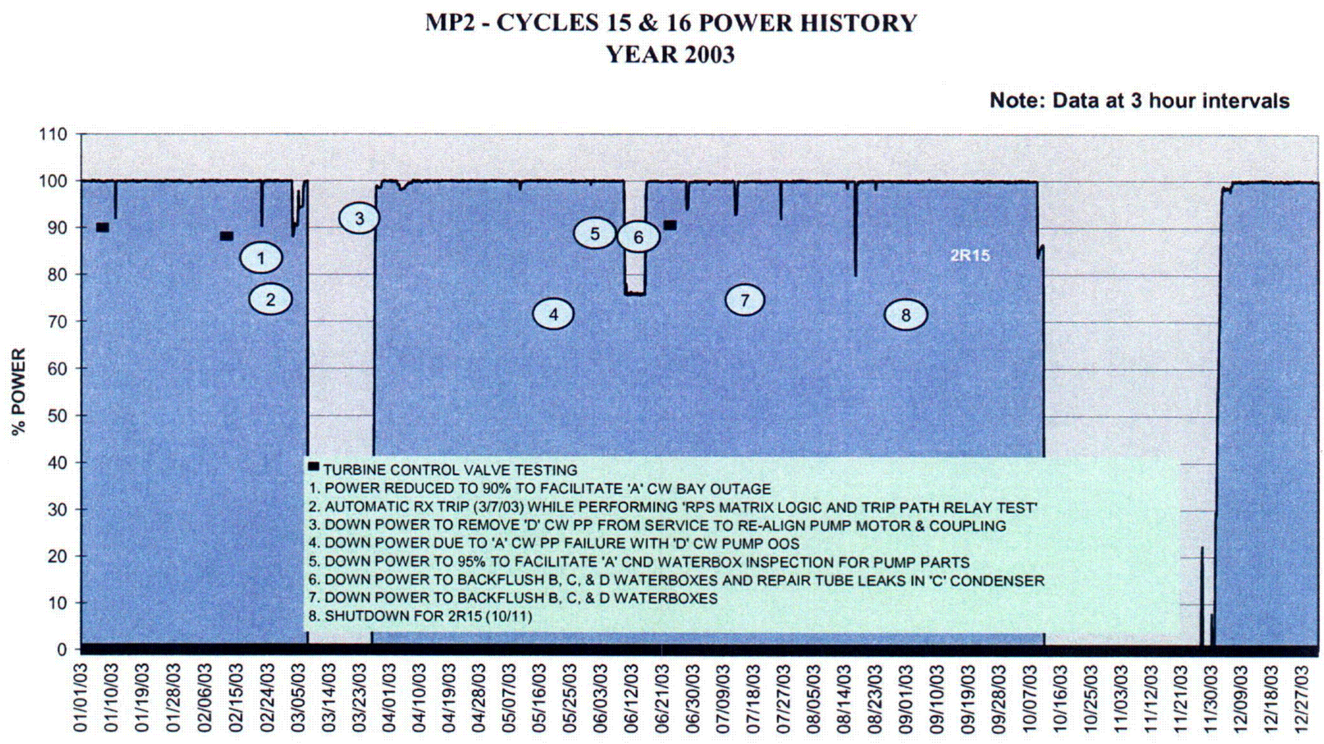
Volume I contains radiological and volumetric information on airborne and liquid effluents and shipments of solid waste & irradiated components, calculated offsite radiological doses, all changes to the REMODCM, *information on effluent monitors inoperable for more than 30 consecutive days, and any corrections to* previous reports. Volume II contains a full copy of each of the complete revisions to the REMODCM effective during the calendar year.

Operating History

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

The annual capacity factor for Unit 1 was 0.0%. Unit 1 was shut down November 11, 1995 with a cessation of operation declared in July 1998.

The annual capacity factor for Unit 2 was **80.00%** based on Design Electrical Rating (DER). Unit 2 was shut down due to a reactor trip on March 7th, and then on October 11th for 2R15 refueling and maintenance.



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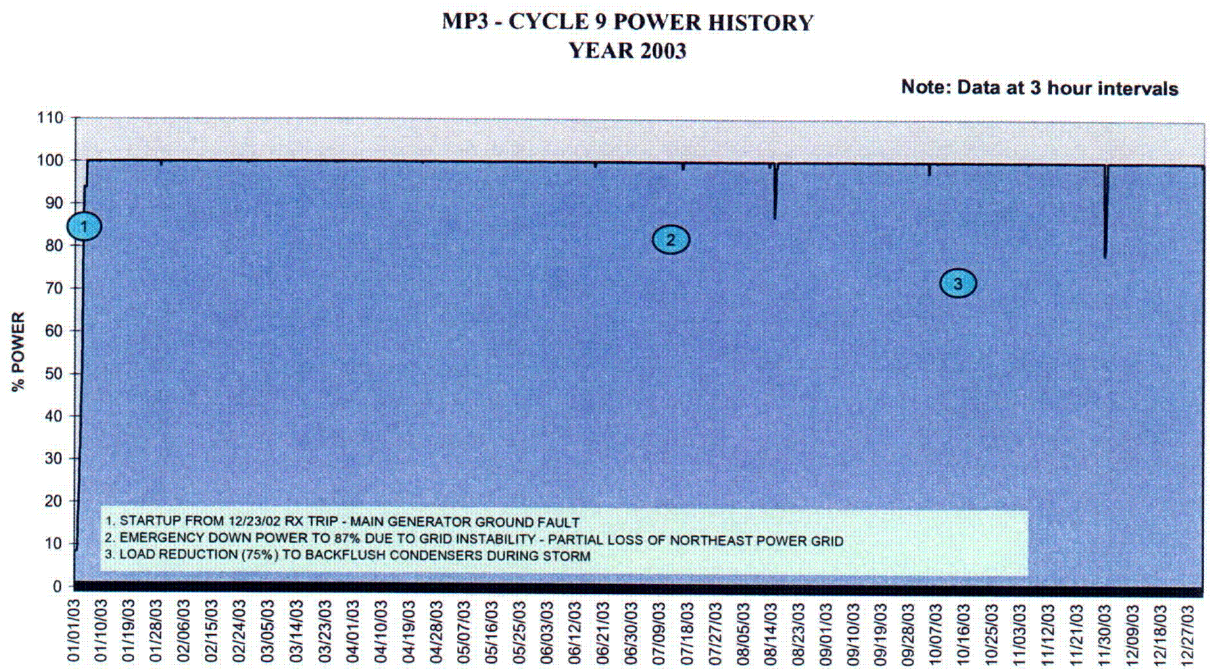
The annual capacity factor for Unit 3 was **98.8**% based on Design Electrical Rating (DER). On December 23, 2002, Unit 3 was temporarily shut down due to a main generator ground fault, and returned to full power in early January 2003. Except for a short-term down power to 87% in August due to Northeast grid instability and a short-term down power to 75% to backflush of the condensers, Unit 3 ran close to 100% power.



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1.0 Doses

This report provides a summary of the 2003 off-site radiation doses for releases of radioactive materials in airborne and liquid effluents from Millstone 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 with the regulatory limits and with the annual average dose a member of the public could receive from natural background and other sources.

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 dose computer models DOSAIR and DOSLIQ, which were developed by Millstone. 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.

1.1.1 Maximum Individual Dose

The 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 due to inhalation and ingestion, taking into account radioactive decay and biological elimination of the radioactive materials.

Maximum Individual dose is defined as the dose to the individual within the 50 mile population 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 these three types of input: radioactive source term, site-specific data, and generic factors. The radioactive source terms (Curies) are characterized in the Radioactivity section of this report. The site specific data includes: meteorological data (e.g. wind speed, direction, 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.

1.1.1.1 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 (χ/Q) and average relative deposition (D/Q) used in the DOSAIR code were generated using EDAN 3, 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 Stack (375 ft) releases are normally considered elevated 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 for elevated releases from the Millstone Stack prior to touchdown. All three units had the ability to discharge effluents to the Millstone Stack, however, in March 2001, Unit 1 was separated from releasing to the stack and modifications were made to add two new release points, the Spent Fuel Pool Island Vent (SFPI) and the Balance of Plant Vent (BOP).

Unit 1 Spent Fuel Pool Island Vent (73 ft) and the Balance of Plant Vent (80 ft) releases are considered ground level and DOSAIR was used to calculate doses using 33 ft meteorology. Continuous ventilation of the spent fuel pool island and evaporation from the spent fuel pool water (H-3) release to 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. Each of these doses were summed to determine the total Unit 1 airborne effluent dose.

Unit 2 Vent (159 ft) releases are considered mixed mode (partially elevated and partially ground) releases; and, Pasquill stability classes are determined based upon the temperature gradient between the 33 ft and 142 ft meteorological tower levels. DOSAIR was used to calculate doses for Unit 2 mixed mode continuous releases (Auxiliary Building Ventilation and the Steam Generator Blowdown Tank flashed gases) and mixed mode batch releases (Containment Purge) through the Unit 2 Vent, and elevated batch releases (Waste Gas Decay Tanks and Containment Vents) through the Millstone Stack. The doses for these elevated batches were conservatively calculated using mixed mode 142 ft meteorology. Each of these doses were summed to determine the total Unit 2 airborne effluent dose. The Containment Equipment Hatch and the RWST Tank Vent releases are considered ground level and DOSAIR was used to calculate doses using 33 ft meteorology.

Unit 3 (142.5 ft) Vent releases are considered mixed mode (partially elevated and partially ground) releases; and, Pasquill stability classes are determined based upon the temperature gradient between the 33 ft and 142 ft meteorological tower levels. DOSAIR was used to calculate doses for Unit 3 mixed mode continuous releases through the Unit 3 Vent (Auxiliary Building Ventilation), mixed mode batch releases (Containment Purge) through the Unit 3 Vent, and "initial" Containment Drawdown through the roof of the Auxiliary Building. Gaseous waste and containment drawdowns are released through the Unit 3 SLCRS system to the Millstone Stack (375 ft). The doses for these elevated releases were conservatively calculated using mixed mode 142 ft meteorology. In addition, the Engineered Safety Features Building (ESF) Vent releases are considered ground level and doses are calculated using 33 ft meteorology Each of these doses were summed to determine the total Unit 3 airborne effluent dose.

1.1.1.2 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).

1.1.2 Gamma and Beta Air Doses

Maximum gamma and beta air doses from the release of noble gases are calculated using DOSAIR.

1.2 Dose Results

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 the plume and from ground deposition, inhalation, and ingestion of vegetation, cow and 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 except for the case when only tritium is released in which the maximum individual dose is calculated at the vegetable garden with the highest χ/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.

For the 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).

The air dose includes only the dose from noble gases in the plume.

The off-site doses from airborne effluents are presented in Table 1-1. These are the calculated maximum off-site doses.

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).

The off-site doses from liquid effluents are presented in Table 1-2. These are the calculated maximum off-site doses.

1.2.3 Analysis of Results

In the first quarter of 2003, Unit 2 shutdown due to a reactor trip and subsequent issues with the charging system. The noble gas and iodine activity concentration in the primary coolant was higher than normal due to the existence of small fuel pin leakage. This resulted in higher than normal releases. In addition, Unit 2 was shutdown in October for 2R15 refueling and maintenance. The leaking fuel pins were identified and moved from the reactor to the fuel storage pool. Although offsite doses were higher than normal during these two periods of time, the doses are well below the permissible levels in the REMODCM and the applicable sections of 10CFR50. The quarterly doses are presented in Tables 1-1 and 1-2.

Table 1-3 provides a quantitative dose comparison with limits specified in the REMODCM. The data indicates that the total whole body and organ doses to the maximum offsite individual from Millstone 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 0.034 mrem/yr. The doses from airborne and liquid effluents were added to the estimated dose from on-site radioactive waste storage to show compliance with 40CFR190.

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

Table 1-1
2003 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	1.51E-04	3.17E-04	7.42E-04	4.24E-04	1.63E-03
Skin	1.66E-04	3.21E-04	7.48E-04	4.63E-04	1.70E-03
Thyroid	1.51E-04	3.03E-04	7.19E-04	4.23E-04	1.60E-03
Max organ+	1.52E-04	4.02E-04	8.73E-04	4.25E-04	1.85E-03
Unit 2	*1st Quarter*	*2nd Quarter*	*3rd Quarter*	*4th Quarter*	*Annual Total*
Max Air	(mrad)	(mrad)	(mrad)	(mrad)	(mrad)
Beta	2.61E-02	5.98E-03	1.31E-02	2.25E-02	6.77E-02
Gamma	8.17E-03	2.10E-03	5.89E-03	6.22E-03	2.24E-02
Max Individual	(mrem)	(mrem)	(mrem)	(mrem)	(mrem)
Whole Body	5.80E-03	1.48E-03	3.84E-03	4.75E-03	1.59E-02
Skin	1.71E-02	4.07E-03	1.03E-02	1.48E-02	4.63E-02
Thyroid	1.95E-02	2.08E-02	3.12E-02	3.68E-02	1.08E-01
Max organ+	6.07E-03	1.54E-03	3.96E-03	5.01E-03	1.66E-02
Unit 3	*1st Quarter*	*2nd Quarter*	*3rd Quarter*	*4th Quarter*	*Annual Total*
Max Air	(mrad)	(mrad)	(mrad)	(mrad)	(mrad)
Beta	2.30E-05	2.98E-05	8.55E-07	6.31E-06	5.99E-05
Gamma	4.97E-05	4.19E-05	1.27E-06	1.52E-05	1.08E-04
Max Individual	(mrem)	(mrem)	(mrem)	(mrem)	(mrem)
Whole Body	1.81E-03	2.12E-03	4.11E-03	7.75E-04	8.82E-03
Skin	1.84E-03	2.13E-03	4.11E-03	7.85E-04	8.87E-03
Thyroid	1.81E-03	2.12E-03	4.11E-03	7.75E-04	8.82E-03
Max organ+	1.82E-03	2.12E-03	4.11E-03	7.75E-04	8.82E-03

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

Table 1-2
2003 Off-Site Dose Commitments from Liquid Effluents
Millstone 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	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Thyroid	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Max Organ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Unit 2	*1st Quarter*	*2nd Quarter*	*3rd Quarter*	*4th Quarter*	*Annual Total*
Max Individual	(mrem)	(mrem)	(mrem)	(mrem)	(mrem)
Whole Body	5.88E-05	3.43E-03	5.63E-04	4.75E-04	4.52E-03
Thyroid	6.71E-05	1.23E-03	2.26E-04	2.02E-04	1.72E-03
Max Organ	1.07E-04	4.47E-03	2.04E-03	6.85E-03	1.35E-02

Unit 3	*1st Quarter*	*2nd Quarter*	*3rd Quarter*	*4th Quarter*	*Annual Total*
Max Individual	(mrem)	(mrem)	(mrem)	(mrem)	(mrem)
Whole Body	7.74E-05	6.99E-05	1.81E-04	5.14E-04	8.42E-04
Thyroid	4.32E-05	3.53E-05	9.22E-05	1.36E-04	3.07E-04
Max Organ	2.65E-04	2.83E-04	6.90E-04	2.49E-03	3.73E-03

Table 1-3
2003 Off-Site Dose Comparison to Limits
Millstone Units 1, 2, 3

Airborne Effluents

Max Individual Dose vs REMODCM Limits

	Whole Body *(mrem)*	Thyroid *(mrem)*	Max Organ** *(mrem)*	Skin *(mrem)*	Beta Air *(mrad)*	Gamma Air *(mrad)*
Unit 1	1.63E-03	1.60E-03	1.85E-03	1.70E-03	0.00E+00	0.00E+00
Unit 2	1.59E-02	1.08E-01	1.66E-02	4.63E-02	6.77E-02	2.24E-02
Unit 3	8.82E-03	8.82E-03	8.82E-03	8.87E-03	5.99E-05	1.08E-04
Millstone Station	2.63E-02	1.19E-01	2.73E-02	5.69E-02	6.78E-02	2.25E-02
REMODCM Limits	5	15*	15	15	20	10

Liquid Effluents

Max Individual Dose vs REMODCM Limits

	Whole Body *(mrem)*	Thyroid *(mrem)*	Max Organ** *(mrem)*
Unit 1	0.00E+00	0.00E+00	0.00E+00
Unit 2	4.52E-03	1.72E-03	1.35E-02
Unit 3	8.42E-04	3.07E-04	3.73E-03
Millstone Station	5.36E-03	2.03E-03	1.72E-02
REMODCM Limits	3	10	10

Millstone Station

Max Individual Dose vs 40CFR190 Limits

	Whole Body *(mrem)*	Thyroid *(mrem)*	Max Organ ** *(mrem)*
Airborne Effluents	2.63E-02	1.19E-01	2.73E-02
Liquid Effluents	5.36E-03	2.03E-03	1.72E-02
Radwaste Storage	3.40E-02	3.40E-02	3.40E-02
Millstone Station	0.066	0.155	0.08
40CFR190 Limit	25	75	25

* 10CFR50, Appendix I Guidelines

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

Table 1-4
2003 Offsite Dose Comparison
Millstone Units 1, 2, 3

Natural Background Radiation Dose vs. Radiation Dose from Millstone 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
Effective Whole Body Dose	~ 284 mrem

Maximum Offsite Individual	**Millstone Station**
Whole Body Dose	0.07 mrem
Thyroid Dose	0.15 mrem
Maximum Organ (other than Thyroid)	0.08 mrem

* NCRP 94

2.0 Radioactivity

2.1 Airborne Effluents

2.1.1 Measurement of Radioactivity

2.1.1.1 Millstone Stack

The MP2 WRGM and MP3 SLCRS continuously monitor the effluent activity concentration and flow rate to the Millstone Stack. Monthly gaseous grab samples are taken and analyzed for isotopic content. The isotopic concentrations at the release point are multiplied by the total flow to the stack to obtain the total activity released for each isotope.

The gas washing bottle method accomplishes tritium collection. The sample is counted on a liquid scintillation detector. Concentration is multiplied by volume to get the total activity released.

Charcoal cartridges and particulate filters are used to collect iodines and particulates, respectively. These filters are then analyzed for isotopic content using a gamma spectrometer. Particulate filters are also analyzed for Sr-89, Sr-90 and gross alpha. Isotopic concentrations are multiplied by the release flow rate and sampling time to determine the total amount of activity released.

2.1.1.2 Unit 1 Spent Fuel Pool Island (SFPI) Vent

The SFPI monitor continuously records the effluent activity concentration and flow rate. Monthly gaseous grab samples are taken and analyzed for isotopic content. The isotopic concentrations at the release point are multiplied by the total flow to the stack to obtain the total activity released for each isotope.

The gas washing bottle method accomplishes tritium collection. The sample is counted on a liquid scintillation detector. Concentration is multiplied by volume to get the total activity released.

Particulate filters are used to collect particulates. These filters are then analyzed for isotopic content using a gamma spectrometer. Particulate filters are also analyzed for Sr-90 and gross alpha. Isotopic concentrations are multiplied by the release flow rate and sampling time to determine the total amount of activity released.

2.1.1.3 Unit 1 Balance of Plant (BOP) Vent

The BOP monitor continuously records the effluent activity concentration and flow rate. Monthly gaseous grab samples are taken and analyzed for isotopic content. The isotopic concentrations at the release point are multiplied by the total flow to the stack to obtain the total activity released for each isotope.

The gas washing bottle method accomplishes tritium collection. Prior to processing each batch from the Reactor building Evaporator a sample is collected and counted on a liquid scintillation detector. Concentration is multiplied by volume to get the total activity released.

Particulate filters are used to collect particulates. These filters are then analyzed for isotopic content using a gamma spectrometer. Particulate filters are also analyzed for Sr-90 and gross alpha. Isotopic concentrations are multiplied by the release flow rate and sampling time to determine the total amount of activity released.

2.1.1.4 Unit 2 Vent

Effluent volume from the Unit 2 vent is multiplied by the isotopic concentrations as measured by gamma spectrometer HPGe analysis for gases and liquid scintillation analysis for tritium to obtain the total activity released from the vent. The gas washing bottle method accomplishes tritium collection.

Since a major source of tritium is evaporation of water from the spent fuel pool, tritium releases were also estimated based upon amount of water lost and measured concentrations of the pool water. This amount was added to the amount measured by the grab sample technique.

Charcoal cartridges and particulate filters are used to collect iodines and particulates, respectively. These filters are then analyzed for isotopic content using a gamma spectrometer. Particulate filters are also analyzed for Sr-89, Sr-90 and gross alpha. Isotopic concentrations are multiplied by the release flow rate and sampling time to determine the total amount of activity released.

