Docket Nos. 50-245
50-336
50-423
B18071

Attachment 1

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

Annual Radioactive Effluent Report - 1999

April 2000

Annual Radioactive Effluent Report 1999

Northeast Nuclear Energy Company
Millstone Nuclear Power Station

Unit	License	Docket
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Introduction

This report, for the period of January through December of 1999, 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 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 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 57.9%. Unit 2 was restarted on May 11, 1999 following an extended shutdown since February 20, 1996. The unit was tripped offline from May 25, 1999 through May 30, 1999 due to a steam leak in the 1A feedwater heater shell relief valve flange. Also, the unit was manually shutdown from September 17, 1999 through September 24, 1999 as required by Technical Specifications due to control rod problems.

The annual capacity factor for Unit 3 was 81.7%. Unit 3 was shutdown for a refueling outage (RF06) from May 1, 1999 and restarted on June 29, 1999.

1.0 Doses

This report provides a summary of the 1999 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 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

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 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. 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. 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. 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 considered elevated releases; and, Pasquill stability classes are determined based upon the temperature gradient between the 33 ft and 447 ft meteorological tower levels, however, the doses were calculated using mixed mode meteorology. In addition to using the GASPAR code, EPA AIREM code (Reference 2) may be used for elevated airborne releases of noble gases to determine if the dose to the maximum individual occurs before the airborne plume 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 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) and mixed mode batch releases (Containment Purge) through the Unit 3 Vent and ("initial" Containment Drawdown) through the roof of the Auxiliary Building. 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 LADTAP II code, (Reference 6), which uses the dose models and parameters cited in NRC Regulatory Guide 1.109 and site specific inputs.

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, 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 dose, if different than thyroid, 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. 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 whole body dose only includes the external pathways (i.e. plume and ground exposure) while the maximum individual organ dose only includes the internal pathways (inhalation and ingestion). Population doses include all applicable pathways.

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 LADTAP II code performs calculations for the following pathways: fish, shellfish, algae, drinking water, irrigated food, shoreline activity, swimming, and boating. At Millstone, the algae, drinking water, and irrigated food pathways do not exist; and, thus, only the other pathways are included in the totals. Doses are calculated for the whole body, skin, thyroid, 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 from natural background radiation.

Refer to Table 1-3 for the summary of annual doses for the 50 mile population, the maximum, and average individual due to airborne and liquid effluents. Table 1-4 provides a quantitative comparison between the doses from the Millstone Station and those doses from other sources such as naturally occurring background radiation.

For compliance with 40CFR190, (Reference 8), 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 was from the Unit 1 turbine shine and station radwaste storage. All radwaste storage during this year was within storage criteria that ensures the public dose to be less than 1 mrem/yr from each storage area. During Unit 1 operation, the Unit 1 turbine shine dose was at most 3.4 mrem/yr to the maximum individual, who is assumed to be a lobsterman that frequents the water immediately outside the Unit 1 turbine building. Since Unit 1 has been shutdown since November 1995 with a cessation of operation declared in July 1998, the turbine shine dose has been eliminated. Table 1-4 indicates the total dose to a member of the public due to the Millstone station and all sources of the fuel cycle is well within the 40CFR190 limits.

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-00-0004, Solid Waste Data for the 1999 Millstone Annual Radioactive Effluent Report , Rev 0, April 10, 2000.

10. Letter to USNRC No. B17271, Millstone Nuclear Power Station, Units 1, 2, 3 Change to the 1997 Annual Effluent Report, , May 29, 1998.

Table 1-1

1999 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+	7.35E-05	6.27E-05	4.35E-05	7.43E-05
Skin+	8.64E-05	7.37E-05	5.11E-05	8.72E-05
Thyroid	(See Note)	(See Note)	(See Note)	(See Note)
Max Organ++	4.63E-07	2.40E-05	7.29E-05	8.32E-05
Population	(person-rem)	(person-rem)	(person-rem)	(person-rem)
Whole Body	3.96E-04	3.40E-04	4.04E-04	7.24E-04
Skin	4.64E-04	3.54E-04	4.28E-04	7.87E-04
Thyroid	3.95E-04	3.01E-04	3.65E-04	6.70E-04
Max Organ++	4.20E-04	4.03E-04	4.79E-04	8.23E-04
Avg Individual	(mrem)	(mrem)	(mrem)	(mrem)
Whole Body	1.32E-07	1.13E-07	1.35E-07	2.41E-07
Skin	1.55E-07	1.18E-07	1.43E-07	2.62E-07
Thyroid	1.32E-07	1.00E-07	1.22E-07	2.23E-07
Max Organ++	1.40E-07	1.34E-07	1.60E-07	2.74E-07

Unit 2	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter
Max Air	(mrad)	(mrad)	(mrad)	(mrad)
Beta	1.90E-05	5.49E-05	6.46E-04	1.28E-04
Gamma	1.68E-07	9.77E-05	3.71E-04	1.35E-04
Max Individual	(mrem)	(mrem)	(mrem)	(mrem)
Whole Body+	6.68E-05	1.07E-04	2.35E-04	9.28E-05
Skin+	9.17E-05	1.66E-04	7.25E-04	1.84E-04
Thyroid	7.30E-06	5.94E-04	5.19E-03	4.17E-03
Max Organ++	8.61E-06	5.94E-04	5.19E-03	4.17E-03
Population	(person-rem)	(person-rem)	(person-rem)	(person-rem)
Whole Body	3.76E-05	1.55E-04	1.82E-03	1.81E-04
Skin	6.97E-05	2.47E-04	3.08E-03	2.90E-04
Thyroid	3.76E-05	1.18E-03	1.09E-02	7.97E-03
Max Organ++	3.95E-05	1.18E-03	1.09E-02	7.97E-03
Avg Individual	(mrem)	(mrem)	(mrem)	(mrem)
Whole Body	1.25E-08	5.17E-08	6.07E-07	6.03E-08
Skin	2.32E-08	8.23E-08	1.03E-06	9.67E-08
Thyroid	1.25E-08	3.93E-07	3.63E-06	2.66E-06
Max Organ++	1.32E-08	3.93E-07	3.63E-06	2.66E-06

Unit 3	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter
Max Air	(mrad)	(mrad)	(mrad)	(mrad)
Beta	1.48E-03	1.69E-03	0	0
Gamma	2.85E-04	5.70E-04	0	0
Max Individual	(mrem)	(mrem)	(mrem)	(mrem)
Whole Body+	1.41E-04	9.22E-04	7.69E-06	8.45E-13
Skin+	8.96E-04	1.63E-03	8.99E-06	9.81E-13
Thyroid	7.58E-05	2.32E-02	1.06E-03	2.93E-03
Max Organ++	7.58E-05	2.32E-02	1.07E-03	2.93E-03
Population	(person-rem)	(person-rem)	(person-rem)	(person-rem)
Whole Body	2.03E-04	1.22E-03	9.75E-04	1.16E-02
Skin	1.67E-03	3.35E-03	9.75E-04	1.16E-02
Thyroid	2.97E-04	4.18E-02	9.75E-04	1.16E-02
Max Organ++	2.99E-04	4.18E-02	9.77E-04	1.16E-02
Avg Individual	(mrem)	(mrem)	(mrem)	(mrem)
Whole Body	6.77E-08	4.07E-07	3.25E-07	3.87E-06
Skin	5.57E-07	1.12E-06	3.25E-07	3.87E-06
Thyroid	9.90E-08	1.39E-05	3.25E-07	3.87E-06
Max Organ++	9.97E-08	1.39E-05	3.26E-07	3.87E-06

* External doses only

** Maximum of the following organs: Bone, GI-LLI, Kidney, Liver, Lung, Thyroid

Note: Max Individual dose is zero while Population dose is not zero because Max Individual dose includes only external doses.

Table 1-2

1999 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	3.90E-04	8.22E-05	5.46E-05	7.60E-05
Thyroid	4.39E-06	2.08E-06	6.75E-06	3.57E-06
Max Organ	7.78E-04	1.85E-04	1.03E-04	1.64E-04
Population	(person-rem)	(person-rem)	(person-rem)	(person-rem)
Whole Body	6.20E-04	5.64E-04	4.16E-04	4.82E-04
Thyroid	4.26E-05	2.01E-05	6.35E-05	3.47E-05
Max Organ	1.19E-03	2.48E-03	6.21E-04	1.73E-03
Avg Individual	(mrem)	(mrem)	(mrem)	(mrem)
Whole Body	2.07E-07	1.88E-07	1.39E-07	1.61E-07
Thyroid	1.42E-08	6.70E-09	2.12E-08	1.16E-08
Max Organ	3.97E-07	8.27E-07	2.07E-07	5.77E-07

Unit 2	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter
Max Individual	(mrem)	(mrem)	(mrem)	(mrem)
Whole Body	5.48E-04	1.12E-03	7.89E-05	3.63E-05
Thyroid	3.05E-04	3.71E-04	4.80E-05	2.86E-05
Max Organ	2.84E-03	4.31E-03	3.41E-04	1.05E-04
Population	(person-rem)	(person-rem)	(person-rem)	(person-rem)
Whole Body	8.69E-03	2.27E-02	1.96E-03	1.22E-03
Thyroid	2.91E-03	3.63E-03	1.16E-03	1.03E-03
Max Organ	4.52E-02	9.02E-02	8.89E-03	2.84E-03
Avg Individual	(mrem)	(mrem)	(mrem)	(mrem)
Whole Body	2.90E-06	7.57E-06	6.53E-07	4.07E-07
Thyroid	9.70E-07	1.21E-06	3.87E-07	3.43E-07
Max Organ	1.51E-05	3.01E-05	2.96E-06	9.47E-07

Unit 3	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter
Max Individual	(mrem)	(mrem)	(mrem)	(mrem)
Whole Body	3.29E-04	4.84E-04	1.93E-04	1.83E-04
Thyroid	1.10E-04	2.68E-04	7.37E-05	5.97E-05
Max Organ	1.49E-03	1.84E-03	4.29E-03	1.80E-03
Population	(person-rem)	(person-rem)	(person-rem)	(person-rem)
Whole Body	9.91E-03	1.11E-02	4.85E-03	4.34E-03
Thyroid	4.41E-03	5.19E-03	1.51E-03	1.10E-03
Max Organ	3.15E-02	4.64E-02	1.86E-01	5.10E-02
Avg Individual	(mrem)	(mrem)	(mrem)	(mrem)
Whole Body	3.30E-06	3.70E-06	1.62E-06	1.45E-06
Thyroid	1.47E-06	1.73E-06	5.03E-07	3.67E-07
Max Organ	1.05E-05	1.55E-05	6.20E-05	1.70E-05

Table 1-3

1999 Off-Site Dose Summary from Effluents
Millstone Units 1, 2, 3

Airborne Effluents

Population Dose Commitments *(person-rem)*

	Whole Body	Thyroid	Max Organ	Skin
Unit 1	1.86E-03	1.73E-03	2.13E-03	2.03E-03
Unit 2	2.19E-03	2.01E-02	2.01E-02	3.69E-03
Unit 3	1.40E-02	5.47E-02	5.47E-02	1.76E-02
Station Total	1.81E-02	7.65E-02	7.69E-02	2.33E-02

Max Individual Dose/Dose Commitments vs
Annual Radiological Effluent Technical Specifications

	Whole Body *(mrem)*	Thyroid *(mrem)*	Max Organ *(mrem)*	Skin *(mrem)*	Beta Air Dose *(mrad)*	Gamma Air Dose *(mrad)*
Unit RETS	*5 **	*15*	*15*	*15 **	*20*	*10*
Unit 1	2.54E-04	0.00E+00	1.81E-04	2.98E-04	0.00E+00	0.00E+00
Unit 2	5.02E-04	9.96E-03	9.96E-03	1.17E-03	8.48E-04	6.04E-04
Unit 3	1.07E-03	2.73E-02	2.73E-02	2.53E-03	3.17E-03	8.55E-04
Station Total	1.83E-03	3.72E-02	3.74E-02	4.00E-03	4.02E-03	1.46E-03

* 10CFR50, Appendix I limits

Liquid Effluents

Population Dose Commitments *(person-rem)*

	Whole Body	Thyroid	Max Organ
Unit 1	2.08E-03	1.61E-04	6.02E-03
Unit 2	3.46E-02	8.73E-03	1.47E-01
Unit 3	3.02E-02	1.22E-02	3.15E-01
Station Total	6.69E-02	2.11E-02	4.68E-01

Max Individual Dose/Dose Commitments vs
Annual Radiological Effluent Technical Specifications

	Whole Body *(mrem)*	Thyroid *(mrem)*	Max Organ *(mrem)*
Unit RETS	*3*	*10*	*10*
Unit 1	6.03E-04	1.68E-05	1.23E-03
Unit 2	1.78E-03	7.53E-04	7.60E-03
Unit 3	1.19E-03	5.11E-04	9.42E-03
Station Total	3.58E-03	1.28E-03	1.82E-02

Table 1-4

1999 Off-Site Dose Comparison
Millstone Station

Max Individual Dose/Dose Commitments vs 40CFR190 Limits

	Whole Body *(mrem)*	Max Organ *(mrem)*
40CFR190 Limit	25	75
Airborne Effluents	0.0018	0.0374
Liquid Effluents	0.0036	0.0182
Radwaste Storage	< 4	< 4
Station Total	< 4.005	< 4.056

Whole Body Dose from Millstone Station vs. Background Radiation

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

CT Resident (within 50 miles) Whole Body Dose from Millstone Station Airborne and Liquid Effluents	**0.0000283 mrem**
Maximum Individual (within 50 miles) Whole Body Dose from Millstone Station Airborne and Liquid Effluents	**0.005 mrem**
Maximum Individual (within 50 miles) Whole Body Dose from Millstone Station and all sources of the fuel cycle	**< 4.005 mrem**

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 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.

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.

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.

2.1.1.3 Unit 2 Containment Purges

Grab samples are taken and are analyzed on a HPGe gamma spectrometer and liquid scintillation detector for tritium. Computed concentrations are then multiplied by the purge volume for the total activity released.

Tritium collection is accomplished by the gas washing bottle method. The sample is counted on a liquid scintillation detector. Concentration is multiplied by volume purged to give the total activity released.

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, containment purge, and gaseous waste process vent. The Unit 3 Engineered Safety Features (ESF) building vent collects gas streams from the ESF building ventilation system. This vent is located on the south wall and discharges 23 feet above grade. 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 drawn down and purged intermittently. 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 filtered and normally released through the Unit 3 vent but may use the Unit 1 stack. Purges and drawdowns are intermittent and are therefore considered batch releases. Calculated volume discharged is multiplied by isotopic concentrations from the analysis of grab samples to obtain 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%	Maximum error for counting statistics
Flow & Level Measurements	10%	Maximum 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	6	10	54	70
Total Time (min)	22137	3706	7159	33002
Maximum Time (min)	9097	688	239	9097
Average Time (min)	3689	371	133	471
Minimum Time (min)	552	15	50	15

Unit 3	Ctmt Purge	Ctmt Drawdown	Summary
Number of Batches	2	1	3
Total Time (min)	316	22	338
Maximum Time (min)	316	22	316
Average Time (min)	316	22	113
Minimum Time (min)	316	22	22

2.1.4 Abnormal Airborne 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 1999, the following abnormal airborne releases occurred:

2.2.4.1 Unit 1

An abnormal release occurred from the Unit 1 Solid Radwaste Truck Bay area on June 17, 1999 from 1030 to 1430 attributed to a ladder decontamination process. Portable air samplers were continuously monitoring the work area and a separate air sampler monitored the effluent of the decontamination

encapsulation. Air sample results indicated a 4 hour release period (1030 - 1430) consisting of Co-60 and Cs-137. The assumption is that the exhaust fan was running at rated capacity of 3.53E+03 cfm for 4 hours.

The following radioactivity was released from 1030 to 1430 on June 17, 1999:

Co-60	3.19 E-07 Curies
Cs-137	5.98 E-08 Curies
Total	3.79 E-07 Curies

The dose consequence for this abnormal release was calculated to be:

Whole Body	3.98 E-05 mrem
Max Organ	1.62 E-06 mrem
Skin	4.68 E-05 mrem

2.2.4.2 Unit 2 - None

2.2.4.3 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

Unit 3 High Level Waste Test Tanks (2)
Low Level Waste Tanks (2)

Prior to release, a tank is recirculated for two equivalent tank volumes, a sample is drawn and analyzed on the 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. Total volume of blowdown is multiplied by the isotopic concentrations 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.

Tritium is determined through liquid scintillation counting; and, strontiums are analyzed by radiochemical separations and appropriate counting techniques.

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%	Maximum error for counting statistics
Flow & Level Measurements	10%	Maximum error for release volumes

2.2.3 Batch Releases - Liquid Effluents

	Unit 1	Unit 2	Unit 3
Number of Batches	67	55	395
Total Time (min)	4751	5404	48254
Maximum Time (min)	168	294	843
Average Time (min)	71	98	122
Minimum Time (min)	34	1	1
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 1999, the following abnormal liquid releases occurred:

2.2.4.1 Unit 1 - None

2.2.4.2 Unit 2 - None

2.2.4.3 Unit 3 -

1. **"A" Waste Test Tank** leaked into the berm and heavy rain caused the berm to overflow. Approximately 1050 gallons leaked into Storm Drain 006. Tank level decreased from ~90% to 86% (21000 gallon tank).

   The following radioactivity was released from 2000 to 2300 on January 3, 1999:

Co-58	2.32 E-06 Curies
Co-60	4.21 E-06 Curies
I-133	6.90 E-07 Curies
Xe-135	1.15 E-06 Curies
H-3	2.17 E-02 Curies
Total	2.17 E-02 Curies

   The dose consequence for this abnormal release was calculated to be:

Whole Body	3.07 E-06 mrem
Thyroid	2.47 E-06 mrem
Max Organ	2.07 E-05 mrem

2. **Auxilliary Boiler Blowdown Tank** discharged to the Circulating Water Tunnel into the Quarry Cut. Approximately 67560 gallons was released.

The following radioactivity was released from April 6, 1999 to April 20, 1999:

H-3	1.21 E-03 Curies

The dose consequence for this abnormal release was calculated to be:

Whole Body	4.27 E-10 mrem
Thyroid	4.27 E-10 mrem
Max Organ	4.27 E-10 mrem

List of Effluent Release Tables

Table 2.1-1

Millstone Unit No. 1
Airborne Effluents - Release Summary

	Units	1999 1st Qtr	1999 2nd Qtr	1999 3rd Qtr	1999 4th Qtr	1999 Total
A. Fission & Activation Gases						
1. Total Activity Released	Ci	N/D	N/D	N/D	N/D	N/D
2. Average Period Release Rate	uCi/sec	-	-	No Activity Detected	-	-
B. Iodine-131						
1. Total Activity Released	Ci	N/D	N/D	N/D	N/D	N/D
2. Average Period Release Rate	uCi/sec	-	-	No Activity Detected	-	-
C. Particulates						
1. Total Activity Released	Ci	5.50E-05	7.62E-05	6.10E-05	5.87E-05	2.51E-04
2. Average Period Release Rate	uCi/sec	7.08E-06	9.69E-06	7.68E-06	7.39E-06	7.96E-06
D. Gross Alpha						
1. Total Activity Released	Ci	8.75E-07	1.06E-06	6.51E-07	8.41E-07	3.43E-06
E. Tritium						
1. Total Activity Released	Ci	N/D	N/D	N/D	N/D	N/D
2. Average Period Release Rate	uCi/sec	-	-	No Activity Detected	-	-

N/D = Not Detected

Table 2.1-2

Millstone Unit No. 1
Airborne Effluents - Elevated Continuous

Nuclides Released	Units	1999				
		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	3.70E-05	4.61E-05	3.54E-05	3.88E-05	1.57E-04
Cs-137	Ci	1.77E-05	2.93E-05	2.48E-05	1.87E-05	9.05E-05
Sr-90	Ci	3.16E-07	3.89E-07	8.26E-07	1.24E-06	2.77E-06
Total Activity	Ci	5.50E-05	7.58E-05	6.10E-05	5.87E-05	2.51E-04
D. Gross Alpha						
Gross Alpha	Ci	8.75E-07	1.06E-06	6.51E-07	8.41E-07	3.43E-06
E. Tritium						
H-3	Ci	-	-	-	-	N/D

N/D = Not Detected

Table 2.1-3

Millstone Unit No. 1

Airborne Effluents - Ground Batch - Abnormal Releases

Nuclides Released	Units	1999				
		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	-	3.19E-07	-	-	3.19E-07
Cs-137	Ci	-	5.98E-08	-	-	5.98E-08
Total Activity	Ci	-	3.79E-07	-	-	3.79E-07
D. Gross Alpha						
Gross Alpha	Ci	-	-	-	-	N/D
E. Tritium						
H-3	Ci	-	-	-	-	N/D

N/D = Not Detected

Abnormal Releases:

1st Qtr - None

2nd Qtr - Solid Waste Truck Bay decontamination evolution (1030-1430 6/17/99)

3rd Qtr - None

4th Qtr - None

Table 2.1-4

Millstone Unit No. 1
Liquid Effluents - Release Summary

	Units	1999 1st Qtr	1999 2nd Qtr	1999 3rd Qtr	1999 4th Qtr	1999 Total
A. Fission and Activation Products						
1. Total Activity Released	Ci	7.72E-04	1.24E-03	1.34E-03	1.71E-03	5.07E-03
2. Average Period Diluted Activity	uCi/ml	1.31E-10	1.95E-10	2.07E-10	2.85E-10	2.05E-10
B. Tritium						
1. Total Activity Released	Ci	1.14E-01	4.42E-02	6.54E-02	1.34E-01	3.58E-01
2. Average Period Diluted Activity	uCi/ml	1.94E-08	6.94E-09	1.01E-08	2.23E-08	1.44E-08
C. Dissolved and Entrained Gases						
1. Total Activity Released	Ci	N/D	N/D	N/D	N/D	N/D
		No Activity Detected				
2. Average Period Diluted Activity	uCi/ml	-	-	-	-	-
D. Gross Alpha						
1. Total Activity Released	Ci	N/D	N/D	N/D	N/D	N/D
		No Activity Detected				
E. Volume						
1. Released Waste Volume	Liters	7.83E+05	3.90E+05	4.43E+05	6.01E+05	2.22E+06
2. Dilution Volume During Releases	Liters	5.36E+09	1.39E+09	6.71E+08	7.87E+08	8.21E+09
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

Note: 1st Qtr Dilution Volume During Releases 5.36E+09 liters (E.2) includes dilution flow from Units 2 and 3, as well, which was allowed at the time by the REMODCM; whereas, 1st Qtr Dilution Volume During Period 5.88E+09 liters (E.3) includes only Unit 1 dilution flow.

Table 2.1-5

Millstone Unit No. 1
Liquid Effluents - Batch

Nuclides Released	Units	1999				
		1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	Total
A. Fission & Activation Products						
Ag-110m	Ci	-	-	-	7.96E-06	7.96E-06
Co-58	Ci	-	-	2.14E-06	1.90E-05	2.11E-05
Co-60	Ci	3.09E-04	1.19E-04	6.99E-04	3.75E-04	1.50E-03
Cs-137	Ci	2.85E-04	1.59E-04	5.69E-04	2.63E-04	1.28E-03
Fe-55	Ci	-	9.39E-04	2.84E-05	9.49E-04	1.92E-03
Mn-54	Ci	1.18E-04	1.17E-05	7.32E-06	8.34E-05	2.20E-04
Sr-90	Ci	-	4.40E-06	2.86E-05	-	3.30E-05
Zn-65	Ci	6.01E-05	8.80E-06	9.35E-06	1.29E-05	9.12E-05
Total Activity	Ci	7.72E-04	1.24E-03	1.34E-03	1.71E-03	5.07E-03
B. Tritium						
H-3	Ci	1.14E-01	4.42E-02	6.54E-02	1.34E-01	3.58E-01
C. Dissolved & Entrained Gases						
	Ci	-	-	-	-	-
Total Activity	Ci	-	-	-	-	N/D
D. Gross Alpha						
Gross Alpha	Ci	-	-	-	-	N/D

N/D = Not Detected

Table 2.2-1

Millstone Unit No. 2

Airborne Effluents - Release Summary

	Units	1999 1st Qtr	1999 2nd Qtr	1999 3rd Qtr	1999 4th Qtr	1999 Total
A. Fission & Activation Gases						
1. Total Activity Released	Ci	2.63E-02	5.77E-02	1.39E+00	1.75E-01	1.65E+00
2. Average Period Release Rate	uCi/sec	3.38E-03	7.33E-03	1.75E-01	2.20E-02	5.23E-02
B. Iodine-131						
1. Total Activity Released	Ci	N/D	4.42E-05	7.97E-05	7.34E-05	1.97E-04
2. Average Period Release Rate	uCi/sec	-	5.63E-06	1.00E-05	9.23E-06	6.26E-06
C. Particulates						
1. Total Activity Released	Ci	7.30E-07	3.90E-07	1.27E-07	N/D	1.25E-06
2. Average Period Release Rate	uCi/sec	9.39E-08	4.96E-08	1.60E-08	-	3.95E-08
D. Gross Alpha						
1. Total Activity Released	Ci	6.22E-08	4.01E-08	1.07E-08	2.77E-08	1.41E-07
E. Tritium						
1. Total Activity Released	Ci	1.96E-02	2.09E-02	8.79E-01	6.45E-02	9.84E-01
2. Average Period Release Rate	uCi/sec	2.52E-03	2.66E-03	1.11E-01	8.11E-03	3.12E-02

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	1999				
		1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	Total
A. Fission & Activation Gases						
Xe-133	Ci	-	-	9.01E-02	-	9.01E-02
Xe-133m	Ci	-	-	9.61E-01	-	9.61E-01
Xe-135	Ci	-	-	8.54E-02	-	8.54E-02
Xe-135m	Ci	-	-	1.20E-01	-	1.20E-01
Total Activity	Ci	-	-	1.26E+00	-	1.26E+00
B. Iodines						
I-131	Ci	-	4.36E-05	7.92E-05	7.34E-05	1.96E-04
I-133	Ci	-	2.27E-04	2.81E-04	2.80E-04	7.88E-04
Total Activity	Ci	-	2.71E-04	3.60E-04	3.53E-04	9.84E-04
C. Particulates						
I-131	Ci	-	-	-	-	-
Co-60	Ci	-	3.90E-07	-	-	3.90E-07
Sr-90	Ci	-	-	1.27E-07	-	1.27E-07
Total Activity	Ci	-	3.90E-07	1.27E-07	-	5.17E-07
D. Gross Alpha						
Gross Alpha	Ci	6.22E-08	4.01E-08	1.07E-08	2.77E-08	1.41E-07
E. Tritium						
H-3	Ci	-	-	8.39E-01	-	8.39E-01

N/D = Not Detected

Table 2.2-3

Millstone Unit No. 2

Airborne Effluents - Mixed Batch - Containment Purges

Nuclides Released	Units	1999				
		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	7.30E-07	-	-	-	7.30E-07
Total Activity	Ci	7.30E-07	-	-	-	7.30E-07
D. Gross Alpha						
Gross Alpha	Ci	-	-	-	-	N/D
E. Tritium						
H-3	Ci	1.58E-02	3.07E-03	-	-	1.89E-02

N/D = Not Detected

Table 2.2-4

Millstone Unit No. 2

Airborne Effluents - Elevated Batch - WGDT

Nuclides Released	Units	1999				
		1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	Total
A. Fission & Activation Gases						
Kr-85	Ci	2.63E-02	3.22E-02	2.06E-02	1.51E-02	9.42E-02
Xe-131m	Ci	-	-	-	2.85E-05	2.85E-05
Xe-133	Ci	-	-	-	4.40E-04	4.40E-04
Xe-135	Ci	-	-	-	2.33E-07	2.33E-07
Total Activity	Ci	2.63E-02	3.22E-02	2.06E-02	1.56E-02	9.47E-02
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	3.00E-03	3.75E-04	2.39E-05	3.67E-04	3.77E-03

N/D = Not Detected

Table 2.2-5

Millstone Unit No. 2

Airborne Effluents - Elevated Batch - Containment Vents

Nuclides Released	Units	1999				
		1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	Total
A. Fission & Activation Gases						
Ar-41	Ci	-	1.71E-02	2.79E-02	2.76E-02	7.26E-02
Kr-85	Ci	-	-	1.24E-02	1.40E-02	2.64E-02
Kr-85m	Ci	-	-	2.38E-05	3.55E-05	5.93E-05
Xe-133	Ci	-	7.75E-03	7.23E-02	1.09E-01	1.89E-01
Xe-135	Ci	-	6.18E-04	1.96E-03	8.58E-03	1.12E-02
Total Activity	Ci	-	2.55E-02	1.15E-01	1.59E-01	2.99E-01
B. Iodines *						
I-131	Ci	-	6.47E-07	4.52E-07	-	1.10E-06
I-133	Ci	-	1.68E-07	8.60E-08	-	2.54E-07
Total Activity	Ci	-	8.15E-07	5.38E-07	-	1.35E-06
C. Particulates						
I-131	Ci	-	-	-	-	-
	Ci	-	-	-	-	-
Total Activity	Ci	-	-	-	-	N/D
D. Gross Alpha						
Gross Alpha	Ci	-	-	-	-	N/D
E. Tritium						
H-3	Ci	7.67E-04	1.75E-02	3.98E-02	6.41E-02	1.22E-01

N/D = Not Detected

* Prior to charcoal filtration

Table 2.2-6

Millstone Unit No. 2
Liquid Effluents - Release Summary

	Units	1999 1st Qtr	1999 2nd Qtr	1999 3rd Qtr	1999 4th Qtr	1999 Total
A. Fission and Activation Products						
1. Total Activity Released	Ci	3.71E-02	7.92E-02	7.60E-03	2.52E-03	1.26E-01
2. Average Period Diluted Activity	uCi/ml	5.57E-10	3.74E-10	2.86E-11	9.35E-12	1.55E-10
B. Tritium						
1. Total Activity Released	Ci	4.50E+00	1.03E+01	6.14E+01	6.63E+01	1.43E+02
2. Average Period Diluted Activity	uCi/ml	6.76E-08	4.86E-08	2.31E-07	2.46E-07	1.75E-07
C. Dissolved and Entrained Gases						
1. Total Activity Released	Ci	N/D	9.60E-03	6.75E-03	2.32E-02	3.96E-02
2. Average Period Diluted Activity	uCi/ml	-	4.53E-11	2.54E-11	8.63E-11	4.86E-11
D. Gross Alpha						
1. Total Activity Released	Ci	N/D	7.65E-06	1.62E-06	N/D	9.27E-06
E. Volume						
1. Released Waste Volume	Liters	3.73E+05	8.51E+05	3.73E+05	3.21E+05	1.92E+06
2. Dilution Volume During Releases	Liters	8.25E+08	2.39E+09	1.68E+09	1.56E+09	6.46E+09
3. Dilution Volume During Period	Liters	6.66E+10	2.12E+11	2.66E+11	2.69E+11	8.14E+11

