Dominion Nuclear Connecticut, Inc.

Dominion

APR 30 2001

Docket Nos. 50-245
50-336
50-423
B18394

RE: 10 CFR 50.36a

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

Millstone Nuclear Power Station, Unit Nos. 1, 2, and 3
2000 Radioactive Effluent Release Report

The purpose of this letter is to submit the annual Radioactive Effluent Release Report in accordance with the requirements of 10 CFR 50.36a and Sections 6.9.1.6b and 6.9.1.4 of the Millstone Unit Nos. 2 and 3 Technical Specifications, respectively. This report also satisfies the requirements of Section 5.7.3 of the Unit No. 1 Defueled Technical Specifications. This report covers the period of January through December 2000.

Enclosure 1 transmits Volumes I and II of the 2000 Radioactive Effluent Release Report, in accordance with Regulatory Guide 1.21. Volume I contains information regarding airborne, liquid, and solid radioactivity released from Millstone, as well as off-site doses from airborne and liquid radioactive effluents. Volume II contains the revisions made to the Radioactive Effluent Monitoring and Off-site Dose Calculation Manual (REMODCM) throughout the year 2000.

Enclosure 2 transmits a complete copy of the REMODCM as of December 31, 2000, in accordance with Sections 5.6.1c of the Millstone Unit No. 1 Defueled Technical Specifications, and with Sections 6.9.1.6b and 6.9.1.4 of the Millstone Unit Nos. 2 and 3 Technical Specifications, respectively.

There are no regulatory commitments contained within this letter.

IE42

If you have any questions concerning this submittal, please contact, Mr. David A. Smith at (860) 437-5840.

Very truly yours,

DOMINION NUCLEAR CONNECTICUT, INC

Raymond P. Necci
Vice President - Nuclear Technical Services

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Docket Nos. 50-245
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Enclosure 1

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

2000 Radioactive Effluent Release Report, Volumes I and II

Millstone Power Station

2000 Radioactive Effluent Release Report

Volume I

Dominion

Dominion Nuclear Connecticut, Inc.

MILLSTONE UNIT	LICENSE	DOCKET
1	DPR-21	50-245
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Introduction

This report, for the period of January through December of 2000, is being submitted for Northeast Nuclear Energy Company's Millstone Power Station's Units 1, 2, and 3, in accordance with 10CFR50.36a and the Radiological Effluent 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.

The report provides radioactivity information for airborne and liquid effluents and disposal of solid waste. Doses and regulatory limits are provided for airborne and liquid effluents. If applicable, any changes to the REMODCM, description of any effluent monitors inoperable for more than 30 days, and any corrections to previous reports are included.

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 81.9%. Unit 2 tripped and shutdown on 1/27/00 due to decreasing steam generator water levels caused by a decrease in feedwater flow with a restart on 1/30/00. Unit 2 tripped and shutdown on 2/11/00 as required by Technical Specifications due to control rod problem and restarted on 2/27/00 for a total of 16 days. Unit 2 was shutdown and offline on April 21, 2000 for a total of 40.8 days for refueling (2R13) and restarted on June 1, 2000.

The annual capacity factor for Unit 3 was 99.9%. Unit 3 continuously operated throughout the year following the restart on June 29, 1999 from refueling outage (3R06).

Nesting Ospreys

1.0 Doses

This report provides a summary of the 2000 off-site radiation doses from releases of radioactive materials in airborne and liquid effluents for Millstone Unit 1, 2, and 3. Included are the annual population dose commitments (person-rem) for the area within 50 miles of the site, the annual average dose commitment (mrem) to the population, and the annual maximum dose commitment (mrem) to any real member of the public. Also provided are the maximum gamma and beta air doses.

The doses are compared with the regulatory limits and with the annual average population dose commitments from natural background and other sources to provide perspective.

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 developed by or derived from the US Nuclear Regulatory Commission (NRC) and the Environmental Protection Agency (EPA). These doses generally tend to be conservative because of the conservative assumptions used in these models. 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 will be presented in the Annual Radiological Environmental Operating Report.

1.1.1 Population and Maximum Individual Dose Commitment

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 contributing to the dose. Population dose commitment is defined as the total radiation dose received by the specified population in a specified time period from an identified radiation source. For this report, the specified population is defined as the population within 50 miles of the Millstone nuclear site. The population dose commitment (person-rem) is the integration of the doses for each compass sector in each of the radial distances with the population distribution in those areas.

Maximum Individual dose commitment 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. Other site specific data include the average annual production of milk, meat, vegetation, fish, and shellfish. 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 population and individual dose commitments from radioactive airborne and liquid effluents.

1.1.1.1 Airborne Effluents

Maximum individual doses and population doses due to the release of noble gases, radioiodines, and particulates were calculated using the computer code GASPAR (Reference 1). The GASPAR code is an NRC code 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 GASPAR code were generated using 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.

Unit 1 (375 ft) Stack releases are normally considered elevated with Pasquill stability classes determined based upon the temperature gradient between the 33 ft and 447 ft meteorological tower levels, however, the doses were conservatively calculated using mixed mode 142 ft meteorology since GASPAR may underestimate the plume exposure for elevated releases from the Millstone 1 stack prior to touchdown . During operation, when the house heating boiler releases through its exhaust stack it is considered a ground level release.

Unit 2 (159 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. GASPAR 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 Unit 1 Stack. The doses for these elevated batches were conservatively calculated using mixed mode 142 ft meteorology. 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. GASPAR 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. In addition, the Engineered Safety Features Building (ESF) Vent releases are considered as ground level and doses are calculated using 33 ft meteorology. These doses were summed to determine the total Unit 3 airborne effluent dose.

1.1.1.2 Liquid Effluents

Maximum individual and population 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 the GASPAR code.

1.2 Dose Results

1.2.1 Airborne Effluents

For population doses, the GASPAR code 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's 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 dose to the maximum individual, the GASPAR code calculates the dose to the same organs listed above for the following pathways: direct exposure to the plume, exposure from ground deposition, inhalation, and ingestion of vegetation, meat, cow's milk, and goat's milk.

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 or the off-site location of highest overhead plume shine dose for elevated releases.

For ground deposition, the maximum individual dose is calculated at 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 meat, cow's milk, and goat's milk pathways, the calculated dose is included for 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 and population 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. Hence, if the ground shine contribution was significant, there may be cases where the maximum whole body or skin dose is greater than the maximum gamma or beta air dose respectively.

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

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 max organ (GI-LLI, bone, liver, kidney, and lung).

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

1.2.3 Analysis of Results

The quarterly doses presented in Table 1-1 and 1-2 are well below the permissible levels in 10CFR50 and the applicable Radiological Effluent Technical Specifications and are small in comparison to the dose received from natural background radiation.

Table 1-3 provides a quantitative dose comparison with limits specified in the Radiological Environmental Technical specifications (RETS) and also indicates that the total dose to a member of the public from the Millstone station and all sources of the fuel cycle is well within the limits of 40CFR190 (Reference 8).

For compliance with 40CFR190, any direct dose from the station must be added to the dose due effluents to a "real member of the public." At Millstone, the only potential direct dose of significance is from station radwaste storage. All onsite radwaste storage during this year was within storage criteria and the maximum dose to a member of the public is approximately 1 mrem/yr.

Table 1-4 provides a summary of doses for the 50 mile population due to airborne and liquid effluents.

Table 1-1
2000 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	0	0	0
Gamma	0	0	0	0
Max Individual	(mrem)	(mrem)	(mrem)	(mrem)
Whole Body	5.24E-03	4.41E-03	5.43E-03	2.68E-03
Skin	6.15E-03	5.18E-03	6.36E-03	3.14E-03
Thyroid	5.24E-03	4.41E-03	5.43E-03	2.68E-03
Max organ+	5.30E-03	4.68E-03	6.68E-03	2.70E-03
Avg Individual	(mrem)	(mrem)	(mrem)	(mrem)
Whole Body	6.50E-07	6.30E-07	7.96E-07	4.56E-07
Skin	7.60E-07	6.90E-07	8.23E-07	4.70E-07
Thyroid	6.46E-07	5.86E-07	7.03E-07	4.00E-07
Max organ+	6.76E-07	7.00E-07	9.46E-07	5.56E-07

Unit 2	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter
Max Air	(mrad)	(mrad)	(mrad)	(mrad)
Beta	7.26E-04	7.12E-03	2.83E-04	3.45E-05
Gamma	7.36E-04	4.31E-03	4.00E-05	3.50E-05
Max Individual	(mrem)	(mrem)	(mrem)	(mrem)
Whole Body	6.21E-04	3.20E-03	1.47E-03	9.17E-05
Skin	1.15E-03	8.18E-03	1.65E-03	1.21E-04
Thyroid	1.57E-03	4.52E-02	5.95E-03	1.52E-03
Max organ+	6.28E-04	3.35E-03	1.47E-03	9.19E-05
Avg Individual	(mrem)	(mrem)	(mrem)	(mrem)
Whole Body	4.17E-07	1.93E-06	9.23E-07	1.20E-07
Skin	8.89E-07	5.18E-06	1.02E-06	1.43E-07
Thyroid	9.20E-07	1.75E-05	3.01E-06	1.55E-06
Max organ+	4.23E-07	1.98E-06	9.28E-07	1.22E-07

Unit 3	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter
Max Air	(mrad)	(mrad)	(mrad)	(mrad)
Beta	1.79E-05	0	0	0
Gamma	1.40E-05	0	0	0
Max Individual	(mrem)	(mrem)	(mrem)	(mrem)
Whole Body	9.77E-04	1.84E-03	4.13E-03	3.50E-04
Skin	9.93E-04	1.84E-03	4.13E-03	3.50E-04
Thyroid	9.77E-04	1.84E-03	4.13E-03	3.51E-04
Max organ+	9.77E-04	1.84E-03	4.13E-03	3.50E-04
Avg Individual	(mrem)	(mrem)	(mrem)	(mrem)
Whole Body	1.11E-06	1.44E-06	1.53E-06	6.93E-07
Skin	1.12E-06	1.44E-06	1.53E-06	6.93E-07
Thyroid	1.11E-06	1.44E-06	1.53E-06	6.94E-07
Max organ+	1.11E-06	1.44E-06	1.53E-06	6.93E-07

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

Table 1-2
2000 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	8.70E-06	7.11E-05	1.31E-05	1.28E-05
Thyroid	3.41E-06	4.34E-06	4.37E-06	4.49E-06
Max Organ	2.52E-05	1.45E-04	1.87E-05	3.55E-05
Avg Individual	(mrem)	(mrem)	(mrem)	(mrem)
Whole Body	7.00E-08	1.45E-07	1.43E-07	1.21E-07
Thyroid	1.14E-08	2.37E-08	1.57E-08	2.03E-08
Max Organ	1.54E-07	2.72E-07	2.56E-07	2.92E-07

Unit 2	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter
Max Individual	(mrem)	(mrem)	(mrem)	(mrem)
Whole Body	1.25E-04	2.01E-04	5.66E-05	9.96E-05
Thyroid	9.00E-05	5.08E-05	1.74E-05	4.90E-05
Max Organ	3.48E-04	1.49E-03	5.15E-04	1.15E-03
Avg Individual	(mrem)	(mrem)	(mrem)	(mrem)
Whole Body	1.40E-06	1.57E-06	4.73E-07	9.93E-07
Thyroid	1.11E-06	3.56E-07	9.93E-08	3.70E-07
Max Organ	2.85E-06	1.39E-05	4.96E-06	8.79E-06

Unit 3	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter
Max Individual	(mrem)	(mrem)	(mrem)	(mrem)
Whole Body	1.21E-04	2.55E-04	1.83E-04	2.66E-04
Thyroid	6.45E-05	1.63E-04	1.48E-04	2.21E-04
Max Organ	1.43E-03	1.04E-03	3.15E-04	5.40E-04
Avg Individual	(mrem)	(mrem)	(mrem)	(mrem)
Whole Body	9.89E-07	2.83E-06	2.49E-06	3.60E-06
Thyroid	4.86E-07	1.97E-06	2.13E-06	3.11E-06
Max Organ	1.32E-05	9.93E-06	3.56E-06	6.86E-06

Table 1-3
2000 Off-Site Dose Comparison to Limits
Millstone Units 1, 2, 3

Max Individual Dose vs 40CFR190 Limits

	Whole Body (mrem)	Max Organ * (mrem)	Thyroid (mrem)
Airborne Effluents	3.04E-02	3.22E-02	7.93E-02
Liquid Effluents	1.41E-03	7.05E-03	8.20E-04
Radwaste Storage	~ 1	~ 1	~ 1
Millstone Station	~ 1.029	~ 1.037	~ 1.08
40CFR190 Limit	*25*	*25*	*75*

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

Airborne Effluents

Max Individual Dose vs RETS Limits

	Whole Body (mrem)	Thyroid (mrem)	Max Organ (mrem)	Skin (mrem)	Beta Air (mrad)	Gamma Air (mrad)
RETS Limits	*5 **	*15*	*15*	*15 **	*20*	*10*
Unit 1	1.78E-02	1.78E-02	1.94E-02	2.08E-02	0.00E+00	0.00E+00
Unit 2	5.39E-03	5.42E-02	5.54E-03	1.11E-02	8.17E-03	5.12E-03
Unit 3	7.29E-03	7.29E-03	7.29E-03	7.31E-03	1.79E-05	1.40E-05
Millstone Station	3.04E-02	7.93E-02	3.22E-02	3.92E-02	8.19E-03	5.14E-03

Liquid Effluents

Max Individual Dose/Dose Commitments vs RETS Limits

	Whole Body (mrem)	Thyroid (mrem)	Max Organ (mrem)
RETS Limits	*3 **	*10 **	*10 **
Unit 1	1.06E-04	1.66E-05	2.24E-04
Unit 2	4.82E-04	2.07E-04	3.50E-03
Unit 3	8.25E-04	5.97E-04	3.33E-03
Millstone Station	1.41E-03	8.20E-04	7.05E-03

* 10CFR50, Appendix I Guidelines

Table 1-4
2000 Population Dose Summary
Millstone Units 1, 2, 3

Airborne Effluents

50 mile Population Dose Commitments *(person-rem)*

	Whole Body	Thyroid	Max Organ	Skin
Unit 1	7.60E-03	7.01E-03	8.64E-03	8.23E-03
Unit 2	1.02E-02	6.91E-02	1.04E-02	2.17E-02
Unit 3	1.43E-02	1.43E-02	1.43E-02	1.44E-02
Millstone Station	**3.21E-02**	**9.04E-02**	**3.33E-02**	**4.43E-02**

Liquid Effluents

50 mile Population Dose Commitments *(person-rem)*

	Whole Body	Thyroid	Max Organ
Unit 1	1.44E-03	2.13E-04	2.93E-03
Unit 2	1.33E-02	5.80E-03	9.17E-02
Unit 3	2.98E-02	2.31E-02	1.01E-01
Millstone Station	4.45E-02	2.91E-02	1.95E-01

Whole Body Dose from Millstone Station vs. Natural Background Radiation *(mrem)*

Sources of Background Radiation:	Whole Body
Cosmic	~ 27
Cosmogenic	~ 1
Terrestial (Atlantic and Gulf Coastal Plain)	~ 16
Inhaled	~ 200
In the Body	~ 40
CT Resident Whole Body Dose from Natural Background *	**~ 284**

Average CT Resident (within 50 miles) Whole Body Dose from Millstone Station Airborne and Liquid Effluents	0.0000255
Maximum Individual (within 50 miles) Whole Body Dose from Millstone Station Airborne and Liquid Effluents	0.032
Maximum Individual (within 50 miles) Whole Body Dose from Millstone Station and all sources of the Fuel Cycle	**~ 1.029**

* NCRP 94

2.0 Radioactivity

2.1 Airborne Effluents

2.1.1 Measurement of Radioactivity

2.1.1.1 Unit 1 Stack

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

Tritium collection is accomplished by the gas washing bottle method. 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 2 Vent

Total monthly 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. Tritium collection is accomplished by the gas washing bottle method.

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.

2.1.1.3 Unit 2 Containment Purges / Vents

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. Tritium collection is accomplished by the gas washing bottle method.

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.

A vent is the process of discharging air from containment usually once per week to maintain temperature, humidity, pressure, concentration without supplying replacement air.

2.1.1.4 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.

2.1.1.5 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.

2.1.1.6 Unit 3 Vent and ESF Building Vent

The Unit 3 ventilation vent collects gas streams from the auxiliary, fuel, waste disposal, and service building exhausts, and containment purge. 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 gas, weekly composites of filters for iodines and particulates, monthly composites of particulate filters for gross alpha and strontium.

2.1.1.7 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 Unit 1 stack. The purge is the process of discharging air from containment to maintain temperature, humidity, pressure, concentration, etc., where air is replaced. Purges are normally released through the Unit 3. 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.

2.1.1.8 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. 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	Summary
Number of Batches	0
Total Time (min)	0
Maximum Time (min)	0
Average Time (min)	0
Minimum Time (min)	0

Unit 2	Ctmt Purge	WGDT	Ctmt Vent	Summary
Number of Batches	3	14	58	75
Total Time (min)	720	4713	8839	14272
Maximum Time (min)	240	548	265	548
Average Time (min)	240	337	152	190
Minimum Time (min)	240	38	62	38

Unit 3	Ctmt Purge	Initial Ctmt Drawdown	Summary
Number of Batches	0	0	0
Total Time (min)	0	0	0
Maximum Time (min)	0	0	0
Average Time (min)	0	0	0
Minimum Time (min)	0	0	0

2.1.4 Abnormal Airborne Releases

An abnormal release of radioactivity is defined as the unintended discharge of a volume of liquid or airborne radioactive material to the environment which was unplanned and/or uncontrolled.

2.1.4.1 Unit 1 - None

2.1.4.2 Unit 2 - An abnormal release of radioactivity occurred from the containment building through the open equipment hatch on two occasions in May. MP2 Equipment Hatch was opened for the time period from May 10, 2000 at 1723 to May 13, 2000 at 1710 and also from May 19, 2000 at 0820 to May 21, 2000 at 0312. Air samples obtained from the equipment hatch boundary were analyzed and found to contain low levels of radioactive particulates. As a result of these positive samples it was assumed that the potential existed for a release to the environment. An initial calculation was made to determine an estimate of the radioactivity potentially released using the guidance in the REMODCM (Ref 10). The initial estimates were compared against dose limits in Tech Spec 3.11.2 (the Tech Spec has since been moved to the REMODCM) and against State of CT and US EPA reportability criteria in EPIP 4400 A. It was concluded that the radioactive release event reported in CR M2-00-1526 was not reportable.

For the period of May 10-13,2000:

Nuclide	Source Term (μCi)
Co-58	6.5 E-02
I-131	9.7 E-01

For the period of May 19-21,2000:

Nuclide	Source Term (μCi)
Co-58	1.96 E-02

The dose for these abnormal releases were calculated to be:

May 10-13, 2000	Maximum Individual (mrem)
Total Body	7.21E-08 @ 0.37mi ENE
Thyroid (max organ)	2.57E-05 @ 2.00mi ENE
Skin	7.58E-08 @ 0.37mi ENE

May 19-21, 2000	Maximum Individual (mrem)
Total Body	2.28E-08 @ 0.79mi SSW
Thyroid	2.28E-08 @ 0.79mi SSW
Max organ (lung)	3.39E-08 @ 0.79mi SSW
Skin	2.68E-08 @ 0.79mi SSW

2.1.4.3 Unit 3 - None

2.2 Liquid Effluents

2.2.1 Measurement of Radioactivity

2.2.1.1 Liquid Tanks

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

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

Prior to release, a tank is recirculated for two equivalent tank volumes, a sample is drawn and 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.

2.2.1.2 Unit 1, 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 Reactor Building Service Water from unit 1, 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	103	66	562
Total Time (min)	8176	9856	52135
Maximum Time (min)	251	822	1157
Average Time (min)	79	149	93
Minimum Time (min)	15	1	13
Average Stream Flow	Not Applicable - Ocean Site		

2.2.4 Abnormal Liquid Releases

An abnormal release of radioactivity is the unintentional discharge of a volume of liquid or airborne material to the environment which was unplanned and/or uncontrolled.

In 2000, the following abnormal liquid releases occurred:

2.2.4.1 Unit 1 - None

2.2.4.2 Unit 2 - Turbine Building Sump to Storm Drain (DSN 006)

In November - December, an unplanned release of radioactivity occurred when the Auxilliary Steam Heat Exchanger interface in the RWST resulted in radioactivity entering the Turbine Building Sump which discharges to the Storm Drain Release Point (DSN 006) into the Long Island Sound.

