NINE MILE POINT NUCLEAR STATION - UNIT 2

RADIOACTIVE EFFLUENT RELEASE REPORT

January – December 2002

NINE MILE POINT NUCLEAR STATION - UNIT 2

RADIOACTIVE EFFLUENT RELEASE REPORT

JANUARY – DECEMBER 2002

SUPPLEMENTAL INFORMATION

Facility: Nine Mile Point Unit 2 **Licensee:** Nine Mile Point Nuclear Station, LLC

1. TECHNICAL SPECIFICATION ADMINISTRATIVE CONTROLS – (Off-Site Dose Calculation Manual (ODCM) Limits – Radioactive Effluent Controls Program)

A) FISSION AND ACTIVATION GASES

1. The dose rate limit of noble gases released in gaseous effluents from the site to areas at or beyond the site boundary shall be less than or equal to 500 mrem/year to the whole body and less than or equal to 3000 mrem/year to the skin.

2. The air dose from noble gases released in gaseous effluents from Nine Mile Point Unit 2 to areas at or beyond the site boundary shall be limited during any calendar quarter to less than or equal to 5 mrad for gamma radiation and less than or equal to 10 mrad for beta radiation, and during any calendar year to less than or equal to 10 mrad for gamma radiation and less than or equal to 20 mrad for beta radiation.

B&C) TRITIUM, IODINES AND PARTICULATES, HALF LIVES > 8 DAYS

1. The dose rate limit of Iodine-131, Iodine-133, Tritium and all radionuclides in particulate form with half-lives greater than eight days, released in gaseous effluents from the site to areas at or beyond the site boundary shall be less than or equal to 1500 mrem/year to any organ.

2. The dose to a member of the public from Iodine-131, Iodine-133, Tritium and all radionuclides in particulate form with half-lives greater than eight days in gaseous effluents released from Nine Mile Point Unit 2 to areas at or beyond the site boundary shall be limited during any calendar quarter to less than or equal to 7.5 mrem to any organ, and during any calendar year to less than or equal to 15 mrem to any organ.

D) LIQUID EFFLUENTS

1. The concentration of radioactive material released in the liquid effluents to unrestricted areas shall be limited to ten times the concentrations specified in 10CFR Part 20.1001-20.2402, Appendix B, Table 2, Column 2 for radionuclides other than dissolved or entrained noble gases. For dissolved or entrained noble gases, the concentration shall be limited to 2E-04 microcuries/ml total activity.

2. The dose or dose commitment to a member of the public from radioactive materials in liquid effluents released from Nine Mile Point Unit 2 to unrestricted areas shall be limited during any calendar quarter to less than or equal to 1.5 mrem to the whole body and to less than or equal to 5 mrem to any organ, and during any calendar year to less than or equal to 3 mrem to the whole body and to less than or equal to 10 mrem to any organ.

2. MEASUREMENTS AND APPROXIMATIONS OF TOTAL RADIOACTIVITY

Described below are the methods used to measure or approximate the total radioactivity and radionuclide composition in effluents.

A) FISSION AND ACTIVATION GASES

Noble gas effluent activity is determined by on-line gamma spectroscopic monitoring of an isokinetic sample stream.

B) IODINES

Iodine effluent activity is determined by gamma spectroscopic analysis once every seven days of charcoal cartridges sampled from an isokinetic sample stream.

C) PARTICULATES

Activity released from the main stack and the combined Radwaste/Reactor Building vent is determined by gamma spectroscopic analysis once every seven days of particulate filters sampled from an isokinetic sample stream and composite analysis of the filters for non-gamma emitters.

D) TRITIUM

Tritium effluent activity is measured by liquid scintillation or gas proportional counting of samples taken once every 31 days with an air sparging/water trap apparatus.

E) LIQUID EFFLUENTS

Isotopic contents of liquid effluents are determined by isotopic analysis of a representative sample of each batch and composite analysis of non-gamma emitters.