N/D = Not Detected

Table 2.2-7

Millstone Unit No. 2
Liquid Effluents - Continuous - SGBD

<< No Activity Detected >>

Nuclides Released	Units	1999				
		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	1999				
		1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	Total
A. Fission & Activation Products						
Ag-110m	Ci	2.26E-04	1.23E-04	8.80E-06	2.08E-06	3.60E-04
Co-58	Ci	-	7.59E-04	9.80E-04	7.37E-04	2.48E-03
Co-60	Ci	3.17E-02	3.47E-02	4.22E-03	1.27E-03	7.19E-02
Cr-51	Ci	-	5.76E-03	7.88E-04	2.81E-04	6.83E-03
Cs-137	Ci	5.86E-05	1.01E-04	7.05E-05	1.10E-05	2.41E-04
Fe-55	Ci	4.87E-03	3.59E-02	1.40E-03	1.69E-04	4.23E-02
Hf-181	Ci	-	8.64E-05	-	-	8.64E-05
I-131	Ci	-	-	1.48E-06	-	1.48E-06
La-140	Ci	-	9.45E-05	2.37E-05	5.10E-06	1.23E-04
Mn-54	Ci	2.31E-04	4.95E-04	-	1.35E-06	7.27E-04
Mo-99	Ci	-	4.53E-05	-	-	4.53E-05
Nb-95	Ci	-	8.81E-06	5.04E-05	8.85E-06	6.81E-05
Nb-97	Ci	-	2.59E-04	-	-	2.59E-04
Np-239	Ci	-	4.03E-04	-	-	4.03E-04
Sb-124	Ci	-	-	1.73E-06	-	1.73E-06
Sb-125	Ci	2.92E-05	2.18E-04	5.14E-05	3.01E-05	3.29E-04
Sr-90	Ci	-	-	8.79E-07	-	8.79E-07
Sr-92	Ci	-	3.59E-06	-	-	3.59E-06
Tc-99m	Ci	-	4.93E-05	-	-	4.93E-05
Zr-95	Ci	-	5.64E-05	-	-	5.64E-05
Zr-97	Ci	-	1.52E-04	-	-	1.52E-04
Total Activity	Ci	3.71E-02	7.92E-02	7.60E-03	2.52E-03	1.26E-01
B. Tritium						
H-3	Ci	4.50E+00	1.03E+01	6.14E+01	6.63E+01	1.43E+02
C. Dissolved & Entrained Gases						
Kr-85	Ci	-	-	-	1.47E-02	1.47E-02
Xe-133	Ci	-	9.24E-03	6.73E-03	8.52E-03	2.45E-02
Xe-135	Ci	-	3.57E-04	1.68E-05	1.49E-06	3.75E-04
Total Activity	Ci	-	9.60E-03	6.75E-03	2.32E-02	3.96E-02
D. Gross Alpha						
Gross Alpha	Ci	-	7.65E-06	1.62E-06	-	9.27E-06

N/D = Not Detected

Table 2.3-1

Millstone Unit No. 3

Airborne Effluents - Release Summary

	Units	1999 1st Qtr	1999 2nd Qtr	1999 3rd Qtr	1999 4th Qtr	1999 Total
A. Fission & Activation Gases						
1. Total Activity Released	Ci	6.77E+00	7.94E+00	N/D	N/D	1.47E+01
2. Average Period Release Rate	uCi/sec	8.70E-01	1.01E+00	-	-	4.67E-01
B. Iodine-131						
1. Total Activity Released	Ci	1.32E-05	3.57E-04	N/D	N/D	3.70E-04
2. Average Period Release Rate	uCi/sec	1.70E-06	4.54E-05	-	-	1.17E-05
C. Particulates						
1. Total Activity Released	Ci	N/D	2.19E-04	3.53E-06	1.02E-08	2.23E-04
2. Average Period Release Rate	uCi/sec	-	2.79E-05	4.45E-07	1.28E-09	7.07E-06
D. Gross Alpha						
1. Total Activity Released	Ci	2.06E-07	2.58E-07	3.52E-07	1.00E-07	9.17E-07
E. Tritium						
1. Total Activity Released	Ci	N/D	1.97E-04	3.91E-01	1.74E+01	1.78E+01
2. Average Period Release Rate	uCi/sec	-	2.51E-05	4.92E-02	2.19E+00	5.64E-01

N/D = Not Detected

Table 2.3-2

Millstone Unit No. 3

Airborne Effluents - Mixed Continuous - Normal Ventilation

Nuclides Released	Units	1999				
		1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	Total
A. Fission & Activation Gases						
Xe-131m	Ci	6.16E+00	-	-	-	6.16E+00
Xe-133	Ci	-	7.88E+00	-	-	7.88E+00
Xe-135	Ci	2.79E-01	-	-	-	2.79E-01
Total Activity	Ci	6.44E+00	7.88E+00	-	-	1.43E+01
B. Iodines						
I-131	Ci	1.32E-05	3.41E-04	-	-	3.54E-04
I-133	Ci	5.65E-05	3.33E-04	-	-	3.90E-04
Total Activity	Ci	6.97E-05	6.74E-04	-	-	7.44E-04
C. Particulates						
I-131	Ci	-	-	-	-	-
Co-58	Ci	-	1.13E-04	3.46E-06	-	1.16E-04
Co-60	Ci	-	2.76E-06	-	-	2.76E-06
Cr-51	Ci	-	9.53E-05	-	-	9.53E-05
Mn-54	Ci	-	6.08E-06	-	-	6.08E-06
Total Activity	Ci	-	2.17E-04	3.46E-06	-	2.21E-04
D. Gross Alpha						
Gross Alpha	Ci	1.89E-07	2.49E-07	3.44E-07	9.44E-08	8.76E-07
E. Tritium						
H-3	Ci	-	-	-	1.74E+01	1.74E+01

N/D = Not Detected

Table 2.3-3

Millstone Unit No. 3

Airborne Effluents - Ground Continuous - ESF Building Ventilation

Nuclides Released	Units	1999				
		1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	Total
A. Fission & Activation Gases						
Xe-131m	Ci	3.30E-01	-	-	-	3.30E-01
Total Activity	Ci	3.30E-01	-	-	-	3.30E-01
B. Iodines						
I-131	Ci	-	1.53E-05	-	-	1.53E-05
I-133	Ci	-	5.72E-06	1.22E-07	-	5.84E-06
Total Activity	Ci	-	2.10E-05	1.22E-07	-	2.11E-05
C. Particulates						
I-131	Ci	-	-	-	-	-
Co-58	Ci	-	1.52E-06	3.17E-08	-	1.55E-06
Co-60	Ci	-	2.51E-07	-	-	2.51E-07
Cs-137	Ci	-	5.41E-07	4.27E-08	-	5.84E-07
Mn-54	Ci	-	4.64E-08	-	-	4.64E-08
Sr-89	Ci	-	-	-	1.02E-08	1.02E-08
Total Activity	Ci	-	2.36E-06	7.44E-08	1.02E-08	2.44E-06
D. Gross Alpha						
Gross Alpha	Ci	1.71E-08	9.19E-09	8.20E-09	6.07E-09	4.06E-08
E. Tritium						
H-3	Ci	-	-	3.91E-01	-	3.91E-01

N/D = Not Detected

Table 2.3-4

Millstone Unit No. 3

Airborne Effluents - Mixed Batch - Containment Drawdowns

Nuclides Released	Units	1999				
		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	-	1.97E-04	-	-	1.97E-04

N/D = Not Detected

Table 2.3-5

Millstone Unit No. 3

Airborne Effluents - Mixed Batch - Containment Purges

Nuclides Released	Units	1999				
		1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	Total
A. Fission & Activation Gases						
Xe-133	Ci	-	6.32E-02	-	-	6.32E-02
Xe-135	Ci	-	4.77E-04	-	-	4.77E-04
Total Activity	Ci	-	6.37E-02	-	-	6.37E-02
B. Iodines						
I-131	Ci	-	9.38E-07	-	-	9.38E-07
I-133	Ci	-	1.98E-07	-	-	1.98E-07
Total Activity	Ci	-	1.14E-06	-	-	1.14E-06
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	1999 1st Qtr	1999 2nd Qtr	1999 3rd Qtr	1999 4th Qtr	1999 Total
A. Fission and Activation Products						
1. Total Activity Released	Ci	2.21E-02	7.98E-02	5.29E-02	2.31E-02	1.78E-01
2. Average Period Diluted Activity	uCi/ml	4.84E-11	3.00E-10	1.12E-10	4.93E-11	1.07E-10
B. Tritium						
1. Total Activity Released	Ci	2.14E+02	1.52E+02	7.09E+01	4.67E+01	4.84E+02
2. Average Period Diluted Activity	uCi/ml	4.69E-07	5.71E-07	1.51E-07	9.97E-08	2.91E-07
C. Dissolved and Entrained Gases						
1. Total Activity Released	Ci	5.63E-04	1.33E-04	1.11E-05	1.00E-04	8.08E-04
2. Average Period Diluted Activity	uCi/ml	1.23E-12	5.01E-13	2.36E-14	2.14E-13	4.86E-13
D. Gross Alpha						
1. Total Activity Released	Ci	N/D	N/D	N/D	N/D	N/D
		No Activity Detected				
E. Volume						
1. Released Waste Volume	Liters	1.09E+07	3.03E+06	4.57E+06	7.15E+06	2.57E+07
2. Dilution Volume During Releases	Liters	2.85E+10	1.11E+10	2.10E+10	1.86E+10	7.92E+10
3. Dilution Volume During Period	Liters	4.56E+11	2.66E+11	4.71E+11	4.68E+11	1.66E+12

N/D = Not Detected

Table 2.3-7

Millstone Unit No. 3

Liquid Effluents - Continuous - SGBD, SW, TB Sump

Nuclides Released	Units	1999				
		1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	Total
A. Fission & Activation Products						
	Ci	-	-	-	-	-
Total Activity	Ci	-	-	-	-	N/D
B. Tritium						
H-3	Ci	-	5.84E-03	2.85E-02	1.45E-01	1.79E-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	1999				
		1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	Total
A. Fission & Activation Products						
Ag-110m	Ci	7.95E-05	-	-	2.11E-04	2.91E-04
As-76	Ci	-	-	1.27E-05	-	1.27E-05
Ba-141	Ci	-	8.81E-05	-	-	8.81E-05
Co-58	Ci	2.44E-03	1.46E-02	1.68E-02	5.09E-03	3.89E-02
Co-60	Ci	1.64E-03	1.37E-02	5.64E-03	5.37E-03	2.64E-02
Cr-51	Ci	2.26E-04	9.69E-04	9.42E-03	-	1.06E-02
Cs-134	Ci	5.63E-06	-	-	5.35E-05	5.91E-05
Cs-137	Ci	1.31E-04	6.31E-04	8.59E-04	1.64E-03	3.26E-03
Fe-55	Ci	1.42E-02	6.84E-03	4.77E-03	6.92E-03	3.27E-02
Fe-59	Ci	-	-	2.75E-04	-	2.75E-04
Hf-181	Ci	-	-	6.65E-06	-	6.65E-06
I-131	Ci	-	1.88E-05	-	-	1.88E-05
I-133	Ci	3.29E-05	1.22E-05	-	-	4.51E-05
I-135	Ci	8.91E-06	-	-	-	8.91E-06
Mn-54	Ci	4.53E-04	1.42E-03	2.21E-03	1.26E-03	5.34E-03
Na-24	Ci	2.78E-06	-	2.68E-06	-	5.46E-06
Nb-95	Ci	2.22E-05	6.92E-05	2.21E-03	4.37E-04	2.74E-03
Nb-97	Ci	5.82E-06	6.94E-05	-	-	7.52E-05
Ru-105	Ci	-	-	1.63E-04	3.01E-06	1.66E-04
Sb-122	Ci	-	1.97E-05	1.10E-05	-	3.07E-05
Sb-124	Ci	-	1.98E-03	5.55E-05	-	2.04E-03
Sb-125	Ci	2.80E-03	3.93E-02	9.49E-03	2.05E-03	5.36E-02
Sn-113	Ci	6.31E-06	-	-	-	6.31E-06
Tc-104	Ci	-	4.64E-05	-	-	4.64E-05
Zn-65	Ci	-	-	-	4.25E-06	4.25E-06
Zr-95	Ci	-	-	9.48E-04	5.30E-05	1.00E-03
Total Activity	Ci	2.21E-02	7.98E-02	5.29E-02	2.31E-02	1.78E-01
B. Tritium						
H-3	Ci	2.14E+02	1.52E+02	7.09E+01	4.64E+01	4.83E+02
C. Dissolved & Entrained Gases						
Xe-133	Ci	2.52E-04	1.84E-05	-	-	2.70E-04
Xe-135	Ci	3.10E-04	1.15E-04	-	-	4.25E-04
Xe-135m	Ci	-	-	1.11E-05	-	1.11E-05
Total Activity	Ci	5.62E-04	1.33E-04	1.11E-05	-	7.07E-04
D. Gross Alpha						
Gross Alpha	Ci	-	-	-	-	N/D

N/D = Not Detected

Table 2.3-9

Millstone Unit No. 3

Liquid Effluents - Batch - CPF Waste Neutralization Sumps

Nuclides Released	Units	1999				
		1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	Total
A. Fission & Activation Products						
	Ci	-	-	-	-	-
Total Activity	Ci	-	-	-	-	N/D
B. Tritium						
H-3	Ci	-	-	1.17E-02	1.16E-01	1.28E-01
C. Dissolved & Entrained Gases						
Xe-131m	Ci	-	-	-	9.82E-05	9.82E-05
Xe-135	Ci	-	-	-	1.78E-06	1.78E-06
Total Activity	Ci	-	-	-	1.00E-04	1.00E-04
D. Gross Alpha						
Gross Alpha	Ci	-	-	-	-	N/D

N/D = Not Detected

Table 2.3-10

Millstone Unit No. 3
Liquid Effluents - Abnormal Releases

Nuclides Released	Units	1999				
		1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	Total
A. Fission & Activation Products						
Co-58	Ci	2.32E-06	-	-	-	2.32E-06
Co-60	Ci	4.21E-06	-	-	-	4.21E-06
I-133	Ci	6.90E-07	-	-	-	6.90E-07
Total Activity	Ci	7.22E-06	-	-	-	7.22E-06
B. Tritium						
H-3	Ci	2.17E-02	1.21E-03	-	-	2.29E-02
C. Dissolved & Entrained Gases						
Xe-135	Ci	1.15E-06	-	-	-	1.15E-06
Total Activity	Ci	1.15E-06	-	-	-	1.15E-06
D. Gross Alpha						
Gross Alpha	Ci	-	-	-	-	N/D

N/D = Not Detected

Abnormal Releases:

1st Qtr - "A" WTT leak to LI Sound via Storm Drain 006 (2000-2300 01/03/99)
2nd Qtr - Aux Boiler Blowdown Tank discharge to quarry cut (4/6/99 - 4/20/99)
3rd Qtr - None
4th Qtr - None

2.3 Solid Waste

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

Table 2.1-6	Unit 1 Solid Waste and Irradiated Component Shipments
Table 2.2-9	Unit 2 Solid Waste and Irradiated Component Shipments
Table 2.3-11	Unit 3 Solid Waste and Irradiated Component Shipments

The principal radionuclides in these tables were from shipping manifests.

Solidification Agent(s):

No solidification on site for 1999

Containers routinely used for radioactive waste shipment include:

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

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

January 1, 1999 through December 31, 1999

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

1. Type of Waste

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

Disposition	Units	Annual Totals	Est. Total Error %
No shipments made in 1999	m^3	0.00E+00	
	Ci	0.00E+00	N/A

b. Dry compressible waste, contaminated equipment, etc.

Disposition	Units	Annual Totals	Est. Total Error %
From Millstone Nuclear Power Station To GTS Duratek	m^3	4.77E+01	
Oak Ridge, TN for Super-Compaction, Incineration, etc.	Ci	2.43E-02	25%
From Millstone Nuclear Power Station To HAKE	m^3	1.17E+01	
Oak Ridge, TN for Decontamination	Ci	3.09E-02	25%
From GTS Duratek to Chem-Nuclear Services, Inc.	m^3	2.14E-02	
Barnwell, SC for Burial	Ci	1.77E-03	25%
From Manufacturing Sciences Corporation to Chem-Nuclear Services, Inc.	m^3	2.12E-01	
Barnwell, SC for Burial	Ci	6.90E-02	25%
From GTS Duratek To Envirocare	m^3	5.44E-01	
Clive, UT for Burial	Ci	2.58E-02	25%
From Manufacturing Sciences Corporation To Envirocare	m^3	4.14E+00	
Clive, UT for Burial	Ci	2.80E-01	25%

c. Irradiated components, control rods, etc.

Disposition	Units	Annual Totals	Est. Total Error %
No shipments made in 1999	m^3	0.00E+00	
	Ci	0.00E+00	N/A

d. Other - (Oil, Oily Sludge)

Disposition	Units	Annual Totals	Est. Total Error %
From Millstone Nuclear Power Station To GTS Duratek	m^3	8.31E-01	
Oak Ridge, TN for Super-Compaction, Incineration, etc.	Ci	3.21E-04	25%

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 (Estimate)	Curies
H-3	3.344%	8.13E-04
C-14	0.066%	1.61E-05
Mn-54	0.764%	1.86E-04
Fe-55	17.681%	4.30E-03
Co-60	12.840%	3.12E-03
Ni-63	2.324%	5.65E-04
Zn-65	2.724%	6.62E-04
Cs-137	60.031%	1.46E-02
Pu-241	0.226%	5.51E-05
		2.43E-02

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

b. Dry compressible waste, contaminated equipment, etc.

From Millstone Nuclear Power Station To HAKE - Oak Ridge, TN for Decontamination.

Radionuclide	% of Total (Estimate)	Curies
H-3	4.049%	1.25E-03
C-14	0.174%	5.37E-05
Mn-54	0.768%	2.38E-04
Fe-55	26.638%	8.24E-03
Co-60	14.640%	4.53E-03
Ni-63	5.713%	1.77E-03
Zn-65	1.836%	5.68E-04
Sr-90	0.043%	1.33E-05
Tc-99	<0.01%	1.28E-07
Sb-125	0.414%	1.28E-04
Cs-134	0.236%	7.31E-05
Cs-137	45.287%	1.40E-02
Pu-238	<0.01%	1.62E-07
Pu-239	<0.01%	5.69E-08
Pu-241	0.200%	6.18E-05
Am-241	<0.01%	1.68E-07
Cm-244	<0.01%	5.82E-08
		3.09E-02

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

b. Dry compressible waste, contaminated equipment, etc.

From GTS Duratek To Chem-Nuclear Services, Inc. - Barnwell, SC for Burial

Radionuclide	% of Total (Estimate)	Curies
H-3	73.467%	1.30E-03
C-14	0.286%	5.07E-06
Mn-54	0.811%	1.44E-05
Fe-55	15.169%	2.69E-04
Co-58	0.700%	1.24E-05
Co-60	3.702%	6.57E-05
Ni-63	2.034%	3.61E-05
Zr-95	2.155%	3.82E-05
Sb-125	0.096%	1.70E-06
Cs-134	0.088%	1.56E-06
Cs-137	1.493%	2.65E-05
		1.77E-03

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

b. Dry compressible waste, contaminated equipment, etc.

From Manufacturing Sciences Corporation To Chem-Nuclear Services, Inc. - Barnwell, SC for Burial

Radionuclide	% of Total (Estimate)	Curies
H-3	0.031%	2.13E-05
C-14	<0.01%	4.68E-06
Fe-55	20.570%	1.42E-02
Co-57	<0.01%	3.77E-06
Co-60	22.581%	1.56E-02
Ni-63	4.207%	2.90E-03
Sr-90	5.320%	3.67E-03
Cs-134	0.092%	6.35E-05
Cs-137	45.549%	3.14E-02
Ra-226	0.321%	2.21E-04
Pu-238	0.033%	2.29E-05
Pu-239	0.015%	1.05E-05
Am-241	0.053%	3.63E-05
Pu-241	1.168%	8.06E-04
Cm-242	<0.01%	3.08E-07
Cm-244	0.048%	3.29E-05
		6.90E-02

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

b. Dry compressible waste, contaminated equipment, etc.

From GTS Duratek To Envirocare. - Clive, UT for Burial

Radionuclide	% of Total (Estimate)	Curies
H-3	15.194%	3.91E-03
C-14	0.388%	1.00E-04
Mn-54	1.385%	3.57E-04
Fe-55	41.904%	1.08E-02
Co-57	0.022%	5.72E-06
Co-58	0.233%	5.99E-05
Co-60	18.081%	4.66E-03
Ni-63	11.947%	3.08E-03
Zn-65	3.911%	1.01E-03
Sr-89	<0.01%	1.04E-06
Sr-90	0.098%	2.54E-05
Zr-95	0.039%	1.02E-05
Tc-99	<0.01%	4.22E-07
Ag-110m	0.271%	6.97E-05
Sn-113	0.024%	6.23E-06
Sb-125	0.210%	5.40E-05
I-129	0.028%	7.20E-06
Cs-134	0.238%	6.14E-05
Cs-137	5.981%	1.54E-03
Pu-238	<0.01%	9.60E-08
Pu-239	<0.01%	4.20E-08
Am-241	<0.01%	5.40E-08
Pu-241	0.038%	9.67E-06
Cm-242	<0.01%	3.60E-08
Cm-244	<0.01%	1.08E-07
		2.58E-02

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

b. Dry compressible waste, contaminated equipment, etc.

From Manufacturing Sciences Corporation To Envirocare. - Clive, UT for Burial

Radionuclide	% of Total (Estimate)	Curies
H-3	0.548%	1.53E-03
C-14	0.026%	7.16E-05
Cr-51	<0.01%	5.62E-07
Mn-54	6.970%	1.95E-02
Fe-55	14.485%	4.05E-02
Co-57	<0.01%	9.66E-06
Co-58	0.052%	1.46E-04
Fe-59	7.590%	2.12E-02
Co-60	16.298%	4.56E-02
Ni-63	2.875%	8.04E-03
Zn-65	0.123%	3.45E-04
Sr-89	1.788%	5.00E-03
Sr-90	3.364%	9.41E-03
Nb-95	<0.01%	1.06E-06
Zr-95	<0.01%	5.80E-07
Sb-125	<0.01%	1.31E-06
I-131	0.031%	8.65E-05
Cs-134	15.371%	4.30E-02
Cs-137	28.884%	8.08E-02
Ta-182	0.108%	3.02E-04
Ra-226	0.203%	5.68E-04
Np-237	0.011%	3.12E-05
Pu-238	0.026%	7.28E-05
Pu-239	0.402%	1.12E-03
Pu-241	0.761%	2.13E-03
Am-241	0.033%	9.31E-05
Pu-242	<0.01%	4.20E-07
Cm-242	0.016%	4.56E-05
Cm-244	0.029%	8.10E-05
		2.80E-01

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 Super-Compaction, Incineration, etc.

Radionuclide	% of Total (Estimate)	Curies
H-3	77.83%	2.50E-04
C-14	0.05%	1.50E-07
Mn-54	0.06%	2.04E-07
Fe-55	7.72%	2.48E-05
Co-60	6.38%	2.05E-05
Ni-63	1.80%	5.79E-06
Zn-65	0.33%	1.07E-06
Sr-90	0.02%	4.85E-08
Cs-137	5.73%	1.84E-05
Pu-241	0.08%	2.71E-07
		3.21E-04

3. Solid Waste Disposition (Shipments from Millstone)

Number of Shipments	Mode of Transportation	Destination
2	Truck (Sole Use Vehicle)	HAKE - Oak Ridge, TN
3	Truck (Sole Use Vehicle)	GTS Duratek - Oak Ridge, TN

B. IRRADIATED FUEL SHIPMENTS (Disposition)

Number of Shipments	Mode of Transportation	Destination
No Shipments in 1999	N/A	N/A

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

January 1, 1999 through December 31, 1999

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 Allied Technical Group, Inc.	m^3	6.44E+00	
Oak Ridge, TN for Thermal Destruction	Ci	3.20E+01	25%
From Allied Technical Group to Chem-Nuclear Services, Inc	m^3	1.19E-02	
Barnwell, SC for Burial	Ci	6.84E+00	25%

b. Dry compressible waste, contaminated equipment, etc.

Disposition	Units	Annual Totals	Est. Total Error %
From Millstone Nuclear Power Station To HAKE	m^3	8.53E+00	
Oak Ridge, TN for Decontamination	Ci	3.58E-02	25%
From Millstone Nuclear Power Station To GTS Duratek	m^3	8.07E+01	
Oak Ridge, TN for Super-Compaction, Incineration, etc.	Ci	1.47E-01	25%
From Millstone Nuclear Power Station To Envirocare	m^3	2.69E+00	
Clive, UT for Burial	Ci	7.57E-03	25%
From GTS Duratek to Chem-Nuclear Services, Inc.	m^3	1.93E-02	
Barnwell, SC for Burial	Ci	1.72E-03	25%
From GTS Duratek To Envirocare	m^3	4.31E+00	
Clive, UT for Burial	Ci	3.32E-01	25%
From Manufacturing Sciences Corporation To Envirocare	m^3	1.23E+00	
Clive, UT for Burial	Ci	4.00E-03	25%

c. Irradiated components, control rods, etc.

Disposition	Units	Annual Totals	Est. Total Error %
No shipments made in 1999	m^3	0.00E+00	
	Ci	0.00E+00	N/A

d. Other - (Oil, Oily Sludge)

Disposition	Units	Annual Totals	Est. Total Error %
From Millstone Nuclear Power Station To GTS Duratek	m^3	1.98E+00	
Oak Ridge, TN for Super-Compaction, Incineration, etc.	Ci	1.12E-03	25%

d. Other - (Water)

Disposition	Units	Annual Totals	Est. Total Error %
From Millstone Nuclear Power Station To GTS Duratek	m3	4.47E+00	
Oak Ridge, TN for Incineration	Ci	7.70E-03	25%

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

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

From Millstone Nuclear Power Station To Allied Technical Group, Inc. - Oak Ridge TN for Thermal Destruction

Radionuclide	% of Total (Estimate)	Curies
H-3	<0.01%	9.92E-04
C-14	2.065%	6.62E-01
Mn-54	0.292%	9.37E-02
Fe-55	18.879%	6.05E+00
Co-57	0.024%	7.84E-03
Co-60	25.089%	8.04E+00
Ni-63	36.136%	1.16E+01
Sr-90	0.482%	1.54E-01
Sb-125	0.345%	1.11E-01
Cs-134	1.104%	3.54E-01
Cs-137	15.497%	4.97E+00
Pu-238	0.002%	5.97E-04
Pu-239	0.001%	3.19E-04
Pu-241	0.079%	2.53E-02
Am-241	<0.01%	3.17E-04
Cm-242	<0.01%	6.85E-06
Cm-244	<0.01%	4.57E-04
		3.20E+01

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

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

From Allied Technical Group, Inc. To Chem-Nuclear Services, Inc. - Barnwell, SC for Burial

Radionuclide	% of Total (Estimate)	Curies
H-3	<0.01%	5.49E-04
C-14	5.271%	3.61E-01
Mn-54	0.098%	6.72E-03
Fe-55	25.789%	1.76E+00
Co-57	<0.01%	3.66E-04
Co-60	20.812%	1.42E+00
Ni-63	28.956%	1.98E+00
Sr-90	1.244%	8.51E-02
Sb-125	0.464%	3.17E-02
Cs-134	0.794%	5.43E-02
Cs-137	16.401%	1.12E+00
Pu-238	<0.01%	1.56E-04
Pu-239	<0.01%	1.08E-04
Am-241	<0.01%	1.53E-04
Pu-241	0.147%	1.01E-02
Cm-242	<0.01%	1.15E-06
Cm-244	<0.01%	2.34E-04
		6.84E+00

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

b. Dry compressible waste, contaminated equipment, etc.

From Millstone Nuclear Power Station To HAKE - Oak Ridge, TN for Decontamination.

Radionuclide	% of Total (Estimate)	Curies
H-3	5.952%	2.13E-03
C-14	0.710%	2.54E-04
Mn-54	0.392%	1.40E-04
Fe-55	32.290%	1.16E-02
Co-60	28.224%	1.01E-02
Ni-63	16.635%	5.95E-03
Zn-65	0.086%	3.08E-05
Sr-90	0.171%	6.12E-05
Sb-125	0.430%	1.54E-04
Cs-134	0.664%	2.38E-04
Cs-137	14.361%	5.14E-03
Pu-241	0.084%	3.02E-05
		3.58E-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 (Estimate)	Curies
H-3	5.891%	8.69E-03
C-14	1.040%	1.53E-03
Cr-51	0.193%	2.85E-04
Fe-55	23.963%	3.53E-02
Co-60	34.968%	5.16E-02
Ni-63	20.662%	3.05E-02
Sr-90	0.294%	4.34E-04
Cs-134	0.723%	1.07E-03
Cs-137	12.237%	1.80E-02
Pu-241	0.028%	4.06E-05
		1.47E-01

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

b. Dry compressible waste, contaminated equipment, etc.

From Millstone Nuclear Power Station To Envirocare. - Clive, UT for Burial

Radionuclide	% of Total (Estimate)	Curies
H-3	13.110%	9.92E-04
C-14	0.945%	7.15E-05
Fe-55	22.202%	1.68E-03
Co-60	32.113%	2.43E-03
Ni-63	19.030%	1.44E-03
Sr-90	0.270%	2.04E-05
Cs-134	0.663%	5.02E-05
Cs-137	11.273%	8.53E-04
Pu-241	0.395%	2.99E-05
		7.57E-03

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

b. Dry compressible waste, contaminated equipment, etc.

From GTS Duratek To Chem-Nuclear Services, Inc. - Barnwell, SC for Burial

Radionuclide	% of Total (Estimate)	Curies
H-3	73.402%	1.26E-03
C-14	0.286%	4.92E-06
Mn-54	0.813%	1.40E-05
Fe-55	15.204%	2.61E-04
Co-58	0.702%	1.20E-05
Co-60	3.711%	6.37E-05
Ni-63	2.039%	3.50E-05
Zr-95	2.160%	3.71E-05
Sb-125	0.096%	1.65E-06
Cs-134	0.088%	1.52E-06
Cs-137	1.497%	2.57E-05
		1.72E-03

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

b. Dry compressible waste, contaminated equipment, etc.