The following radioactivity was unintentionally released :

H3	2.00 E-02 Curies

The dose consequence resulting from this release

May 19-21, 2000	Maximum Individual (mrem)
Total Body	2.48 E-06 mrem
Thyroid	2.48 E-06 mrem
Skin	2.48 E-06 mrem

2.2.4.1 Unit 3 - None

Table 2.1-1

Millstone Unit No. 1

Airborne Effluents - Release Summary

		2000				
	Units	1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	Total
A. Fission & Activation Gases						
1. Total Activity Released	Ci	N/D	N/D	N/D	N/D	N/D
		No Activity Detected				
2. Average Period Release Rate	uCi/sec	-	-	-	-	-
B. Iodine-131						
1. Total Activity Released	Ci	N/D	N/D	N/D	N/D	N/D
		No Activity Detected				
2. Average Period Release Rate	uCi/sec	-	-	-	-	-
C. Particulates						
1. Total Activity Released	Ci	8.38E-05	6.61E-05	6.95E-05	6.59E-05	2.85E-04
2. Average Period Release Rate	uCi/sec	1.07E-05	8.41E-06	8.74E-06	8.28E-06	9.02E-06
D. Gross Alpha						
1. Total Activity Released	Ci	1.48E-06	8.87E-07	1.91E-07	7.96E-07	3.35E-06
E. Tritium						
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	-	-	-	-	-

N/D = Not Detected

Table 2.1-2

Millstone Unit No. 1

Airborne Effluents - Elevated Continuous

Nuclides Released	Units	2000				
		1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	Total
A. Fission & Activation Gases						
	Ci	-	-	-	-	-
Total Activity	Ci	-	-	-	-	N/D
B. Iodines						
I-131	Ci	-	-	-	-	-
	Ci	-	-	-	-	-
Total Activity	Ci	-	-	-	-	N/D
C. Particulates						
I-131	Ci	-	-	-	-	-
Co-58	Ci	4.60E-06	1.81E-05	-	1.65E-06	2.44E-05
Co-60	Ci	4.39E-05	3.20E-05	2.84E-05	3.59E-05	1.40E-04
Cs-137	Ci	3.44E-05	1.54E-05	4.08E-05	2.78E-05	1.18E-04
Mn-54	Ci	-	-	-	5.02E-07	5.02E-07
Sr-90	Ci	8.50E-07	6.08E-07	2.72E-07	-	1.73E-06
Total Activity	Ci	8.38E-05	6.61E-05	6.95E-05	6.59E-05	2.85E-04
D. Gross Alpha						
Gross Alpha	Ci	1.48E-06	8.87E-07	1.91E-07	7.96E-07	3.35E-06
E. Tritium						
H-3	Ci	-	-	-	-	N/D

N/D = Not Detected

Table 2.1-3

Millstone Unit No. 1
Airborne Effluents - Ground Continuous

<< No Activity Discharged >>

Nuclides Released	Units	2000				
		1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	Total
A. Fission & Activation Gases						
	Ci	-	-	-	-	-
Total Activity	Ci	-	-	-	-	N/D
B. Iodines						
I-131	Ci	-	-	-	-	-
	Ci	-	-	-	-	-
Total Activity	Ci	-	-	-	-	N/D
C. Particulates						
I-131	Ci	-	-	-	-	-
Co-60	Ci	-	-	-	-	-
Cs-137	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 2.1-4

Millstone Unit No. 1

Liquid Effluents - Release Summary

	Units	2000 1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	Total
A. Fission and Activation Products						
1. Total Activity Released	Ci	1.39E-03	1.56E-03	1.17E-03	1.21E-03	5.32E-03
2. Average Period Diluted Activity	uCi/ml	2.36E-10	2.44E-10	1.81E-10	2.01E-10	2.15E-10
B. Tritium						
1. Total Activity Released	Ci	2.09E-01	2.42E+00	5.68E-01	1.68E+00	4.88E+00
2. Average Period Diluted Activity	uCi/ml	3.55E-08	3.80E-07	8.74E-08	2.79E-07	1.97E-07
C. Dissolved and Entrained Gases						
1. Total Activity Released	Ci	N/D	N/D	N/D	N/D	N/D
2. Average Period Diluted Activity	uCi/ml	-	-	No Activity Detected -	-	-
D. Gross Alpha						
1. Total Activity Released	Ci	N/D	N/D	N/D	N/D	N/D
E. Volume				No Activity Detected		
1. Released Waste Volume	Liters	7.72E+05	2.01E+06	7.60E+05	1.26E+06	4.80E+06
2. Dilution Volume During Releases	Liters	4.41E+08	9.07E+07	4.65E+07	5.74E+07	6.36E+08
3. Dilution Volume During Period	Liters	5.88E+09	6.37E+09	6.50E+09	6.01E+09	2.48E+10

N/D = Not Detected

Table 2.1-5

Millstone Unit No. 1
Liquid Effluents - Batch

Nuclides Released	Units	2000				
		1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	Total
A. Fission & Activation Products						
Ag-110m	Ci	-	-	-	-	-
Co-58	Ci	7.14E-04	6.41E-04	1.16E-05	4.65E-06	1.37E-03
Co-60	Ci	3.26E-04	2.34E-04	1.70E-04	3.64E-04	1.09E-03
Cs-137	Ci	2.78E-04	4.54E-04	9.41E-04	4.60E-04	2.13E-03
Fe-55	Ci	-	2.08E-04	5.13E-05	3.72E-04	6.31E-04
Mn-54	Ci	5.27E-05	-	-	-	5.27E-05
Sr-89	Ci	-	-	-	5.08E-06	5.08E-06
Sr-90	Ci	1.72E-05	8.17E-06	-	-	2.54E-05
Zn-65	Ci	-	1.22E-05	-	-	1.22E-05
Total Activity	Ci	1.39E-03	1.56E-03	1.17E-03	1.21E-03	5.32E-03
B. Tritium						
H-3	Ci	2.09E-01	2.42E+00	5.68E-01	1.68E+00	4.88E+00
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	2000 1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	Total
A. Fission & Activation Gases						
1. Total Activity Released	Ci	3.04E+00	8.42E+00	4.23E-01	2.75E-01	1.22E+01
2. Average Period Release Rate	uCi/sec	3.87E-01	1.07E+00	5.32E-02	3.46E-02	3.84E-01
B. Iodine-131						
1. Total Activity Released	Ci	1.20E-04	4.25E-04	5.38E-05	4.15E-05	6.40E-04
2. Average Period Release Rate	uCi/sec	1.52E-05	5.40E-05	6.77E-06	5.22E-06	2.02E-05
C. Particulates						
1. Total Activity Released	Ci	3.05E-06	4.98E-06	8.74E-07	N/D	8.89E-06
2. Average Period Release Rate	uCi/sec	3.87E-07	6.33E-07	1.10E-07	-	2.81E-07
D. Gross Alpha						
1. Total Activity Released	Ci	4.21E-08	N/D	N/D	N/D	4.21E-08
E. Tritium						
1. Total Activity Released	Ci	4.89E-01	5.49E-01	2.23E+00	5.52E-01	3.82E+00
2. Average Period Release Rate	uCi/sec	6.21E-02	6.98E-02	2.81E-01	6.95E-02	1.21E-01

N/D = Not Detected

Table 2.2-2

Millstone Unit No. 2

Airborne Effluents - Mixed Continuous - Aux Bldg Vent & SGBD Tank Vent

Nuclides Released	Units	2000				
		1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	Total
A. Fission & Activation Gases						
Ar-41	Ci	2.86E-01	7.75E-01	-	-	1.06E+00
Kr-85m	Ci	-	9.70E-02	-	-	9.70E-02
Xe-133	Ci	6.54E-01	3.23E+00	-	-	3.88E+00
Xe-133m	Ci	-	-	-	-	-
Xe-135	Ci	5.75E-01	1.69E+00	-	1.02E-01	2.37E+00
Xe-135m	Ci	-	-	-	-	-
Total Activity	Ci	1.52E+00	5.79E+00	-	1.02E-01	7.41E+00
B. Iodines						
I-131	Ci	1.20E-04	4.25E-04	5.38E-05	4.15E-05	6.40E-04
I-132	Ci	3.91E-04	9.86E-03	-	-	1.02E-02
I-133	Ci	6.80E-04	3.13E-04	2.73E-04	1.01E-04	1.37E-03
I-135	Ci	6.93E-04	1.65E-04	4.65E-05	2.44E-05	9.29E-04
Total Activity	Ci	1.88E-03	1.08E-02	3.74E-04	1.67E-04	1.32E-02
C. Particulates						
I-131	Ci	-	-	-	-	-
Br-82*	Ci	-	9.14E-11	-	-	9.14E-11
Co-58	Ci	3.05E-06	4.68E-06	6.46E-07	-	8.38E-06
Co-60	Ci	-	-	-	-	-
Mn-54	Ci	-	-	2.28E-07	-	2.28E-07
Na-24	Ci	-	1.66E-07	-	-	1.66E-07
Cs-137	Ci	-	1.26E-07	-	-	1.26E-07
Total Activity	Ci	3.05E-06	4.98E-06	8.74E-07	-	8.89E-06
D. Gross Alpha						
Gross Alpha	Ci	4.21E-08	-	-	-	4.21E-08
E. Tritium						
H-3	Ci	3.10E-01	4.90E-01	2.16E+00	3.50E-01	3.31E+00

N/D = Not Detected

* Placed with particulates

Table 2.2-3

Millstone Unit No. 2

Airborne Effluents - Mixed Batch - Containment Purges

Nuclides Released	Units	2000				
		1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	Total
A. Fission & Activation Gases						
Kr-85	Ci	5.14E-01	-	-	-	5.14E-01
Xe-133	Ci	4.70E-01	5.23E-01	-	-	9.93E-01
Xe-133m	Ci	1.30E-02	6.29E-03	-	-	1.92E-02
Xe-135	Ci	3.32E-02	1.15E-02	-	-	4.47E-02
Total Activity	Ci	1.03E+00	5.40E-01	-	-	1.57E+00
B. Iodines						
I-131	Ci	-	-	-	-	-
	Ci	-	-	-	-	-
Total Activity	Ci	-	-	-	-	N/D
C. Particulates						
I-131	Ci	-	-	-	-	-
Br-82	Ci	-	-	-	-	-
Co-60	Ci	-	-	-	-	-
Total Activity	Ci	-	-	-	-	N/D
D. Gross Alpha						
Gross Alpha	Ci	-	-	-	-	N/D
E. Tritium						
H-3	Ci	1.28E-01	5.01E-02	-	-	1.78E-01

N/D = Not Detected

Table 2.2-4

Millstone Unit No. 2

Airborne Effluents - Elevated Batch - WGDT

Nuclides Released	Units	2000				
		1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	Total
A. Fission & Activation Gases						
Ar-41	Ci	5.84E-03	-	-	-	5.84E-03
Kr-85	Ci	3.58E-01	2.01E+00	3.79E-01	1.17E-01	2.86E+00
Kr-85m	Ci	2.96E-04	-	-	-	2.96E-04
Kr-87	Ci	1.72E-04	-	-	-	1.72E-04
Kr-88	Ci	4.82E-04	-	-	-	4.82E-04
Xe-131m	Ci	-	4.01E-03	-	-	4.01E-03
Xe-133	Ci	6.51E-04	3.09E-02	1.62E-05	-	3.16E-02
Xe-133m	Ci	7.61E-05	-	-	-	7.61E-05
Xe-135	Ci	5.20E-03	-	-	-	5.20E-03
Xe-135m	Ci	1.67E-04	-	-	-	1.67E-04
Total Activity	Ci	3.71E-01	2.04E+00	3.79E-01	1.17E-01	2.91E+00
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	1.30E-04	5.12E-04	6.99E-05	2.46E-05	7.36E-04

N/D = Not Detected

Table 2.2-5

Millstone Unit No. 2

Airborne Effluents - Elevated Batch - Containment Vents

Nuclides Released	Units	2000				
		1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	Total
A. Fission & Activation Gases						
Ar-41	Ci	2.51E-02	1.21E-02	1.93E-02	1.65E-02	7.30E-02
Kr-85	Ci	1.11E-02	-	-	-	1.11E-02
Kr-85m	Ci	-	-	-	-	-
Xe-133	Ci	8.51E-02	2.79E-02	2.37E-02	3.82E-02	1.75E-01
Xe-133m	Ci	5.94E-04	-	-	-	5.94E-04
Xe-135	Ci	3.16E-03	1.00E-03	5.88E-04	1.93E-03	6.68E-03
Total Activity	Ci	1.25E-01	4.10E-02	4.36E-02	5.66E-02	2.66E-01
B. Iodines *						
I-131	Ci	-	-	-	-	-
I-133	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	5.05E-02	8.09E-03	7.32E-02	2.02E-01	3.34E-01

N/D = Not Detected

* Prior to charcoal filtration

Table 2.2-6

Millstone Unit No. 2

Liquid Effluents - Release Summary

	Units	2000 1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	Total
A. Fission and Activation Products						
1. Total Activity Released	Ci	1.26E-02	4.15E-02	2.09E-02	1.23E-02	8.73E-02
2. Average Period Diluted Activity	uCi/ml	4.92E-11	2.11E-10	7.27E-11	4.28E-11	8.50E-11
B. Tritium						
1. Total Activity Released	Ci	2.12E+02	4.47E+01	1.21E+01	5.95E+01	3.29E+02
2. Average Period Diluted Activity	uCi/ml	8.30E-07	2.27E-07	4.22E-08	2.07E-07	3.20E-07
C. Dissolved and Entrained Gases						
1. Total Activity Released	Ci	2.28E-01	1.93E-01	9.21E-03	4.74E-03	4.36E-01
2. Average Period Diluted Activity	uCi/ml	8.92E-10	9.81E-10	3.21E-11	1.65E-11	4.24E-10
D. Gross Alpha						
1. Total Activity Released	Ci	N/D	1.47E-05	N/D	9.62E-07	1.57E-05
E. Volume						
1. Released Waste Volume	Liters	1.35E+06	9.23E+05	3.89E+05	3.46E+05	3.00E+06
2. Dilution Volume During Releases	Liters	5.39E+09	3.55E+09	2.92E+09	1.59E+09	1.34E+10
3. Dilution Volume During Period	Liters	2.56E+11	1.97E+11	2.87E+11	2.87E+11	1.03E+12

N/D = Not Detected

Table 2.2-7

Millstone Unit No. 2

Liquid Effluents - Continuous - SGBD

<< No Activity Detected >>

Nuclides Released	Units	2000				
		1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	Total
A. Fission & Activation Products						
	Ci	-	-	-	-	-
Total Activity	Ci	-	-	-	-	N/D
B. Tritium						
H-3	Ci	-	-	-	-	N/D
C. Dissolved & Entrained Gases						
	Ci	-	-	-	-	-
Total Activity	Ci	-	-	-	-	N/D
D. Gross Alpha						
Gross Alpha	Ci	-	-	-	-	N/D

N/D = Not Detected

Table 2.2-8

Millstone Unit No. 2
Liquid Effluents - Batch

Nuclides Released	Units	2000				
		1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	Total
A. Fission & Activation Products						
Ag-110m	Ci	-	8.02E-05	2.70E-05	2.33E-04	3.41E-04
Ce-141	Ci	-	8.67E-05	-	-	8.67E-05
Cr-51	Ci	2.80E-05	1.22E-02	4.16E-04	-	1.26E-02
Co-57	Ci	-	1.84E-05	1.25E-05	1.20E-05	4.29E-05
Co-58	Ci	7.81E-03	1.61E-02	1.37E-02	3.79E-03	4.14E-02
Co-60	Ci	3.47E-03	3.88E-03	1.00E-03	2.41E-03	1.08E-02
Cs-134	Ci	-	-	1.12E-04	2.19E-04	3.31E-04
Cs-137	Ci	1.42E-04	2.50E-04	7.77E-04	3.14E-03	4.31E-03
Cs-138	Ci	2.22E-05	-	1.16E-05	-	3.38E-05
Fe-55	Ci	1.07E-03	8.13E-03	9.78E-04	7.10E-04	1.09E-02
Fe-59	Ci	-	1.56E-04	-	-	1.56E-04
I-131	Ci	3.84E-06	2.64E-05	-	-	3.03E-05
I-132	Ci	9.79E-06	-	-	-	9.79E-06
I-133	Ci	9.71E-06	-	-	-	9.71E-06
I-135	Ci	1.08E-05	-	-	-	1.08E-05
La-140	Ci	-	1.86E-05	-	-	1.86E-05
Mn-54	Ci	-	8.77E-06	1.86E-05	1.08E-04	1.35E-04
Na-22	Ci	-	-	-	3.95E-08	3.95E-08
Na-24	Ci			3.41E-06	-	3.41E-06
Nb-95	Ci	9.23E-06	2.84E-04	1.22E-04	1.92E-04	6.07E-04
Ru-105	Ci	-	-	-	8.09E-06	8.09E-06
Sb-124	Ci	-	3.71E-05	4.29E-04	6.06E-05	5.27E-04
Sb-125	Ci	1.65E-05	1.78E-04	3.17E-03	1.35E-03	4.72E-03
Sn-113	Ci		7.45E-05	6.97E-05	3.95E-05	1.84E-04
Sr-89	Ci	6.91E-06	-	5.46E-06	-	1.24E-05
Sr-90	Ci	1.63E-06	-	-	-	1.63E-06
Zr-95	Ci	-	2.50E-05	4.25E-05	1.41E-05	8.16E-05
Total Activity	Ci	1.26E-02	4.15E-02	2.09E-02	1.23E-02	8.73E-02
B. Tritium						
H-3	Ci	2.12E+02	4.47E+01	1.21E+01	5.95E+01	3.29E+02
C. Dissolved & Entrained Gases						
Kr-85	Ci	1.09E-01	8.84E-02	8.84E-03	4.74E-03	2.11E-01
Xe-131m	Ci	4.69E-03	-	-	-	4.69E-03
Xe-133	Ci	1.14E-01	1.03E-01	3.74E-04	-	2.17E-01
Xe-133m	Ci	1.07E-04	1.41E-03	-	-	1.52E-03
Xe-135	Ci	5.00E-04	7.24E-04	-	-	1.22E-03
Total Activity	Ci	2.28E-01	1.93E-01	9.21E-03	4.74E-03	4.36E-01
D. Gross Alpha						
Gross Alpha	Ci	-	1.47E-05	-	9.62E-07	1.57E-05

N/D = Not Detected

Table 2.3-1

Millstone Unit No. 3
Airborne Effluents - Release Summary

	Units	2000 1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	Total
A. Fission & Activation Gases						
1. Total Activity Released	Ci	5.08E-02	N/D	N/D	N/D	5.08E-02
2. Average Period Release Rate	uCi/sec	6.46E-03	-	-	-	1.61E-03
B. Iodine-131						
1. Total Activity Released	Ci	N/D	N/D	3.65E-08	2.08E-08	5.73E-08
2. Average Period Release Rate	uCi/sec	-	-	4.59E-09	2.62E-09	1.81E-09
C. Particulates						
1. Total Activity Released	Ci	1.27E-05	N/D	N/D	N/D	1.27E-05
2. Average Period Release Rate	uCi/sec	1.62E-06	-	-	-	4.02E-07
D. Gross Alpha						
1. Total Activity Released	Ci	1.50E-07	6.76E-08	1.23E-07	N/D	3.40E-07
E. Tritium						
1. Total Activity Released	Ci	5.30E+00	0.00E+00	3.66E+00	4.27E+00	1.32E+01
2. Average Period Release Rate	uCi/sec	6.74E-01	0.00E+00	4.60E-01	5.37E-01	4.18E-01

N/D = Not Detected

Table 2.3-2

Millstone Unit No. 3

Airborne Effluents - Mixed Continuous - Normal Ventilation

Nuclides Released	Units	2000				
		1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	Total
A. Fission & Activation Gases						
Xe-131m	Ci	-	-	-	-	-
Xe-133	Ci	-	-	-	-	-
Xe-135	Ci	5.08E-02	-	-	-	5.08E-02
Total Activity	Ci	5.08E-02	-	-	-	5.08E-02
B. Iodines						
I-131	Ci	-	-	-	-	-
I-133	Ci	-	-	-	-	-
Total Activity	Ci	-	-	-	-	N/D
C. Particulates						
I-131	Ci	-	-	-	-	-
Ru-106	Ci	1.27E-05	-	-	-	1.27E-05
Total Activity	Ci	1.27E-05	-	-	-	1.27E-05
D. Gross Alpha						
Gross Alpha	Ci	1.37E-07	5.26E-08	6.68E-08	-	2.56E-07
E. Tritium						
H-3	Ci	5.30E+00	3.38E+00	2.38E+00	4.27E+00	1.53E+01

N/D = Not Detected

Table 2.3-3

Millstone Unit No. 3

Airborne Effluents - Ground Continuous - ESF Building Ventilation

Nuclides Released	Units	2000				
		1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	Total
A. Fission & Activation Gases						
Xe-131m	Ci	-	-	-	-	-
Total Activity	Ci	-	-	-	-	-
B. Iodines						
I-131	Ci	-	-	3.65E-08	2.08E-08	5.73E-08
I-133	Ci	-	-	4.16E-08	2.42E-08	6.58E-08
Total Activity	Ci	-	-	7.81E-08	4.50E-08	1.23E-07
C. Particulates						
I-131	Ci	-	-	-	-	-
Sr-89	Ci	-	-	-	-	-
Sr-90	Ci	-	-	-	-	-
Total Activity	Ci	-	-	-	-	-
D. Gross Alpha						
Gross Alpha	Ci	1.26E-08	1.50E-08	5.61E-08	-	8.37E-08
E. Tritium						
H-3	Ci	-	-	1.28E+00	-	1.28E+00