2.1.1.5 Unit 2 Containment Purges / Vents

A purge is the process of discharging air from containment to maintain temperature, humidity, pressure, concentration, etc., where air is replaced. Purges are considered batch releases and are filtered by HEPA and normally released through the Unit 2 vent. If necessary, the purge may be filtered by charcoal in the EBFS system and discharged to the Millstone Stack.

Gaseous grab samples (Noble Gas & Tritium) are taken and are analyzed on a HPGe gamma spectrometer and liquid scintillation detector for tritium. Computed concentrations are then multiplied by the calculated purge volume to obtain the total activity released. The gas washing bottle method accomplishes tritium collection.

A vent is the process of discharging air from containment usually once per week to maintain temperature, humidity, pressure, concentration without supplying replacement air. Weekly gaseous grab samples (Noble Gas & Tritium) are taken and are analyzed on a HPGe gamma spectrometer and liquid scintillation detector for tritium. Computed concentrations are then multiplied by the calculated containment vent volume to obtain the total activity released. The gas washing bottle method accomplishes tritium collection.

2.1.1.6 Unit 2 Waste Gas Decay Tanks

Waste Gases from the Gaseous Waste Processing System are held for decay in waste gas decay tanks (6) prior to discharge through the Unit 1 Stack. Calculated volume discharged is multiplied by the isotopic concentrations from the analysis of grab samples to determine the total activity released.

2.1.1.7 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.

2.1.1.8 Unit 2 Radwaste Storage Tank (RWST) Vent

A decontamination factor (DF) of 100 was applied to the total iodine transferred from the RCS to the RWST water to estimate the iodine release out the vent. All noble gases are assumed to be released through the tank vent.

2.1.1.9 Unit 2 Containment Equipment Hatch Opening

Samples of air near the opening are analyzed for particulates, iodines, during refueling outages. One containment volume is assumed to be released during the period that the equipment hatch is open to estimate the release.

2.1.1.10 Unit 3 Vent and ESF Building Vent

Effluent volume from the Unit 3 ventilation vent is multiplied by the isotopic concentrations as measured by gamma spectrometer HPGe analysis for gases and liquid scintillation analysis for tritium to obtain the total activity released from the vent. The gas washing bottle method accomplishes tritium collection.

Since a major source of tritium is evaporation of water from the spent fuel pool, tritium releases were also estimated based upon amount of water lost and measured concentrations of the pool water. This amount was added to the amount measured by the grab sample technique.

The Unit 3 Engineered Safety Features (ESF) building vent collects gas streams from the ESF building ventilation system.

Total effluent volume is multiplied by isotopic concentrations from the analysis of grab samples and composites to obtain the total activity released. These samples are obtained monthly for fission gases, weekly composites of filters for iodines and particulates, monthly composites of particulate filters for gross alpha and strontium.

2.1.1.11 Unit 3 Containment Drawdown and Purge

Unit 3 containment is initially drawn down prior to startup and purged typically during outages. The initial drawdown is accomplished by using the containment vacuum steam jet ejector and releases through an unmonitored vent on the roof of the auxiliary building. The containment vacuum pump discharge, which maintains subatmospheric pressure following initial drawdown, is released through the Millstone Stack.

The purge is the process of discharging air from containment to maintain temperature, humidity, pressure, concentration, etc., where air is replaced. Purges are normally released through the Unit 3 Vent. Intermittent purges and drawdowns are considered continuous releases since they occur usually 1 or 2 times a week. For initial drawdowns and purges, the calculated volume discharged is multiplied by isotopic concentrations from the analysis of grab samples to obtain total activity released. These are considered as batch releases.

A ground level release of radioactivity may occur during outages from the containment building through the open equipment hatch. The calculated volume discharged is multiplied by isotopic concentrations from the analysis of grab samples to obtain total activity released.

2.1.1.12 Unit 3 Containment Equipment Hatch Opening

Samples of air near the opening are analyzed for particulates, iodines, during refueling outages. One containment volume is assumed to be released during the period that the equipment hatch is open to estimate the release.

2.1.2 Estimate of Errors

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

Sampling/Data Collection	10%	Variation in data collection
Sample Line Loss	10%	Deposition of some nuclides
Calibration	10%	Calibration to NBS standards
Sample Counting	10%	Error for counting statistics
Flow & Level Measurements	10%	Error for release volumes

2.1.3 Batch Releases - Airborne Effluents

Unit 1 – None

Unit 2	Ctmt Purges	WGDT	Ctmt Vents
Number of Batches	5	15	37
Total Time (min)	2,040	5,688	5,436
Maximum Time (min)	660	590	248
Average Time (min)	408	379	147
Minimum Time (min)	240	15	52

Unit 3	Ctmt Purges	Drawdowns
Number of Batches	0	0
Total Time (min)	0	0
Maximum Time (min)	0	0
Average Time (min)	0	0
Minimum Time (min)	0	0

2.1.4 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.

In 2003, the following abnormal airborne releases occurred:

2.1.4.1 **Unit 1** - None

2.1.4.2 **Unit 2** –

On March 7, 2003 at 1439, with the plant at full power and SP 2401D "RPS Matrix Testing" in progress, a reactor trip occurred due to a malfunction of the "A-C" Matrix Relay Test switch. This was followed by an automatic turbine trip. All control rods inserted into the core and all electrical busses transferred properly following the trip. Auxiliary Feed initiated automatically on low steam generator level, which is an anticipated response. Following the plant trip, normal secondary heat removal systems (condenser steam dumps, atmospheric steam dumps) did not respond as designed resulting in 6 of 16 Steam Generator (SG) Safety Relief Valves lifting. The two backup charging pumps started in response to the plant cooldown, however charging flow did not increase as expected and eventually, all charging flow was lost.

While attempting to restore charging, the operating crew identified discrepancies in charging inventory and declared an Unusual Event (UE) due to RCS leakage. Initially, the crew could not account for all of the discharge flow from the operating charging pumps. They were uncertain if there was a break somewhere inside Containment in addition to the leakage in the charging pump cubicle area and decided to conservatively declare the UE. This decision was made within the first thirty minutes of the event. Plant conditions continued to be monitored, and it became clear to the operating crew that there were no breaks other than those already identified in the charging pump cubicle area. The Containment Sump level had increased and was pumped down soon after the trip. This was normal, as there is a great deal of condensation inside Containment following a plant trip. Eventually, charging capability was established via the alternate charging path and with suction aligned to the RWST. Once charging flow was restored, plant cooldown proceeded slowly resulting in a second Unusual Event declaration for failure to reach Mode 5 within the time required by Technical Specifications. In addition, during plant cooldown, the frequency of having to pump the Containment Sump increased, indicating a possible leak inside Containment.
Once the unit was cooled down to Mode 4, a containment entry was made and the source of RCS leakage was determined to be from the 'C' RCP vapor seal leakoff. The plant was then maintained on the Shutdown Cooling system in mode 5.

Releases to the Unit 2 Vent from the auxiliary building were largest at the start of the incident with the charging pump releases. Several minor releases occurred via this pathway within the next 24 hours. The Chemistry department estimated the Tritium release via the steam safeties to be 6.50E-04 Ci.

Early in the event the operating crew declared an Unusual Event (UE) due to RCS leakage. Leakage into containment was determined to be from the "C" RCP seal leakoff. The containment was purged to the Millstone Stack via the Enclosure Building Filtration System (EBFS). The iodines from the Millstone Stack monitor were included in the Containment Purge activity table below.

This sequence of events resulted in an unplanned airborne radioactive release and is therefore considered an "**abnormal release**" in accordance with Reg Guide 1.21. The Millstone Unit 2 Auxilliary Building Ventilation Vent releases during the period as well as the subsequent Containment Purge were considered to be due to this event. The amount of iodines released was higher than normal due to fuel defects.

The corrective action process identified and implemented changes in equipment and procedures to prevent recurrence.

MP2 Abnormal Releases	Units	Aux Bldg Vent	Containment Purge
A. Fission & Activation Gases			
Ar-41	Ci	-	-
Kr-85	Ci	-	4.37E+00
Kr-85m	Ci	9.06E-03	
Xe-131m	Ci	-	3.34E-01
Xe-133	Ci	7.51E+00	2.86E+01
Xe-133m	Ci	1.78E-01	4.04E-01
Xe-135	Ci	1.16E-01	3.61E-01
Total Activity	Ci	7.81E+00	3.41E+01
B. Iodines			
I-131	Ci	1.93E-03	2.75E-05
I-133	Ci	2.36E-04	5.16E-06
Total Activity	Ci	2.17E-03	3.27E-05
C. Particulates			
Total Activity	Ci	-	
D. Gross Alpha			
Gross Alpha	Ci	-	
E. Tritium			
H-3	Ci	6.50E-04	5.64E-01

Aux Bldg Vent

SUMMARY OF DOSES TO MAXIMUM INDIVIDUAL

Case Analyzed: M2SB103 Quarter 1

Maximum Air (mrad)	Beta:	3.27E-03
	Gamma:	1.14E-03
Maximum Individual (mrem)		
Whole Body:		7.81E-04
Skin:		2.06E-03
Thyroid:		1.33E-02
Maximum Organ:		8.26E-04

Ctmnt Purge

SUMMARY OF DOSES TO MAXIMUM INDIVIDUAL

Case Analyzed: M2MP103 Quarter 1

Maximum Air (mrad)	Beta:	1.58E-02
	Gamma:	4.31E-03
Maximum Individual (mrem)		
Whole Body:		2.69E-03
Skin:		9.69E-03
Thyroid:		2.85E-03
Maximum Organ:		2.85E-03

2.1.4.3 Unit 3 - None

2.2 Liquid Effluents

2.2.1 Measurement of Radioactivity

2.2.1.1 Liquid Tanks/Sumps

There are numerous tanks & sumps that are used to discharge liquids containing radioactivity to the environs; they are:

Unit 1	None (All liquid processed by the Reactor Building Evaporator)
Unit 2	Clean Waste Monitor Tanks (2) Aerated Waste Monitor Tank 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 for individual radionuclide composition. 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 Sr-89, Sr-90, Fe-55 and gross alpha.

2.2.1.2 Unit 2 and Unit 3 Steam Generator Blowdown

Steam generator blowdown water grab samples are taken and analyzed on the HPGe gamma spectrometer and liquid scintillation detector if required by the conditional action requirements of the REMODCM. Total volume of blowdown is multiplied by the isotopic concentrations (if any) to determine the total activity released via blowdown. 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. Tritium is determined through liquid scintillation counting. Unit 2 is a continuous release while Unit 3 recycles blowdown except for periodic open cycle blowdown.

2.2.1.3 Unit 2 and Unit 3 Continuous Liquid Releases

Grab samples are taken for continuous liquid release pathways and analyzed on the HPGe gamma spectrometer and liquid scintillation detector. 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. Tritium is determined through liquid scintillation counting. Pathways for continuous liquid effluent releases include, Steam Generator

Blowdown, Service Water Effluent, and Turbine Building Sump discharge from Units 2 & 3.

2.2.2 Estimate of Errors

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

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

2.2.3 Batch Releases - Liquid Effluents

	Unit 1	Unit 2	Unit 3
Number of Batches	0	67	281
Total Time (min)	0	7,306	30,448
Maximum Time (min)	0	466	211
Average Time (min)	0	109	108
Minimum Time (min)	0	12	3
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 2003, the following abnormal liquid releases occurred:

2.2.4.1 Unit 1 - None

2.2.4.2 Unit 2

On April 22, 20 totes were staged in the Unit 2 Turbine Building access area in preparation for temporarily storing TB sump water while the sump was isolated for the replacement of the charcoal in the treatment beds. Mistakenly, "low dose" totes were requested from Waste Services, instead of "H-3 only contaminated" totes. When Waste Services issues "low dose" totes, they expect the water stored in these totes to be returned for treatment.

On April 23`during the day, seven totes filled; and, from 20:00 April 23 to 05:00 April 24, they were drained, untreated by Waste Services, into the TB floor trough near the tote staging area through the TB sump charcoal treatment beds into Yard Drain DSN006 and then into the Niantic Bay.

From 07:00 April 24 to 06:00 April 25 during the weekly sampling of Yard Drain DSN006, radioactive contamination other than tritium was discovered.

For further details refer to:

(1) RER-03-001 Gamma Contamination in Storm Drain System and Cs-137 Contamination in Unit 2 Turbine Building East Sump, Rev 0, April 28, 2003;
(2) RP-03-02 MP2 Turbine Building Sump Contamination, Rev 0, Approved May 30, 2003.

The following source term and dose consequences were determined:

Source Term	
Co-60	5.40E-05 *Ci*
Cs-137	2.42E-04 *Ci*

Maximum Individual Doses	
Whole Body	3.16E-03 *mrem*
Thyroid	1.10E-03 *mrem*
Maximum Organ	4.14E-03 *mrem*

2.2.4.3 Unit 3 - None

Table 2.1-A1
Millstone Unit 1 Airborne Effluents
Release Summary

	Units	2003 1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	Total
A. Fission & Activation Gases						
1. Total Activity Released	Ci	N/D	N/D	N/D	N/D	N/D
		No Activity Detected				
2. Average Period Release Rate	uCi/sec	-	-	-	-	-
B. Iodine-131						
1. Total Activity Released	Ci	N/D	N/D	N/D	N/D	N/D
		No Activity Detected				
2. Average Period Release Rate	uCi/sec	-	-	-	-	-
C. Particulates						
1. Total Activity Released	Ci	2.81E-06	2.53E-06	2.26E-06	6.98E-06	1.46E-05
2. Average Period Release Rate	uCi/sec	3.61E-07	3.22E-07	2.85E-07	8.79E-07	4.63E-07
D. Gross Alpha						
1. Total Activity Released	Ci	N/D	N/D	N/D	N/D	N/D
		No Activity Detected				
E. Tritium						
1. Total Activity Released	Ci	2.19E-01	1.90E-01	3.71E-01	8.44E-01	1.62E+00
2. Average Period Release Rate	uCi/sec	2.82E-02	2.41E-02	4.67E-02	1.06E-01	5.15E-02

N/D = Not Detected

Table 2.1-A2

Millstone Unit 1 Airborne Effluents

Elevated Continuous

< After 1Q-2001, Unit 1 ventilation releases were seperated from elevated Millstone Stack >

Nuclides Released	Units	2003				
		1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	Total
A. Fission & Activation Gases						
	Ci	-	-	-	-	-
Total Activity	Ci	-	-	-	-	N/D
B. Iodines						
I-131	Ci	-	-	-	-	-
Total Activity	Ci	-	-	-	-	N/D
C. Particulates						
I-131	Ci	-	-	-	-	-
Total Activity	Ci	-	-	-	-	N/D
D. Gross Alpha						
Gross Alpha	Ci	-	-	-	-	N/D
E. Tritium						
H-3	Ci	-	-	-	-	N/D

N/D = Not Detected

Table 2.1-A3

Millstone Unit 1 Airborne Effluents

Ground Continuous - Balance of Plant Vent & Spent Fuel Pool Island Vent

Nuclides Released	Units	2003				
		1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	Total
A. Fission & Activation Gases						
	Ci	-	-	-	-	-
Total Activity	Ci	-	-	-	-	N/D
B. Iodines						
I-131	Ci	-	-	-	-	-
Total Activity	Ci	-	-	-	-	N/D
C. Particulates						
I-131	Ci	-	-	-	-	-
Co-58	Ci	-	2.41E-07	-	-	2.41E-07
Cs-137	Ci	2.81E-06	2.29E-06	2.26E-06	6.98E-06	1.43E-05
Total Activity	Ci	2.81E-06	2.53E-06	2.26E-06	6.98E-06	1.46E-05
D. Gross Alpha						
Gross Alpha	Ci	-	-	-	-	N/D
E. Tritium						
H-3	Ci	2.19E-01	1.90E-01	3.71E-01	8.44E-01	1.62E+00

N/D = Not Detected

Table 2.1-L1

Millstone Unit 1 Liquid Effluents

Release Summary

(Quarry Release Point)

<< No Liquid Discharges>>

	Units	2003 1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	Total
A. Fission and Activation Products						
1. Total Activity Released	Ci	N/D	N/D	N/D	N/D	N/D
		No Activity Detected				
2. Average Period Diluted Activity	uCi/ml	-	-	-	-	-
B. Tritium						
1. Total Activity Released	Ci	N/D	N/D	N/D	N/D	N/D
		No Activity Detected				
2. Average Period Diluted Activity	uCi/ml	-	-	-	-	-
C. Dissolved and Entrained Gases						
1. Total Activity Released	Ci	N/D	N/D	N/D	N/D	N/D
		No Activity Detected				
2. Average Period Diluted Activity	uCi/ml	-	-	-	-	-
D. Gross Alpha						
1. Total Activity Released	Ci	N/D	N/D	N/D	N/D	N/D
		No Activity Detected				
E. Volume						
1. Released Waste Volume	Liters	-	-	-	-	-
2. Dilution Volume During Releases	Liters	-	-	-	-	-
3. Dilution Volume During Period	Liters	-	-	-	-	-

N/D = Not Detected

Table 2.1-L2

Millstone Unit 1 Liquid Effluents

Batch

(Quarry Release Point)

<< No Liquid Discharges>>

Nuclides Released	Units	2003 1st Qtr	2003 2nd Qtr	2003 3rd Qtr	2003 4th Qtr	2003 Total
A. Fission & Activation Products						
	Ci	-	-	-	-	-
Total Activity	Ci	-	-	-	-	N/D
B. Tritium						
H-3	Ci	-	-	-	-	N/D
C. Dissolved & Entrained Gases						
	Ci	-	-	-	-	-
Total Activity	Ci	-	-	-	-	N/D
D. Gross Alpha						
Gross Alpha	Ci	-	-	-	-	N/D

N/D = Not Detected

Table 2.2-A1

Millstone Unit No. 2
Airborne Effluents - Release Summary

	Units	2003 1st Qtr	2003 2nd Qtr	2003 3rd Qtr	2003 4th Qtr	2003 Total
A. Fission & Activation Gases						
1. Total Activity Released	Ci	7.64E+01	1.75E+01	3.15E+01	1.85E+02	3.11E+02
2. Average Period Release Rate	uCi/sec	9.82E+00	2.22E+00	3.96E+00	2.33E+01	9.85E+00
B. Iodine-131						
1. Total Activity Released	Ci	2.24E-03	5.89E-04	4.09E-04	9.10E-03	1.23E-02
2. Average Period Release Rate	uCi/sec	2.89E-04	7.49E-05	5.14E-05	1.14E-03	3.91E-04
C. Particulates						
1. Total Activity Released	Ci	5.32E-07	4.46E-07	2.37E-07	1.30E-04	1.31E-04
2. Average Period Release Rate	uCi/sec	6.85E-08	5.67E-08	2.98E-08	1.63E-05	4.15E-06
D. Gross Alpha						
1. Total Activity Released	Ci	N/D	N/D	N/D	N/D	N/D
		No Activity Detected				
E. Tritium						
1. Total Activity Released	Ci	5.64E+00	7.79E-01	5.46E-01	3.23E+00	1.02E+01
2. Average Period Release Rate	uCi/sec	7.25E-01	9.90E-02	6.87E-02	4.06E-01	3.23E-01

N/D = Not Detected

Table 2.2-A2

Millstone Unit No. 2

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

Nuclides Released	Units	2003				
		1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	Total
A. Fission & Activation Gases						
Ar-41	Ci	-	-	6.17E-01	-	6.17E-01
Kr-85	Ci	-	-	1.97E+00	-	1.97E+00
Kr-85m	Ci	9.06E-03	-	1.34E-01	1.80E-02	1.61E-01
Xe-131m	Ci	-	-	-	-	-
Xe-133	Ci	3.56E+01	1.51E+01	2.55E+01	4.85E+01	1.25E+02
Xe-133m	Ci	1.78E-01	-	-	5.01E-01	6.79E-01
Xe-135	Ci	1.86E+00	6.39E-01	1.08E+00	1.19E+00	4.77E+00
Total Activity	Ci	3.77E+01	1.58E+01	2.93E+01	5.02E+01	1.33E+02
B. Iodines						
I-131	Ci	2.22E-03	5.88E-04	4.08E-04	4.22E-03	7.43E-03
I-132	Ci	9.60E-05	2.96E-05	1.70E-04	7.25E-05	3.68E-04
I-133	Ci	4.93E-04	8.19E-04	7.72E-04	9.82E-04	3.07E-03
I-135	Ci	2.10E-04	4.64E-04	4.98E-04	2.46E-04	1.42E-03
Total Activity	Ci	3.01E-03	1.90E-03	1.85E-03	5.52E-03	1.23E-02
C. Particulates						
I-131	Ci	-	-	-	-	-
Co-58	Ci	-	-	-	2.14E-06	2.14E-06
Co-60	Ci	-	-	-	-	-
Mn-54	Ci	-	-	-	-	-
Ba-140	Ci	-	-	-	-	-
Cs-137	Ci	5.32E-07	4.46E-07	2.08E-07	8.10E-07	2.00E-06
Total Activity	Ci	5.32E-07	4.46E-07	2.08E-07	2.95E-06	4.13E-06
D. Gross Alpha						
Gross Alpha	Ci	-	-	-	-	N/D
E. Tritium						
H-3	Ci	4.79E+00	3.53E-01	4.11E-01	1.92E+00	7.48E+00

