Docket Nos. 50-245
50-336
50-423
B18875

Enclosure 1

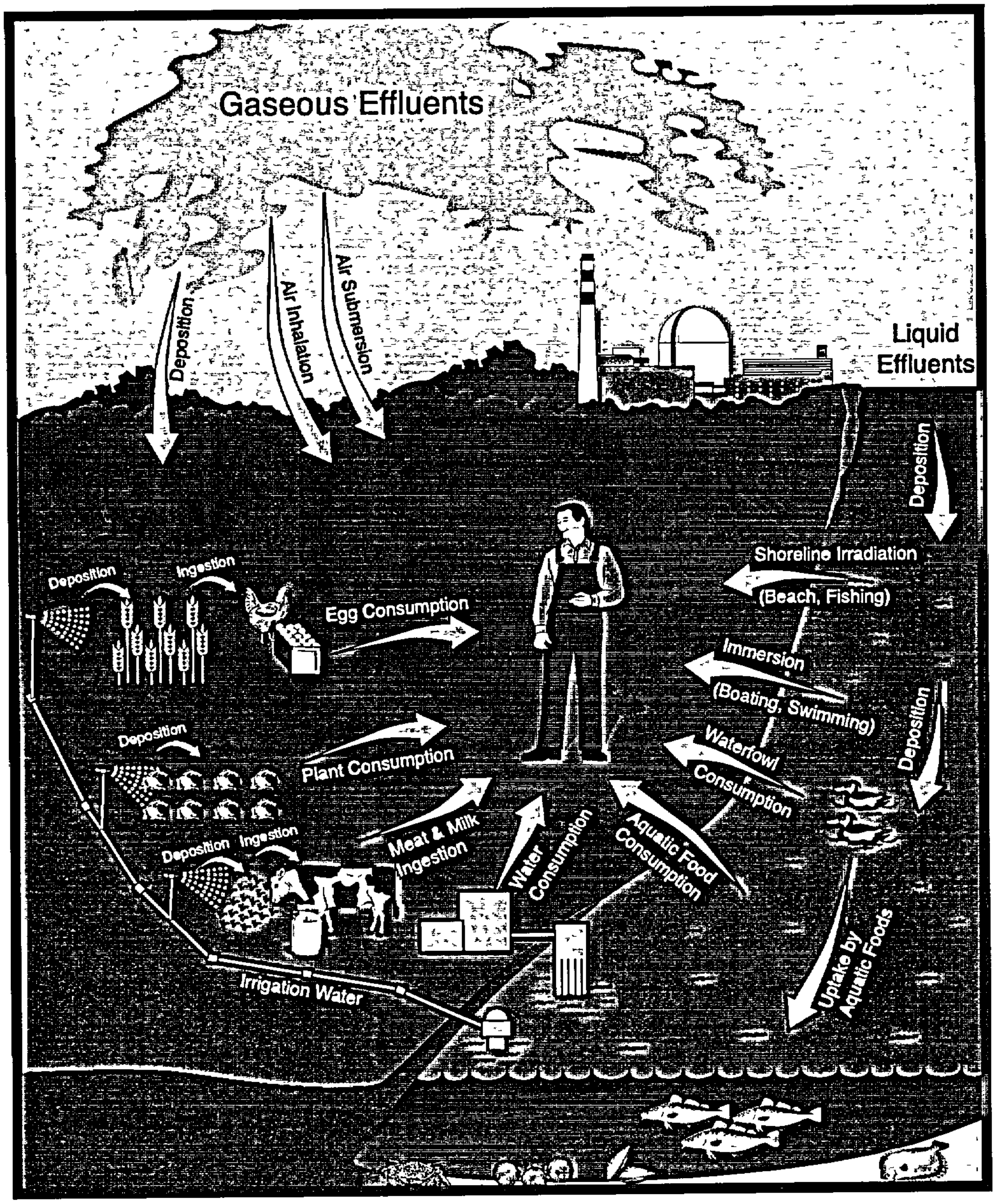
Millstone Power Station, Unit Nos. 1, 2 and 3

2002 Radioactive Effluent Release Report, Volume I

Millstone Power Station

2002 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
3	NPF-49	50-423

Millstone Power Station

2002
Radioactive Effluent Release Report

Volume I

Nesting Ospreys

Dominion Nuclear Connecticut, Inc.

Unit	License	Docket
1	DPR-21	50-245
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3. NRC Regulatory Guide 1.109 Calculation of Annual Doses to Man from Routine Releases of Reactor Effluents for the Purpose of Evaluating Compliance with 10 CFR Part 50, Appendix I, Revision 1, October 1977.

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5. NRC Regulatory Guide 1.111 Methods for Estimating Atmospheric Transport and Dispersion of Gaseous Effluents in Routine Releases from Light-Water-Cooled Reactors, Revision 1, July 1977.

6. NUREG/CR-1276, ORNL/NUREG/TDMC-1 User's Manual for LADTAP II - A Computer Program for Calculating Radiation Exposure to Man from Routine Release of Nuclear Reactor Liquid Effluents, DB Simpson, BL McGill, prepared by Oak Ridge National Laboratory, Oak Ridge, TN 37830, for Office of Administration, US Nuclear Regulatory Commission, manuscript completed 17 March 1980.

7. 10 CFR Energy, Part 50 Domestic Licensing of Production and Utilization Facilities, Appendix I Numerical Guides for Design Objectives and Limiting Conditions for Operation to Meet the Criterion "As Low As Reasonably Achievable" for Radioactive Material in Light-Water-Cooled Nuclear Power Reactor Effluents.

8. 40 CFR Environmental Protection Agency, Part 190 Environmental Radiation Protection Standard for Nuclear Power Operation.

9. Memo No. MPWS-03-006, Solid Waste and Irradiated Component Shipments , March 11, 2003.

10. DOSLIQ-Dose Excel Code for Liquid Effluents,Software Document File, Rev 1, February 2002

11. DOSAIR-Dose Excel Code for Airborne Effluents,Software Document File, Rev 0, February, 2002

12. GASPAR II - Technical Reference and User Guide (NUREG/CR-4653), March 1987.

Introduction

This report, for the period of January through December of 2002, 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 being submitted for all three units because they share some common effluent facilities.

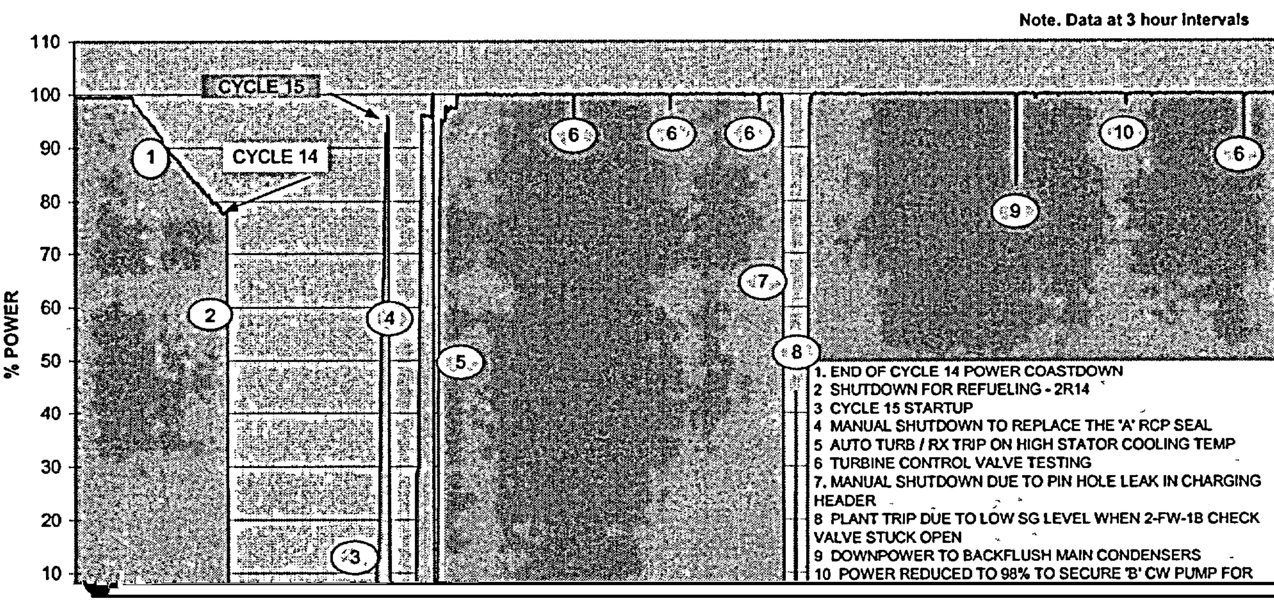
Volume I contains radiological and volumetric information on airborne and liquid effluents and shipments of solid waste & irradiated components, calculated offsite radiological doses, all changes to the REMODCM, information on any effluent monitors inoperable for more than 30 consecutive days, and any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

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

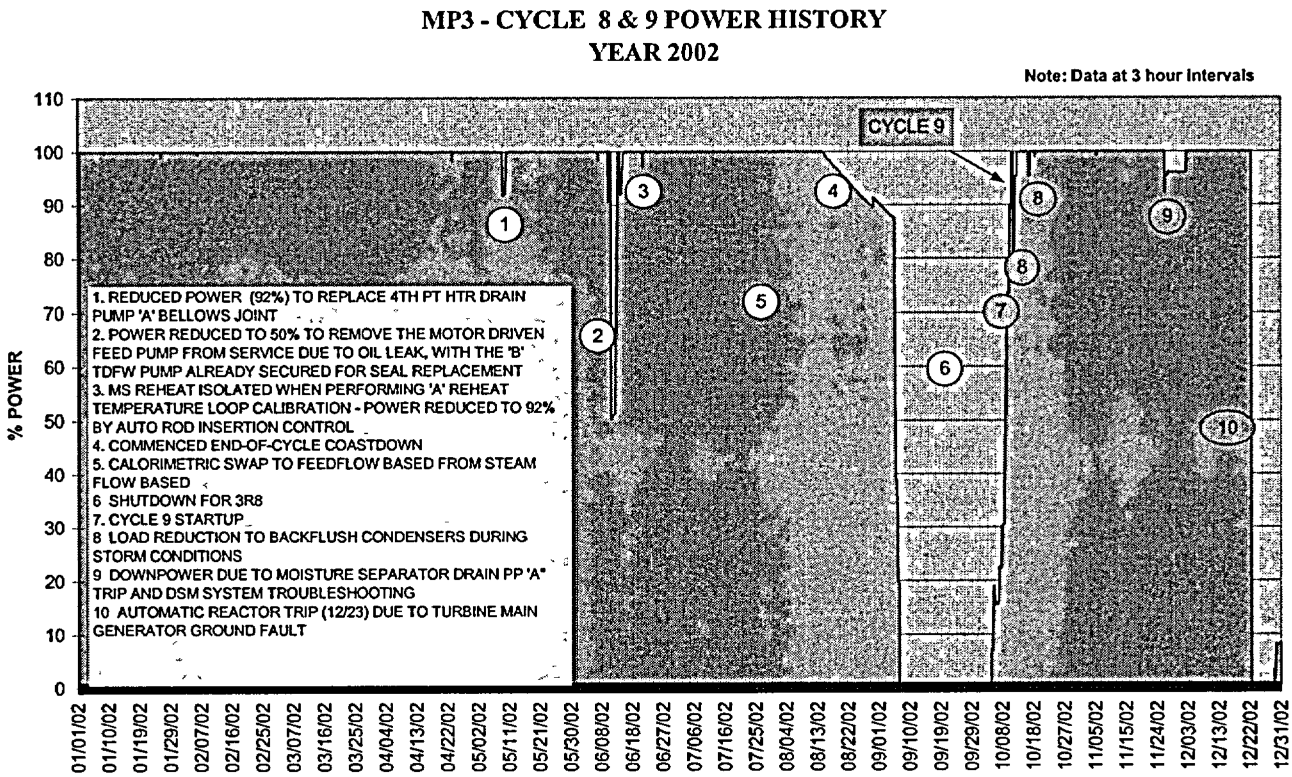
The annual capacity factor for Unit 1 was 0.0%. Unit 1 was shutdown November 11,1995 with a cessation of operation declared in July 1998.

The annual capacity factor for Unit 2 was **81.25%** based on Design Electrical Rating (DER). Unit 2 was shutdown in the first quarter for 2R14 refueling and maintenance. In August, Unit 2 was temporarily shutdown due to a leak in the charging system.