From GTS Duratek To Envirocare. - Clive, UT for Burial

Radionuclide	% of Total (Estimate)	Curies
H-3	1.072%	3.55E-03
C-14	0.425%	1.41E-03
Cr-51	1.359%	4.51E-03
Mn-54	2.419%	8.02E-03
Fe-55	46.970%	1.56E-01
Co-57	0.025%	8.40E-05
Co-58	3.468%	1.15E-02
Co-60	20.522%	6.80E-02
Ni-63	16.530%	5.48E-02
Zn-65	0.141%	4.68E-04
Sr-89	0.043%	1.44E-04
Sr-90	0.104%	3.45E-04
Zr-95	0.122%	4.05E-04
Tc-99	<0.01%	1.75E-06
Ag-110m	0.308%	1.02E-03
Sn-113	0.028%	9.13E-05
Sb-125	0.545%	1.81E-03
I-129	<0.01%	2.98E-05
Cs-134	0.435%	1.44E-03
Cs-137	5.414%	1.80E-02
Pu-238	<0.01%	1.41E-06
Pu-239	<0.01%	6.16E-07
Am-241	<0.01%	7.92E-07
Pu-241	0.057%	1.90E-04
Cm-242	<0.01%	5.28E-07
Cm-244	<0.01%	1.58E-06
		3.32E-01

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

b. Dry compressible waste, contaminated equipment, etc.

From Manufacturing Sciences Corporation To Envirocare - Clive, UT for Burial

Radionuclide	% of Total (Estimate)	Curies
C-14	1.488%	5.96E-05
Mn-54	3.198%	1.28E-04
Fe-55	60.311%	2.41E-03
Co-58	3.435%	1.38E-04
Co-60	13.754%	5.51E-04
Ni-63	9.808%	3.93E-04
Zn-65	2.940%	1.18E-04
Cs-134	0.176%	7.05E-06
Cs-137	4.890%	1.96E-04
		4.00E-03

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 Super-Compaction, Incineration, etc.

Radionuclide	% of Total (Estimate)	Curies
H-3	46.942%	5.25E-04
C-14	0.047%	5.23E-07
Cr-51	0.380%	4.25E-06
Mn-54	26.645%	2.98E-04
Fe-55	0.017%	1.93E-07
Co-58	<0.01%	5.53E-09
Co-60	11.007%	1.23E-04
Ni-63	14.490%	1.62E-04
Sr-90	0.010%	1.09E-07
Sb-125	0.381%	4.26E-06
Cs-134	<0.01%	7.08E-09
Cs-137	0.079%	8.86E-07
Pu-241	<0.01%	4.84E-10
		1.12E-03

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 (Estimate)	Curies
H-3	1.614%	1.24E-04
C-14	<0.01%	1.29E-08
Fe-55	0.017%	1.32E-06
Co-58	<0.01%	6.72E-09
Co-60	<0.01%	4.53E-08
Ni-63	<0.01%	1.52E-07
Sr-90	6.351%	4.89E-04
Tc-99	0.308%	2.37E-05
Cs-137	91.698%	7.06E-03
Ra-226	<0.01%	4.48E-08
Pu-238	<0.01%	5.32E-09
Pu-239	<0.01%	2.66E-07
Am-241	<0.01%	4.91E-08
U-234	<0.01%	1.09E-07
U-235	<0.01%	2.28E-08
U-238	<0.01%	1.17E-07
		7.70E-03

3. Solid Waste Disposition (Shipments from Millstone)

Number of Shipments	Mode of Transportation	Destination
3	Truck (Sole Use Vehicle)	Allied Technical Group Inc. - Oak Ridge, TN
7	Truck (Sole Use Vehicle)	GTS Duratek - Oak Ridge, TN
1	Truck (Sole Use Vehicle)	Envirocare. - Clive, UT
2	Truck (Sole Use Vehicle)	HAKE - Oak Ridge, TN

B. IRRADIATED FUEL SHIPMENTS (Disposition)

Number of Shipments	Mode of Transportation	Destination
No Shipments in 1999	N/A	N/A

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

January 1, 1999 through December 31, 1999

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 Allied Technical Group, Inc.	m^3	2.78E+00	
Oak Ridge, TN for Thermal Destruction	Ci	3.92E+01	25%
From Allied Technical Group to Chem-Nuclear Services, Inc	m^3	2.15E-02	
Barnwell, SC for Burial	Ci	3.69E+01	25%

b. Dry compressible waste, contaminated equipment, etc.

Disposition	Units	Annual Totals	Est. Total Error %
From Millstone Nuclear Power Station to Chem-Nuclear Services, Inc.	m^3	3.41E+00	
Barnwell, SC for Burial	Ci	5.63E+02	25%
From Millstone Nuclear Power Station To HAKE	m^3	2.61E+00	
Oak Ridge, TN for Decontamination	Ci	4.63E-03	25%
From Millstone Nuclear Power Station To GTS Duratek	m^3	1.16E+02	
Oak Ridge, TN for Super-Compaction, Incineration, etc.	Ci	1.03E+00	25%
From Millstone Nuclear Power Station To Envirocare	m^3	2.69E+00	
Clive, UT for Burial	Ci	1.59E-03	25%
From GTS Duratek to Chem-Nuclear Services, Inc.	m^3	2.03E-02	
Barnwell, SC for Burial	Ci	1.72E-03	25%
From GTS Duratek To Envirocare	m^3	1.14E+01	
Clive, UT for Burial	Ci	7.38E-01	25%
From Manufacturing Sciences Corporation To Envirocare	m^3	1.23E+00	
Clive, UT for Burial	Ci	4.00E-03	25%

c. Irradiated components, control rods, etc.

Disposition	Units	Annual Totals	Est. Total Error %
No shipments made in 1999	m^3	0.00E+00	
	Ci	0.00E+00	N/A

d. Other - (Oil, Oily Sludge)

Disposition	Units	Annual Totals	Est. Total Error %
From Millstone Nuclear Power Station To GTS Duratek	m^3	8.81E-01	
Oak Ridge, TN for Super-Compaction, Incineration, etc.	Ci	1.30E-03	25%

d. Other - (Water)

Disposition	Units	Annual Totals	Est. Total Error %
From Millstone Nuclear Power Station To GTS Duratek	m3	1.49E+02	
Oak Ridge, TN for Incineration	Ci	6.80E-02	25%

d. Other - (Mixed Waste)

Disposition	Units	Annual Totals	Est. Total Error %
From Millstone Nuclear Power Station To Diversified Scientific Services Inc.	m3	8.07E+00	
Oak Ridge, TN for Incineration	Ci	6.22E-05	25%

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

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

From Millstone Nuclear Power Station To Allied Technical Group, Inc. - Oak Ridge TN for Thermal Destruction

Radionuclide	% of Total (Estimate)	Curies
H-3	0.024%	9.40E-03
C-14	<0.01%	5.76E-04
Mn-54	0.304%	1.19E-01
Fe-55	5.053%	1.98E+00
Co-60	23.479%	9.20E+00
Ni-63	67.375%	2.64E+01
Sr-90	0.029%	1.14E-02
Cs-134	0.643%	2.52E-01
Cs-137	3.088%	1.21E+00
Pu-238	<0.01%	6.87E-05
Pu-239	<0.01%	1.11E-05
Pu-241	<0.01%	1.15E-03
Am-241	<0.01%	3.60E-05
Cm-244	<0.01%	8.99E-05
		3.92E+01

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

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

From Allied Technical Group, Inc. To Chem-Nuclear Services, Inc. - Barnwell, SC for Burial

Radionuclide	% of Total (Estimate)	Curies
H-3	0.024%	8.85E-03
C-14	<0.01%	5.42E-04
Mn-54	0.304%	1.12E-01
Fe-55	5.053%	1.86E+00
Co-60	23.479%	8.66E+00
Ni-63	67.375%	2.49E+01
Sr-90	0.029%	1.07E-02
Cs-134	0.643%	2.37E-01
Cs-137	3.088%	1.14E+00
Pu-238	<0.01%	6.47E-05
Pu-239	<0.01%	1.05E-05
Am-241	<0.01%	3.39E-05
Pu-241	<0.01%	1.08E-03
Cm-244	<0.01%	8.47E-05
	100%	3.69E+01

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

b. Dry compressible waste, contaminated equipment, etc.

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

Radionuclide	% of Total (Estimate)	Curies
H-3	<0.01%	1.38E-02
C-14	0.036%	2.03E-01
Cr-51	<0.01%	3.50E-06
Mn-54	0.700%	3.94E+00
Fe-55	73.026%	4.11E+02
Co-57	0.011%	6.36E-02
Co-58	<0.01%	1.21E-03
Fe-59	<0.01%	5.21E-08
Co-60	12.278%	6.91E+01
Ni-63	11.940%	6.72E+01
Zn-65	<0.01%	4.47E-02
Sr-89	<0.01%	8.63E-09
Sr-90	<0.01%	2.64E-02
Nb-95	<0.01%	1.20E-10
Zr-95	<0.01%	1.49E-05
Ag-110m	0.022%	1.22E-01
Sn-113	<0.01%	3.74E-04
Sb-125	0.462%	2.60E+00
Cs-134	0.143%	8.04E-01
Cs-137	1.318%	7.42E+00
Ce-144	<0.01%	1.38E-05
Np-237	<0.01%	9.79E-09
Pu-238	<0.01%	4.73E-03
Pu-239	<0.01%	1.81E-03
Pu-241	0.045%	2.56E-01
Am-241	<0.01%	2.46E-03
Pu-242	<0.01%	2.04E-07
Cm-242	<0.01%	1.18E-04
Cm-244	<0.01%	6.66E-03
		5.63E+02

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

b. Dry compressible waste, contaminated equipment, etc.

From Millstone Nuclear Power Station To HAKE - Oak Ridge, TN for Decontamination.

Radionuclide	% of Total (Estimate)	Curies
H-3	9.588%	4.44E-04
C-14	0.110%	5.09E-06
Cr-51	5.852%	2.71E-04
Mn-54	5.939%	2.75E-04
Fe-55	31.314%	1.45E-03
Co-58	13.929%	6.45E-04
Co-60	11.532%	5.34E-04
Ni-63	16.629%	7.70E-04
Zr-95	0.834%	3.86E-05
Sb-125	1.315%	6.09E-05
Cs-137	2.959%	1.37E-04
		4.63E-03

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 (Estimate)	Curies
H-3	0.624%	6.44E-03
C-14	0.086%	8.91E-04
Cr-51	5.385%	5.56E-02
Mn-54	5.845%	6.03E-02
Fe-55	40.224%	4.15E-01
Co-57	0.009%	9.54E-05
Co-58	12.894%	1.33E-01
Co-60	12.698%	1.31E-01
Ni-63	17.357%	1.79E-01
Zn-65	0.030%	3.12E-04
Sr-89	0.160%	1.65E-03
Sr-90	<0.01%	6.85E-06
Nb-95	0.023%	2.39E-04
Zr-95	0.410%	4.23E-03
Ag-110m	0.112%	1.16E-03
Sn-113	0.010%	1.04E-04
Sb-125	1.301%	1.34E-02
Cs-137	2.739%	2.83E-02
Pu-238	<0.01%	1.64E-06
Pu-239	<0.01%	6.98E-07
Pu-241	0.091%	9.37E-04
Am-241	<0.01%	9.57E-07
Cm-242	<0.01%	6.51E-07
Cm-244	<0.01%	1.85E-06
		1.03E+00

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

b. Dry compressible waste, contaminated equipment, etc.

From Millstone Nuclear Power Station To Envirocare. - Clive, UT for Burial

Radionuclide	% of Total (Estimate)	Curies
H-3	38.492%	6.11E-04
C-14	0.051%	8.15E-07
Cr-51	3.982%	6.32E-05
Mn-54	4.045%	6.42E-05
Fe-55	21.357%	3.39E-04
Co-58	9.450%	1.50E-04
Co-60	7.875%	1.25E-04
Ni-63	11.340%	1.80E-04
Sr-89	0.123%	1.96E-06
Zr-95	0.320%	5.08E-06
Sb-125	0.895%	1.42E-05
Cs-137	2.010%	3.19E-05
Pu-241	0.061%	9.71E-07
		1.59E-03

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

b. Dry compressible waste, contaminated equipment, etc.

From GTS Duratek To Chem-Nuclear Services, Inc. - Barnwell, SC for Burial

Radionuclide	% of Total (Estimate)	Curies
H-3	73.446%	1.26E-03
C-14	0.286%	4.92E-06
Mn-54	0.812%	1.40E-05
Fe-55	15.181%	2.61E-04
Co-58	0.700%	1.20E-05
Co-60	3.705%	6.37E-05
Ni-63	2.036%	3.50E-05
Zr-95	2.157%	3.71E-05
Sb-125	0.096%	1.65E-06
Cs-134	0.088%	1.52E-06
Cs-137	1.495%	2.57E-05
		1.72E-03

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

b. Dry compressible waste, contaminated equipment, etc.

From GTS Duratek To Envirocare. - Clive, UT for Burial

Radionuclide	% of Total (Estimate)	Curies
H-3	1.109%	8.19E-03
C-14	0.105%	7.75E-04
Cr-51	6.069%	4.48E-02
Mn-54	6.221%	4.59E-02
Fe-55	34.437%	2.54E-01
Co-57	0.001%	5.72E-06
Co-58	14.426%	1.07E-01
Co-60	13.280%	9.81E-02
Ni-63	18.045%	1.33E-01
Zn-65	0.111%	8.17E-04
Sr-89	0.189%	1.40E-03
Sr-90	<0.01%	5.57E-05
Zr-95	0.501%	3.70E-03
Tc-99	<0.01%	3.86E-06
Ag-110m	0.011%	7.89E-05
Sn-113	<0.01%	6.23E-06
Sb-125	1.377%	1.02E-02
I-129	<0.01%	6.58E-05
Cs-134	0.649%	4.80E-03
Cs-137	3.353%	2.48E-02
Pu-238	<0.01%	9.60E-08
Pu-239	<0.01%	4.20E-08
Am-241	<0.01%	5.40E-08
Pu-241	0.099%	7.28E-04
Cm-242	<0.01%	3.60E-08
Cm-244	<0.01%	1.08E-07
		7.38E-01

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

b. Dry compressible waste, contaminated equipment, etc.

From Manufacturing Sciences Corporation To Envirocare - Clive, UT for Burial

Radionuclide	% of Total (Estimate)	Curies
C-14	1.488%	5.96E-05
Mn-54	3.198%	1.28E-04
Fe-55	60.311%	2.41E-03
Co-58	3.435%	1.38E-04
Co-60	13.754%	5.51E-04
Ni-63	9.808%	3.93E-04
Zn-65	2.940%	1.18E-04
Cs-134	0.176%	7.05E-06
Cs-137	4.890%	1.96E-04
		4.00E-03

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 Super-Compaction, Incineration, etc.

Radionuclide	% of Total (Estimate)	Curies
H-3	22.017%	2.87E-04
C-14	<0.01%	3.70E-08
Mn-54	<0.01%	4.36E-08
Fe-55	2.823%	3.68E-05
Co-58	<0.01%	1.86E-08
Co-60	1.166%	1.52E-05
Ni-63	1.527%	1.99E-05
Sr-90	0.002%	2.11E-08
Cs-134	0.038%	4.90E-07
Cs-137	72.420%	9.44E-04
		1.30E-03

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 (Estimate)	Curies
H-3	40.766%	2.77E-02
C-14	0.665%	4.52E-04
P-32	4.214%	2.86E-03
P-33	<0.01%	5.20E-08
S-35	5.973%	4.06E-03
Cr-51	0.018%	1.23E-05
Mn-54	<0.01%	5.52E-06
Fe-55	0.396%	2.69E-04
Co-57	<0.01%	6.62E-07
Co-58	<0.01%	4.82E-08
Co-60	0.179%	1.21E-04
Ni-63	<0.01%	1.70E-06
Zn-65	<0.01%	3.48E-06
Sr-90	3.032%	2.06E-03
Tc-99	0.149%	1.01E-04
In-111	<0.01%	2.08E-07
I-125	<0.01%	1.20E-06
Sb-125	0.011%	7.40E-06
I-131	<0.01%	1.34E-09
Cs-134	0.010%	7.12E-06
Cs-137	44.565%	3.03E-02
Ra-226	<0.01%	1.91E-07
U-234	<0.01%	4.65E-07
U-235	<0.01%	9.72E-08
U-238	<0.01%	4.99E-07
Pu-238	<0.01%	2.26E-08
Pu-239	<0.01%	1.13E-06
Pu-241	<0.01%	2.95E-10
Am-241	<0.01%	2.09E-07
		6.80E-02

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 (Estimate)	Curies
H-3	94.310%	5.87E-05
C-14	<0.01%	1.47E-09
Mn-54	0.029%	1.83E-08
Fe-55	3.904%	2.43E-06
Co-60	0.807%	5.02E-07
Ni-63	0.765%	4.76E-07
Cs-137	0.183%	1.14E-07
		6.22E-05

3. Solid Waste Disposition (Shipments from Millstone)

Number of Shipments	Mode of Transportation	Destination
1	Truck (Sole Use Vehicle)	Allied Technical Group Inc. - Oak Ridge, TN
15	Truck (Sole Use Vehicle)	GTS Duratek - Oak Ridge, TN
1	Truck (Sole Use Vehicle)	Diversified Scientific Services Inc. - Oak Ridge, TN
1	Truck (Sole Use Vehicle)	Envirocare. - Clive, UT
1	Truck (Sole Use Vehicle)	Chem-Nuclear Services, Inc. - Barnwell, SC
2	Truck (Sole Use Vehicle)	HAKE - Oak Ridge, TN

B. IRRADIATED FUEL SHIPMENTS (Disposition)

Number of Shipments	Mode of Transportation	Destination
No Shipments in 1999	N/A	N/A

3.0 REMODCM Changes

In 1999, the following changes were made to the Millstone REMODCM:

Section I (REMM)	Change 99-2	Rev 14	Effective April 30, 1999 Note: No Rev 13 issued
	Change 99-4 to 99-11	Rev 15	Effective October 1, 1999
	Change 99-13	Rev 16	Effective October 1, 1999
	Change 99-12	Rev 17	Effective November 18, 1999
Section II (ODCM)	Change 99-1	Rev 13	Effective March 3, 1999
	Change 99-3	Rev 14	Effective April 30, 1999
	Change 99-4 to 99-11	Rev 15	Effective October 1, 1999
	Change 99-12	Rev 17	Effective November 18, 1999

The description and the bases for the changed pages for each REMODCM revision are included in this report. In addition, a complete updated copy of the REMODCM, as of 12/31/99, is provided to the Nuclear Regulatory Commission along with this report.

REMODCM Changes

Revision 13

March 3, 1999

Radiological Environmental Review
REMODCM Rev 13

DESCRIPTION OF THE CHANGE

Section E.7 of Part II of the REMODCM is being revised to change the required Unit 2 RBCCW radiation monitor setpoint. For power operations, the calculated setpoint is revised from 9,000 to 2,000 cpm plus background. For three month outages the setpoint is revised from 1,900 to 415 cpm plus background. For extended shutdowns from three months to three years the setpoint is revised from 400 to 80 cpm plus background. Extended outages beyond three years would require recalculation of the setpoint. These setpoint values are based on Calculation RERM-02665-R2, Rev 1.

The change does not affect Units 1 or 3.

AFFECT OF THE CHANGE

The RBCCW setpoint is needed to satisfy the requirement of Technical Specifications 3.3.3.9 and 3.11.1.1 that any leakage of contaminated RBCCW water into the service water system does not result in a discharge of service water to the environment with concentrations of radioactivity greater than the limits in 10CFR20. Because of concerns with system design impacts on the validity of the setpoint, it was recalculated with Calculation RERM-02665-R2, Rev 0. Revision 1 was required because of a wrong assumption in the original calculation. It was assumed that mixing of water between the two RBCCW trains would compensate for sample line dilution. This revision uses a factor to correct for worse case sample line dilution. It resulted in a lowering of the required maximum allowed setpoint.

Because the present Cs-137 contamination in the RBCCW system is part of the calculated setpoint it was recommended in Calculation RERM-02665-R2, Rev 1 that the background be reduced by 100 cpm before addition of the setpoint.

Compared to the calculation, the proposed ODCM change applies a more conservative setpoint of two times the radiation monitor background reading unless the reading equals or exceeds the setpoint. As recommended in the calculation, provisions are required to adjust the setpoint if the monitor reading decreases when background is equal to or greater than the setpoint. There is also an allowance for larger dilution flows than the 4,000 gpm used in the calculation. As allowed in Calculation RERM-02665-R2, Rev 1, crediting of larger dilution flows would allow a proportionately larger setpoint which would still maintain a margin below limits.

This revised calculation assume very conservative parameters to ensure that the monitor alarms well before the limits could be reached. Moreover, the worse case scenario which would cause the setpoint to be reached is extremely unlikely. It would involve simultaneous major leaks into the RBCCW system and from RBCCW into the Service Water system. Any contaminating leakage into the RBCCW system would, in almost every case, be detected by the weekly Chemistry sample prior to reaching the alarm setpoint.

CONCLUSION

These changes to the REMODCM do not constitute an Unreviewed Radiological Environmental Impact. They will not increase the amount of curies released from the site or the public dose and they will maintain the level of radioactive effluent control required by Technical Specifications, the FSAR, 10CFR20.1301, 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.

Prepared by: Claude Flory Date: 2/2/99

Claude Flory, NES/SAB/NED

Approved by: William Eakin Date: 2/2/99

William Eakin, NES/SAB/NED

File: remodr13

Safety Evaluation Screen Form [♣Comm. 3.6]

REMODCM Rev 13 and Calc RERM-02665-R2, Rev 1

(Sheet 1 of 4)

Unit ____ **Document No.** REMODCM **Revision No.** 13 **Change No.** 0

AND

Unit 2 **Document No.** Calc RERM-02665-R2 **Revision No.** 1 **Change No.** 0

A. SUMMARY INFORMATION *(Completed by the Preparer)*

1. Description of the Proposed Change, Test or Experiment

   Section E.7 of Part II of the REMODCM is being revised to change the Unit 2 RBCCW radiation monitor (RM-6038) setpoint based on Revision 1 of Calculation RERM-02665-R2. The setpoint is needed to satisfy the requirement of Technical Specifications 3.3.3.9 and 3.11.1.1 that any leakage of contaminated RBCCW water into the service water system does not result in a discharge of service water to the environment with concentrations of radioactivity greater than the limits in 10CFR20. Revision 1 was required because of a wrong assumption in the original calculation's. It was assumed that mixing of water between the two RBCCW trains would compensate for sample line dilution. This revision uses a factor to correct for worse case sample line dilution. For power operations, the calculated setpoint is revised from 9,300 to 2,100 cpm plus background. For three month outages the setpoint is revised from 2,000 to 515 cpm plus background. For extended shutdowns from three months to three years the setpoint is revised from 510 to 180 cpm plus background. There is an allowance for larger dilution flows than the 4,000 gpm used in the calculation. Crediting of larger dilution flows would allow a proportionately large setpoint.

B. SCREENING QUESTIONS *(Completed by the Preparer)*

1. Will implementation of the proposed Change, Test or Experiment require a revision to the Operating License or the Technical Specifications? *(If "Yes," complete (a.), go to Section D and sign as Preparer - prior NRC review and approval is required. If "No," complete (b) and go to Question 2.)*

   ☐ Yes *(OL or T/S change required)* ☒ No

   a. *Reason OL or T/S change required and sections impacted:*

   b. *Reason OL or T/S change not required and sections reviewed:*

      The operating license does not address the RBCCW radiation monitor or setpoints for limiting discharge of radioactive materials in liquids. This calculation provides an RBCCW radiation monitor setpoint which ensures that Technical Specification 3.3.3.9, "LCO for Radioactive Liquid Effluent Monitoring Instrumentation", and Technical Specification 3.11.1.1, "LCO for Liquid Effluents Concentration" are satisfied. There are no other Technical Specifications impacted by this calculation.

Safety Evaluation Screen Form [*Comm. 3.6]
REMODCM Rev 13 and Calc RERM-02665-R2, Rev 1

2. Is the proposed Change, Test or Experiment fully bounded by the scope of a previously approved Safety Evaluation? *(Refer to Section B.2 of Attachment 6 to determine if fully bounded. If "Yes," complete (a.) and (b.), go to Section D and sign as Preparer - a new SE is not required. If "No," go to Question 3.)*

   ☐ Yes *(new SE not required)* ☒ No

   a. *Identification of previously approved SE:*

   b. *Reason previously approved SE fully bounds proposed activity:*

3. Is it obvious that the proposed Change, Test or Experiment requires a Safety Evaluation? *(If "Yes," a SE is required – complete (a.), go to Section D and sign as Preparer. If "Not Obvious," go to Question 4. If it is not clear, a SE is required.)*

   ☐ Yes *(SE required)* ☒ Not Obvious

   a. *Reason SE required:*

4. Does the proposed activity meet the criteria of a Non-Intent Change to the Facility or procedures as described in the SAR? *(Refer to the guidance in Section B.4 of Attachment 6 to determine if Non-intent. If a Non-intent Change, check "Yes," complete (a.) go to Section D, and sign as Preparer - a SE is not required. If "No," go to Question 5.)*

   ☐ Yes *(SE not required)* ☒ No

   a. *Reason SE not required and SAR sections reviewed:*

5. Will implementation of the proposed activity modify the Facility as described in the SAR? *(Per the guidance in Section B.5 of Attachment 6, ensure that you check "Yes" if the proposed activity could directly or indirectly, as a result of a system interaction, introduce different failure modes or affect the function or reliability of equipment described in the SAR. If "Yes," complete (a.), go to Section D and sign as Preparer - a SE is required. If "No," complete (b.) and go to Question 6.)*

   ☐ Yes *(SE required)* ☒ No

   a. *Reason SE required and SAR sections impacted:*

   b. *Basis for "No" and SAR sections reviewed:*

   This change will only reduce the setpoint on the RBCCW radiation monitor. Setpoint adjustment is done at the Control Room Module (CRM) which is designed to perform this function. Modifications to facilities, equipment, or instrumentation as described in the FSAR will not be needed to lower the setpoint.

   SAR sections impacted are the same as those listed in Section 6.b.

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REMODCM Rev 13 and Calc RERM-02665-R2, Rev 1
(Sheet 3 of 4)

6. Will implementation of the proposed activity modify procedures as described in the SAR? *(Refer to the list of supplemental questions in Section B.6 of Attachment 6 to evaluate the need for a SE. If "Yes," complete (a.), go to Section D and sign as Preparer - a SE is required. If "No," complete (b.) and go to Question 7.)*

☐ Yes *(SE required)* ☒ No

a. *Reason SE required and SAR sections impacted:*

b. *Basis for "No" and SAR sections reviewed:*

This calculation defines limits on the RBCCW high radiation monitor setpoint. Because it is based on the monitor background reading, the setpoint would have to be adjusted as background changes. This is routinely done using Operations procedures SP2654K and OP2383C. The FSAR states that the function of the radiation monitor is to prevent releases above the limits in 10CFR20; it does not describe the method by which the setpoint is determined for this purpose.

The RBCCW radiation monitor is not one of the instrumentation used to monitor operation of the RBCCW system during normal operation or during a LOCA accident (see FSAR Sections 9.4.3.1 and 9.4.3.2 on pages 9.4-4 and 9.4-6.) It is used to monitor the RBCCW system water for radioactivity. The setpoint calculation does not contradict any description of the use of the monitor to detect RBCCW system water radioactivity or to alarm upon high radioactivity.

Therefore implementation of this change will not modify any procedure as described in the FSAR.

SAR sections reviewed:

1.2.10.3 - Reactor Building Closed Cooling Water System

1.2.10.6 - Cooling Water Systems

1.8.2.1 - Release of Radioactivity in Case of Damaged Fuel Assemblies in Spent Fuel Pool

7.5.6.2 - Liquid Radiation Monitoring System

9.4 - Reactor Building Closed Cooling Water System

9.7.2 - Service Water System

7. Will implementation of the proposed activity involve a Test or Experiment *not* described in the SAR? *(Refer to the list of examples in Section B.7 of Attachment 6 to determine the need for a SE. If "Yes," complete (a.), go to Section D and sign as Preparer - a SE is required. If "No," complete (b.), go to Section D and sign as Preparer.)*

☐ Yes *(SE required)* ☒ No

a. *Reason SE required:*

b. *Basis for "No" and SAR sections reviewed:*

The only activities which this calculation will generate are an adjustment of the RBCCW radiation monitor setpoint and procedure changes to show the new setpoint and to limit the monitor background below the background limit. No tests or experiments will be needed for these activities.

Safety Evaluation Screen Form [♣Comm. 3.6]
REMODCM Rev 13 and Calc RERM-02665-R2, Rev 1

C. SUMMARY *(Completed by the Approver)*

1. Is a revision to the technical specifications or operating license required? *("Yes, if Question B.1 checked "Yes")*
   ☐ Yes ☐ No
2. Is a Design Engineering Screening Evaluation per the Design Change Manual Required? *(Yes, if proposed Change is an Intent Change to the Facility as described in the SAR)*
   ☐ Yes ☐ No ☐ Not Applicable
3. Is a new Safety Evaluation required? *(Yes, if Question B.1, B.3, B.5, B.6 or B.7 is checked "Yes")*
   ☐ Yes ☐ No
4. Is a FSARCR per RAC 03 necessary? *(Yes, if responses to Question B.5 or B.6 indicate proposed activity will cause the FSAR description to be incorrect)*
   ☐ Yes ☐ No ☐ Not Applicable
5. Is the proposed activity fully bounded by a previously approved Safety Evaluation? *(Yes, if Question B.2 is checked "Yes")*
   ☐ Yes ☐ No
6. Is the Quality Assurance Plan, Emergency Plan or Security Plan affected requiring an evaluation per RAC 01? *(Yes, if response to Question B.5, B.6, or B.7 identifies these portions of the SAR as being affected by the proposed activity)*
   ☐ Yes ☐ No ☐ Not Applicable

D. APPROVAL

Preparer: Claude Flory/James Wheeler Date: 2/5/09
Print and Sign

Reviewer: *(if required)* _____ Date: _____
Print and Sign

Approver: Michael Kai SIGNATURE ON ATTACHED FAX PAGE Date: _____
Print and Sign

Level of Use Information

STOP THINK ACT REVIEW

Safety Evaluation Screen Form [*Comm. 3.6]
REMODCM Rev 13 and Calc RERM-02665-R2, Rev 1
(Sheet 4 of 4)

C. SUMMARY *(Completed by the Approver)*

1. Is a revision to the technical specifications or operating license required? *("Yes, if Question B.1 checked "Yes")*
   ☐ Yes ☒ No
2. Is a Design Engineering Screening Evaluation per the Design Change Manual Required? *(Yes, if proposed Change is an Intent Change to the Facility as described in the SAR)*
   ☐ Yes ☒ No ☐ Not Applicable Addressed in REMODCM change process per NGP 6.09 proc. changes have been identified.
3. Is a new Safety Evaluation required? *(Yes, if Question B.1, B.3, B.5, B.6 or B.7 is checked "Yes")*
   ☐ Yes ☒ No
4. Is a FSARCR per RAC 03 necessary? *(Yes, if responses to Question B.5 or B.6 indicate proposed activity will cause the FSAR description to be incorrect)*
   ☐ Yes ☒ No ☐ Not Applicable
5. Is the proposed activity fully bounded by a previously approved Safety Evaluation? *(Yes, if Question B.2 is checked "Yes")*
   ☐ Yes ☒ No
6. Is the Quality Assurance Plan, Emergency Plan or Security Plan affected requiring an evaluation per RAC 01? *(Yes, if response to Question B.5, B.6, or B.7 identifies these portions of the SAR as being affected by the proposed activity)*
   ☐ Yes ☒ No ☐ Not Applicable

D. APPROVAL

Preparer: Claude Flory/James Wheeler Date: 2/5/99
Print and Sign

Reviewer: *(if required)* _____ Date: _____
Print and Sign

Approver: Michael Kai Date: 2/8/99
Print and Sign

Level of Use Information

REMODCM Changes

Revision 14

April 30, 1999

TECHNICAL EVALUATION

RA-EV-99-0001

Revision 0

and

RADIOLOGICAL ENVIRONMENTAL REVIEW

RER-99-004

for

REMODCM Rev 14

April 12, 1999

Total Number of Pages: 5

Claude Flory	Preparer	4/12/99 Date
James Wheeler	Independent Reviewer	4/12/99 Date
William Eakin	Supervisor	4/14/99 Date
Michael Kai	Manager	4/19/99 Date

1.0 PURPOSE

The purpose of this technical evaluation is to perform a detailed Radiological Environmental Review of Revision 14 to the Radiological Effluent Monitoring and Offsite Dose Calculation Manual (REMODCM) in accordance with NGP 6.09 and NGP 5.16.