N/D = Not Detected

Table 2.2-A3

Millstone Unit No. 2

Airborne Effluents - Mixed Batch - Containment Purges

Nuclides Released	Units	2003 1st Qtr	2003 2nd Qtr	2003 3rd Qtr	2003 4th Qtr	2003 Total
A. Fission & Activation Gases						
Ar-41	Ci	-	-	-	2.29E-03	2.29E-03
Kr-85	Ci	4.37E+00	-	-	3.92E+00	8.29E+00
Kr-85m	Ci	-	-	-	7.37E-03	7.37E-03
Xe-131m	Ci	3.34E-01	-	-	3.60E-01	6.94E-01
Xe-133	Ci	2.86E+01	-	-	2.75E+01	5.61E+01
Xe-133m	Ci	4.04E-01	-	-	5.02E-01	9.05E-01
Xe-135	Ci	3.61E-01	-	-	1.16E+00	1.52E+00
Xe-135m	Ci	-	-	-	2.73E-03	2.73E-03
Total Activity	Ci	3.41E+01	-	-	3.34E+01	6.75E+01
B. Iodines		*				
I-131	Ci	2.75E-05	-	-	-	2.75E-05
I-132	Ci	5.16E-06	-	-	-	5.16E-06
I-133	Ci	-	-	-	-	-
Total Activity	Ci	3.27E-05	-	-	-	3.27E-05
C. Particulates						
I-131	Ci	-	-	-	-	-
Br-82	Ci	-	-	-	-	-
Cs-137	Ci	-	-	-	-	-
Total Activity	Ci	-	-	-	-	N/D
D. Gross Alpha						
Gross Alpha	Ci	-	-	-	-	N/D
E. Tritium						
H-3	Ci	5.64E-01	-	-	5.60E-02	6.20E-01

* Iodines attributed to containment purge via Millstone Stack

N/D = Not Detected

Table 2.2-A4
Millstone Unit No. 2
Airborne Effluents - Elevated Batch - WGDT

Nuclides Released	Units	2003				
		1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	Total
A. Fission & Activation Gases						
Ar-41	Ci	-	-	-	-	-
Kr-85	Ci	2.78E-03	1.23E+00	1.52E+00	6.12E+00	8.88E+00
Kr-85m	Ci	-	-	-	-	-
Kr-87	Ci	-	-	-	-	-
Kr-88	Ci	-	-	-	-	-
Xe-131m	Ci	-	-	-	4.36E-02	4.36E-02
Xe-133	Ci	-	-	-	1.11E-01	1.11E-01
Xe-133m	Ci	-	-	-	-	-
Xe-135	Ci	-	-	-	5.87E-05	5.87E-05
Xe-135m	Ci	-	-	-	-	-
Total Activity	Ci	2.78E-03	1.23E+00	1.52E+00	6.28E+00	5.87E-05
B. Iodines						
I-131	Ci	-	-	-	-	-
	Ci	-	-	-	-	-
Total Activity	Ci	-	-	-	-	N/D
C. Particulates						
I-131	Ci	-	-	-	-	-
	Ci	-	-	-	-	-
Total Activity	Ci	-	-	-	-	N/D
D. Gross Alpha						
Gross Alpha	Ci	-	-	-	-	N/D
E. Tritium						
H-3	Ci	6.92E-07	2.34E-04	2.79E-04	1.14E-03	1.66E-03

N/D = Not Detected

Table 2.2-A5

Millstone Unit No. 2

Airborne Effluents - Elevated - Containment Vents/Site Stack

Nuclides Released	Units	2003 1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	Total
A. Fission & Activation Gases						
Ar-41	Ci	1.82E-02	2.05E-02	2.37E-02	1.06E-02	7.30E-02
Kr-85	Ci	5.36E-01	1.33E-01	3.51E-01	4.07E-02	1.06E+00
Kr-85m	Ci	2.83E-05	1.39E-02	1.91E-04	5.89E-05	1.41E-02
Xe-131m	Ci	5.94E-03	5.20E-04	5.63E-03	-	1.21E-02
Xe-133	Ci	3.76E+00	2.89E-01	2.83E-01	8.68E+01	9.11E+01
Xe-133m	Ci	-	1.77E-03	2.75E-03	1.10E+00	1.10E+00
Xe-135	Ci	2.95E-01	3.37E-03	4.34E-03	1.64E-01	4.68E-01
Total Activity	Ci	4.62E+00	4.62E-01	6.70E-01	8.81E+01	9.39E+01
B. Iodines *		**				
I-131	Ci	-	8.43E-07	4.19E-07	2.25E-05	2.38E-05
I-133	Ci	-	-	-	7.32E-06	7.32E-06
I-135	Ci	-	-	-	1.48E-06	1.48E-06
Total Activity	Ci	-	8.43E-07	4.19E-07	3.13E-05	3.25E-05
C. Particulates						
I-131	Ci	-	-	-	-	-
Co-58	Ci	-	-	-	1.10E-04	1.10E-04
Co-60	Ci	-	-	-	5.25E-07	5.25E-07
Cs-134	Ci	-	-	-	8.79E-06	8.79E-06
Cs-136	Ci	-	-	-	1.64E-06	1.64E-06
Cs-137	Ci	-	-	2.88E-08	5.61E-06	5.64E-06
Sb-124	Ci	-	-	-	3.12E-07	3.12E-07
Total Activity	Ci	-	-	2.88E-08	1.27E-04	1.27E-04
D. Gross Alpha						
Gross Alpha	Ci	-	-	-	-	N/D
E. Tritium						
H-3	Ci	2.85E-01	4.25E-01	1.35E-01	2.49E-01	1.09E+00

* Prior to charcoal filtration

** 1st Qtr iodines shown in containment purge via stack in Table 2.2-A3

N/D = Not Detected

Table 2.2-A6

Millstone Unit No. 2

Airborne Effluents - Ground Batch - Containment Equipment Hatch

Nuclides Released	Units	2003 1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	Total
A. Fission & Activation Gases						
Ar-41	Ci	-	-	-	-	-
Kr-85	Ci	-	-	-	-	-
Kr-85m	Ci	-	-	-	-	-
Kr-87	Ci	-	-	-	-	-
Kr-88	Ci	-	-	-	-	-
Xe-131m	Ci	-	-	-	-	-
Xe-133	Ci	-	-	-	3.07E-01	3.07E-01
Xe-133m	Ci	-	-	-	-	-
Xe-135	Ci	-	-	-	7.53E-03	7.53E-03
Xe-135m	Ci	-	-	-	-	-
Total Activity	Ci	-	-	-	3.15E-01	7.53E-03
B. Iodines						
I-131	Ci	-	-	-	6.94E-07	6.94E-07
I-133	Ci	-	-	-	9.22E-07	9.22E-07
Total Activity	Ci	-	-	-	1.62E-06	1.62E-06
C. Particulates						
I-131	Ci	-	-	-	-	-
Co-58	Ci	-	-	-	9.99E-09	1.52E-08
Cs-137	Ci	-	-	-	9.97E-09	9.97E-09
Total Activity	Ci	-	-	-	2.00E-08	2.52E-08
D. Gross Alpha						
Gross Alpha	Ci	-	-	-	-	N/D
E. Tritium						
H-3	Ci	-	-	-	-	N/D

N/D = Not Detected

Table 2.2-A7

Millstone Unit No. 2

Airborne Effluents - Ground Batch - RWST Vent

Nuclides Released	Units	2003 1st Qtr	2003 2nd Qtr	2003 3rd Qtr	2003 4th Qtr	2003 Total
A. Fission & Activation Gases						
Ar-41	Ci	-	-	-	-	-
Kr-85	Ci	-	-	-	-	-
Kr-85m	Ci	-	-	-	-	-
Xe-131m	Ci	-	-	-	1.33E-01	1.33E-01
Xe-133	Ci	-	-	-	6.41E+00	6.41E+00
Xe-133m	Ci	-	-	-	1.39E-01	1.39E-01
Xe-135	Ci	-	-	-	1.70E-01	1.70E-01
Total Activity	Ci	-	-	-	6.85E+00	6.85E+00
B. Iodines						
I-131	Ci	-	-	-	4.86E-03	4.86E-03
I-132	Ci	-	-	-	1.27E-03	1.27E-03
I-133	Ci	-	-	-	7.37E-04	7.37E-04
Total Activity	Ci	-	-	-	6.87E-03	6.87E-03
C. Particulates						
I-131	Ci	-	-	-	-	-
Co-58	Ci	-	-	-	-	-
Co-60	Ci	-	-	-	-	-
Cs-134	Ci	-	-	-	-	-
Cs-136	Ci	-	-	-	-	-
Cs-137	Ci	-	-	-	-	-
Sb-124	Ci	-	-	-	-	-
Total Activity	Ci	-	-	-	-	N/D
D. Gross Alpha						
Gross Alpha	Ci	-	-	-	-	N/D
E. Tritium						
H-3	Ci	-	-	-	9.98E-01	9.98E-01

N/D = Not Detected

Table 2.2-L1

Millstone Unit 2 Liquid Effluents

Release Summary

(Quarry Release Point)

	Units	2003 1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	Total
A. Fission and Activation Products						
1. Total Activity Released	Ci	2.88E-03	2.46E-02	5.71E-02	4.50E-02	1.30E-01
2. Average Period Diluted Activity	uCi/ml	1.16E-11	9.66E-11	1.99E-10	2.49E-10	1.33E-10
B. Tritium						
1. Total Activity Released	Ci	1.21E+02	1.89E+02	2.05E+02	1.10E+02	6.24E+02
2. Average Period Diluted Activity	uCi/ml	4.85E-07	7.42E-07	7.14E-07	6.08E-07	6.43E-07
C. Dissolved and Entrained Gases						
1. Total Activity Released	Ci	1.53E-01	2.62E-01	7.05E-01	8.43E+00	9.55E+00
2. Average Period Diluted Activity	uCi/ml	6.15E-10	1.03E-09	2.46E-09	4.67E-08	9.84E-09
D. Gross Alpha						
1. Total Activity Released	Ci	N/D	N/D	N/D No Activity Detected	N/D	N/D
E. Volume						
1. Released Waste Volume[1]	Liters	2.90E+07	3.50E+05	8.04E+05	9.47E+05	3.11E+07
2. Dilution Volume During Releases[2]	Liters	1.28E+09	1.82E+09	3.50E+09	4.11E+09	1.07E+10
3. Dilution Volume During Period*	Liters	2.49E+11	2.55E+11	2.87E+11	1.80E+11	9.70E+11

Notes:

[1] Includes *Batch and Continuous* Released Waste Volumes

[2] Includes *only Batch* Dilution Volumes During Releases; Dilution Volumes can not be accurately determined for Continuous releases

N/D = Not Detected

Table 2.2-L2

Millstone Unit 2 Liquid Effluents

Continuous - SGBD, SW, RBCCW

(Quarry Release Point)

Nuclides Released	Units	2003 1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	Total
A. Fission & Activation Products						
Cs-134	Ci	-	-	-	1.39E-06	1.39E-06
Cs-137	Ci	-	-	-	4.31E-06	4.31E-06
Total Activity	Ci	-	-	-	5.70E-06	5.70E-06
B. Tritium						
H-3	Ci	1.62E-01	3.26E-04	2.49E-05	5.70E-03	1.68E-01
C. Dissolved & Entrained Gases						
	Ci	-	-	-	-	-
Total Activity	Ci	-	-	-	-	N/D
D. Gross Alpha						
Gross Alpha	Ci	-	-	-	-	N/D

N/D = Not Detected

Table 2.2-L3

Millstone Unit 2 Liquid Effluents

Batch - LWS, Millstone Stack Sump

(Quarry Release Point)

Nuclides Released	Units	2003 1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	Total
A. Fission & Activation Products						
Ag-110m	Ci	1.39E-06	-	3.82E-04	1.23E-03	1.61E-03
Ba-140	Ci	-	-	-	3.41E-04	3.41E-04
Ba-142	Ci	-	-	5.27E-04	-	5.27E-04
Co-57	Ci	6.95E-06	1.82E-06	5.41E-05	6.94E-05	1.32E-04
Co-58	Ci	3.76E-04	6.81E-03	3.88E-03	5.54E-03	1.66E-02
Co-60	Ci	5.19E-04	2.91E-04	1.55E-02	8.26E-03	2.46E-02
Cr-51	Ci	-	-	-	1.13E-03	1.13E-03
Cs-134	Ci	8.20E-05	7.24E-03	1.05E-02	1.40E-03	1.92E-02
Cs-137	Ci	9.35E-05	5.52E-03	8.85E-03	1.23E-03	1.57E-02
Fe-55	Ci	5.97E-04	6.37E-04	6.21E-03	1.89E-02	2.63E-02
Fe-59	Ci	1.63E-05	8.43E-06	-	6.52E-04	6.76E-04
I-131	Ci	1.91E-04	3.04E-04	2.19E-06	6.66E-04	9.72E-04
I-132	Ci	-	-	-	6.74E-05	6.74E-05
La-140	Ci	-	5.58E-06	-	5.50E-04	5.56E-04
Mn-54	Ci	2.76E-06	6.01E-05	2.62E-04	6.94E-04	1.02E-03
Mo-99	Ci	-	-	-	2.56E-05	2.56E-05
Nb-95	Ci	2.55E-06	-	-	5.90E-04	5.93E-04
Nb-97	Ci	2.97E-06	-	-	-	2.97E-06
Np-239	Ci	-	-	-	1.78E-05	1.78E-05
Ru-103	Ci	-	-	-	8.61E-06	8.61E-06
Ru-105	Ci	-	-	-	1.09E-05	1.09E-05
Sb-122	Ci	-	-	-	2.33E-05	2.33E-05
Sb-124	Ci	-	-	-	5.29E-05	5.29E-05
Sb-125	Ci	9.93E-04	3.63E-03	1.09E-02	2.90E-03	1.84E-02
Sn-113	Ci	-	-	-	2.05E-04	2.05E-04
Sn-117m	Ci	-	-	-	1.26E-05	1.26E-05
Sr-89	Ci	-	7.81E-05	1.32E-05	1.26E-04	2.18E-04
Sr-90	Ci	-	1.16E-06	-	-	1.16E-06
Sr-92	Ci	-	-	-	1.89E-05	1.89E-05
Tc-99m	Ci	-	-	-	2.83E-05	2.83E-05
Te-132	Ci	-	-	-	5.53E-05	5.53E-05
Zr-95	Ci	-	-	-	2.22E-04	2.22E-04
Total Activity	Ci	2.88E-03	2.46E-02	5.71E-02	4.50E-02	1.30E-01
B. Tritium						
H-3	Ci	1.20E+02	1.89E+02	2.05E+02	1.10E+02	6.24E+02

Table 2.2-L3 *(Cont)*

Millstone Unit 2 Liquid Effluents

Batch - LWS, Millstone Stack Sump

(Quarry Release Point)

Nuclides Released	Units	2003				
		1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	Total

C. Dissolved & Entrained Gases

Kr-85	Ci	5.92E-02	2.41E-01	3.94E-01	9.47E-01	1.64E+00
Xe-131m	Ci	3.89E-03	3.09E-03	1.46E-02	1.23E-01	1.45E-01
Xe-133	Ci	8.98E-02	1.83E-02	2.96E-01	7.31E+00	7.72E+00
Xe-133m	Ci	1.45E-04	-	4.34E-04	4.47E-02	4.53E-02
Xe-135	Ci	-	-	2.09E-04	6.61E-04	8.70E-04
Total Activity	Ci	1.53E-01	2.62E-01	7.05E-01	8.43E+00	9.55E+00

D. Gross Alpha

Gross Alpha	Ci	-	-	-	-	N/D

N/D = Not Detected

Table 2.2-L4

Millstone Unit 2 Liquid Effluents

Release Summary

(Yard Drain DSN 006 Release Point)

	Units	2003 1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	Total
A. Fission and Activation Products						
1. Total Activity Released	Ci	N/D	2.42E-04	N/D	N/D	2.42E-04
2. Average Period Diluted Activity	uCi/ml	-	1.08E-08	-	-	2.70E-09
B. Tritium						
1. Total Activity Released	Ci	1.41E-02	4.32E-03	1.34E-04	1.83E-02	3.69E-02
2. Average Period Diluted Activity	uCi/ml	6.40E-07	1.93E-07	5.93E-09	8.11E-07	4.12E-07
C. Dissolved and Entrained Gases						
1. Total Activity Released	Ci	N/D	N/D	N/D No Activity Detected	N/D	N/D
2. Average Period Diluted Activity	uCi/ml	-	-	-	-	-
D. Gross Alpha						
1. Total Activity Released	Ci	N/D	N/D	N/D	N/D	N/D
E. Volume						
1. Released Waste Volume(3)	Liters	2.27E+06	7.42E+05	6.18E+04	1.71E+06	4.79E+06
2. Dilution Volume During Releases(4)	Liters	-	-	-	-	-
3. Dilution Volume During Period	Liters	1.98E+07	2.16E+07	2.25E+07	2.09E+07	8.47E+07

Notes:

(3) Includes *only Continuous* Released Waste Volumes

(4) Dilution Volumes can not be accurately determined for Continuous releases

N/D = Not Detected

Table 2.2-L5

Millstone Unit 2 Liquid Effluents

Continuous - Turbine Building Sump

(Yard Drain DSN 006 Release Point)

Nuclides Released	Units	2003				
		1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	Total
A. Fission & Activation Products						
Co-60	Ci	-	*5.40E-05	-	-	5.40E-05
Cs-137	Ci	-	*2.42E-04	-	-	2.42E-04
Total Activity	Ci	-	2.42E-04	-	-	2.42E-04
B. Tritium						
H-3	Ci	1.41E-02	4.32E-03	1.34E-04	1.83E-02	3.69E-02
C. Dissolved & Entrained Gases						
	Ci	-	-	-	-	-
Total Activity	Ci	-	-	-	-	N/D
D. Gross Alpha						
Gross Alpha	Ci	-	-	-	-	N/D

**Abnormal Release (4/23/03-4/25/03)*

N/D = Not Detected

Table 2.3-A1

Millstone Unit No. 3

Airborne Effluents - Release Summary

	Units	2003				
		1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	Total
A. Fission & Activation Gases						
1. Total Activity Released	Ci	6.20E-02	2.82E-02	2.49E-03	2.86E-02	1.21E-01
2. Average Period Release Rate	uCi/sec	7.98E-03	3.59E-03	3.14E-04	3.60E-03	3.85E-03
B. Iodine-131						
1. Total Activity Released	Ci	N/D	N/D	N/D No Activity Detected	N/D	N/D
2. Average Period Release Rate	uCi/sec	-	-	-	-	-
C. Particulates						
1. Total Activity Released	Ci	3.74E-07	N/D	9.43E-06	5.27E-05	6.25E-05
2. Average Period Release Rate	uCi/sec	4.81E-08	-	1.19E-06	6.63E-06	1.98E-06
D. Gross Alpha						
1. Total Activity Released	Ci	N/D	N/D	N/D No Activity Detected	N/D	N/D
E. Tritium						
1. Total Activity Released	Ci	1.94E+01	1.41E+01	1.39E+01	1.22E+01	5.96E+01
2. Average Period Release Rate	uCi/sec	2.49E+00	1.80E+00	1.75E+00	1.53E+00	1.89E+00