MP2 - CYCLE 14 & 15 POWER HISTORY
YEAR 2002



The annual capacity factor for Unit 3 was **86.35%** based on Design Electrical Rating (DER). Unit 3 was shutdown in the third quarter for refueling (3R8) and restarted in October 2002. In December, Unit 3 was temporarily shutdown due to a ground fault in the Turbine Main Generator.



1.0 Doses

This report provides a summary of the 2002 off-site radiation doses for releases of radioactive materials in airborne and liquid effluents from Millstone Unit 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. Input parameters for DOSAIR are those used in GASPAR II (Reference 12) and NRC Regulatory Guide 1.109 (Reference 3). 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, dilution factors for liquid effluents, the population distribution and demographic profile surrounding the site by compass sector. 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.

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). In addition, the Engineered Safety Features Building (ESF) Vent releases are considered as ground level and doses are calculated using 33 ft meteorology. The doses for these elevated releases were conservatively calculated using mixed mode 142 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), which uses the dose models and parameters cited in NRC Regulatory Guide 1.109 and site specific inputs and produces 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. Doses were calculated at the cow farm and goat farm of maximum deposition.

To determine compliance with 10CFR50, Appendix I (Reference 7), the maximum individual whole body and organ doses includes 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 2002, Unit 2 shutdown for 2R14 refueling and maintenance. As a consequence of small fuel pin leakage, the noble gas and iodine activity concentration in the primary coolant was higher than normal. When the primary systems were opened inside containment during the shutdown period, higher than normal levels of noble gas and iodine were released during containment purging (Table 2.2-3). In addition, Unit 2 shutdown in August due to a pinhole leak in the charging system resulting in higher than normal releases via the Unit 2 Vent. 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 0.05 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
2002 Off-Site Dose Commitments from Airborne Effluents
Millstone Units 1, 2, 3

Unit 1	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter
Max Air	(mrad)	(mrad)	(mrad)	(mrad)
Beta	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
Max Individual	(mrem)	(mrem)	(mrem)	(mrem)
Whole Body	2.00E-04	6.39E-04	7.79E-04	8.66E-05
Skin	2.11E-04	6.43E-04	8.64E-04	1.01E-04
Thyroid	1.99E-04	6.26E-04	7.60E-04	8.63E-05
Max organ+	2.08E-04	7.16E-04	1.41E-03	8.69E-05

Unit 2	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter
Max Air	(mrad)	(mrad)	(mrad)	(mrad)
Beta	3.76E-02	1.24E-02	1.10E-02	7.86E-03
Gamma	1.19E-02	1.31E-03	2.14E-03	3.50E-03
Max Individual	(mrem)	(mrem)	(mrem)	(mrem)
Whole Body	7.69E-03	1.33E-03	2.48E-03	4.67E-03
Skin	2.29E-02	8.89E-03	7.84E-03	8.45E-03
Thyroid	3.26E-02	7.12E-02	1.34E-01	1.56E-02
Max organ+	8.03E-03	1.66E-03	2.86E-03	4.74E-03

Unit 3	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter
Max Air	(mrad)	(mrad)	(mrad)	(mrad)
Beta	9.70E-06	5.33E-06	1.51E-05	2.65E-04
Gamma	2.38E-05	1.21E-05	1.94E-05	6.63E-05
Max Individual	(mrem)	(mrem)	(mrem)	(mrem)
Whole Body	7.51E-04	2.36E-03	5.20E-03	1.81E-03
Skin	7.61E-04	2.36E-03	5.30E-03	1.96E-03
Thyroid	7.51E-04	2.36E-03	5.15E-03	1.82E-03
Max organ+	7.51E-04	2.36E-03	5.27E-03	1.82E-03

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

Table 1-2
2002 Off-Site Dose Commitments from Liquid Effluents
Millstone Units 1, 2, 3

Unit 1	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter
Max Individual	(mrem)	(mrem)	(mrem)	(mrem)
Whole Body	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
Max Organ	0.00E+00	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	2.78E-04	2.05E-04	3.86E-05	2.69E-05
Thyroid	1.05E-04	3.48E-05	2.74E-05	2.25E-05
Max Organ	3.61E-03	2.97E-03	2.16E-04	5.15E-05

Unit 3	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter
Max Individual	(mrem)	(mrem)	(mrem)	(mrem)
Whole Body	1.23E-04	2.25E-04	7.31E-04	4.02E-04
Thyroid	7.62E-05	1.72E-04	3.65E-04	7.20E-05
Max Organ	3.52E-04	3.88E-04	2.89E-03	4.34E-03

Table 1-3
2002 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	1.70E-03	1.67E-03	2.42E-03	1.82E-03	0.00E+00	0.00E+00
Unit 2	1.62E-02	2.53E-01	1.73E-02	4.81E-02	6.88E-02	1.88E-02
Unit 3	1.01E-02	1.01E-02	1.02E-02	1.04E-02	2.95E-04	1.22E-04
Millstone Station	**2.80E-02**	**2.65E-01**	**2.99E-02**	**6.03E-02**	**6.91E-02**	**1.89E-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	5.49E-04	1.89E-04	6 85E-03
Unit 3	1.48E-03	6.85E-04	7.98E-03
Millstone Station	**2.03E-03**	**8.74E-04**	**1.48E-02**
REMODCM Limits	***3 ****	***10 ****	***10 ****

Millstone Station

Max Individual Dose vs 40CFR190 Limits

	Whole Body *(mrem)*	Thyroid *(mrem)*	Max Organ ** *(mrem)*
Airborne Effluents	2.80E-02	2.65E-01	2.99E-02
Liquid Effluents	2.03E-03	8.74E-04	1.48E-02
Radwaste Storage	5.00E-02	4.80E-02	4.80E-02
Millstone Station	**0.080**	**0.314**	**0.09**
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
2002 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 from Natural Background	**284 mrem**

Maximum Offsite Individual	Millstone Station
Whole Body Dose	0.080 mrem
Thyroid Dose	0.314 mrem
Effective Whole Body Dose from Millstone Station	**< 0.1 mrem**

* NCRP 94

2.0 Radioactivity

2.1 Airborne Effluents

2.1.1 Measurement of Radioactivity

2.1.1.1 Millstone Stack

Millstone Stack monitors, MP2 WRGM and MP3 SLCRS continuously record 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.

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 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.

2.1.1.9 Unit 3 Containment Drawdown and Purge

Unit 3 containment is initially drawn down 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. Purges and drawdowns are intermittent and are therefore considered batch releases. 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

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.

2.1.1.10 Unit 3 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, when applicable. 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.

2.1.2 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

2.1.3 Batch Releases - Airborne Effluents

Unit 1 – None

Unit 2	Ctmt Purge	WGDT
Number of Batches	3	15
Total Time (min)	1080	5688
Maximum Time (min)	600	590
Average Time (min)	360	379
Minimum Time (min)	240	15

Unit 3	Ctmt Purge	Drawdown
Number of Batches	2	1
Total Time (min)	249	59
Maximum Time (min)	217	59
Average Time (min)	125	59
Minimum Time (min)	217	59

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 2002, the following abnormal airborne releases occurred:

2.1.4.1 **Unit 1** - None

2.1.4.2 **Unit 2** - None

2.1.4.2 **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.

2.2.1.3 Unit 2 and Unit 3 Continuous Liquid Releases

Grab samples are 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	50	294
Total Time (min)	0	6453	31973
Maximum Time (min)	0	542	206
Average Time (min)	0	129	109
Minimum Time (min)	0	42	7
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 2002, the following abnormal liquid releases occurred:

2.2.4.1 Unit 1 - None

2.2.4.2 Unit 2 - None

2.2.4.3 Unit 3 - None

Table 2.1-1
Millstone Unit No. 1
Airborne Effluents - Release Summary

	Units	2002 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. Total Activity	Ci					
1. Total Activity Released	Ci	2.45E-06	1.17E-06	8.24E-06	2.74E-06	1.46E-05
2. Average Period Release Rate	uCi/sec	3.15E-07	1.49E-07	1.04E-06	3.45E-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	3.40E-01	3.92E-01	1.69E-01	4.13E-03	9.05E-01
2. Average Period Release Rate	uCi/sec	4.37E-02	4.99E-02	2.13E-02	5.20E-04	2.87E-02

N/D = Not Detected

Table 2.1-2
Millstone Unit No. 1
Airborne Effluents - Elevated Continuous

<< No Activity Detected >>

Note: MP1 ventilation releases were seperated from elevated Millstone stack after 1st Quarter 2001

Nuclides Released	Units	2002 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						
	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 2.1-3

Millstone Unit No. 1

Airborne Effluents - Ground Continuous -Balance of Plant Vent (BOP) and Spent Fuel Pool Island Vent (SFPI)

Nuclides Released	Units	2002 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						
Sr-90	Ci	1.06E-06	-	-	-	1.06E-06
Cs-137	Ci	1.39E-06	1.17E-06	8.24E-06	2.74E-06	1.35E-05
Total Activity	Ci	2.45E-06	1.17E-06	8.24E-06	2.74E-06	1.46E-05
D. Gross Alpha						
Gross Alpha	Ci	-	-	-	-	N/D
E. Tritium						
H-3	Ci	3.40E-01	3.92E-01	1.69E-01	4.13E-03	9.05E-01

N/D = Not Detected

Table 2.1-4
Millstone Unit No. 1
Liquid Effluents - Release Summary
(Release Point - Quarry)

	Units	2002				
		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	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2. Dilution Volume During Releases	Liters	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
3. Dilution Volume During Period	Liters	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

N/D = Not Detected

Table 2.1-5
Millstone Unit No. 1
Liquid Effluents - Batch

<< No Activity Detected >>

Nuclides Released	Units	2002 1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	Total
A. Fission & Activation Products						
Ag-110m	Ci	-	-	-	-	-
Co-58	Ci	-	-	-	-	-
Co-60	Ci	-	-	-	-	-
Cs-137	Ci	-	-	-	-	-
Fe-55	Ci	-	-	-	-	-
Mn-54	Ci	-	-	-	-	-
Sr-89	Ci	-	-	-	-	-
Sr-90	Ci	-	-	-	-	-
Zn-65	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 2.2-1
Millstone Unit No. 2
Airborne Effluents - Release Summary

	Units	2002				
		1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	Total
A. Fission & Activation Gases						
1. Total Activity Released	Ci	5.15E+01	1.24E+01	1.68E+01	4.72E+01	1.28E+02
2. Average Period Release Rate	uCi/sec	6.63E+00	1.58E+00	2.11E+00	5.94E+00	4.06E+00
B. Iodine-131						
1. Total Activity Released	Ci	2.27E-03	7.43E-04	1.60E-03	2.83E-04	4.90E-03
2. Average Period Release Rate	uCi/sec	2.92E-04	9.45E-05	2.02E-04	3.56E-05	1.55E-04
C. Particulates						
1. Total Activity Released	Ci	7.67E-06	2.27E-06	2.30E-06	N/D	1.22E-05
2. Average Period Release Rate	uCi/sec	9.86E-07	2.89E-07	2.89E-07	-	3.88E-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	1.81E+00	1.29E+00	2.91E+00	2.52E+01	3.12E+01
2. Average Period Release Rate	uCi/sec	2.33E-01	1.63E-01	3.66E-01	3.17E+00	9.88E-01

N/D = Not Detected

Table 2.2-2

Millstone Unit No. 2

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

Nuclides Released	Units	2002 1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	Total
A. Fission & Activation Gases						
Ar-41	Ci	3.09E-02	-	9.52E-04	5.74E-02	8.92E-02
Kr-85m	Ci	-	-	-	5.92E-01	5.92E-01
Xe-131m	Ci	-	-	-	-	-
Xe-133	Ci	1.95E+01	6.87E+00	1.53E+01	4.05E+01	8.22E+01
Xe-133m	Ci	3.76E-02	-	-	-	3.76E-02
Xe-135	Ci	3.38E-01	3.62E-01	1.42E-01	4.91E+00	5.75E+00
Xe-135m	Ci	-	-	-	7.15E-02	7.15E-02
Total Activity	Ci	1.99E+01	7.23E+00	1.54E+01	4.61E+01	8.87E+01
B. Iodines						
I-131	Ci	9.93E-04	7.41E-04	1.59E-03	2.83E-04	3.60E-03
I-132	Ci	1.72E-04	2.71E-04	6.25E-04	1.28E-04	1.20E-03
I-133	Ci	3.73E-04	1.91E-03	1.01E-03	4.75E-04	3.77E-03
I-135	Ci	3.31E-04	2.67E-04	6.34E-04	2.65E-04	1.50E-03
Total Activity	Ci	1.87E-03	3.19E-03	3.86E-03	1.15E-03	1.01E-02
C. Particulates						
I-131	Ci	-	-	-	-	-
Co-58	Ci	6.99E-07	1.88E-06	2.30E-06	-	4.88E-06
Co-60	Ci	-	-	-	-	-
Mn-54	Ci	-	-	-	-	-
Ba-140	Ci	-	-	-	-	-
Cs-137	Ci	-	-	-	-	-
Total Activity	Ci	6.99E-07	1.88E-06	2.30E-06	-	4.88E-06
D. Gross Alpha						
Gross Alpha	Ci	-	-	-	-	N/D
E. Tritium						
H-3	Ci	1.24E+00	1.22E+00	2.70E+00	2.39E+01	2.91E+01