2.0 BACKGROUND

Two changes are being made to the REMODCM for Revision 14:

1) Section C.2 of Part I (REMM) is being changed by deleting the portable disposable dimineralizer from the list of Unit 2 liquid radwaste processing equipment which would be required to be in service if a monthly dose projection exceeded certain criteria.
2) Section E.9 of Part II (ODCM) is being revised by deleting the requirement for an alarm setpoint on the Unit 3 Regenerant Evaporator Radiation Monitor (LWC-RE65).

3.0 DISCUSSION

Each month doses to the public from Unit 2 radioactive liquid effluents are estimated for the next month. If an estimated dose exceeds 0.06 mrem to the total body or 0.2 mrem to any organ, any inoperable processing equipment listed in Section C.2 of Part I of the REMODCM would have to be returned to service. A special report to the NRC is required if a piece of equipment is not returned to service and the actual dose at the end of the month exceeds 0.06 mrem to the total body or 0.2 mrem to any organ with 10% of the dose from the pathway with inoperable equipment. The portable disposable demineralizer has been removed from the FSAR with FSARCR 98-MP2-167 approved by PORC on April 5, 1999. The FSAR Chapter 11 design basis for radioactivity releases and dose to the public was recalculated for the FSAR change. The new calculation did not include the portable disposable demineralizer because it has not been used and there are no plans to use it. Removing the demineralizer would not cause a design increase in radioactivity released or dose because it was not credited in the design calculation. Nor would it cause an actual release in radioactivity released or dose because it has never been used.

The Unit 3 Condensate Demineralizer Liquid Waste (LWC) System has been removed from service with DCR M3-97041. Removal of the system will not change the capability for monitoring of systems and releases, which may contain radioactive material. Because the LWC system will be isolated and drained, it will not contain any radioactive material. Therefore the setpoint requirement in Section E.9 of Part II of the REMODCM for the Unit 3 Regenerant Evaporator Radiation Monitor (LWC-RE65) is no longer needed.

4.0 SAFETY-SIGNIFICANCE

Both changes to the REMODCM are needed because of a change to the Unit 3 plant and a change to the Unit 2 FSAR.

The Unit 2 portable disposable demineralizer was removed from Chapter 11 of the FSAR. Safety Evaluation S2-EV-99-0008 concluded that this change was safe and was not an USQ.

The removal from service of the Unit 3 Condensate Demineralizer Liquid Waste System was evaluated in Safety Evaluation S3-EV-97-0227 which concluded that the change was safe and was not an USQ. With this system removed from service, there is no need for a effluent radiation monitor on this system. Therefore, deleting the requirement for a setpoint in the REMODCM is also safe.

5.0 CONCLUSION

The two proposed changes to the REMODCM for Revision 14, deletion of the Unit 2 portable disposable dimineralizer from Section C.2 of Part I and deletion of a requirement for an alarm setpoint on the Unit 3 Regenerant Evaporator Radiation Monitor from Section E.9 of Part II, are needed because of changes to the plant or the FSAR which have already been determined to be safe.

These changes to the REMODCM would not cause an increase in release of radioactivity to the environment or of dose to the public as allowed by the design bases of the FSAR. The changes also will not affect the level of radioactive effluent control required by Technical Specifications, the 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.

6.0 ATTACHMENTS

1. Independent Reviewer Comment and Resolution Sheets, dated 04-05-99.

Independent Reviewer Comment and Resolution Sheet(s)

ER/EV No. RA-EV-99-0001 Rev. 0

Independent Reviewer Name: James Wheeler Date: 4/12/99

Comment No.	ER/EV Section	Comment
1.	3.0, 4.0	Change "Unit 3 Condensate Liquid Waste System" to "Unit 3 Condensate Demineralizer Liquid Waste System."
2.	3.0	Identify the FSARCR for the Unit 2 FSAR which removes the portable disposable demineralizer.
3.	3.0	In the second paragraph change first sentence to past tense because action to remove the Unit 3 LWC system is completed.
4.	4.0	In the first sentence change "other changes" to "a change to the Unit 3 plant and a change to the Unit 2 FSAR."
5.	4.0	In the last paragraph edit the first sentence to begin "The removal from service of the Unit 3 Condensate Demineralizer Liquid Waste System was evaluated..."
6.	4.0	In the last paragraph add the words "on this system" to the end of the second sentence.
7.	5.0	In the first paragraph change the words "other changes" to "changes to the plant or the FSAR."
8.	5.0	It is concluded that there is no increase in release of radioactivity to the environment. The information in this evaluation does not support that conclusion for removal of the Unit 2 portable disposable demineralizer.
9.		
10.		
11.		
12.		
13.		
14.		
15.		

Comments Resolved:

ER/EV Preparer Signature: Claude Flory Date 4/12/99

Independent Reviewer Concurrence: [signature] Date 4/12/99

If Applicable, Manager's Signature: N/A Date

Independent Reviewer Comment and Resolution Sheet(s)

ER/EV No. RA-EV-99-0001 Rev. 0

Comment No.	Resolution	Resolved By	Date
1.	Changed according to comment.	CAF	4/12/99
2.	Identified the FSARCR as 98-MP2-167 approved by PORC on April 5, 1999.	CAF	4/12/99
3.	Changed according to comment.	CAF	4/12/99
4.	Changed according to comment.	CAF	4/12/99
5.	Changed according to comment.	CAF	4/12/99
6.	Changed according to comment.	CAF	4/12/99
7.	Changed according to comment.	CAF	4/12/99
8.	Added additional discussion at end of the first paragraph in Section 3.0 to explain how the removal of the Unit 2 portable disposable demineralizer does not cause an increase in release of radioactivity.	CAF	4/12/99
9.			
10.			
11.			
12.			
13.			
14.			
15.			

Safety Evaluation Screen Form [*Comm. 3.6]

(Sheet 1 of 3)

Unit NA **Document No.** REMODCM **Revision No.** 14 **Change No.** NA

A. SUMMARY INFORMATION *(Completed by the Preparer)*

1. Description of the Proposed Change, Test or Experiment

   Section C.2 of Part I of the Radiological Effluent Monitoring and Offsite Dose Calculation Manual (REMODCM) will be changed by deleting the portable disposable demineralizer from the list of Unit 2 liquid radwaste processing equipment which would be required to be in service if a monthly dose projection exceeded certain criteria. Doses to the public from Unit 2 radioactive gaseous effluents are estimated monthly for the next month. If a projected dose exceeds 0.06 mrem to the total body or 0.2 mrem to any organ, any inoperable processing equipment listed in Section C.2 of Part I of the REMODCM would have to be returned to service. A special report to the NRC is required if a piece of equipment is not returned to service and the actual dose at the end of the month exceeds 0.06 mrem total body or 0.2 mrem any organ with 10% of the dose from the pathway with inoperable equipment.

B. SCREENING QUESTIONS *(Completed by the Preparer)*

1. Will implementation of the proposed Change, Test or Experiment require a revision to the Operating License or the Technical Specifications? *(If "Yes," complete (a.), go to Section D and sign as Preparer - prior NRC review and approval is required. If "No," complete (b) and go to Question 2.)*

   ☐ Yes *(OL or T/S change required)* ☒ No

   a. *Reason OL or T/S change required and sections impacted:*

   b. *Reason OL or T/S change not required and sections reviewed:*

      Use of radwaste processing equipment helps in satisfying the Limiting Conditions for Operations in Technical Specifications. There are specific surveillance requirements for sampling, analyzing, and releasing of; and for calculating doses from; radioactivity in effluents. However, there are no specific requirements in the Operating License or in Technical Specifications for operations of radioactive waste processing equipment. Administrative Technical Specification 6.15 requires that the REMODCM specify operating guidelines for radioactive waste treatment systems. This change removes a specific piece of processing equipment, but the operating guidelines in the REMODCM are retained.

      T.S. 3/4.11.1, "Radioactive Effluents - Liquid Effluents"

      T.S. 3/4.11.3, "Radioactive Effluents - Total Dose"

      T.S. 6.15, "Radiological Effluent Monitoring and Off-Site Dose Calculation Manual"

Safety Evaluation Screen Form [♣Comm. 3.6]

(Sheet 2 of 3)

2. Is the proposed Change, Test or Experiment fully bounded by the scope of a previously approved Safety Evaluation? *(Refer to Section B.2 of Attachment 6 to determine if fully bounded. If "Yes," complete (a.) and (b.), go to Section D and sign as Preparer - a new SE is not required. If "No," go to Question 3.)*

   ☒ Yes *(new SE not required)* ☐ No

   a. *Identification of previously approved SE:*

      S2-EV-98-0008 for FSARCR 98-MP2-167, "FSARCR for Section 11.1, Radioactive Waste Processing Systems"

   b. *Reason previously approved SE fully bounds proposed activity:*

      The SE addresses changes to Chapter 11 of the FSAR including deletion of the portable disposable demineralizer. Deletion of this equipment was justified in the SE because the radiological design basis for release of radioactivity in effluents was revised without the use of the equipment.

3. Is it obvious that the proposed Change, Test or Experiment requires a Safety Evaluation? *(If "Yes," a SE is required – complete (a.), go to Section D and sign as Preparer. If "Not Obvious," go to Question 4. If it is not clear, a SE is required.)*

   ☐ Yes *(SE required)* ☐ Not Obvious

   Reason SE required:

4. Does the proposed activity meet the criteria of a Non-Intent Change to the Facility or procedures as described in the SAR? *(Refer to the guidance in Section B.4 of Attachment 6 to determine if Non-intent. If a Non-intent Change, check "Yes," complete (a.) go to Section D, and sign as Preparer - a SE is not required. If "No," go to Question 5.)*

   ☐ Yes *(SE not required)* ☐ No

   a. *Reason SE not required and SAR sections reviewed:*

5. Will implementation of the proposed activity modify the Facility as described in the SAR? *(Per the guidance in Section B.5 of Attachment 6, ensure that you check "Yes" if the proposed activity could directly or indirectly, as a result of a system interaction, introduce different failure modes or affect the function or reliability of equipment described in the SAR. If "Yes," complete (a.), go to Section D and sign as Preparer - a SE is required. If "No," complete (b.) and go to Question 6.)*

   ☐ Yes *(SE required)* ☐ No

   a. *Reason SE required and SAR sections impacted:*

   b. *Basis for "No" and SAR sections reviewed:*

6. Will implementation of the proposed activity modify procedures as described in the SAR? *(Refer to the list of supplemental questions in Section B.6 of Attachment 6 to evaluate the need for a SE. If "Yes," complete (a.), go to Section D and sign as Preparer - a SE is required. If "No," complete (b.) and go to Question 7.)*

   ☐ Yes *(SE required)* ☐ No

   a. *Reason SE required and SAR sections impacted:*

   b. *Basis for "No" and SAR sections reviewed:*

Safety Evaluation Screen Form [♣Comm. 3.6]

(Sheet 3 of 3)

7. Will implementation of the proposed activity involve a Test or Experiment *not* described in the SAR? *(Refer to the list of examples in Section B.7 of Attachment 6 to determine the need for a SE. If "Yes," complete (a.), go to Section D and sign as Preparer - a SE is required. If "No," complete (b.), go to Section D and sign as Preparer.)*

   ☐ Yes *(SE required)* ☐ No

   a. *Reason SE required:*

   b. *Basis for "No" and SAR sections reviewed:*

C. SUMMARY *(Completed by the Approver)*

1. Is a revision to the technical specifications or operating license required? *("Yes, if Question B.1 checked "Yes")*

   ☐ Yes ☒ No

2. Is a Design Engineering Screening Evaluation per the Design Change Manual Required? *(Yes, if proposed Change is an Intent Change to the Facility as described in the SAR)*

   ☐ Yes ☒ No ☐ Not Applicable

3. Is a new Safety Evaluation required? *(Yes, if Question B.1, B.3, B.5, B.6 or B.7 is checked "Yes")*

   ☐ Yes ☒ No

4. Is a FSARCR per RAC 03 necessary? *(Yes, if responses to Question B.5 or B.6 indicate proposed activity will cause the FSAR description to be incorrect)*

   ☐ Yes ☒ No ☐ Not Applicable

5. Is the proposed activity fully bounded by a previously approved Safety Evaluation? *(Yes, if Question B.2 is checked "Yes")*

   ☒ Yes ☐ No

6. Is the Quality Assurance Plan, Emergency Plan or Security Plan affected requiring an evaluation per RAC 01? *(Yes, if response to Question B.5, B.6, or B.7 identifies these portions of the SAR as being affected by the proposed activity)*

   ☐ Yes ☒ No ☐ Not Applicable

D. APPROVAL

Preparer: Claude Flory/James Wheeler Date: 4/12/99
Print and Sign

Reviewer: *(if required)* _____ Date: _____
Print and Sign

Approver: William Eakin Date: 4/14/99
Print and Sign

Level of Use Information

STOP THINK ACT REVIEW

Safety Evaluation Form [+Comm. 3.6]

(Sheet 1 of 13)

(Attachment 7 provides guidance)

Safety Evaluation Number E2-EV-99-0008 Revision No. 0

Activity Document Number FSARCR 98-MP2-167 Revision No. 0

Activity Document Title FSARCR for Section 11.1, Radioactive Waste Processing Systems

A. SUMMARY INFORMATION

1. Description of the Activity

This safety evaluation covers an update to the FSAR Section 11.1, Appendices 11A, 11B, 11C, all associated tables and two new figures. FSAR Sections 1.2.12c, 1.2.13a, 1.7.3.2, 1.A (Criterion 60), 2.3.5.2.1, 4.3.2.4, 9.2.2.1, 9.4.2.1, 9.5.2.1, 10.1, 10.4.6.2, 10.4.6.3, 11.2.1, 11.2 References, Appendix 11D, 14.7.1.3 and Tables 1.3-1, 2.3-1 and 14.7.1-1 are also collaterally impacted and updated accordingly. The change is proposed to address current liquid and gaseous radwaste system process parameters and the availability of certain processing components. These changes required a revision to the 10CFR50 Appendix I compliance analysis and confirmation that effluent concentrations of 10CFR20 are not exceeded.

An updated radiological analysis was performed, using NUREG-0017 Rev. 1 methodology, to quantify the normal expected liquid, gaseous and airborne releases to the environment and resultant doses to the public. The analysis indicates that the current liquid and gaseous waste processing equipment are adequate to ensure that the radiological dose consequences to the public from releases of liquid, gaseous and airborne effluents to the environment during normal operation, including anticipated operational occurrences, will not result in the radiological limits of 10CFR50 Appendix I being exceeded.

The radiological analysis also determined liquid, gaseous and airborne effluent radionuclide concentrations with design reactor coolant activity based on 1% failed fuel during normal operation, including anticipated operational occurrences. The analysis indicates that the current radwaste processing equipment is adequate to ensure that the sum-of-the-fractions of the maximum permissible radionuclide concentration of the liquid, gaseous and airborne releases are significantly less than the 10CFR20 limits.

The radiological analysis supporting the existing FSAR evaluated only the individual liquid and gaseous waste release pathways. This was done using a methodology that pre-dated NUREG-0017. The FSAR also indicated that a "more recent calculation" was provided in the Docketed 1976 report entitled "Demonstration of Compliance with 10CFR50 Appendix I". It is this 1976 report that actually provides the licensing basis for the Millstone Unit 2 radioactive waste processing systems and airborne effluents. Consequently, it is this 1976 report that is being updated to reflect current plant conditions and operating procedures.

The updated analysis considers both liquid and airborne (gaseous) release pathways and uses site-specific parameters as input (with NRC-accepted industry default parameters used in cases where site-specific parameters are unavailable). The input parameters and assumptions used for the Reference 1 analyses were provided in Reference 7. All calculation input parameters have been verified, and assumptions have been evaluated for consistency with NUREG-0017, Rev. 1, methodology. The current process parameters and equipment availability of the liquid and gaseous radwaste processing system components differ from that currently described in Chapter 11 of the FSAR in the following important ways:

- The Degasifier is no longer continuously operated in the clean liquid waste system. However, credit is taken for complete degasification of the letdown stream in the VCT.
- The Boric Acid Evaporator in the clean liquid waste system and the Waste Evaporator in the aerated waste system are no longer used or credited.
- The rate of steam generator blowdown has increased, with resultant effects in the liquid waste processing system and airborne releases.
- The condensate polishing facility regenerant activity is discharged untreated directly to the environment instead of being processed as solid radwaste.
- The containment purge volume activity is no longer normally processed by charcoal filtration.
- Credit is no longer taken for HEPA filtration of the gaseous waste decay tank effluent.

The results of the updated NUREG-0017 analysis show that, while the doses from normal expected liquid, gaseous and airborne effluents have increased, they remain below the limiting 10CFR50 Appendix I guidelines.

	Existing Calculation (Reference 9)	Revised Calculation (Reference 1)	Licensing Bases - 10CFR50 Appendix I Design Objective
Gaseous/Airborne Effluent			
Gamma Air Dose (mrad)	0.013	0.196	10
Beta Air Dose (mrad)	0.010	0.0779	20
Total Body Dose (mrem)	0.009	0.151	5
Skin Dose (mrem)	0.015	0.254	15
Max Organ Dose (mrem)	4.1	8.33	15
Liquid Effluent			
Total Body Dose (mrem)	0.03	0.0603	3
Max Organ Dose (mrem)	0.82	0.913	10

The liquid and gaseous effluent sum-of-the-fractions of the maximum permissible radionuclide concentrations with design 1% fuel failures have also increased, but are significantly less (0.45% and 0.239% respectively) than the 10CFR20 limits.

It must be emphasized that actual radiological effluent releases have not increased. Compliance with the ALARA provisions of 10CFR50 Appendix I and the effluent concentration limits of 10CFR20 are not controlled by this change. They are controlled by compliance with the Radiological Environmental Technical Specifications (RETS) and the Radiological Environmental Monitoring and Offsite Dose Calculation Manual (REMODCM). This change documents only a verification that current process parameters and equipment availability comply with the licensing basis.

2. Reason for the Activity

The change is proposed to reflect the actual current equipment availability, process parameters and radiological effectiveness, and to update the resultant expected radiological dose consequences and normal design effluent radionuclide concentrations of the liquid and gaseous waste processing systems and airborne releases in the MP2 FSAR. The current radioactive waste system licensing basis, i.e., the 1976 Demonstration of Compliance Report, does not reflect current equipment availability and process parameters.

3. Safety Evaluation Summary

This change is an update to the FSAR Section 11.1, Appendices 11A, 11B, 11C and associated tables and figures. The change addresses current liquid and gaseous radwaste system process parameters and the availability of certain processing components. This update incorporates a revision to the 10CFR20 and 10CFR50 Appendix I compliance analysis.

The change is safe. Four calculations were performed to document a NUREG-0017, Rev.1 radioactive effluent reanalysis as a result of normal operation, including anticipated operational occurrences. The results of the analysis show that doses have generally increased but remain well within the limiting 10CFR50 Appendix I guidelines. The liquid and gaseous effluent sum-of-the-fractions concentrations with design 1% fuel failures have also increased, but are significantly less than the 10CFR20 (Section 105 and 106, version in effect prior to January 1, 1994 and Appendix B) limits. The results of the analysis show that all the acceptance criteria are met and Millstone Unit 2 has sufficient installed radwaste processing equipment. Sampling and monitoring, in accordance with the Radiological Environmental Monitoring and Offsite Dose Calculation Manual (REMODCM), compliance with the Radiological Environmental Technical Specifications (RETS) and release point radiation monitors are unchanged and will continue to ensure that liquid, gaseous and airborne releases to the environment are kept below the regulatory limits.

The change is not an Unreviewed Safety Question (USQ). The probability and consequences of the existing radwaste malfunctions, including the simultaneous failure of all non-seismic Category I portions of the radwaste system, are shown to remain bounding. The probability and consequences of the waste gas decay tank failure accident, described in the FSAR Section 14.7.1, also remains bounding. No new

malfunctions or accidents are created. The margin of safety as defined in the basis of any technical specifications is unchanged because the licensing basis regulatory limits for normal operation continue to be met and accident doses are not increased.

In summary, the change is safe and not a USQ. The calculation and resulting changes in the FSAR do not affect the ability of the plant to meet 10CFR50 Appendix I off-site dose guidelines or 10CFR20, in accordance with the RETS and their bases. The NUREG-0017 analysis verifies only that there is sufficient installed equipment to process liquid and gaseous radioactive wastes. Actual effluent concentrations and doses are controlled through effluent sampling in accordance with the REMODCM and compliance with the RETS. The change does not increase the probability of occurrence of a malfunction of equipment important to safety or of a previously evaluated accident. The possibility of a malfunction or accident of a different type has also not been increased as a result of this change. The consequences of either a malfunction of equipment or of an accident have not been increased. The margin of safety as defined in the basis of the technical specifications has not been reduced.

4. Aspects of the Activity Evaluated

The proposed changes have been reviewed to determine whether they constitute an USQ. All aspects were reviewed to verify that the changes adequately reflect the Reference 1 analyses. The analysis methodology employed was reviewed and the analysis results were verified that they met the acceptance criteria.

Only equipment availability and process changes are evaluated. Any physical changes, retirement or removal of equipment are outside the scope of this safety evaluation. This safety evaluation evaluates the radiological aspects of a change to the system capability, in accordance with NUREG-0017 methodology, to verify that certain equipment need not be used and maintained to ensure compliance with the radiological licensing bases.

5. References

1. Raytheon Calculations 77850-H-001, Rev. 4; 77850-H-002, Rev. 2; 77850-H-003, Rev. 1 and 77850-H-004, Rev. 2
2. Radiological Environmental Monitoring and Offsite Dose Calculation Manual (REMODCM).
3. Radioactive Effluent Technical Specifications (RETS) (TS 3/4.11.1, 3/4.11.2 and 3/4.11.3).
4. NUREG-0017, Rev 1 - GALE Code - PWR dated April, 1976.
5. M2-EV-99-0049, Rev. 0 - Evaluation of the Simultaneous Failure of the Non-Seismic Portions of the Millstone Unit 2 Radwaste System
6. Millstone Unit 2 FSAR Sections 11.1 - Radioactive Waste Processing Systems, Appendix 11A - Source Terms for Radioactive Waste Processing System Input Streams, Appendix 11B - Radioactive Waste Processing System Releases to Environment, Appendix 11C - Doses from Liquid and Gaseous Radioactive Waste Processing System Releases, Appendix 11D - Expected Annual Inhalation Doses and

Estimated Air Concentrations of Radioactive Isotopes for MP2 Facilities, and all referenced tables and figures.

7. Technical Evaluation M2-EV-98-0203, Rev. 0; Engineering Records of Correspondence 25203-ER-98-0352, Rev. 0; 25203-ER-98-0359, Rev. 1; and 25203-ER-98-0348, Rev. 1.
8. NU Calculation 78-772-18RA, Revision 1, "MP2 Stretch Power Application: Radiological Consequences of Waste Gas Decay Tank Rupture," February 26, 1999.
9. NU Letter, D.C. Switzer to G. Lear (NRC) dated November 15, 1976, "Millstone Unit 2 Compliance with 10CFR50, Appendix I."
10. NRC Letter, Robert A. Clark to W. G. Counsil (NU) dated April 21, 1983, "Revisions to Radiological Effluent Technical Specifications - Millstone Nuclear Power Station, Unit 2."
11. NRC Letter, Olan D. Parr to Donald C. Switzer (NU), dated May 10 1974, "Safety Evaluation by the Directorate of Licensing, U.S. Atomic Energy Commission in the Matter of The Connecticut Light and Power Company (et al) Millstion Nuclear Power Station, Unit 2, Docket No. 50-336."
12. Thomas E. Murley (NRC) letter to Thomas E. Tipton (NUMARC) dated June 30, 1993 - Generic NRC acceptance of the pre-1994 10CFR20 for effluents

B. UNREVIEWED SAFETY QUESTION DETERMINATION [♣Comm.3.4]

1. Malfunctions

a. *Malfunctions Evaluated*

- Radioactive releases due to simultaneous failure of the entire radioactive waste processing system, excluding seismic Category I portions of the gaseous waste system.
- Radiological malfunction during normal operation - Unacceptably high liquid, gaseous or airborne radioactive releases.

b. *May the proposed activity increase the probability of occurrence of a Malfunction of Equipment Important to Safety previously evaluated in the SAR?*

☐ Yes *(activity involves an USQ)* ☒ No

Basis:

The FSAR evaluates the simultaneous failure of the entire liquid, gaseous and solid radwaste system, excluding seismic Category I portions (waste gas decay tanks and associated high pressure piping and components) of the gaseous waste system. This analysis was required by Safety Guide 29 during initial plant licensing to justify the seismic classification of the system. The proposed changes are analytical in nature and do not affect the probability of seismic events or challenge the system pressure boundary in any way. The changes do not impact or represent a change to the likelihood of the failure. The probability of occurrence of the malfunction, therefore, does not change.

Radwaste environmental releases of radioactivity are not controlled by the NUREG-0017 analysis (Reference 1). This analysis is meant to only verify that there is sufficient installed radwaste processing equipment available for normal operation with

anticipated operational occurrences. Radwaste environmental and airborne releases of radioactivity are controlled by sampling the effluent prior to discharge per the REMODCM and compliance with the RETS (References 2 and 3). As a final check, discharges are sampled by radiation monitors. The liquid and gaseous radwaste system radiation monitors provide automatic isolation on high radioactivity. This sampling and monitoring assures that discharges are acceptable and is unchanged by the Reference 1 calculations and the proposed changes.

c. *May the proposed activity increase the Consequences of a Malfunction of Equipment Important to Safety previously evaluated in the SAR?*

☐ Yes *(activity involves an USQ)* ☒ No

Basis:

The changes have been evaluated in Reference 5 for any impact on the calculated dose due to simultaneous failure of the entire liquid, gaseous and solid radwaste system, excluding seismic Category I portions of the gaseous waste system. Reference 5 concludes that the dose consequences for this FSAR malfunction remain bounding.

As stated in section B.1.b, radwaste effluents are sampled and controlled in accordance with the REMODCM and the RETS, with final checks performed by radiation monitors. These limits and controls are unchanged. The unchanged liquid, gaseous and airborne effluent sampling and monitoring program prevents any consequences of a radiological malfunction during normal operation from increasing liquid and gaseous radwaste processing system effluent doses.

d. *May the proposed activity create the possibility of a Malfunction of a different type than any previously evaluated in the SAR?*

☐ Yes *(activity involves an USQ)* ☒ No

Basis:

The FSAR malfunction, discussed above, encompasses all possible malfunctions, due to operational errors or pressure boundary failure, that may result in offsite releases from non-seismic portions of the system. Failure of the seismic Category I portions of the system are addressed in the next section. There are no new release points, and the RETS, REMODCM and radiation monitors are unaffected by the changes. Therefore, there are no new malfunctions that can cause an effluent release that results in an increase in offsite dose above 10CFR50 Appendix I guidance or radionuclide concentration above 10CFR20 limits. This change does not create a malfunction of a different type than any previously evaluated.

2. Accidents

a. *Accidents Evaluated*

- FSAR Section 14.7.1, Waste Gas System Failure

b. *May the proposed activity increase the probability of occurrence of Accidents previously evaluated in the SAR?*

☐ Yes *(activity involves an USQ)* ☒ No

Basis:

The limiting accident considered for the radioactive releases from a subsystem or component provided in the FSAR Section 14.7 is the postulated and uncontrolled release to the auxiliary building of the radioactive xenon and krypton gases, from one RCS volume, stored in one waste gas decay tank. The result of a rupture of a gas decay tank was analyzed in order that the maximum hazard which would result from a malfunction in the radioactive waste processing system would be defined.

No new or changed challenges to the integrity of the waste gas system exist due to the proposed changes. The change does not affect the probability of failure of the waste gas system. System parameters, such as pressure transients, that could fail the waste gas system or other tanks also are not affected by these analyses because there are no new operating mode or configuration options created. Thus, the probability of failure of the waste gas system is unchanged and remains bounding.

The change in the source terms assumed for the Reference 8 reanalysis does not impact or represent a change to the likelihood of initiating events. Therefore, the change does not affect the probability of occurrence of accidents previously evaluated.

c. *May the proposed activity increase the Consequences of Accidents previously evaluated in the SAR?*

☐ Yes *(activity involves an USQ)* ☒ No

Basis:

The Section 14.7.1 analysis assumed that the waste gas decay tank contains the gaseous activity evolved from degassing one system volume of reactor coolant for refueling. The maximum activity would exist prior to cold shutdown at the end of an operating cycle during which extended operation with 1% defective fuel had occurred. Based on this and neglecting decay after degasification, the noble gas activity in the tank was conservatively assumed as provided in the FSAR Table 14.7.1-1.

Updated sources terms reflecting the current reactor core were assumed for the reanalysis of the Section 14.7.1 event (Reference 8). The change does not affect the analysis method. The reanalysis (Reference 8) shows that the existing dose results still bound the reanalysis results, thus all the acceptance criteria are met. Since the method of analysis is not changed and the reanalysis results are acceptable for the waste gas system failure accident, the change does not increase the consequences of the accidents previously evaluated. Since all other changes are not associated with the new analysis, those changes also do not increase the consequences of the accidents previously evaluated.

d. *May the proposed activity create the possibility of an Accident of a different type than previously evaluated in the SAR?*

☐ Yes *(activity involves an USQ)* ☒ No

Basis:

There are no physical changes, no new equipment to fail or any new failure modes for existing equipment that result from the reanalysis. Only radioactive concentrations may change in certain equipment. Any changes in radioactive concentration are evaluated in sections B.2.b and B.2.c. Therefore, no different type of accident is created.