N/D = Not Detected

Table 2.3-A2

Millstone Unit No. 3

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

Nuclides Released	Units	2003				
		1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	Total
A. Fission & Activation Gases						
Xe-131m	Ci	-	-	-	-	-
Xe-133	Ci	-	-	-	-	-
Xe-135	Ci	-	-	-	-	-
Total Activity	Ci	-	-	-	-	N/D
B. Iodines						
I-131	Ci	-	-	-	-	-
I-133	Ci	-	-	-	-	-
Total Activity	Ci	-	-	-	-	N/D
C. Particulates						
I-131	Ci	-	-	-	-	-
Co-58	Ci	-	-	-	-	-
Co-60	Ci	-	-	-	-	-
Cr-51	Ci	-	-	-	-	-
Mn-54	Ci	-	-	-	-	-
Br-82	Ci	-	-	-	4.16E-05	4.16E-05
Ru-106	Ci	-	-	-	-	-
Sr-89	Ci	-	-	-	-	-
Sr-90	Ci	-	-	-	-	-
Total Activity	Ci	-	-	-	4.16E-05	4.16E-05
D. Gross Alpha						
Gross Alpha	Ci	-	-	-	-	N/D
E. Tritium						
H-3	Ci	1.87E+01	1.17E+01	1.32E+01	1.09E+01	5.45E+01

N/D = Not Detected

Table 2.3-A3

Millstone Unit No. 3

Airborne Effluents - Ground Continuous - ESF Building Ventilation

Nuclides Released	Units	2003				
		1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	Total
A. Fission & Activation Gases						
Kr-87	Ci	-	8.72E-03	-	-	8.72E-03
Total Activity	Ci	-	8.72E-03	-	-	8.72E-03
B. Iodines						
I-131	Ci	-	-	-	-	-
I-133	Ci	-	-	-	-	-
Total Activity	Ci	-	-	-	-	N/D
C. Particulates						
I-131	Ci	-	-	-	-	-
Co-58	Ci	-	-	-	-	-
Cr-51	Ci	-	-	-	-	-
Hf-181	Ci	-	-	-	-	-
Mn-54	Ci	-	-	-	-	-
Sr-89	Ci	-	-	-	-	-
Sr-90	Ci	-	-	-	-	-
Total Activity	Ci	-	-	-	-	-
D. Gross Alpha						
Gross Alpha	Ci	-	-	-	-	N/D
E. Tritium						
H-3	Ci	-	-	-	-	N/D

N/D = Not Detected

Table 2.3-A4
Millstone Unit No. 3
Airborne Effluents - Mixed Batch - Containment Drawdowns

<< No Activity Detected >>

Nuclides Released	Units	2003				
		1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	Total
A. Fission & Activation Gases						
Xe-131m	Ci	-	-	-	-	-
Total Activity	Ci	-	-	-	-	N/D
B. Iodines						
I-131	Ci	-	-	-	-	-
I-133	Ci	-	-	-	-	-
Total Activity	Ci	-	-	-	-	N/D
C. Particulates						
I-131	Ci	-	-	-	-	-
Nb-97	Ci	-	-	-	-	-
Total Activity	Ci	-	-	-	-	N/D
D. Gross Alpha						
Gross Alpha	Ci	-	-	-	-	N/D
E. Tritium						
H-3	Ci	-	-	-	-	N/D

N/D = Not Detected

Table 2.3-A5

Millstone Unit No. 3

Airborne Effluents - Mixed Batch - Containment Purges

<< No Activity Detected >>

Nuclides Released	Units	2003				
		1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	Total
A. Fission & Activation Gases						
Xe-133	Ci	-	-	-	-	-
Xe-135	Ci	-	-	-	-	-
Total Activity	Ci	-	-	-	-	N/D
B. Iodines						
I-131	Ci	-	-	-	-	-
I-133	Ci	-	-	-	-	-
Total Activity	Ci	-	-	-	-	N/D
C. Particulates						
I-131	Ci	-	-	-	-	-
I-133	Ci	-	-	-	-	-
Total Activity	Ci	-	-	-	-	N/D
D. Gross Alpha						
Gross Alpha	Ci	-	-	-	-	N/D
E. Tritium						
H-3	Ci	-	-	-	-	N/D

N/D = Not Detected

Table 2.3-A6

Millstone Unit No. 3

Airborne Effluents - Elevated Continuous - Gaseous Waste System & Containment Vents

Nuclides Released	Units	2002				
		1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	Total
A. Fission & Activation Gases						
Ar-41	Ci	1.09E-02	1.63E-02	5.43E-04	1.87E-02	4.64E-02
Kr-85m	Ci	3.53E-03	-	-	3.51E-05	3.57E-03
Kr-87	Ci	5.18E-03	-	-	-	5.18E-03
Kr-88	Ci	6.89E-03	-	-	-	6.89E-03
Xe-133	Ci	4.33E-03	2.34E-03	1.80E-03	7.53E-03	1.60E-02
Xe-135	Ci	2.80E-03	8.81E-04	1.49E-04	2.40E-03	6.23E-03
Xe-135m	Ci	2.00E-02	-	-	-	2.00E-02
Xe-138	Ci	8.40E-03	-	-	-	8.40E-03
Total Activity	Ci	6.20E-02	1.95E-02	2.49E-03	2.86E-02	1.13E-01
B. Iodines						
I-131	Ci	-	-	-	-	-
I-133	Ci	-	-	-	-	-
Total Activity	Ci	-	-	-	-	N/D
C. Particulates						
I-131	Ci	-	-	-	-	-
Co-58	Ci	1.74E-07	-	-	-	1.74E-07
Co-60	Ci	1.43E-07	-	-	2.79E-07	4.22E-07
Cr-51	Ci	-	-	-	-	-
Cs-137	Ci	-	-	-	-	-
Mn-54	Ci	5.68E-08	-	-	-	5.68E-08
Nb-95	Ci	-	-	-	-	-
Ru-106	Ci	-	-	-	-	-
Zr-95	Ci	-	-	-	-	-
Br-82	Ci	-	-	9.43E-06	1.08E-05	2.02E-05
Total Activity	Ci	3.74E-07	-	9.43E-06	1.11E-05	2.09E-05
D. Gross Alpha						
Gross Alpha	Ci	-	-	-	-	N/D
E. Tritium						
H-3	Ci	6.60E-01	2.43E+00	7.49E-01	1.27E+00	5.11E+00

N/D = Not Detected

Table 2.3-L1

Millstone Unit 3 Liquid Effluents

Release Summary

(Quarry Release Point)

	Units	2003				
		1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	Total
A. Fission and Activation Products						
1. Total Activity Released	Ci	6.56E-03	4.73E-03	1.39E-02	3.46E-02	5.99E-02
2. Average Period Diluted Activity	uCi/ml	1.51E-11	1.01E-11	2.96E-11	7.35E-11	3.25E-11
B. Tritium						
1. Total Activity Released	Ci	9.37E+01	7.34E+01	2.22E+02	2.65E+02	6.54E+02
2. Average Period Diluted Activity	uCi/ml	2.15E-07	1.57E-07	4.71E-07	5.62E-07	3.55E-07
C. Dissolved and Entrained Gases						
1. Total Activity Released	Ci	N/D	1.68E-05	1.29E-05	6.08E-06	3.58E-05
2. Average Period Diluted Activity	uCi/ml	-	3.60E-14	2.74E-14	1.29E-14	1.94E-14
D. Gross Alpha						
1. Total Activity Released	Ci	N/D	N/D	N/D	N/D	N/D
E. Volume						
1. Released Waste Volume(1)	Liters	5.03E+06	5.54E+06	1.13E+07	1.19E+07	3.38E+07
2. Dilution Volume During Releases(2)	Liters	9.40E+09	2.66E+10	9.73E+09	7.43E+09	5.32E+10
3. Dilution Volume During Period	Liters	4.36E+11	4.66E+11	4.71E+11	4.71E+11	1.84E+12

Notes:

(1) Includes *Batch and Continuous* Released Waste Volumes

(2) Includes *only Batch* Dilution Volumes During Releases; Dilution Volumes can not be accurately determined for Continuous release:

N/D = Not Detected

Table 2.3-L2

Millstone Unit 3 Liquid Effluents

Continuous - SGBD, SW, TK2

(Quarry Release Point)

Nuclides Released	Units	2003 1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	Total
A. Fission & Activation Products						
	Ci	-	-	-	-	-
Total Activity	Ci	-	-	-	-	N/D
B. Tritium						
H-3	Ci	1.14E-01	2.13E-01	2.47E-01	2.06E-01	7.80E-01
C. Dissolved & Entrained Gases						
	Ci	-	-	-	-	-
Total Activity	Ci	-	-	-	-	N/D
D. Gross Alpha						
Gross Alpha	Ci	-	-	-	-	N/D

N/D = Not Detected

Table 2.3-L3

Millstone Unit 3 Liquid Effluents

Batch - LWS

(Quarry Release Point)

Nuclides Released	Units	2003				
		1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	Total
A. Fission & Activation Products						
As-76	Ci	-	-	1.08E-05	-	1.08E-05
Ba-140	Ci	-	-	2.50E-04	-	2.50E-04
Co-57	Ci	-	-	5.70E-06	-	5.70E-06
Co-58	Ci	2.81E-04	3.60E-05	3.52E-04	8.21E-05	7.52E-04
Co-60	Ci	8.53E-04	5.51E-05	1.59E-03	4.40E-03	6.91E-03
Cs-137	Ci	-	2.88E-04	4.90E-04	1.44E-04	9.22E-04
Fe-55	Ci	3.25E-03	3.62E-03	9.14E-03	2.88E-02	4.49E-02
Mn-54	Ci	1.51E-04	-	3.48E-04	5.13E-04	1.01E-03
Nb-95	Ci	-	3.31E-05	2.08E-05	-	5.39E-05
Nb-97	Ci	-	-	-	7.71E-05	7.71E-05
Sb-125	Ci	2.03E-03	6.76E-04	1.73E-03	5.63E-04	4.99E-03
Sr-91	Ci	-	-	5.11E-06	-	5.11E-06
Zr-95	Ci	-	2.10E-05	-	-	2.10E-05
Total Activity	Ci	6.56E-03	4.73E-03	1.39E-02	3.46E-02	5.99E-02
B. Tritium						
H-3	Ci	9.36E+01	7.32E+01	2.22E+02	2.64E+02	6.53E+02
C. Dissolved & Entrained Gases						
Xe-135	Ci	-	1.68E-05	1.29E-05	6.08E-06	3.58E-05
Total Activity	Ci	-	1.68E-05	1.29E-05	6.08E-06	3.58E-05
D. Gross Alpha						
Gross Alpha	Ci	-	-	-	-	N/D

N/D = Not Detected

Table 2.3-L4

Millstone Unit 3 Liquid Effluents

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

(Quarry Release Point)

Nuclides Released	Units	2003				
		1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	Total
A. Fission & Activation Products						
	Ci	-	-	-	-	-
Total Activity	Ci	-	-	-	-	N/D
B. Tritium						
H-3	Ci	1.19E-02	2.20E-02	3.17E-02	2.15E-02	8.70E-02
C. Dissolved & Entrained Gases						
	Ci	-	-	-	-	-
Total Activity	Ci	-	-	-	-	N/D
D. Gross Alpha						
Gross Alpha	Ci	-	-	-	-	N/D

N/D = Not Detected

Table 2.3-L5
Millstone Unit 3 Liquid Effluents
Release Summary
(Yard Drain DSN 006 Release Point)

	Units	2003 1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	Total
A. Fission and Activation Products						
1. Total Activity Released	Ci	N/D	N/D	N/D	N/D	N/D
		No Activity Detected				
2. Average Period Diluted Activity	uCi/ml	-	-	-	-	-
B. Tritium						
1. Total Activity Released	Ci	2.06E-02	4.07E-02	5.01E-02	3.73E-02	1.49E-01
2. Average Period Diluted Activity	uCi/ml	9.33E-07	1.82E-06	2.22E-06	1.65E-06	1.66E-06
C. Dissolved and Entrained Gases						
1. Total Activity Released	Ci	N/D	N/D	N/D	N/D	N/D
		No Activity Detected				
2. Average Period Diluted Activity	uCi/ml	-	-	-	-	-
D. Gross Alpha						
1. Total Activity Released	Ci	N/D	N/D	N/D	N/D	N/D
E. Volume						
1. Released Waste Volume(3)	Liters	4.75E+05	4.87E+05	1.74E+06	1.69E+06	4.39E+06
2. Dilution Volume During Releases(4)	Liters	-	-	-	-	-
3. Dilution Volume During Period	Liters	2.16E+07	2.18E+07	2.08E+07	2.09E+07	8.51E+07

Notes:
(3) Includes *only Continuous* Released Waste Volumes
(4) Dilution Volumes can not be accurately determined for Continuous releases

N/D = Not Detected

Table 2.3-L6

Millstone Unit 3 Liquid Effluents

Continuous - Turbine Building Sump

(Yard Drain DSN 006 Release Point)

Nuclides Released	Units	2003 1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	Total
A. Fission & Activation Products						
	Ci	-	-	-	-	-
Total Activity	Ci	-	-	-	-	N/D
B. Tritium						
H-3	Ci	2.04E-02	3.95E-02	4.64E-02	3.45E-02	1.41E-01
C. Dissolved & Entrained Gases						
	Ci	-	-	-	-	-
Total Activity	Ci	-	-	-	-	N/D
D. Gross Alpha						
Gross Alpha	Ci	-	-	-	-	N/D

N/D = Not Detected

Table 2.3-L7
Millstone Unit 3 Liquid Effluents
Continuous - WTT Berm Water
(Yard Drain DSN 006 Release Point)

Nuclides Released	Units	2003				
		1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	Total
A. Fission & Activation Products						
	Ci	-	-	-	-	-
Total Activity	Ci	-	-	-	-	N/D
B. Tritium						
H-3	Ci	2.16E-04	1.18E-03	3.71E-03	2.75E-03	7.86E-03
C. Dissolved & Entrained Gases						
	Ci	-	-	-	-	-
Total Activity	Ci	-	-	-	-	N/D
D. Gross Alpha						
Gross Alpha	Ci	-	-	-	-	N/D

N/D = Not Detected

2.3 Solid Waste

Solid waste shipment radioactivity summaries for each unit are given in the following tables:

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 for 2003

Containers routinely used for radioactive waste shipment include:

55-gal Steel Drum DOT 17-H container	7.5 ft3
Steel Boxes	45 ft3
	87 ft3
	95 ft3
	122 ft3
Steel Container	202.1 ft3
Steel "Sea Van"	1280 ft3
Polyethylene High Integrity Containers	120.3 ft3
	132.4 ft3
	173.4 ft3
	202.1 ft3

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

January 1, 2003 through December 31, 2003

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

1. Type of Waste

a. Spent resins, Filter sludges, Evaporator bottoms, etc.

Disposition	Units	Annual Totals	Est Total Error %
- No shipments during this report period -	m^3	n/a	
	Ci	n/a	n/a

b. Dry compressible waste, Contaminated equipment, etc.

Disposition	Units	Annual Totals	Est Total Error %
From Millstone Nuclear Power Station to Duratek Inc.,	m^3	5.5970E+01	
Kingston, TN for Super-Compaction, Incineration, etc.	Ci	7.0083E-02	25%
From Millstone Nuclear Power Station to Duratek Inc.,	m^3	3.5509E+01	
Oak Ridge, TN for Super-Compaction, Incineration, etc.	Ci	2.8118E+00	25%

c. Irradiated components, Control rods, etc.

Disposition	Units	Annual Totals	Est Total Error %
From Millstone Nuclear Power Station to	m^3	1.0196E+01	
Chem-Nuclear Services LLC, Barnwell, SC for Burial	Ci	2.4479E+04	25%

d. Other - (Grease, Oil, Oily waste)

Disposition	Units	Annual Totals	Est Total Error %
From Millstone Nuclear Power Station to Duratek Inc.,	m^3	4.2467E-01	
Kingston, TN for Super-Compaction, Incineration, etc.	Ci	7.1646E-04	25%

d. Other - (Water)

Disposition	Units	Annual Totals	Est Total Error %
From Millstone Nuclear Power Station to Duratek Inc.,	m^3	2.5620E+01	
Oak Ridge, TN for Incineration	Ci	3.8158E-02	25%

d. Other - (Mixed Waste)

Disposition	Units	Annual Totals	Est Total Error %
From Millstone Nuclear Power Station to Diversified Scientific	m^3	1.1230E-02	
Services, Kingston, TN for Incineration, Fuel Blending, etc.	Ci	1.1324E-05	25%
From Millstone Nuclear Power Station to Perma-Fix of Florida, Inc.,	m^3	2.4681E-01	
Gainesville, FL for Stabilization, Fuel Blending, etc.	Ci	1.4832E-03	25%

2. Estimate of major nuclide composition (by type of waste)

b. Dry compressible waste, Contaminated equipment, etc.

From Millstone Nuclear Power Station to Duratek Inc., Kingston, TN for Super-Compaction, Incineration, etc.

Radionuclide	% of Total	Curies
H-3	3.99	2.7978E-03
C-14	<0.01	2.3340E-06
Cr-51		
Mn-54		
Fe-55	39.88	2.7948E-02
Fe-59		
Co-57		
Co-58		
Co-60	15.87	1.1122E-02
Ni-59		
Ni-63	2.38	1.6689E-03
Zn-65		
Sr-89		
Sr-90	2.01	1.4059E-03
Nb-94		
Zr-95		
Nb-95		
Tc-99		
Ru-103		
Ru-106		
Ag-108m		
Ag-110m		
Sn-113		
Sb-124		
Sb-125		
I-125		
I-129		
Cs-134		
Cs-137	35.82	2.5101E-02
Ba-140		
Ce-141		
Ce-144	<0.01	4.1400E-06
Gd-153		
U-235		
U-238		
Pu-238		1.0680E-06
Pu-239	<0.01	5.6100E-07
Pu-241	0.04	2.8270E-05
Am-241	<0.01	1.9140E-06
Cm-242		
Cm-243		
Cm-244	<0.01	9.9700E-07
CURIES (TOTAL)		7.0083E-02

2. Estimate of major nuclide composition (by type of waste)

b. Dry compressible waste, Contaminated equipment, etc.

From Millstone Nuclear Power Station to Duratek Inc., Oak Ridge, TN for Super-Compaction, Incineration, etc.

Radionuclide	% of Total	Curies
H-3	0.31	8.6300E-03
C-14	<0.01	2.6640E-04
Cr-51		
Mn-54		
Fe-55	50.61	1.4230E+00
Fe-59		
Co-57		
Co-58		
Co-60	13.05	3.6705E-01
Ni-59		
Ni-63	3.03	8.5200E-02
Zn-65		
Sr-89		
Sr-90	1.02	2.8808E-02
Nb-94		
Zr-95		
Nb-95		
Tc-99		
Ru-103		
Ru-106		
Ag-108m		
Ag-110m		
Sn-113		
Sb-124		
Sb-125		
I-125		
I-129		
Cs-134		
Cs-137	31.21	8.7748E-01
Ba-140		
Ce-141		
Ce-144	0.35	9.9600E-03
Gd-153		
U-235		
U-238		
Pu-238	0.01	3.6600E-04
Pu-239	<0.01	1.8390E-04
Pu-241	0.25	7.1000E-03
Am-241	0.08	2.3610E-03
Cm-242	<0.01	5.9600E-08
Cm-243		
Cm-244	0.05	1.3770E-03
CURIES (TOTAL)		2.8118E+00

2. Estimate of major nuclide composition (by type of waste)

c. Irradiated components, Control rods, etc.