N/D = Not Detected

Table 2.3-4

Millstone Unit No. 3

Airborne Effluents - Mixed Batch - Containment Drawdowns

<< No Activity Detected >>

Nuclides Released	Units	2000				
		1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	Total
A. Fission & Activation Gases						
	Ci	-	-	-	-	-
Total Activity	Ci	-	-	-	-	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	-	-	-	-	N/D

N/D = Not Detected

Table 2.3-5

Millstone Unit No. 3

Airborne Effluents - Mixed Batch - Containment Purges

<< No Activity Detected >>

Nuclides Released	Units	2000				
		1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	Total
A. Fission & Activation Gases						
Xe-133	Ci	-	-	-	-	-
Xe-135	Ci	-	-	-	-	-
Total Activity	Ci	-	-	-	-	N/D
B. Iodines						
I-131	Ci	-	-	-	-	-
I-133	Ci	-	-	-	-	-
Total Activity	Ci	-	-	-	-	N/D
C. Particulates						
I-131	Ci	-	-	-	-	-
	Ci	-	-	-	-	-
Total Activity	Ci	-	-	-	-	N/D
D. Gross Alpha						
Gross Alpha	Ci	-	-	-	-	N/D
E. Tritium						
H-3	Ci	-	-	-	-	N/D

N/D = Not Detected

Table 2.3-6

Millstone Unit No. 3
Liquid Effluents - Release Summary

	Units	2000 1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	Total
A. Fission and Activation Products						
1. Total Activity Released	Ci	1.35E-02	2.49E-02	1.91E-02	3.08E-02	8.83E-02
2. Average Period Diluted Activity	uCi/ml	2.92E-11	5.36E-11	4.09E-11	6.68E-11	4.76E-11
B. Tritium						
1. Total Activity Released	Ci	7.36E+01	3.44E+02	4.43E+02	6.37E+02	1.50E+03
2. Average Period Diluted Activity	uCi/ml	1.59E-07	7.42E-07	9.51E-07	1.38E-06	8.08E-07
C. Dissolved and Entrained Gases						
1. Total Activity Released	Ci	9.29E-06	1.14E-05	4.90E-04	1.07E-03	1.58E-03
2. Average Period Diluted Activity	uCi/ml	2.00E-14	2.46E-14	1.05E-12	2.33E-12	8.54E-13
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	5.02E+06	5.45E+06	5.41E+06	5.57E+06	2.15E+07
2. Dilution Volume During Releases	Liters	4.20E+10	4.46E+10	4.82E+10	4.98E+10	1.85E+11
3. Dilution Volume During Period	Liters	4.64E+11	4.64E+11	4.66E+11	4.61E+11	1.86E+12

N/D = Not Detected

Table 2.3-7

Millstone Unit No. 3

Liquid Effluents - Continuous - SGBD, SW, TB Sump

Nuclides Released	Units	2000				
		1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	Total
A. Fission & Activation Products						
	Ci	-	-	-	-	-
Total Activity	Ci	-	-	-	-	N/D
B. Tritium						
H-3	Ci	2.03E-01	2.40E-01	1.62E-01	1.12E-01	7.17E-01
C. Dissolved & Entrained Gases						
	Ci	-	-	-	-	-
Total Activity	Ci	-	-	-	-	N/D
D. Gross Alpha						
Gross Alpha	Ci	-	-	-	-	N/D

N/D = Not Detected

Table 2.3-8

Millstone Unit No. 3
Liquid Effluents - Batch - LWS

Nuclides Released	Units	2000				
		1st Qtr	2nd Qtr *	3rd Qtr	4th Qtr	Total
A. Fission & Activation Products						
Ag-110m	Ci	1.89E-04	6.98E-05	9.22E-06	-	2.68E-04
Ba-140	Ci		2.81E-05	-	-	2.81E-05
Ba-141	Ci	-	-	4.15E-05	2.82E-06	4.43E-05
Ce-141	Ci	-	-	-	5.66E-07	5.66E-07
Co-58	Ci	2.58E-03	1.00E-03	4.20E-05	6.96E-04	4.32E-03
Co-60	Ci	5.63E-03	5.36E-03	1.17E-03	2.11E-03	1.43E-02
Cr-51	Ci	-	-	1.33E-04	9.59E-04	1.09E-03
Cs-134	Ci	-	2.99E-06	-	1.42E-05	1.72E-05
Cs-137	Ci	2.33E-04	5.29E-05	1.45E-04	2.95E-04	7.26E-04
Fe-55	Ci	2.09E-03	6.68E-03	3.51E-03	4.10E-03	1.64E-02
I-131	Ci	-	-	4.27E-06	2.30E-05	2.73E-05
I-133	Ci	1.11E-05	-	1.49E-05	7.46E-06	3.35E-05
Mn-54	Ci	1.16E-03	7.67E-04	5.18E-05	1.91E-04	2.17E-03
Mo-99	Ci	1.48E-06	-	4.90E-06	-	6.38E-06
Na-24	Ci	8.10E-06	-	7.03E-06	-	1.51E-05
Nb-95	Ci	3.24E-04	1.36E-04	-	6.91E-05	5.29E-04
Nb-97	Ci	-	-	2.49E-05	-	2.49E-05
Re-188	Ci	3.51E-05	-	-	-	3.51E-05
Ru-105	Ci	6.65E-06	-	-	-	6.65E-06
Ru-106	Ci	-	7.17E-05	-	-	7.17E-05
Sb-125	Ci	1.03E-03	1.07E-02	1.39E-02	2.23E-02	4.79E-02
Sr-87m	Ci	-	-	1.23E-06	-	1.23E-06
Sr-90	Ci	2.41E-04	-	-	-	2.41E-04
Tc-99m	Ci	1.60E-06	-	5.68E-06	-	7.28E-06
Tc-101	Ci	-	-	-	5.64E-06	5.64E-06
Te-132	Ci	-	6.53E-07	-	-	6.53E-07
Zn-69m	Ci	8.01E-07	-	-	-	8.01E-07
Total Activity	Ci	1.35E-02	2.49E-02	1.91E-02	3.08E-02	8.83E-02
B. Tritium						
H-3	Ci	7.34E+01	3.44E+02	4.43E+02	6.37E+02	1.50E+03
C. Dissolved & Entrained Gases						
Xe-133	Ci	-	-	3.38E-04	8.19E-04	1.16E-03
Xe-133m	Ci	5.99E-06	-	-	-	5.99E-06
Xe-135	Ci	3.30E-06	1.14E-05	1.52E-04	2.55E-04	4.22E-04
Total Activity	Ci	9.29E-06	1.14E-05	4.90E-04	1.07E-03	1.58E-03
D. Gross Alpha						
Gross Alpha	Ci	-	-	-	-	N/D

N/D = Not Detected
* Fe-55 May data was conservatively estimated to be 2.37E-03 Ci

Table 2.3-9

Millstone Unit No. 3

Liquid Effluents - Batch - CPF Waste Neutralization Sumps

Nuclides Released	Units	2000				
		1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	Total
A. Fission & Activation Products						
	Ci	-	-	-	-	-
Total Activity	Ci	-	-	-	-	N/D
B. Tritium						
H-3	Ci	4.34E-02	4.54E-02	4.59E-02	1.79E-02	1.53E-01
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

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 2.3-10	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 2000

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

Dominion Nuclear Connecticut, Inc.
Millstone Power Station
Rope Ferry Road
Waterford, CT 06385

Dominion

ENGINEERING RECORD CORRESPONDENCE
April 10, 2001
(Sheet 1 of 26)

25205-ER-01-0005 REV. 0

TO: L. J. Landry

FROM: K.W. Hajnal
Millstone ext. 5235 Date: 4/10/01

Independent Reviewer: G.L. Holtz Date: 4/10/01

Approved: J.E. Laine Date: 4/10/01

Subject: **Solid Waste Data for the 2000 Millstone Annual Radioactive Effluent Report**

References: Memo, number NE-99-SAB-019 from D. M. Flick to S.M. Turowski, "Solid Waste Data for the 1998 Millstone Annual Radioactive Effluent Report," dated January 19, 1999.

Per your request, the solid radioactive waste data for the 2000 Millstone Annual Radioactive Effluent Report has been compiled and is attached.

Additionally, you asked for a listing of all radwaste storage facilities at Millstone for 2000. They are listed below: There were no new radwaste storage facilities created at Millstone for 2000.

Millstone Radwaste Reduction Facility
Warehouse #9
Unit 1 Solid Radwaste Building
Unit 2 Condensate Polishing Facility.
Millstone Radwaste Storage Bunker
On-site storage containers located outside of warehouse #9.

The reference memo also asked for a statement that would substantiate compliance with the 40 CFR 190 annual site limit of 25 mrem. The statement appears below:

All Waste Services radwaste storage facilities were within NU curie content limits, in 2000, as set forth in each of the facilities' Radiological Environmental Reviews.

If you need further assistance regarding the 2000 Millstone Annual Radioactive Effluent Report, please call me.

Attachment: (1) Solid Waste Data for the 2000 Millstone Annual Radioactive Effluent Report.

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

January 1, 2000 through December 31, 2000

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	1.72E-01	
Chem-Nuclear Services Inc., Barnwell, SC for Burial	Ci	2.08E-01	25%
From Millstone Nuclear Power Station to Studsvik	m^3	2.50E+00	
Processing Facility, LLC, Erwin, TN for Thermal Destruction	Ci	1.58E+00	25%

b. Dry compressible waste, contaminated equipment, etc.

Disposition	Units	Annual Totals	Est. Total Error %
From Millstone Nuclear Power Station to GTS Duratek,	m^3	3.79E+03	
Oak Ridge, TN for Super-Compaction, Incineration, etc.	Ci	9.84E-01	25%

c. Irradiated components, control rods, etc.

Disposition	Units	Annual Totals	Est. Total Error %
From Millstone Nuclear Power Station to GTS Duratek,	m^3	4.36E+02	
Oak Ridge, TN for Metal Melt, Super-Compaction, etc.	Ci	7.88E+00	25%
From Millstone Nuclear Power Station to	m^3	1.16E+01	
Chem-Nuclear Services Inc., Barnwell, SC, for Burial	Ci	4.42E+04	25%
From Millstone Nuclear Power Station to Allied	m^3	1.02E-01	
Technology Group Inc., Oak Ridge, TN for Metal Melt, etc.	Ci	1.89E+01	25%

d. Other - (Mixed Waste)

Disposition	Units	Annual Totals	Est. Total Error %
From Millstone Nuclear Power Station to Diversified	m^3	8.57E-01	
Scientific Services, Inc., Oak Ridge, TN for Incineration	Ci	2.84E-04	25%

d. Other - (Water)

Disposition	Units	Annual Totals	Est. Total Error %
From Millstone Nuclear Power Station to GTS	m^3	1.29E+01	
Duratek, Oak Ridge, TN for Incineration	Ci	2.96E-02	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 Inc, Barnwell, SC for Burial

Radionuclide	% of Total	Curies
H-3	0.08	1.60E-04
C-14	0.09	1.81E-04
Na-22		
Cr-51	<0.01	7.08E-08
Mn-54	2.51	5.22E-03
Fe-55	62.01	1.29E-01
Co-57	0.04	9.00E-05
Co-58	0.23	4.83E-04
Fe-59	<0.01	3.75E-07
Co-60	16.33	3.39E-02
Ni-59		
Ni-63	17.92	3.72E-02
Zn-65	0.01	2.45E-05
Rb-83		
Rb-84		
Sr-89	<0.01	3.06E-08
Sr-90	<0.01	1.02E-05
Nb-94		
Nb-95	<0.01	2.06E-06
Zr-95	<0.01	1.03E-05
Tc-99		
Ag-110m	0.03	6.15E-05
Sn-113	0.01	1.44E-05
Sb-125	0.57	1.19E-03
I-129		
Xe-133		
Cs-134	<0.01	9.96E-06
Cs-137	0.12	2.43E-04
Ce-144		
Eu-152		
Th-228		
Th-230		
Th-232		
U-234		
U-235		
Np-237		
Pu-238	<0.01	1.51E-06
U-238		
Pu-239	<0.01	6.66E-07
Pu-241	0.02	4.71E-05
Am-241	<0.01	4.05E-06
Pu-242		
Cm-242	<0.01	6.42E-07
Am-243		
Cm-243		
Cm-244	<0.01	3.54E-06
TOTALS		2.08E-01

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

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

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

Radionuclide	% of Total	Curies
H-3	0.04	5.85E-04
C-14	0.13	2.08E-03
Na-22		
Cr-51		
Mn-54	0.91	1.44E-02
Fe-55	57.13	9.04E-01
Co-57		
Co-58		
Fe-59		
Co-60	12.32	1.95E-01
Ni-59		
Ni-63	2.92	4.62E-02
Zn-65	7.84	1.24E-01
Rb-83		
Rb-84		
Sr-89		
Sr-90	0.04	7.12E-04
Nb-94		
Nb-95		
Zr-95		
Tc-99		
Ag-110m		
Sn-113		
Sb-125		
I-129		
Xe-133		
Cs-134		
Cs-137	18.58	2.94E-01
Ce-144		
Eu-152		
Th-228		
Th-230		
Th-232		
U-234		
U-235		
Np-237		
Pu-238	<0.01	4.61E-05
U-238		
Pu-239	<0.01	2.68E-05
Pu-241	0.06	9.96E-04
Am-241	<0.01	2.36E-04
Pu-242		
Cm-242	<0.01	2.93E-07
Am-243		
Cm-243		
Cm-244	<0.01	1.39E-05
TOTALS		1.58E+00

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

b. Dry compressible waste, contaminated equipment, etc.

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

Radionuclide	% of Total	Curies
H-3	2.66	2.62E-02
C-14	0.06	6.29E-04
Na-22		
Cr-51	<0.01	1.58E-05
Mn-54	0.14	1.40E-03
Fe-55	43.32	4.26E-01
Co-57		
Co-58	0.01	1.46E-04
Fe-59	<0.01	6.78E-09
Co-60	23.34	2.30E-01
Ni-59	<0.01	1.72E-06
Ni-63	3.52	3.46E-02
Zn-65	0.48	4.74E-03
Rb-83		
Rb-84		
Sr-89		
Sr-90	<0.01	8.32E-06
Nb-94	<0.01	7.78E-09
Nb-95		
Zr-95		
Tc-99	<0.01	1.27E-09
Ag-110m		
Sn-113		
Sb-125	<0.01	3.53E-06
I-129		
Xe-133		
Cs-134	0.01	5.48E-05
Cs-137	26.40	2.60E-01
Ce-144		
Eu-152		
Th-228		
Th-230		
Th-232		
U-234		
U-235		
Np-237		
Pu-238		
U-238		
Pu-239		
Pu-241	0.06	5.67E-04
Am-241		
Pu-242		
Cm-242		
Am-243		
Cm-243		
Cm-244		
TOTALS		9.84E-01

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

c. Irradiated components, control rods, etc.

From Millstone Nuclear Power Station to GTS Duratek, Oak Ridge, TN for Metal Melt, Super-Compaction, etc.

Radionuclide	% of Total	Curies
H-3	0.12	9.52E-03
C-14	0.07	5.87E-03
Na-22		
Cr-51		
Mn-54	0.13	1.04E-02
Fe-55	77.01	6.07E+00
Co-57	<0.01	7.96E-06
Co-58		
Fe-59		
Co-60	18.11	1.43E+00
Ni-59	0.01	9.30E-04
Ni-63	3.53	2.78E-01
Zn-65		
Rb-83		
Rb-84		
Sr-89		
Sr-90	<0.01	1.59E-04
Nb-94		
Nb-95		
Zr-95		
Tc-99		
Ag-110m	0.12	9.74E-03
Sn-113		
Sb-125		
I-129		
Xe-133		
Cs-134		
Cs-137	0.61	4.81E-02
Ce-144		
Eu-152	<0.01	1.26E-05
Th-228		
Th-230		
Th-232		
U-234		
U-235		
Np-237		
Pu-238	0.01	4.89E-04
U-238		
Pu-239	<0.01	2.39E-04
Pu-241	0.17	1.34E-02
Am-241	0.05	4.09E-03
Pu-242		
Cm-242	<0.01	1.32E-05
Am-243		
Cm-243	0.01	4.43E-04
Cm-244	0.03	2.49E-03
TOTALS		7.88E+00

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

c. Irradiated components, control rods, etc.

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

Radionuclide	% of Total	Curies
H-3	<0.01	3.96E-01
C-14	0.01	2.21E+00
Na-22		
Cr-51	<0.01	5.06E-05
Mn-54	0.07	2.94E+01
Fe-55	16.52	7.30E+03
Co-57		
Co-58		
Fe-59		
Co-60	80.00	3.54E+04
Ni-59	0.02	7.77E+00
Ni-63	3.40	1.50E+03
Zn-65		
Rb-83		
Rb-84		
Sr-89		
Sr-90	<0.01	7.04E-04
Nb-94	<0.01	3.74E-02
Nb-95		
Zr-95		
Tc-99	<0.01	8.10E-03
Ag-110m	<0.01	3.90E-03
Sn-113		
Sb-125		
I-129		
Xe-133		
Cs-134		
Cs-137	<0.01	2.11E-01
Ce-144	<0.01	3.02E-03
Eu-152		
Th-228		
Th-230		
Th-232		
U-234		
U-235	<0.01	4.70E-08
Np-237	<0.01	1.64E-07
Pu-238	<0.01	3.87E-03
U-238		
Pu-239	<0.01	5.21E-04
Pu-241	<0.01	3.31E-02
Am-241	<0.01	6.13E-03
Pu-242	<0.01	2.22E-07
Cm-242	<0.01	8.70E-03
Am-243	<0.01	4.32E-06
Cm-243	<0.01	9.49E-03
Cm-244		
TOTALS		4.42E+04

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

c. Irradiated components, control rods, etc.

From Millstone Nuclear Power Station to Allied Technology Group, Inc., Oak Ridge, TN for Metal Melt, etc.

Radionuclide	% of Total	Curies
H-3		
C-14	0.02	2.89E-03
Na-22		
Cr-51		
Mn-54	0.06	1.08E-02
Fe-55	32.93	6.21E+00
Co-57		
Co-58		
Fe-59		
Co-60	56.74	1.07E+01
Ni-59	0.05	9.37E-03
Ni-63	10.18	1.92E+00
Zn-65		
Rb-83		
Rb-84		
Sr-89		
Sr-90		
Nb-94	<0.01	4.87E-05
Nb-95		
Zr-95		
Tc-99	<0.01	9.42E-06
Ag-110m		
Sn-113		
Sb-125		
I-129		
Xe-133		
Cs-134		
Cs-137		
Ce-144		
Eu-152		
Th-228		
Th-230		
Th-232		
U-234		
U-235		
Np-237		
Pu-238	<0.01	8.35E-05
U-238		
Pu-239	<0.01	1.03E-04
Pu-241	0.02	3.09E-03
Am-241	<0.01	2.85E-04
Pu-242	<0.01	1.07E-07
Cm-242	<0.01	6.36E-07
Am-243		
Cm-243	<0.01	4.07E-05
Cm-244		
TOTALS		1.89E+01

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

d. Other - (Mixed Waste)

From Millstone Nuclear Power Station to Diversified Scientific Services, Inc., Oak Ridge, TN for Incineration

Radionuclide	% of Total	Curies
H-3	73.06	2.07E-04
C-14	0.54	1.52E-06
Na-22		
Cr-51		
Mn-54		
Fe-55	11.20	3.18E-05
Co-57		
Co-58		
Fe-59		
Co-60	8.61	2.44E-05
Ni-59		
Ni-63	5.95	1.69E-05
Zn-65		
Rb-83		
Rb-84		
Sr-89		
Sr-90		
Nb-94		
Nb-95		
Zr-95		
Tc-99	<0.01	2.02E-10
Ag-110m		
Sn-113		
Sb-125		
I-129	<0.01	2.81E-11
Xe-133		
Cs-134	<0.01	2.34E-09
Cs-137	0.64	1.81E-06
Ce-144		
Eu-152		
Th-228		
Th-230		
Th-232		
U-234		
U-235		
Np-237		
Pu-238		
U-238		
Pu-239		
Pu-241		
Am-241		
Pu-242		
Cm-242		
Am-243		
Cm-243		
Cm-244		
TOTALS		2.84E-04

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

d. Other - (Water)

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

Radionuclide	% of Total	Curies
H-3	68.79	2.04E-02
C-14	0.20	6.00E-05
Na-22		
Cr-51		
Mn-54	0.06	1.76E-05
Fe-55	3.78	1.12E-03
Co-57	0.08	2.41E-05
Co-58	24.82	7.34E-03
Fe-59		
Co-60	1.06	3.14E-04
Ni-59		
Ni-63	1.15	3.40E-04
Zn-65		
Rb-83		
Rb-84		
Sr-89		
Sr-90	<0.01	5.46E-10
Nb-94		
Nb-95		
Zr-95		
Tc-99		
Ag-110m		
Sn-113		
Sb-125		
I-129		
Xe-133		
Cs-134	<0.01	3.85E-07
Cs-137	0.06	1.71E-05
Ce-144	<0.01	1.49E-07
Eu-152		
Th-228		
Th-230		
Th-232		
U-234		
U-235		
Np-237	<0.01	4.76E-10
Pu-238	<0.01	4.17E-10
U-238		
Pu-239	<0.01	1.61E-10
Pu-241	<0.01	1.91E-08
Am-241	<0.01	5.01E-10
Pu-242	<0.01	1.24E-10
Cm-242	<0.01	2.58E-09
Am-243		
Cm-243	<0.01	4.94E-10
Cm-244		
TOTALS		2.96E-02

Number of Shipments	Mode of Transportation	Destination
1	Truck (Sole Use Vehicle)	Allied Technology Group, Inc. - Oak Ridge, TN
7	Truck (Sole Use Vehicle)	Chem-Nuclear Services Inc., Barnwell, SC
1	Truck (Sole Use Vehicle)	Diversified Scientific Services, Inc. - Oak Ridge, TN
74	Truck (Sole Use Vehicle)	GTS Duratek - Oak Ridge, TN
9	Railroad Car	GTS Duratek - Oak Ridge, TN
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 2000	N/A	N/A

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

January 1, 2000 through December 31, 2000

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	5.15E-01	
Chem-Nuclear Services Inc., Barnwell, SC for Burial	Ci	6.23E-01	25%
From Millstone Nuclear Power Station to GTS Duratek,	m^3	9.06E+00	
Oak Ridge, TN for Super-Compaction, Incineration, etc.	Ci	1.80E-02	25%

b. Dry compressible waste, contaminated equipment, etc.