N/D = Not Detected

Table 2.2-3

Millstone Unit No. 2

Airborne Effluents - Mixed Batch - Containment Purges

Nuclides Released	Units	2002 1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	Total
A. Fission & Activation Gases						
Kr-85	Ci	1.72E+00	-	-	-	1.72E+00
Xe-133	Ci	2.67E+01	1.89E-02	-	-	2.67E+01
Xe-131m	Ci	1.17E-01	-	-	-	1.17E-01
Xe-133m	Ci	1.20E-01	-	-	-	1.20E-01
Xe-135	Ci	2.40E-01	1.09E-02	-	-	2.51E-01
Total Activity	Ci	2.89E+01	2.97E-02	-	-	2.89E+01
B. Iodines						
I-131	Ci	1.28E-03	1.64E-06	-	-	1.28E-03
I-132	Ci	5.27E-05	-	-	-	5.27E-05
I-133	Ci	1.10E-04	6.29E-06	-	-	1.16E-04
Total Activity	Ci	1.44E-03	7.92E-06	-	-	1.45E-03
C. Particulates						
I-131	Ci	-	-	-	-	-
Br-82	Ci	6.97E-06	-	-	-	6.97E-06
Cs-137	Ci	-	-	-	-	-
Total Activity	Ci	6.97E-06	-	-	-	6.97E-06
D. Gross Alpha						
Gross Alpha	Ci	-	-	-	-	N/D
E. Tritium						
H-3	Ci	1.77E-01	2.89E-02	-	-	2.06E-01

N/D = Not Detected

Table 2.2-4

Millstone Unit No. 2

Airborne Effluents - Elevated Batch - WGDT

Nuclides Released	Units	2002 1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	Total
A. Fission & Activation Gases						
Ar-41	Ci	-	-	-	-	-
Kr-85	Ci	8.36E-01	4.87E+00	8.81E-01	3.06E-01	6.90E+00
Kr-85m	Ci	-	-	-	-	-
Kr-87	Ci	-	-	-	-	-
Kr-88	Ci	-	-	-	-	-
Xe-131m	Ci	4.48E-03	5.51E-02	-	-	5.96E-02
Xe-133	Ci	7.73E-02	1.07E-01	-	-	1.84E-01
Xe-133m	Ci	2.37E-04	-	-	-	2.37E-04
Xe-135	Ci	-	-	-	-	-
Xe-135m	Ci	-	-	-	-	-
Total Activity	Ci	9.18E-01	5.04E+00	8.81E-01	3.06E-01	N/D
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	1.85E-04	7.44E-04	2.14E-04	7.98E-05	1.22E-03

N/D = Not Detected

Table 2.2-5

Millstone Unit No. 2

Airborne Effluents - Elevated - Containment Vents

Nuclides Released	Units	2002 1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	Total
A. Fission & Activation Gases						
Ar-41	Ci	4.31E-02	2.24E-02	2.04E-02	2.43E-02	1.10E-01
Kr-85	Ci	4.18E-01	-	1.64E-01	5.53E-01	1.13E+00
Kr-85m	Ci	4.53E-04	3.84E-05	-	-	4.91E-04
Xe-131m	Ci	1.90E-02	7.59E-04	1.12E-02	4.84E-03	3.58E-02
Xe-133	Ci	1.35E+00	1.03E-01	2.57E-01	1.97E-01	1.91E+00
Xe-133m	Ci	8.85E-03	-	8.38E-04	-	8.38E-04
Xe-135	Ci	1.97E-02	2.41E-03	7.46E-04	8.51E-04	2.37E-02
Total Activity	Ci	1.86E+00	1.29E-01	4.54E-01	7.80E-01	3.22E+00
B. Iodines *						
I-131	Ci	1.65E-06	3.13E-07	1.40E-05	-	1.59E-05
I-133	Ci	5.37E-07	-	3.82E-07	-	9.19E-07
Total Activity	Ci	2.18E-06	3.13E-07	1.44E-05	-	1.68E-05
C. Particulates						
I-131	Ci	-	-	-	-	-
Co-58	Ci	-	3.85E-07	-	-	3.85E-07
Cs-137	Ci	-	-	-	-	-
Total Activity	Ci	-	3.85E-07	-	-	3.85E-07
D. Gross Alpha						
Gross Alpha	Ci	-	-	-	-	N/D
E. Tritium						
H-3	Ci	3.90E-01	3.47E-02	2.08E-01	1.25E+00	1.88E+00

N/D = Not Detected

* Prior to charcoal filtration

Table 2.2-6
Millstone Unit No. 2
Liquid Effluents - Release Summary
(Release Point - Quarry)

	Units	2002 1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	Total
A. Fission and Activation Products						
1. Total Activity Released	Ci	3.23E-02	4.28E-02	3.98E-03	1.75E-03	8.09E-02
2. Average Period Diluted Activity	uCi/ml	1.67E-10	1.65E-10	1.43E-11	6.10E-12	7.95E-11
B. Tritium						
1. Total Activity Released	Ci	6.07E+01	1.80E+01	6.75E+01	6.11E+01	2.07E+02
2. Average Period Diluted Activity	uCi/ml	3.15E-07	6.91E-08	2.43E-07	2.14E-07	2.04E-07
C. Dissolved and Entrained Gases						
1. Total Activity Released	Ci	6.72E-01	4.22E-01	1.93E-01	4.13E-02	1.33E+00
2. Average Period Diluted Activity	uCi/ml	3.48E-09	1.62E-09	6.95E-10	1.44E-10	1.31E-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	Liters	7.03E+05	8.24E+05	3.20E+05	3.16E+07	3.34E+07
2. Dilution Volume During Releases	Liters	2.40E+09	2.29E+09	1.05E+09	1.25E+09	6.99E+09
3. Dilution Volume During Period	Liters	1.93E+11	2.60E+11	2.78E+11	2.86E+11	1.02E+12

N/D = Not Detected

Table 2.2-7
Millstone Unit No. 2
Liquid Effluents - Continuous - SGBD

Nuclides Released	Units	2002 1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	Total
A. Fission & Activation Products						
	Ci	-	-	-	-	-
Total Activity	Ci	-	-	-	-	N/D
B. Tritium						
H-3	Ci	-	-	-	6.91E-02	6.91E-02
C. Dissolved & Entrained Gases						
	Ci	-	-	-	-	-
Total Activity	Ci	-	-	-	-	N/D
D. Gross Alpha						
Gross Alpha	Ci	-	-	-	-	N/D

N/D = Not Detected

Table 2.2-8A

Millstone Unit No. 2
Liquid Effluents - Batch - LWS

Nuclides Released	Units	2002 1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	Total
A. Fission & Activation Products						
Ba-140	Ci	7.64E-05	-	-	-	7.64E-05
Ag-110m	Ci	5.19E-04	3.21E-05	2.39E-05	2.07E-06	5.77E-04
Cr-51	Ci	3.92E-03	9.53E-03	-	-	1.35E-02
Co-57	Ci	2.43E-05	3.77E-05	-	-	6.20E-05
Co-58	Ci	6.75E-03	1.98E-02	1.00E-03	2.02E-04	2.77E-02
Co-60	Ci	8.30E-03	1.85E-03	3.79E-04	2.27E-04	1.08E-02
Cs-134	Ci	4.84E-04	1.15E-03	6.26E-05	-	1.70E-03
Cs-137	Ci	4.56E-04	8.04E-04	5.24E-05	1.75E-05	1.33E-03
Fe-55	Ci	9.24E-03	5.81E-03	6.47E-04	3.47E-04	1.60E-02
Fe-59	Ci	3.68E-04	7.96E-04	-	-	1.16E-03
I-131	Ci	8.23E-05	5.58E-05	-	9.70E-07	5.68E-05
La-140	Ci	9.68E-05	-	2.32E-06	-	9.91E-05
Mn-54	Ci	5.29E-04	4.30E-04	6.40E-06	3.53E-06	9.69E-04
Nb-95	Ci	5.32E-04	1.17E-03	3.59E-05	1.63E-06	1.74E-03
Nb-97	Ci	-	7.09E-06	6.13E-06	-	1.32E-05
Ru-103	Ci	4.94E-06	-	-	-	4.94E-06
Ru-105	Ci	1.17E-04	1.47E-04	-	-	2.63E-04
Sb-122	Ci	-	4.69E-05	-	-	4.69E-05
Sb-124	Ci	-	3.83E-05	2.11E-05	-	5.93E-05
Sb-125	Ci	5.29E-04	2.98E-04	1.67E-03	8.78E-04	3.38E-03
Sn-113	Ci	2.91E-05	1.54E-04	-	-	1.83E-04
Sr-89	Ci	3.97E-05	-	6.94E-05	6.52E-05	1.74E-04
Sr-90	Ci	-	2.33E-06	-	-	2.33E-06
Sr-92	Ci	-	2.48E-06	-	-	2.48E-06
Zr-95	Ci	2.25E-04	6.69E-04	-	-	8.94E-04
Total Activity	Ci	3.23E-02	4.28E-02	3.98E-03	1.75E-03	8.08E-02
B. Tritium						
H-3	Ci	6.07E+01	1.80E+01	6.75E+01	6.11E+01	2.07E+02
C. Dissolved & Entrained Gases						
Kr-85	Ci	2.07E-01	2.80E-01	6.04E-02	3.97E-02	5.87E-01
Xe-131m	Ci	1.65E-02	4.29E-03	7.38E-03	-	2.81E-02
Xe-133	Ci	4.47E-01	1.35E-01	1.25E-01	1.57E-03	7.09E-01
Xe-133m	Ci	1.17E-03	1.98E-03	2.84E-04	-	3.44E-03
Xe-135	Ci	1.11E-04	2.10E-04	-	-	3.20E-04
Total Activity	Ci	6.72E-01	4.22E-01	1.93E-01	4.13E-02	1.33E+00
D. Gross Alpha						
Gross Alpha	Ci	-	-	-	-	N/D

N/D = Not Detected

Table 2.2-8B

Millstone Unit No. 2

Liquid Effluents -Continuous-Turbine Building Sump

(Release Point - Yard Drain - DSN 006)

Nuclides Released	Units	2002 1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	Total
A. Fission & Activation Products						
	Ci	-	-	-	-	-
Total Activity	Ci	-	-	-	-	N/D
B. Tritium						
H-3	Ci	2.48E-02	8.34E-03	2.33E-05	4.72E-03	3.78E-02
Average Period Diluted Activity	uCi/ml	1.01E-06	3.36E-07	9.29E-10	1.88E-07	3.80E-07
C. Dissolved & Entrained Gases						
	Ci	-	-	-	-	-
Total Activity	Ci	-	-	-	-	N/D
D. Gross Alpha						
Gross Alpha	Ci	-	-	-	-	N/D
E. Volume						
Released Waste Volume	Liters	1.86E+06	6.61E+05	1.16E+04	1.14E+06	3.67E+06
Dilution Volume During Period *	Liters	2.45E+07	2.48E+07	2.51E+07	2.51E+07	9.95E+07

* from Yard Drains

N/D = Not Detected

Table 2.3-1
Millstone Unit No. 3
Airborne Effluents - Release Summary

	Units	2002				
		1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	Total
A. Fission & Activation Gases						
1. Total Activity Released	Ci	2.15E-02	9.93E-03	2.14E-02	2.40E+00	2.45E+00
2. Average Period Release Rate	uCi/sec	2.77E-03	1.26E-03	2.69E-03	3.02E-01	7.78E-02
B. Iodine-131						
1. Total Activity Released	Ci	N/D	N/D	2.50E-07	1.27E-06	1.52E-06
2. Average Period Release Rate	uCi/sec	-	-	3.15E-08	1.60E-07	4.82E-08
C. Particulates						
1. Total Activity Released	Ci	N/D	N/D	5.94E-05	1.37E-06	6.08E-05
2. Average Period Release Rate	uCi/sec	-	-	7.47E-06	1.73E-07	1.93E-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	6.05E+00	6.49E+00	9.91E+00	2.49E+01	4.73E+01
2. Average Period Release Rate	uCi/sec	7.78E-01	8.25E-01	1.25E+00	3.13E+00	1.50E+00