From Millstone Nuclear Power Station to Chem-Nuclear Services LLC, Barnwell, SC for Burial

Radionuclide	% of Total	Curies
H-3	<0.01	1.6430E-03
C-14	0.01	3.2474E+00
Cr-51	<0.01	2.1761E-02
Mn-54	0.06	1.3834E+01
Fe-55	36.74	8.9944E+03
Fe-59	<0.01	2.9230E-03
Co-57	<0.01	3.9980E-03
Co-58	<0.01	7.7800E-03
Co-60	52.97	1.2967E+04
Ni-59	0.07	1.8297E+01
Ni-63	10.13	2.4808E+03
Zn-65	<0.01	9.8020E-02
Sr-89	<0.01	1.9090E-05
Sr-90	<0.01	1.0361E-01
Nb-94	<0.01	7.3090E-02
Zr-95	<0.01	1.8620E-03
Nb-95	<0.01	5.6320E-03
Tc-99	<0.01	5.2340E-04
Ru-103	<0.01	2.3450E-03
Ru-106	<0.01	4.0240E-02
Ag-108m	<0.01	6.5500E-03
Ag-110m	<0.01	8.0122E-03
Sn-113		
Sb-124	<0.01	4.5870E-03
Sb-125	<0.01	7.5800E-03
I-125		
I-129	<0.01	4.0850E-05
Cs-134	<0.01	5.3600E-03
Cs-137	<0.01	3.5510E-01
Ba-140	<0.01	1.1123E-03
Ce-141	<0.01	8.3400E-03
Ce-144	<0.01	1.1850E-02
Gd-153		
U-235	<0.01	2.6400E-08
U-238	<0.01	7.3900E-08
Pu-238	<0.01	6.6800E-04
Pu-239	<0.01	5.1910E-04
Pu-241	<0.01	3.9800E-02
Am-241	<0.01	3.5950E-03
Cm-242	<0.01	1.1450E-05
Cm-243	<0.01	1.1290E-03
Cm-244	<0.01	2.1360E-03
CURIES (TOTAL)		2.4479E+04

2. Estimate of major nuclide composition (by type of waste)

d. Other - (Grease, Oil, Oily waste)

From Millstone Nuclear Power Station to Duratek Inc., Kingston, TN for Super-Compaction, Incineration, etc.

Radionuclide	% of Total	Curies
H-3	0.01	8.5000E-08
C-14		
Cr-51		
Mn-54	1.61	1.1500E-05
Fe-55	51.64	3.7000E-04
Fe-59		
Co-57		
Co-58	1.25	8.9667E-06
Co-60	17.68	1.2667E-04
Ni-59		
Ni-63	14.19	1.0167E-04
Zn-65		
Sr-89		
Sr-90	0.25	1.7767E-06
Nb-94		
Zr-95	0.60	4.2667E-06
Nb-95	0.64	4.6000E-06
Tc-99		
Ru-103		
Ru-106		
Ag-108m		
Ag-110m		
Sn-113		
Sb-124		
Sb-125		
I-125		
I-129		
Cs-134	1.29	9.2667E-06
Cs-137	10.84	7.7667E-05
Ba-140		
Ce-141		
Ce-144		
Gd-153		
U-235		
U-238		
Pu-238		
Pu-239		
Pu-241		
Am-241		
Cm-242		
Cm-243		
Cm-244		
CURIES (TOTAL)		7.1646E-04

2. Estimate of major nuclide composition (by type of waste)

d. Other - (Water)

From Millstone Nuclear Power Station to Duratek Inc., Oak Ridge, TN for Incineration

RadionUclide	% of Total	Curies
H-3	84.50	3.2245E-02
C-14	0.25	9.3691E-05
Cr-51		
Mn-54	0.13	5.1333E-05
Fe-55	7.34	2.8018E-03
Fe-59		
Co-57	0.01	4.7433E-06
Co-58	0.01	5.4986E-06
Co-60	5.12	1.9544E-03
Ni-59		
Ni-63	1.80	6.8663E-04
Zn-65		
Sr-89		
Sr-90	<0.01	2.2160E-06
Nb-94		
Zr-95		
Nb-95	<0.01	7.1000E-07
Tc-99	<0.01	3.2000E-06
Ru-103		
Ru-106		
Ag-108m		
Ag-110m		
Sn-113		
Sb-124		
Sb-125	0.02	6.7633E-06
I-125	<0.01	3.7400E-06
I-129	<0.01	6.7933E-07
Cs-134	0.04	1.5200E-05
Cs-137	0.67	2.5602E-04
Ba-140		
Ce-141		
Ce-144	<0.01	8.1160E-10
Gd-153	0.02	6.5700E-06
U-235		
U-238	0.02	6.6000E-06
Pu-238		
Pu-239		
Pu-241		
Am-241	0.04	1.3920E-05
Cm-242		
Cm-243		
Cm-244		
CURIES (TOTAL)		3.8158E-02

2. Estimate of major nuclide composition (by type of waste)

d. Other - (Mixed Waste)

From Millstone Nuclear Power Station to Diversified Scientific Services, Kingston, TN for Incineration, Fuel Blending, etc.

Radionuclide	% of Total	Curies
H-3	99.64	1.1283E-05
C-14		
Cr-51		
Mn-54	<0.01	4.7667E-10
Fe-55	0.10	1.1640E-08
Fe-59		
Co-57	<0.01	1.2867E-10
Co-58	0.02	2.5800E-09
Co-60	0.06	7.2407E-09
Ni-59		
Ni-63	0.09	9.8733E-09
Zn-65		
Sr-89		
Sr-90	<0.01	1.1853E-10
Nb-94		
Zr-95		
Nb-95	<0.01	1.3367E-11
Tc-99		
Ru-103		
Ru-106		
Ag-108m		
Ag-110m		
Sn-113		
Sb-124		
Sb-125	<0.01	3.7333E-10
I-125		
I-129		
Cs-134	0.03	3.7000E-09
Cs-137	0.05	5.1833E-09
Ba-140		
Ce-141		
Ce-144		
Gd-153		
U-235		
U-238		
Pu-238		
Pu-239		
Pu-241		
Am-241		
Cm-242		
Cm-243		
Cm-244		
CURIES (TOTAL)		1.1324E-05

2. Estimate of major nuclide composition (by type of waste)

d. Other - (Mixed Waste)

From Millstone Nuclear Power Station to Perma-Fix of Florida, Inc., Gainesville, FL for Stabilization, Fuel Blending, etc.

Radionuclide	% of Total	Curies
H-3	0.63	9.3028E-06
C-14	0.37	5.5467E-06
Cr-51		
Mn-54	0.68	1.0112E-05
Fe-55	29.69	4.4034E-04
Fe-59		
Co-57		
Co-58	0.93	1.3844E-05
Co-60	21.10	3.1297E-04
Ni-59		
Ni-63	15.97	2.3679E-04
Zn-65		
Sr-89		
Sr-90	0.09	1.3075E-06
Nb-94		
Zr-95	0.48	7.1557E-06
Nb-95	1.04	1.5409E-05
Tc-99		
Ru-103		
Ru-106		
Ag-108m		
Ag-110m		
Sn-113		
Sb-124		
Sb-125	0.41	6.0997E-06
I-125		
I-129		
Cs-134	0.48	7.1557E-06
Cs-137	28.12	4.1713E-04
Ba-140		
Ce-141		
Ce-144		
Gd-153		
U-235		
U-238		
Pu-238		
Pu-239		
Pu-241		
Am-241		
Cm-242		
Cm-243		
Cm-244		
CURIES (TOTAL)		1.4832E-03

3. Solid Waste Disposition (Shipments from Millstone)

Number of Shipments*	Mode of Transportation	Destination
4	Truck (Sole Use Vehicle)	Chem-Nuclear Services LLC, Barnwell, SC
1	Truck (Sole Use Vehicle)	Diversified Scientific Services, Kingston, TN
4	Truck (Sole Use Vehicle)	Duratek Inc. - Kingston, TN
7	Truck (Sole Use Vehicle)	Duratek Inc. - Oak Ridge, TN
2	Truck (Sole Use Vehicle)	Perma-Fix of Florida Inc. - Gainesville FL

* Indicates the number of shipments in this category which contained *any* unit-1 waste (Example: A shipment containing wastes from units 1, 2 *and* 3 will be counted once on *each* of the three unit-specific sections of this report.) 27 physical shipments were made from this station in 2003.

B. IRRADIATED FUEL SHIPMENTS (Disposition)

Number of Shipments	Mode of Transportation	Destination
No Shipments in 2003	N/A	N/A

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

January 1, 2003 through December 31, 2003

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

1. Type of Waste

a. Spent resins, Filter sludges, Evaporator bottoms, etc.

Disposition	Units	Annual Totals	Est. Total Error %
From Millstone Nuclear Power Station to Duratek Inc.,	m^3	2.0392E+01	
Kingston, TN for Super-Compaction, Incineration, etc.	Ci	1.2605E-02	25%
From Millstone Nuclear Power Station to Studsvik	m^3	7.4475E+00	
Processing Center LLC, Erwin, TN for Thermal Destruction	Ci	3.5266E+01	25%

b. Dry compressible waste, Contaminated equipment, etc.

Disposition	Units	Annual Totals	Est. Total Error %
From Millstone Nuclear Power Station to Duratek Inc.,	m^3	9.9123E+01	
Kingston, TN for Super-Compaction, Incineration, etc.	Ci	2.8841E-01	25%

c. Irradiated components, Control rods, etc.

Disposition	Units	Annual Totals	Est. Total Error %
- No shipments during this report period -	m^3	n/a	
	Ci	n/a	n/a

d. Other - (Grease, Oil, Oily waste)

Disposition	Units	Annual Totals	Est. Total Error %
From Millstone Nuclear Power Station to Duratek Inc.,	m^3	1.0487E+00	
Kingston, TN for Super-Compaction, Incineration, etc.	Ci	2.7882E-03	25%

d. Other - (Water)

Disposition	Units	Annual Totals	Est. Total Error %
From Millstone Nuclear Power Station to Duratek Inc.,	m^3	4.4549E+01	
Oak Ridge, TN for Incineration	Ci	8.5322E-02	25%

d. Other - (Mixed Waste)

Disposition	Units	Annual Totals	Est. Total Error %
From Millstone Nuclear Power Station to Diversified Scientific	m^3	1.1230E-02	
Services, Kingston, TN for Incineration, Fuel Blending, etc.	Ci	1.1324E-05	25%
From Millstone Nuclear Power Station to Perma-Fix of Florida, Inc.,	m^3	3.8581E-01	
Gainesville, FL for Stabilization, Fuel Blending, etc.	Ci	1.9736E-03	25%

2. Estimate of major nuclide composition (by type of waste)

a. Spent resins, Filter sludges, Evaporator bottoms, etc.

From Millstone Nuclear Power Station to Duratek Inc., Kingston, TN for Super-Compaction, Incineration, etc.

Radionuclide	% of Total	Curies
H-3		
C-14		
Cr-51		
Mn-54	0.76	9.6140E-05
Fe-55	34.42	4.3390E-03
Fe-59		
Co-57		
Co-58	2.52	3.1780E-04
Co-60	21.52	2.7130E-03
Ni-59		
Ni-63	29.54	3.7240E-03
Zn-65		
Sr-89		
Sr-90		
Nb-94		
Zr-95		
Nb-95		
Tc-99		
Ru-103		
Ru-106		
Ag-108m		
Ag-110m		
Sn-113		
Sb-124		
Sb-125		
I-125		
I-129		
Cs-134	3.82	4.8150E-04
Cs-137	7.41	9.3380E-04
Ba-140		
Ce-141		
Ce-144		
Gd-153		
U-235		
U-238		
Pu-238		
Pu-239		
Pu-241		
Am-241		
Cm-242		
Cm-243		
Cm-244		
CURIES (TOTAL)		1.2605E-02

2. Estimate of major nuclide composition (by type of waste)

a. Spent resins, Filter sludges, Evaporator bottoms, etc.

From Millstone Nuclear Power Station to Studsvik Processing Center LLC, Erwin, TN for Thermal Destruction

Radionuclide	% of Total	Curies
H-3	0.03	1.0529E-02
C-14	0.40	1.4141E-01
Cr-51		
Mn-54	0.91	3.2120E-01
Fe-55	10.95	3.8610E+00
Fe-59		
Co-57		
Co-58	0.04	1.4405E-02
Co-60	1.90	6.6980E-01
Ni-59		
Ni-63	2.33	8.2330E-01
Zn-65	<0.01	3.0500E-03
Sr-89	<0.01	3.4300E-05
Sr-90	0.11	3.8860E-02
Nb-94		
Zr-95		
Nb-95		
Tc-99		
Ru-103		
Ru-106		
Ag-108m		
Ag-110m		
Sn-113		
Sb-124		
Sb-125		
I-125		
I-129	<0.01	3.6370E-04
Cs-134	32.37	1.1414E+01
Cs-137	50.69	1.7875E+01
Ba-140		
Ce-141		
Ce-144	0.26	9.0010E-02
Gd-153		
U-235		
U-238		
Pu-238	<0.01	1.8900E-05
Pu-239	<0.01	4.3110E-05
Pu-241	<0.01	3.1150E-03
Am-241		
Cm-242		
Cm-243		
Cm-244	<0.01	2.1000E-05
CURIES (TOTAL)		3.5266E+01

2. Estimate of major nuclide composition (by type of waste)

b. Dry compressible waste, Contaminated equipment, etc.

From Millstone Nuclear Power Station to Duratek Inc., Kingston, TN for Super-Compaction, Incineration, etc.

Radionuclide	% of Total	Curies
H-3	0.58	1.6620E-03
C-14	0.10	3.0252E-04
Cr-51		
Mn-54	0.04	1.0840E-04
Fe-55	29.37	8.4720E-02
Fe-59		
Co-57		
Co-58	3.67	1.0570E-02
Co-60	19.49	5.6198E-02
Ni-59		
Ni-63	24.35	7.0238E-02
Zn-65		
Sr-89		
Sr-90	<0.01	5.4450E-06
Nb-94		
Zr-95	<0.01	2.6350E-05
Nb-95	0.02	5.0600E-05
Tc-99		
Ru-103		
Ru-106		
Ag-108m		
Ag-110m		
Sn-113		
Sb-124		
Sb-125		
I-125		
I-129		
Cs-134	10.00	2.8839E-02
Cs-137	11.70	3.3754E-02
Ba-140		
Ce-141		
Ce-144	0.38	1.0936E-03
Gd-153		
U-235		
U-238		
Pu-238	<0.01	1.2486E-05
Pu-239	<0.01	9.8578E-06
Pu-241	0.27	7.8441E-04
Am-241	<0.01	1.8297E-05
Cm-242		
Cm-243		
Cm-244	<0.01	1.6095E-05
CURIES (TOTAL)		2.8841E-01

2. Estimate of major nuclide composition (by type of waste)

d. Other - (Grease, Oil, Oily waste)

From Millstone Nuclear Power Station to Duratek Inc., Kingston, TN for Super-Compaction, Incineration, etc.

Radionuclide	% of Total	Curies
H-3	0.01	3.3115E-07
C-14		
Cr-51		
Mn-54	1.59	4.4452E-05
Fe-55	51.70	1.4415E-03
Fe-59		
Co-57		
Co-58	1.21	3.3750E-05
Co-60	17.67	4.9267E-04
Ni-59		
Ni-63	14.23	3.9672E-04
Zn-65		
Sr-89		
Sr-90	0.25	6.9417E-06
Nb-94		
Zr-95	0.58	1.6033E-05
Nb-95	0.60	1.6632E-05
Tc-99		
Ru-103		
Ru-106		
Ag-108m		
Ag-110m		
Sn-113		
Sb-124		
Sb-125		
I-125		
I-129		
Cs-134	1.29	3.6067E-05
Cs-137	10.87	3.0307E-04
Ba-140		
Ce-141		
Ce-144		
Gd-153		
U-235		
U-238		
Pu-238		
Pu-239		
Pu-241		
Am-241		
Cm-242		
Cm-243		
Cm-244		
CURIES (TOTAL)		2.7882E-03

2. Estimate of major nuclide composition (by type of waste)

d. Other - (Water)

From Millstone Nuclear Power Station to Duratek Inc., Oak Ridge, TN for Incineration

Radionuclide	% of Total	Curies
H-3	92.64	7.9045E-02
C-14	0.11	9.3691E-05
Cr-51		
Mn-54	0.09	7.3133E-05
Fe-55	3.34	2.8509E-03
Fe-59		
Co-57	<0.01	4.7433E-06
Co-58	0.02	1.4649E-05
Co-60	2.33	1.9856E-03
Ni-59		
Ni-63	0.85	7.2853E-04
Zn-65	0.06	5.2100E-05
Sr-89		
Sr-90	<0.01	2.2160E-06
Nb-94		
Zr-95		
Nb-95	<0.01	7.1000E-07
Tc-99	<0.01	3.2000E-06
Ru-103		
Ru-106		
Ag-108m		
Ag-110m		
Sn-113		
Sb-124		
Sb-125	<0.01	6.7633E-06
I-125	<0.01	3.7400E-06
I-129	<0.01	6.7933E-07
Cs-134	0.02	1.8700E-05
Cs-137	0.48	4.1102E-04
Ba-140		
Ce-141		
Ce-144	<0.01	8.1160E-10
Gd-153	<0.01	6.5700E-06
U-235		
U-238	<0.01	6.6000E-06
Pu-238		
Pu-239		
Pu-241		
Am-241	0.02	1.3920E-05
Cm-242		
Cm-243		
Cm-244		
CURIES (TOTAL)		8.5322E-02

2. Estimate of major nuclide composition (by type of waste)

d. Other - (Mixed Waste)

From Millstone Nuclear Power Station to Diversified Scientific Services, Kingston, TN for Incineration, Fuel Blending, etc.

Radionuclide	% of Total	Curies
H-3	99.64	1.1283E-05
C-14		
Cr-51		
Mn-54	<0.01	4.7667E-10
Fe-55	0.10	1.1640E-08
Fe-59		
Co-57	<0.01	1.2867E-10
Co-58	0.02	2.5800E-09
Co-60	0.06	7.2407E-09
Ni-59		
Ni-63	0.09	9.8733E-09
Zn-65		
Sr-89		
Sr-90	<0.01	1.1853E-10
Nb-94		
Zr-95		
Nb-95	<0.01	1.3367E-11
Tc-99		
Ru-103		
Ru-106		
Ag-108m		
Ag-110m		
Sn-113		
Sb-124		
Sb-125	<0.01	3.7333E-10
I-125		
I-129		
Cs-134	0.03	3.7000E-09
Cs-137	0.05	5.1833E-09
Ba-140		
Ce-141		
Ce-144		
Gd-153		
U-235		
U-238		
Pu-238		
Pu-239		
Pu-241		
Am-241		
Cm-242		
Cm-243		
Cm-244		
CURIES (TOTAL)		1.1324E-05

2. Estimate of major nuclide composition (by type of waste)

d. Other - (Mixed Waste)

From Millstone Nuclear Power Station to Perma-Fix of Florida, Inc., Gainesville, FL for Stabilization, Fuel Blending, etc.

Radionuclide	% of Total	Curies
H-3	0.51	1.0091E-05
C-14	0.29	5.6896E-06
Cr-51		
Mn-54	0.65	1.2910E-05
Fe-55	30.51	6.0222E-04
Fe-59		
Co-57		
Co-58	1.52	2.9991E-05
Co-60	21.05	4.1539E-04
Ni-59		
Ni-63	18.92	3.7335E-04
Zn-65		
Sr-89		
Sr-90	0.07	1.3075E-06
Nb-94		
Zr-95	0.36	7.1557E-06
Nb-95	0.78	1.5409E-05
Tc-99		
Ru-103		
Ru-106		
Ag-108m		
Ag-110m		
Sn-113		
Sb-124		
Sb-125	0.31	6.0997E-06
I-125		
I-129		
Cs-134	1.75	3.4564E-05
Cs-137	23.26	4.5898E-04
Ba-140		
Ce-141		
Ce-144		
Gd-153		
U-235		
U-238		
Pu-238	<0.01	5.8913E-09
Pu-239	<0.01	4.6476E-09
Pu-241	0.02	3.7079E-07
Am-241	<0.01	8.6339E-09
Cm-242		
Cm-243		
Cm-244	<0.01	7.6124E-09
CURIES (TOTAL)		1.9736E-03

3. Solid Waste Disposition (Shipments from Millstone)

Number of Shipments*	Mode of Transportation	Destination
1	Truck (Sole Use Vehicle)	Diversified Scientific Services, Kingston, TN
7	Truck (Sole Use Vehicle)	Duratek Inc. - Kingston, TN
5	Truck (Sole Use Vehicle)	Duratek Inc. - Oak Ridge, TN
2	Truck (Sole Use Vehicle)	Perma-Fix of Florida Inc. - Gainesville FL
3	Truck (Sole Use Vehicle)	Studsvik Processing Center LLC - Erwin, TN

* Indicates the number of shipments in this category which contained *any* unit 2 waste. (Example: A shipment containing wastes from units 1, 2 *and* 3 will be counted once on *each* of the three unit-specific sections of this report.) 27 physical shipments were made from this station in 2003.

B. IRRADIATED FUEL SHIPMENTS (Disposition)

Number of Shipments	Mode of Transportation	Destination
No Shipments in 2003	N/A	N/A

Table 2.3-S
Solid Waste and Irradiated Component Shipments
Millstone Unit 3

January 1, 2003 through December 31, 2003

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

1. Type of Waste

a. Spent resins, Filter sludges, Evaporator bottoms, etc.