Disposition	Units	Annual Totals	Est. Total Error %
From Millstone Nuclear Power Station to GTS Duratek,	m^3	1.81E+02	
Oak Ridge, TN for Super-Compaction, Incineration, etc.	Ci	3.04E-01	25%

c. Irradiated components, control rods, etc.

Disposition	Units	Annual Totals	Est. Total Error %
No shipments made in 2000	m^3		
	Ci		N/A

d. Other - (Mixed Waste)

Disposition	Units	Annual Totals	Est. Total Error %
From Millstone Nuclear Power Station to Diversified	m^3	8.57E-01	
Scientific Services, Inc., Oak Ridge, TN for Incineration	Ci	2.84E-04	25%

d. Other - (Water)

Disposition	Units	Annual Totals	Est. Total Error %
From Millstone Nuclear Power Station to GTS Duratek,	m^3	1.05E+02	
Oak Ridge, TN for Incineration	Ci	1.39E+00	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 Inc., Barnwell, SC for Burial

Radionuclide	% of Total	Curies
H-3	0.08	4.79E-04
C-14	0.09	5.42E-04
Na-22		
Cr-51	<0.01	2.12E-07
Mn-54	2.51	1.57E-02
Fe-55	62.01	3.86E-01
Co-57	0.04	2.70E-04
Co-58	0.23	1.45E-03
Fe-59	<0.01	1.13E-06
Co-60	16.33	1.02E-01
Ni-59		
Ni-63	17.92	1.12E-01
Zn-65	0.01	7.35E-05
Rb-83		
Rb-84		
Sr-89	<0.01	9.18E-08
Sr-90	<0.01	3.07E-05
Nb-94		
Nb-95	<0.01	6.19E-06
Zr-95	<0.01	3.10E-05
Tc-99		
Ag-110m	0.03	1.85E-04
Sn-113	0.01	4.31E-05
Sb-125	0.57	3.57E-03
I-129		
Xe-133		
Cs-134	<0.01	2.99E-05
Cs-137	0.12	7.30E-04
Ce-144		
Eu-152		
Th-228		
Th-230		
Th-232		
U-234		
U-235		
Np-237		
Pu-238	<0.01	4.54E-06
U-238		
Pu-239	<0.01	2.00E-06
Pu-241	0.02	1.41E-04
Am-241	<0.01	1.22E-05
Pu-242		
Cm-242	<0.01	1.93E-06
Am-243		
Cm-243		
Cm-244	<0.01	1.06E-05
TOTALS		6.23E-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 GTS Duratek, Oak Ridge, TN for Super-Compaction, Incineration, etc.

Radionuclide	% of Total	Curies
H-3	0.08	1.36E-05
C-14	0.89	1.60E-04
Na-22		
Cr-51	3.02	5.44E-04
Mn-54		
Fe-55	16.50	2.97E-03
Co-57		
Co-58	42.77	7.70E-03
Fe-59		
Co-60	4.64	8.35E-04
Ni-59		
Ni-63	5.04	9.07E-04
Zn-65		
Rb-83		
Rb-84		
Sr-89		
Sr-90		
Nb-94		
Nb-95	2.13	3.84E-04
Zr-95	14.05	2.53E-03
Tc-99		
Ag-110m		
Sn-113		
Sb-125		
I-129		
Xe-133		
Cs-134		
Cs-137	10.89	1.96E-03
Ce-144		
Eu-152		
Th-228		
Th-230		
Th-232		
U-234		
U-235		
Np-237		
Pu-238		
U-238		
Pu-239		
Pu-241		
Am-241		
Pu-242		
Cm-242		
Am-243		
Cm-243		
Cm-244		
TOTALS		1.80E-02

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

b. Dry compressible waste, contaminated equipment, etc.

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

Radionuclide	% of Total	Curies
H-3	1.99	6.05E-03
C-14	1.06	3.21E-03
Na-22		
Cr-51	0.95	2.89E-03
Mn-54	0.01	1.72E-05
Fe-55	23.60	7.18E-02
Co-57		
Co-58	13.40	4.08E-02
Fe-59		
Co-60	27.23	8.29E-02
Ni-59		
Ni-63	16.89	5.14E-02
Zn-65	<0.01	4.03E-06
Rb-83		
Rb-84		
Sr-89		
Sr-90	0.21	6.50E-04
Nb-94		
Nb-95	0.67	2.03E-03
Zr-95	0.73	2.22E-03
Tc-99		
Ag-110m		
Sn-113		
Sb-125	<0.01	3.53E-06
I-129		
Xe-133		
Cs-134	0.54	1.63E-03
Cs-137	12.72	3.87E-02
Ce-144		
Eu-152		
Th-228		
Th-230		
Th-232		
U-234		
U-235		
Np-237		
Pu-238		
U-238		
Pu-239		
Pu-241	0.02	5.97E-05
Am-241		
Pu-242		
Cm-242		
Am-243		
Cm-243		
Cm-244		
TOTALS		3.04E-01

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

d. Other - (Mixed Waste)

From Millstone Nuclear Power Station to Diversified Scientific Services, Inc., Oak Ridge, TN for Incineration

Radionuclide	% of Total	Curies
H-3	73.06	2.07E-04
C-14	0.54	1.52E-06
Na-22		
Cr-51		
Mn-54		
Fe-55	11.20	3.18E-05
Co-57		
Co-58		
Fe-59		
Co-60	8.61	2.44E-05
Ni-59		
Ni-63	5.95	1.69E-05
Zn-65		
Rb-83		
Rb-84		
Sr-89		
Sr-90		
Nb-94		
Nb-95		
Zr-95		
Tc-99	<0.01	2.02E-10
Ag-110m		
Sn-113		
Sb-125		
I-129	<0.01	2.81E-11
Xe-133		
Cs-134	<0.01	2.34E-09
Cs-137	0.64	1.81E-06
Ce-144		
Eu-152		
Th-228		
Th-230		
Th-232		
U-234		
U-235		
Np-237		
Pu-238		
U-238		
Pu-239		
Pu-241		
Am-241		
Pu-242		
Cm-242		
Am-243		
Cm-243		
Cm-244		
TOTALS		2.84E-04

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

d. Other - (Oil, Oily Sludge)

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

Radionuclide	% of Total	Curies
H-3	85.00	1.18E+00
C-14	0.49	6.76E-03
Na-22	<0.01	8.99E-08
Cr-51	0.01	1.25E-04
Mn-54	0.03	3.91E-04
Fe-55	5.60	7.76E-02
Co-57	0.01	8.44E-05
Co-58	3.23	4.47E-02
Fe-59	<0.01	1.71E-05
Co-60	3.76	5.20E-02
Ni-59		
Ni-63	1.44	2.00E-02
Zn-65		
Rb-83	<0.01	3.29E-05
Rb-84	<0.01	1.45E-05
Sr-89		
Sr-90	0.05	7.44E-04
Nb-94		
Nb-95	0.03	3.85E-04
Zr-95	0.02	2.18E-04
Tc-99		
Ag-110m		
Sn-113		
Sb-125	0.03	4.04E-04
I-129	0.01	9.61E-05
Xe-133	0.04	5.00E-04
Cs-134	0.05	7.24E-04
Cs-137	0.18	2.52E-03
Ce-144		
Eu-152		
Th-228	<0.01	1.31E-10
Th-230	<0.01	8.51E-09
Th-232	<0.01	8.99E-10
U-234	<0.01	1.14E-06
U-235	<0.01	6.77E-08
Np-237	<0.01	8.67E-09
Pu-238	<0.01	7.73E-06
U-238	<0.01	9.19E-07
Pu-239	<0.01	4.83E-06
Pu-241	0.03	3.53E-04
Am-241	<0.01	6.98E-06
Pu-242		
Cm-242	<0.01	9.10E-07
Am-243		
Cm-243		
Cm-244	<0.01	1.15E-05
TOTALS		1.39E+00

Number of Shipments	Mode of Transportation	Destination
1	Truck (Sole Use Vehicle)	Chem-Nuclear Services Inc., Barnwell, SC
1	Truck (Sole Use Vehicle)	Diversified Scientific Services, Inc. - Oak Ridge, TN
18	Truck (Sole Use Vehicle)	GTS Duratek - Oak Ridge, TN

B. IRRADIATED FUEL SHIPMENTS (Disposition)

Number of Shipments	Mode of Transportation	Destination
No Shipments in 2000	N/A	N/A

Table 2.3-10
Solid Waste and Irradiated Component Shipments
Millstone Unit 3

January 1, 2000 through December 31, 2000

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	5.04E+00	
Chem-Nuclear Services Inc., Barnwell, SC for Burial	Ci	6.09E+00	25%
From Millstone Nuclear Power Station to GTS Duratek,	m^3	7.44E+00	
Oak Ridge, TN for Super-Compaction, Incineration, etc.	Ci	1.50E-01	25%
From Millstone Nuclear Power Station to Studsvik	m^3	5.72E+00	
Processing Facility for Thermal Destruction	Ci	1.19E+02	25%

b. Dry compressible waste, contaminated equipment, etc.

Disposition	Units	Annual Totals	Est. Total Error %
From Millstone Nuclear Power Station to GTS Duratek,	m^3	1.21E+02	
Oak Ridge, TN for Super-Compaction, Incineration, etc.	Ci	4.75E-01	25%

c. Irradiated components, control rods, etc.

Disposition	Units	Annual Totals	Est. Total Error %
No shipments made in 2000	m^3		
	Ci		N/A

d. Other - (Mixed Waste)

Disposition	Units	Annual Totals	Est. Total Error %
From Millstone Nuclear Power Station to Diversified	m^3	8.57E-01	
Scientific Services, Inc., Oak Ridge, TN for Incineration	Ci	2.84E-04	25%

d. Other - (Water)

Disposition	Units	Annual Totals	Est. Total Error %
From Millstone Nuclear Power Station to GTS Duratek,	m^3	5.04E+01	
Oak Ridge, TN for Incineration	Ci	1.95E-01	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 Inc., Barnwell, SC for Burial

Radionuclide	% of Total	Curies
H-3	0.08	4.68E-03
C-14	0.09	5.30E-03
Na-22		
Cr-51	<0.01	2.08E-06
Mn-54	2.51	1.53E-01
Fe-55	62.01	3.78E+00
Co-57	0.04	2.64E-03
Co-58	0.23	1.42E-02
Fe-59	<0.01	1.10E-05
Co-60	16.33	9.94E-01
Ni-59		
Ni-63	17.92	1.09E+00
Zn-65	0.01	7.19E-04
Rb-83		
Rb-84		
Sr-89	<0.01	8.98E-07
Sr-90	<0.01	3.00E-04
Nb-94		
Nb-95	<0.01	6.05E-05
Zr-95	<0.01	3.03E-04
Tc-99		
Ag-110m	0.03	1.80E-03
Sn-113	0.01	4.22E-04
Sb-125	0.57	3.49E-02
I-129		
Xe-133		
Cs-134	<0.01	2.92E-04
Cs-137	0.12	7.14E-03
Ce-144		
Eu-152		
Th-228		
Th-230		
Th-232		
U-234		
U-235		
Np-237		
Pu-238	<0.01	4.44E-05
U-238		
Pu-239	<0.01	1.95E-05
Pu-241	0.02	1.38E-03
Am-241	<0.01	1.19E-04
Pu-242		
Cm-242	<0.01	1.88E-05
Am-243		
Cm-243		
Cm-244	<0.01	1.04E-04
TOTALS		6.09E+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 GTS Duratek, Oak Ridge, TN for Super-Compaction, Incineration, etc.

Radionuclide	% of Total	Curies
H-3	0.26	3.84E-04
C-14	0.53	7.88E-04
Na-22		
Cr-51		
Mn-54	3.73	5.58E-03
Fe-55	67.21	1.01E-01
Co-57	0.11	1.59E-04
Co-58	4.90	7.34E-03
Fe-59		
Co-60	13.47	2.02E-02
Ni-59		
Ni-63	8.31	1.25E-02
Zn-65		
Rb-83		
Rb-84		
Sr-89		
Sr-90	<0.01	6.00E-07
Nb-94		
Nb-95	0.45	6.73E-04
Zr-95	0.17	2.49E-04
Tc-99		
Ag-110m		
Sn-113	0.08	1.25E-04
Sb-125	0.45	6.77E-04
I-129		
Xe-133		
Cs-134		
Cs-137		
Ce-144		
Eu-152		
Th-228		
Th-230		
Th-232		
U-234		
U-235		
Np-237		
Pu-238	<0.01	6.68E-07
U-238		
Pu-239	<0.01	2.22E-07
Pu-241	0.34	5.08E-04
Am-241	<0.01	5.04E-07
Pu-242		
Cm-242	<0.01	3.18E-06
Am-243		
Cm-243		
Cm-244	<0.01	1.15E-06
TOTALS		1.50E-01

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

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

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

Radionuclide	% of Total	Curies
H-3	<0.01	1.86E-03
C-14	<0.01	4.47E-03
Na-22		
Cr-51		
Mn-54	5.57	6.64E+00
Fe-55	49.78	5.94E+01
Co-57	0.08	9.01E-02
Co-58	2.19	2.61E+00
Fe-59		
Co-60	16.76	2.00E+01
Ni-59		
Ni-63	23.80	2.84E+01
Zn-65		
Rb-83		
Rb-84		
Sr-89	<0.01	6.72E-05
Sr-90	<0.01	3.48E-04
Nb-94		
Nb-95		
Zr-95		
Tc-99		
Ag-110m		
Sn-113		
Sb-125	0.95	1.13E+00
I-129		
Xe-133		
Cs-134	0.07	8.23E-02
Cs-137	0.80	9.55E-01
Ce-144		
Eu-152		
Th-228		
Th-230		
Th-232		
U-234		
U-235		
Np-237		
Pu-238	<0.01	5.16E-05
U-238		
Pu-239	<0.01	1.76E-05
Pu-241	<0.01	1.12E-03
Am-241	<0.01	2.17E-05
Pu-242		
Cm-242	<0.01	6.66E-05
Am-243		
Cm-243		
Cm-244	<0.01	5.32E-05
TOTALS		1.19E+02

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

b. Dry compressible waste, contaminated equipment, etc.

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

Radionuclide	% of Total	Curies
H-3	0.08	3.91E-04
C-14	0.10	4.66E-04
Na-22		
Cr-51	<0.01	1.58E-05
Mn-54	1.62	7.69E-03
Fe-55	64.74	3.08E-01
Co-57		
Co-58	1.10	5.22E-03
Fe-59		
Co-60	15.69	7.46E-02
Ni-59		
Ni-63	14.70	6.99E-02
Zn-65	<0.01	4.03E-06
Rb-83		
Rb-84		
Sr-89		
Sr-90		
Nb-94		
Nb-95		
Zr-95		
Tc-99		
Ag-110m		
Sn-113		
Sb-125	<0.01	3.53E-06
I-129		
Xe-133		
Cs-134	0.01	3.43E-05
Cs-137	1.94	9.24E-03
Ce-144		
Eu-152		
Th-228		
Th-230		
Th-232		
U-234		
U-235		
Np-237		
Pu-238		
U-238		
Pu-239		
Pu-241	0.01	5.97E-05
Am-241		
Pu-242		
Cm-242		
Am-243		
Cm-243		
Cm-244		
TOTALS		4.75E-01

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

d. Other - (Mixed Waste)

From Millstone Nuclear Power Station to Diversified Scientific Services, Inc., Oak Ridge, TN for Incineration

Radionuclide	% of Total	Curies
H-3	73.06	2.07E-04
C-14	0.54	1.52E-06
Na-22		
Cr-51		
Mn-54		
Fe-55	11.20	3.18E-05
Co-57		
Co-58		
Fe-59		
Co-60	8.61	2.44E-05
Ni-59		
Ni-63	5.95	1.69E-05
Zn-65		
Rb-83		
Rb-84		
Sr-89		
Sr-90		
Nb-94		
Nb-95		
Zr-95		
Tc-99	<0.01	2.02E-10
Ag-110m		
Sn-113		
Sb-125		
I-129	<0.01	2.81E-11
Xe-133		
Cs-134	<0.01	2.34E-09
Cs-137	0.64	1.81E-06
Ce-144		
Eu-152		
Th-228		
Th-230		
Th-232		
U-234		
U-235		
Np-237		
Pu-238		
U-238		
Pu-239		
Pu-241		
Am-241		
Pu-242		
Cm-242		
Am-243		
Cm-243		
Cm-244		
TOTALS		2.84E-04

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

d. Other - (Oil, Oily Sludge)

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

Radionuclide	% of Total	Curies
H-3	74.21	1.44E-01
C-14	0.38	7.42E-04
Na-22		
Cr-51	<0.01	2.47E-06
Mn-54	0.04	6.99E-05
Fe-55	5.31	1.03E-02
Co-57	0.05	9.25E-05
Co-58	15.03	2.92E-02
Fe-59		
Co-60	2.71	5.27E-03
Ni-59		
Ni-63	1.46	2.84E-03
Zn-65		
Rb-83	0.32	6.21E-04
Rb-84	0.28	5.53E-04
Sr-89		
Sr-90	0.02	4.35E-05
Nb-94		
Nb-95	0.02	3.03E-05
Zr-95	0.01	1.75E-05
Tc-99		
Ag-110m		
Sn-113		
Sb-125	0.02	3.29E-05
I-129	<0.01	5.62E-06
Xe-133		
Cs-134	0.02	4.17E-05
Cs-137	0.10	1.89E-04
Ce-144	<0.01	2.78E-07
Eu-152		
Th-228	<0.01	7.57E-09
Th-230	<0.01	7.40E-08
Th-232	<0.01	1.04E-08
U-234	0.01	1.45E-05
U-235	<0.01	9.03E-07
Np-237	<0.01	1.77E-08
Pu-238	<0.01	2.10E-06
U-238	0.01	1.11E-05
Pu-239	<0.01	7.54E-07
Pu-241	0.01	2.77E-05
Am-241	<0.01	5.38E-07
Pu-242	<0.01	2.30E-10
Cm-242	<0.01	7.57E-08
Am-243		
Cm-243	<0.01	9.17E-10
Cm-244	<0.01	8.98E-07
TOTALS		1.95E-01

3. Solid Waste Disposition (Shipments from Millstone)

Number of Shipments	Mode of Transportation	Destination
1	Truck (Sole Use Vehicle)	Chem-Nuclear Services Inc., Barnwell, SC
1	Truck (Sole Use Vehicle)	Diversified Scientific Services, Inc. - Oak Ridge, TN
17	Truck (Sole Use Vehicle)	GTS Duratek - Oak Ridge, TN
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 2000	N/A	N/A

Effective 12/21/00 Approved 12/28/00

Northeast Utilities Service Co. Document Transmittal

Quality Documents ☐ Yes ☒ No	Page 1 of 27 Including cover

DFI-DT-0159-01

Transmittal Number: ~~25205-ER-01-0005~~	EWA/EWR No.		
Prepared By: K.W. Hajnal x5235	Dept: RPWS	Location: Building 410	Date: 4/10/01
Document Status: ☒ Non—Confidential	☐ Confidential*	☐ Safeguards*	

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25205-01-005			**Solid Waste Data for the 2000 Millstone Annual Radioactive Effluent Report**

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To Preparer:

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References

1. NUREG-0597 User Guide to GASPAR Code, KF Eckerman, FJ Congel, AK Roecklien, WJ Pasciak, Division of Site Safety and Environmental Analysis, Office of Nuclear Reactor Regulation, US Nuclear Regulatory Commission, Washington, DC 20555, manuscript completed January 1980, published June 1980.