F) SOLID EFFLUENTS

Isotopic contents of waste shipments are determined by gamma spectroscopy analyses of a representative sample of each batch. Scaling factors established from primary composite sample analyses conducted off-site are applied, where appropriate, to find estimated concentration of non-gamma emitters. For low activity trash shipments, curie content is estimated by dose rate measurement and application of appropriate scaling factors.

ATTACHMENT 1
Summary Data

Unit 1 ___ Unit 2 X Reporting Period January – December 2002

Liquid Effluents:

10CFR20.1001-20.2402, Appendix B, Table 2, Column 2[1]

Average MEC - µCi/ml (Qtr. 1) = 5.76E-03
Average MEC - µCi/ml (Qtr. 2) = 3.04E-03
Average MEC - µCi/ml (Qtr. 3) = 6.88E-03
Average MEC - µCi/ml (Qtr. 4) = 8.17E-03

Average Energy (Fission and Activation gases – Mev):

Qtr. 1 :	E(gamma) = 4.27E-01	E(beta) = 2.79E-01
Qtr. 2 :	E(gamma) = 5.45E-01	E(beta) = 3.93E-01
Qtr. 3 :	E(gamma) = 1.59E-01	E(beta) = 2.53E-01
Qtr. 4 :	E(gamma) = 6.96E-01	E(beta) = 6.01E-01

Liquid:

Number of batch releases	:	57			
Total time period for batch releases (hrs)	:	1.85E+02			
Maximum time period for a batch release (hrs)	:	3.33E+00			
Average time period for a batch release (hrs)	:	3.25E+00			
Minimum time period for a batch release (hrs)	:	3.13E+00			
Total volume of water used to dilute the liquid effluent during the release period (L)	:	1st 2.42E+08	2nd 4.30E+08	3rd 1.56E+08	4th 3.17E+08
Total volume of water used to dilute the liquid effluent during reporting Period (L)	:	1st 1.13E+10	2nd 1.32E+10	3rd 1.38E+10	4th 1.38E+10

Gaseous (Emergency Condenser Vent): "Not Applicable for Unit 2"

Number of batch releases	:	N/A
Total time period for batch releases (hrs)	:	N/A
Maximum time period for a batch release (hrs)	:	N/A
Average time period for a batch release (hrs)	:	N/A
Minimum time period for a batch release (hrs)	:	N/A

Gaseous (Primary Containment Purge):

Number of batch releases	:	14
Total time period for batch releases (hrs)	:	3.81E+02
Maximum time period for a batch release (hrs)	:	1.08E+02
Average time period for a batch release (hrs)	:	2.72E+01
Minimum time period for a batch release (hrs)	:	4.57E+00

[1] The Off-site Dose Calculation Manual limits the concentration of radioactive material released in the liquid effluents to unrestricted areas to ten times the concentrations specified in 10CFR20.1001-20.2402, Appendix B, Table 2, Column 2. Maximum Effluent Concentrations (MEC) numerically equal to ten times the 10CFR20.1001-20.2402 concentrations were adopted to evaluate liquid effluents.

ATTACHMENT 1

Summary Data

Unit 1 ___ Unit 2 X	Reporting Period January – December 2002
Abnormal Releases: There were no abnormal releases during this report period.	
A. Liquids:	
Number of releases	0
Total activity released	N/A Ci
B. Gaseous:	
Number of releases	0
Total activity released	N/A Ci