Disposition	Units	Annual Totals	Est. Total Error %
From Millstone Nuclear Power Station to Duratek Inc.,	m^3	2.0170E+01	
Kingston, TN for Super-Compaction, Incineration, etc.	Ci	5.3624E-01	25%
From Millstone Nuclear Power Station to Studsvik	m^3	7.0150E+00	
Processing Center LLC, Erwin, TN for Thermal Destruction	Ci	2.0671E+02	25%

b. Dry compressible waste, Contaminated equipment, etc.

Disposition	Units	Annual Totals	Est. Total Error %
From Millstone Nuclear Power Station to Duratek Inc.,	m^3	3.5119E+01	
Kingston, TN for Super-Compaction, Incineration, etc.	Ci	3.8776E-02	25%

c. Irradiated components, Control rods, etc.

Disposition	Units	Annual Totals	Est. Total Error %
- No shipments during this report period -	m^3	n/a	
	Ci	n/a	n/a

d. Other - (Grease, Oil, Oily waste)

Disposition	Units	Annual Totals	Est. Total Error %
From Millstone Nuclear Power Station to Duratek Inc.,	m^3	1.0487E+00	
Kingston, TN for Super-Compaction, Incineration, etc.	Ci	2.7882E-03	25%

d. Other - (Water)

Disposition	Units	Annual Totals	Est. Total Error %
From Millstone Nuclear Power Station to Duratek Inc.,	m^3	2.5620E+01	
Oak Ridge, TN for Incineration	Ci	3.8158E-02	25%

d. Other - (Mixed Waste)

Disposition	Units	Annual Totals	Est. Total Error %
From Millstone Nuclear Power Station to Diversified Scientific	m^3	1.1230E-02	
Services, Kingston, TN for Incineration, Fuel Blending, etc.	Ci	1.1324E-05	25%
From Millstone Nuclear Power Station to Perma-Fix of Florida, Inc.,	m^3	2.4681E-01	
Gainesville, FL for Stabilization, Fuel Blending, etc.	Ci	1.4832E-03	25%

2. Estimate of major nuclide composition (by type of waste)

a. Spent resins, Filter sludges, Evaporator bottoms, etc.

From Millstone Nuclear Power Station to Duratek Inc., Kingston, TN for Super-Compaction, Incineration, etc.

Radionuclide	% of Total	Curies
H-3	1.21	6.4900E-03
C-14	0.03	1.4830E-04
Cr-51		
Mn-54	2.61	1.4004E-02
Fe-55	74.74	4.0081E-01
Fe-59		
Co-57	0.06	2.9900E-04
Co-58	1.25	6.7042E-03
Co-60	10.25	5.4967E-02
Ni-59		
Ni-63	8.72	4.6776E-02
Zn-65		
Sr-89		
Sr-90		
Nb-94		
Zr-95	0.16	8.3630E-04
Nb-95	0.24	1.2993E-03
Tc-99		
Ru-103		
Ru-106		
Ag-108m		
Ag-110m		
Sn-113		
Sb-124		
Sb-125	0.32	1.7314E-03
I-125		
I-129		
Cs-134		
Cs-137	0.22	1.1583E-03
Ba-140		
Ce-141		
Ce-144	0.18	9.6400E-04
Gd-153		
U-235		
U-238		
Pu-238	<0.01	6.6000E-07
Pu-239	<0.01	5.2900E-07
Pu-241	<0.01	5.1400E-05
Am-241	<0.01	7.7600E-07
Cm-242	<0.01	2.1080E-06
Cm-243		
Cm-244	<0.01	2.7900E-06
CURIES (TOTAL)		5.3624E-01

2. Estimate of major nuclide composition (by type of waste)

a. Spent resins, Filter sludges, Evaporator bottoms, etc.

From Millstone Nuclear Power Station to Studsvik Processing Center LLC, Erwin, TN for Thermal Destruction

Radionuclide	% of Total	Curies
H-3	0.19	4.0300E-01
C-14	0.35	7.2300E-01
Cr-51	<0.01	4.3300E-04
Mn-54	4.36	9.0100E+00
Fe-55	30.53	6.3100E+01
Fe-59	<0.01	1.7400E-03
Co-57	0.03	5.6900E-02
Co-58	0.26	5.4270E-01
Co-60	11.92	2.4630E+01
Ni-59		
Ni-63	49.27	1.0184E+02
Zn-65		
Sr-89		
Sr-90	0.02	3.2700E-02
Nb-94		
Zr-95	<0.01	1.8300E-02
Nb-95	<0.01	8.6900E-04
Tc-99	<0.01	1.1200E-02
Ru-103		
Ru-106		
Ag-108m		
Ag-110m		
Sn-113	0.02	3.1600E-02
Sb-124		
Sb-125	0.81	1.6790E+00
I-125		
I-129	<0.01	9.3500E-04
Cs-134		
Cs-137	1.90	3.9176E+00
Ba-140		
Ce-141		
Ce-144	0.33	6.8500E-01
Gd-153		
U-235		
U-238		
Pu-238	<0.01	7.6320E-04
Pu-239	<0.01	1.0160E-04
Pu-241	<0.01	1.8080E-02
Am-241	<0.01	3.8320E-04
Cm-242	<0.01	6.7100E-05
Cm-243		
Cm-244	<0.01	7.1870E-04
CURIES (TOTAL)		2.0671E+02

2. Estimate of major nuclide composition (by type of waste)

b. Dry compressible waste, Contaminated equipment, etc.

From Millstone Nuclear Power Station to Duratek Inc., Kingston, TN for Super-Compaction, Incineration, etc.

Radionuclide	% of Total	Curies
H-3	2.87	1.1127E-03
C-14		
Cr-51		
Mn-54	4.82	1.8693E-03
Fe-55	52.69	2.0432E-02
Fe-59		
Co-57		
Co-58	2.97	1.1530E-03
Co-60	12.81	4.9665E-03
Ni-59		
Ni-63	10.29	3.9905E-03
Zn-65		
Sr-89		
Sr-90	0.01	5.4450E-06
Nb-94		
Zr-95	2.27	8.7935E-04
Nb-95	2.86	1.1079E-03
Tc-99		
Ru-103		
Ru-106		
Ag-108m		
Ag-110m		
Sn-113		
Sb-124		
Sb-125	0.17	6.4600E-05
I-125		
I-129		
Cs-134	0.08	3.0000E-05
Cs-137	8.16	3.1645E-03
Ba-140		
Ce-141		
Ce-144		
Gd-153		
U-235		
U-238		
Pu-238		
Pu-239		
Pu-241		
Am-241		
Cm-242		
Cm-243		
Cm-244		
CURIES (TOTAL)		3.8776E-02

2. Estimate of major nuclide composition (by type of waste)

d. Other - (Grease, Oil, Oily waste)

From Millstone Nuclear Power Station to Duratek Inc., Kingston, TN for Super-Compaction, Incineration, etc.

Radionuclide	% of Total	Curies
H-3	0.01	3.3115E-07
C-14		
Cr-51		
Mn-54	1.59	4.4452E-05
Fe-55	51.70	1.4415E-03
Fe-59		
Co-57		
Co-58	1.21	3.3750E-05
Co-60	17.67	4.9267E-04
Ni-59		
Ni-63	14.23	3.9672E-04
Zn-65		
Sr-89		
Sr-90	0.25	6.9417E-06
Nb-94		
Zr-95	0.58	1.6033E-05
Nb-95	0.60	1.6632E-05
Tc-99		
Ru-103		
Ru-106		
Ag-108m		
Ag-110m		
Sn-113		
Sb-124		
Sb-125		
I-125		
I-129		
Cs-134	1.29	3.6067E-05
Cs-137	10.87	3.0307E-04
Ba-140		
Ce-141		
Ce-144		
Gd-153		
U-235		
U-238		
Pu-238		
Pu-239		
Pu-241		
Am-241		
Cm-242		
Cm-243		
Cm-244		
CURIES (TOTAL)		2.7882E-03

2. Estimate of major nuclide composition (by type of waste)

d. Other - (Water)

From Millstone Nuclear Power Station to Duratek Inc., Oak Ridge, TN for Incineration

Radionuclide	% of Total	Curies
H-3	84.50	3.2245E-02
C-14	0.25	9.3691E-05
Cr-51		
Mn-54	0.13	5.1333E-05
Fe-55	7.34	2.8018E-03
Fe-59		
Co-57	0.01	4.7433E-06
Co-58	0.01	5.4986E-06
Co-60	5.12	1.9544E-03
Ni-59		
Ni-63	1.80	6.8663E-04
Zn-65		
Sr-89		
Sr-90	<0.01	2.2160E-06
Nb-94		
Zr-95		
Nb-95	<0.01	7.1000E-07
Tc-99	<0.01	3.2000E-06
Ru-103		
Ru-106		
Ag-108m		
Ag-110m		
Sn-113		
Sb-124		
Sb-125	0.02	6.7633E-06
I-125	<0.01	3.7400E-06
I-129	<0.01	6.7933E-07
Cs-134	0.04	1.5200E-05
Cs-137	0.67	2.5602E-04
Ba-140		
Ce-141		
Ce-144	<0.01	8.1160E-10
Gd-153	0.02	6.5700E-06
U-235		
U-238	0.02	6.6000E-06
Pu-238		
Pu-239		
Pu-241		
Am-241	0.04	1.3920E-05
Cm-242		
Cm-243		
Cm-244		
CURIES (TOTAL)		3.8158E-02

2. Estimate of major nuclide composition (by type of waste)

d. Other - (Mixed Waste)

From Millstone Nuclear Power Station to Diversified Scientific Services, Kingston, TN for Incineration, Fuel Blending, etc.

Radionuclide	% of Total	Curies
H-3	99.64	1.1283E-05
C-14		
Cr-51		
Mn-54	<0.01	4.7667E-10
Fe-55	0.10	1.1640E-08
Fe-59		
Co-57	<0.01	1.2867E-10
Co-58	0.02	2.5800E-09
Co-60	0.06	7.2407E-09
Ni-59		
Ni-63	0.09	9.8733E-09
Zn-65		
Sr-89		
Sr-90	<0.01	1.1853E-10
Nb-94		
Zr-95		
Nb-95	<0.01	1.3367E-11
Tc-99		
Ru-103		
Ru-106		
Ag-108m		
Ag-110m		
Sn-113		
Sb-124		
Sb-125	<0.01	3.7333E-10
I-125		
I-129		
Cs-134	0.03	3.7000E-09
Cs-137	0.05	5.1833E-09
Ba-140		
Ce-141		
Ce-144		
Gd-153		
U-235		
U-238		
Pu-238		
Pu-239		
Pu-241		
Am-241		
Cm-242		
Cm-243		
Cm-244		
CURIES (TOTAL)		1.1324E-05

2. Estimate of major nuclide composition (by type of waste)

d. Other - (Mixed Waste)

From Millstone Nuclear Power Station to Perma-Fix of Florida, Inc., Gainesville, FL for Stabilization, Fuel Blending, etc.

Radionuclide	% of Total	Curies
H-3	0.63	9.3028E-06
C-14	0.37	5.5467E-06
Cr-51		
Mn-54	0.68	1.0112E-05
Fe-55	29.69	4.4034E-04
Fe-59		
Co-57		
Co-58	0.93	1.3844E-05
Co-60	21.10	3.1297E-04
Ni-59		
Ni-63	15.97	2.3679E-04
Zn-65		
Sr-89		
Sr-90	0.09	1.3075E-06
Nb-94		
Zr-95	0.48	7.1557E-06
Nb-95	1.04	1.5409E-05
Tc-99		
Ru-103		
Ru-106		
Ag-108m		
Ag-110m		
Sn-113		
Sb-124		
Sb-125	0.41	6.0997E-06
I-125		
I-129		
Cs-134	0.48	7.1557E-06
Cs-137	28.12	4.1713E-04
Ba-140		
Ce-141		
Ce-144		
Gd-153		
U-235		
U-238		
Pu-238		
Pu-239		
Pu-241		
Am-241		
Cm-242		
Cm-243		
Cm-244		
CURIES (TOTAL)		1.4832E-03

3. Solid Waste Disposition (Shipments from Millstone)

Number of Shipments*	Mode of Transportation	Destination
1	Truck (Sole Use Vehicle)	Diversified Scientific Services, Kingston, TN
6	Truck (Sole Use Vehicle)	Duratek Inc. - Kingston, TN
4	Truck (Sole Use Vehicle)	Duratek Inc. - Oak Ridge, TN
2	Truck (Sole Use Vehicle)	Perma-Fix of Florida Inc. - Gainesville FL
2	Truck (Sole Use Vehicle)	Studsvik Processing Center LLC - Erwin, TN

* Indicates the number of shipments in this category which contained *any* unit 3 waste. (Example: A shipment containing wastes from units 1, 2 *and* 3 will be counted once on *each* of the three unit-specific sections of this report.) 27 physical shipments were made from this station in 2003.

B. IRRADIATED FUEL SHIPMENTS (Disposition)

Number of Shipments	Mode of Transportation	Destination
No Shipments in 2003	N/A	N/A

3.0 REMODCM Changes

In 2003, the following changes were made to the Millstone REMODCM:

Rev	Effective Date	
24	September 12, 2003	
24-01	October 7, 2003	(Non-intent administrative change)

The description and the bases of the change(s) for each REMODCM revision are included in Volume I of this report. In addition, a complete copy of the REMODCM revision(s) for the calendar year 2003 is provided to the Nuclear Regulatory Commission as Volume II of this report.

REMODCM Rev 24

Description of Changes and

Radiological Environmental Review

Radiological Environmental Review

RER-03-002

Revision 0

REMODCM Revision 24

May 6, 2003

Total Number of Pages: 20

Claude Flory	*Claude Flory* Preparer	5/6/03 Date
William Eakin	*W.J. Eakin* Supervisor	5/9/03 Date

1.0 <u>DESCRIPTION OF CHANGE</u>

List of proposed changes for REMODCM Revision 24 per Change Requests I-02-01, II-02-01, III-02-01, IV-02-01, and V-02-01:

General Changes:
1. A general table of contents is being added to facilitate manual reference.
2. Changes are being made to switch from the version of 10 CFR Part 20 prior to 1994 to the present version of Part 20 when applicable to the Radiological Effluent Control Program.

Section I.A, "Introduction"
Adding a link to the REMODCM Technical Information Document (MP-13-REM-REF02) for exceptions to Reg Guide 1.21. Unit 3 FSAR Table 1.8-1 will be revised to take exceptions to this regulatory guidance; it will reference the REMODCM for an explanation of exceptions.

Section I.C.1, "Liquid Effluent Sampling and Analysis Program"
1. Moving RBCCW Sump from Batch Release to Continuous Release section of Table I.C-2.
2. Adding Footnote N in Table I.C-2 and Footnote M in Table I.C-3 to require accounting of tritium releases via the steam generator blowdown tank vent.

Section I.C.2, "Liquid Radioactive Waste Treatment"
1. In Step a.2, changing "inoperable equipment" to "processing" and, in Sub-section c, revising the wording to specify equipment as being "in or out of service" rather than "inoperable."
2. In Step a.3 deleting the word "applicable" and adding the words "with processing equipment not operating" in order to make the requirement more explicit.

Section I.D.1, "Gaseous Effluent Sampling and Analysis Program"
1. In Table I.D-2, deleting some requirements for containment purge/vent sampling and analyses:
   (a) Analysis for tritium is being relaxed from prior to purge and weekly for venting to monthly.
   (b) Requirements for sampling and analyses for iodine and particulates are being deleted.
2. In Table I.D-2, revising Footnote H to delete the word "continuously," add the words "and released to the environment," and modifying Condition (4) for releasing contents of waste gas decay tanks during purging/venting of a tank.
3. In Table I.D-2, revising Footnote C which requires an additional gas sample after an unexplained increase in radiation monitor reading of 50%.
4. In Tables I.D-2 and I.D-3, revising Footnote F to:
   a) Change criteria for more frequent collection and analyses of charcoal and particulate samples. The criterion of a factor of five increase of I-131 in reactor coolant samples will be changed to an increase of a factor of three. A new criterion of an increase in noble gas monitor reading by a factor of three will be added.
   b) Change Footnote F to require subsequent samples daily rather than "every 24 hour."

5. Adding Footnote J in Table I.D-2 and Footnote H in Table I.D-3 to specify that only the initial purge during outages needs to be sampled.
6. In Tables I.D-2 and I.D-3, adding a requirement for sampling at the open equipment hatch during outages.
7. In Table I.D-3, adding a requirement to obtain weekly containment air samples with weekly analysis for gaseous radioactivity and monthly analyses for tritium.
8. Revising Table I.D-3 Footnote F to specify that the more frequent charcoal and particulate sample requirement applies only to the Unit 3 Vent and not to the ESF Vent or Unit 3 releases to the Millstone Stack.

Section I.D.2, "Gaseous Radioactive Waste Treatment"
1. In Step a.2, changing "inoperable equipment" to "processing" and, in Sub-section c, revising the wording to specify equipment as being "in or out of service" rather than "inoperable."
2. In Step a.3, deleting the word "continuously."
3. Revising Figure I.D-3 to:
   a) Add CPF with Turbine Gland Seal Steam Condenser Exhaust,
   b) Add Main Condenser Air Ejector,
   c) Replace boxes showing Reactor Plant Gaseous Drains and Charging System with RCS Letdown and Gaseous Waste System.

Section I.E, "Radiological Environmental Monitoring - Sampling and Analysis":
Adding onsite well water samples.

Section I.F.2, "Radioactive Effluent Report"
The word 'time' in "meteorological conditions concurrent with the time of radioactive gaseous effluent releases" is being changed to 'quarter.'

Section II.C.5, "Monthly Dose Projections"
1. The dose projection method for Units 2 & 3 is being divided into two methods - one without significant radioactivity in the steam generators and one with significant radioactivity in the steam generators. A new Sub-section 'c' is being created to accommodate the additional method.
2. Two footnotes are being added in Sub-section 'b.' These notes were inadvertently deleted in Revision 21 to the REMODCM when Sub-section 'a' was revised. In Sub-section 'c' the asterisked note to refer to notes in Sub-section 'a' was revised to refer to the notes in Sub-section 'b.'
3. Deleting reference to note in Section II.C.5.a. Section II.C.5.a had been deleted in a prior revision.
4. Page II.C-6 is being repaginated.

Section II.D.3, "10CFR50 Appendix I - Iodine and Particulate Doses"
1. The word 'time' in "meteorological conditions concurrent with the time of radioactive gaseous effluent releases" is being changed to 'quarter.'
2. Changing title of section to "10CFR50 Appendix I - Iodine, Tritium, and Particulate Doses."

3. Correcting method so that Unit 1 releases dose calculation goes from Method 1 to Method 2b (bypassing Method 2a).
4. Correcting the meteorological parameter, X/Q, in Method 2a from $6.1x10^8$ sec/m^3 to $6.3x10^8$ sec/m^3 to correct a typographical error.
5. Deleting alternate meteorological parameter, D/Q, in Stack release Method 2a.
6. In Sub-section (3), "Method 2b - Millstone Stack and Unit 1 Releases", correcting reference from 'Section c(5)' to 'Section b(3).'
7. In Section II.D.3.b, deleting the two asterisk footnotes in the descriptions for parameters $_{131}C_{IV}$, $_{133}C_{IV}$, C_{PS}, and C_{HV}.
8. In Section II.D.3.b, adding the steam generator blowdown tank vent as one of the release pathways which have to be included when determining tritium releases for dose calculations.
9. For the alternate meteorological parameter, D/Q, in Unit 2 and 3 releases Method 2a, deleting present guidance in parentheses and adding new guidance that the alternate D/Q is only for milk if the closest milk animal is no closer than in 1983 to 1987.
10. In Sub-section (3), "Method 2b - Unit 2 and Unit 3 releases," correcting 'aerated ventilation' to "ESF ventilation' in last sentence.

Section II.D.4, "Gaseous Effluent Monthly Dose Projections"
1. Deleting Section II.D.4.b(2), "Unit 2 Projection Method - Due to Steam Generator Blowdown Tank Vent."
2. In Section II.D.4.b(3), deleting the double asterisk (**) note which states that gamma and beta air dose projections are not required for ventilation releases.