The reanalysis assumed updated source terms reflecting the current reactor core. All other changes are not associated with the new analysis. Since the changes do not involve any hardware modifications and equipment operating modes have not changed, the changes do not create the possibility of an accident of a different type than previously evaluated.

3. Does the proposed activity reduce the Margin of Safety as defined in the basis for any Technical Specification?

☐ Yes *(activity involves an USQ)* ☒ No

Basis:

The NRC acceptance limit for off-site dose due to normal operation of liquid and gaseous waste systems is governed by 10CFR50, Appendix I. The RETS (Reference 3) and their bases all list Appendix I as the limiting condition. The original NRC SER for FSAR Chapter 11 (Reference 11) predates 10CFR50 Appendix I. When Appendix I was issued, however, the NRC requested, and Millstone Unit 2 provided, a demonstration of compliance (Reference 9) that has been incorporated into FSAR Chapter 11 by reference. The NRC did not specifically approve or reject Reference 9, but did refer to it in SERs for the RETS (Reference 10). Reference 9 also states the basis for acceptability as the fact that the calculated normal off-site doses are less than Appendix I guidelines.

The change documents a recalculation of the off-site dose using the NRC-endorsed NUREG-0017 methodology. This recalculation utilizes a later revision of NUREG 0017, but is still consistent with the methodology used in Reference 9. While the calculated off-site dose is higher than that currently in the FSAR, it still falls below the acceptance limit (defined above as the Appendix I guidelines) and the margin of safety (which is inherently included in the acceptance limit) remains unchanged. Per RAC 12, if the applicable accident doses due to a reanalysis using the same methodology increase over that presented by NU in the SAR, then a USQ exists. Although the same methods were used in the reanalysis of the Radwaste System in Chapter 11, the analysis was for normal operation and not accident conditions. Therefore, the margin of safety is not reduced.

Similarly, the NRC acceptance limit per the initial SER (Reference 11) in 1974 for liquid and gaseous discharge concentrations is that 10CFR20 concentration limits are met with expected and design fuel failures. The NRC, in Reference 12, stated that it is acceptable for licensees to continue to use pre-1994 effluent concentration limits despite a rule change that occurred at that time. The Millstone Unit 2 FSAR reflects this NRC

statement. The RETS and their bases all list pre-1994 10CFR20 concentrations as the limiting condition. The Reference 1 calculation shows that, at the design value of 1% fuel failures, the effluent radionuclide sum-of-the-fractions of maximum permissible concentrations are still significantly less than 10CFR20 limits.

The current analysis results and the conclusions for the FSAR Section 14.7.1 event bound the changes. Thus, none of the changes affect the performance of any protective boundaries. As such, the change to the FSAR Section 11.1 for the analysis description and results do not reduce the margin of safety defined in the bases of any Technical Specifications.

4. Does the proposed activity affect a liquid, solid or gaseous radwaste system?

☒ Yes ☐ No *(If "Yes," answer the following four questions and provide the basis for your answers. If "No," go to C)*

a. *Does the proposed activity meet the applicable seismic, quality group; quality assurance criteria and design provisions for controlling releases of radioactive liquids in Regulatory Guide 1.143?*

☐ Yes ☐ No *(activity involves an USQ)* ☒ N/A

Basis:

Millstone Unit 2 is not committed to Regulatory Guide 1.143 requirements. However, this new analysis does not change any existing seismic, quality group, quality assurance criteria or design provisions of any radwaste system in any way. It determines only what existing equipment is needed to meet the licensing basis per a NUREG-0017 analysis.

b. *Do the radiological controls associated with the proposed activity meet the applicable criteria in Regulatory Guide 1.21 and Standard Review Plan Section 11.5, for process and effluent radiological monitoring and sampling systems?*

☒ Yes ☐ No *(activity involves an USQ)* ☐ N/A

Basis:

Regulatory Guide 1.21, committed to in section 6.8.1 of the Technical Specifications, addresses Measuring, Evaluating, and Reporting Radioactivity in radioactive wastes. Section 3 of RG 1.21, which provides guidance on types of Monitoring, refers to Technical Specifications and/or 10 CFR Part 20. Section 6 and 7 of RG 1.21 discuss representative and composite sampling guidance. Technical Specifications refer to the REMODCM for control of these issues. None of the changes affect the Technical Specifications or REMODCM.

SRP 11.5 acceptance criteria lists 10 CFR 20 and General Design Criteria 60, 63 and 64, which deal with effluent monitoring, system design to control radioactive material release and to monitor radiation levels and leakage. The proposed change has no effect on the process and effluent radiological monitoring and sampling systems.

Radiological controls are unchanged and continue to meet the applicable criteria for process and effluent radiological monitoring and sampling systems through the requirements of the RETS and REMODCM (see section B.4.d.2). There are no new release points to be monitored.

c. *For systems involving potentially explosive mixtures, does the proposed activity meet the applicable criteria in Standard Review Plan Section 11.3, Subsection II, Item 6?*

☐ Yes ☐ No *(activity involves an USQ)* ☒ N/A

Basis:

Millstone Unit 2 is not committed to SRP section 11.3 - item II B.6. However, the change does not impact existing monitoring or control of explosive mixtures in the gaseous waste processing system. Plant practice for the gaseous waste processing system is unchanged by the References 1 and 8 analyses.

d. *Does the proposed activity cause (1) the radiological Consequences of unexpected and uncontrolled releases of radioactivity that is stored or transferred in a waste system to be more than a small fraction of the 10CFR100 guidelines or (2) the radionuclide concentrations from liquid releases to be more than the maximum permissible concentrations specified in the 1993 version of 10CFR20, Appendix B, Table 2, column 2 at the nearest water supplies (see SRP 15.7.1, 2 & 3 for more details)?*

☐ Yes *(activity involves an USQ)* ☒ No ☐ N/A

Basis:

1) The proposed change does not impact the FSAR Section 14.7.1 atmospheric release due to rupture of a gas decay tank accident. As discussed in Section B.2, this accident bounds the new design radionuclide concentrations in the reactor coolant system that may result in unexpected and uncontrolled releases of radioactivity that is stored or transferred. 10CFR100 guidelines are, therefore, not impacted.

2) Effluent sampling is in accordance with the REMODCM and RETS with discharge radiation monitors as a final check. This ensures compliance with 10CFR20, Appendix B, Table 2, column 2 maximum permissible radionuclide concentrations. The NUREG-0017 analysis, modified with 1% design failed fuel, also demonstrates that the systems are capable of processing liquids and gasses for discharge within these maximum permissible radionuclide concentrations.

Prior to the licensing and operation of a nuclear plant, the applicant must include, in Chapter 11 of the FSAR, an estimate of the radioactive effluents and resulting public dose. This is provided to ensure that the proposed radwaste treatment system will be sufficient to ensure compliance with radioactive release criteria such as 10CFR50 Appendix I and 10CFR20. The assessments presented in Section 11.1 are based, in part, on nominal assumptions and generic models that are appropriate prior to initial plant operation. They represent estimates chosen for the purpose of calculating the overall estimate of projected public dose consequences. They do not represent design or operational requirements. It was fully expected that actual operational data would not match the chosen assumptions. Actual operational data may be more or less conservative than the assumptions presented in Section 11.1. The final

concentration and dose estimates presented in Section 11.1 are expected to be conservative because of the conservative level chosen for the reactor coolant activity. Typical reactor coolant activity is orders of magnitude less than that assumed. This significant conservatism helps ensure that variations in other assumed parameters should be insignificant in regard to the final conclusion.

With the plant licensed for operation, compliance with the effluent release limits is ensured and controlled by compliance with the RETS and the REMODCM. These documents provide detailed controls on limits, monitoring requirements and performance of dose calculations. They also require operation of specified radwaste treatment equipment if the projected dose exceeds a small fraction of effluent 10CFR50 Appendix I guidelines. If these guidelines are exceeded, or if treatment equipment is not operated when necessary, special reports to the NRC are required. These reports must provide the corrective actions being taken to ensure that the guidelines are not exceeded in the future. The RETS and REMODCM require the use of the actual measured concentrations of radioactivity released and site specific dilution or dispersion estimates to verify compliance with effluent limits.

Therefore, compliance with effluent limits and regulations is controlled by the RETS and REMODCM, not by meeting parameters or assumptions provided in Section 11.1 of the FSAR. With the plant licensed and operational, the assessments provided in Section 11.1 become the basis behind the radwaste system design.

C. SAFETY DETERMINATION

1. Qualitative Safety Determination

   a. *Is the proposed activity Safe?*

   ☒ Yes ☐ No

   Basis:

   The proposed change updates information regarding the capability of the liquid and gaseous waste processing systems and airborne releases based on NUREG-0017 (Reference 4) methodology. It evaluates 10CRF50 Appendix I compliance without the use of the Degasifier and the Boric Acid Evaporator in the clean liquid waste system and without the use of the Waste Evaporator in the aerated waste system. Other process parameters have also been updated.

   Based on the NUREG-0017 analysis (Reference 1) of the liquid and gaseous waste processing system capability as a result of normal (expected) operation, including anticipated operational occurrences, the change is safe for the following reasons.

   - The FSAR Section 14.7.1 accident remains unchanged and bounds the proposed change,
   - The FSAR malfunction, evaluated in Section 11.1.1.2, of the simultaneous failure of all non-seismic Category I portions of the radwaste system remains bounding, and

- The RETS and their bases will still be met through effluent sampling in accordance with the REMODCM and final monitoring by the effluent radiation monitors.

The results of the analysis show that normal expected offsite doses may increase but remain less than the limiting 10CFR50 Appendix I guidelines. Normal design liquid, gaseous and airborne effluent concentrations with design fuel failures of 1% also increase, but remain significantly less than 10CFR20 limits.

The NUREG-0017 analysis verifies only that there is sufficient installed equipment to process liquid and gaseous radioactive wastes and airborne activity. Actual effluent dose and concentration are controlled through effluent sampling and monitoring in accordance with the REMODCM to verify compliance with the RETS and are unchanged.

Based on the above, changes do not constitute an USQ and are safe to implement. Thus, the changes to the FSAR will not increase the risk to health and safety of the public.

2. Detailed Safety Determination *(If ISE and Change is an USQ)*

   a. *Can the proposed activity increase the probability of initiation of an Accident?*
   ☐ Yes ☐ No
   Basis:

   b. *Can the proposed activity increase the probability that operators will fail to mitigate an Accident?*
   ☐ Yes ☐ No
   Basis:

   c. *Can the proposed activity increase the probability that mitigating equipment will fail?*
   ☐ Yes ☐ No
   Basis:

   d. *Can the proposed activity increase the Consequences of an Accident?*
   ☐ Yes ☐ No
   Basis:

   e. *Conclusion (based on the responses above, provide a conclusion for the detailed Safety Determination)*

Safety Evaluation Form [+Comm. 3.6]

D. APPROVAL

Preparer: Safety Analysis (Discipline) — J.F. Kapinos / John F. Kapinos (Print and Sign) — Date: 3/12/99

Preparer: Radwaste Engineering (Discipline) — W. R. Koste / Wm R Koste (Print and Sign) — Date: 3-12-99

Reviewer *(If required)*: ☒ Concur ☐ Do Not Concur *(if do not concur, attach documentation of reasons)*

_____ (Discipline) — _____ (Print and Sign) — Date: _____

Approver: ☒ Concur ☐ Do Not Concur *(if do not concur, attach documentation of reasons)*

Safety Analysis (Discipline) — M. L. VanHaltern / M L VanHaltern (Print and Sign) — Date 3/12/99

Radiological Engineering (Discipline) — W. J. Eakin / M L VanHaltern for WJE per telecon (Print and Sign) — Date 3/12/99

Manager, Safety Analysis — M.S. Kai / NA (Print and Sign) — Date _____

PORC or SORC Meeting No.: _____ Date: _____ Approval: _____ (PORC or SORC Chairperson)

Level of Use Information

Safety Evaluation Screen Form [♣Comm. 3.6]

(Sheet 1 of 3)

Unit NA **Document No.** REMODCM **Revision No.** 14 **Change No.** NA

A. SUMMARY INFORMATION *(Completed by the Preparer)*

1. Description of the Proposed Change, Test or Experiment

   Section E.9 of Part II of the Radiological Effluent Monitoring and Offsite Dose Calculation Manual (REMODCM) is being changed to delete the requirement for an alarm setpoint on the Unit 3 Regenerant Evaporator Radiation Monitor (LWC-RE65). The Condensate Demineralizer Liquid Waste (LWC) system has been abandoned in place with DCR M3-97-041.

B. SCREENING QUESTIONS *(Completed by the Preparer)*

1. Will implementation of the proposed Change, Test or Experiment require a revision to the Operating License or the Technical Specifications? *(If "Yes," complete (a.), go to Section D and sign as Preparer - prior NRC review and approval is required. If "No," complete (b) and go to Question 2.)*

   ☐ Yes *(OL or T/S change required)* ☒ No

   a. *Reason OL or T/S change required and sections impacted:*

   b. *Reason OL or T/S change not required and sections reviewed:*

      Technical Specification Table 3.3-12 says that the radiation monitor is not required to be operable if the regenerant evaporator system is not in service. This system is a sub-system of the Condensate Demineralizer Liquid Waste system.

      Sections Reviewed:

      Unit 3 Technical Specification 3/4.3.3, "Radioactive Liquid Effluent Monitoring Instrumentation"

2. Is the proposed Change, Test or Experiment fully bounded by the scope of a previously approved Safety Evaluation? *(Refer to Section B.2 of Attachment 6 to determine if fully bounded. If "Yes," complete (a.) and (b.), go to Section D and sign as Preparer - a new SE is not required. If "No," go to Question 3.)*

   ☒ Yes *(new SE not required)* ☐ No

   a. *Identification of previously approved SE:*

      S3-EV-97-0227, Rev 0, "Condensate Demineralizer Liquid Waste System (LWC) Removal From Service and Abandonment in Place"

   b. *Reason previously approved SE fully bounds proposed activity:*

      The SE provides the basis for permanent shutdown of the Condensate Liquid Waste system (LWC). It states that modifications will not change the capability for monitoring of systems and releases, which may contain radioactive material. The LWC system will be isolated and drained. Because it was never used it does not contain any radioactive material.

Safety Evaluation Screen Form [♣Comm. 3.6]

(Sheet 2 of 3)

3. Is it obvious that the proposed Change, Test or Experiment requires a Safety Evaluation? *(If "Yes," a SE is required – complete (a.), go to Section D and sign as Preparer. If "Not Obvious," go to Question 4. If it is not clear, a SE is required.)*

   ☐ Yes *(SE required)* ☐ Not Obvious

   a. *Reason SE required:*

4. Does the proposed activity meet the criteria of a Non-Intent Change to the Facility or procedures as described in the SAR? *(Refer to the guidance in Section B.4 of Attachment 6 to determine if Non-intent. If a Non-intent Change, check "Yes," complete (a.) go to Section D, and sign as Preparer - a SE is not required. If "No," go to Question 5.)*

   ☐ Yes *(SE not required)* ☐ No

   a. *Reason SE not required and SAR sections reviewed:*

5. Will implementation of the proposed activity modify the Facility as described in the SAR? *(Per the guidance in Section B.5 of Attachment 6, ensure that you check "Yes" if the proposed activity could directly or indirectly, as a result of a system interaction, introduce different failure modes or affect the function or reliability of equipment described in the SAR. If "Yes," complete (a.), go to Section D and sign as Preparer - a SE is required. If "No," complete (b.) and go to Question 6.)*

   ☐ Yes *(SE required)* ☐ No

   a. *Reason SE required and SAR sections impacted:*

   b. *Basis for "No" and SAR sections reviewed:*

6. Will implementation of the proposed activity modify procedures as described in the SAR? *(Refer to the list of supplemental questions in Section B.6 of Attachment 6 to evaluate the need for a SE. If "Yes," complete (a.), go to Section D and sign as Preparer - a SE is required. If "No," complete (b.) and go to Question 7.)*

   ☐ Yes *(SE required)* ☐ No

   a. *Reason SE required and SAR sections impacted:*

   b. *Basis for "No" and SAR sections reviewed:*

7. Will implementation of the proposed activity involve a Test or Experiment *not* described in the SAR? *(Refer to the list of examples in Section B.7 of Attachment 6 to determine the need for a SE. If "Yes," complete (a.), go to Section D and sign as Preparer - a SE is required. If "No," complete (b.), go to Section D and sign as Preparer.)*

   ☐ Yes *(SE required)* ☐ No

   a. *Reason SE required:*

   b. *Basis for "No" and SAR sections reviewed:*

Safety Evaluation Screen Form [♣Comm. 3.6]

(Sheet 3 of 3)

C. SUMMARY *(Completed by the Approver)*

1. Is a revision to the technical specifications or operating license required? *("Yes, if Question B.1 checked "Yes")*

   ☐ Yes ☒ No

2. Is a Design Engineering Screening Evaluation per the Design Change Manual Required? *(Yes, if proposed Change is an Intent Change to the Facility as described in the SAR)*

   ☐ Yes ☒ No ☐ Not Applicable

3. Is a new Safety Evaluation required? *(Yes, if Question B.1, B.3, B.5, B.6 or B.7 is checked "Yes")*

   ☐ Yes ☒ No

4. Is a FSARCR per RAC 03 necessary? *(Yes, if responses to Question B.5 or B.6 indicate proposed activity will cause the FSAR description to be incorrect)*

   ☐ Yes ☒ No ☐ Not Applicable

5. Is the proposed activity fully bounded by a previously approved Safety Evaluation? *(Yes, if Question B.2 is checked "Yes")*

   ☒ Yes ☐ No

6. Is the Quality Assurance Plan, Emergency Plan or Security Plan affected requiring an evaluation per RAC 01? *(Yes, if response to Question B.5, B.6, or B.7 identifies these portions of the SAR as being affected by the proposed activity)*

   ☐ Yes ☒ No ☐ Not Applicable

D. APPROVAL

Preparer: Claude Flory/James Wheeler Date: 4/12/99
Print and Sign

Reviewer: *(if required)* _____ Date: _____
Print and Sign

Approver: William Eakin Date: 4/16/99
Print and Sign

Level of Use Information

STOP THINK ACT REVIEW

FIGURE 7.2 SAFETY EVALUATION FORMAT

Safety Evaluation Number	S3-EV-97-0227	Revision No. 0
Plant Change Number	DCR M3-97041	Revision No. 0
Plant Change Title	Condensate Liquid Waste System (LWC) Removal From Service and Abandonment In Place	

1. SUMMARY INFORMATION

1.1 Description of the Change

DCR M3-97041 removes the Condensate Liquid Waste (LWC) System from service and abandons it in place. This abandonment is implemented administratively and will be accomplished administratively via procedure changes and two DCNs:

- DCN DM3-00-0746-97 defines the isolation boundary valves for MP3 and changes the P&ID(s) to reflect that the system is isolated.
- DCN DM2-00-0505-97 defines the isolation boundary valves for MP2 and changes the P&ID(s) to reflect that the system is isolated. Note: (1) MP2 valves are being closed where the LWC system interconnects to MP2. (2) A 10CFR50.59 screening was performed for this DCN and found that a safety evaluation is NOT required for MP2.

1.2 Aspects of the Change

This safety evaluation reviews the impact of the design change on plant safety and effluent releases.

The MP3 LWC will no longer be available to process the condensate demineralizer and other turbine building waste in the event that it becomes radioactively contaminated. A Radiological Environmental Review of Millstone CPF Liquid Waste Systems, REMM CR # 95-7, was performed, which determined that the LWC was not required to meet Technical Specification limits. As a result, the REMODCM has been revised to delete references to both the MP2 and MP3 LWCs. Although not credited by the design, MP2 and MP3 have established contingency plans for processing the secondary plant water following a steam generator tube leak (ref. OP 2267 and 3250.19A).

The MP3 LWC has never been used. This modification will make the necessary changes in the plant design and the FSAR to reflect that the Unit 3 LWC is abandoned in place. A system isolation boundary is established by closing and locking valves (where required) where the LWC interfaces with other plant systems.

This DCR will require that the FSAR system descriptions for the LWC and related systems be modified. Also various FSAR Figures will be revised to show the locked closed boundary valves.

This DCR does not change the function of the MP2 LWC. The only changes being made to MP2 are locking closed valves that interconnect the MP3 LWC to MP2.

There are no physical system modifications being made with this Design Change. The only changes will be establishing a system isolation boundary by providing positive control on system boundary valves (locking them where possible). The system pressure boundary will remain intact.

1.3 Safety Evaluation Summary

This design change is safe and not an unreviewed safety question.

The MP2 and MP3 LWCs have been evaluated and determined not to be required (ref. REMM CR# 95-7). This Radiological Environmental Review concluded that "the potential estimated dose, under worst case operating conditions, without treatment is insignificant compared to the Tech Spec limits and compared to the expected dose from primary side liquid radwaste releases. Since there would be essentially no increase in total liquid effluent releases under design basis conditions, the proposed change does not constitute an Unreviewed Radiological Environmental Impact." Consequently, the MP2 and MP3 LWCs are not required.

Based on the previous evaluation, the processing of radwaste and release of radioactive materials to the environment will be within the requirements of the operating license.

10CFR50, Appendix A, GDC 60 requires that design provide for control , handling and holdup capacity for radioactive releases. The REMODCM change evaluated the control systems and has removed the LWC from consideration. This modification does not impact the plant holdup capacity, as the collection sumps are not physically part of the LWC. Consequently the sumps are unaffected by this design modification.

10CFR50, Appendix A, GDC 63 and GDC 64 provide requirements for monitoring waste systems and releases. This modification will not change the capability for monitoring of systems and releases, which may contain radioactive material. This system will be isolated and drained, and thus will not be expected to contain any radioactive material upon completion of this modification. Based on the above discussions, the proposed plant modifications result in a safe design, and is not an unreviewed safety question.

1.4 References

1. Millstone Nuclear Power Station Unit 3 Final Safety Evaluation Report, through change 25, Sections:
   - 3.1 Conformance with NRC General Design Criteria
   - 9.2 Water Systems
   - 9.3 Process Auxiliaries
   - 10.4 Other Features of Main Steam and Power Conversion Systems
   - 11.2 Liquid Waste Management Systems
   - 11.4 Solid Waste Management
   - 13.5 Plant Procedures
   - 15.4.8 Spectrum of Rod Cluster Control Assembly Ejection Accidents
   - 15.6.3 Steam Generator Tube Failure
   - 15.7 Radioactive Releases From a Subsystem or a Component
2. 12179-EM-128D-15, P&ID, Condensate Demineralizer - Mixed Bed
3. 12179-EM-129A-8, P&ID, Condensate Demineralizer Liquid Waste
4. 12179-EM-132A-25, P&ID, Circulating Water
5. 12179-EM-132B-17, P&ID, Circulating Water
6. 12179-EM-135B-15, P&ID, Auxiliary Steam Feedwater and Condensate
7. Tech Specs LCO 3.3.3.9 Radioactive Liquid Effluent Monitoring Instrumentation Limiting Condition for Operation, Table 3.3-12 Radioactive Liquid Effluent Monitoring Instrumentation, Table 4.3-8 Radioactive Liquid Effluent Monitoring Instrumentation Surveillance Instructions, Section 3/4.11 Radioactive Effluent
8. Tech Specs LCO 3.4.6.2.c, Reactor Coolant System Operational Leakage
9. REMM CR# 95-7, Radiological Environmental Review for the Millstone CPF Liquid Waste Systems
10. Radiological Effluent Monitoring & Offsite Dose Calculation Manual, rev 10.
11. SD 3319C, Condensate Demineralizer - Mixed Bed
12. 10CFR20, Standards for Protection Against Radiation
13. 10CFR50.36a, Technical Specifications
14. 10CFR50, Appendix A, General Design Criteria for Nuclear Power Plants, GDC 60, 63, and 64
15. 10CFR50, Appendix I, ALARA
16. Millstone Nuclear Power Station Unit 2 Final Safety Evaluation Report, through change 47, Chapters:
   - 1 Conformance with NRC General Design Criteria
   - 9 Water Systems
   - 10 Process Auxiliaries
   - 11 Other Features of Main Steam and Power Conversion Systems
17. DCN DM2-00-0505-97 P&ID Update For Condensate Liquid Waste System (LWC) Removal From Service
18. 25213-26802, Rev 6, P&ID - Condensate Demineralizer Service & Component Cooling Water System
19. 25213-26805 sh 1, Rev 4, P&ID - Condensate Demineralizer Liquid Waste System
20. 25213-26805 sh 2, Rev 7, Flow Diagram - Condensate Demineralizer Liquid

Waste System
21. 25213-26806 sh 1, Rev 2, P&ID - Condensate Demineralizer Solid Waste System
22. 25213-26806 sh 2, Rev 6, P&ID - Condensate Demineralizer Solid Waste System
23. 25213-26807 sh 2, Rev 10, Flow Diagram - Miscellaneous Support Systems
24. DCN DM3-00-0746-97 Condensate Liquid Waste System (LWC) Removal From Service.
25. OP 3250.19A, Secondary Plant Cleanup Following Steam Generator Tube Ruptures, Rev. 0.
26. OP 2267, Secondary Plant Cleanup Following Steam Generator Tube Ruptures, Rev. 0.

2. UNREVIEWED SAFETY QUESTION DETERMINATION

2.1 Malfunctions

2.1.1 List Malfunctions Evaluated

Two types of evaluations are considered: 1) a leak from the primary to the secondary system, i.e. a steam generator tube leak, which may require processing by the LWC, and 2) malfunctions of equipment within the LWC system.

Primary to secondary system leakage during normal operation is governed by the MP3 technical specifications, 3.4.6.2.c, Reactor Coolant System Operational Leakage. This leakage was evaluated for impact on plant operation, considering anticipated operational occurrences. This Radiological Environmental Review (REMODCM) concluded that "the potential estimated dose, under worst case operating conditions, without treatment is insignificant compared to the Tech Spec limits and compared to the expected dose from primary side liquid radwaste releases. Since there would be essentially no increase in total liquid effluent releases under design basis conditions, the proposed change does not constitute an Unreviewed Radiological Environmental Impact." Consequently, the MP2 & MP3 LWCs are not required to be operational.

The LWC will be isolated from the plant and will no longer be in service, nor will it be maintained. Thus, malfunctions of equipment within the isolation boundaries are not applicable. Additionally, since the LWC is not required for normal plant operation, the locked valves only serve as isolation boundaries. Malfunction of the isolation boundaries due to valve leakage was considered, however, the pressure boundary of the LWC will remain intact, and thus any malfunction of equipment would be no different than if the system were available for

service. Closed valves will isolate the LWC. These valves could leak over time, and refill the system. However, the system pressure boundary will remain intact. Thus, the affect of valve leakage will be no different than if the system were in a standby state and available for normal service.

2.1.2 Affect on the Probability of Occurrence of Previously Evaluated Malfunction of Equipment Important to Safety (A.4.2)

This design change will have no affect on the probability of occurrence of previously evaluated malfunctions of equipment important to safety. The LWC is not safety related system. It's original design function was to process secondary water in the event that it became radioactively contaminated (i.e. following steam generator tube leakage which may be considered an anticipated operational occurrence).

Thus, this modification, which abandons the LWC in place, will not affect the probability of a primary to secondary leak.

Also, the LWC does not contain equipment important to safety as defined by NGP 3.12, revision 10, section A.4.2. This modification only establishes an isolation boundary for the LWC by closing and locking valves (where possible) and providing for administrative controls. These valves are located on lines that are only used to interface with the surrounding systems, consequently, closing them will not adversely impact the operation of the physical plant, nor will it impact any of the LWC equipment since it will no longer be in service. Thus any malfunction within the system will have no effect on equipment important to safety.

2.1.3 Affect on the Consequences of a Previously Evaluated Malfunction of Equipment Important to Safety(A.4.4)

This design change does not change the consequences of a previously evaluated malfunction of equipment important to safety. Should a steam generator leak occur, contamination of the secondary system is expected. However, an evaluation was previously performed, entitled "Radiological Review for the Millstone CPF Liquid Waste Systems" (REMM CR # 95-7). This Radiological Environmental Review concluded that "the potential estimated dose, under worst case operating conditions, without treatment is insignificant compared to the Tech Spec limits and compared to the expected dose from primary side liquid radwaste releases. Since there would be essentially no increase in total liquid effluent releases under design basis conditions, the proposed change does not constitute an Unreviewed Radiological Environmental Impact." Consequently, the LWC is not required.

Although not expected to be required for anticipated operational occurrences, various other methods are administratively available to process contaminated

secondary water, as defined in OP 3250.19A, Secondary Plant Cleanup Following Steam Generator Tube Ruptures.

Since it has been previously determined that the LWC is not needed, and since other processing methods will be available, isolation and removal of the LWC from service by this DCR will not affect the consequences of previously evaluated equipment malfunctions.

2.1.4 Possibility of a Malfunction of a Different Type than Previously Evaluated (A.4.6)

This design change does not affect the possibility of a malfunction of a different type than previously evaluated. The LWC will be isolated from the plant by closing valves. The LWC pressure boundary will be maintained. The system equipment is not in service. Thus, establishing an isolation boundary and removing the LWC from service does not create a new failure mode for the valves or for the system.

2.2 Accidents

2.2.1 List Accidents Evaluated

Chapter 15 of the FSAR was reviewed, specifically sections resulting in radioactive releases from the reactor system. The LWC system is used to process secondary water from the condensate demineralizer system. Thus, the primary concern for the LWC would be a leak of the primary system to the secondary system. The accidents of concern is a steam generator tube rupture event, in section 15.6.3 of the FSAR and a control rod eject, in section 15.4.8 of the FSAR.

A review of the other accidents resulting in a radioactive release from the reactor system, identified by figure A.5 of NGP 3.12, determined that these other plant transients and accidents are not impacted by the LWC removal from service.

2.2.2 Affect on the Probability of Occurrence of Previously Evaluated Accidents (A.4.1)

This design change will have no affect on the probability of occurrence of previously evaluated accidents. The LWC is not required or used for normal plant operation. Additionally, it is not part of the plant safety related systems. From a review of the accident initiators, it was determined that removal of the LWC from service will not contribute to the probability of a steam generator tube rupture, a control rod eject accident, or to failed fuel associated with either accident.

2.2.3 Affect on the Consequences of Previously Evaluated Accidents (A.4.3)

This design change will have no affect on the consequences of previously evaluated accidents. The secondary system could become contaminated by: 1) operational leakage of the primary system to the secondary system from steam generator tube leakage, or 2) from an accident as a result of a complete generator tube failure. Normal operational leakage limits are imposed by the plant technical specifications, and are discussed previously with respect to a malfunction of equipment.

Section 15.6.3.3 of the MP3 FSAR discussed the consequences of a steam generator tube rupture. Section 15.4.8.4 discussed the consequences of a control rod eject accident. In both cases, fuel damage is expected, and contamination is expected in the secondary system through leaks in the steam generator tubes. Per a review of these FSAR sections, it was found that the LWC is not credited with the mitigation of these events, nor is it required to mitigate the consequences of these events. Thus, removal of the LWC will not affect the consequences of these previously evaluated accidents.