N/D = Not Detected

Table 2.3-2

Millstone Unit No. 3
Airborne Effluents - Mixed Continuous - Normal Ventilation & Spent Fuel Pool Evaporation

Nuclides Released	Units	2002				
		1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	Total

A. Fission & Activation Gases

Xe-131m	Ci	-	-	-	2.17E+00	2.17E+00
Xe-133	Ci	-	-	-	-	-
Xe-135	Ci	-	-	-	1.18E-01	1.18E-01
Total Activity	Ci	-	-	-	2.29E+00	2.29E+00

B. Iodines

I-131	Ci	-	-	-	1.27E-06	1.27E-06
I-133	Ci	-	-	-	9.15E-06	9.15E-06
Total Activity	Ci	-	-	-	1.04E-05	1.04E-05

C. Particulates

I-131	Ci	-	-	-	-	-
Cr-51	Ci	-	-	1.66E-05	-	1.66E-05
Mn-54	Ci	-	-	4.28E-06	-	4.28E-06
Co-58	Ci	-	-	2.17E-05	-	2.17E-05
Co-60	Ci	-	-	1.21E-05	-	1.21E-05
Nb-95	Ci	-	-	-	-	-
Sr-89	Ci	-	-	-	-	-
Sr-90	Ci	-	-	-	-	-
Ru-106	Ci	-	-	-	-	-
Total Activity	Ci	-	-	5.47E-05	-	5.47E-05

D. Gross Alpha

Gross Alpha	Ci	-	-	-	-	N/D

E. Tritium

H-3	Ci	4.92E+00	5.89E+00	9.01E+00	2.47E+01	4.45E+01

N/D = Not Detected

Table 2.3-3

Millstone Unit No. 3

Airborne Effluents - Ground Continuous - ESF Building Ventilation

Nuclides Released	Units	2002 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	-	-	-	-	-
Co-58	Ci	-	-	-	1.82E-07	1.82E-07
Mn-54	Ci	-	-	-	-	-
Hf-181	Ci	-	-	3.06E-08	-	3.06E-08
Cr-51	Ci	-	-	-	-	-
Sr-89	Ci	-	-	-	-	-
Sr-90	Ci	-	-	-	-	-
Total Activity	Ci	-	-	3.06E-08	1.82E-07	2.13E-07

D. Gross Alpha

Gross Alpha	Ci	-	-	-	-	N/D

E. Tritium

H-3	Ci	-	-	3.31E-01	-	3.31E-01

N/D = Not Detected

Table 2.3-4

Millstone Unit No. 3

Airborne Effluents - Mixed Batch - Containment Drawdowns

Nuclides Released	Units	2002 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	-	-	2.21E-08	-	2.21E-08
Total Activity	Ci	-	-	2.21E-08	-	2.21E-08
D. Gross Alpha						
Gross Alpha	Ci	-	-	-	-	N/D
E. Tritium						
H-3	Ci	-	-	6.31E-04	-	6.31E-04

N/D = Not Detected

Table 2.3-5

Millstone Unit No. 3

Airborne Effluents - Mixed Batch - Containment Purges

Nuclides Released	Units	2002				
		1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	Total

A. Fission & Activation Gases

Xe-133	Ci	-	-	4.12E-03	-	4.12E-03
Xe-135	Ci	-	-	2.01E-03	-	2.01E-03
Total Activity	Ci	-	-	6.13E-03	-	6.13E-03

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	-	-	6.51E-02	-	6.51E-02

N/D = Not Detected

Table 2.3-6

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	1.47E-02	5.54E-03	6.51E-03	1.29E-02	3.97E-02
Kr-85m	Ci	-	-	-	-	-
Kr-87	Ci	-	-	-	-	-
Xe-133	Ci	5.12E-03	3.59E-03	6.37E-03	2.29E-04	1.53E-02
Xe-135	Ci	1.72E-03	8.01E-04	2.35E-03	-	4.87E-03
Kr-85	Ci	-	-	-	9.93E-02	9.93E-02
Total Activity	Ci	2.15E-02	9.93E-03	1.52E-02	1.12E-01	1.59E-01
B. Iodines						
I-131	Ci	-	-	2.50E-07	-	2.50E-07
I-133	Ci	-	-	5.34E-07	-	5.34E-07
Total Activity	Ci	-	-	7.84E-07	-	7.84E-07
C. Particulates						
I-131	Ci	-	-	-	-	-
Cr-51	Ci	-	-	2.64E-06	1.75E-07	2.82E-06
Mn-54	Ci	-	-	-	5.19E-08	5.19E-08
Co-58	Ci	-	-	1.92E-06	4.82E-07	2.40E-06
Co-60	Ci	-	-	1.03E-07	4.83E-07	5.86E-07
Nb-95	Ci	-	-	-	-	-
Ru-106	Ci	-	-	-	-	-
Cs-137	Ci	-	-	-	-	-
Br-82	Ci	-	-	-	-	-
Zr-95	Ci	-	-	-	-	-
Total Activity	Ci	-	-	4.66E-06	1.19E-06	5.85E-06
D. Gross Alpha						
Gross Alpha	Ci	-	-	-	-	N/D
E. Tritium						
H-3	Ci	1.13E+00	5.98E-01	4.99E-01	1.57E-01	2.38E+00

N/D = Not Detected

Table 2.3-7
Millstone Unit No. 3
Liquid Effluents - Release Summary
(Release Point - Quarry)

	Units	2002 1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	Total
A. Fission and Activation Products						
1. Total Activity Released	Ci	7.92E-03	1.05E-02	6.61E-02	6.40E-02	1.49E-01
2. Average Period Diluted Activity	uCi/ml	1.72E-11	2.25E-11	1.72E-10	1.49E-10	8.53E-11
B. Tritium						
1. Total Activity Released	Ci	1.69E+02	4.90E+02	6.25E+02	4.29E+01	1.33E+03
2. Average Period Diluted Activity	uCi/ml	3.68E-07	1.05E-06	1.63E-06	9.99E-08	7.63E-07
C. Dissolved and Entrained Gases						
1. Total Activity Released	Ci	4.07E-05	1.26E-05	N/D	N/D	5.33E-05
2. Average Period Diluted Activity	uCi/ml	8.85E-14	2.70E-14	-	-	3.06E-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	Liters	5.65E+06	3.59E+06	5.36E+06	3.20E+06	1.78E+07
2. Dilution Volume During Releases	Liters	2.94E+10	1.21E+10	1.77E+10	9.09E+09	6.83E+10
3. Dilution Volume During Period	Liters	4.60E+11	4.66E+11	3.84E+11	4.30E+11	1.74E+12

N/D = Not Detected

Table 2.3-8

Millstone Unit No. 3

Liquid Effluents - Continuous - SGBD & SW & TK2

Nuclides Released	Units	2002 1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	Total
A. Fission & Activation Products						
	Ci	-	-	-	-	-
Total Activity	Ci	-	-	-	-	N/D
B. Tritium						
H-3	Ci	2.09E-01	1.77E-01	9.28E-02	4.01E-02	5.19E-01
C. Dissolved & Entrained Gases						
	Ci	-	-	-	-	-
Total Activity	Ci	-	-	-	-	N/D
D. Gross Alpha						
Gross Alpha	Ci	-	-	-	-	N/D

N/D = Not Detected

Table 2.3-9
Millstone Unit No. 3
Liquid Effluents - Batch - LWS

Nuclides Released	Units	2002 1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	Total
A. Fission & Activation Products						
Ag-110m	Ci	-	-	-	-	-
Co-57	Ci	2.27E-06	-	6.44E-05	1.81E-05	8.48E-05
Co-58	Ci	5.27E-04	1.90E-04	5.12E-03	1.07E-02	1.65E-02
Co-60	Ci	1.10E-03	1.14E-03	1.78E-02	6.59E-03	2.66E-02
Cr-51	Ci	-	-	6.18E-03	1.33E-02	1.95E-02
Cs-134	Ci	-	-	-	-	-
Cs-137	Ci	2.94E-04	8.42E-04	2.02E-03	-	3.16E-03
Fe-55	Ci	3.96E-03	4.69E-03	2.40E-02	2.04E-02	5.31E-02
Fe-59	Ci	-	-	2.46E-04	5.31E-04	7.77E-04
I-131	Ci	-	-	-	-	-
I-133	Ci	-	-	-	-	-
Mn-54	Ci	4.59E-04	1.25E-04	3.09E-03	1.60E-03	5.27E-03
Mo-99	Ci	-	-	-	-	-
Na-24	Ci	-	-	-	-	-
Nb-95	Ci	1.96E-05	-	5.19E-04	1.86E-03	2.40E-03
Nb-97	Ci	3.35E-05	-	2.26E-05	-	5.61E-05
Rb-88	Ci	-	-	-	-	-
Ru-105	Ci	-	-	-	8.71E-05	8.71E-05
Sb-124	Ci	-	-	-	-	-
Sb-125	Ci	1.52E-03	3.52E-03	6.55E-03	8.00E-03	1.96E-02
Sr-91	Ci	-	-	1.60E-05	-	1.60E-05
Sn-113	Ci	-	-	2.72E-05	3.33E-05	6.05E-05
Tc-99m	Ci	-	-	-	-	-
Tc-101	Ci	-	-	-	-	-
Zr-95	Ci	-	-	3.19E-04	9.12E-04	1.23E-03
Ba-140	Ci	-	-	8.12E-05	-	8.12E-05
Y-91m	Ci	-	-	-	-	-
Total Activity	Ci	7.92E-03	1.05E-02	6.61E-02	6.40E-02	1.49E-01
B. Tritium						
H-3	Ci	1.69E+02	4.90E+02	6.25E+02	4.29E+01	1.33E+03
C. Dissolved & Entrained Gases						
Xe-133	Ci	-	1.26E-05	-	-	1.26E-05
Xe-135m	Ci	2.54E-05	-	-	-	2.54E-05
Xe-135	Ci	1.53E-05	-	-	-	1.53E-05
Total Activity	Ci	4.07E-05	1.26E-05	-	-	5.33E-05
D. Gross Alpha						
Gross Alpha	Ci	-	-	-	-	N/D

N/D = Not Detected

Table 2.3-10A

Millstone Unit No. 3

Liquid Effluents - Batch - CPF Waste Neutralization Sumps & Hotwell Discharge

<< No Activity Detected >>

Nuclides Released	Units	2002				
		1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	Total
A. Fission & Activation Products						
	Ci	-	-	-	-	-
Total Activity	Ci	-	-	-	-	N/D
B. Tritium						
H-3	Ci	2.56E-02	2.39E-02	8.28E-03	5.08E-03	N/D
C. Dissolved & Entrained Gases						
Xe-131m	Ci	-	-	-	-	-
Xe-135	Ci	-	-	-	-	-
Total Activity	Ci	-	-	-	-	N/D
D. Gross Alpha						
Gross Alpha	Ci	-	-	-	-	N/D

N/D = Not Detected

Table 2.3-10B
Millstone Unit No. 3
Liquid Effluents - Release Summary
(Release Point - Yard Drain - DSN 006)

	Units	2002 1st Qtr	2002 2nd Qtr	2002 3rd Qtr	2002 4th Qtr	2002 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	3.72E-02	4.28E-02	1.18E-02	9.97E-03	1.02E-01
2. Average Period Diluted Activity	uCi/ml	1.49E-06	1.72E-06	4.63E-07	3.89E-07	1.00E-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	Liters	4.15E+05	4.71E+05	3.83E+05	5.30E+05	1.80E+06
3. Dilution Volume During Period	Liters	2.45E+07	2.48E+07	2.51E+07	2.51E+07	9.95E+07

N/D = Not Detected

Table 2.3-10C

Millstone Unit No. 3

Liquid Effluents - Continuous - Turbine Building Sump

(Release Point - Yard Drain - DSN 006)

Nuclides Released	Units	2002 1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	Total
A. Fission & Activation Products						
	Ci	-	-	-	-	-
Total Activity	Ci	-	-	-	-	N/D
B. Tritium						
H-3	Ci	3.72E-02	4.03E-02	1.16E-02	9.42E-03	9.85E-02
Average Period Diluted Activity	uCi/ml	1.52E-06	1.63E-06	4.56E-07	3.68E-07	9.73E-07
C. Dissolved & Entrained Gases						
	Ci	-	-	-	-	-
Total Activity	Ci	-	-	-	-	N/D
D. Gross Alpha						
Gross Alpha	Ci	-	-	-	-	N/D
E. Volume						
Released Waste Volume	Liters	4.15E+05	4.40E+05	3.77E+05	5.09E+05	1.74E+06
Dilution Volume During Period *	Liters	2.45E+07	2.48E+07	2.51E+07	2.51E+07	9.95E+07