ATTACHMENT 2

Unit 1 ___ Unit 2 X Reporting Period January – December 2002

GASEOUS EFFLUENTS – SUMMATION OF ALL RELEASES, ELEVATED AND GROUND LEVEL

			1st QUARTER	2nd QUARTER	3rd QUARTER	4th QUARTER	EST. TOTAL ERROR, %
A.	Fission & Activation gases						
	1. Total release	Ci	2.34E+00	1.29E+00	3.25E-01	9.99E+00	5.00E+01
	2. Average release rate	µCi/sec	3.02E-01	1.64E-01	4.11E-02	1.25E+00	
B.	Iodines						
	1. Total Iodine-131	Ci	1.69E-04	3.31E-06	6.89E-06	1.84E-04	3.00E+01
	2. Average release rate for period	µCi/sec	2.15E-05	4.21E-07	9.49E-07	2.17E-05	
C.	Particulates						
	1. Particulates with half-lives >8 days	Ci	1.12E-03	5.84E-04	1.26E-03	3.61E-04	3.00E+01
	2. Average release rate for period	µCi/sec	1.42E-04	7.44E-05	1.74E-04	4.27E-05	
	3. Gross alpha radioactivity	Ci	1.88E-05	1.86E-05	3.09E-05	1.50E-05	2.50E+01
D.	Tritium						
	1. Total release	Ci	1.09E+01	4.21E+00	7.15E+00	8.13E+00	5.00E+01
	2. Average release rate for period	µCi/sec	1.40E+00	5.36E-01	9.85E-01	9.60E-01	
E.	Percent of ODCM Limits						
	Fission and Activation Gases						
	Percent of Quarterly Gamma Air Dose Limit (5 mR)	%	2.27E-03	1.65E-03	1.05E-04	1.60E-02	
	Percent of Quarterly Beta Air Dose Limit (10 mrad)	%	7.16E-05	5.51E-05	9.16E-06	6.64E-04	
	Percent of Annual Gamma Air Dose Limit to Date (10 mR)	%	1.13E-03	1.96E-03	2.01E-03	1.00E-02	
	Percent of Annual Beta Air Dose Limit to Date (20 mrad)	%	3.57E-05	6.29E-05	6.76E-05	3.99E-04	
	Percent of Whole Body Dose Rate Limit (500 mrem/yr)	%	8.93E-05	6.32E-05	4.03E-07	6.11E-04	
	Percent of Skin Dose Rate Limit (3000 mrem/yr)	%	1.79E-05	1.28E-05	8.62E-07	1.25E-04	
	Tritium, Iodines, and Particulates (with half-lives greater than 8 days)						
	Percent of Quarterly Dose Limit (7.5 mrem)	%	4.78E-02	1.00E-02	1.60E-02	5.40E-02	
	Percent of Annual Dose Limit (15 mrem)	%	2.41E-02	2.90E-02	3.70E-02	6.42E-02	
	Percent of Organ Dose Rate Limit (1500 mrem/yr)	%	9.64E-04	2.02E-04	3.47E-04	1.01E-03	

ATTACHMENT 3

Unit 1 ___ Unit 2 X

Reporting Period January – December 2002

GASEOUS EFFLUENTS – ELEVATED RELEASE

Nuclides Released			CONTINUOUS MODE[2] 1st QUARTER	2nd QUARTER	3rd QUARTER	4th QUARTER
1.	Fission Gases[1]					
	Argon-41	Ci	2.07E-01	2.53E-01	**	9.18E-02
	Krypton-85	Ci	**	**	**	**
	Krypton-85m	Ci	1.77E+00	7.93E-01	3.25E-01	2.15E+00
	Krypton-87	Ci	**	**	**	1.74E-01
	Krypton-88	Ci	2.03E-01	2.79E-02	**	1.96E+00
	Xenon-127	Ci	**	**	**	**
	Xenon-131m	Ci	**	**	**	**
	Xenon-133	Ci	**	**	**	1.16E+00
	Xenon-133m	Ci	**	**	**	**
	Xenon-135	Ci	8.10E-02	**	**	5.84E-01
	Xenon-135m	Ci	7.83E-02	1.29E-02	**	4.49E-01
	Xenon-137	Ci	**	5.17E-02	**	1.92E+00
	Xenon-138	Ci	**	1.52E-01	**	1.49E+00
2.	Iodines[1]					
	Iodine-131	Ci	1.24E-04	3.31E-06	6.89E-06	1.84E-04
	Iodine-133	Ci	7.16E-05	**	5.07E-05	1.53E-03
	Iodine-135	Ci	**	**	**	**
3.	Particulates[1]					
	Strontium-89	Ci	**	**	7.54E-06	**
	Strontium-90	Ci	**	**	**	**
	Cesium-134	Ci	**	**	**	**
	Cesium-137	Ci	**	**	**	**
	Cobalt-60	Ci	2.08E-05	3.32E-05	3.79E-05	4.47E-05
	Cobalt-58	Ci	**	**	**	3.72E-06
	Manganese-54	Ci	7.43E-06	1.08E-05	**	**
	Barium-Lanthanum-140	Ci	**	**	**	**
	Antimony-125	Ci	**	**	**	**
	Niobium-95	Ci	**	**	**	**
	Cerium-141	Ci	**	**	**	**
	Cerium-144	Ci	**	**	**	**
	Iron-59	Ci	**	**	**	**
	Cesium-136	Ci	**	**	**	**
	Chromium-51	Ci	**	**	**	**
	Zinc-65	Ci	**	**	**	**
	Iron-55	Ci	4.01E-05	**	**	**
	Molybdenum-99	Ci	**	**	**	**
	Silver-110m	Ci	**	**	**	**
	Zirconium-95	Ci	**	**	**	1.97E-06
4.	Tritium	Ci	9.25E+00	2.66+00	5.89E+00	6.57E+00