2.2.4 Possibility of a Accident of a Different Type than Previously Evaluated (A.4.3)

This design change will have no impact on the possibility of an accident of a different type than previously evaluated. The LWC is being isolated from the plant by locking closing valves. The pressure boundary of the system will remain intact. This configuration is essentially the same as if the system were in its normal mode of operation, which is standby. No new failure modes are being introduced by isolation of the system, thus the possibility of a different type of accident than previously evaluated is not credible.

2.3 Impact on the Margin of Safety as Defined in the Basis of Any Technical Specification (A.4.7)

This change does not reduce the margin of safety. It does not affect safety related equipment. Technical Specifications sections which apply to the LWC were reviewed, specifically LCO 3.3.3.9, Table 3.3-12, Table 4.3-8, and Section 3/4.11. Also, section 3.4.6.2.c was reviewed, which defines primary to secondary system leakage limits for normal operation. The only possible impact to safety that may be introduced by isolating this system would be, in the event of a primary to secondary leak, the potential to increase offsite releases. However, the Radiological Effluent Monitoring & Offsite Dose Calculation Manual (REMODCM) program tracks releases to ensure that all discharges are within the limits imposed by 10CFR20, 10CFR100, and the plant Technical Specifications. The impact of removing the LWC from service was evaluated by REMM CR# 95-7, Radiological Environmental Review for the Millstone CPF Liquid Waste Systems and subsequently the LWC equipment was eliminated from the REMODCM. Based on the previous evaluation, and compliance with existing Technical Specification requirements, processing of radwaste and release of radioactive materials to the environment will be within the requirements of the operating license. Thus, the margin of safety defined by the technical specifications is not reduced.

3. SAFETY DETERMINATION

3.1 Qualitative Safety Determination

Based on the review of the system, the FSAR, the Technical Specifications, the REMODCM, and referenced regulations, it is determined that this change is safe and does not involve an unreviewed safety question.

3.2 Detailed Safety Determination(If ISE and Change is an USQ)
N/A

3.2.1 Affect on the Probability of Initiation of an Accident(A.5.1)
N/A

3.2.2 Affect on the Probability that Operations Will Fail to Mitigate an Accident(A.5.2)
N/A

3.2.3 Affect on the Probability that Mitigating Equipment Will Fail (A.5.3)
N/A

3.2.4 Affect on the Consequences of an Accident(A.5.4)
N/A

S3-EV-97-0227

4. APPROVAL

Lead Discipline Mechanical

Prepare: ED RINK / Edward J. Rink Jr. Date: 7-16-97
Print/Sign

Review: J.A. Wehrenberg / J.A. Wehrenberg Date: 7.16.97
(If Required) Print/Sign

Approval: Jim Wade / J. Wade Date: 7-16-97
Print/Sign

Supporting Disciplines:

Discipline: _____ Approval: _____ Date: _____
Print/Sign

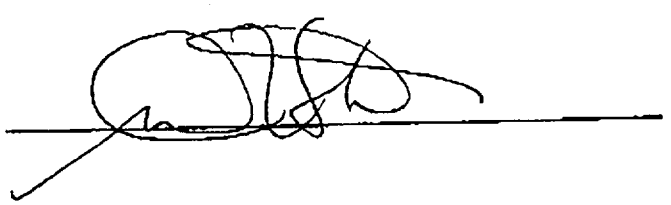
Discipline: _____ Approved: _____ Date: _____
Print/Sign

Discipline: _____ Approved: _____ Date: _____
Print/Sign

Integrated Safety Evaluation (If Required) No ISE is required per telecon with Mike Kai on 7-11-97 CR Date: 7-16-97

Manager-SAB N/A Date: N/A
Print/Sign

SAFETY EVAL PORC/SORC Meeting Number: 3-97-157 Date: 7/17/97



REMODCM Changes

Revision 15

October 1, 1999

RADIOLOGICAL ENVIRONMENTAL REVIEW

RER-99-006

for

REMODCM Rev 15

June 15, 1999

Total Number of Pages: 6

Claude Flory	Preparer	6/30/99 Date
William Eakin	Supervisor	7/2/99 Date

1.0 BACKGROUND

Revision 15 to the REMODCM involves a large number of changes to address a number of CRs generated from Chemistry self assessments and Oversight audits. Some changes are being made because of the permanent shutdown of Unit 1. At the same time a number of non-intent changes are being made to facilitate use of the REMODCM.

2.0 DISCUSSION

The following changes are being made to the REMODCM:

Part I Section C.1 - Liquid Effluents Sampling And Analysis Program

A. Changes common to Tables C-1, C-2, and C-3 (Units 1, 2, and 3)
   1. All footnote designators were changed from lower case to upper case. This is a non-intent change.
   2. Mo-99 and Ce-141 has been removed from the "Type of Activity Analysis" column. The result of this change is to lower the LLDs for these two nuclides to 5E-7 uCi/ml, a factor of two reduction for Mo-99 and a factor of ten reduction for Ce-141. This is a corrective action for CR M3-97-3877 which reported that the REMODCM required lower limits of detection (LLD) were not consistent with NUREG-1301. Because the requirement is being changed to a lower LLDs the change is an enhancement. As part of this change, Mo-99 and Ce-141 were added to footnote C as principal gamma emitters and a sentence added to explain that Ce-144 has a different LLD. This part of the change is a non-intent change.

B. Changes to Table C-1 (Unit 1 only)
   1. Changed daily grab sample of service water to weekly with daily samples required if gamma concentration in service water is detected at 5E-7 uCi/ml or greater. Once the concentration drops below this level, the required sampling frequency returns to weekly. Contingency for daily sampling is contained in footnote D. Because Unit 1 is permanently shut down a weekly sample is sufficient as long as gamma concentration in service water is less than 5E-7 uCi/ml.
   2. Deleted monthly sample and analysis for dissolved and entrained gases in service water. Because Unit 1 is permanently shutdown the only source of radioactive gas is Kr-85 from the spent fuel pool. Any leakage of water from the spent fuel pool into service water will be detected by the presence of gamma emitters, including Kr-85, during the required weekly gamma emitter analysis.
   3. Applied footnote E to "Weekly Grab or Composite" and to "Weekly Composite" for service water sampling frequency. This will ensure that the definition for composite sampling is uniformly applied. This is a non-intent change.
   4. Applied footnote F to "Weekly Composite" and to "Quarterly Composite" for service water sample and analysis for strontium and Fe-55. This is to clarify a present condition that the sample need not be collected if the analysis is not required. This is a non-intent change.

C. Changes to Tables C-2 and C-3 (Units 2 and 3 only)
   1. Footnote L was added to require a lower LLD for I-131 and gross alpha when turbine building sump releases are directed to the yard drains. This is a corrective action for CR M3-98-2228 to ensure adequate detection in case there is no dilution water available in the yard drains.

D. Changes to Table C-3 (Unit 3 only)
   1. Increased frequency of tritium analysis for continuous releases from monthly to weekly in response to a Chemistry self-assessment finding. Increased surveillance of tritium is needed because tritium, once detected in the steam generator, can easily migrate to blowdown or to the secondary side (turbine building sump).

Part I Section C-2: Liquid Radioactive Waste Treatment

A. Non-intent changes
   1. Format of Page C-11 was restructured for better readability.
   2. Defined waste streams at each Millstone unit and, for each waste stream, identified applicable processing equipment (including equipment designators for Units 2 and 3) to avoid any ambiguity in equipment references.
   3. For Unit 3 boron recovery stream specified the ion exchanger as the Cesium ion exchanger for clarification.

B. Technical changes
   1. Units 2 and 3 FSAR Chapter 11 were recently revised based on the results of revised design calculations. The following REMODCM changes aligns the REMODCM with these changes.
      a. The degasifier and the filter were deleted from the Unit 2 clean liquid waste stream and the deborating and purification ion exchangers were added.
      b. The filter was deleted from the Unit 2 aerated liquid waste stream.
      c. The degasifier and the waste evaporator were deleted from the Unit 3 high level waste stream.
      d. Allow the option of using either DEMIN2 with FLT3 or DEMIN1 with FLT1 for the Unit 3 high level waste stream.
      e. Specify that processing would be through high level processing equipment for the Unit 3 low level waste stream. This requirement is needed in case the low level stream contains an unusual amount of radioactivity causing dose criteria to be approached.
      f. For Unit 3 the steam generator blowdown as a pathway and limitation of 10% on blowdown was added.

Part I Section D.1: Gaseous Effluents Sampling And Analysis Program

A. Changes common to Tables D-1, D-2, and D-3 (Units 1, 2, and 3)
   1. All footnote designations were changed to upper case for better readability. This is a non-intent change.

B. Changes to Table D-1 (Unit 1 only)
   1. I-131 was added as a specific example of principal particulate gamma emitters in the "Type of Activity Analysis" column to be consistent with Tables D-2 and D-3. This is a non-intent change.
   2. In footnote F, deleted the requirement for special sampling and analysis when I-131 increases in reactor coolant. With Unit 1 permanently shutdown, radioactive iodine has decayed away.

C. Changes to Table D-2 (Unit 2 only)
   1. Containment venting was added as a second type of continuous release requiring a weekly sample with analysis for principal gamma emitters and H-3. Footnote I was added to require a new grab sample when either containment air monitor shows an increase or decrease. This new requirement was needed to ensure adequate accounting of radioactivity released during containment venting.

D. Changes to Table D-3 (Unit 3 only)
   1. Added a sentence at end of Footnote C that the actions is only applicable to the gaseous waste radiation monitor when doses exceed 20% of the limit as allowed in Footnote I. This is a non-intent change to provide clarification of a requirement.

Part I Section D.2: Gaseous Radioactive Waste Treatment

A. Non-intent changes
   1. Format of Page D-9 was restructured for better readability.
   2. Defined waste streams at each Millstone unit and, for each waste stream, identified applicable processing equipment (including equipment designators for Unit 2) to avoid any ambiguity in equipment references.

B. Technical changes
   1. Deleted Unit 1 offgas system. Because of shutdown the system is no longer used or needed.
   2. Units 2 and 3 FSAR Chapter 11 were recently revised based on the results of revised design calculations. The following REMODCM changes aligns the REMODCM with these changes.
      a. For Unit 2 gaseous radwaste stream changed "at least two gas decay tanks" to "Five gas decay tanks." This ensures that there is sufficient holdup capacity to allow 90 day decay of gases as assumed in the design calculation.
      b. For Unit 2 gaseous radwaste waste stream deleted the filter.
      c. For Unit 2 vent exhaust stream added containment vent HEPA/charcoal filter (L29A or B).
      d. For Unit 2 vent exhaust stream added the optional filter L27 for aux building ventilation.
      e. For Unit 3 gaseous radwaste stream deleted the gas compressor.

Part I Section E: Radiological Environmental Monitoring Sampling And Analysis

A. Changes to Table E-1
   1. Number of required milk sample locations was reduced from four to three because there are only two locations within ten miles of Millstone with milking animals. The third required location is a control location located 29 miles from Millstone.
   2. Changed frequency of sea water sample collection at the quarry discharge from quarterly to monthly. Additional surveillance of water at discharge is needed because of increased concerns about radioactivity discharges in liquid.
   3. "Edible portion" in parentheses was added for fish and shellfish in exposure pathway column. This is currently being done; there will be no change to the program.

B. Changes to Table E-2
   1. The following changes were made as a corrective action for CR M3-97-3877 to make the REMODCM consistent with NUREG-1301.
      a. Reporting level of 20 pCi/l was added for I-131 in water.
      b. Footnote a was revised to allow option of using reporting level of 30,000 pCi/l for H-3 in water if not drinking water.
      c. Footnote b revised to explain that reporting level for I-131 in water is for non-drinking water and that a level of 2 pCi/L is applicable if drinking water is sampled.
   2. Corrected reference in Footnote a from 40 CFR Part 131 to 40 CFR Part 141. This is a non-intent change.

C. Changes to Table E-3
   1. The following changes were made as a corrective action for CR M3-97-3877 to make the REMODCM consistent with NUREG-1301.
      a. Added footnote d for LLD for H-3 in water to allow the option of using an LLD of 3000 pCi/l if no drinking water pathway exists.
      b. Added LLD of 15 pCi/l for I-131 in water and deleted footnote c which justified no LLD.
      c. Re-lettered footnote d to c and included I-131 in water for this footnote (LLD applicable to end of sample period). This provision is allowed in NUREG-1301 and will allow quarterly composite samples of water to meet the new requirement for I-131 LLD.
   2. Changed requirement for reporting reasons for missing LLDs in the sample transmittal sheet to reporting the reason in the Annual Radiological Environmental Operating Report (AREOR) which is submitted every year to the NRC. This will be an additional reporting requirement to those requirements already listed in Section F.1.

D. Changes to Section E.2
   1. Added requirement to include closest resident in annual land use census to ensure that the requirement in 10CFR50, Appendix I to modify the program based on significant population changes is satisfied.

Part I Section F.2: Annual Radioactive Effluent Operating Report

1. Removed word "Operating" from title of section to be consistent with actual name of report, the Annual Radioactive Effluent Report (ARER) which is submitted each year to the NRC. This is a non-intent change.
2. Made the following changes to be consistent with Regulatory Guidance 1.21:
   a. In the third paragraph replaced "exceeding Technical Specification instantaneous release limits" with "all unplanned or uncontrolled radioactivity releases including reportable quantities".
   b. In list of reportable items for abnormal releases added "total number of and curie content of releases (liquid and gas)."

Part II Section D.2 10CFR50 Appendix I - Noble Gas Limits

1. In sub-sections D.2.b and D.2.c, changed "real-time meteorology" to "meteorology concurrent with time of release" to better define the intent of the requirement. This is a non-intent change.

Part II Section E Liquid Monitor Setpoint Calculations

A. General Non-intent Changes
   1. Changed name of section to "Liquid Monitor Setpoints and Compliance with 10CFR20 Concentration Limits" because of new Sections E.2b, E.5b, E.7b, E.11b, and E.12b.
   2. Most pages in this section were repaginated.

B. Changes to Section E.1
   1. Deleted noble gas in determination of setpoint because Unit 1, being permanently shutdown, will not generate any significant quantities of noble gases.
   2. Deleted Note 1 in Step 5. This note contained only basis information which will be added to the basis document when it is developed. This is a non-intent change.
   3. Deleted Note 2 in Step 5 because Unit 1 no longer uses the circulating water pumps.
   4. Changed the optional setpoint of 9.4×10^{-5} uCi/ml in Step 5 to 2.1×10^{-5} uCi/ml and added double asterisk note. This change is based on a new minimum available dilution flow for Unit 1 and the absence of any I-131 with it's limiting 10CFR20 concentration of 3×10^{-7} uCi/ml.
   5. Added conditions of at least one circulating water pump and a setpoint of 8.5×10^{-4} uCi/ml when crediting dilution flow from another unit. Added basis for the alternate setpoint.

C. Changes to Sections E.2, E.5, E.7, E.11, and E.12
   1. Changed each section designator by adding the letter 'a' (E.2 to E.2a, etc). This is a non-intent change.
   2. Added new Sections E.2b, E.5b, E.7b, E.11b, and E.12b to require use of certain sample analyses results to ensure that the concentration limits in 10CFR20 are not exceeded. Although the program ensured that the limits were not exceeded there was a need for these new sections because the literal wording of Technical Specification 4.8.C.1 at Unit 1 and Technical Specification 4.11.1.1.2 at Units 2 and 3 require that the REMODCM give specific directions for such use of the sample analyses results.

D. Changes to Section E.5
   1. Assumed blowdown flowrate was changed from 350 to 700 gpm because 350 gpm only account for maximum blowdown flowrate from one steam generator. The radiation monitor looks at blowflow from both steam generators. This lowers the radiation monitor setpoint by a factor of two but there is not impact on operations because the actual setpoint is set to a factor of normal reading. This calculation determines the maximum allowable setpoint.
   2. Deleted the reference to Unit 2 Reactor Engineering as source for blowdown flowrate. This statement could not be made without an ERC to document the reference.

Part II Section F: Gaseous Monitor Setpoint Calculations

1. Following changes were made because of Unit 1's permanent shutdown:
   a. In Sections F.1 and F.2, added a note that the parameters are pertinent only during plant operations and that the plant is now permanently shutdown. This is a non-intent change.
   b. In Sections F.5 and F.7, deleted requirement to evaluate need to change Unit 1 steam jet air ejector monitor setpoint.
2. In Sections F.3, F.5, F.6, F.7, and F.8, rewrote each section for clarity including removing some discussion which was only pertinent to other Millstone units. Information removed is still in Section D.1.a of the ODCM which is referenced. These are non-intent changes.

3.0 CONCLUSION

The changes in Revision 15 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 the design bases for an effluent control program in the FSAR for each Millstone unit. The changes will not affect the level of radioactive effluent control required by Technical Specifications, the 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).

Safety Evaluation Screen Form [♣Comm. 3.6]

(Sheet 1 of 14)

Unit NA **Document No.** REMODCM **Revision No.** 15 **Change No.** NA

A. SUMMARY INFORMATION *(Completed by the Preparer)*

1. Description of the Proposed Change, Test or Experiment

Revision 15 involves a large number of changes to many sections of the REMODCM. Most of the changes address technical fixes and enhancements identified in CRs. Some changes are non-intent changes intended to facilitate use of the REMODCM. The following sections are being revised:

PART I: RADIOLOGICAL EFFLUENT MONITORING MANUAL (REMM)

C.1 LIQUID EFFLUENTS SAMPLING AND ANALYSIS PROGRAM

- Table C-1: Millstone 1 Radioactive Liquid Waste Sampling and Analysis Program
- Table C-2: Millstone 2 Radioactive Liquid Waste Sampling and Analysis Program
- Table C-3: Millstone 3 Radioactive Liquid Waste Sampling and Analysis Program

C.2 LIQUID RADIOACTIVE WASTE TREATMENT

D.1 GASEOUS EFFLUENTS SAMPLING AND ANALYSIS PROGRAM

- Table D-1: Millstone 1 Radioactive Gaseous Waste Sampling and Analysis Program
- Table D-2: Millstone 2 Radioactive Gaseous Waste Sampling and Analysis Program
- Table D-3: Millstone 3 Radioactive Gaseous Waste Sampling and Analysis Program

D.2 GASEOUS RADIOACTIVE WASTE TREATMENT

E.1 RADIOLOGICAL ENVIRONMENTAL MONITORING SAMPLING AND ANALYSIS

- Table E-1: Millstone Radiological Environmental Monitoring Program
- Table E-2: Reporting Levels for Radioactivity Concentrations in Environmental Samples
- Table E-3: Maximum Values for Lower Limits of Detection (LLD)

F.2 ANNUAL RADIOACTIVE EFFLUENT OPERATING REPORT

PART II: OFF-SITE DOSE CALCULATION MANUAL (ODCM)

D.2 10CFR50 APPENDIX I - NOBLE GAS LIMITS

- D.2.b: Quarterly Air Dose - Method 2 - All Units
- D.2.c: Annual Air Dose Limit Due to Noble Gases - All Units

E LIQUID MONITOR SETPOINT CALCULATIONS

- E.1: Unit 1 Liquid Radwaste Effluent Line
- E.2: Unit 1 Reactor Building Service Water Effluent Line
- E.5: Unit 2 Steam Generator Blowdown
- E.7: Unit 2 Reactor Building Closed Cooling Water Line
- E.11: Unit 3 Steam Generator Blowdown
- E.12: Unit 3 Turbine Building Floor Drains Effluent Line

F GASEOUS MONITOR SETPOINT CALCULATIONS

- F.1: Unit 1 Hydrogen Monitor
- F.2: Unit 1 Steam Jet Air Ejector Offgas Monitor
- F.3: Unit 1 Stack Noble Gas Monitor
- F.5: Unit 2 Vent Noble Gas Monitor
- F.6: Unit 2 Waste Gas Decay Tank Monitor
- F.7: Unit 3 Vent Noble Gas Monitor
- F.8: Unit 3 Engineering Safeguards Building Monitor

Safety Evaluation Screen Form [♣Comm. 3.6]

DETAILS OF CHANGES - PART I: REMM

C.1 LIQUID EFFLUENTS SAMPLING AND ANALYSIS PROGRAM

A) Changes common to Tables C-1, C-2, and C-3 (Units 1, 2, and 3)

1. All footnote designators were changed from lower case to upper case. This is a non-intent change.
2. Mo-99 and Ce-141 has been removed from the "Type of Activity Analysis" column. The effect is to lower the LLDs for these two nuclides to 5E-7 uCi/ml, from 1E-6 uCi/ml for Mo-99 and from 5E-6 uCi/ml for Ce-141. As part of this change, Mo-99 and Ce-141 were added to footnote C as principal gamma emitters and a sentence added to explain that Ce-144 has a different LLD (as required in the tables).

B) Changes to Table C-1 (Unit 1 only)

1. Changed daily grab sample of service water to weekly. With Unit 1 permanently shut down a weekly sample is sufficient. However, daily samples will be required if gamma concentration in service water is detected at 5E-7 uCi/ml or greater. Once the concentration drops below this level, the required sampling frequency returns to weekly. Contingency for daily sampling is contained in footnote D.
2. Deleted monthly sample and analysis for dissolved and entrained gases in service water and for batch releases. With Unit 1 shut down radioactive gases will be absent.
3. Applied footnote E to "Weekly Grab or Composite" and to "Weekly Composite" for service water sampling frequency. This will ensure that the definition for composite sampling is uniformly applied. This is a non-intent change.
4. Applied footnote F to "Weekly Composite" and to "Quarterly Composite" for service water sample and analysis for strontium and Fe-55. This is to clarify that the sample need not be collected if the analysis is not required. This is a non-intent change.

C) Changes to Tables C-2 and C-3 (Units 2 and 3 only)

1. Footnote L was added to require a lower LLD for I-131 and gross alpha when turbine building sump releases are directed to the yard drains. This ensures adequate detection in case there is no dilution water available in the yard drains.

D) Changes to Table C-3 (Unit 3 only)

1. Increased frequency of tritium analysis for continuous releases from monthly to weekly. Increased surveillance of tritium is needed because tritium, once detected in the steam generator, can easily migrate to blowdown or to the secondary side (turbine building sump).

C.2 LIQUID RADIOACTIVE WASTE TREATMENT

A) Non-intent changes

1. Format of Page C-11 was restructured for better readability.
2. Defined waste streams at each Millstone unit and, for each waste stream, identified applicable processing equipment (including equipment designators for Units 2 and 3) to avoid any ambiguity in equipment references.
3. For Unit 3 boron recovery stream specified the ion exchanger as the Cesium ion exchanger for clarification.

B) Technical changes

1. For Unit 2 clean liquid stream deleted the degasifier and the filter because they are not credited in FSAR Chapter 11 design calculation (GALE code).
2. For Unit 2 clean liquid stream added the deborating ion exchanger and optional delithiating ion exchangers (T10 A or B). The deborating ion exchanger is credited in the FSAR Chapter 11 design calculation (GALE code). Although the delithiating ion exchangers are

not credited in the design calculation, they are included as options because they are normally used during Mode 1 power operations and offer equivalent reduction factors.

3. For Unit 2 aerated liquid stream deleted the filter because it is not credited in FSAR Chapter 11 design calculation (GALE code).
4. For Unit 3 high level stream deleted the degasifier and the waste evaporator because they are not credited in FSAR Chapter 11 design calculation (GALE code).
5. For Unit 3 high level stream allowed option of either DEMIN2 with FLT3 or DEMIN1 with FLT1 as assumed in the design calculation.
6. For Unit 3 low level stream specified that processing would be through high level processing equipment. This requirement is needed in case the low level stream contains an unusual amount of radioactivity causing dose criteria to be approached.
7. For Unit 3 added steam generator blowdown as a pathway and limitation of 10% on blowdown because this is a processing option assumed in the design calculation.

D.1 GASEOUS EFFLUENTS SAMPLING AND ANALYSIS PROGRAM

A) Changes common to Tables D-1, D-2, and D-3 (Units 1, 2, and 3)

1. All footnote designations were changed to upper case for better readability.

B) Changes to Table D-1 (Unit 1 only)

1. I-131 was added as a specific example of principal particulate gamma emitters in the "Type of Activity Analysis" column to be consistent with Tables D-2 and D-3.
2. In footnote F, deleted the requirement for special sampling and analysis when I-131 increases in reactor coolant. With Unit 1 permanently shutdown, radioactive iodine has decayed away.

C) Changes to Table D-2 (Unit 2 only)

1. Containment venting was added as a second type of continuous release requiring a weekly grab if venting with weekly analysis of principal gamma emitters and H-3. Footnote I was added to require a new grab sample when either containment air monitor shows an increase or decrease.

D) Changes to Table D-3 (Unit 3 only)

1. Added a sentence at end of Footnote C that the actions is only applicable to the gaseous waste radiation monitor when doses exceed 20% of the limit as allowed in Footnote I. This is a non-intent change to provide clarification of a requirement.

D.2 GASEOUS RADIOACTIVE WASTE TREATMENT

A) Non-intent changes

1. Format of Page D-9 was restructured for better readability.
2. Defined waste streams at each Millstone unit and, for each waste stream, identified applicable processing equipment (including equipment designators for Unit 2) to avoid any ambiguity in equipment references.

B) Technical changes

1. Deleted Unit 1 offgas system. Because of shutdown the system is no longer used or needed.
2. For Unit 2 gaseous radwaste stream changed "at least two gas decay tanks" to "Five gas decay tanks." This ensures that there is sufficient holdup capacity to allow 90 day decay of gases as assumed in the design calculation.
3. For Unit 2 gaseous radwaste stream deleted the filter because it is not credited in FSAR Chapter 11 design calculation (GALE code).

4. For Unit 2 vent exhaust stream added containment vent HEPA/charcoal filter (L29A or B) because this equipment is credited in the design calculation.
5. For Unit 2 vent exhaust stream added the optional filter L27 for aux building ventilation.
6. For Unit 3 gaseous radwaste stream deleted the gas compressor because it is not credited in FSAR Chapter 11 design calculation (GALE code).

E.1 RADIOLOGICAL ENVIRONMENTAL MONITORING SAMPLING AND ANALYSIS

A) Changes to Table E-1

1. Number of required milk sample locations was reduced from four to three because there are only two locations within ten miles of Millstone with milking animals. The third required location is a control location located 29 miles from Millstone.
2. Changed frequency of sea water sample collection at the quarry discharge from quarterly to monthly. Additional surveillance of water at discharge is needed because of increased concerns about radioactivity discharges in liquid.
3. "Edible portion" in parentheses was added for fish and shellfish in exposure pathway column. This is currently being done; there will be no change to the program.

B) Changes to Table E-2

1. Reporting level of 20 pCi/l was added for I-131 in water.
2. Footnote a was revised to allow option of using reporting level of 30,000 pCi/l for H-3 in water if not drinking water.
3. Corrected reference in Footnote a from 40 CFR Part 131 to 40 CFR Part 141.
4. Footnote b revised to explain that reporting level for I-131 in water is for non-drinking water and that a level of 2 pCi/L is applicable if drinking water is sampled.

C) Changes to Table E-3

1. Added footnote d for LLD for H-3 in water to allow the option of using an LLD of 3000 pCi/l if no drinking water pathway exists.
2. Added LLD of 15 pCi/l for I-131 in water and deleted footnote c which justified no LLD.
3. Re-lettered footnote d to c and included I-131 in water for this footnote (LLD applicable to end of sample period). This provision is allowed in NUREG-1301 and will allow quarterly composite samples of water to meet the new requirement for I-131 LLD.
4. Changed requirement for reporting reasons for missing LLDs in analysis sheet to the reporting in the annual report.

D) Changes to Section E.2

1. Added requirement to include closest resident in annual land use census.

F.2 ANNUAL RADIOACTIVE EFFLUENT OPERATING REPORT

A) Changes to Section F.2

1. Removed word "Operating" from title of section to be consistent with actual name of report.
2. In the third paragraph replaced "exceeding Technical Specification instantaneous release limits" with "all unplanned or uncontrolled radioactivity releases including reportable quantities" to be consistent with Regulatory Guidance 1.21.
3. In list of reportable items for abnormal releases added "total number of and curie content of releases (liquid and gas)."

Safety Evaluation Screen Form [♣Comm. 3.6]

DETAILS OF CHANGES - PARTII: ODCM

D.2 10CFR50 APPENDIX I - NOBLE GAS LIMITS

A) Changes to Sections D.2.b and D.2.c

1. Changed "real-time meteorology" to "meteorology concurrent with time of release" to better define the intent of the requirement.

E LIQUID MONITOR SETPOINT CALCULATIONS

A) General Changes

1. Changed name of section to "Liquid Monitor Setpoints and Compliance with 10CFR20 Concentration Limits" because of new Sections E.2b, E.5b, E.7b, E.11b, and E.12b.
2. Most pages in this section were repaginated.
3. Added new Sections E.2b, E.5b, E.7b, E.11b, and E.12b to require use of certain sample analyses results to ensure that the concentration limits in 10CFR20 are not exceeded. Although the program ensured that the limits were not exceeded there was a need for these new sections because the literal wording of Technical Specification 4.8.C.1 at Unit 1 and Technical Specification 4.11.1.1.2 at Units 2 and 3 required that the REMODCM give specific directions for such use of the sample analyses results.

B) Changes to Section E.1

1. Deleted noble gas in determination of setpoint because Unit 1, being permanently shutdown, will not generate noble gases.
2. Deleted Note 1 in Step 5. The information in this note will be added to the basis document when it is developed.
3. Deleted Note 2 in Step 5 because Unit 1 no longer uses the circulating water pumps.
4. Changed the optional setpoint of 9.4×10^{-5} uCi/ml in Step 5 to 2.1×10^{-5} uCi/ml and added double asterisk note. As explained in the double asterisk note, the new value is based on a new available dilution flow for Unit 1 and the absence of any I-131 which has a concentration limit of 3×10^{-7} uCi/ml.
5. Added conditions of at least one circulating water pump and a setpoint of 8.5×10^{-4} uCi/ml to allow for using dilution flow from another unit. Added basis for the alternate setpoint.

C) Changes to Section E.2

1. Changed section designator from E.2 to E.2a. This is a non-intent change.

D) Changes to Section E.5

1. Changed section designator from E.5 to E.5a. This is a non-intent change.
2. Assumed blowdown flowrate was changed from 350 to 700 gpm because 350 gpm only account for maximum blowdown flowrate from one steam generator. The radiation monitor looks at blowflow from both steam generators. This lowers the radiation monitor setpoint by a factor of two but there is not impact on operations because the actual setpoint is set to a factor of normal reading. This calculation determines the maximum allowable setpoint.
3. Deleted the reference to Unit 2 Reactor Engineering as source for blowdown flowrate. This statement could not be made without an ERC to document the reference.