2. EPA-520/1-74-004, AIREM Program Manual - A Computer Code for Calculating Doses, Population Doses, and Ground Depositions Due to Atmospheric Emissions of Radionuclides, JA Martin Jr, CB Nelson, PA Cuny, Field Operations Division, Office of Radiation Programs, US Environmental Protection Agency, Washington, DC 20460, May 1974.

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.

4. DF-1304 EGAD - A Computer Program to Compute Dose Integrals from External Gamma Emitters, RE Cooper, Mathematics and Computers (TID-4500, VC32), Savannah River Laboratory, Aiken, SC, September 1972.

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. Engineering Record Correspondence No. 25205-ER-01-0005, Solid Waste Data for the 2000 Millstone Annual Radioactive Effluent Report , Rev 0, April 10, 2001.

10. DOSLIQ-Dose Excel Code for Liquid Effluents,Software Document File, Rev 0, April 2001

3.0 REMODCM Changes

In 2000, the following changes were made to the Millstone REMODCM:

Change	99-14	Rev 18	Effective January 3, 2000
Change	00-01	Rev 19	Effective June 15, 2000

The description and the bases for the changed pages for each REMODCM revision are included here in Volume I of this report. In addition, a complete updated copy of the REMODCM, as of 12/31/2000, is provided to the Nuclear Regulatory Commission along with this report.

The complete set of revised pages to the REMMODCM are included in Volume II of this report.

REMODCM Rev 18

Description of Changes

Radiological Environmental Review

Attachment 3
REMM/ODCM Change Request - Routing and Cover Sheet
(Sheet 1a of 3)

Check one: ☒ REMM ☒ ODCM ☒ Unit 1 Effluent Controls

Change Request #: REMODCM-99-14
Revision 18

1. Originator name (Print): Claude Flory

Markups of all pages included except for pages II.C-1 thru II.C-5, II.D-1 thru II.D-14, II.E-1 thru II.E-3, and II.E-6. Because of extensive changes the original excepted pages are enclosed for comparison.

Sect	Section Title	Page	Description of change and reason
All		All	Structure and format changes to enhance readability and user functionality: 1. Added a page change summary page (Page I-i) in Section I to track which pages are revised which each revision. To implement this new page revision tracking system all pages in the manual were stepped up to Revision 18. 2. Relabeled all the section and sub-section designators by starting with the section designator I, II, or III and changed some sub-section designators to provide a simpler and consistent section designation system. Because of the pervasive nature of this change there are no mark-ups or change bars for this change. 3. Revised the header on each page by showing the section acronym (REMM for Section I, ODCM for Section II, and Unit 1 Controls for Section III) and removing the revision date which will be tracked on the change summary page. 4. Revised the page numbering in the footer on each page to preface with the section designator I, II, or III. This will avoid confusion between like numbered pages from different sections. 5. In Tables of Contents removed the Rev No. and Date (of rev) columns. All pages will show the same revision number in the future with dates for individual page revisions tracked in the change summary page. 6. Added a list of tables and figures to the Tables of Contents. 7. Revised internal cross references to other sections because of the re-labeling of sections.
I.B	REMM Responsibilities	I.B-1	1. In first sentence clarified that "this manual" is the REMM. 2. Deleted "for Millstone Units 2 and 3" after "Technical Specifications" because Unit 1 also has applicable specification in the administrative portion of Unit 1 tech specs. 3. Added reference to the effluent program reference manual (MP-13-REM-REF01) for responsibilities.
I.C.1	Liquid Effluents Sampling and Analysis Program	I.C-2	In Table I.C-1 added asterisks to foot notations D and E and the statement that these footnotes indicate conditional action requirements. This will increase user functionality by identifying in the table where there are additional requirements within the footnotes.
I.C.1	Liquid Effluents Sampling and Analysis Program	I.C-3 I.C-4	Grouped table footnotes into informational and conditional requirement footnotes.

Attachment 3
REMM/ODCM Change Request - Routing and Cover Sheet
(Sheet 1b of 3)

Check one: ☒ REMM ☒ ODCM ☒ Unit 1 Effluent Controls

Change Request #: REMODCM-99-14 (cont'd)
Revision 18

1. Originator name (Print): Claude Flory

(Indicate if markup pages are included.)

Sect	Section Title	Page	Description of change and reason
I.C.1	Liquid Effluents Sampling and Analysis Program	I.C-4	1. Deleted footnote G. This footnote has no application in the table. It should have been removed Revision 15 when the requirement for analyzing dissolved and entrained gases in liquid effluents was deleted from the table. 2. Converted footnotes D and F to conditional requirements by applying IF/THEN statements.
I.C.1	Liquid Effluents Sampling and Analysis Program	I.C-5 I.C-7	Added footnote M to Table I.C-2 to exempt turbine building sumps from sampling and analysis when sump water is diverted to radwaste. Sampling and analysis is not needed when the sump is diverted to radwaste because the batch release sampling and analyses requirements in the table include releases from the radwaste system.
I.C.1	Liquid Effluents Sampling and Analysis Program	I.C-5	In Table I.C-2 added asterisks to foot notations D, E, H, J, L, and M and the statement that these footnotes indicate conditional action requirements. This will increase user functionality by identifying in the table where there are additional requirements within the footnotes.
I.C.1	Liquid Effluents Sampling and Analysis Program	I.C-5 I.C-6 I.C-7	Grouped table footnotes into informational and conditional requirement footnotes.
I.C.1	Liquid Effluents Sampling and Analysis Program	I.C-7	1. Converted footnotes D, E, H, J, and L to conditional requirements by applying IF/THEN statements and changed the logic structure of the footnotes to be more explicit. 2. In footnotes D, E, H, and J listed the specific analyses. The listed analyses are consistent with the table.
I.C.1	Liquid Effluents Sampling and Analysis Program	I.C-8 I.C-10	Added footnote M to Table I.C-3 to exempt turbine building sumps from sampling and analysis when sump water is diverted to radwaste. Sampling and analysis is not needed when the sump is diverted to radwaste because the batch release sampling and analyses requirements in the table include releases from the radwaste system.
I.C.1	Liquid Effluents Sampling and Analysis Program	I.C-8	In Table I.C-3 added asterisks to foot notations D, E, H, J, L, and M and the statement that these footnotes indicate conditional action requirements. This will increase user functionality by identifying in the table where there are additional requirements within the footnotes.

Attachment 3

REMM/ODCM Change Request - Routing and Cover Sheet

(Sheet 1c of 3)

Check one: [X] REMM [X] ODCM [X] Unit 1 Effluent Controls

Change Request #: REMODCM-99-14 (cont'd)
Revision 18

1. Originator name (Print): Claude Flory

(Indicate if markup pages are included.)

Sect	Section Title	Page	Description of change and reason
I.C.1	Liquid Effluents Sampling and Analysis Program	I.C-8 I.C-9 I.C-10	Grouped table footnotes into informational and conditional requirement footnotes.
I.C.1	Liquid Effluents Sampling and Analysis Program	I.C-10	1. Converted footnotes D, E, H, J, and L to conditional requirements by applying IF/THEN statements and changed the logic structure of the footnotes to be more explicit. 2. In footnotes D, E, H, and J listed the specific analyses. The listed analyses are consistent with the table.
I.C.2	Liquid Radioactive Waste Treatment	I.C-11	Changed designators for Unit 3 demineralizers from "DMIN" to "DEMN" to be consistent with plant nomenclature.
I.C.3 New	Bases for Liquid Sampling, Analysis and Radioactive Treatment System Use	I.C-12	Added a brief statement of bases for the requirements of Section I.C. More detailed bases are available in the REMODCM Technical Information Document (MP-13-REM-REF02).
I.C.2 New	Liquid Radioactive Waste Treatment	I.C-13 I.C-14 I.C-15	Added simplified line diagrams for Units 2 and 3 liquid effluents pathways. Diagrams serve as part of the bases information and can be useful in implementation of the requirements of the REMODCM. Figure I.C-1 is reserved for Unit 1 and will be used after reconfiguration of Unit 1 systems.
I.D.1	Gaseous Effluents Sampling and Analysis Program	I.D-2	In Table I.D-1 added asterisks to foot notations C and F and the statement that these footnotes indicate conditional action requirements. This will increase user functionality by identifying in the table where there are additional requirements within the footnotes.
I.D.1	Gaseous Effluents Sampling and Analysis Program	I.D-2 I.D-3	Grouped table footnotes into informational and conditional requirement footnotes.
I.D.1	Gaseous Effluents Sampling and Analysis Program	I.D-3	Converted footnotes C and F to conditional requirements by applying IF/THEN statements and changed the logic structure of the footnotes to be more explicit.
I.D.1	Gaseous Effluents Sampling and Analysis Program	I.D-4	In Table I.D-2 added asterisks to foot notations C, F, G and I and the statement that these footnotes indicate conditional action requirements. This will increase user functionality by identifying in the table where there are additional requirements within the footnotes.
I.D.1	Gaseous Effluents Sampling and Analysis Program	I.D-4 I.D-5 I.D-6	Grouped table footnotes into informational and conditional requirement footnotes.

Attachment 3
REMM/ODCM Change Request - Routing and Cover Sheet
(Sheet 1d of 3)

Check one: [X] REMM [X] ODCM [X] Unit 1 Effluent Controls

Change Request #: REMODCM-99-14 (cont'd)
Revision 18

I. Originator name (Print): Claude Flory

(Indicate if markup pages are included.)

Sect	Section Title	Page	Description of change and reason
I.D.1	Gaseous Effluents Sampling and Analysis Program	I.D-6	Converted footnotes C, F, G and I to conditional requirements by applying IF/THEN statements and changed the logic structure of the footnotes to be more explicit.
I.D.1	Gaseous Effluents Sampling and Analysis Program	I.D-7	In Table I.D-3 added asterisks to foot notations C, F, G and I and the statement that these footnotes indicate conditional action requirements. This will increase user functionality by identifying in the table where there are additional requirements within the footnotes.
I.D.1	Gaseous Effluents Sampling and Analysis Program	I.D-7 I.D-8	Grouped table footnotes into informational and conditional requirement footnotes.
I.D.1	Gaseous Effluents Sampling and Analysis Program	I.D-8	Converted footnotes C, F, G and I to conditional requirements by applying IF/THEN statements and changed the logic structure of the footnotes to be more explicit.
I.D.3 New	Bases for Gaseous Sampling, Analysis and Radioactive Treatment System Use	I.D-10	Added a brief statement of bases for the requirements of Section I.D. More detailed bases are available in the REMODCM Technical Information Document (MP-13-REM-REF02).
I.C.2 New	Gaseous Radioactive Waste Treatment	I.D-11 I.D-12 I.D-13	Added simplified line diagrams for Units 2 and 3 airborne effluents pathways. Diagrams serve as part of the bases information and can be useful in implementation of the requirements of the REMODCM. Figure I.D-1 is reserved for Unit 1 and will be used after reconfiguration of Unit 1 systems.
I.E.1	REMP Sampling and Analysis	I.E-4 I.E-5 I.E-6 I.E-7	Moved Appendix G to Section I.E.1. This includes a table and three figures of maps showing REMP sampling locations. This section is the appropriate place for the table and figures and will facilitate referencing the REMODCM for REMP locations.
I.E.1	REMP Sampling and Analysis	I.E-4	1. Deleted Location #23 and descriptor "Location number not in use" because this place holder is not needed in the table. 2. Deleted Location #30-C, "Golden Spur." This table listing was an error. The location is an extra REMP location listed in the annual reports as "30-X."
I.E.1 New	REMP Sampling and Analysis	I.E-12	Added a brief statement of bases for the requirements of Section I.E.

Attachment 3
REMM/ODCM Change Request - Routing and Cover Sheet
(Sheet 1e of 3)

Check one: ☒ REMM ☐ ODCM ☐ Unit 1 Effluent Controls

Change Request #: REMODCM-99-14 (cont'd)
Revision 18

I. Originator name (Print): Claude Flory

(Indicate if markup pages are included.)

Sect	Section Title	Page	Description of change and reason
II.A	ODCM Introduction	II.A-1	1. In first sentence clarified that "this manual" is the ODCM. 2. In the first paragraph specified that the operability section of the Radiological Effluent Monitoring Manual is the REMM - Section I of the REMODCM. 3. Added reference to the effluent program reference manual (MP-13-REM-REF01) for responsibilities. 4. Removed references to appendices which have been moved to the reference manual or Section I.E. 5. Specified that surveillance requirements are contained in either the Technical Specifications for Units 2 and 3 or in the Section III for Unit 3. This change occurred because applicable Unit 1 tech specs were moved to the REMODCM with revision of Unit 1 Safety Tech Specs to the Defueled Tech Specs. 6. Added a reference to a new Appendix A. 7. Deleted reference to the NUSCO Radiological Assessment Branch which is now part of the NNECO Safety Analysis Branch (SAB). Reference to SAB is not needed here.
II.B	ODCM Responsibilities	II.B-1	1. In first sentence clarified that "this manual" is the ODCM. 2. Added reference to the effluent program reference manual (MP-13-REM-REF01) for responsibilities.
NOTE:	Because of extensive changes, pages II.C-1 thru II.C-5 and II.D-1 thru II.D-14 show change bars but no mark-ups. Copies of the present revision pages are included for comparion.		
II.C.1 thru II.C.6	Liquid Dose Calculations	II.C-1 thru II.C-5	Structure of these sections were revised to make them easier to read and interpret. There is no change in the requirements.
II.C.7 New	Bases for Liquid Pathway Dose Calculations	II.C-6	Added a brief statement of bases for the requirements of Section II.C. More detailed bases are available in the REMODCM Technical Information Document (MP-13-REM-REF02).
II.D.1 thru II.D.4	Gaseous Dose Calculations	II.D-1 thru II.C-14	Structure of these sections were revised to make them easier to read and interpret. There is no change in the requirements.
II.D.5	Quarterly Dose Calculations for Annual Radioactive Effluent Report	II.D-15	Added the word "gaseous" because the codes GASPAR and AIREM only apply to gaseous dose calculations.
II.D.6	Compliance with 40CFR190	II.D-15	At bottom of page changed "RAB" to "Safety Analysis Branch (SAB)" because of an organizational change.
II.D.7 New	Bases for Gaseous Pathway Dose Calculations	II.D-16	Added a brief statement of bases for the requirements of Section II.D. More detailed bases are available in the REMODCM Technical Information Document (MP-13-REM-REF02).

Attachment 3

REMM/ODCM Change Request - Routing and Cover Sheet

(Sheet 1f of 3)

Check one: ☒ REMM ☒ ODCM ☒ Unit 1 Effluent Controls

Change Request #: REMODCM-99-14 (cont'd)
Revision 18

1. Originator name (Print): Claude Flory

(Indicate if markup pages are included.)

Sect	Section Title	Page	Description of change and reason
NOTE: Because of extensive changes, pages II.E-1 thru II.E-3 and II.E-6 show change bars but no mark-ups. Copies of the present revision pages are included for comparion.			
II.E.1	Unit 1 Liquid Radwaste Effluent Line	II.E-1	Structure of this section was revised to make it easier to read and interpret. There is no change in the requirements.
II.E.3	Unit 2 Clean Liquid Radwaste Effluent Line	II.E-3	Structure of this section was revised to make it easier to read and interpret. There is no change in the requirements.
II.E.8	Unit 3 Liquid Waste Monitor	II.E-6 II.E-7	Structure of this section was revised to make it easier to read and interpret. There is no change in the requirements.
II.E.13 New	Bases for Liquid Monitor Setpoints	II.E-9	Added a brief statement of bases for the requirements of Section II.E.
II.F.9 New	Bases for Gaseous Monitor Setpoints	II.F-4	Added a brief statement of bases for the requirements of Section II.F.
III.B	Definitions	III.B-1	Added definition for "Radioactive Waste Treatment Systems." This definition was inadvertently not included in Revision 17 with incorporation of Unit 1 Radiological Tech Specs into the REMODCM.
App. A New	REMODCM Methodology Cross-References	APP. A-1	Added a table to cross-reference REMODCM Sections I and II to tech spec requirements for Units 2 and 3 and REMODCM Sections I and II to Section III requirements. For each requirement the table lists applicable limit or objective, exposure period, and required actions.

Originator signature: Claude Flory Date: 11/22/99

RADIOLOGICAL ENVIRONMENTAL REVIEW

RER-99-019

for

REMODCM Rev 18

December 22, 1999

Total Number of Pages: 6

Claude Flory _____ Preparer — 12/22/99 Date

William Eakin _____ Supervisor — 12/22/99 Date

1.0 DESCRIPTION OF CHANGE

REMODCM Revision 18 will be mostly an extensive revision of the REMODCM for the purpose of making the manual more user-friendly and to add bases information. All these changes do not change any of the requirements of the REMODCM. There are a couple of needed technical changes. The following list of changes highlight in bold those changes considered technical in nature. Technical changes are discussed in Section 2.0.

List of changes for REMODCM Revision 18:

1. Structure and format changes to enhance readability and user functionality:
   - Added a page change summary page (Page I-i) in Section I to track which pages are revised with each revision. To implement this new page revision tracking system all pages in the manual were stepped up to Revision 18.
   - Relabeled all the section and sub-section designators by starting with the section designator I, II, or III and changed some sub-section designators to provide a simpler and consistent section designation system. Because of the pervasive nature of this change there are no mark-ups or change bars for this change.
   - Revised the header on each page by showing the section acronym (REMM for Section I, ODCM for Section II, and Unit 1 Controls for Section III) and removing the revision date which will be tracked on the change summary page.
   - Revised the page numbering in the footer on each page to preface with the section designator I, II, or III. This will avoid confusion between like numbered pages from different sections.
   - In Tables of Contents removed the Rev No. and Date (of rev) columns. All pages will show the same revision number in the future with dates for individual page revisions tracked in the change summary page.
   - Added a list of tables and figures to the Tables of Contents.
   - Revised internal cross references to other sections because of the re-labeling of sections.
2. In Section I.B, "Responsibilities," made the following changes:
   - In first sentence clarified that "this manual" is the REMM.
   - Deleted "for Millstone Units 2 and 3" after "Technical Specifications" because Unit 1 also has applicable specification in the administrative portion of Unit 1 tech specs.
   - Added reference to the effluent program reference manual (MP-13-REM-REF01) for responsibilities.
3. In Table I.C-1, "Radioactive Liquid Waste Sampling and Analysis Program - Millstone Unit 1," made the following changes:
   - Added asterisks to foot notations D and E and the statement that these footnotes indicate conditional action requirements. This will increase user functionality by identifying in the table where there are additional requirements within the footnotes.
   - Grouped table footnotes into informational and conditional requirement footnotes.
   - **Deleted footnote G. THIS IS A TECHNICAL CHANGE.**
   - Converted footnotes D and F to conditional requirements by applying IF/THEN statements.

4. In Table I.C-2, "Radioactive Liquid Waste Sampling and Analysis Program - Millstone Unit 2," made the following changes:
   - Added asterisks to foot notations D, E, H, J, L and M and the statement that these footnotes indicate conditional action requirements. This will increase user functionality by identifying in the table where there are additional requirements within the footnotes.
   - Grouped table footnotes into informational and conditional requirement footnotes.
   - Converted footnotes D, E, H, J and L to conditional requirements by applying IF/THEN statements.
   - In footnotes D, E, H, and J listed the specific analyses. The listed analyses are consistent with the table.
   - **Added footnote M to exempt turbine building sumps from sampling and analysis when sump water is diverted to radwaste. THIS IS A TECHNICAL CHANGE.**
5. In Table I.C-3, "Radioactive Liquid Waste Sampling and Analysis Program - Millstone Unit 3," made the following changes:
   - Added asterisks to foot notations D, E, H, J, L and M and the statement that these footnotes indicate conditional action requirements. This will increase user functionality by identifying in the table where there are additional requirements within the footnotes.
   - Grouped table footnotes into informational and conditional requirement footnotes.
   - Converted footnotes D, E, H, J and L to conditional requirements by applying IF/THEN statements.
   - In footnotes D, E, H, and J listed the specific analyses. The listed analyses are consistent with the table.
   - **Added footnote M to exempt turbine building sumps from sampling and analysis when sump water is diverted to radwaste. THIS IS A TECHNICAL CHANGE.**
6. In Section I.C.2, "Liquid Radioactive Waste Treatment," changed designators for Unit 3 demineralizers from "DEMIN" to "DEMN" to be consistent with plant nomenclature.
7. Added a new Section I.C.3 which contains the bases for the requirements of Section I.C. More detailed bases are available in the REMODCM Technical Information Document (MP-13-REM-REF02).
8. Added simplified line diagrams (Figures I.C-1, I.C-2, and I.C-3) for liquid effluents pathways. Diagrams serve as part of the bases information and can be useful in implementation of the requirements of the REMODCM. Figure I.C-1 is blank; it is reserved for Unit 1 and will be used after reconfiguration of Unit 1 systems.
9. In Table I.D-1, "Radioactive Gaseous Waste Sampling and Analysis Program - Millstone Unit 1," made the following changes:
   - Added asterisks to footnotes C and F and the statement that these footnotes indicate conditional action requirements. This will increase user functionality by identifying in the table where there are additional requirements within the footnotes.
   - Grouped table footnotes into informational and conditional requirement footnotes.