[1] Concentrations less than the lower limit of detection of the counting system used are indicated with a double asterisk. A lower limit of detection of 1.00E-04 µCi/ml for required noble gases, 1.00E-11 µCi/ml for required particulates, 1.00E-12 µCi/ml for required Iodines, and 1.00E-06 µCi/ml for Tritium, as required by the Off-Site Dose Calculation Manual (ODCM), has been verified.

[2] Contributions from purges are included.

Unit 1 ___ Unit 2 X Reporting Period January – December 2002

GASEOUS EFFLUENTS – GROUND LEVEL RELEASES

CONTINUOUS MODE

			1st QUARTER	2nd QUARTER	3rd QUARTER	4th QUARTER
1.	Fission Gases[1]					
	Argon-41	Ci	**	**	**	**
	Krypton-85	Ci	**	**	2.83E-05	**
	Krypton-85m	Ci	**	**	**	**
	Krypton-87	Ci	**	**	**	**
	Krypton-88	Ci	**	**	**	**
	Xenon-127	Ci	**	**	**	**
	Xenon-131m	Ci	**	**	**	**
	Xenon-133	Ci	**	**	**	**
	Xenon-133m	Ci	**	**	**	**
	Xenon-135	Ci	**	**	**	**
	Xenon-135m	Ci	**	**	**	**
	Xenon-137	Ci	**	**	**	**
	Xenon-138	Ci	**	**	**	**
2.	Iodines[1]					
	Iodine-131	Ci	4.45E-05	**	**	**
	Iodine-133	Ci	**	**	3.76E-05	**
	Iodine-135	Ci	**	**	**	**
3.	Particulates[1]					
	Strontium-89	Ci	**	**	**	**
	Strontium-90	Ci	**	**	**	**
	Cesium-134	Ci	**	**	**	**
	Cesium-137	Ci	**	2.79E-06	**	**
	Cobalt-60	Ci	2.21E-04	2.75E-04	4.53E-04	2.36E-04
	Cobalt-58	Ci	4.83E-06	**	1.65E-05	**
	Manganese-54	Ci	1.24E-04	2.26E-04	3.39E-04	5.88E-05
	Barium-Lanthanum-140	Ci	**	**	**	**
	Antimony-125	Ci	**	**	**	**
	Niobium-95	Ci	**	**	**	**
	Cerium-141	Ci	**	**	**	**
	Cerium-144	Ci	**	**	**	**
	Iron-59	Ci	**	1.43E-05	2.47E-05	**
	Cesium-136	Ci	**	**	**	**
	Chromium-51	Ci	**	**	**	**
	Zinc-65	Ci	**	2.18E-05	9.60E-05	1.60E-05
	Iron-55	Ci	7.00E-04	**	2.81E-04	**
	Molybdenum-99	Ci	**	**	8.85E-06	**
	Silver-110m	Ci	**	**	**	**
4.	Tritium	Ci	1.69E+00	1.55E+00	1.26E+00	1.57E+00

[1] Concentrations less than the lower limit of detection of the counting system used are indicated with a double asterisk. A lower limit of detection of 1.00E-04 µCi/ml for required noble gases, 1.00E-11 µCi/ml for required particulates, 1.00E-12 µCi/ml for required Iodines, and 1.00E-06 µCi/ml for Tritium, as required by the Off-Site Dose Calculation Manual (ODCM), has been verified.