* from Yard Drains

N/D = Not Detected

Table 2.3-10D

Millstone Unit No. 3

Liquid Effluents - Continuous - WTT Berm Water

(Release Point - Yard Drain - DSN 006)

Nuclides Released	Units	2002 1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	Total
A. Fission & Activation Products						
	Ci	-	-	-	-	-
Total Activity	Ci	-	-	-	-	N/D
B. Tritium						
H-3	Ci	-	2.46E-03	1.89E-04	5.51E-04	3.20E-03
Average Period Diluted Activity	uCi/ml	0.00E+00	9.94E-08	7.54E-09	2.20E-08	3.22E-08
C. Dissolved & Entrained Gases						
	Ci	-	-	-	-	-
Total Activity	Ci	-	-	-	-	N/D
D. Gross Alpha						
Gross Alpha	Ci	-	-	-	-	N/D
E. Volume						
Released Waste Volume	Liters	0.00E+00	3.05E+04	5.95E+03	2.12E+04	5.77E+04
Dilution Volume During Period *	Liters	2.45E+07	2.48E+07	2.51E+07	2.51E+07	9.95E+07

* from Yard Drains

N/D = Not Detected

2.3 Solid Waste

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

Table 2.1-6	Unit 1 Solid Waste and Irradiated Component Shipments
Table 2.2-9	Unit 2 Solid Waste and Irradiated Component Shipments
Table 2.3-11	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 2002

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 2.1-6
Solid Waste and Irradiated Component Shipments
Millstone Unit 1

January 1, 2002 through December 31, 2002

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	m^3	1.13E+00	
Chem-Nuclear Services LLC, Barnwell SC for burial	Ci	8.17E+00	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	1.45E+01	
Oak Ridge TN for Super-Compaction, Incineration, etc.	Ci	1.33E+00	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 - (Mixed Waste)

Disposition	Units	Annual Totals	Est. Total Error %
From Millstone Nuclear Power Station to Perma-Fix Environmental	m^3	1.30E+01	
Services, Gainesville FL for Stabilization, Fuel Blending, etc.	Ci	3.50E-03	25%

d. Other - (Water)

Disposition	Units	Annual Totals	Est. Total Error %
From Millstone Nuclear Power Station to Duratek Inc.,	m^3	6.27E+00	
Oak Ridge, TN for Incineration	Ci	1.91E-02	25%

d. Other - (Grease, oil, oily waste)

Disposition	Units	Annual Totals	Est. Total Error %
From Millstone Nuclear Power Station to Duratek Inc.,	m^3	3.85E-01	
Oak Ridge, TN for Super-Compaction, Incineration, etc.	Ci	1.35E-05	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 Chem-Nuclear Services LLC, Barnwell, SC for Burial

Radionuclide	% of Total	Curies
H-3	0.11	8.63E-03
C-14	1.92	1.57E-01
Na-22		
Cr-51	<0.01	7.91E-09
Mn-54	0.92	7.54E-02
Fe-55	56.48	4.61E+00
Fe-59	<0.01	1.70E-07
Co-57	0.02	1.94E-03
Co-58	0.05	3.98E-03
Co-60	22.59	1.85E+00
Ni-63	16.73	1.37E+00
Zn-65	<0.01	1.50E-04
Rb-83		
Sr-89	<0.01	4.91E-06
Sr-90	<0.01	5.08E-04
Nb-95	<0.01	2.39E-05
Zr-95	<0.01	2.28E-04
Tc-99	<0.01	9.65E-06
Ru-103	<0.01	3.40E-10
Ru-106	<0.01	8.23E-05
Ag-110m	0.01	8.36E-04
Sn-113	<0.01	2.69E-04
Sb-124	<0.01	1.10E-07
Sb-125	0.41	3.39E-02
I-129	<0.01	1.48E-04
Cs-134	0.10	7.91E-03
Cs-137	0.44	3.63E-02
Ce-144	<0.01	9.77E-08
U-234		
U-235		
U-238		
Pu-238	<0.01	3.62E-04
Pu-239	<0.01	1.97E-04
Pu-241	0.18	1.47E-02
Am-241	<0.01	4.13E-04
Pu-242	<0.01	2.60E-07
Cm-242	<0.01	2.50E-05
Cm-244	<0.01	4.82E-04
TOTALS		8.17E+00

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	0.20	2.63E-03
C-14		
Na-22		
Cr-51		
Mn-54		
Fe-55	63.25	8.38E-01
Fe-59		
Co-57		
Co-58		
Co-60	24.22	3.21E-01
Ni-63	3.24	4.29E-02
Zn-65		
Rb-83		
Sr-89		
Sr-90	0.59	7.87E-03
Nb-95		
Zr-95		
Tc-99		
Ru-103		
Ru-106		
Ag-110m		
Sn-113		
Sb-124		
Sb-125		
I-129		
Cs-134		
Cs-137	8.50	1.13E-01
Ce-144		
U-234		
U-235		
U-238		
Pu-238		
Pu-239		
Pu-241		
Am-241		
Pu-242		
Cm-242		
Cm-244		
TOTALS		1.33E+00

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

d. Other - (Mixed Waste)

From Millstone Nuclear Power Station to Perma-Fix Environmental Services, Gainesville FL for Stabilization, Fuel Blending, etc.

Radionuclide	% of Total	Curies
H-3	1.41	4.95E-05
C-14	0.20	7.17E-06
Na-22		
Cr-51		
Mn-54		
Fe-55	40.73	1.43E-03
Fe-59		
Co-57		
Co-58	0.55	1.91E-05
Co-60	27.62	9.66E-04
Ni-63	5.72	2.00E-04
Zn-65		
Rb-83		
Sr-89		
Sr-90	<0.01	2.22E-07
Nb-95		
Zr-95		
Tc-99		
Ru-103		
Ru-106		
Ag-110m		
Sn-113		
Sb-124		
Sb-125		
I-129		
Cs-134		
Cs-137	23.76	8.31E-04
Ce-144		
U-234		
U-235		
U-238		
Pu-238		
Pu-239		
Pu-241		
Am-241		
Pu-242		
Cm-242		
Cm-244		
TOTALS		3.50E-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	93.92	1.79E-02
C-14		
Na-22		
Cr-51	0.23	4.46E-05
Mn-54	0.12	2.37E-05
Fe-55	2.24	4.27E-04
Fe-59		
Co-57	<0.01	1.76E-06
Co-58	1.83	3.48E-04
Co-60	0.77	1.48E-04
Ni-63	0.58	1.11E-04
Zn-65	<0.01	5.67E-07
Rb-83	<0.01	3.33E-08
Sr-89		
Sr-90		
Nb-95	0.14	2.58E-05
Zr-95	0.07	1.43E-05
Tc-99		
Ru-103	0.01	2.13E-06
Ru-106		
Ag-110m		
Sn-113		
Sb-124		
Sb-125	0.03	5.53E-06
I-129		
Cs-134		
Cs-137	0.03	6.11E-06
Ce-144		
U-234	<0.01	6.67E-07
U-235		
U-238		
Pu-238		
Pu-239		
Pu-241		
Am-241	<0.01	3.33E-08
Pu-242		
Cm-242		
Cm-244		
TOTALS		1.91E-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., Oak Ridge, TN for Super-Compaction, Incineration, etc.

Radionuclide	% of Total	Curies
H-3		
C-14		
Na-22		
Cr-51		
Mn-54	1.46	1.98E-07
Fe-55	46.63	6.30E-06
Fe-59		
Co-57	0.12	1.66E-08
Co-58	9.05	1.22E-06
Co-60	15.57	2.10E-06
Ni-63	12.16	1.64E-06
Zn-65		
Rb-83		
Sr-89		
Sr-90	0.32	4.37E-08
Nb-95		
Zr-95		
Tc-99		
Ru-103		
Ru-106		
Ag-110m		
Sn-113		
Sb-124		
Sb-125		
I-129		
Cs-134	0.79	1.07E-07
Cs-137	13.89	1.88E-06
Ce-144		
U-234		
U-235		
U-238		
Pu-238		
Pu-239		
Pu-241		
Am-241		
Pu-242		
Cm-242		
Cm-244		
TOTALS		1.35E-05

3. Solid Waste Disposition (Shipments from Millstone)

Number of Shipments	Mode of Transportation	Destination
2	Truck (Sole Use Vehicle)	Chem-Nuclear Services LLC, Barnwell, SC
5	Truck (Sole Use Vehicle)	Duratek Inc. - Oak Ridge, TN
1	Truck (Sole Use Vehicle)	Perma-Fix Environmental Services - Gainesville FL

B. IRRADIATED FUEL SHIPMENTS (Disposition)

Number of Shipments	Mode of Transportation	Destination
No Shipments in 2002	N/A	N/A

Table 2.2-9
Solid Waste and Irradiated Component Shipments
Millstone Unit 2

January 1, 2002 through December 31, 2002

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 Studsvik	m^3	2.35E+00	
Processing Facility for Thermal Destruction	Ci	2.14E+01	25%
From Millstone Nuclear Power Station to Duratek Inc.,	m^3	7.45E-01	
Oak Ridge, TN for Super-Compaction, Incineration, etc.	Ci	1.19E+00	25%
From Millstone Nuclear Power Station to	m^3	1.88E+00	
Chem-Nuclear Services LLC, Barnwell, SC for Burial	Ci	9.13E+00	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	3.17E+02	
Oak Ridge, TN for Super-Compaction, Incineration, etc.	Ci	3.43E+00	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 - (Mixed Waste)

Disposition	Units	Annual Totals	Est. Total Error %
From Millstone Nuclear Power Station to Perma-Fix Environmental	m^3	4.31E+00	
Services, Gainesville FL for Stabilization, Fuel Blending, etc.	Ci	1.18E-03	25%

d. Other - (Water)

Disposition	Units	Annual Totals	Est. Total Error %
From Millstone Nuclear Power Station to Duratek Inc.,	m^3	1.61E+01	
Oak Ridge, TN for Super-Compaction, Incineration, etc.	Ci	2.56E-02	25%

d. Other - (Grease, oil, oily waste)

Disposition	Units	Annual Totals	Est. Total Error %
From Millstone Nuclear Power Station to Duratek Inc.,	m^3	2.79E+00	
Oak Ridge, TN for Super-Compaction, Incineration, etc.	Ci	6.66E-05	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 Studsvik Processing Facility for Thermal Destruction

Radionuclide	% of Total	Curies
H-3	<0.01	3.01E-04
C-14	2.96	6.34E-01
Na-22		
Cr-51		
Mn-54	0.10	2.14E-02
Fe-55	8.58	1.84E+00
Fe-59		
Co-57	0.01	2.49E-03
Co-58	0.01	2.34E-03
Co-60	14.45	3.10E+00
Ni-63	66.97	1.44E+01
Zn-65		
Rb-83		
Sr-89		
Sr-90	0.19	4.01E-02
Nb-95		
Zr-95		
Tc-99	<0.01	5.43E-05
Ru-103		
Ru-106		
Ag-110m		
Sn-113		
Sb-124		
Sb-125	0.13	2.86E-02
I-129		
Cs-134	0.59	1.27E-01
Cs-137	5.98	1.28E+00
Ce-144		
U-234		
U-235		
U-238		
Pu-238	<0.01	2.18E-04
Pu-239	<0.01	9.97E-05
Pu-241	0.03	5.81E-03
Am-241	<0.01	8.34E-05
Pu-242		
Cm-242	<0.01	6.16E-06
Cm-244	<0.01	9.22E-05
TOTALS		2.14E+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 Duratek Inc., Oak Ridge, TN for Super-Compaction, Incineration, etc.

Radionuclide	% of Total	Curies
H-3	2.02	2.40E-02
C-14	1.37	1.63E-02
Na-22		
Cr-51		
Mn-54	0.24	2.91E-03
Fe-55	47.78	5.69E-01
Fe-59		
Co-57	0.05	6.41E-04
Co-58	0.05	6.47E-04
Co-60	25.81	3.07E-01
Ni-63	20.51	2.44E-01
Zn-65		
Rb-83		
Sr-89		
Sr-90		
Nb-95		
Zr-95		
Tc-99		
Ru-103		
Ru-106		
Ag-110m		
Sn-113		
Sb-124		
Sb-125	0.58	6.88E-03
I-129		
Cs-134		
Cs-137	1.20	1.43E-02
Ce-144		
U-234		
U-235		
U-238		
Pu-238	<0.01	9.54E-05
Pu-239	<0.01	3.84E-05
Pu-241	0.35	4.14E-03
Am-241	<0.01	7.08E-05
Pu-242		
Cm-242	<0.01	5.24E-05
Cm-244	0.01	1.33E-04
TOTALS		1.19E+00

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

a. Spent resins, filter sludges, evaporator bottoms, etc.