- Converted footnotes C and F to conditional requirements by applying IF/THEN statements and changed the logic structure of the footnotes to be more explicit.

10. In Table I.D-2, "Radioactive Gaseous Waste Sampling and Analysis Program - Millstone Unit 2," made the following changes:
    - Added asterisks to footnotes C, F, G and I and the statement that these footnotes indicate conditional action requirements. This will increase user functionality by identifying in the table where there are additional requirements within the footnotes.
    - Grouped table footnotes into informational and conditional requirement footnotes.
    - Converted footnotes C, F, G and I to conditional requirements by applying IF/THEN statements and changed the logic structure of the footnotes to be more explicit.
11. In Table I.D-3, "Radioactive Gaseous Waste Sampling and Analysis Program - Millstone Unit 3," made the following changes:
    - Added asterisks to footnotes C, F, G and I and the statement that these footnotes indicate conditional action requirements. This will increase user functionality by identifying in the table where there are additional requirements within the footnotes.
    - Grouped table footnotes into informational and conditional requirement footnotes.
    - Converted footnotes C, F, G and I to conditional requirements by applying IF/THEN statements and changed the logic structure of the footnotes to be more explicit.
12. Added a new Section I.D.3 containing the bases for the requirements of Section I.D. More detailed bases are available in the REMODCM Technical Information Document (MP-13-REM-REF02).
13. Added simplified line diagrams for airborne effluents pathways. Diagrams serve as part of the bases information and can be useful in implementation of the requirements of the REMODCM. Figure I.D-1 is blank; it is reserved for Unit 1 and will be used after reconfiguration of Unit 1 systems.
14. Moved Appendix G to Section I.E.1. This includes a table and three figures of maps showing REMP sampling locations. This section is the appropriate place for the table and figures and will facilitate referencing the REMODCM for REMP locations.
15. In Table I.E-2, "Environmental Monitoring Programs - Sampling Locations," deleted location #23 and descriptor "Location number not in use" because this place holder is not needed in the table.
16. **In Table I.E-2, "Environmental Monitoring Programs - Sampling Locations," deleted location and #30. THIS IS A TECHNICAL CHANGE.**
17. Added a new Section I.E.4 containing bases for requirements of Section I.E.
18. In Section II.A, "Introduction," made the following changes:
    - In first sentence clarified that "this manual" is the ODCM.
    - In the first paragraph specified that the operability section of the Radiological Effluent Monitoring Manual is the REMM - Section I of the REMODCM.
    - Added reference for the bases for selected site specific factors (MP-13-REM-REF02).

- Removed references to appendices which have been moved to the reference manual or Section I.E.
- Specified that surveillance requirements are contained in either the Technical Specifications for Units 2 and 3 or in the Section III for Unit 3. This change occurred because applicable Unit 1 tech specs were moved to the REMODCM with revision of Unit 1 Safety Tech Specs to the Defueled Tech Specs.
- Added a reference to a new Appendix A.
- Deleted reference to the NUSCO Radiological Assessment Branch which is now part of the NNECO Safety Analysis Branch (SAB). Reference to SAB is not needed here.

19. In Section II.B, "Responsibilities," made the following changes:
    - In first sentence clarified that "this manual" is the ODCM.
    - Added reference to the effluent program reference manual (MP-13-REM-REF01) for responsibilities.
20. Pages II.C-1 through II.C-5 and II.D-1 through II.D-14 (Sections II.C.1 through II.C.6 and II.D.1 through II.D.4 for calculations of doses from liquid and gaseous effluents) were rewritten to make the requirements easier to read and interpret.
21. Added a new Section II.C.7 containing bases for the requirements of Section II.C.
22. In Section II.D.5, "Quarterly Dose Calculations for Annual Radioactive Effluent Report," added the word 'gaseous' to clarify that the computer codes 'GASPAR' and 'AIREM' are only applicable to airborne doses.
23. In Section II.D.6, "Compliance with 40CFR190," changed "RAB" to "Safety Analysis Branch (SAB)" because of an organizational change.
24. Added a new Section II.D.7 containing bases for the requirements of Section II.D.
25. Pages II.E-1, II.E-3, II.E.6 and II.E-7 (Sections II.E.1, II.E.3 and II.E.8 for calculations of liquid radiation monitor setpoints) were rewritten to make the requirements easier to read and interpret.
26. Added a new Section II.E.13 containing bases for the requirements of Section II.E.
27. Added a new Section II.F.9 containing bases for the requirements of Section II.F.
28. In Section III.B, "Definitions," corrected an error in the definition for "Real Member of the Public." When retyping the definition when it was being moved from the Unit 1 Technical Specifications to the REMODCM the last sentence was connected to the previous sentence. This inadvertantly excluded "persons who use portions of the Millstone site for recreational, occupational, or other purposes not associated with any of the Millstone plants" as a member of the public.
29. In Section III.B, "Definitions," added a definition for "Radioactive Waste Treatment Systems." This definition was inadvertently not included in Revision 17 with incorporation of Unit 1 Radiological Tech Specs into the REMODCM.
30. Added new Appendix A with a table to cross-reference REMODCM Sections I and II to tech spec requirements for Units 2 and 3 and REMODCM Sections I and II to Section III requirements. For each requirement the table lists applicable limit or objective, exposure period, and required actions.
31. Deleted Appendices A through F. All the information from these appendices are being relocated to the REMODCM Technical Information Document (Reference Manual MP-13-REM-REF01). None of the REMODCM technical requirements are affected by the transfer of this information out of the REMODCM into a separate manual.

2.0 DISCUSSION

There are four technical changes in Revision 18 to the REMODCM.

1. In Table I.C-1, "Radioactive Liquid Waste Sampling and Analysis Program - Millstone Unit 1," footnote G was deleted. This footnote, which specifies technical requirements for analysis of radioactive noble gases in liquids, has no application in the table. It should have been removed in Revision 15 when the requirement for analyzing dissolved and entrained gases in liquid effluents was deleted from the table. Analysis of radioactive noble gases in liquid is no longer needed at Millstone Unit 1 because it was permanently shutdown over three years ago.
2. In Table I.C-2, "Radioactive Liquid Waste Sampling and Analysis Program - Millstone Unit 2," footnote M was added to exempt sampling of the turbine building sump when sump water is being diverted to radwaste. Sampling and analysis is not needed when the sump is diverted to radwaste because the batch release sampling and analyses requirements in the table include releases from the radwaste system. Having a separate sample and analysis requirement for turbine building sump water while it is being diverted to radwaste would be double accounting for the same radioactivity.
3. In Table I.C-3, "Radioactive Liquid Waste Sampling and Analysis Program - Millstone Unit 3," footnote M was added to not require sampling of the turbine building sump when sump water is being diverted to radwaste. The reason for this change is the same as that for Unit 2 (see item #2 above).
4. Radiological Environmental Monitoring Program (REMP) sample location #30 was deleted from Table I.E-2. Although this location was listed as a control location, there was no sample type identified in the table. This is an aquatic sample location which is in the Niantic River where it becomes an estuary. However, there is already a required control location for aquatic samples (#37 at Giant's Neck). Because of tidal action, the Niantic River estuary would not be a good control sample location. This sample location was inadvertantly place on the list as a required control location. Although samples from the location have been analyzed, the location has always been identified as an extra, non-required sample location in the annual report.

3.0 CONCLUSION

The changes in Revision 18 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, 10CFR50 GDCs 60 and 64, 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).

REMODCM Rev 19

Description of Changes

Radiological Environmental Review

REMODCM Revision 19 Briefing Sheet

Revision 19 of the Radiological Effluent Monitoring and Off-site Dose Calculation Manual (REMODCM) includes major changes to delete many requirements no longer needed at Unit 1. Some requirements relative to the Site Stack are transferred from Unit 1 responsibility to Site (Units 2/3) responsibility. Besides the changes related to Unit 1, there are also other minor changes. A listing of changes is provided below.

1. The title "Annual Radioactive Effluent Report (ARER)" is being changed to "Radioactive Effluent Release Report (RERR)." This change is needed to make the REMODCM consistent with Unit 1 Tech Specs and the proposed Units 2 and 3 Tech Spec Change Requests TSCR 2-2-00 and 3-1-00. This is a non-technical change which is made in Sections I.A, I.B, I.C.1, I.D.1, I.F.2, II.A, II.B, II.C, II.D.1, II.D.2, II.D.3, II.D.5, and III.C.1.
2. In Table I.C-1, "Radioactive Liquid Waste Sampling and Analysis Program - Millstone Unit 1," the requirement to analyze for I-131 and Ce-141 in batch and continuous releases is being deleted.
3. In Tables I.D-1 and I.D-2, "Radioactive Gaseous Waste Sampling and Analysis Program - Millstone Unit 1 (and Unit 2)," the following changes are being made:
   a. All requirements for sampling and analyses of airborne radioactivity from the Steam Jet Air Ejector Discharge are being deleted from Table I.D-1.
   b. Responsibilities for sampling and analyses airborne radioactivity in discharges from the Main Stack is being transferred to Unit 2. The change is being accomplished by removal of the requirements from Table I.D-1 (pages I.D-2 and I.D-3) and adding "Site Stack" to Table I.D-2 (page I.D-4). All the requirements and footnotes for sampling and analyses of a continuous release in Table I.D-2 are identical to those in Table I.D-1 for the Main Stack. As part of this change, Footnotes C, F and G for Table I.D-2 (page I.D-6) are being revised; Footnote C and G to make them applicable to the Site Stack and Unit 2 Vent, and Footnote F to show which part of the footnotes are applicable to Unit 2 Vent only.
4. In Section I.D.2, "Gaseous Radioactive Waste Treatment," the "Radwaste Vent Exhaust" is being deleted as a Unit 1 Waste Stream and the "Radwaste ventilation HEPA filters" are being deleted as a Unit 1 Processing Equipment. This leaves no identified processing equipment for airborne discharges at Unit 1, which effectively removes any requirement for Unit 1 to do airborne dose projections (see #14 below).
5. In Section I.D.3, "Basis for Gaseous Sampling, Analysis, and Radioactive Treatment System Use," in the second sentence, "Radiological Effluent Control III.D.2.1" is being changed to "Radiological Effluent Control III.D.2.a" to correct a typo. This is a non-technical change.
6. In Section I.F.2, "Radioactive Effluent Release Report," the requirement for submittal of the RERR is being changed from a due date of "by May 1 of each year" to "prior to May 1 of each year." This change is needed to make the REMODCM consistent with Unit 1 Tech Specs and the proposed Units 2 and 3 Tech Spec Change Requests TSCR 2-2-00 and 3-1-00. This is a non-technical change.
7. The flexibility of using a computer code equivalent to LADTAP for calculation of liquid effluent doses is being added. The alternate code will have to be compatible with the methodology given in Regulatory Guide 1.109 which is NRC's expectation for calculation of effluent doses. This change is being made in Sections II.C and II.E.12a.

8. In Section II.C.5, "Liquid Dose Calculations - Monthly Dose Projections," a portion of Note 1 is being deleted because the wording is no longer applicable to Unit 1 which is permanently shutdown. The wording uses the example of plant shutdown for refueling to illustrate when a prior month operations may not be typical of the current month operation. This example is no longer applicable. This is a non-technical change.
9. "Stack" is being redesignated as "Site Stack" because this release point is common for all three Millstone Units. This is a non-technical change which is being made in Sections II.D.1, II.D.2, II.D.3, II.D.4, II.F.3, II.F.4, II.F.5, II.F.6, and II.F.7.
10. The flexibility of using a computer code equivalent to GASPAR for calculation of gaseous effluent doses is being added. The alternate code will have to be compatible with the methodology given in Regulatory Guide 1.109 which is NRC's expectation for calculation of effluent doses. This change is being made in Sections II.D.1, II.D.2, II.D.3, II.D.5, and II.D.
11. In Section II.D.1, "Gaseous Dose Calculations - Site Release Rate Limits," the Words "Applicable to Units 1,2, and 3" in title for sub-sections a, b, and c are being deleted. Because the release limits are site limits, the words are not needed. This is a non-technical change.
12. In Sections II.D.2 and II.D.3, "Gaseous Dose Calculations - 10CFR50 Appendix I - Noble Gas Limits and Iodine and Particulate Doses," the following changes are being made:
    a. In notes at the bottom of Pages II.D-3 and II.D-5, wording is being revised to clarify that all three Millstone Units contribute releases to the site stack. This is a non-technical change.
    b. In notes on Pages II.D-3, II.D-5, and II.D-8 the criteria for a special assessment is being changed from 20% to 10% of the dose limit. This change is being to avoid assigning excessive dose to Unit 1 which is permanently shutdown.
    Unit 1 will be assigned dose from Units 2 and 3 releases from the Site Stack as long as the doses stay below 10% of the limit.
    c. Words are being added to distinguish doses calculated for releases from the site stack from doses for releases from Units 2 and 3. This is for clarification purposes. This is a non-technical change.
13. In Section II.D.4, "Gaseous Dose Calculations - Gaseous Effluent Monthly Dose Projections," dose projection for Unit 1 is being deleted. (See #4 above.)
14. In Section II.D.6, "Compliance with 40CFR190," radiation from the Unit 1 turbine building is being deleted as a contributor to site dose.
15. In Section II.E.11a, "Liquid Monitor Setpoints - Unit 3 Steam Generator Blowdown," the reference basis for steam generator blowdown flow rate is being changed from "per 3-Part Memo from MP3 Reactor Engineering" to "ERC 25212-ER-99-0133" because the current reference cannot be documented. This is a non-technical change.
16. Section II.F.1, "Gaseous Monitor Setpoints - Unit 1 Hydrogen Monitor" and Section II.F.2, "Gaseous Monitor Setpoints - Unit 1 Steam Jet Air Ejector Offgas Monitor" are being deleted. They are not needed because of Unit 1's permanent shutdown status.
17. In Section II.F.3, "Gaseous Monitor Setpoints - Unit 1 Stack Noble Gas Monitor," reference to "Radiological Effluent Control III.D.2.1 is being changed to "Units 2 and 3 Technical Specification 3.3.3.10." Requirements for the site stack radiation monitor is being removed from Unit 1 radiological control requirements. The requirements in Units 2 and 3 technical specifications have always been there; the REMODCM just never referred to them. This is a non-technical change.

18. In Section II.F.5, "Gaseous Monitor Setpoints - Unit 2 Vent Noble Gas Monitor, " requirement to assess Unit 1 steam jet air ejector setpoint when decreasing the stack setpoint is being deleted because the air ejector has been decommissioned.
19. In Appendix A after Section II, the designation of the appendix is being changed from "A" to "II.A" to clarify that the appendix belongs to Section II of the REMODCM. This is a non-technical change.
20. In Table III.C-1, "Radioactive Liquid Effluent Monitoring Instrumentation," (for Unit 1) the following changes are being made:
    a. In Action A, the word "independent" is being deleted.
    b. In Action B, the frequency of sample collection during service water monitor inoperability is being decreased from once per 12 hours to daily.
    c. In Action B, the lower limit of detection for gross radioactivity analysis is being changed from $3x10^{-7}$ uCi/gm to the effluent LLD of $5x10^{-7}$ uCi/gm.
21. In Table III.C-2, "Radioactive Liquid Effluent Monitoring Instrumentation Surveillance Requirements," (for Unit 1) the following changes are being made:
    a. The source check frequency for the service water effluent lines is being relaxed from monthly to quarterly.
    b. The instrument check frequency for the dilution water flow is being changed from "daily" to "prior to each batch release." A change to Footnote (4) is part of this change.
22. Requirements for the hydrogen and SJAE offgas monitors in Section III.C.2 are being deleted. These systems have been decommissioned.
23. All the requirements in Section III.C.2 for MP1 Main Stack gaseous monitoring instrumentation are being deleted except for two. These same requirements with the two exceptions are still contained in Technical Specification 3/4.3.3.10 for both Units 2 and 3. Site I&C and Chemistry Departments are assuming responsibility by procedure for continuing work to comply with these requirements. The two exceptions are that an alarm on the sampler flow rate monitor and testing the noble gas activity alarm when the instrument controls are not set in operate mode during the functional test for the noble gas monitor are not in the tech specs. These two requirements remain in the REMOCM because they are not covered by tech specs. This is a non-technical change.
24. Section III.C.3, "Explosive Gas Monitoring" and Section III.C.4, "Steam Jet Air Ejector (SJAE) Noble Gas Activity" (Unit 1), are being deleted because explosive gas monitoring is no longer needed in the Unit 1 offgas system and the SJAE system has been decommissioned. This change will include deletion of basis for the requirements of these sections in Section III.F.
25. In Section III.D.1, "Radioactive Liquid Effluents" (Unit 1), the requirement in Controls for dissolved gases is being deleted.
26. In Section III.D.2, "Radioactive Gaseous Effluents" (Unit 1), the following changes are being made:
    a. The requirement to include radioiodines in dose calculation is being deleted.
    b. Title in Sub-section c is being revised to a more general form. This is a non-technical change.

Attachment 3
REMM/ODCM Change Request - Routing and Cover Sheet

(Sheet 1a of 3)

Check: ☑ REMM ☑ ODCM ☑ Unit 1 Effluent Controls

Change Request #: REMODCM-00-01 Revision 19

I. Originator name (Print): Claude Flory
Markups of all changed pages included.

Sect	Section Title	Page	Description of change and reason
I.A	Introduction	I.A-1	The title "Annual Radioactive Effluent Report (ARER)" in the last sentence is being changed to "Radioactive Effluent Release Report (RERR)." This change is needed to make the REMODCM consistent with Unit 1 Tech Specs and the proposed Units 2 and 3 Tech Specs in TSCR 2-2-00 and 3-1-00.
I.B	Responsibilities	I.B-1	The title "Annual Radioactive Effluent Report (ARER)" in the second sentence is being changed to "Radioactive Effluent Release Report (RERR)." This change is needed to make the REMODCM consistent with Unit 1 Tech Specs and the proposed Units 2 and 3 Tech Specs in TSCR 2-2-00 and 3-1-00.
I.C.1	Liquid Effluent Sampling and Analysis Program	I.C-2 I.C-3 I.C-4 I.C-6 I.C-7 I.C-9 I.C-10	1. Requirement to analyze for I-131 and Ce-141 in batch and continuous releases is being deleted. I-131 is being deleted directly from Table I.C-1 and Ce-141 from Note C of the table. The half-lives of these radionuclides are short enough that they are no longer a concern at Unit 1 which has been permanently shut down for over four years. 2. The title "Annual Radioactive Effluent Report (ARER)" in table footnotes (Footnote C to Table I.C-1, Table I.C-2, and Table I.C-3; and Footnote K to Table I.C-2 and Table I.C-3) is being changed to "Radioactive Effluent Release Report (RERR)." This change is needed to make the REMODCM consistent with Unit 1 Tech Specs and the proposed Units 2 and 3 Tech Specs in TSCR 2-2-00 and 3-1-00.
I.D.1	Gaseous Effluent Sampling and Analysis Program	I.D-2 I.D-3 I.D-4 I.D-5 I.D-6 I.D-8	1. All requirements for sampling and analyses of airborne radioactivity from the Steam Jet Air Ejector Discharge are being deleted. With Unit 1 permanently shutdown this system has been decommissioned. 2. Responsibilities for sampling and analyses airborne radioactivity in discharges from the Main Stack is being transferred to Unit 2. This change is in preparation for separation of Unit 1 from the rest of the Millstone site. The change is being accomplished by removal of the requirements from Table I.D-1 (pages I.D-2 and I.D-3) and adding "Site Stack" to Table I.D-2 (page I.D-4). All the requirements and footnotes for sampling and analyses of a continuous release in Table I.D-2 are identical to those in Table I.D-1 for the Main Stack. As part of this change, Footnote C, F and G of Table I.D-2 (page I.D-6) are being revised; Footnote C and G to make them applicable to the Site Stack and Unit 2 Vent, and Footnote F to show which part of the footnote is applicable to Unit 2 Vent only. These changes retain the same level of monitoring for discharges from the site stack. 3. The title "Annual Radioactive Effluent Report (ARER)" in table footnotes (Footnote B to Table I.D-2, and Table I.D-3) is being changed to "Radioactive Effluent Release Report (RERR)." This change is needed to make the REMODCM consistent with Unit 1 Tech Specs and the proposed Units 2 and 3 Tech Specs in TSCR 2-2-00 and 3-1-00.