Unit 1 ___ Unit 2 X Reporting Period January – December 2002

GASEOUS EFFLUENTS – GROUND LEVEL RELEASES

BATCH MODE

There were no batch releases during the reporting period.

			1st QUARTER	2nd QUARTER	3rd QUARTER	4th QUARTER
1.	Fission Gases[1]					
	Argon-41	Ci				
	Krypton-85	Ci				
	Krypton-85m	Ci				
	Krypton-87	Ci				
	Krypton-88	Ci				
	Xenon-127	Ci				
	Xenon-131m	Ci				
	Xenon-133	Ci				
	Xenon-133m	Ci				
	Xenon-135	Ci				
	Xenon-135m	Ci				
	Xenon-137	Ci				
	Xenon-138	Ci				
2.	Iodines[1]					
	Iodine-131	Ci				
	Iodine-133	Ci				
	Iodine-135	Ci				
3.	Particulates[1]					
	Strontium-89	Ci				
	Strontium-90	Ci				
	Cesium-134	Ci				
	Cesium-137	Ci				
	Cobalt-60	Ci				
	Cobalt-58	Ci				
	Manganese-54	Ci				
	Barium-Lanthanum-140	Ci				
	Antimony-125	Ci				
	Niobium-95	Ci				
	Cerium-141	Ci				
	Cerium-144	Ci				
	Iron-59	Ci				
	Cesium-136	Ci				
	Chromium-51	Ci				
	Zinc-65	Ci				
	Iron-55	Ci				
	Molybdenum-99	Ci				
	Silver-110m	Ci				
4.	Tritium	Ci				

[1] Concentrations less than the lower limit of detection of the counting system used are indicated with a double asterisk. A lower limit of detection of 1.00E-04 µCi/ml for required noble gases, 1.00E-11 µCi/ml for required particulates, 1.00E-12 µCi/ml for required iodines, and 1.00E-06 µCi/ml for Tritium, as required by the Off-Site Dose Calculation Manual (ODCM), has been verified.

ATTACHMENT 5

Unit 1 ___ Unit 2 X Reporting Period January – December 2002

LIQUID EFFLUENTS – SUMMATION OF ALL RELEASES

			1st QUARTER	2nd QUARTER	3rd QUARTER	4th QUARTER	EST. TOTAL ERROR, %
A.	Fission & Activation Products						
	1. Total release (not including Tritium, gases, alpha)	Ci	3.33E-02	8.79E-02	7.22E-03	1.01E-02	5.00E+01
	2. Average diluted concentration during reporting period	µCi/ml	2.94E-09	6.65E-09	5.21E-10	7.31E-10	
B.	Tritium[1]						
	1. Total release	Ci	4.69E+00	5.39E+00	2.48E+00	6.28E+00	5.00E+01
	2. Average diluted concentration during reporting period	µCi/ml	4.14E-07	4.07E-07	1.79E-07	4.56E-07	
C.	Dissolved and Entrained Gases[2]						
	1. Total release	Ci	**	**	**	**	5.00E+01
	2. Average diluted concentration during reporting period	µCi/ml	**	**	**	**	
D.	Gross Alpha Radioactivity[2]						
	1. Total release	Ci	6.44E-05	9.46E-05	2.46E-05	5.63E-05	5.00E+01
E.	Volumes						
	1. Prior to dilution	Liters	1.24E+06	1.85E+06	7.08E+05	1.23E+06	5.00E+01
	2. Volume of dilution water used during release period	Liters	2.42E+08	4.30E+08	1.56E+08	3.17E+08	5.00E+01
	3. Volume of dilution water available during reporting period:	Liters	1.13E+10	1.32E+10	1.38E+10	1.38E+10	5.00E+01
F.	Percent of ODCM Limits						
	Percent of Quarterly Whole Body Dose Limit (1.5 mrem)	%	2.25E-01	3.75E-01	2.77E-02	2.32E-02	
	Percent of Quarterly Organ Dose Limit (5 mrem)	%	2.79E-01	5.12E-01	3.55E-02	3.61E-02	
	Percent of Annual Whole Body Dose Limit to Date (3 mrem)	%	1.13E-01	3.00E-01	3.14E-01	3.26E-01	
	Percent of Annual Organ Dose Limit to Date (10 mrem)	%	1.40E-01	3.96E-01	4.14E-01	4.32E-01	
	Percent of 10CFR20 Concentration Limit[1,3]	%	7.25E-03	1.36E-02	2.61E-03	5.59E-03	
	Percent of Dissolved or Entrained Noble Gas Limit (2.00E-04 µCi/ml)[2,3]	%	**	**	**	**	