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

Radionuclide	% of Total	Curies
H-3	0.13	1.14E-02
C-14	2.40	2.19E-01
Na-22		
Cr-51	<0.01	7.91E-09
Mn-54	0.83	7.61E-02
Fe-55	53.93	4.92E+00
Fe-59	<0.01	1.70E-07
Co-57	0.02	1.95E-03
Co-58	0.04	3.98E-03
Co-60	23.29	2.13E+00
Ni-63	17.78	1.62E+00
Zn-65	<0.01	1.50E-04
Rb-83		
Sr-89	<0.01	4.91E-06
Sr-90	<0.01	7.49E-04
Nb-95	<0.01	2.39E-05
Zr-95	<0.01	2.28E-04
Tc-99	<0.01	9.65E-06
Ru-103	<0.01	3.40E-10
Ru-106	<0.01	8.23E-05
Ag-110m	<0.01	8.73E-04
Sn-113	<0.01	2.69E-04
Sb-124	<0.01	1.10E-07
Sb-125	0.40	3.65E-02
I-129	<0.01	1.51E-04
Cs-134	0.10	9.16E-03
Cs-137	0.84	7.67E-02
Ce-144	<0.01	9.77E-08
U-234		
U-235		
U-238		
Pu-238	<0.01	4.53E-04
Pu-239	<0.01	2.44E-04
Pu-241	0.20	1.83E-02
Am-241	<0.01	4.62E-04
Pu-242	<0.01	2.60E-07
Cm-242	<0.01	2.51E-05
Cm-244	<0.01	5.64E-04
TOTALS		9.13E+00

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	[illegible]
H-3	0.27	9.17E-03
C-14	0.06	2.18E-03
Na-22		
Cr-51	0.14	4.79E-03
Mn-54	0.76	2.62E-02
Fe-55	34.64	1.19E+00
Fe-59	<0.01	5.55E-08
Co-57	<0.01	3.62E-05
Co-58	4.66	1.60E-01
Co-60	20.68	7.09E-01
Ni-63	27.75	9.52E-01
Zn-65		
Rb-83		
Sr-89	<0.01	5.45E-09
Sr-90	<0.01	8.12E-06
Nb-95	0.10	3.45E-03
Zr-95	0.07	2.26E-03
Tc-99	<0.01	4.37E-09
Ru-103		
Ru-106		
Ag-110m	<0.01	2.26E-04
Sn-113	<0.01	8.75E-06
Sb-124	<0.01	2.40E-08
Sb-125	0.01	3.91E-04
I-129		
Cs-134	3.54	1.22E-01
Cs-137	7.30	2.51E-01
Ce-144		
U-234		
U-235		
U-238		
Pu-238	<0.01	3.39E-06
Pu-239	<0.01	1.48E-06
Pu-241	<0.01	1.47E-04
Am-241	<0.01	2.64E-06
Pu-242		
Cm-242	<0.01	2.95E-06
Cm-244	<0.01	4.98E-06
TOTALS		3.43E+00

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

d. Other - (Mixed Waste)

From Millstone Nuclear Power Station to Perma-Fix Environmental Services, Gainesville FL for Stabilization, Fuel Blending, etc.

Radionuclide	% of Total	Curies
H-3	11.39	1.34E-04
C-14	1.42	1.67E-05
Na-22		
Cr-51		
Mn-54	0.06	7.11E-07
Fe-55	37.97	4.47E-04
Fe-59		
Co-57		
Co-58	2.84	3.34E-05
Co-60	14.69	1.73E-04
Ni-63	14.79	1.74E-04
Zn-65		
Rb-83		
Sr-89		
Sr-90	0.02	2.22E-07
Nb-95		
Zr-95		
Tc-99		
Ru-103		
Ru-106		
Ag-110m		
Sn-113		
Sb-124		
Sb-125		
I-129		
Cs-134	0.30	3.49E-06
Cs-137	16.52	1.94E-04
Ce-144		
U-234		
U-235		
U-238		
Pu-238		
Pu-239		
Pu-241		
Am-241		
Pu-242		
Cm-242		
Cm-244		
TOTALS		1.18E-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 Super-Compaction, Incineration, etc.

Radionuclide	% of Total	Curies
H-3	90.75	2.33E-02
C-14		
Na-22	<0.01	6.40E-07
Cr-51	0.17	4.46E-05
Mn-54	0.18	4.49E-05
Fe-55	3.36	8.61E-04
Fe-59		
Co-57	<0.01	1.77E-06
Co-58	1.51	3.86E-04
Co-60	0.93	2.38E-04
Ni-63	0.73	1.88E-04
Zn-65	0.05	1.31E-05
Rb-83	<0.01	3.33E-08
Sr-89		
Sr-90		
Nb-95	0.12	3.13E-05
Zr-95	0.07	1.78E-05
Tc-99		
Ru-103	<0.01	2.13E-06
Ru-106		
Ag-110m		
Sn-113		
Sb-124		
Sb-125	0.02	5.53E-06
I-129		
Cs-134	<0.01	1.42E-06
Cs-137	2.07	5.31E-04
Ce-144		
U-234	<0.01	2.28E-06
U-235	<0.01	1.16E-08
U-238	<0.01	1.18E-07
Pu-238	<0.01	1.81E-07
Pu-239	<0.01	1.00E-07
Pu-241		
Am-241	<0.01	1.68E-07
Pu-242		
Cm-242		
Cm-244		
TOTALS		2.56E-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., Oak Ridge, TN for Super-Compaction, Incineration, etc.

Radionuclide	% of Total	Curies
H-3	70.06	4.67E-05
C-14		
Na-22		
Cr-51		
Mn-54	0.30	1.98E-07
Fe-55	9.45	6.30E-06
Fe-59		
Co-57	0.02	1.66E-08
Co-58	2.54	1.69E-06
Co-60	11.74	7.82E-06
Ni-63	2.47	1.64E-06
Zn-65		
Rb-83		
Sr-89		
Sr-90	0.07	4.37E-08
Nb-95		
Zr-95		
Tc-99		
Ru-103		
Ru-106		
Ag-110m		
Sn-113		
Sb-124		
Sb-125		
I-129		
Cs-134	0.16	1.07E-07
Cs-137	3.19	2.13E-06
Ce-144		
U-234		
U-235		
U-238		
Pu-238		
Pu-239		
Pu-241		
Am-241		
Pu-242		
Cm-242		
Cm-244		
TOTALS		6.66E-05

3. Solid Waste Disposition (Shipments from Millstone)

Number of Shipments	Mode of Transportation	Destination
3	Truck (Sole Use Vehicle)	Chem-Nuclear Services - Barnwell, SC
14	Truck (Sole Use Vehicle)	Duratek Inc. - Oak Ridge, TN
2	Truck (Sole Use Vehicle)	Perma-Fix Environmental Services - Gainesville FL
1	Truck (Sole Use Vehicle)	Studsvik Processing Facility, LLC - Erwin, TN

B. IRRADIATED FUEL SHIPMENTS (Disposition)

Number of Shipments	Mode of Transportation	Destination
No Shipments in 2002	N/A	N/A

Table 2.3-11
Solid Waste and Irradiated Component Shipments
Millstone Unit 3

January 1, 2002 through December 31, 2002

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 Chem-Nuclear Services LLC, Barnwell, SC for Burial	m^3	2.76E+00	
	Ci	2.30E+01	25%
From Millstone Nuclear Power Station to Duratek Inc., Oak Ridge, TN for Super-Compaction, Incineration, etc.	m^3	4.28E-01	
	Ci	1.76E+00	25%
From Millstone Nuclear Power Station to Studsvik Processing Facility for Thermal Destruction	m^3	4.09E+00	
	Ci	4.96E+01	25%

b. Dry compressible waste, contaminated equipment, etc.

Disposition	Units	Annual Totals	Est. Total Error %
From Millstone Nuclear Power Station to Duratek Inc., Oak Ridge, TN for Super-Compaction, Incineration, etc.	m^3	1.98E+02	
	Ci	1.13E+00	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 - (Mixed Waste)

Disposition	Units	Annual Totals	Est. Total Error %
From Millstone Nuclear Power Station to Perma-Fix Environmental Services, Gainesville FL for Stabilization, Fuel Blending, etc.	m^3	4.51E-01	
	Ci	4.24E-04	25%

d. Other - (Water)

Disposition	Units	Annual Totals	Est. Total Error %
From Millstone Nuclear Power Station to Duratek Inc., Oak Ridge, TN for Super-Compaction, Incineration, etc.	m^3	3.65E+01	
	Ci	1.36E-01	25%

d. Other - (Grease, oil, oily waste)

Disposition	Units	Annual Totals	Est. Total Error %
From Millstone Nuclear Power Station to Duratek Inc., Oak Ridge, TN for Super-Compaction, Incineration, etc.	m^3	3.85E-01	
	Ci	1.35E-05	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 Chem-Nuclear Services LLC, Barnwell, SC for Burial

Radionuclide	% of Total	Curies
H-3	0.06	1.29E-02
C-14	0.97	2.23E-01
Na-22		
Cr-51	<0.01	7.91E-09
Mn-54	1.45	3.33E-01
Fe-55	56.03	1.29E+01
Fe-59	<0.01	1.70E-07
Co-57	0.03	7.31E-03
Co-58	0.04	8.52E-03
Co-60	24.18	5.56E+00
Ni-63	16.11	3.71E+00
Zn-65	<0.01	1.50E-04
Rb-83		
Sr-89	<0.01	4.91E-06
Sr-90	<0.01	9.04E-04
Nb-95	<0.01	3.80E-05
Zr-95	<0.01	4.94E-04
Tc-99	<0.01	9.65E-06
Ru-103	<0.01	3.40E-10
Ru-106	<0.01	8.23E-05
Ag-110m	<0.01	8.73E-04
Sn-113	<0.01	3.63E-04
Sb-124	<0.01	1.10E-07
Sb-125	0.60	1.37E-01
I-129	<0.01	1.25E-03
Cs-134	0.04	9.16E-03
Cs-137	0.37	8.52E-02
Ce-144	<0.01	9.77E-08
U-234		
U-235		
U-238		
Pu-238	<0.01	5.60E-04
Pu-239	<0.01	2.82E-04
Pu-241	0.10	2.25E-02
Am-241	<0.01	4.85E-04
Pu-242	<0.01	2.60E-07
Cm-242	<0.01	3.04E-05
Cm-244	<0.01	5.84E-04
TOTALS		2.30E+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 Duratek Inc., Oak Ridge, TN for Super-Compaction, Incineration, etc.

Radionuclide	% of Total	Curies
H-3	1.83	3.22E-02
C-14	0.03	5.33E-04
Na-22		
Cr-51		
Mn-54	0.17	2.95E-03
Fe-55	77.17	1.36E+00
Fe-59		
Co-57		
Co-58		
Co-60	10.73	1.89E-01
Ni-63	9.30	1.64E-01
Zn-65		
Rb-83		
Sr-89		
Sr-90		
Nb-95		
Zr-95		
Tc-99		
Ru-103		
Ru-106		
Ag-110m		
Sn-113		
Sb-124		
Sb-125	0.31	5.55E-03
I-129		
Cs-134		
Cs-137	0.45	7.93E-03
Ce-144		
U-234		
U-235		
U-238		
Pu-238	<0.01	2.37E-06
Pu-239	<0.01	1.90E-06
Pu-241	0.01	1.83E-04
Am-241	<0.01	2.79E-06
Pu-242		
Cm-242	<0.01	5.92E-06
Cm-244	<0.01	9.96E-06
TOTALS		1.76E+00

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 Facility for Thermal Destruction

Radionuclide	% of Total	Curies
H-3	0.11	5.62E-02
C-14	0.07	3.59E-02
Na-22		
Cr-51		
Mn-54	2.14	1.06E+00
Fe-55	19.86	9.85E+00
Fe-59		
Co-57		
Co-58	0.32	1.57E-01
Co-60	12.83	6.36E+00
Ni-63	61.02	3.03E+01
Zn-65		
Rb-83		
Sr-89		
Sr-90	0.02	1.06E-02
Nb-95		
Zr-95		
Tc-99		
Ru-103		
Ru-106		
Ag-110m		
Sn-113		
Sb-124		
Sb-125	1.11	5.48E-01
I-129		
Cs-134		
Cs-137	2.51	1.24E+00
Ce-144		
U-234		
U-235		
U-238		
Pu-238	<0.01	2.36E-04
Pu-239	<0.01	2.28E-05
Pu-241	<0.01	3.82E-03
Am-241	<0.01	1.06E-04
Pu-242		
Cm-242	<0.01	5.25E-05
Cm-244	<0.01	2.25E-04
TOTALS		4.96E+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., Oak Ridge, TN for Super-Compaction, Incineration, etc.