Attachment 3
REMM/ODCM Change Request - Routing and Cover Sheet

(Sheet 1b of 3)

Check: ☑ REMM ☑ ODCM ☑ Unit 1 Effluent Controls

Change Request #: REMODCM-00-01 Revision 19

I. Originator name (Print): Claude Flory
Markups of all changed pages included.

Sect	Section Title	Page	Description of change and reason
I.D.2	Gaseous Radioactive Waste Treatment	I.D-9	1. The "Radwaste Vent Exhaust" is being deleted as a Unit 1 Waste Stream and the "Radwaste ventilation HEPA filters" are being deleted as a Unit 1 Processing Equipment. This leaves no identified processing equipment for airborne discharges at Unit 1, which effectively removes any requirement for Unit 1 to do airborne dose projections. Because radioactivity in airborne discharges have been minimal since Unit 1 was permanently shutdown, the dose criteria at which processing equipment would be required to be operable would never be reached. Only the organ dose criteria of 0.03 mrem is applicable for any requirement to have operating processing equipment on the radwaste vent exhaust pathway. (This pathway never emits radioactive noble gas to which the 0.02 mrad gamma radiation and 0.04 mrad beta radiation are applicable.) A monthly release from the radwaste vent of 7E-4 Curies would trigger the 0.03 mrem organ dose criteria. The highest total annual curies released in the last three years has been 5.6E-4 Curies with the total decreasing each year.
I.D.3	Basis for Gaseous Sampling, Analysis, and Radioactive Treatment System Use	I.D-10	In the second sentence "Radiological Effluent Control III.D.2.1" was changed to "Radiological Effluent Control III.D.2.a" to correct a typo.
I.F.2	Radioactive Effluent Release Report	I.F-2	The title "Annual Radioactive Effluent Report (ARER)" is being changed to "Radioactive Effluent Release Report (RERR)" and the requirement for submittal of the RERR is being changed from a due date of "by May 1 of each year" to "prior to May 1 of each year." These changes are needed to make the REMODCM consistent with Unit 1 Tech Specs and the proposed Units 2 and 3 Tech Specs in TSCR 2-2-00 and 3-1-00.
II.A	Introduction	II.A-1	The title "Annual Radioactive Effluent Report (ARER)" in the first paragraph is being changed to "Radioactive Effluent Release Report (RERR)." This change is needed to make the REMODCM consistent with Unit 1 Tech Specs and the proposed Units 2 and 3 Tech Specs in TSCR 2-2-00 and 3-1-00.
II.B	Responsibilities	II.B-1	The title "Annual Radioactive Effluent Report (ARER)" in the second sentence is being changed to "Radioactive Effluent Release Report (RERR)." This change is needed to make the REMODCM consistent with Unit 1 Tech Specs and the proposed Units 2 and 3 Tech Specs in TSCR 2-2-00 and 3-1-00.

Attachment 3
REMM/ODCM Change Request - Routing and Cover Sheet

(Sheet 1c of 3)

Check: ☑ REMM ☑ ODCM ☑ Unit 1 Effluent Controls

Change Request #: REMODCM-00-01 Revision 19

I. Originator name (Print): Claude Flory
Markups of all changed pages included.

Sect	Section Title	Page	Description of change and reason
II.C	Liquid Dose Calculations	II.C-1 II.C-2 II.C-3 II.C-5	1. The title "Annual Radioactive Effluent Report (ARER)" throughout this section is being changed to "Radioactive Effluent Release Report (RERR)." This change is needed to make the REMODCM consistent with Unit 1 Tech Specs and the proposed Units 2 and 3 Tech Specs in TSCR 2-2-00 and 3-1-00. 2. The flexibility of using a computer code equivalent to LADTAP for calculation of liquid effluent doses is being added. The alternate code will have to be compatible with the methodolgy given in Regulatory Guide 1.109 which is NRC's expectation for calculation of effluent doses.
II.C.5	Liquid Dose Calculations Monthly Dose Projections	II.C-4	A portion of Note 1 is being deleted because the wording is no longer applicable to Unit 1 which is permanently shutdown.
II.D.1	Gaseous Dose Calculations Site Release Rate Limits	II.D-1 II.D-2	1. The title "Annual Radioactive Effluent Report (ARER)" in the introductory paragraph is being changed to "Radioactive Effluent Release Report (RERR)." This change is needed to make the REMODCM consistent with Unit 1 Tech Specs and the proposed Units 2 and 3 Tech Specs in TSCR 2-2-00 and 3-1-00. 2. Words "Applicable to Units 1,2, and 3" in title for sub-sections a, b, and c are being deleted. Because the release limits are site limits, the words are not needed. 3. "Stack" is being redesignated as "Site Stack" because this release point is common for all three Millstone Units. 4. The flexibility of using a computer code equivalent to GASPAR for calculation of gaseous effluent doses is being added. The alternate code will have to be compatible with the methodolgy given in Regulatory Guide 1.109 which is NRC's expectation for calculation of effluent doses.

Attachment 3
REMM/ODCM Change Request - Routing and Cover Sheet

(Sheet 1d of 3)

Check: ☑ REMM ☑ ODCM ☑ Unit 1 Effluent Controls

Change Request #: REMODCM-00-01 Revision 19

I. Originator name (Print): Claude Flory
Markups of all changed pages included.

Sect	Section Title	Page	Description of change and reason
II.D.2	Gaseous Dose Calculations 10CFR50 Appendix I - Noble Gas Limits	II.D-3 II.D-4	1. In single asterisk note at bottom of Page II.D-3, wording is being revised to clarify that all three Millstone Units contribute releases to the site stack. 2. In the single asterisk note at bottom of Page II.D-3 the criteria for a special assessment is being changed from 20% to 10% of the dose limit. This change is being to avoid assigning excessive dose to Unit 1 which is permanently shutdown. Unit 1 will be assigned dose from Units 2 and 3 releases from the Site Stack as long as the doses stay below 10% of the limit. 3. "Stack" is being redesignated as "Site Stack" because this release point is common for all three Millstone Units. 4. Words are being added in Sub-section b to distinguish doses calculated for releases from the site stack from doses for releases from Units 2 and 3. This is for clarification purposes. 5. The title "Annual Radioactive Effluent Report (ARER)" is being changed to "Radioactive Effluent Release Report (RERR)." This changes is needed to make the REMODCM consistent with Unit 1 Tech Specs and the proposed Units 2 and 3 Tech Specs in TSCR 2-2-00 and 3-1-00. 6. The flexibility of using a computer code equivalent to GASPAR for calculation of gaseous effluent doses is being added. The alternate code will have to be compatible with the methodolgy given in Regulatory Guide 1.109 which is NRC's expectation for calculation of effluent doses.
II.D.3	Gaseous Dose Calculations 10CFR50 Appendix I - Iodine and Particulate Doses	II.D-5 II.D-6 II.D-7 II.D-8 II.D-9 II.D-10	1. "Unit 1 Stack" is being changed to "Site Stack" because this release point is common for all three Millstone Units. 2. In note at bottom of Page II.D-5, wording is being revised to clarify that all three Millstone Units contribute releases to the site stack. 3. In notes on Pages II.D-5 and II.D-8 the criteria for a special assessment is being changed from 20% to 10% of the dose limit. This change is being to avoid assigning excessive dose to Unit 1 which is permanently shutdown. Unit 1 will be assigned dose from Units 2 and 3 releases from the Site Stack as long as the doses stay below 10% of the limit. 4. Words are being added to distinguish doses calculated for releases from the site stack from doses for releases from Units 2 and 3. This is for clarification purposes.

Attachment 3
REMM/ODCM Change Request - Routing and Cover Sheet

(Sheet 1e of 3)

Check: ☑ REMM ☑ ODCM ☑ Unit 1 Effluent Controls

Change Request #: REMODCM-00-01 Revision 19

I. Originator name (Print): Claude Flory
Markups of all changed pages included.

Sect	Section Title	Page	Description of change and reason
II.D.3 (cont'd)	Gaseous Dose Calculations 10CFR50 Appendix I - Iodine and Particulate Doses	II.D-5 II.D-6 II.D-7 II.D-8 II.D-9 II.D-10	5. On page II.D-10, the title "Annual Radioactive Effluent Report (ARER)" is being changed to "Radioactive Effluent Release Report (RERR)." This changes is needed to make the REMODCM consistent with Unit 1 Tech Specs and the proposed Units 2 and 3 Tech Specs in TSCR 2-2-00 and 3-1-00. 6. The flexibility of using a computer code equivalent to GASPAR for calculation of gaseous effluent doses is being added. The alternate code will have to be compatible with the methodolgy given in Regulatory Guide 1.109 which is NRC's expectation for calculation of effluent doses.
II.D.4	Gaseous Dose Calculations - Gaseous Effluent Monthly Dose Projections	II.D-11 II.D-12 II.D-13	1. Dose projection for Unit 1 is being deleted. The offgas treatment system is no longer needed and has been decommissioned. The only remaining treatment system available for ventilation releases at Unit 1 is the radwaste ventilation HEPA filter. Because system configuration always aligns releases through the HEPA filter, there is no need to project doses for the purpose of determining if applicable treatment system needs to be restored. In the event of filter bypass or gross failure of the HEPA filter, a dose projection would never exceed 7E-4 Curies in any month because Unit 1 has been permanently shutdown for over four years. This is the criteria in Section I.D.2 at which operability of treatments systems would be required. See additional discussion for Section I.D.2 above. 2. "Unit 1 Stack" is being changed to "Site Stack" because this release point is common for all three Millstone Units.
II.D.5	Quarterly Dose Calculations for Annual Radioactive Effluent Report	II.D-15	1. The title "Annual Radioactive Effluent Report (ARER)" is being changed to "Radioactive Effluent Release Report (RERR)." This changes is needed to make the REMODCM consistent with Unit 1 Tech Specs and the proposed Units 2 and 3 Tech Specs in TSCR 2-2-00 and 3-1-00. 2. The flexibility of using computer codes equivalent to GASPAR for calculation of gaseous effluent doses is being added. The alternate codes will have to be compatible with the methodology given in Regulatory Guide 1.109 which is NRC's expectation for calculation of effluent doses.
II.D.6	Gaseous Dose Calculations - Compliance with 40CFR190	II.D-15 II.D-16	Radiation from the Unit 1 turbine building is being deleted as a contributor to site dose because of Unit 1 permanent shutdown status. This will involve deleting reference to direct and scattered radiation from the turbine, calculation of dose to the critical fisherman, and supporting footnotes.

Attachment 3
REMM/ODCM Change Request - Routing and Cover Sheet

(Sheet 1f of 3)

Check: ☑ REMM ☑ ODCM ☑ Unit 1 Effluent Controls

Change Request #: REMODCM-00-01 Revision 19

I. Originator name (Print): Claude Flory
Markups of all changed pages included.

Sect	Section Title	Page	Description of change and reason
II.E.11a	Liquid Monitor Setpoints - Unit 3 Steam Generator Blowdown	II.E-8	The reference basis for steam generator blowdown flow rate is being changed from "per 3-Part Memo from MP3 Reactor Engineering" to "ERC 25212-ER-99-0133." The current reference cannot be documented.
II.E.12a	Unit 3 Turbine Building Floor Drains Effluent Line	II.E-9	The flexibility of using a computer code equivalent to LADTAP for calculation of Liquid effluent doses is being added. The alternate codes will have to be compatible with the methodology given in Regulatory Guide 1.109 which is NRC's expectation for calculation of effluent doses.
II.F.1	Gaseous Monitor Setpoints - Unit 1 Hydrogen Monitor	II.F-1	This section is being deleted. It is not needed because of Unit 1's permanent shutdown status.
II.F.2	Gaseous Monitor Setpoints - Unit 1 Steam Jet Air Ejector Offgas Monitor	II.F-1	This section is being deleted. It is not needed because of Unit 1's permanent shutdown status.
II.F.3	Gaseous Monitor Setpoints - Unit 1 Stack Noble Gas Monitor	II.F-2	1. Reference to "Radiological Effluent Control III.D.2.1 is being changed to "Units 2 and 3 Technical Specification 3.3.3.10." Requirements for the site stack radiation monitor is being removed from Unit 1 radiological control requirements. The requirements in Units 2 and 3 technical specifications have always been there; the REMODCM just never referred to them. 2. "Unit 1 Stack" is being changed to "Site Stack" because this release point is common for all three Millstone Units.
II.F.4	Gaseous Monitor Setpoints - Unit 1 Main Stack Sampler Flow Rate Monitor	II.F-2	"Unit 1 Stack" is being changed to "Site Stack" because this release point is common for all three Millstone Units.
II.F.5	Gaseous Monitor Setpoints - Unit 2 Vent Noble Gas Monitor	II.F-2	1. "Unit 1 Stack" is being changed to "Site Stack" because this release point is common for all three Millstone Units. 2. Requirement to assess Unit 1 steam jet air ejector setpoint when decreasing the stack setpoint is being deleted because the air ejector has been decommissioned.
II.F.6	Gaseous Monitor Setpoints - Unit 2 Waste Gas Decay Tank Monitor	II.F-3	"MP1 Stack" is being changed to "Site Stack" because this release point is common for all three Millstone Units.
II.F.7	Gaseous Monitor Setpoints - Unit 3 Vent Noble Gas Monitor	II.F-3	"MP1 Stack" is being changed to "Site Stack" because this release point is common for all three Millstone Units.

Attachment 3
REMM/ODCM Change Request - Routing and Cover Sheet

(Sheet 1g of 3)

Check one: ☑ REMM ☐ ODCM ☑ Unit 1 Effluent Controls

Change Request #: REMODCM-00-01 (cont'd) Revision 19

1. Originator name (Print): Claude Flory

Sect	Section Title	Page	Description of change and reason
App. A	REMODCM Methodology Cross-References	App. A-1 App. A-2 App. A-3	The designation of the appendix is being changed from "A" to "II.A" to clarify that the appendix belongs to Section II of the REMODCM.
III.C.1	Radioactive Liquid Effluent Monitoring Instrumentation	III.C-1 III.C-3 III.C-4	1. On page III.C-1, the title "Annual Radioactive Effluent Report (ARER)" is being changed to "Radioactive Effluent Release Report (RERR)." This changes is needed to make the REMODCM consistent with Unit 1 Tech Specs and the proposed Units 2 and 3 Tech Specs in TSCR 2-2-00 and 3-1-00. 2. In Action A for Table III.C-1 the word "independent" is being deleted. The more stringent requirement for independent analyses of samples from the tank being discharged is no longer needed because of a greatly reduced source term at Unit 1. Independent verification of release rate calculations and discharge valving is still required. 3. In Action B for Table III.C-1 the frequency of sample collection during service water radiation monitor inoperability is being decreased from once per 12 hours to daily. Because of a much lower source term a frequency of every 12 hours is not necessary. 4. In Action B for Table III.C-1 the lower limit of detection for gross radioactivity analysis is being changed from $3x10^{-7}$ uCi/gm to the effluent LLD of $5x10^{-7}$ uCi/gm. This changes the analysis requirement on service water to be consistent with analyses of other similar site releases. 5. In Table III.C-2 the source check frequency for the service water effluent lines is being relaxed, from monthly to quarterly. With the greatly reduced source term at Unit 1 a reduction in surveillance for this radiation monitor is justified. 6. In Table III.C-2 the instrument check frequency for the dilution water flow is being changed from "daily" to "prior to each batch release." Because batch releases at Unit 1 are occurring much less frequently, a check prior to any release would be as effective as a check daily. A change to Footnote (4) is part of this change.
III.C.2	Radioactive Gaseous Effluent Monitoring Instrumentation	III.C-6 III.C-7 III.C-8 III.C-9 III.C-10	1. Requirements for the hydrogen and SJAE offgas monitors are being deleted. These systems have been decommissioned. 2. All the requirements for MP1 Main Stack gaseous monitoring instrumentation are being deleted except for two. These same requirements with the two exceptions are still contained in Technical Specification 3/4.3.3.10 for both Units 2 and 3. Site I&C and Chemistry Departments are assuming responsibility by procedure for continuing work to comply with these requirements. The two exceptions are that an alarm on the sampler flow rate monitor and testing the noble gas monitor alarm when the instrument controls are not set in operate mode during the functional test for the noble gas monitor are not in the tech specs. These two requirements remain in the REMOCM because they are not covered by tech specs.

CHANGE WILL NOT BE MADE BECAUSE UNIT TS 5.6.4 REQUIRES THIS IN REMODCM.
Claude Flory (CAF) 6/14/00

6/14/ CAF

Attachment 3
REMM/ODCM Change Request - Routing and Cover Sheet

(Sheet 1h of 3)

Check one: ☑ REMM ☑ ODCM ☑ Unit 1 Effluent Controls

Change Request #: REMODCM-00-01 (cont'd)
Revision 19

I. Originator name (Print): Claude Flory

Sect	Section Title	Page	Description of change and reason
III.C.3	Explosive Gas Instrumentation	III.C-11	This section is being deleted because explosive gas monitoring is no longer needed in the Unit 1 offgas system.
III.C.4	Steam Jet Air Ejector Noble Gas Activity	III.C-12	This section is being deleted because the steam jet air ejector system has been decommissioned.
II.C.5	High Range Stack Noble Gas Monitor	III.C-13	Requirements are being moved out of the REMODCM and being placed in the Unit 1 DTRM. The requirements on the main stack high range radiation monitor should not be in the REMODCM because it is an accident, not an effluent monitor. These requirements were put in the wrong location when Unit 1 converted from operational Tech Specs to the Defueled Tech Specs (DTS). They should have been moved to the Unit 1 Defueled Technical Requirements Manual (DTRM). A License Basis Document Change (LBDC) has been initiated to transfer these requirements to the DTRM. *
III.D.1	Radioactive Liquid Effluents	III.D-1	Requirement in Controls for dissolved gases is being deleted. Unit 1, being permanently shutdown, no longer has dissolved radioactive gases in liquid effluents.
III.D.2	Radioactive Gaseous Effluents	III.D-5	1. Requirement to include radioiodines in dose calculation is being deleted. Unit 1, being permanently shutdown for over four years, no longer has the short half-life radioiodines. 2. Title in Sub-section c is being revised to a more general form.
III.F	Bases	III.F-1	1. Bases for Section III.C.2, "Radioactive Gaseous Effluent Monitoring Instrumentation," is revised to explain that the Site Stack is the only pathway currently requiring radiation monitoring for Unit 1 and that most of the operability and surveillance requirements for stack gaseous monitoring instrumentation are contained in Units 2 and 3 Technical Specifications. Requirements for a sampler flow rate alarm and noble gas monitor functional alarm testing when controls are not set in operate mode are unique Unit 1 requirements which need to be specified in the REMODCM. 2. Bases for Section III.C.5, "High Range Stack Noble Gas Monitor," are being deleted because all the requirements are being transferred from Section III of the REMODCM to the DTRM. 3. Bases for Section III.C.3, "Explosive Gas Monitoring<' and Section III.C.4, "Steam Jet Air Ejector Gas Activity," are being deleted. These systems have been decommissioned.

* This change will not be made for Revision 19. Requirements will be retained as in Revision 18 because Unit 1 PORC disapproved of moving the requirements to the DTRM.
CLAUDE FLORY
Claude Flory
5/12/2000

RADIOLOGICAL ENVIRONMENTAL REVIEW

RER-00-003

Revision 2

for

REMODCM Rev 19

June 15, 2000

Total Number of Pages: 7

Claude Flory Claude Flory 6/15/00
Preparer Date

William Eakin 7/18/00
Supervisor Date

1.0 DESCRIPTION OF CHANGE

REMODCM Revision 19 will be mostly a revision of the REMODCM for the purpose of removing requirements applicable to Unit 1 which are no longer needed because of Unit 1's defueled and permanent shutdown status. There are a few other needed changes, some technical in nature. In the following list of changes, changes which are not technical in nature are identified. Only technical changes are discussed in Section 2.0.

List of changes for REMODCM Revision 19:

1. The title "Annual Radioactive Effluent Report (ARER)" is being changed to "Radioactive Effluent Release Report (RERR)." This change is needed to make the REMODCM consistent with Unit 1 Tech Specs and the proposed Units 2 and 3 Tech Spec Change Requests TSCR 2-2-00 and 3-1-00. This is a non-technical change which is made in Sections I.A, I.B, I.C.1, I.D.1, I.F.2, II.A, II.B, II.C, II.D.1, II.D.2, II.D.3, II.D.5, and III.C.1.
2. In Table I.C-1, "Radioactive Liquid Waste Sampling and Analysis Program - Millstone Unit 1," the requirement to analyze for I-131 and Ce-141 in batch and continuous releases is being deleted.
3. In Tables I.D-1 and I.D-2, "Radioactive Gaseous Waste Sampling and Analysis Program - Millstone Unit 1 (and Unit 2)," the following changes are being made:
   - All requirements for sampling and analyses of airborne radioactivity from the Steam Jet Air Ejector Discharge are being deleted from Table I.D-1.
   - Responsibilities for sampling and analyses airborne radioactivity in discharges from the Main Stack is being transferred to Unit 2. The change is being accomplished by removal of the requirements from Table I.D-1 (pages I.D-2 and I.D-3) and adding "Site Stack" to Table I.D-2 (page I.D-4). All the requirements and footnotes for sampling and analyses of a continuous release in Table I.D-2 are identical to those in Table I.D-1 for the Main Stack. As part of this change, Footnotes C, F and G for Table I.D-2 (page I.D-6) are being revised; Footnote C and G to make them applicable to the Site Stack and Unit 2 Vent, and Footnote F to show which part of the footnotes are applicable to Unit 2 Vent only.
4. In Section I.D.2, "Gaseous Radioactive Waste Treatment," the "Radwaste Vent Exhaust" is being deleted as a Unit 1 Waste Stream and the "Radwaste ventilation HEPA filters" are being deleted as a Unit 1 Processing Equipment. This leaves no identified processing equipment for airborne discharges at Unit 1, which effectively removes any requirement for Unit 1 to do airborne dose projections (see #14 below).
5. In Section I.D.3, "Basis for Gaseous Sampling, Analysis, and Radioactive Treatment System Use," in the second sentence, "Radiological Effluent Control III.D.2.1" is being changed to "Radiological Effluent Control III.D.2.a" to correct a typo. This is a non-technical change.
6. In Section I.F.2, "Radioactive Effluent Release Report," the requirement for submittal of the RERR is being changed from a due date of "by May 1 of each year" to "prior to May 1 of each year." This change is needed to make the REMODCM consistent with Unit 1 Tech Specs and the proposed Units 2 and 3 Tech Spec Change Requests TSCR 2-2-00 and 3-1-00. This is a non-technical change.