Section II.E, "Liquid Monitor Setpoint Calculations"
3.0 Name of section is being revised because it includes requirements for discharge flow rates.
4.0 For the Unit 2 Clean and Aerated Liquid Radwaste Effluent Lines and Unit 3 Liquid Waste Monitor:
   1. Determination of allowable discharge flow is being simplified.
   2. The requirement to use the smaller of the two factors R_1 or R_2 is being added.
   3. Setpoint methodology is being revised to allow for use of isotopic-specific response factors.
   4. For the Unit 2 monitors, Note 2 is being revised to change the alternate setpoint concentration limit used in the basis from 3×10^{-7} to 1×10^{-7} uCi/ml.
   5. For the Unit 3 monitor, the assumed flow rate for a circulating water pump is being changed from 150,000 to 100,000 cfm
   6. For the Unit 3 monitor, units of 'cps' in directions for determining setpoint is being deleted because this monitor reads in units of 'uCi/ml' rather than in 'cps.'
5.0 The Unit 2 RBCCW Sump is being added as a source which requires limitation on radioactivity concentrations in water being discharged to the environment.
6.0 The setpoint requirement for the Unit 3 Waste Neutralization Sump Effluent Line is being revised so that the setpoint would never exceed 2E-4 uCi/ml. This does not change the affect of the requirement. It does simplify the requirement by removing confusing and ambiguous wording.

7.0 For the Unit 3 Steam Generator Blowdown radiation monitor, the assumed flow rate for a circulating water pump, used as a basis for the setpoint, is being changed from 150,000 to 100,000 cfm.

8.0 For the Unit 3 Turbine Building Floor Drains Effluent Line the setpoint is being changed from a calculated value to a value based on background reading of the radiation monitor.

Section II.F, "Gaseous Monitor Setpoints"

1. Requirements for responses to an alarm for the Unit 1 Spent Fuel Pool Island (SFPI) Vent Monitor, Unit 2 Wide Range Gas and Vent Monitors, and Unit 3 SLCRS and Vent monitors are being revised.
2. For the Unit 1 Spent Fuel Pool Island Monitor, a note is being added to state that the required setpoint of 1.71E-3 uCi/cc is the basis for an emergency classification in Unit 1 EAL Table for OA-1.
3. For the Unit 3 Engineering Safeguards Building Monitor, the setpoint is being revised from 1.5x10-5 uCi/cc to 4.7x10-4 uCi/cc.

Section III.B, "Definitions"

4. Section designation is being changed to III.B.1 to accommodate new Section III.B.2.
5. Definition for INSTRUMENT FUNCTIONAL TEST is being revised to allow, for digital instruments, the alternate test method of raising an alarm, interlock, or trip in lieu of injecting a signal to test instrument operability.

Section III.B.2, "Applicability" (NEW)

Applicability and surveillance requirements are being added with wording identical to Technical Specifications 3.0.2 and 3.0.3 to implement a change being made to Technical Specification 5.6.4 with LBDCR #1-01-02 (Letter B18560, dated 5/13/02, to the NRC).

Section III.C.1, "Radioactive Liquid Effluent Monitoring Instrumentation"

Requirements for a reactor cavity water discharge radiation monitor and flow measurement device is being added.

Section III.C.2, "Radioactive Gaseous Effluent Monitoring Instrumentation"

9.0 In the first paragraph under "Controls" correcting 'Sections II.F.3 and II.F.4' to 'Section II.F.1.' This change should have been made in a prior revision.

10.0 Sampler flow monitor is being added to Balance of Plant Vent instrumentation.

11.0 Table III.C-3 footnote is being revised to:

1. Change allowable outage time from "within the time frame of the specified Action statement" to a maximum of 12 hours.
2. Clarify that the exceptions for maintenance and performance of test, checks, and calibrations is applicable to both the instruments listed in the table and to any system or component which directly affects operability of the these instruments.
3. Add sampling as an activity which could place the instrument temporarily out of service.

12.0 Action C for Table III.C-3 is being revised from the requirement to record a default flow rate of 36,000 cfm daily to recording the flow rate every 8 hours.

13.0 Action D for Table III.C-3 is being revised to specify sampling time period from Action A or Action B.

14.0 Calibration footnote #6 in Table III.C-4 for the Spent Fuel Pool Island Vent Noble Gas Activity Monitor is being revised to specify that the calibration source strength has to be determined by a detector which has been calibrated by an NIST traceable source.

Section III.D.1, "Radioactive Liquid Effluents Concentrations and Doses"
For Unit 1, limits on radioactivity concentrations in liquid effluents and doses from radioactivity released in liquid effluents are being added.

Section III.E, "Total Radiological Dose from Station Operations"
Adding the phrase "beyond the site boundary" to specify where the limit is applicable.

Section III.F, "Bases"
New bases for liquid effluent concentrations and doses to support new requirements is being added. These bases are identical to bases for the same requirements for Units 2 and 3.2.

Section IV.B, "Definitions"

1. Section designation is being changed to IV.B.1 to accommodate new Section IV.B.2.
2. Definition for INSTRUMENT FUNCTIONAL TEST is being revised to allow, for digital instruments, the alternate test method of raising an alarm, interlock, or trip in lieu of injecting a signal to test instrument operability.

Section IV.B.2, "Applicability" (NEW)
Applicability and surveillance requirements are being added with wording identical to Technical Specifications 3.0.2 and 3.0.3 to implement a change being made to Technical Specification 6.20 with LBDCR #2-08-02 (Letter B18560, dated 5/13/02, to the NRC).

Section IV.C.1, "Unit 2 Radioactive Liquid Effluent Monitoring Instrumentation"

3. In Tables IV.C-1 and IV.C-2, requirements for the Dilution Water Flow and the Steam Generator Blowdown line flow rate measurement devices (Items #3.d and 3.e in both tables) are being deleted.
4. In Table IV.C-1, the applicability footnotes are being revised to clarify that the exceptions for maintenance, test, check, calibrations, and sampling is applicable to both the instruments listed in Tables IV.C-1 and to any system or component which directly affects operability of the these instruments.
5. In Table IV.C-1, the specification for dectectability of gross gamma in Footnotes B, C and E is being changed to lower limits of detection specified in Table I.C-2.

Section IV.C.2, "Unit 2 Radioactive Gaseous Effluent Monitoring Instrumentation"

15.0 In Tables IV.C-3 and IV.C-4, wording is being added to specify that the requirements are only applicable to the normal range gaseous effluent monitor and that the high range monitor requirements are contained in the TRM.

16.0 In Table IV.C-3, the double asterisk (**) note is being revised:

1. To clarify that the exceptions for maintenance, test, check, calibrations, and sampling is applicable to both the instruments listed in Tables IV.C-3 and to any system or component which directly affects operability of the these instruments, and
2. To specify applicability only when air is not being released to the environment by the pathway being monitored.

17.0 In Table IV.C-4, Footnote (1) is being revised to specify that the calibration source strength has to be determined by a detector which has been calibrated by an NIST traceable source.

Section IV.D.1, "Radioactive Liquid Effluents"
Wording of surveillance is revised to make it consistent with the NRC guidance in NUREG-1301.

Section IV.E, "Total Radiological Dose from Station Operations"
The phrase "beyond the site boundary" is being added to specify where the limit is applicable.

Section IV.F, "Bases"
In bases for Section IV.C.2 the following changes are being made:

1. Change alarm/trip setpoint bases from 10CFR20 to limits specified in Section IV.D.2.a. Limits in this section are based on annual doses from the version of 10CFR20 prior to 1994.
2. Delete discussion of explosive gas monitoring in the gaseous waste system.

Section V.B, "Definitions"

3. Section designation is being changed to V.B.1 to accommodate new Section V.B.2.
4. Definition for ANALOG CHANNEL OPERATIONAL TEST is being revised to allow, for digital instruments, the alternate test method of raising an alarm, interlock, or trip in lieu of injecting a signal to test instrument operability. Delete the word "ANALOG."

Section V.B.2, "Applicability" (NEW)
Applicability and surveillance requirements are being added with wording identical to Technical Specifications 3.0.2 and 3.0.3 to implement a change being made to Technical Specification 6.15 with LBDCR #3-04-02 (Letter B18560, dated 5/13/02, to the NRC).

Section V.C.1, "Unit 3 Radioactive Liquid and Gaseous Effluent Monitoring Instrumentation"

5. Deleting the word "ANALOG" from "ANALOG CHANNEL OPERATIONAL TEST." This implements the definition change as described above.
6. Deleting conditional statement on Turbine Building Floor Drains Radiation Monitor actions statement by removing the triple asterisk note.
7. Changing applicability for the Steam Generator Blowdown Monitor from "MODEs 1-5 and MODE 6 when pathway is being used" to "MODEs 1-5."
8. Adding an exception for Waste Neutralization Sump Monitor and Effluents flow rate measurement device for times when there is no detectable tritium or gamma radioactivity does not exceed 5E-7 uCi/ml in steam generators or the sump is diverted to radwaste.

9. Revising applicability footnotes to clarify that the exceptions for maintenance, test, check, calibrations, and sampling is applicable to both the instruments listed in Table V.C-1 and to any system or component which directly affects operability of the these instruments.
10. Changing specification for dectectability of gross gamma in Footnotes B and D to lower limits of detection specified in Table I.C-3.
11. Deleting requirements for the Dilution Water Flow rate measurement device (Item 2.f in both tables).
12. Deleting requirements for Regenerative Evaporator radiation monitor and flow measurements.

Section V.C.2, "Unit 3 Radioactive Gaseous Effluent Monitoring Instrumentation"

18.0 Adding wording to specify that the requirements are only applicable to the normal range gaseous effluent monitor and that the high range monitor requirements are contained in the TRM.

19.0 In Table V.C-3, changing Action D for SLCRS Noble Gas Activity Monitor (Item #2.a) to Action A.

20.0 In Table V.C-3, revising Action A to allow use of the Remote Indicating Controller (RIC) with a 12 hour channel check and check for alarm conditions as an alternate compensatory action to sampling.

21.0 Changing Table V.C-3 Action A for the Engineered Safeguards Building and Warehouse No. 5 Vent Noble Gas Monitors (Items 3.a and 4.a) to Action D and revising Action D to add the words "these samples are" and delete the word "gross."

22.0 Changing Table V.C-3 Action A for the Warehouse No. 5 Iodine and Particulate Samplers to Action B. Action is more appropriate for sampler compensatory actions.

23.0 In Table V.C-3, revising the single asterisk (*) note to:

1. Specify applicability only when the release path is in service. The instruments are not needed to perform their functions when air is not being released. This prevents having to classify instrumentation inoperable during ventilation outages.
2. Clarify that the exceptions for maintenance, test, check, calibrations, and sampling is applicable to both the instruments listed in Table V.C-3 and to any system or component which directly affects operability of the these instruments.

Section V.D.1, "Radioactive Liquid Effluents"

Wording of surveillance is revised to make it consistent with the NRC guidance in NUREG-1301.

Section V.E, "Total Radiological Dose from Station Operations"

Add the phrase "beyond the site boundary" to specify where the limit is applicable.

24.0 DISCUSSION

1. General

Changes which are being made for clarification or to correct errors in the REMODCM will not be discussed.

Following changes are being made to change from version of 10CFR20 prior to 1994 to present version of 10CFR20:

a. References to 10CFR20 Table II are being changed Table 2.
b. Changing liquid effluent concentration limit to ten times the concentration limits and changing "MPC' to "Effluent Concentration.'

These changes are needed to implement LBDCRs #1-01-02, #2-08-02, and #3-04-02 (Letter B18560, dated 5/13/02, to the NRC) which will change Millstone licensing basis from Part 20 prior to 1994 to the present version of Part 20 when applicable to the Radiological Effluent Control Program.

2. Changes to Support Discharge of Unit 1 Reactor Cavity Water

A number of changes are being made to support the discharge of Unit 1 reactor cavity water to the Millstone Quarry. These changes are consistent with NRC guidance and similar to requirements for Units 2 and 3 in Sections IV.D.1 and V.D.1. They include:

- Sampling and analysis requirements of Unit 1 reactor cavity water prior to discharge.
- Required processing equipment for Unit 1 reactor cavity water.
- Dose method requirements.
- Limitation on radioactivity concentrations in liquid effluents and doses from radioactivity released in liquid effluents.
- Requirements for the Reactor Cavity Water Discharge Line dilution flow rate and radiation monitor setpoint.
- Requirements for a reactor cavity water discharge radiation monitor and flow measurement device is being added.

3. Changes Relative to Unit 2 RBCCW Sump

RBCCW Sump water used to be directed to radwaste, but recent line repairs restored system ability to bypass radwaste. Bypass is needed to protect radwaste systems from the salt water in the sump.

- The Unit 2 RBCCW Sump is being moved from a batch source to a continuous source in Table I.C-2. This changes the analysis frequency for gamma emitters (with I-131 and Ce-144) from prior to each discharge to weekly and for dissolved and entrained gases from prior to each discharge to monthly. Because the sump discharge operates in an intermittent automatic mode it is more appropriate to treat it as a continuous release. Relaxation of the analysis frequency for gamma emitters and dissolved gases is acceptable because radioactivity levels in the sump water will only change slowly in time.
- A requirement is being added to limit radioactivity concentrations in water being discharged from the RBCCW sump to the environment. Placing limitation on RBCCW Sump water radioactivity concentrations should have been added to the REMODCM when the RBCCW

Sump water sample was added to Table I.C-2 in Revision 22.

4. Accounting for Tritium Releases from Steam Generator Blowdown Tank Vents
At both Units 2 and 3 a requirement is being added to account for tritium releases via the steam generator blowdown tank vent. Tritium is now routinely seen in the each plant's secondary side systems. Therefore, the blowdown vent becomes a source of tritium releases to the environment which needs to be accounted.

5. Clarification on Use of Processing Equipment

- Wording to describe applicable processing equipment is being revised to reinforce the interpretation that the equipment should be returned to service whenever it is operable. The wording changes include changing "inoperable equipment" to "processing" and revising the wording to specify equipment as being "in or out of service" rather than "inoperable."
- For gaseous processing equipment, deleting the word "continuously" in Step a.3 because some of the processing equipment is designed to operate intermittently.
- Revising Figure I.D-3 to:
  1) Add CPF with Turbine Gland Seal Steam Condenser Exhaust to show this release source,
  2) Add Main Condenser Air Ejector to show this release source,
  3) Replace boxes showing Reactor Plant Gaseous Drains and Charging System with RCS Letdown and Gaseous Waste System. This change will more clearly identify the source and pathway of release.
  These changes will make the REMODCM consistent with planned changes to FSAR Figure 11.3-2 (CR M3-98-3325).

6. Relaxation of Requirements on Unit 2 Containment Purge/Vent Sampling and Analyses
The Unit 2 requirements for containment purge/vent sampling and analyses of tritium, iodine, and particulates are being relaxed. Tritium in containment would never be high enough to cause concentration or dose limits to be exceeded at the site boundary for any one purge. Weekly tritium analyses for containment venting are not needed because tritium does not vary considerably in containment. Iodine and particulates are being deleted because all containment purges/vents are released to the vent or the Millstone Stack where weekly iodine and particulate samples are collected as required by Section C in this Table I.D-2. These changes are consistent with NRC guidance found in NUREG-1301.

7. Minor Releases from Unit 2 Waste Gas Decay Tanks
Several changes are being made to Footnote H of Table I.D-2 to avoid unnecessary controls and paperwork for trivial releases of small amounts of radioactive gas already accounted for in a prior release from the Unit 2 waste gas decay tanks. These changes include deleting the word "continuously," adding the words "and released to the environment," and modifying Condition (4) for releasing contents of waste gas decay tanks during purging/venting of a tank. The word "continuously" wrongly connotes a continuous operation which is actually performed in steps. The words "released to the environment" will distinguish environmental release from tank vents within the system. Criteria will be added in Condition (4) to allow

releases without a permit.

8. Changes to Requirement for Additional Gas Samples After a 50% Increase of the Vents and Stack Radiation Monitors

In Tables I.D-2 and I.D-3 for Units 2 and 3, Footnote C requires additional gas samples after an unexplained increase in radiation monitor reading of 50%. The following changes are being made:

- The exception to not take the additional sample following a 50% increase during thermal power changes is being deleted and will be replaced with a requirement to sample 24 to 72 hours after shutdown, startup, or power change of greater than 15%. This sampling requirement is needed to ensure that the change in radionuclide mix after these power changes are measured. This change would make the requirement consistent with NRC guidance in NUREG-1301.
- The footnote is also being revised to avoid having to take a sample if the increase of radioactivity has returned to the reading prior to the increase before a sample can be taken. A requirement is being added to estimate these short term releases of radioactivity.

9. Changes to Requirement for Additional Iodine and Particulates Samples After an Increase in Reactor Coolant Iodine

In Tables I.D-2 and I.D-3 for Units 2 and 3, Footnote F requires additional samples after an increase of dose equivalent I-131 in reactor coolant. The following changes are being made:

- The criterion of a factor of five increase of I-131 in reactor coolant samples will be changed to an increase of a factor of three. This change would make the requirement consistent with NRC guidance in NUREG-1301
- A new criterion of an increase in noble gas monitor reading by a factor of three will be added. This change would make the requirement consistent with NRC guidance in NUREG-1301.
- Change Footnote F to require subsequent samples daily rather than "every 24 hour" to allow more flexibility in scheduling of samples.
- For Unit 3, revising Table I.D-3 Footnote F to specify that the more frequent charcoal and particulate sample requirement applies only to the Unit 3 Vent and not to the ESF Vent or Unit 3 releases to the Millstone Stack. Increases of radioactive iodines or particulates through the ESF Vent or to the Millstone Stack would not be expected with increase in reactor coolant I-131. This makes the footnote consistent with the same footnote for Unit 2 in Table I.D-2.

10. Clarification on Sampling Prior to Containment Purge During an Outage

Adding Footnote J in Table I.D-2 for Unit 2 and Footnote H in Table I.D-3 for Unit 3 to specify that only the initial purge during outages needs to be sampled. During outages the containment is repeatedly purged, sometimes multiple times daily. A sample before each purge is not needed. Almost all the radioactivity released from containment during an outage occurs at the initial purge. Any significant release after the initial purge during an outage will be sampled if it causes a 50% increase in the vent or stack effluent monitor (see Footnote C for each table).

11. Sampling Releases from the Open Equipment Hatch
In Table I.D-2 for Unit 2 and Table I.D-3 for Unit 3, adding a requirement for sampling at the open equipment hatch during outages. Licensing changes are pending to allow the hatch to be open for longer periods of time. The REMODCM requirement will support a commitment made to the NRC associated with the licensing change for enhanced monitoring of airborne releases.

12. Sampling Containment Vents at Unit 3
In Table I.D-3, adding a requirement to obtain weekly containment air samples with weekly analysis for gaseous radioactivity and monthly analyses for tritium. The purpose of this requirement will be to account for releases of gaseous radioactivity and tritium during containment vents which are probably not captured in the weekly grab sample required by Section B of this table. As part of this change a new Footnote I will be added to require an additional sample if the containment air monitor increases after the weekly sample. This change will implement NRC guidance found in NUREG-1301 and will also make Unit 3 consistent with Unit 2 requirements in Table I.D-2.

13. Change to Radiological Environmental Monitoring Program (REMP)
Adding onsite well water samples. Well water samples are being added to address potential releases to the environment via groundwater. This is a response to Connecticut Yankee's experience and to some Millstone incidents and concerns including spills of contaminated water and groundwater intrusions.

14. Clarification on Meteorological Time Frame
The word 'time' in "meteorological conditions concurrent with the time of radioactive gaseous effluent releases" is being changed to 'quarter.' This is a more accurate description of the method used to calculate dose from gaseous effluents. Dose is calculated for each quarter and the meteorological conditions used in the calculation is an average of any time within the quarter when there was a release.

15. Dose Method Simplifications
- The dose projection method for Units 2 & 3 is being divided into two methods - one without significant radioactivity in the steam generators and one with significant radioactivity in the steam generators. This is done to greatly simplify the dose method when there is not significant radioactivity in the steam generators which is normally the case.
- Correcting method so that Unit 1 releases dose calculation goes from Method 1 to Method 2b (bypassing Method 2a) because the meteorological parameters in Method 2a are not applicable to Unit 1 releases.
- Deleting alternate meteorological parameter, D/Q, in Stack release Method 2a. There is no guidance in the REMODCM Technical Information Document as presently stated. Use of the higher D/Q will not have a major impact because, with better computer capabilities, Method 2b is not as time-consuming as before.
- In Section II.D.3.b, deleting the two asterisk footnotes in the descriptions for parameters ${}_{131}C_{IV}$, ${}_{133}C_{IV}$, C_{PS}, and C_{HV}. These footnotes are not needed for the implementing organization to fulfill the REMODCM requirements.