1 The percent of 10CFR20 concentration limit is based on the average concentration during the quarter.

2 Concentrations less than the lower limit of detection of the counting system used are indicated with a double asterisk. A lower limit of detection of 5.00E-07 µCi/ml for required gamma emitting nuclides, 1.00E-05 µCi/ml for required dissolved and entrained noble gases and Tritium, 5.00E-08 µCi/ml for Sr-89/90, 1.00E-06 µCi/ml for Fe-55 and 1.00E-07 µCi/ml for gross alpha radioactivity, as required by the Off-Site Dose Calculation Manual (ODCM), has been verified.

3 The ODCM limits the concentration of radioactive material released in the liquid effluents to unrestricted areas to ten times the concentrations specified in 10CFR20.1001-20.2402, Appendix B, Table 2, Column 2. Maximum Effluent Concentrations (MEC) numerically equal to ten times the 10CFR20.1001-20.2402 concentrations were adopted to evaluate liquid effluents.

ATTACHMENT 5

Unit 1 ___ Unit 2 X

Reporting Period January – December 2002

LIQUID EFFLUENTS RELEASED

Nuclides Released[1]		BATCH MODE[2] 1st QUARTER	2nd QUARTER	3rd QUARTER	4th QUARTER
Silver-110m	Ci	1.06E-04	1.04E-03	**	1.71E-04
Arsenic-76	Ci	**	**	**	**
Gold-199	Ci	**	**	**	**
Barium-140	Ci	**	**	**	**
Cerium-141	Ci	**	**	**	**
Cerium-144	Ci	**	**	**	**
Cobalt-58	Ci	3.01E-04	1.91E-03	1.11E-04	6.91E-05
Cobalt-60	Ci	8.27E-03	2.88E-02	2.92E-03	3.58E-03
Chromium-51	Ci	6.27E-04	3.42E-03	**	3.47E-04
Cesium-134	Ci	**	**	**	**
Cesium-136	Ci	**	**	**	**
Cesium-137	Ci	**	**	**	**
Copper-64	Ci	**	4.71E-05	**	1.41E-03
Iron-55	Ci	1.19E-02	3.39E-03	1.29E-03	4.69E-04
Iron-59	Ci	8.86E-04	5.53E-03	1.17E-04	2.97E-04
Iodine-131	Ci	**	**	**	**
Iodine-132	Ci	**	**	**	**
Iodine-133	Ci	**	**	**	**
Lanthanum-140	Ci	**	**	**	**
Manganese-54	Ci	1.03E-02	3.94E-02	2.55E-03	3.56E-03
Manganese-56	Ci	**	**	**	**
Molybdenum-99	Ci	**	**	**	**
Sodium-24	Ci	**	**	**	**
Niobium-95	Ci	**	3.61E-05	**	**
Nickel-65	Ci	**	**	**	**
Neptunium-239	Ci	**	**	**	**
Antimony-124	Ci	**	3.51E-04	**	**
Strontium-89	Ci	**	**	**	**
Strontium-90	Ci	**	2.96E-06	**	**
Strontium-92	Ci	**	**	**	**
Technecium-99m	Ci	**	**	**	**
Tellurium-132	Ci	**	**	**	**
Tungsten-187	Ci	**	**	**	**
Zinc-65	Ci	8.48E-04	3.98E-03	2.29E-04	1.50E-04
Zinc-69m	Ci	**	**	**	**
Zirconium-95	Ci	**	4.02E-05	**	**
Zirconium-97	Ci	**	**	**	**
Dissolved or Entrained Gases[1]	Ci	**	**	**	**
Tritium	Ci	4.69E+00	5.39E+00	2.48E+00	6.28E+00