E) Changes to Section E.7

1. Changed section designator from E.7 to E.7a. This is a non-intent change.

F) Changes to Section E.11

1. Changed section designator from E.11 to E.11a. This is a non-intent change.

G) Changes to Section E.12

1. Changed section designator from E.12 to E.12a. This is a non-intent change.

F GASEOUS MONITOR SETPOINT CALCULATIONS

A) Change to Section F.1

1. Added a note that the parameter (4% hydrogen) is pertinent only during plant operations and that the plant is now permanently shutdown.

B) Change to Section F.2

1. Added a note that the parameters are pertinent only during plant operations and that the plant is now permanently shutdown.

C) Change common to Sections F.3, F.5, F.6, F.7, and F.8

1. Section has been rewritten for clarity including removing some discussion which was only pertinent to other Millstone units. Information removed is still in Section D.1.a of the ODCM which is referenced. These are non-intent changes.

D) Change common to Sections F.5 and F.7

1. Deleted requirement to evaluate need to change Unit 1 steam jet air ejector monitor setpoint because Unit 1 is shutdown.

B. SCREENING QUESTIONS *(Completed by the Preparer)*

1. Will implementation of the proposed Change, Test or Experiment require a revision to the Operating License or the Technical Specifications? *(If "Yes," complete (a.), go to Section D and sign as Preparer - prior NRC review and approval is required. If "No," complete (b) and go to Question 2.)*

☐ Yes *(OL or T/S change required)* ☒ No

a. *Reason OL or T/S change required and sections impacted:*

b. *Reason OL or T/S change not required and sections reviewed:*

Technical Specifications refer to the REMODCM for methods and parameters to be used in the radiological effluent and environmental monitoring programs. NRC allows changes to the REMODCM with appropriate reviews and SORC approval. Any changes to the REMODCM are reported to the NRC in the annual effluent report. Prior to SORC approval, pending changes to the REMODCM are reviewed by the Safety Analysis Branch, the Chemistry Managers, and Regulatory Affairs to ensure that the changes do not contradict the operating license and technical specifications. A Radiological Environmental Review, in accordance with Nuclear Group Procedure NGP 5.16, is performed to ensure compliance with Technical Specifications, the FSARs, 10CFR20 Sections 1301 and 1302 and Appendix B, 40CFR190, and 10CFR50 Section 36a and Appendix A General Design Criteria 60 and 64 and Appendix I. These reviews have been completed and have determined that the proposed revisions are consistent with the operating license and technical specifications.

Technical Specification sections reviewed:

Unit 1

1.0.DD - Dose Equivalent I-131

1.0.GG - Radiological Effluent Monitoring and Offsite Dose Calculation Manual (REMODCM)

1.0.JJ - Member(s) of the Public

3.8.A - Radioactive Liquid Effluent Instrumentation

3.8.B - Radioactive Gaseous Effluent Instrumentation

3/4.8.C - Radioactive Liquid Effluents

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3/4.8.D - Radioactive Gaseous Effluents

6.8.1(g) - Quality control for effluent monitoring procedures

6.8.1(h) - Procedures to implement REMODCM

6.8.4 - Written procedures for Section I.E of REMODCM

6.9.1.7 - Annual Radiological Environmental Operating Report

6.9.1.8 - Annual Radioactive Effluent Report

6.15 - Radiological Effluent Monitoring and Offsite Dose Calculation Manual

6.16 - Radioactive Waste Treatment

Units 2 and 3

1.19(U2), 1.10(U3) - Dose Equivalent I-131

1.31(U2), 1.26(U3) - Radiological Effluent Monitoring and Offsite Dose Calculation Manual (REMODCM)

1.36(U2), 1.18(U3) - Member(s) of the Public

3.3.3.9 - Radioactive Liquid Effluent Monitoring Instrumentation

3.3.3.10 - Radioactive Gaseous Effluent Monitoring Instrumentation

3/4.11.1 - Radioactive Liquid Effluents

3/4.11.2 - Radioactive Gaseous Effluents

6.8.1(h - U2)(i - U3) - Procedures to implement REMODCM

6.8.1(g - U2)(h - U3) - Quality control for effluent monitoring procedures

6.9.1.6(U2), 6.9.1.4(U3) - Annual Radioactive Effluent Report

6.9.1.13(U3 only) - Annual Radiological Environmental Operating Report

6.15 - Radiological Effluent Monitoring and Offsite Dose Calculation Manual

6.16(U2), 6.14(U3) - Radioactive Waste Treatment

2. Is the proposed Change, Test or Experiment fully bounded by the scope of a previously approved Safety Evaluation? *(Refer to Section B.2 of Attachment 6 to determine if fully bounded. If "Yes," complete (a.) and (b.), go to Section D and sign as Preparer - a new SE is not required. If "No," go to Question 3.)*

☐ Yes *(new SE not required)* ☒ No

a. *Identification of previously approved SE:*

b. *Reason previously approved SE fully bounds proposed activity:*

3. Is it obvious that the proposed Change, Test or Experiment requires a Safety Evaluation? *(If "Yes," a SE is required – complete (a.), go to Section D and sign as Preparer. If "Not Obvious," go to Question 4. If it is not clear, a SE is required.)*

☐ Yes *(SE required)* ☒ Not Obvious

a. *Reason SE required:*

4. Does the proposed activity meet the criteria of a Non-Intent Change to the Facility or procedures as described in the SAR? *(Refer to the guidance in Section B.4 of Attachment 6 to determine if Non-intent. If a Non-intent Change, check "Yes," complete (a.) go to Section D, and sign as Preparer - a SE is not required. If "No," go to Question 5.)*

☐ Yes *(SE not required)* ☒ No

a. *Reason SE not required and SAR sections reviewed:*

5. Will implementation of the proposed activity modify the Facility as described in the SAR? *(Per the guidance in Section B.5 of Attachment 6, ensure that you check "Yes" if the proposed activity could directly or indirectly, as a result of a system interaction, introduce different failure modes or affect the function or*

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reliability of equipment described in the SAR. If "Yes," complete (a.), go to Section D and sign as Preparer - a SE is required. If "No," complete (b.) and go to Question 6.)

☐ Yes *(SE required)* ☒ No

a. *Reason SE required and SAR sections impacted:*

b. *Basis for "No" and SAR sections reviewed:*

The only direct or indirect references to the facility as described in the SARs in the REMODCM are in-plant sampling requirements, a requirement to recirculate tanks prior to liquid sampling, listings of gaseous and liquid radwaste systems required to be operable when projected monthly doses exceed a specified level, and methods for calculating effluent radiation monitor setpoints.

Proposed changes to sampling requirements include:

a) changing frequency of Unit 1 service water sampling,

b) deleted requirement at Unit 1 for additional sampling with increased I-131 in coolant, and

c) added weekly containment air sampling at Unit 2.

Sampling requirements in the REMODCM only specify sample types which may be collected from equipment designed for that purpose as specified in the SARs. The proposed changes to REMODCM sampling requirements will not require any modification to, or addition of, new sample collection equipment.

There is no proposed change to REMODCM requirement to recirculate tanks prior to liquid sampling.

Sections C.2 and D.2 of Part I of the REMODCM list radwaste processing equipment which are required to be operated when doses to the public are projected to exceed specified levels for a monthly period. The REMODCM only requires that the equipment be operated when certain conditions exist and to report to the NRC any inoperable equipment which could have prevented at least 10% of the monthly dose which requires operability. The following changes are being proposed to radwaste processing equipment presently listed in the REMODCM:

Unit 1

- Offgas recombiner train A or B deleted in Section D.2
- Offgas charcoal bed train A or B deleted in Section D.2
- Offgas HEPA filter deleted in Section D.2

Unit 2

- Clean liquid waste degasifier deleted in Section C.2
- Clean liquid waste filter deleted in Section C.2
- Clean liquid waste deborating ion exchanger (T11) added in Section C.2
- Aerated liquid waste filter deleted in Section C.2
- Waste gas decay tank usage increased from two to five in Section D.2
- Optional auxiliary building ventilation HEPA filter (L27) added in Section D.2
- Containment vent HEPA/charcoal filter (L29 A or B) added in Section D.2

Unit 3

- High level waste degasifier deleted in Section C.2
- High level waste evaporator deleted in Section C.2

- Use of high level waste demineralizers DEMIN1 and DEMIN2 and filters FLT1 and FLT3 is clarified in Section C.2
- Low level waste processing through high level waste processing equipment is specified in Section C.2
- Limitation on steam generator blowdown is added in Section C.2
- Gaseous radwaste treatment system gas compressor deleted in Section D.2

The changes at Unit 1 were made because the offgas system is no longer needed with permanent shutdown of the plant. The changes at Units 2 and 3 were made to be consistent with new design information contained in Chapter 11 for each unit's FSAR. The list of radwaste processing equipment being proposed is the suite of equipment used in calculations supporting the Chapter 11 design changes to estimate radioactivity released in plant effluents and resultant doses to the public. There was no equipment added which is not already installed in the plant. Equipment deleted from the list is not being removed. The REMODCM does not require certain radwaste processing equipment to be operating when projected doses reach a certain criteria. However, equipment not listed is still available and may be used at the plant's discretion to maintain radioactivity in effluents to as low as reasonably achievable (ALARA) in accordance with NU Policy #6. REMODCM required operations of the listed equipment are within the normal operating modes. The revised REMODCM requirements will not prevent operation of any safety-related equipement during an accident.

The REMODCM contains methods for determining Unit 1 stack sampler flow rate setpoint and high radiation setpoints for effluent radiation monitors at all three units. The only change to setpoints being proposed is to the Unit 1 liquid radwaste monitor. The requirement for this setpoint is being revised to account for different operating parameters with the plant permanently shutdown. This setpoint is adjusted prior to every radwaste discharge. Therefore changing the requirement does not affect a new setpoint change, only the parameters to be used in on-going setpoint adjustments.

The following SAR sections were reviewed:

Unit 1

- 1.2.2.2.4 - Main Condenser Air Ejector and Turbine Steam Sealing Systems
- 1.2.2.4 - Radioactive Waste Processing Systems
- 1.2.2.5.12 - Standby Gas Treatment System
- 1.2.2.9 - Radiation Monitoring and Control
- 1.2.2.10.4 - Service Water System
- 1.2.2.10.13 - Station Process Sampling System
- 9.3.2 - Process Sampling System
- Table 9.3-1 - Process Sampling Points - Liquid
- Table 9.3-2 - Process Sampling Points - Gas
- 11.2 - Liquid Waste Management Systems (all sub-sections)
- 11.3 - Gaseous Waste Management Systems (all sub-sections)
- 11.5 - Process and Effluent Radiological Monitoring (all sub-sections)

Unit 2

- 1.2.5 - Reactor Coolant System
- 1.2.10.5 - Sampling System
- 1.2.12 - Radioactive Waste Processing System
- 1.4.8 - Radioactive Waste Processing System

- 1.7.3 - Radioactive Waste Processing System
- Appendix 1A, Criterion 60 - Control of Releases of Radioactive Materials to the Environment
- 4.1 - Reactor Coolant System General Description
- 4.2 - Reactor Coolant System Design Basis
- 4.3.2 - Steam Generator
- 4.3.2.4 - Composition of Secondary fluid
- 4.4.3 - Coolant Chemistry
- 7.5.6.2 - Liquid Radiation Monitoring System (all sub-sections)
- 7.5.6.3 - Airborne Radiation Monitoring System (all sub-sections)
- 7.6.3 - Radioactive Waste Processing System Panels (all sub-sections)
- 9.9.9.3.1 - Normal Operation (Main Exhaust System)
- 10.4.6.2 - System Description (Steam Generator Blowdown System)
- 11.1 - Radioactive Waste Processing System (All sections)
- Appendix 11B - Radioactive Waste Processing System Releases to Environment

Unit 3

- 1.2.6 - Radioactive Waste Systems
- 1.2.11 - Cooling Water and Other Auxiliary Systems
- Table 1.8-1 - NRC Regulatory Guides (Reg Guide 1.21)
- 3.1.2.64 - Monitoring Radioactive Releases (Criterion 64)
- 5.4.2 - Steam Generators (all sub-sections)
- 9.3.2 - Process Sampling Systems
- 9.3.3 - Reactor Plant Vent and Drain Systems
- 9.4 - Air Conditioning, Heating, Cooling, and Ventilation Systems (Sections 1-5, 7, 9)
- 9.5.10 - Containment Vacuum System
- Table 9.3-1 - Sampling Points - Reactor Plant
- 10.4.8 - Steam Generator Blowdown System
- 11 - Radioactive Waste Management (all sections)
- Table 11.5-3 - Radiological Samples Taken at Sample Sink
- 15.7.1 - Radioactive Gaseous Waste System Failure (all sub-sections)

6. Will implementation of the proposed activity modify procedures as described in the SAR? *(Refer to the list of supplemental questions in Section B.6 of Attachment 6 to evaluate the need for a SE. If "Yes," complete (a.), go to Section D and sign as Preparer - a SE is required. If "No," complete (b.) and go to Question 7.)*

   ☐ Yes *(SE required)* ☒ No

   a. *Reason SE required and SAR sections impacted:*

   b. *Basis for "No" and SAR sections reviewed:*

   The SARs contain general descriptions of effluent sampling and analysis, radwaste processing, off-site dose calculation, and radiological environmental monitoring programs. Except for rare exceptions, specific descriptions of these programs are not contained in the SARs. One exception, related to the proposed changes, is discussed below. Each unit's SAR references the REMODCM as the source of specific procedural requirements for these programs.

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Unit 1 UFSAR and Units 2 and 3 FSAR Section 2.3.5.2.2 says that "actual meteorology" is used for quarterly calculations of atmospheric dispersion factors (X/Qs). The proposed change to REMODCM Part II Sections D.2.b and D.2.c is consistent with this FSAR description.

The SARs contain no description of use of radwaste processing equipment conditional on dose projections to the public from radioactive releases.

The methodologies for calculating releases of radioactivity and doses to the public as described in the FSARs do not conflict with the methodologies provided in Sections C and D of Part II of the REMODCM. Unit 2 FSAR Appendices 11A and 11C and Unit 3 FSAR Sections 11.2.3 and 11.3.3 and Appendix 11A contain specific methods for calculating doses. The methods in Units 2 and 3 FSARs are equivalent to the dose calculation methods in the REMODCM, but have a different purpose. Dose calculation methods in the FSARs were to demonstrate that projected doses based on design parameters were acceptable prior to plant licensing. Dose calculation methods in the REMODCM demonstrate that dose limits are not exceeded based on actual radioactivity released.

The SARs do not describe any methodology for determining radiation monitor setpoints. Therefore proposed changes to Sections E and F of Part II of the REMODCM would not require any modifications of any procedure as described in the SARs.

All the proposed changes are consistent with the general description of procedures described in the SAR for each unit's effluent sampling and analysis, radwaste processing, off-site dose calculation, and radiological environmental monitoring programs..

The following SAR sections were reviewed:

Unit 1

- 1.2.1.9 - Site Environmental Radioactivity Monitoring Program
- 1.2.2.2.4 - Main Condenser Air Ejector and Turbine Steam Sealing Systems
- 1.2.2.2.6 - Condensate Demineralizer System
- 1.2.2.4 - Radioactive Waste Processing Systems
- 1.2.2.5.12 - Standby Gas Treatment System
- 1.2.2.9 - Radiation Monitoring and Control
- 1.2.2.10.1 - Reactor Building Closed Cooling Water System
- 1.2.2.10.4 - Service Water System
- 1.2.2.10.13 - Station Process Sampling System
- 2.1 - Geography and Demography
- Table 2.3-1 - Distance from Release Points to Receptors
- 2.3.5 - Long-Term (Routine) Diffusion Estimates
- 3.5.1.1.8 - System Reviews (Radioactive Release)
- 5.2.3.2.2 - BWR Chemistry or Reactor Coolant
- 5.2.5.1.4 - Intersystem Leakage Monitoring
- 9.2.1 - Service Water System
- 9.2.3 - Reactor Building Closed Cooling Water System
- 9.3.2 - Process Sampling System
- Table 9.3-1 - Process Sampling Points - Liquid
- Table 9.3-2 - Process Sampling Points - Gas
- 11.1 - Source Terms
- 11.2 - Liquid Waste Management Systems (all sub-sections)
- 11.3 - Gaseous Waste Management Systems (all sub-sections)
- 11.5 - Process and Effluent Radiological Monitoring (all sub-sections)

- 12.3 - Radiation Protection Design Features
- 12.3.2.2 - Description

Unit 2

- 1.2.5 - Reactor Coolant System
- 1.2.10.5 - Sampling System
- 1.2.12 - Radioactive Waste Processing System
- 1.2.13 - Interrelation With Millstone Units 1 and 3
- Figure 1.2-1 - Site Layout
- 1.4.8 - Radioactive Waste Processing System
- 1.7.3 - Radioactive Waste Processing System
- Appendix 1A, Criterion 60 - Control of Releases of Radioactive Materials to the Environment
- 2.1 - General Description (of Site and Environment)
- 2.3.5 - Long-Term (Routine) Diffusion Estimates (all sub-sections)
- Table 2.3-1 - Distances from Release Point to Receptors
- 2.9 - Environmental Radiation Monitoring Program (all sub-sections)
- 4.1 - Reactor Coolant System General Description
- 4.2 - Reactor Coolant System Design Basis
- 4.3.2 - Steam Generator
- 4.3.2.4 - Composition of Secondary fluid
- 4.4.3 - Coolant Chemistry
- 7.5.6.2 - Liquid Radiation Monitoring System (all sub-sections)
- 7.5.6.3 - Airborne and Steam Radioactivity Monitoring (all sub-sections)
- 7.6.3 - Radioactive Waste Processing System Panels (all sub-sections)
- 9.9.5.3 - System Operation (Radwaste Area Ventilation System)
- 9.9.8.3 - System Operation (Fuel Handling Area Ventilation System)
- 9.9.9.3 - System Operation (Main Exhaust System)
- 10.4.6 - Steam Generator Blowdown System
- 11.1 - Radioactive Waste Processing System (all sub-sections)
- Appendix 11B - Radioactive Waste Processing System Releases to Environment
- Appendix 11C - Doses From Liquid Radioactive Waste Processing System
- 12.5.2.2.3 - Chemistry Procedures
- 12.5.2.2.4 - Radioactive Waste System Procedures

Unit 3

- 1.2.6 - Radioactive Waste Systems
- 1.2.11 - Cooling Water and Other Auxiliary Systems
- Figure 1.2-1 - Site Plan
- Table 1.8-1 - NRC Regulatory Guides (Reg Guide 1.21)
- 2.1.1.3 - Boundaries for Establishing Effluent Release Limits
- 2.1.2.2 - Control of Activities Unrelated to Plant Operations
- 2.3.5 - Long-Term (Routine) Diffusion Estimates (all sub-sections)
- 3.1.2.64 - Monitoring Radioactive Releases (Criterion 64)
- 5.4.2 - Steam Generators (all sub-sections)

- 9.3.2 - Process Sampling Systems (all sub-sections)
- Table 9.3-1 - Sampling Points - Reactor Plant
- 9.3.3 - Reactor Plant Vent and Drain System (all sub-sections)
- 9.4 - Air Conditioning, Heating, Cooling, and Ventilation Systems (Sections 1-5, 7, 9)
- 9.5.10 - Containment Vacuum System (all sub-sections)
- 10.4.2 - Main Condenser Evacuation System
- 10.4.6 - Condensate Polishing Demineralizer System
- 10.4.8 - Steam Generator Blowdown System
- 10.4.10 - Auxiliary Steam and Associated Systems
- 11 - Radioactive Waste Management (all sections)
- Table 11.5-3 - Radiological Samples Taken at Sample Sink
- Appendix 11A Part I - Summary of Annual Radiation Doses
- Appendix 11A Part II - Dose Calculation Models and Assumptions
- 12.2 - Radiation Sources
- 15.7.1 - Radioactive Gaseous Waste System Failure (all sub-sections)

7. Will implementation of the proposed activity involve a Test or Experiment *not* described in the SAR? *(Refer to the list of examples in Section B.7 of Attachment 6 to determine the need for a SE. If "Yes," complete (a.), go to Section D and sign as Preparer - a SE is required. If "No," complete (b.), go to Section D and sign as Preparer.)*

   ☐ Yes *(SE required)* ☒ No

   a. *Reason SE required:*

   b. *Basis for "No" and SAR sections reviewed:*

   All the proposed changes to the REMODCM are changes to current requirements for the effluent sampling and analysis, radwaste processing, off-site dose calculation, and radiological environmental monitoring programs. There will be no tests or experiments required to implement these changes. All of these affected programs are established programs involving no tests or experiments.

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C. SUMMARY *(Completed by the Approver)*

1. Is a revision to the technical specifications or operating license required? *("Yes, if Question B.1 checked "Yes")*
   ☐ Yes ☑ No
2. Is a Design Engineering Screening Evaluation per the Design Change Manual Required? *(Yes, if proposed Change is an Intent Change to the Facility as described in the SAR)*
   ☐ Yes ☑ No ☐ Not Applicable
3. Is a new Safety Evaluation required? *(Yes, if Question B.1, B.3, B.5, B.6 or B.7 is checked "Yes")*
   ☐ Yes ☑ No
4. Is a FSARCR per RAC 03 necessary? *(Yes, if responses to Question B.5 or B.6 indicate proposed activity will cause the FSAR description to be incorrect)*
   ☐ Yes ☑ No ☐ Not Applicable
5. Is the proposed activity fully bounded by a previously approved Safety Evaluation? *(Yes, if Question B.2 is checked "Yes")*
   ☐ Yes ☑ No
6. Is the Quality Assurance Plan, Emergency Plan or Security Plan affected requiring an evaluation per RAC 01? *(Yes, if response to Question B.5, B.6, or B.7 identifies these portions of the SAR as being affected by the proposed activity)*
   ☐ Yes ☑ No ☐ Not Applicable

D. APPROVAL

Preparer: Claude Flory / John P. Kangley — Date: 4-26-99
CLAUDE FLORY / JOHN P. KANGLEY
Print and Sign

Reviewer: *(if required)* _____ — Date: _____
Print and Sign

Approver: Martin L. VanHaltern / Martin L VanHaltern — Date: 7/26/99
Print and Sign

Safety Evaluation Screen Form [♣Comm. 3.6]

(Sheet 14 of 14)

C. SUMMARY *(Completed by the Approver)*

1. Is a revision to the technical specifications or operating license required? *("Yes, if Question B.1 checked "Yes")*
   ☐ Yes ☑ No
2. Is a Design Engineering Screening Evaluation per the Design Change Manual Required? *(Yes, if proposed Change is an Intent Change to the Facility as described in the SAR)*
   ☐ Yes ☑ No ☐ Not Applicable
3. Is a new Safety Evaluation required? *(Yes, if Question B.1, B.3, B.5, B.6 or B.7 is checked "Yes")*
   ☐ Yes ☑ No
4. Is a FSARCR per RAC 03 necessary? *(Yes, if responses to Question B.5 or B.6 indicate proposed activity will cause the FSAR description to be incorrect)*
   ☐ Yes ☑ No ☐ Not Applicable
5. Is the proposed activity fully bounded by a previously approved Safety Evaluation? *(Yes, if Question B.2 is checked "Yes")*
   ☐ Yes ☑ No
6. Is the Quality Assurance Plan, Emergency Plan or Security Plan affected requiring an evaluation per RAC 01? *(Yes, if response to Question B.5, B.6, or B.7 identifies these portions of the SAR as being affected by the proposed activity)*
   ☐ Yes ☑ No ☐ Not Applicable

D. APPROVAL

Preparer: Claude Flory / John P. Kangley — Date: 4-26-99
CLAUDE FLORY / JOHN P. KANGLEY
Print and Sign

Reviewer: *(if required)* _____ — Date: _____
Print and Sign

Approver: Martin L. VanHaltern / Martin L VanHaltern — Date: 7/26/99
Print and Sign

Level of Use Information

STOP THINK ACT REVIEW

REMODCM
Changes

Revision 16

October 1, 1999

RADIOLOGICAL ENVIRONMENTAL REVIEW

RER-99-015

Revision 1

for

REMODCM Rev 16

September 30, 1999

Total Number of Pages: 3

Claude Flory Claude Flory 9/30/99
Preparer Date

William Eakin W J Eakin 9/30/99
Supervisor Date

1.0 BACKGROUND

REMODCM Revision 16 will consist of the following changes:

1) In Table C-3 of Section I, for continuous releases from steam generator blowdown, service water, and turbine building sumps the requirement for daily sampling and weekly analysis for tritium is being changed to weekly sampling and monthly analysis for tritium. Because resources were not available to support the new requirement for tritium sampling and analysis the old requirement is being restored.
2) Constraint on Unit 3 blowdown in Section I.C.2 is being changed from 10% of blowdown to blowdown recovery with radioactivity concentration criteria for purposes of requiring a monthly dose projection. This change is needed to give a requirement which can be implemented in procedures. A requirement of 10% of blowdown could not be easily quantified. Part of this change includes addition of new wording to refer to blowdown recovery with radioactivity concentration, applicable waste stream, and limiting discharge. Where the word 'applicable' is to be added the words "untreated" and "with equipment not continuously operating" will be deleted so that the requirements would apply to both processing equipment and radioactivity concentration. Also, for the list of Unit 3 equipment the words "or Radioactivity Concentration" will be added to the header descriptor. This will allow for specification of blowdown radioactivity concentrations in the list. Part of this change will also require a new reporting requirement for explanation of limitations on discharge to cover the case of dose exceedance due to blowdown discharges.
3) For the Unit 2 aerated liquid waste stream in Section I.C.2(b), an equivalent demineralizer is being added as an alternative processing equipment.
4) In Sections I.C.2(b) and I.D.2(b) the paragraph on "Required Equipment for Each Millstone Unit," is being revised to require use of equipment when projected dose exceeds criteria rather than to require use of equipment to ensure that the doses are not exceeded. This change will be needed to correct inappropriate wording which required more than the intent of this section of the REMODCM.

2.0 DISCUSSION

Change to frequency of tritium sampling and analysis in Table C-3

In the prior revision to the REMODCM tritium sampling and analyses of samples from steam generator blowdown, service water effluent, and turbine building sumps was increased because tritium, once detected in the steam generator, can easily migrate to blowdown or to the secondary side (turbine building sump). This change was considered an enhancement, not a need. The major source of tritium in secondary systems leading to environmental releases is from migration of tritium from primary to secondary water in the steam generators. Tritium will appear before other radionuclides because of it's ability to migrate through the tubes. Buildup of tritium due to migration without tube leakage or minimal leakage will be slow. For the purposes of effluent control and accountability a weekly sample with monthly analysis will be sufficient. Therefore relaxation from daily samples with weekly analysis to weekly samples with monthly analysis is acceptable.

Change of blowdown condition for projecting doses and as a restriction when dose projections exceed criteria

Unit 3 steam generator blowdown condition of 10% blowdown releases (open cycle) for requiring monthly dose projections and as a limit when dose projections exceeded criteria was added to the REMODCM with Revision 15. This change was made in an attempt to translate design parameters in Unit 3 FSAR Chapter 11 to specific REMODCM requirements. The purpose of the REMODCM is to limit release of radioactivity such that the dose limits in 10CFR50 Appendix I are not exceeded. Section I.C.2 of the REMODCM helps achieve this purpose by requiring monthly dose projections when specified processing equipment is out of service. If the dose projection shows that discharges from the waste stream with inoperable processing equipment would cause doses exceeding 2.5% of the regulatory dose limit, best efforts have to be made to return the equipment to service. Because steam generator blowdown, a waste stream discharging to the environment, has no processing equipment specifically designed to reduce radioactivity it was not in Section I.C.2 of the REMODCM prior to Revision 15. With Revision 15 the parameter of 10% of blowdown being

released was used instead of processing equipment as the condition requiring a dose projection as well as a requirement if dose projection from the blowdown pathway exceeded 2.5% of the regulatory limit. However the design parameter of 10% blowdown releases is not an easily measured operating parameter. Use of blowdown recovery can be considered a method of limiting release of radioactivity. Blowdown recovery combined with radioactivity concentration criteria for gross gamma and tritium activities can be easily measured and can be used to accomplish the purpose of the REMODCM. The radioactivity limits being added are 5E-7 uCi/ml for total gamma and 0.02 uCi/ml for tritium. Assuming all blowdown flow is released at the maximum flow rate of 400 gpm with these concentrations, the dose would remain less than 1% of the 10CFR50 Appendix I dose limits. Therefore the use of these radioactivity concentrations in REMODCM Section I.C.2 for purpose of requiring dose projections and as limiting condition when dose projection criteria are exceeded is more conservative than the requirement on use of processing equipment.

Change to Section I.C.2 to add an alternative processing equipment for Unit 2 aerated liquid waste stream

Aerated liquid demineralizer T24 is not able to process salty water. When there is salt water in the system the use of another demineralizer is required. This is accomplished with the use of a temporary demineralizer. Use of a temporary demineralizer is acceptable as long as it is equivalent to T24 for removal of radioactivity from the waste stream.

Change in Sections I.C.2(b) and I.D.2(b) for required use of equipment

For Revision 15 of the REMODCM the formats of pages C-11 and D-9 were restructured for better readability. The language in these sections was revised inadvertently to impose a stricter requirement than the original intent of these sections. As shown in both Sections I.C.2(a) and I.D.2(a), the intent is to require dose projections if processing equipment is out of service and, if dose projections exceeds certain criteria, to make best efforts to restore the equipment. Wording changes to Sections I.C.2(b) and I.D.2(b) made with Revision 15 added a requirement which is more stringent than that in Sections I.C.2(a) and I.D.2(a). A literal reading of the wording would require that the processing equipment be continuously operated to ensure that the dose criteria is not exceeded. NRC guidance for REMODCM manuals in NUREG-1301 is to operate radwaste processing equipment in order to minimize dose when dose projections exceed certain criteria, not for continuous operation. The guidance for liquid radwaste treatment systems include the wording "*appropriate portions of the system shall be used to reduce releases of radioactivity when the projected doses due to the liquid effluent to UNRESTRICTED AREAS would exceed 0.06 mrem to the whole body or 0.2 mrem to any organ in a 31-day period.*" Guidance for gaseous radwaste treatment is the same except that different dose criteria are used - 0.2 mrad from gamma radiation, 0.4 mrad from beta radiation, and 0.3 mrem to any organ. This change restores the requirements to the original intent and is consistent with NUREG-1301; therefore the change is acceptable.

3.0 CONCLUSION

The change to required use of equipment in Sections I.C.2(b) and I.D.2(b) would allow non-continuous use of processing equipment allowing for possible increased releases of radioactivity. However best effort to restore inoperative processing equipment will be required if dose projections exceed one-tenth the dose criteria specified in NRC guidance in NUREG-1301. Therefore, with this change the operability of the processing equipment will be required when there is the possibility for increased releases of radioactivity. Times of processing equipment inoperability when release of radioactivity is expected to be lower will not cause a significant increase of released radioactivity to the environment. All the other changes in Revision 16 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 the design bases for an effluent control program in the FSAR for each Millstone unit. The changes will not affect the level of radioactive effluent control required by Technical Specifications, the 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).