- For the alternate meteorological parameter, D/Q, in Unit 2 and 3 releases Method 2a, deleting present guidance in parentheses and adding new guidance that the alternate D/Q is only for milk if the closest milk animal is no closer than in 1983 to 1987. There is no guidance in the REMODCM Technical Information Document as presently stated and the alternate D/Q is not applicable to vegetation.
- Deleting Section II.D.4.b(2), "Unit 2 Projection Method - Due to Steam Generator Blowdown Tank Vent." The intent of the dose projection methods in Section II.D.4 is to estimate doses from release pathways with inoperable processing equipment as specified in Section I.D.2. There is no processing equipment specified for the blowdown tank vent in Section I.D.2; therefore, this dose projection method is not needed.
- In Section II.D.4.b(3), deleting the double asterisk (**) note which states that gamma and beta air dose projections are not required for ventilation releases. The purpose of the note was to explain why only maximum organ dose is projected when ventilation processing equipment is inop as specified in Section I.D.2. However this note is confusing because of it's vagueness and Section I.D.2 already states that only the doses specified in Section II.D.4 need to be determined. Therefore the note is being deleted to avoid any confusion.

16. Unit 2 Clean and Aerated Liquid Waste and Unit 3 Liquid Waste Rad Monitors
17. Determination of allowable discharge flow is being simplified by delineating steps in the process and by deleting the basis information on maximum allowable noble gas concentration. The basis information will be moved to the REMODCM Technical Information Document (MP-13-REM-REF02).
18. The requirement to use the smaller of the two factors R_1 or R_2 is being added. This requirement was inadvertently deleted in a prior revision. However, the implementing organization continued to fulfill the requirement.
19. Setpoint methodology is being revised to allow for use of isotopic-specific response factors.
20. For the Unit 2 monitors, Note 2 is being revised to change the alternate setpoint concentration limit used in the basis from 3×10^{-7} to 1×10^{-7} uCi/ml to make it consistent with the Unit 3 value. This will cause the Unit 2 alternate setpoint to be reduced by a factor of three.
21. For the Unit 3 monitor, the assumed flow rate for a circulating water pump is being changed from 150,000 to 100,000 cfm to account for reduced flow when vacuum priming is off (see CR-02-08409). This results in a lower maximum allowable noble gas concentration and in a lower alternate radiation monitor setpoint. The maximum allowable noble gas concentration will change from 0.4 to 0.26 uCi/ml. The alternate setpoint will change from 2E-4 to 1.3E-4 uCi/ml.

22. Unit 3 Steam Generator Blowdown Rad Monitor

For the Unit 3 Steam Generator Blowdown radiation monitor, the assumed flow rate for a circulating water pump, used as a basis for the setpoint, is being changed from 150,000 to 100,000 cfm to account for reduced flow when vacuum priming is off (see CR-02-08409). This results in a lower radiation monitor setpoint, changing from 2.47E-5 to 1.7E-5 uCi/ml.

23. Unit 3 Turbine Building Floor Drains Rad Monitor

For the Unit 3 Turbine Building Floor Drains Effluent Line the setpoint is being changed from a calculated value to a value based on background reading of the radiation monitor because the original basis for the setpoint was not valid. A maximum limit on the setpoint is being added. The original basis is being deleted and the basis for the maximum limit value is being added to the REMODCM Technical Information Document (MP-13-REM-REF02).

24. Changes to Requirements for Setpoints Based on Instantaneous Release Rate Limit

- Requirements for responses to an alarm for the Unit 1 Spent Fuel Pool Island (SFPI) Vent Monitor, Unit 2 Wide Range Gas and Vent Monitors, and Unit 3 SLCRS and Vent monitors are being revised. These five gaseous release points are major contributors from Millstone for dose from noble gases, particulates and radioactive iodines. Response will be required upon reaching the alarm instead of upon approaching the alarm and the response will be directed to determining concurrent releases from the other four release points. Because each alarm is based on a fraction of the total site limit for an instantaneous dose rate limit, a response is not needed prior to reaching the alarm. Specifying the other four release points when there is an alarm at one release point will define which release points need to be considered when determining total site dose rates.
- For the Units 2 and 3 Vent Monitors, the option to adjust alarm setpoints at multiple release points is being deleted. These changes make the setpoint requirements consistent between the five release point radiation monitors. Adjustment of alarms would never be used because of the difficulty of implementing this option. It also was not needed as there is substantial margin between dose rate from a release which would cause an alarm at one release point and the site dose rate limits.
- For the Unit 3 Engineering Safeguards Building Monitor, the setpoint is being revised from 1.5x10-5 uCi/cc to 4.7x10-4 uCi/cc to implement Calculation RERM-01946-R3, Rev 0. Basis of the setpoint changed from 0.16% to 1% of the site instantaneous release rate limit. The value of the setpoint changed by more that the factor of 1/0.16 because of a new methodology used to calculated the instantaneous release rate limit.

25. Unit 1 Spent Fuel Pool Island Monitor

For the Unit 1 Spent Fuel Pool Island Monitor, a note is being added to state that the required setpoint of 1.71E-3 uCi/cc is the basis for an emergency classification in Unit 1 EAL Table for OA-1.

26. Definition for Instrument Functional Test

The definition is being revised to allow, for digital instruments, the alternate test method of raising an alarm, interlock, or trip in lieu of injecting a signal to test instrument operability. This test method is equivalent to signal injection for digital instruments and provides an easier test method.

27. Applicability And Surveillance Requirements

These requirements are being added with wording identical to Technical Specifications 3.0.2 and 3.0.3 to implement a change being made to Technical Specification 5.6.4 with LBDCR #1-01-02, #2-08-02, and #3-04-02 (Letter B18560, dated 5/13/02, to the NRC).

This addition would also be an enhancement to the REMODCM by making the general requirements the same as Tech Specs. These general requirements were applicable to the requirements of REMODCM Section III when they were in Tech Specs but were not transferred to the REMODCM when the Radiological Effluent Tech Specs (RETS) were moved to the REMODCM. The absence of the general requirements in the REMODCM did not compromise the ability to implement RETS in the REMODCM. However, restoring the general requirements to RETS in the REMODCM gives Operators the same clear interpretations of the requirements as they had when in Tech Specs.

28. Addition of Unit 1 Balance of Plant Sampler Flow Monitor Requirements
Sampler flow monitor is being added to Balance of Plant Vent instrumentation. This instrumentation is important to ensure that gaseous effluent from the plant other than the Spent Fuel Pool Island is being adequately monitored for particulate radioactivity.

29. Clarifications on Gaseous Effluent Rad Monitoring Operability

- For Unit 1, changing allowable outage time from "within the time frame of the specified Action statement" to a maximum of 12 hours. The present allowed time is confusing. The new requirement of a maximum of 12 hours is consistent with requirements for effluent monitors at Millstone Units 2 and 3.
- Clarifying that the exceptions for maintenance and performance of test, checks, and calibrations is applicable to both the instruments listed in the table and to any system or component which directly affects operability of the these instruments.
- For Unit 1, adding sampling as an activity which could place the instrument temporarily out of service. This allows Chemistry to sample the effluent stream without the administrative burden of declaring the instrument inoperable. This change also makes the requirement consistent with operability requirements for effluent monitors at Millstone Units 2 and 3.
- For Units 2 and 3, specifying applicability only when air is not being released to the environment by the pathway being monitored. The instruments are not needed to perform their functions when air is not being released. This prevents having to classify instrumentation inoperable during ventilation outages.

30. Change to Action Statement for Unit 1 SFPI Vent Flow
Action C for Table III.C-3 is being revised from the requirement to record a default flow rate of 36,000 cfm daily to recording the flow rate every 8 hours. This makes the compensatory action consistent with similar actions at Units 2 and 3. Simple recording an assumed maximum flow does not provided any benefit.

31. Change to Action Statement for Unit 1 SFPI Sampler Flow
Action D for Table III.C-3 is being revised to specify sampling time period from Action A or Action B. The current reference to just the 'Chemistry compensatory sampling time period' is too vague, particularly with the addition of the Balance of Plant vent sampler flow monitor.

32. Clarification on Use of NIST Traceable Sources for Calibrations
Calibration requirement is being revised to specify that the calibration source strength has to be determined by a detector which has been calibrated by an NIST traceable source. Radiation monitor vendors often perform primary calibration using sources traceable to the NIST rather than sources obtained directly from the NIST. This change will avoid the interpretation that the primary calibration source has to be a source direct from NIST. Traceablity is acceptable by today's standard for radiation monitor calibrations.

33. Clarification on 40CFR190 Dose Limit Location
Adding the phrase "beyond the site boundary" to specify where the limit is applicable. This change is consistent with the EPA dose limit in 40CFR190 and with NRC guidance in NUREG-1301 and it implements licensing change LBDCR #1-01-02, #2-08-02, and #3-04-02 (Letter B18560, dated 5/13/02, to the NRC).

34. Deletion of Requirements on Dilution and Blowdown Flow Measurement Devices
For Units 2 and 3, the requirements for the Dilution Water Flow and, for Unit 2, the Steam Generator Blowdown line flow rate measurement devices are being deleted. There are no devices which measure these flows. Flow is estimated by number of pumps running at any time and the times of pump operations. This is reflected in both the LCO and Surveillance Tables' footnotes. However, the purpose of these tables is to ensure availability of devices, not the ability to perform an action. Determining pump status is an action; for this reason an Action Statement could never be included for these two parameters. Dilution water (i.e., circulating water) and steam generator blowdown flow is a necessary parameter which is obtained during the course of fulfilling other REMODCM requirements. Dilution water is recorded in liquid waste discharges following the requirements specified in REMODCM Sections II.E.2 and II.E.4. Knowledge of dilution water flow is also needed to fulfill the requirements of Section II.E.7b. Steam Generator Blowdown samples are required by REMODCM Section I.C.1 and reporting of radioactivity released from this source are required by various REMODCM sections. Therefore, Chemistry must (and does) record blowdown flows to fulfill these requirements.

35. Change Detectability Specification from Gross Gamma to Isotopic
In Table IV.C-1, the specification for dectectability of gross gamma in Footnotes B, C and E is being changed to lower limits of detection specified in Table I.C-2. The gamma analyzer is programmed to report results in radioactivity concentration per radionuclide rather than in total (gross) radioactivity. This change will facilitate implementation of the footnote requirements.

36. Non-Applicability of High Range Radiation Monitors
In Tables IV.C-3 and IV.C-4, wording is being added to specify that the requirements are only applicable to the normal range gaseous effluent monitor and that the high range monitor requirements are contained in the TRM.

37. Frequency for Calculation of Liquid Effluent Doses
Wording of surveillance is being revised for a frequency requirement for calculating liquid effluent doses of at least once per 31 days. This would make the requirement consistent with the NRC guidance in NUREG-1301. It would also specify that the dose determination would be a cumulative dose for the current calendar quarter and year.

38. Discussion of Explosive Gas Monitoring
Deleting discussion of explosive gas monitoring in the gaseous waste system because there is no monitoring of explosive gases.

39. Unit 3 Turbine Building Sump Rad Monitor Action Statement
Deleting conditional statement on action statement (remove triple asterisk note). This footnote placed an applicability condition on the Action which is in conflict with the Instrument Applicability which requires instrument operability at all times (see note #). If desired the applicability specified by the triple asterisk note should be applied to instrument applicability. However, the Action statement applicability, which is to take no action if radioactivity in sump water is less than detectable (MDA), is not appropriate. The radiation monitor should be operable at all times, even when no activity is being detected, to monitor for sudden increase of radioactivity in sump water.

40. Unit 3 Steam Generator Blowdown Rad Monitor Applicability
Changing applicability from "MODEs 1-5 and MODE 6 when pathway is being used" to "MODEs 1-5." Monitoring of blowdown is not needed during Mode 6 when steam generator blowdown is isolated. Any discharge of generator water during this mode is preceded by a sample as required in Table I.C-3.

41. Unit 3 Waste Neutralization Sump and Effluents Flow Measurement Devices
Adding an exception for flow rate measurement devices for times when there is no detectable tritium or gamma radioactivity does not exceed 5E-7 uCi/ml in steam generators or the sump is diverted to radwaste. The flow rate measurement device is needed to quantify the amount of radioactivity released in effluents. There are two conditions when radioactivity released via this pathway does not need to be quantified: (1) If the sump water from waste neutralization is being diverted to radwaste, any radioactivity released is being recorded by the Liquid Waste Effluent Line, and (2) The only source of radioactivity to this sump is from the steam generators. Therefore radioactivity releases will not be significant enough to quantify until there is detectable tritium or gamma radioactivity greater than 5E-7 uCi/ml in the steam generators. This gamma value is the same as that used in the sampling requirements in Section I.C.1. A threshold of detectable radioactivity is used for tritium because tritium analysis is not as sensitive as gamma analysis.

42. Unit 3 Regenerative Evaporator Rad Monitor and Flow Measurement Device
Deleting requirements for Regenerative Evaporator radiation monitor and flow measurements. The evaporator is not in use and there is no expectation that it will ever be placed in service.

4.0 Inoperable Effluent Monitors

During the period January 1 through December 31, 2003, the following effluent monitors were inoperable for more than 30 consecutive days:

4.1 Unit 1

The MP1 Spent Fuel Pool Island (SFPI) Vent was declared inoperable from February 23, 2003, when the monitor calibration was determined to have lapsed. The Channel Calibration SP407ST was developed and then performed on April 14, 2003, which restored the monitor to operable status.

The monitor was released to Operations in 2001 with the understanding that it would be removed from service before the Channel Calibration was required. At the time, Millstone expected to remove the fuel from the spent fuel island within two years, which would eliminate the need for the monitor. No provision was made to periodically calibrate the monitor. The I&C department had no transfer calibration data, no test fixture, no sources, and no calibration procedure for the monitor. I&C had to procure the services of the manufacturer Canberra (who had recently purchased Aptec-NRC) to perform a transfer calibration. I&C also had to procure a test fixture and sources, and develop the calibration procedure. During the period that the monitor was determined to be inoperable Chemistry collected and analyzed samples as required by the REMODCM.

4.2 Unit 2

The MP2 Aerated Waste Radiation Monitor (RM-9116) was inoperable on March 4, 2003, when the motor failed. A priority 5 trouble report was assigned to obtain a replacement part from the warehouse. As a result, the monitor was not restored to service within 30 days.

Condition Report, CR-03-03409, was initiated on April 4, 2003, to identify that this radiation monitor was out of service for greater than thirty days. The replacement part was then obtained and the radiation monitor was repaired and returned to service on April 10, 2003.

To prevent recurrence, administrative procedure DNAP 2000 was revised to ensure inoperable REMODCM effluent radiation monitor restoration work is assigned a higher priority.

4.3 Unit 3 - None

5.0 Errata

A Unit 3 outage occurred from February 2 to March 30 during the first quarter of 2001. During this outage the Vacuum Priming System (VPS) was turned off reducing flow to circulating water pumps. Total dilution flow = circulating water + service water = 2.20E11 + 1.19E10 = 2.32E11 liters. This will be used for Unit 3 dilution flow for the first quarter. The total dilution flow for Unit 3 during the first quarter was recalculated to adjust for the flow reduction. Total dilution flow = circulating water + service water = 2.20E11 + 1.19E10 = 2.32E11 liters. The doses from liquid effluents for Millstone 1, 2, & 3 during the 1st quarter 2001 were recalculated to be approximately 7% higher. The updated dose tables are included here as an errata to the 2001 Radiological Effluent Release Report.

Table 1

2001 Off-Site Dose Commitments from Liquid Effluents
Millstone Units 1, 2 and 3

Unit 1	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter
Max Individual	(mrem)	(mrem)	(mrem)	(mrem)
Whole Body	1.50E-05 (a)	0.00E+00	0.00E+00	0.00E+00
Thyroid	6.25E-06 (a)	0.00E+00	0.00E+00	0.00E+00
Max Organ	3.85E-05 (a) (gi)	0.00E+00	0.00E+00	0.00E+00
Population	(person-rem)	(person-rem)	(person-rem)	(person-rem)
Whole Body	3.55E-04	0.00E+00	0.00E+00	0.00E+00
Thyroid	6.50E-05	0.00E+00	0.00E+00	0.00E+00
Max Organ	8.01E-04 (bo)	0.00E+00	0.00E+00	0.00E+00
Avg Individual	(mrem)	(mrem)	(mrem)	(mrem)
Whole Body	1.18E-07	0.00E+00	0.00E+00	0.00E+00
Thyroid	2.17E-08	0.00E+00	0.00E+00	0.00E+00
Max Organ	2.67E-07 (bo)	0.00E+00	0.00E+00	0.00E+00

Unit 2	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter
Max Individual	(mrem)	(mrem)	(mrem)	(mrem)
Whole Body	5.42E-05 (a)	1.06E-04 (a)	1.65E-04 (a)	1.67E-04 (a)
Thyroid	3.23E-05 (a)	7.75E-05 (a)	1.32E-04 (a)	1.28E-04 (a)
Max Organ	8.07E-04 (a) (gi)	1.14E-03 (a) (gi)	7.74E-04 (a) (gi)	1.04E-03 (a) (gi)
Population	(person-rem)	(person-rem)	(person-rem)	(person-rem)
Whole Body	2.24E-03	3.86E-03	5.81E-03	1.03E-02
Thyroid	1.66E-03	3.13E-03	4.97E-03	9.28E-03
Max Organ	1.21E-02 (gi)	2.67E-02 (gi)	1.43E-02 (gi)	2.23E-02 (gi)
Avg Individual	(mrem)	(mrem)	(mrem)	(mrem)
Whole Body	7.47E-07	1.28E-06	1.94E-06	3.44E-06
Thyroid	5.53E-07	1.04E-06	1.66E-06	3.09E-06
Max Organ	4.03E-06 (gi)	8.91E-06 (gi)	4.76E-06 (gi)	7.43E-06 (gi)

Unit 3	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter
Max Individual	(mrem)	(mrem)	(mrem)	(mrem)
Whole Body	1.30E-03 (c)	9.14E-04 (c)	2.84E-04 (c)	1.55E-04 (a)
Thyroid	1.50E-04 (a)	6.04E-05 (a)	2.78E-05 (a)	9.16E-05 (a)
Max Organ	6.95E-03 (c) (bo)	6.54E-03 (a) (gi)	1.58E-03 (c) (bo)	6.19E-04 (a) (gi)
Population	(person-rem)	(person-rem)	(person-rem)	(person-rem)
Whole Body	3.04E-02	2.25E-02	1.79E-02	2.03E-02
Thyroid	4.47E-03	4.02E-03	1.24E-02	1.84E-02
Max Organ	1.63E-01 (gi)	2.70E-01 (gi)	5.44E-02 (gi)	3.88E-02 (gi)
Avg Individual	(mrem)	(mrem)	(mrem)	(mrem)
Whole Body	1.01E-05	7.50E-06	5.97E-06	6.76E-06
Thyroid	1.49E-06	1.34E-06	4.12E-06	6.12E-06
Max Organ	5.43E-05 (gi)	8.98E-05 (gi)	1.81E-05 (gi)	1.29E-05 (gi)

(a)=Adult, (c)=Child, (i)=Infant, (t)=Teen (bo)=Bone; (gi)=GI-LLI, (ki)=Kidney, (li)=Liver, (lu)=Lung, (th)=Thyroid

Table 3

2001 Off-Site Dose Summary from Liquid Effluents
Millstone Units 1, 2 and 3

Population Dose Commitments *(person-rem)*

	Whole Body	Thyroid	Max Organ
Unit 1	3.55E-04	6.50E-05	8.01E-04
Unit 2	2.22E-02	1.90E-02	7.54E-02
Unit 3	9.11E-02	3.93E-02	5.26E-01
Station Total	1.13E-01	5.84E-02	6.02E-01

Max Individual Dose Commitments vs REMODCM Limits

	Whole Body *(mrem)*	Thyroid *(mrem)*	Max Organ *(mrem)*
REMODCM Limit	*3*	*10*	*10*
Unit 1	1.50E-05	6.25E-06	3.85E-05
Unit 2	4.92E-04	3.70E-04	3.76E-03
Unit 3	2.65E-03	3.30E-04	1.57E-02
Station Total	3.16E-03	7.06E-04	1.95E-02