7. The flexibility of using a computer code equivalent to LADTAP for calculation of liquid effluent doses is being added. The alternate code will have to be compatible with the methodology given in Regulatory Guide 1.109 which is NRC's expectation for calculation of effluent doses. This change is being made in Sections II.C and II.E.12a.
8. In Section II.C.5, "Liquid Dose Calculations - Monthly Dose Projections," a portion of Note 1 is being deleted because the wording is no longer applicable to Unit 1 which is permanently shutdown. The wording uses the example of plant shutdown for refueling to illustrate when a prior month operations may not be typical of the current month operation. This example is no longer applicable. This is a non-technical change.
9. "Stack" is being redesignated as "Site Stack" because this release point is common for all three Millstone Units. This is a non-technical change which is being made in Sections II.D.1, II.D.2, II.D.3, II.D.4, II.F.3, II.F.4, II.F.5, II.F.6, and II.F.7.
10. The flexibility of using a computer code equivalent to GASPAR for calculation of gaseous effluent doses is being added. The alternate code will have to be compatible with the methodology given in Regulatory Guide 1.109 which is NRC's expectation for calculation of effluent doses. This change is being made in Sections II.D.1, II.D.2, II.D.3, II.D.5, and II.D.
11. In Section II.D.1, "Gaseous Dose Calculations - Site Release Rate Limits," the Words "Applicable to Units 1,2, and 3" in title for sub-sections a, b, and c are being deleted. Because the release limits are site limits, the words are not needed. This is a non-technical change.
12. In Sections II.D.2 and II.D.3, "Gaseous Dose Calculations - 10CFR50 Appendix I - Noble Gas Limits and Iodine and Particulate Doses," the following changes are being made:
    - In notes at the bottom of Pages II.D-3 and II.D-5, wording is being revised to clarify that all three Millstone Units contribute releases to the site stack. This is a non-technical change.
    - In notes on Pages II.D-3, II.D-5, and II.D-8 the criteria for a special assessment is being changed from 20% to 10% of the dose limit. This change is being to avoid assigning excessive dose to Unit 1 which is permanently shutdown. Unit 1 will be assigned dose from Units 2 and 3 releases from the Site Stack as long as the doses stay below 10% of the limit.
    - Words are being added to distinguish doses calculated for releases from the site stack from doses for releases from Units 2 and 3. This is for clarification purposes. This is a non-technical change.
13. In Section II.D.4, "Gaseous Dose Calculations - Gaseous Effluent Monthly Dose Projections," dose projection for Unit 1 is being deleted. (See #4 above.)
14. In Section II.D.6, "Compliance with 40CFR190," radiation from the Unit 1 turbine building is being deleted as a contributor to site dose.
15. In Section II.E.11a, "Liquid Monitor Setpoints - Unit 3 Steam Generator Blowdown," the reference basis for steam generator blowdown flow rate is being changed from "per 3-Part Memo from MP3 Reactor Engineering" to "ERC 25212-ER-99-0133" because the current reference cannot be documented. This is a non-technical change.

16. Section II.F.1, "Gaseous Monitor Setpoints - Unit 1 Hydrogen Monitor" and Section II.F.2, "Gaseous Monitor Setpoints - Unit 1 Steam Jet Air Ejector Offgas Monitor" are being deleted. They are not needed because of Unit 1's permanent shutdown status.
17. In Section II.F.3, "Gaseous Monitor Setpoints - Unit 1 Stack Noble Gas Monitor," reference to "Radiological Effluent Control III.D.2.1 is being changed to "Units 2 and 3 Technical Specification 3.3.3.10." Requirements for the site stack radiation monitor is being removed from Unit 1 radiological control requirements. The requirements in Units 2 and 3 technical specifications have always been there; the REMODCM just never referred to them. This is a non-technical change.
18. In Section II.F.5, "Gaseous Monitor Setpoints - Unit 2 Vent Noble Gas Monitor, " requirement to assess Unit 1 steam jet air ejector setpoint when decreasing the stack setpoint is being deleted because the air ejector has been decommissioned.
19. In Appendix A after Section II, the designation of the appendix is being changed from "A" to "II.A" to clarify that the appendix belongs to Section II of the REMODCM. This is a non-technical change.
20. In Table III.C-1, "Radioactive Liquid Effluent Monitoring Instrumentation," (for Unit 1) the following changes are being made:
    - In Action A, the word "independent" is being deleted.
    - In Action B, the frequency of sample collection during service water monitor inoperability is being decreased from once per 12 hours to daily.
    - In Action B, the lower limit of detection for gross radioactivity analysis is being changed from $3x10^{-7}$ uCi/gm to the effluent LLD of $5x10^{-7}$ uCi/gm.
21. In Table III.C-2, "Radioactive Liquid Effluent Monitoring Instrumentation Surveillance Requirements," (for Unit 1) the following changes are being made:
    - The source check frequency for the service water effluent lines is being relaxed from monthly to quartery.
    - The instrument check frequency for the dilution water flow is being changed from "daily" to "prior to each batch release." A change to Footnote (4) is part of this change.
22. Requirements for the hydrogen and SJAE offgas monitors in Section III.C.2 are being deleted. These systems have been decommissioned.
23. Section III.C.3, "Explosive Gas Monitoring" and Section III.C.4, "Steam Jet Air Ejector (SJAE) Noble Gas Activity" (Unit 1), are being deleted because explosive gas monitoring is no longer needed in the Unit 1 offgas system and the SJAE system has been decommissioned. This change will include deletion of basis for the requirements of these sections in Section III.F.
24. In Section III.D.1, "Radioactive Liquid Effluents" (Unit 1), the requirement in Controls for dissolved gases is being deleted.
25. In Section III.D.2, "Radioactive Gaseous Effluents" (Unit 1), the following changes are being made:
    - The requirement to include radioiodines in dose calculation is being deleted.
    - Title in Sub-section c is being revised to a more general form. This is a non-technical change.

2.0 DISCUSSION

Millstone Unit 1 has been shutdown for over four years and is in the process is being decommissioned. The reactor is permanently defueled and many major systems are inactive. These include some systems for radioactive effluent control and monitoring such as the Steam Jet Air Ejector (SJAE) System and the Condenser Offgas Treatment System which includes the Hydrogen Monitor. Deactivation of these two systems is the basis for following changes identified in Section 1.0:

- #3, first bullet - No need to sample and analyze airborne discharge from the SJAE discharge.
- #16 - Setpoints for the Hydrogen and SJAE Offgas monitors are no longer needed.
- #18 - Reference to the SJAE monitor setpoint is no longer needed.
- #22 - Hydrogen and SJAE monitors operational and surveillance requirements are no longer needed.
- #23 - Limitations on hydrogen concentrations and noble gas radioactivity in the SJAE are no longer needed.

Because of the reactor has been shutdown for over four years the source term for radioactivity in effluents is greatly diminished because of radioactive decay. This includes the decay of all radioactive noble gases and radioiodines except Kr-85 and I-129 in the spent fuel. The abundance of these two radionuclides is relatively low and their presence in effluents may not be seen. The only significant emission expected from the spent fuel pool is tritium which has a relatively low dose impact. Expected radioactive sources of significance from other parts of the plant are longer lived radionuclides such as Cs-137, Co-60, and Sr-90 which are residual within systems, components, and piping. As plant decommissioning progresses, the longer half-life residual radioactivity will be released to the environment in liquid discharges and airborne effluents. But these releases, relative to effluent releases during plant operations, will be greatly reduced. Therefore some of the requirements in the REMODCM can be deleted or reduced in scope to be commensurate with the risk. The following changes, as identified in Section 1.0, are allowed because of the reduced source:

- #2 (first bullet) - The radionuclides I-131 and Ce-141 have short enough half lives that they are no longer a concern.
- #4 and #13 - Radioactivity in airborne discharges have been minimal since Unit 1 was permanently shutdown. Given the present typical airborne releases, the dose criteria at which processing equipment would be required to be operable will probably not be exceeded. For this reason the Offgas Treatment System was removed from Section I.D.2 of the REMODCM in an earlier revision leaving the radwaste processing ventilation HEPA filter as the only radioactive gas treatment equipment. For the radwaste vent exhaust effluent pathway, only the organ dose criteria of 0.03 mrem is applicable. (This pathway never emits radioactive noble gas to which the 0.02 mrad gamma radiation and 0.04 mrad beta radiation are applicable.) A monthly release from the radwaste vent of 7E-4 Curies would be needed to trigger the 0.03 mrem organ dose criteria. The highest total annual curies released in the last three years has been 5.6E-4 Curies with the total decreasing each year. Therefore the Radwaste Vent Exhaust does not need to be listed as an effluent pathway and the Radwaste Ventilation HEPA Filters do not need to be listed as processing equipment which is required to be operable when projected dose reaches a specified level. Dose due to airborne releases from

Unit 1 will remain As Low As Reasonable Achievable (ALARA), as defined in Appendix I of 10CFR50, without any requirements for gaseous processing equipment in Section I.D.2 of the REMODCM. At this time there is no need for other gaseous waste treatment requirements for Unit 1 decommissioning activities. Before decommissioning work begins at Unit 1 which could generate measureable airborne radioactivity in effluents, appropriate requirements will be added to the REMODCM.

- #12 (second bullet) - The criteria for a special assessment is being changed from 20% to 10% of the dose limit. This change is being to avoid assigning excessive dose to Unit 1 which is permanently shutdown. Unit 1 will be assigned dose from Units 2 and 3 releases from the Site Stack as long as the doses stay below 10% of the limit.
- #14 - Because of Unit 1 permanent shutdown status there will no longer be any direct radiation from the turbine building. Accounting of direct and scattered radiation from the turbine and calculation of dose to the critical fisherman along with supporting footnotes is no longer needed to show compliance with 40CFR190.
- #20 (first bullet) - The more stringent requirement for independent analyses of samples from the tank being discharged is no longer needed because of a greatly reduced source term at Unit 1. Independent verification of release rate calculations and discharge valving is still required.
- #20 (second bullet) - If the service water radiation monitor becomes inoperable, the level of normally required surveillance for radioactivity in service water is reduced from continuous monitoring with the monitor to the weekly sample analysis required by Table I.C-1. However, leakage of radioactivity into the service water system is much less of a health threat because the magnitude of the source of radioactivity, the spent fuel pool with four year old fuel, is greatly reduced from the operational mode. The present requirement was based on an operational mode. Therefore a reduction in the requirement to sampe every 12 hours when the monitor is inoperable to daily sampling is justified.
- #21 (first bullet) - With the greatly reduced source term at Unit 1 a reduction in surveillance for the service water radiation monitor is justified.
- #21 (second bullet) - Because batch releases at Unit 1 are occurring much less frequently, a check prior to any release would be as effective as a check daily.
- #24 - With Unit 1 being permanently shutdown, there is no longer any dissolved radioactive gases in liquid effluents.
- #25 (first bullet) - With Unit 1 being permanently shutdown for over four years, there is no longer any short half-life radioiodines.

Part of the decommissioning strategy for Unit 1 includes separation from the other two operating units including separation of the main stack from Unit 1 with continued use of the stack by Units 2 and 3. This necessitated the following change to REMODCM requirements:

- #3 (second bullet) - This change is in preparation for separation of Unit 1 from the rest of the Millstone site. Unit 2 Chemistry will assume responsibility for sampling and analysis of airborne effluents from the stack. This change will retain the same level of monitoring for discharges from the site stack. At this time there is no need for other monitoring requirements for Unit 1 decommissioning activities. Before decommissioning work begins at Unit 1 which could generate measureable

airborne radioactivity in effluents, appropriate requirements will be added to the REMODCM.

There are a few changes unrelated to shutdown and decommissioning of Unit 1. These include the following changes as identified in Section 1.0 above:

- #7 and #10 - The codes LADTAP and GASPAR have been used to calculate doses to the public from radioactivity released in liquid and gaseous effluents. These codes are NRC codes which implement the NRC guidance in Regulatory Guide 1.109, "Calculation of Annual Doses to Man from Routine Releases of Reactor Effluents for the Purpose of Evaluating Compliance with 10CFR50, Appendix I." Other codes and methodologies have been developed in recent years (or are being developed) which also implement the NRC guidance. Changes are being made to the REMODCM to allow the use of these alternate, but equivalent, codes and methodologies.
- #20 (third bullet) - Changing the analysis requirement for lower limit of detection of gross radioactivity in service water makes the requirement consistent with analyses of other similar site releases.

3.0 CONCLUSION

The changes in Revision 19 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, 10CFR50 GDCs 60 and 64, 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, 2000, the following effluent monitors were inoperable for more than 30 consecutive days:

4.1 Unit 1 - None

4.2 Unit 2 - None

4.3 Unit 3 -

4.3.1 Steam generator blowdown monitor (SSR-08)

The Unit 3 steam generator blowdown monitor (SSR-08) was declared inoperable from 7-20-00 to 9-22-00 for a total of 64 days due to sample line isolation valve failures. The four containment isolation trip valves from the steam generators are solenoid operated. One or more of these valves changed position unexpectedly or did not change position when required during surveillance testing. The valves were dis-assembled, cleaned, repaired, re-assembled, and re-tested sat. Operability was not restored within 30 days because not all the valves failed at the same time and because of the lengthy process of removing the valves from service for repair. The root cause of the valve failures remains under investigation. During the inoperable period, grab samples were collected and analyzed for gross radioactivity at least once every 24 hours when the pathway was in service.

4.3.2 Steam generator blowdown effluent line flow rate measurement device for the D steam generator

The steam generator blowdown effluent line flow rate measurement device for the D steam generator was declared inoperable from 10-09-00 to 11-08-00 for a total of 30 days due to the failure of the transmitter BDG-FT47D. A design change was processed to replace two obsolete transmitters (BDG-FT46D and BDG-FT47D) which provide steam generator blowdown effluent line flow rate measurement for the D steam generator with a single, functionally equivalent transmitter (BDG-FT46D). Operability was not restored within 30 days because of the time required to prepare the design change. During the inoperable period, blowdown flow rate from the D steam generator was estimated at least once every four hours during actual releases.

5.0 Errata

An error was found in Tables 1-2 and 1-3 of the 1997 Radioactive Effluent Release Report. The Millstone Unit 2 liquid effluent maximum organ dose for the second quarter of 1997 was incorrectly reported as 4.83 E-02 mrem rather than 4.80 E-03 mrem. The correction to this entry on Table 1-2 and the subsequent correction to the total maximum individual dose summary for unit 2 and the station on Table 1-3 are highlighted in borders and boldfaced in the following pages.

Table 1-2

1997 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	5.78E-02 (c)	8.92E-02 (c)	1.00E-01 (c)	6.35E-02 (c)
Thyroid	9.27E-05 (a)	9.86E-05 (a)	8.21E-05 (a)	5.44E-05 (a)
Max Organ	1.15E-01 (a) (li)	1.78E-01 (a) (li)	2.00E-01 (a) (li)	1.27E-01 (a) (li)
Population	(person-rem)	(person-rem)	(person-rem)	(person-rem)
Whole Body	5.84E-02	8.76E-02	9.88E-02	6.57E-02
Thyroid	8.97E-04	9.24E-04	7.76E-04	5.18E-04
Max Organ	1.20E-01 (li)	1.83E-01 (li)	2.11E-01 (li)	1.46E-01 (li)
Avg Individual	(mrem)	(mrem)	(mrem)	(mrem)
Whole Body	2.00E-05	3.00E-05	3.38E-05	2.25E-05
Thyroid	3.07E-07	3.16E-07	2.66E-07	1.77E-07
Max Organ	4.11E-05 (li)	6.27E-05 (li)	7.23E-05 (li)	5.00E-05 (li)

Unit 2	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter
Max Individual	(mrem)	(mrem)	(mrem)	(mrem)
Whole Body	2.38E-03 (a)	3.88E-04 (c)	3.24E-04 (t)	3.83E-04 (t)
Thyroid	1.00E-03 (a)	1.31E-04 (a)	1.30E-04 (a)	1.57E-04 (a)
Max Organ	2.25E-02 (a) (gi)	**4.80E-03** (a) (gi)	2.96E-03 (a) (gi)	5.18E-03 (a) (gi)
Population	(person-rem)	(person-rem)	(person-rem)	(person-rem)
Whole Body	5.02E-02	8.46E-03	6.36E-03	7.27E-03
Thyroid	1.04E-02	1.33E-03	1.23E-03	1.50E-03
Max Organ	3.58E-01 (gi)	6.70E-02 (gi)	4.29E-02 (gi)	7.08E-02 (gi)
Avg Individual	(mrem)	(mrem)	(mrem)	(mrem)
Whole Body	1.72E-05	2.90E-06	2.18E-06	2.49E-06
Thyroid	3.56E-06	4.55E-07	4.21E-07	5.14E-07
Max Organ	1.23E-04 (gi)	2.29E-05 (gi)	1.47E-05 (gi)	2.42E-05 (gi)

Unit 3	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter
Max Individual	(mrem)	(mrem)	(mrem)	(mrem)
Whole Body	9.47E-04 (a)	1.30E-03 (c)	4.85E-03 (c)	4.66E-03 (a)
Thyroid	5.32E-04 (a)	4.79E-04 (a)	1.14E-03 (a)	2.67E-03 (a)
Max Organ	2.52E-03 (a) (gi)	6.55E-03 (a) (gi)	3.69E-02 (a) (gi)	1.55E-02 (a) (gi)
Population	(person-rem)	(person-rem)	(person-rem)	(person-rem)
Whole Body	2.77E-02	3.57E-02	1.12E-01	8.66E-02
Thyroid	1.41E-02	1.28E-02	1.22E-02	2.76E-02
Max Organ	7.01E-02 (gi)	1.24E-01 (gi)	5.68E-01 (gi)	3.09E-01 (gi)
Avg Individual	(mrem)	(mrem)	(mrem)	(mrem)
Whole Body	9.49E-06	1.22E-05	3.84E-05	2.97E-05
Thyroid	4.83E-06	4.38E-06	4.18E-06	9.45E-06
Max Organ	2.40E-05 (gi)	4.25E-05 (gi)	1.95E-04 (gi)	1.06E-04 (gi)

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

Table 1-3

1997 Off-Site Dose Summary
Millstone Units 1, 2, 3

Population Dose Committments (person-rem)

	Airborne			Liquid		
	Whole Body	Thyroid	Skin	Whole Body	Thyroid	Max Organ
Unit 1	0.0030	0.0029	0.0034	0.3105	0.0031	0.6600
Unit 2	0.0081	0.0081	0.0081	0.0723	0.0145	0.5387
Unit 3	0.0002	0.0002	0.0002	0.2620	0.0667	1.0711
Station	0.0113	0.0111	0.0117	0.6448	0.0843	2.2698

Max Individual Doses vs Limits

	Whole Body		Thyroid		Max Organ	Skin	Air	
	Airborne	Liquid	Airborne	Liquid	Liquid	Airborne	Beta	Gamma
	(mrem)		(mrem)		(mrem)	(mrem)	(mrad)	
*Unit Limit **	*5*	*3*	*15*	*10*	*10*	*15*	*20*	*10*
Unit 1 Actual	0.0007	0.3105	0.0000	0.0003	0.6200	0.0008	0.0000	0.0000
Unit 2 Actual	0.0000	0.0035	0.0040	0.0014	**0.0354**	0.0000	0.0000	0.0000
Unit 3 Actual	0.0004	0.0118	0.0000	0.0048	0.0615	0.0004	0.0000	0.0000
*Station Limit ***	*25*		*75*		*25*			
Station Actual	0.3268		0.0106		**0.7169**			

Connecticut Resident
Average Whole Body Doses (mrem)

Cosmic	27
Cosmogenic	1
Terrestial (Atlantic and Gulf Coastal Plain)	16
Inhaled	200
In the Body	40
Average CT Resident Whole Body Dose from Background ***	284

Average CT Resident (within 50 miles) Whole Body Dose from Millstone Station Radioactive Effluents	0.0002

* 10CFR50 Appendix I

** 40CFR190

*** NCRP94