Radionuclide	% of Total	Curies
H-3	1.96	2.22E-02
C-14	0.09	1.03E-03
Na-22		
Cr-51	0.17	1.88E-03
Mn-54	4.23	4.79E-02
Fe-55	50.78	5.74E-01
Fe-59	<0.01	5.55E-08
Co-57	<0.01	1.10E-04
Co-58	6.49	7.33E-02
Co-60	10.55	1.19E-01
Ni-63	8.96	1.01E-01
Zn-65		
Rb-83		
Sr-89	<0.01	5.45E-09
Sr-90	<0.01	8.12E-06
Nb-95	<0.01	8.01E-02
Zr-95	<0.01	3.74E-02
Tc-99	<0.01	4.37E-09
Ru-103		
Ru-106		
Ag-110m		
Sn-113	<0.01	8.75E-06
Sb-124	<0.01	2.40E-08
Sb-125	0.07	7.41E-04
I-129		
Cs-134	<0.01	5.76E-05
Cs-137	6.29	7.11E-02
Ce-144		
U-234		
U-235		
U-238		
Pu-238	<0.01	1.36E-06
Pu-239	<0.01	7.21E-07
Pu-241	<0.01	6.20E-05
Am-241	<0.01	1.19E-06
Pu-242		
Cm-242	<0.01	1.19E-06
Cm-244	<0.01	2.50E-06
TOTALS		1.13E+00

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

d. Other - (Mixed Waste)

From Millstone Nuclear Power Station to Perma-Fix Environmental Services, Gainesville FL for Stabilization, Fuel Blending, etc.

Radionuclide	% of Total	Curies
H-3	5.83	2.47E-05
C-14	1.35	5.71E-06
Na-22		
Cr-51		
Mn-54	<0.01	1.36E-10
Fe-55	40.26	1.71E-04
Fe-59		
Co-57		
Co-58	4.51	1.91E-05
Co-60	19.15	8.13E-05
Ni-63	18.18	7.72E-05
Zn-65		
Rb-83		
Sr-89		
Sr-90	0.05	2.22E-07
Nb-95		
Zr-95		
Tc-99		
Ru-103		
Ru-106		
Ag-110m		
Sn-113		
Sb-124		
Sb-125		
I-129		
Cs-134		
Cs-137	10.67	4.53E-05
Ce-144		
U-234		
U-235		
U-238		
Pu-238		
Pu-239		
Pu-241		
Am-241		
Pu-242		
Cm-242		
Cm-244		
TOTALS		4.24E-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 Super-Compaction, Incineration, etc.

Radionuclide	% of Total	Curies
H-3	97.91	1.33E-01
C-14	<0.01	1.81E-06
Na-22	<0.01	1.23E-06
Cr-51	0.03	4.46E-05
Mn-54	0.04	5.04E-05
Fe-55	0.69	9.44E-04
Fe-59	<0.01	1.90E-06
Co-57	<0.01	2.13E-06
Co-58	0.29	3.91E-04
Co-60	0.20	2.75E-04
Ni-63	0.15	2.08E-04
Zn-65	0.01	1.47E-05
Rb-83	<0.01	3.33E-08
Sr-89		
Sr-90		
Nb-95	0.02	3.24E-05
Zr-95	0.01	1.78E-05
Tc-99		
Ru-103	<0.01	2.13E-06
Ru-106		
Ag-110m		
Sn-113		
Sb-124		
Sb-125	<0.01	5.53E-06
I-129		
Cs-134	0.08	1.06E-04
Cs-137	0.55	7.46E-04
Ce-144		
U-234	<0.01	2.28E-06
U-235	<0.01	1.16E-08
U-238	<0.01	1.18E-07
Pu-238	<0.01	1.81E-07
Pu-239	<0.01	1.00E-07
Pu-241		
Am-241	<0.01	1.68E-07
Pu-242		
Cm-242		
Cm-244		
TOTALS		1.36E-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., Oak Ridge, TN for Super-Compaction, Incineration, etc.

Radionuclide	% of Total	Curies
H-3		
C-14		
Na-22		
Cr-51		
Mn-54	1.46	1.98E-07
Fe-55	46.63	6.30E-06
Fe-59		
Co-57	0.12	1.66E-08
Co-58	9.05	1.22E-06
Co-60	15.57	2.10E-06
Ni-63	12.16	1.64E-06
Zn-65		
Rb-83		
Sr-89		
Sr-90	0.32	4.37E-08
Nb-95		
Zr-95		
Tc-99		
Ru-103		
Ru-106		
Ag-110m		
Sn-113		
Sb-124		
Sb-125		
I-129		
Cs-134	0.79	1.07E-07
Cs-137	13.89	1.88E-06
Ce-144		
U-234		
U-235		
U-238		
Pu-238		
Pu-239		
Pu-241		
Am-241		
Pu-242		
Cm-242		
Cm-244		
TOTALS		1.35E-05

3. Solid Waste Disposition (Shipments from Millstone)

Number of Shipments	Mode of Transportation	Destination
4	Truck (Sole Use Vehicle)	Chem-Nuclear Services - Barnwell, SC
13	Truck (Sole Use Vehicle)	Duratek Inc. - Oak Ridge, TN
1	Truck (Sole Use Vehicle)	Perma-Fix Environmental Services - Gainesville FL
1	Truck (Sole Use Vehicle)	Studsvik Processing Facility, LLC - Erwin, TN

B. IRRADIATED FUEL SHIPMENTS (Disposition)

Number of Shipments	Mode of Transportation	Destination
No Shipments in 2002	N/A	N/A

3.0 REMODCM Changes

In 2002, the following changes were made to the Millstone REMODCM:

Change #	Rev	Effective Date
01-03	23	January 8, 2002

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 2002 is provided to the Nuclear Regulatory Commission as Volume II of this report.

<u>REMODCM</u>

Rev 23

Description of Changes and

Radiological Environmental Review

REMODCM Change Request - Routing and Cover Sheet

Change Request #: 01-03

I. Description of changes (include markup pages) and implementing documents

Originator name (Print): Claude Flory

Section/Page	Section Title and Description of Change with Basis	Documents
I.E I.E.1/I.E-2	Radiological Environmental Monitoring - Sampling and Analysis 1. Corrected references: from - IV.E.1b, IV.E.2.b, IV.E.2.c, V.E.1.b, V.E.2.b, and V.E.2.c to IV.D.1.b, IV.D.2.b, IV.D.2.c, V.D.1.b, V.D.2.b, and V.D.2.c	None
I.E.1/I.E-3,5	2. Increased the total number of environmental TLDs from 36 to 40 by adding four TLDs used to support the Millstone Emergency Plan. As part of this change the footnote at bottom of Table I.E-2 was revised so that it no longer states that there are additional TLDs which are used in the emergency plan. With the addition of the four TLDs, all TLDs will now be listed in this table. This makes the REMODCM consistent with the Millstone Emergency Plan.	None
I.E.1/I.E-4,5	3. Added "Onsite" to names for locations #5, 6, 7, 8, 9, 44 and 45 to be consistent with other onsite location names.	None
I.E.1/I.E-5	4. Changed name of location 44 from "Old Schoolhouse" to "Schoolhouse" and of location 53 from "Rt. 156&Gardiners Wood Rd" to "Gardiners Wood Rd" for the convenience of a shorter name.	None
I.E.1/I.E-5	5. Changed name of location 45 from "North Access Point" to "Access Road" to be more accurate in describing the location.	None
II.E II.E.4/II.E-4	Liquid Monitor Setpoints Condensate Polishing Facility Waste Neutralization Sump Effluent Line - CND245 Revised setpoint based on background from two times to ten times monitor background to avoid an unnecesarily low setpoint. A setpoint of two times background was tripping on normal instrumentation signal flucations. An upper limit on background based setpoint of 1.7E-4 uCi/ml is added to guard against unacceptable increses in monitor background. This upper limits ensures that Specification IV.D.1.a is not exceeded.	CP2809E SP2864

If more space is needed, use MP-13-REM-SAP01-002 Yes ☐ No ☒

Originator signature: Claude Flory **Date:** 12/19/01

I.E. RADIOLOGICAL ENVIRONMENTAL MONITORING (Cont'd)

When radionuclides other than those in *Table I.E-3* are detected and are the result of plant effluents, this report shall be submitted if the potential annual dose to an individual is equal to or greater than the appropriate calendar year limit of the *Radiological Effluent Controls (Sections III.D.1.b, III.D.2.b, or III.D.2.c for Unit 1; Sections IV.~~E~~D.1b, IV.~~E~~D.2.b, or IV.~~E~~D.2.c for Unit 2; and Sections V.~~E~~D.1.b, V.~~E~~D.2.b, or V.~~E~~D.2.c for Unit 3).* This report is not required if the measured level of radioactivity was not the result of plant effluents, however, in such an event, the condition shall be reported and described in the *Annual Radiological Environmental Operating Report.*

The detection capabilities required by *Table I.E-4* are state-of-the-art for routine environmental measurements in industrial laboratories. It should be recognized that the LLD is defined as an a priori (before the fact) limit representing the capability of a measurement system and not as an a posteriori (after the fact) limit for a particular measurement. All analyses shall be performed in such a manner that the stated LLDs will be achieved under routine conditions. Occasionally background fluctuations, unavoidably small sample sizes, the presence of interfering nuclides, or other uncontrollable circumstances may render these LLDs unachievable. In such cases, the contributing factors will be identified and described in the *Annual Radiological Environmental Operating Report.*

TABLE I.E-1

MILLSTONE RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM

Exposure Pathway and/or Sample	Number of Locations	Sampling and Collection Frequency	Type and Frequency of Analysis
1. Gamma Dose - Environmental TLD	~~36~~40[a]	Quarterly	Gamma Dose - Quarterly
2. Airborne Particulate	8	Continuous sampler - weekly filter change	Gross Beta - Weekly Gamma Spectrum - Quarterly on composite (by location), and on individual sample if gross beta is greater than 10 times the mean of the weekly control station's gross beta results
3. Airborne Iodine	8	Continuous sampler - weekly canister change	I-131 - Weekly
4. Vegetation	5	One sample near middle and one near end of growing season	Gamma Isotopic on each sample
5. Milk	3	Semimonthly when animals are on pasture; monthly at other times.	Gamma Isotopic and I-131 on each sample; Sr-89 and Sr-90 on Quarterly Composite
5a. Pasture Grass	3	Sample as necessary to substitute for unavailable milk	Gamma Isotopic and I-131
6. Sea Water	2	Continuous sampler with a monthly collection at indicator location. Quarterly at control location - Composite of 6 weekly grab samples	Gamma Isotopic and Tritium on each sample.
7. Bottom Sediment	5	Semiannual	Gamma Isotopic on each sample
7a. Soil	3	Quarterly	Gamma Isotopic on each sample
8. Fin Fish-Flounder and one other type of edible fin fish (edible portion)	2	Quarterly	Gamma Isotopic on each sample
9. Mussels (edible portion)	2	Quarterly	Gamma Isotopic on each sample
10. Oysters (edible portion)	4	Quarterly	Gamma Isotopic on each sample
11. Clams (edible portion)	2	Quarterly	Gamma Isotopic on each sample
12. Lobsters (edible portion)	2	Quarterly	Gamma Isotopic on each sample

(a) Two or more TLDs or TLD with two or more elements per location.