RADIOLOGICAL ENVIRONMENTAL REVIEW

RER-99-015

for

REMODCM Rev 16

September 16, 1999

Total Number of Pages: 3

Claude Flory Claude Flory 9/16/99
Preparer Date

William Eakin W. Eakin 9/28/99
Supervisor Date

1.0 BACKGROUND

REMODCM Revision 16 will consist of the following changes:

1) In Table C-3 of Section I, for continuous releases from steam generator blowdown, service water, and turbine building sumps the requirement for daily sampling and weekly analysis for tritium is being changed to weekly sampling and monthly analysis for tritium. Because resources were not available to support the new requirement for tritium sampling and analysis the old requirement is being restored.
2) Constraint on Unit 3 blowdown in Section I.C.2 is being changed from 10% of blowdown to blowdown recovery with radioactivity concentration criteria for purposes of requiring a monthly dose projection. This change is needed to give a requirement which can be implemented in procedures. A requirement of 10% of blowdown could not be easily quantified. Part of this change includes addition of new wording to refer to blowdown recovery with radioactivity concentration, applicable waste stream, and limiting discharge. Where the word 'applicable' is to be added the words "untreated" and "with equipment not continuously operating" will be deleted so that the requirements would apply to both processing equipment and radioactivity concentration. Also, for the list of Unit 3 equipment the words "or Radioactivity Concentration" will be added to the header descriptor. This will allow for specification of blowdown radioactivity concentrations in the list. Part of this change will also require a new reporting requirement for explanation of limitations on discharge to cover the case of dose exceedance due to blowdown discharges.
3) For the Unit 2 aerated liquid waste stream in Section I.C.2, an equivalent demineralizer is being added as an alternative processing equipment.
4) In Sections I.C.2 and I.D.2 the paragraph on "Required Equipment for Each Millstone Unit," is being revised to require use of equipment when projected dose exceeds criteria rather than to require use of equipment to ensure that the doses are not exceeded. This change will be needed to correct inappropriate wording which required more than the intent of this section of the REMODCM.

2.0 DISCUSSION

Change to frequency of tritium sampling and analysis in Table C-3

In the prior revision to the REMODCM tritium sampling and analyses of samples from steam generator blowdown, service water effluent, and turbine building sumps was increased because tritium, once detected in the steam generator, can easily migrate to blowdown or to the secondary side (turbine building sump). This change was considered an enhancement, not a need. The major source of tritium in secondary systems leading to environmental releases is from migration of tritium from primary to secondary water in the steam generators. Tritium will appear before other radionuclides because of it's ability to migrate through the tubes. Buildup of tritium due to migration without tube leakage or minimal leakage will be slow. For the purposes of effluent control and accountability a weekly sample with monthly analysis will be sufficient. Therefore relaxation from daily samples with weekly analysis to weekly samples with monthly analysis is acceptable.

Change of blowdown condition for projecting doses and as a restriction when dose projections exceed criteria

Unit 3 steam generator blowdown condition of 10% blowdown releases (open cycle) for requiring monthly dose projections and as a limit when dose projections exceeded criteria was added to the REMODCM with Revision 15. This change was made in an attempt to translate design parameters in Unit 3 FSAR Chapter 11 to specific REMODCM requirements. The purpose of the REMODCM is to limit release of radioactivity such that the dose limits in 10CFR50 Appendix I are not exceeded. Section I.C.2 of the REMODCM helps achieve this purpose by requiring monthly dose projections when specified processing equipment is out of service. If the dose projection shows that discharges from the waste stream with inoperable processing equipment would cause doses exceeding 2.5% of the regulatory dose limit, best efforts have to be made to return the equipment to service. Because steam generator blowdown, a waste stream discharging to the environment, has no processing equipment specifically designed to reduce radioactivity it was not in Section I.C.2 of

the REMODCM prior to Revision 15. With Revision 15 the parameter of 10% of blowdown being released was used instead of processing equipment as the condition requiring a dose projection as well as a requirement if dose projection from the blowdown pathway exceeded 2.5% of the regulatory limit. However the design parameter of 10% blowdown releases is not an easily measured operating parameter. Use of blowdown recovery can be considered a method of limiting release of radioactivity. Blowdown recovery combined with radioactivity concentration criteria for gross gamma and tritium activities can be easily measured and can be used to accomplish the purpose of the REMODCM. The radioactivity limits being added are 5E-7 uCi/ml for total gamma and 0.02 uCi/ml for tritium. Assuming all blowdown flow is released at the maximum flow rate of 400 gpm with these concentrations, the dose would remain less than 1% of the 10CFR50 Appendix I dose limits. Therefore the use of these radioactivity concentrations in REMODCM Section I.C.2 for purpose of requiring dose projections and as limiting condition when dose projection criteria are exceeded is more conservative than the requirement on use of processing equipment.

Change to Section I.C.2 to add an alternative processing equipment for Unit 2 aerated liquid waste stream

Aerated liquid demineralizer T24 is not able to process salty water. When there is salt water in the system the use of another demineralizer is required. This is accomplished with the use of a temporary demineralizer. Use of a temporary demineralizer is acceptable as long as it is equivalent to T24 for removal of radioactivity from the waste stream.

Change in Sections I.C.2 and I.D.2 for required use of equipment

For Revision 15 of the REMODCM the formats of pages C-11 and D-9 were restructured for better readability. The language in these sections was revised to inadvertently imposed a stricter requirement than the intent of these sections. The intent is to require dose projections if processing equipment was out of service and if dose projections exceeded certain criteria best efforts would be required to restore the equipment. Instead the Revision 15 language requires that the processing equipment be operated to ensure that the dose criteria is not exceeded. This change restores the requirements to the original intent and is therefore acceptable.

3.0 CONCLUSION

The changes in Revision 16 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 the design bases for an effluent control program in the FSAR for each Millstone unit. The changes will not affect the level of radioactive effluent control required by Technical Specifications, the 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).

Safety Evaluation Screen Form [*Comm. 3.6]

(Sheet 1 of 6)

Unit NA Document No. REMODCM Revision No. 16 Change No. NA

A. SUMMARY INFORMATION

1. Description of the Proposed Change, Test or Experiment

REMODCM Revision 16 will consist of the following changes:

1) In Table C-3 of Section I, for continuous releases from steam generator blowdown, service water, and turbine building sumps the requirement for daily sampling and weekly analysis for tritium is being changed to weekly sampling and monthly analysis for tritium. Because resources were not available to support the new requirement for tritium sampling and analysis the old requirement is being restored.
2) Constraint on Unit 3 blowdown in Section I.C.2 is being changed from 10% of blowdown to a radioactivity concentration criteria for purposes of requiring a monthly dose projection. This change is needed to give a requirement which can be implemented in procedures. A requirement of 10% of blowdown could not be easily quantified. Part of this change includes addition of new wording to refer to radioactivity concentration, applicable waste stream, and limiting discharge. Where the word 'applicable' is to be added the words "untreated" and "with equipment not continuously operating" will be deleted so that the requirements would apply to both processing equipment and radioactivity concentration. Also, for the list of Unit 3 equipment the words "or Radioactivity Concentration" will be added to the header descriptor. This will allow for specification of blowdown radioactivity concentrations in the list. Part of this change will also required a new reporting requirement for explanation of limitations on discharge to cover the case of dose exceedance due to blowdown discharges.
3) For the Unit 2 aerated liquid waste stream in Section I.C.2, an equivalent demineralizer is being added as an alternative processing equipment.
4) In Sections I.C.2 and I.D.2 the paragraph on "Required Equipment for Each Millstone Unit," is being revised to require use of equipment when projected dose exceeds criteria rather than to require use of equipment to ensure that the doses are not exceeded. This change will be needed to correct inappropriate wording which required more than the intent of this section of the REMODCM.

B. SCREENING QUESTIONS *(Completed by the Preparer)*

1. Will implementation of the proposed Change, Test or Experiment require a revision to the Operating License or the Technical Specifications? *(If "Yes," complete (a.), go to Section D and sign as Preparer - prior NRC review and approval is required. If "No," complete (b) and go to Question 2.)*

☐ Yes *(OL or T/S change required)* ☒ No

a. *Reason OL or T/S change required and sections impacted:*

b. *Reason OL or T/S change not required and sections reviewed:*

Technical Specifications refer to the REMODCM for methods and parameters to be used in the radiological effluent and environmental monitoring programs. NRC allows changes to the REMODCM with appropriate reviews and SORC approval. Any changes to the REMODCM are reported to the NRC in the annual effluent report. Prior to SORC approval, pending changes to the REMODCM are reviewed by the Safety Analysis Branch, the Chemistry Managers, and Regulatory Affairs to ensure that the changes do not contradict the operating license and technical specifications. A Radiological Environmental Review, in accordance with Nuclear Group Procedure NGP 5.16, is performed to ensure compliance with Technical Specifications, the FSARs, 10CFR20 Sections 1301 and 1302 and Appendix B, 40CFR190, and 10CFR50 Section 36a and Appendix A General Design Criteria 60 and 64 and Appendix I. These reviews have been completed and have determined that the proposed revisions are consistent with the operating license and technical specifications.

Safety Evaluation Screen Form [♣Comm. 3.6]

(Sheet 2 of 6)

Unit NA Document No. REMODCM Revision No. 16 Change No. NA

Technical Specification sections reviewed:

Unit 1

1.0.GG - Radiological Effluent Monitoring and Offsite Dose Calculation Manual (REMODCM)

3/4.8.D - Radioactive Gaseous Effluents

6.8.1(g) - Quality control for effluent monitoring procedures

6.8.1(h) - Procedures to implement REMODCM

6.8.4 - Written procedures for Section I.E of REMODCM

6.8.5 - Radiological Effluent Monitoring and Offsite Dose Calculation Manual

6.16 - Radioactive Waste Treatment

Units 2 and 3

1.31(U2), 1.26(U3) - Radiological Effluent Monitoring and Offsite Dose Calculation Manual (REMODCM)

3/4.11.1 - Radioactive Liquid Effluents

3/4.11.2 - Radioactive Gaseous Effluents

6.8.1(h - U2)(i - U3) - Procedures to implement REMODCM

6.8.1(g - U2)(h - U3) - Quality control for effluent monitoring procedures

6.15 - Radiological Effluent Monitoring and Offsite Dose Calculation Manual

6.16(U2), 6.14(U3) - Radioactive Waste Treatment

2. Is the proposed Change, Test or Experiment fully bounded by the scope of a previously approved Safety Evaluation? *(Refer to Section B.2 of Attachment 6 to determine if fully bounded. If "Yes," complete (a.) and (b.), go to Section D and sign as Preparer - a new SE is not required. If "No," go to Question 3.)*

☐ Yes *(new SE not required)* ☒ No

a. *Identification of previously approved SE:*

b. *Reason previously approved SE fully bounds proposed activity:*

3. Is it obvious that the proposed Change, Test or Experiment requires a Safety Evaluation? *(If "Yes," a SE is required – complete (a.), go to Section D and sign as Preparer. If "Not Obvious," go to Question 4. If it is not clear, a SE is required.)*

☐ Yes *(SE required)* ☒ Not Obvious

a. *Reason SE required:*

4. Does the proposed activity meet the criteria of a Non-Intent Change to the Facility or procedures as described in the SAR? *(Refer to the guidance in Section B.4 of Attachment 6 to determine if Non-intent. If a Non-intent Change, check "Yes," complete (a.) go to Section D, and sign as Preparer - a SE is not required. If "No," go to Question 5.)*

☐ Yes *(SE not required)* ☒ No

a. *Reason SE not required and SAR sections reviewed:*

Safety Evaluation Screen Form [♣Comm. 3.6]

(Sheet 3 of 6)

Unit NA Document No. REMODCM Revision No. 16 Change No. NA

5. Will implementation of the proposed activity modify the Facility as described in the SAR? *(Per the guidance in Section B.5 of Attachment 6, ensure that you check "Yes" if the proposed activity could directly or indirectly as a result of a system interaction, introduce different failure modes or affect the function or reliability of equipment described in the SAR. If "Yes," complete (a.), go to Section D and sign as Preparer. - a SE is required. If "No," complete (b.) and go to Question 6.)*

☐ Yes *(SE required)* ☒ No

a. *Reason SE required and SAR sections impacted:*

b. *Basis for "No" and SAR sections reviewed:*

All the changes for Revision 16 to the REMODCM involve Chemistry procedures for sampling of effluent streams or calculation of effluent doses. None of the procedure changes needed to implement this revision will require modification to any structure, equipment, or component. Sampling and analysis of tritium from steam generator blowdown, service water system, or turbine building sump is routinely done with installed equipment. A reduction in frequency of sampling and analysis will not require new or modified equipment. Changes to the requirements in Sections I.C.2 and I.D.2 for processing equipment do not involve the need for new or modified equipment or structures.

The following SAR sections were reviewed:

Unit 1

- 1.2.2.4 - Radioactive Waste Processing Systems
- 1.2.2.9 - Radiation Monitoring and Control
- 1.2.2.10.13 - Station Process Sampling System
- 9.3.2 - Process Sampling System
- Table 9.3-2 - Process Sampling Points - Gas
- 11.2 - Liquid Waste Management Systems (all sub-sections)
- 11.3 - Gaseous Waste Management Systems (all sub-sections)
- 11.5 - Process and Effluent Radiological Monitoring (all sub-sections)

Unit 2

- 1.2.10.5 - Sampling System
- 1.2.12 - Radioactive Waste Processing System
- 1.4.8 - Radioactive Waste Processing System
- 1.7.3 - Radioactive Waste Processing System
- Appendix 1A, Criterion 60 - Control of Releases of Radioactive Materials to the Environment
- 7.6.3 - Radioactive Waste Processing System Panels (all sub-sections)
- 10.4.6.2 - System Description (Steam Generator Blowdown System)
- 11.1 - Radioactive Waste Processing System (All sections)
- Appendix 11B - Radioactive Waste Processing System Releases to Environment

Unit 3

- 1.2.6 - Radioactive Waste Systems
- 1.2.11 - Cooling Water and Other Auxiliary Systems
- Table 1.8-1 - NRC Regulatory Guides (Reg Guide 1.21)
- 3.1.2.64 - Monitoring Radioactive Releases (Criterion 64)

- 5.4.2 - Steam Generators (all sub-sections)
- 9.3.2 - Process Sampling Systems
- 9.3.3 - Reactor Plant Vent and Drain Systems
- Table 9.3-1 - Sampling Points - Reactor Plant
- 10.4.8 - Steam Generator Blowdown System
- 11 - Radioactive Waste Management (all sections)
- Table 11.5-3 - Radiological Samples Taken at Sample Sink
- 15.7.1 - Radioactive Gaseous Waste System Failure (all sub-sections)

6. Will implementation of the proposed activity modify procedures as described in the SAR? *(Refer to the list of supplemental questions in Section B.6 of Attachment 6 to evaluate the need for a SE. If "Yes," complete (a.), go to Section D and sign as Preparer - a SE is required. If "No," complete (b.) and go to Question 7.)*

☐ Yes *(SE required)* ☒ No

a. *Reason SE required and SAR sections impacted:*

b. *Basis for "No" and SAR sections reviewed:*

The SARs contain general descriptions of effluent sampling and analysis, radwaste processing, off-site dose calculation, and radiological environmental monitoring programs. Except for rare exceptions, specific descriptions of these programs are not contained in the SARs. Each unit's SAR references the REMODCM as the source of specific procedural requirements for these programs.

The SARs contain no description of use of radwaste processing equipment conditional on dose projections to the public from radioactive releases.

All the proposed changes are consistent with the general description of procedures described in the SAR for each unit's effluent sampling and analysis and radwaste processing programs.

The following SAR sections were reviewed:

Unit 1

- 1.2.2.4 - Radioactive Waste Processing Systems
- 1.2.2.9 - Radiation Monitoring and Control
- 1.2.2.10.13 - Station Process Sampling System
- 9.3.2 - Process Sampling System
- Table 9.3-1 - Process Sampling Points - Liquid
- Table 9.3-2 - Process Sampling Points - Gas
- 11.1 - Source Terms
- 11.2 - Liquid Waste Management Systems (all sub-sections)
- 11.3 - Gaseous Waste Management Systems (all sub-sections)

Unit 2

- 1.2.10.5 - Sampling System
- 1.2.12 - Radioactive Waste Processing System
- 1.2.13 - Interrelation With Millstone Units 1 and 3
- 1.4.8 - Radioactive Waste Processing System
- 1.7.3 - Radioactive Waste Processing System

- Appendix 1A, Criterion 60 - Control of Releases of Radioactive Materials to the Environment
- 7.6.3 - Radioactive Waste Processing System Panels (all sub-sections)
- 11.1 - Radioactive Waste Processing System (all sub-sections)
- Appendix 11B - Radioactive Waste Processing System Releases to Environment
- Appendix 11C - Doses From Liquid Radioactive Waste Processing System
- 12.5.2.2.3 - Chemistry Procedures
- 12.5.2.2.4 - Radioactive Waste System Procedures

Unit 3

- 1.2.6 - Radioactive Waste Systems
- Table 1.8-1 - NRC Regulatory Guides (Reg Guide 1.21)
- 3.1.2.64 - Monitoring Radioactive Releases (Criterion 64)
- 5.4.2 - Steam Generators (all sub-sections)
- 9.3.2 - Process Sampling Systems (all sub-sections)
- Table 9.3-1 - Sampling Points - Reactor Plant
- 10.4.8 - Steam Generator Blowdown System
- 11 - Radioactive Waste Management (all sections)
- Table 11.5-3 - Radiological Samples Taken at Sample Sink
- Appendix 11A Part I - Summary of Annual Radiation Doses
- Appendix 11A Part II - Dose Calculation Models and Assumptions
- 12.2 - Radiation Sources
- 15.7.1 - Radioactive Gaseous Waste System Failure (all sub-sections)

7. Will implementation of the proposed activity involve a Test or Experiment *not* described in the SAR? *(Refer to the list of examples in Section B.7 of Attachment 6 to determine the need for a SE. If "Yes," complete (a.), go to Section D and sign as Preparer - a SE is required. If "No," complete (b.), go to Section D and sign as Preparer.)*

   ☐ Yes *(SE required)* ☒ No

   a. *Reason SE required:*

   b. *Basis for "No" and SAR sections reviewed:*

   All the proposed changes to the REMODCM are changes to current requirements for the effluent sampling and analysis and dose projections based on availability of radwaste processing. There will be no tests or experiments required to implement these changes. All of these affected programs are established programs involving no tests or experiments.

Safety Evaluation Screen Form [♣Comm. 3.6]

(Sheet 6 of 6)

Unit NA Document No. REMODCM Revision No. 16 Change No. NA

C. SUMMARY *(Completed by the Approver)*

1. Is a revision to the technical specifications or operating license required? *("Yes, if Question B.1 checked "Yes")*

   ☐ Yes ☒ No

2. Is a Design Engineering Screening Evaluation per the Design Change Manual Required? *(Yes, if proposed Change is an Intent Change to the Facility as described in the SAR)*

   ☐ Yes ☒ No ☐ Not Applicable

3. Is a new Safety Evaluation required? *(Yes, if Question B.1, B.3, B.5, B.6 or B.7 is checked "Yes")*

   ☐ Yes ☒ No

4. Is a FSARCR per RAC 03 necessary? *(Yes, if responses to Question B.5 or B.6 indicate proposed activity will cause the FSAR description to be incorrect)*

   ☐ Yes ☒ No ☐ Not Applicable

5. Is the proposed activity fully bounded by a previously approved Safety Evaluation? *(Yes, if Question B.2 is checked "Yes")*

   ☐ Yes ☒ No

6. Is the Quality Assurance Plan, Emergency Plan or Security Plan affected, requiring an evaluation per RAC 01? *(Yes, if response to Question B.5, B.6, or B.7 identifies these portions of the SAR as being affected by the proposed activity)*

   ☐ Yes ☒ No ☐ Not Applicable

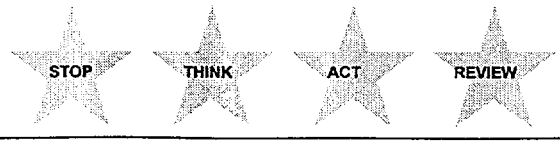
D. APPROVAL

Preparer: Claude Flory Claude Flory Date: 9/16/99
Print and Sign

Reviewer: *(if required)* _____ Date: _____
Print and Sign

Approver: M.S. Kai M S Kai Date: 9/23/99
Print and Sign

Level of Use Information



REMODCM Changes

Revision 17

November 18, 1999

RADIOLOGICAL ENVIRONMENTAL REVIEW

RER-99-016

for

REMODCM Rev 17

October 15, 1999

Total Number of Pages: 2

Claude Flory Claude Flory 10/13/99
Preparer Date

William Eakin W J Eakin 10/14/99
Supervisor Date

1.0 DESCRIPTION OF CHANGE

REMODCM Revision 17 will consist of the addition of a new section (Section III) to incorporate the Unit 1 Radiological Effluent Technical Specifications (RETS) and their bases. Sections I and II are being revised to revise any reference to Unit 1 RETS so that Section III is referenced.

2.0 DISCUSSION

Millstone Unit 1 Safety Technical Specifications (STS) are being revised to the Permanently Defueled Technical Specifications (PDTS). Part of this revision includes transferring the RETS portion of STS, all of Section 3.8 and corresponding bases, into the REMODCM. STS Section 3.8 and bases will be placed verbatim in new REMODCM Section III. References in Sections I and II which reference Unit 1 RETS are being revised to refer to Section III.

Because the Unit 1 RETS are being incorporated verbatim, there are no changes in the requirements of the REMODCM.

3.0 CONCLUSION

The changes in Revision 17 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 each Millstone unit. 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).

Safety Evaluation Screen Form [♣Comm. 3.6]

(Sheet 1 of 4)

Unit NA **Document No.** REMODCM **Revision No.** 17 **Change No.** 0

A. SUMMARY INFORMATION *(Completed by the Preparer)*

1. Description of the Proposed Change, Test or Experiment

   REMODCM Revision 16 will consist of the addition of a new section (Section III) to incorporate the Unit 1 Radiological Effluent Technical Specifications (RETS) and their bases. Sections I and II are being revised to change any reference to Unit 1 RETS so that Section III is referenced. This change is part of the conversion of the Millstone Unit 1 Safety Technical Specifications (STS) into the Permanently Defueled Technical Specifications (PDTS). All of STS Section 3.8 and corresponding bases are being incorporated verbatim into the REMODCM.

B. SCREENING QUESTIONS *(Completed by the Preparer)*

1. Will implementation of the proposed Change, Test or Experiment require a revision to the Operating License or the Technical Specifications? *(If "Yes," complete (a.), go to Section D and sign as Preparer - prior NRC review and approval is required. If "No," complete (b) and go to Question 2.)*

   ☐ Yes *(OL or T/S change required)* ☒ No

   a. *Reason OL or T/S change required and sections impacted:*

   b. *Reason OL or T/S change not required and sections reviewed:*

   With this change, Section 3.8 and corresponding bases of the Unit 1 Safety Technical Specifications (STS) are being incorporated into the REMODCM and all references to the Unit 1 STS are being removed. A change to the Unit 1 STS is not needed because a part of the plan to convert the Unit 1 STS to the Permanent Defueled Technical Specifications (PDTS) includes incorporation of Section 3.8 with corresponding bases into the REMODCM. This incorporation of a part of the STS into the REMODCM is an action specifcally allowed in:

   1) NRC Generic Letter 89-01, "Implementation of Programmatic Controls for Radiological Effluent Technical Specifications in the Adminstrative Controls Section of the Technical Specifications and the Relocation of Procedural Details of RETS to the Offsite Dose Calculation Manual or to the Process Control Program," and
   2) NUREG-1433, Vol 1, Rev 1, "Standard Technical Specifications (STS) for General Electric Plants, BWR/4."

   Conversion of the Unit 1 STS to PDTS also includes a new administative control (PDTS 5.6.4) for a radiological effluent controls program and a revised administrative control (STS 6.15 to PDTS 5.6.1) for the REMODCM which maintains the same level of regulatory control on radiological effluents.

Safety Evaluation Screen Form [♣Comm. 3.6]

Unit NA **Document No.** REMODCM **Revision No.** 17 **Change No.** 0

2. Is the proposed Change, Test or Experiment fully bounded by the scope of a previously approved Safety Evaluation? *(Refer to Section B.2 of Attachment 6 to determine if fully bounded. If "Yes," complete (a.) and (b.), go to Section D and sign as Preparer - a new SE is not required. If "No," go to Question 3.)*

   ☒ Yes *(new SE not required)* ☐ No

   a. *Identification of previously approved SE:*

      E1-EV-99-001, Rev 1

   b. *Reason previously approved SE fully bounds proposed activity:*

      Safety Evaluation E1-EV-99-001, Rev 1 was written for the conversion of the Unit 1 STS to the PDTS. It concluded that the conversion, including provisions for control of radiological effleunts, is safe and that there is no USQ.

3. Is it obvious that the proposed Change, Test or Experiment requires a Safety Evaluation? *(If "Yes," a SE is required – complete (a.), go to Section D and sign as Preparer. If "Not Obvious," go to Question 4. If it is not clear, a SE is required.)*

   ☐ Yes *(SE required)* ☐ Not Obvious

   a. *Reason SE required:*

4. Does the proposed activity meet the criteria of a Non-Intent Change to the Facility or procedures as described in the SAR? *(Refer to the guidance in Section B.4 of Attachment 6 to determine if Non-intent. If a Non-intent Change, check "Yes," complete (a.) go to Section D, and sign as Preparer - a SE is not required. If "No," go to Question 5.)*

   ☐ Yes *(SE not required)* ☐ No

   a. *Reason SE not required and SAR sections reviewed:*

5. Will implementation of the proposed activity modify the Facility as described in the SAR? *(Per the guidance in Section B.5 of Attachment 6, ensure that you check "Yes" if the proposed activity could directly or indirectly as a result of a system interaction, introduce different failure modes or affect the function or reliability of equipment described in the SAR. If "Yes," complete (a.), go to Section D and sign as Preparer. - a SE is required. If "No," complete (b.) and go to Question 6.)*

   ☐ Yes *(SE required)* ☐ No

   a. *Reason SE required and SAR sections impacted:*

   b. *Basis for "No" and SAR sections reviewed:*

Safety Evaluation Screen Form [♣Comm. 3.6]

Unit NA Document No. REMODCM Revision No. 17 Change No. 0

6. Will implementation of the proposed activity modify procedures as described in the SAR? *(Refer to the list of supplemental questions in Section B.6 of Attachment 6 to evaluate the need for a SE. If "Yes," complete (a.), go to Section D and sign as Preparer - a SE is required. If "No," complete (b.) and go to Question 7.)*

☐ Yes *(SE required)* ☐ No

a. *Reason SE required and SAR sections impacted:*

b. *Basis for "No" and SAR sections reviewed:*

7. Will implementation of the proposed activity involve a Test or Experiment *not* described in the SAR? *(Refer to the list of examples in Section B.7 of Attachment 6 to determine the need for a SE. If "Yes," complete (a.), go to Section D and sign as Preparer - a SE is required. If "No," complete (b.), go to Section D and sign as Preparer.)*

☐ Yes *(SE required)* ☐ No

a. *Reason SE required:*

b. *Basis for "No" and SAR sections reviewed:*

C. SUMMARY *(Completed by the Approver)*

1. Is a revision to the technical specifications or operating license required? *("Yes, if Question B.1 checked "Yes")*

☐ Yes ☒ No

2. Is a Design Engineering Screening Evaluation per the Design Change Manual Required? *(Yes, if proposed Change is an Intent Change to the Facility as described in the SAR)*

☐ Yes ☒ No ☐ Not Applicable

3. Is a new Safety Evaluation required? *(Yes, if Question B.1, B.3, B.5, B.6 or B.7 is checked "Yes")*

☐ Yes ☒ No

4. Is a FSARCR per RAC 03 necessary? *(Yes, if responses to Question B.5 or B.6 indicate proposed activity will cause the FSAR description to be incorrect)*

☐ Yes ☒ No ☐ Not Applicable

5. Is the proposed activity fully bounded by a previously approved Safety Evaluation? *(Yes, if Question B.2 is checked "Yes")*

☒ Yes ☐ No

6. Is the Quality Assurance Plan, Emergency Plan or Security Plan affected, requiring an evaluation per RAC 01? *(Yes, if response to Question B.5, B.6, or B.7 identifies these portions of the SAR as being affected by the proposed activity)*

☐ Yes ☒ No ☐ Not Applicable

Safety Evaluation Screen Form [♣Comm. 3.6]

(Sheet 4 of 4)

Unit NA **Document No.** REMODCM **Revision No.** 17 **Change No.** 0

D. APPROVAL

Preparer: Claude Flory / Kong Ju — Date: 10/15/99
Print and Sign

Reviewer: *(if required)* _____ — Date: _____
Print and Sign

Approver: M. S. Kai — Date: 10/19/99
Print and Sign

Level of Use Information

STOP THINK ACT REVIEW

4.0 Inoperable Effluent Monitors

During the period January 1 through December 31, 1999, 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 for the period 5/1/99-6/24/99 for a total of 55 days due to inadequate design. The monitor uses steam generator pressure to provide sample flow. In modes 4, 5, 6, steam generator pressure is insufficient to provide adequate sample flow. Millstone Unit 3 was in a refueling outage during this time and therefore could not be restored within 30 days. During the inoperable period, Chemistry personnel analyzed grab samples for gross radioactivity at least once per 24 hours when the pathway was in service.

5.0 Errata

5.1. Unit 3 Table 2.3-1 Airborne Release - Summary had an incorrect total for gross alpha in the 2nd quarter of 1998. See updated table on next page.

Table 2.3-1

Millstone Unit No. 3

Airborne Effluents - Release Summary

	Units	1998				
		1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	Total
A. Fission & Activation Gases						
1. Total Activity Released	Ci	N/D	N/D	2.24E-01	2.66E-03	2.27E-01
2. Average Period Release Rate	uCi/sec	-	-	2.82E-02	3.35E-04	7.19E-03
B. Iodine-131						
1. Total Activity Released	Ci	N/D	N/D	3.43E-05	7.64E-06	4.19E-05
2. Average Period Release Rate	uCi/sec	-	-	4.31E-06	9.61E-07	1.33E-06
C. Particulates						
1. Total Activity Released	Ci	N/D	N/D	2.14E-06	N/D	2.14E-06
2. Average Period Release Rate	uCi/sec	-	-	2.69E-07	-	6.79E-08
D. Gross Alpha						
1. Total Activity Released	Ci	4.38E-07	**3.38E-07**	5.58E-07	2.82E-07	**1.62E-06**
E. Tritium						
1. Total Activity Released	Ci	N/D	N/D	N/D	4.24E-04	4.24E-04
2. Average Period Release Rate	uCi/sec	-	-	-	5.33E-05	1.34E-05

N/D = Not Detected