TABLE I.E-2

ENVIRONMENTAL MONITORING PROGRAM

Sampling Locations

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

Location			
Number*	**Name**	**Direction & Distance from Release Point****	**Sample Types**
1-I	Onsite - Old Millstone Road	0.6 Mi, NNW	TLD, Air Particulate, Iodine, Vegetation
2-I	Onsite - Weather Shack	0.3 Mi, S	TLD, Air Particulate, Iodine
3-I	Onsite - Bird Sanctuary	0.3 Mi, NE	TLD, Air Particulate, Iodine, Soil
4-I	Onsite - Albacore Drive	1.0 Mi, N	TLD, Air Particulate, Iodine, Soil
5-I	Onsite - MP3 Discharge	0.1 Mi, SSE	TLD
6-I	Onsite - Quarry Discharge	0.3 Mi, SSE	TLD
7-I	Onsite - Environmental Lab Dock	0.3 Mi, SE	TLD
8-I	Onsite - Environmental Lab	0.3 Mi, SE	TLD
9-I	Onsite - Bay Point Beach	0.4 Mi, W	TLD
10-I	Pleasure Beach	1.2 Mi, E	TLD, Air Particulate, Iodine, Vegetation
11-I	New London Country Club	1.6 Mi, ENE	TLD, Air Particulate, Iodine
12-C	Fisher's Island, NY	8.0 Mi, ESE	TLD
13-C	Mystic, CT	11.5 Mi, ENE	TLD
14-C	Ledyard, CT	12.0 Mi, NE	TLD, Soil
15-C	Norwich, CT	14.0 Mi, N	TLD, Air Particulate, Iodine
16-C	Old Lyme, CT	8.8 Mi, W	TLD
17-I	Site Boundary	0.5 Mi, NE	Vegetation
21-I	Goat Location No. 1	2.0 Mi., N	Milk
22-I	Goat Location No. 2	5.2 Mi, NNE	Milk
24-C	Goat Location No. 3	29 Mi, NNW	Milk
25-I	Fruits & Vegetables	Within 10 Miles	Vegetation
26-C	Fruits & Vegetables	Beyond 10 Miles	Vegetation
27-I	Niantic	1.7 Mi, WNW	TLD, Air Particulate, Iodine
28-I	Two Tree Island	0.8 Mi, SSE	Mussels
29-I	West Jordan Cove	0.4 Mi, NNE	Clams
30-I	Niantic Shoals	1.5 Mi, NNW	Mussels
31-I	Niantic Shoals	1.8 Mi, NW	Bottom Sediment, Oysters
32-I	Vicinity of Discharge		Bottom Sediment, Oysters, Lobster, Fish, Seawater
33-I	Seaside Point	1.8 Mi, ESE	Bottom Sediment
34-I	Thames River Yacht Club	4.0 Mi, ENE	Bottom Sediment
35-I	Niantic Bay	0.3 Mi, WNW	Lobster, Fish
36-I	Black Point	3.0 Mi, WSW	Oysters
37-C	Giant's Neck	3.5 Mi, WSW	Bottom Sediment, Oysters, Seawater
38-I	Waterford Shellfish Bed No. 1	1.0 Mi, NW	Clams

* I = Indicator; C = Control

** = The release points are the Millstone Stack for terrestrial locations and the end of the quarry for aquatic location.

TABLE I.E-2 (cont.)
ENVIRONMENTAL MONITORING PROGRAM
Sampling Locations

Location			
Number*	**Name**	**Direction & Distance from Release Point****	**Sample Types**
41-I	Myrock Avenue	3.2 Mi, ENE	TLD
42-I	Billow Road	2.4 Mi, WSW	TLD
43-I	Black Point	2.6 Mi, SW	TLD
44-I	Onsite ~~Old~~ Schoolhouse	0.1 Mi, NNE	TLD
45-I	~~North Access Point~~Onsite Access Road	0.5 Mi, NNW	TLD
46-I	Old Lyme - Hillcrest Ave.	4.6 Mi, WSW	TLD
47-I	East Lyme - W. Main St.	4.5 Mi, W	TLD
48-I	East Lyme - Corey Rd.	3.4 Mi, WNW	TLD
49-I	East Lyme - Society Rd.	3.6 Mi, NW	TLD
50-I	East Lyme - Manwaring Rd.	2.1 Mi, W	TLD
51-I	East Lyme - Smith Ave.	1.5 Mi, NW	TLD
52-I	Waterford - River Rd.	1.1 Mi, NNW	TLD
53-I	Waterford - ~~Rt. 156 &~~ Gardiners Wood Rd.	1.4 Mi, NNE	TLD
55-I	Waterford - Magonk Point	1.8 Mi, ESE	TLD
56-I	New London - Mott Ave.	3.7 Mi, E	TLD
57-I	New London - Ocean Ave.	3.6 Mi, ENE	TLD
59-I	Waterford -Miner Ave.	3.4 Mi, NNE	TLD
60-I	Waterford - Parkway South	4.0 Mi, N	TLD
61-I	Waterford - Boston Post Rd.	4.3 Mi, NNW	TLD
62-I	East Lyme - Columbus Ave.	1.9 Mi, WNW	TLD
63-I	Waterford - Jordon Cove Rd.	0.8 Mi, NE	TLD
64-I	Waterford - Shore Rd.	1.1 Mi, ENE	TLD
65-I	Waterford - Bank St.	3.2 Mi, NE	TLD

* I = Indicator; C = Control.

** = The release points are the Millstone Stack for terrestrial locations and the end of the quarry for aquatic location.

NOTE: Environmental TLDs also function as accident TLDs in support of the Millstone Emergency Plan. ~~The 36 listed locations for TLDs are the number of environmental TLDs required by Table I.E-1. There are additional TLDs deployed in the environment not listed in this table, including TLDs needed to comply with the Millstone Emergency Plan.~~

II.E. LIQUID MONITOR SETPOINTS (Cont'd)

4. Condensate Polishing Facility Waste Neutralization Sump Effluent Line - CND245

When the grab sample prior to release required by Table I.C-2 is greater than 5×10^{-7} uCi/ml, the setpoint shall be determined as for the Clean and Aerated Liquid Monitors in Section II.E.3 except the CPF monitor has the capability to readout in CPM or µCi/ml. If the grab sample is less than 5×10^{-7} uCi/ml, use a setpoint of the lower of ~~two~~ten times background or the value as specified in II.E.3. A setpoint based on ten times background shall not exceed a reading corresponding to 1.7E-4 uCi/ml, which is approximately 38,000 CPM based on recent calibration data.

5a. Unit 2 Steam Generator Blowdown - RM4262

Assumptions used in determining the Alarm setpoint for this monitor are:

a. Total S.G. blowdown flow rate = 700 gpm.

b. Normal minimum possible circulating water dilution flow during periods of blowdown = 200,000 gpm (2 circulating water pumps) = 200,000 gpm.

c. The release rate limit is conservatively set at 10% of the *10CFR Part 20* limit for I-131 ($0.1 \times 3 \times 10^{-7}$ µCi/ml = 3×10^{-8} µCi/ml)*

d. Background can be added after above calculations are performed.

Therefore, the alarm setpoint corresponds to a concentration of:

$$\text{Alarm } (\mu Ci/ml) = \frac{200{,}000}{700} \times 3 \times 10^{-8} + \text{background}^{**} = 8.5 \times 10^{-6}\ \mu Ci/ml + \text{background}$$

The latest monitor calibration curve shall be used to determine the alarm setpoint in cpm corresponding to 8.5×10^{-6} µCi/ml.

This setpoint may be adjusted (increased or decreased) through proper administrative controls if the steam generator blowdown rate is maintained other than 700 gpm and/or other than 2 circulating water pumps are available. The adjustment would correspond to the ratio of flows to those assumed above or:

$$\text{Alarm } (\mu Ci/ml) = 8.5 \times 10^{-6}\ \mu Ci/ml \times \frac{\text{circulating \& service water flow (gpm)}}{200{,}000} \times \frac{700}{S/G \text{ blowdown (gpm)}} +$$

$$\text{Background} = 3 \times 10^{-8} \mu Ci/ml \times \frac{\text{circulating \& service water flow (gpm)}}{\text{total } S/G \text{ blowdown (gpm)}} + \text{Background}$$

Note: The Steam Generator Blowdown alarm criteria is in practice based on setpoints required to detect allowable levels of primary to secondary leakage. This alarm criteria is typically more restrictive than that required to meet discharge limits. This fact shall be verified, however, whenever the alarm setpoint is recalculated.

* In lieu of using the I-131 MPC value, the identified MPC values for unrestricted area may be used.

** Background of monitor at monitor location (i.e., indication provided by system monitor with no activity present in the monitored system).

RADIOLOGICAL ENVIRONMENTAL REVIEW

RER-02-001

Revision 0

for

REMODCM Rev 23

January 8, 2002

Total Number of Pages: 2

Claude Flory *Claude Flory* 1/8/02
Preparer Date

William Eakin *WJ Eakin* 1/8/02
Supervisor Date

1.0 DESCRIPTION OF CHANGE

List of changes for REMODCM Revision 23:

In Section I.E, "Radiological Environmental Monitoring - Sampling and Analysis":

1. Corrected internal references from IV.E.1b, IV.E.2.b, IV.E.2.c, V.E.1.b, V.E.2.b, and V.E.2.c to IV.D.1.b, IV.D.2.b, IV.D.2.c, V.D.1.b, V.D.2.b, and V.D.2.c
2. Increased the total number of environmental TLDs from 36 to 40 by adding four TLDs. As part of this change the footnote at bottom of Table I.E-2 was revised so that it no longer states that there are additional TLDs which are used in the emergency plan.
3. Added "Onsite" to names for locations #5, 6, 7, 8, 9, 44 and 45 to be consistent with other onsite location names.
4. Changed name of location 44 from "Old Schoolhouse" to "Schoolhouse" and of location 53 from "Rt. 156&Gardiners Wood Rd" to "Gardiners Wood Rd" for the convenience of a shorter name.
5. Changed name of location 45 from "North Access Point" to "Access Road" to be more accurate in describing the location.

In Section II.E, "Liquid Monitor Setpoints":
Revised the setpoint for the Condensate Polishing Facility (CPF) Waste Neutralization Sump Effluent Line Radiation Monitor (CND245). The requirement was changed from two times background to ten times monitor background.

2.0 DISCUSSION

Changes in Section I.E to correct wrong internal references and revise location names are self-explanatory or briefly explained in the Description of Change.

The increased in total number of environmental TLDs from 36 to 40 was done in support of the Millstone Emergency Plan. With the addition of the four TLDs, all TLDs used for both environmental monitoring and for accident assessment will now be listed in this table. This makes the REMODCM consistent with statements in the Millstone Emergency Plan.

The CPF Waste Neutralization Sump Radiation Monitor setpoint requirement was revised to avoid an unnecessarily low setpoint. A setpoint of two times background was tripping on normal instrumentation signal fluctuations. An upper limit on background based setpoint of 1.7E-4 uCi/ml is added to guard against unacceptable increases in monitor background. This upper limits ensures that Specification IV.D.1.a is not exceeded and has the same basis as the limit on setpoint for the other liquid radwaste radiation monitors.

3.0 CONCLUSION

The changes in Revision 23 to the REMODCM would not cause an increase in release of radioactivity to the environment or of dose to the public and they do not deviate from any of the design bases for an effluent control program in the FSAR for Millstone Units 2 and 3 or in the DSAR for Millstone Unit 1. The changes will not affect the level of radioactive effluent control required by each unit's Technical Specifications and FSAR, 10CFR20, 40CFR190, 10CFR50.36a, and Appendix I of 10CFR50 and will not adversely impact the accuracy or reliability of effluent, dose or setpoint calculations. The changes do not cause an Unreviewed Radiological Environmental Impact (UREI).

4.0 Inoperable Effluent Monitors

During the period January 1 through December 31, 2002, the following effluent monitors were inoperable for more than 30 consecutive days:

4.1 Unit 1 -

The **MP1 BOP** balance of plant sampler was declared inoperable from September 23 @ 10:03 to November 2 @ 09:00 for a total of 39 days due to a lightning strike which failed the sample flow control valve. The purchased replacement flow control valve did not arrive on site until October 31. The valve was installed and the monitor declared operable on November 2. Operability was not restored within 30 days as required because there were no spares on site. Corrective actions include stocking a spare flow control valve for this application. During the period that the monitor was inoperable, periodic samples were collected and analyzed as required.

4.2 Unit 2 -

The **MP2 WRGM** wide range gas monitor was declared inoperable from September 20 @ 03:32 to October 23 @ 11:13 for a total of 33 days due to a lightning strike which damaged several components of the monitor. The control room indication was damaged such that it would loose communication with the monitor for 10 to 15 seconds at a time causing alarms. The power isolation card and the I/O card were also replaced. Operability was not restored within 30 days as required because the required troubleshooting exceeded our on site capability in experience and in spare parts. We were not prepared to diagnose the multiple failures caused by the lightning strike. We were forced to bring in the vendor and to wait several days as he was at another site when we called. Our supply of spare parts did not include the control room indication that failed. Corrective actions include analysis of the failed components to identify the failure mechanism. During the period that the monitor was inoperable, samples were collected and analyzed, and flow rates were periodically estimated as required.

4.3 Unit 3 - None

5.0 Errata

None