1 Concentrations less than the lower limit of detection of the counting system used are indicated with a double asterisk. A lower limit of detection of 5.00E-07 µCi/ml for required gamma emitting nuclides, 1.00E-05 µCi/ml for required dissolved and entrained noble gases and Tritium, 5.00E-08 µCi/ml for Sr-89/90, 1.00E-06 µCi/ml for Fe-55 and 1.00E-07 µCi/ml for gross alpha radioactivity, as required by the Off-Site Dose Calculation Manual (ODCM), has been verified.

2 No continuous mode releases occurred during the reporting period.

ATTACHMENT 6

Unit 1 ___ Unit 2 X Reporting Period January – December 2002

SOLID WASTE AND IRRADIATED FUEL SHIPMENTS

A. TYPE	Volume (m^3) Class			Activity[1] (Ci) Class		
	A	B	C	A	B	C
1. Spent Resins (Dewatered)	5.83E+00	0	0	2.07E+01	0	0
2. Dry Active Waste (Compactible and Non-Compactible)	5.87E+00	0	0	1.58E+01	0	0
3. Suppression Pool Sludges	0	3.41E+00	0	0	2.80E+02	0
4. Other: (to Vendor for Processing or Consolidation)						
a. Dry Active Waste (Compactible and Non-Compactible)	5.56E+02	0	0	7.91E+00	0	0
b. Spent Resins (Dewatered)	9.30E+01	0	0	3.68E+02	0	0
c. Other Waste (Contaminated Oil)	6.80E+01	0	0	1.42E-02	0	0
d. Evaporator Bottoms	1.75E+01	0	0	4.63E+01	0	0

[1] The estimated total error is 5.00E+01%.

Unit 1 ___ Unit 2 X Reporting Period January – December 2002

SOLID WASTE AND IRRADIATED FUEL SHIPMENTS

A.1 TYPE	Container	Package	Solidification Agent
1. Spent Resins (Dewatered)	HIC – Poly	STP	None
2. Dry Active Waste (Compactible and Non-Compactible)	Steel Liner	STP	None
3. Suppression Pool Sludges.	HIC-Poly	Type B	None
4. Other: (To Vendor for Processing or Consolidation)			
a. Dry Active Waste (Compactible and Non-Compactible)	Metal Box	STP	None
b. Spent Resins (Dewatered)	HIC HIC	STP Type A	None None
c. Other Waste (Contaminated Oil)	Metal Box	STP	None
d. Evaporator Bottoms	HIC	STP	None

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SOLID WASTE AND IRRADIATED FUEL SHIPMENTS

A.2 ESTIMATE OF MAJOR NUCLIDE COMPOSITION (BY TYPE OF WASTE)

1. Spent Resins (Dewatered):

Nuclide	Percent
(1) Fe-55	4.32E+01
(2) Co-60	2.42E+01
(3) Mn-54	1.98E+01
(4) Zn-65	7.25E+00
(5) Fe-59	2.01E+00
(6) Co-58	1.68E+00
(7) Other	1.86E+00

2. Dry Compressible Waste (Compactible and Non-compactible):

Nuclide	Percent
(1) Fe-55	6.64E+01
(2) Mn-54	1.11E+01
(3) Co-60	8.98E+00
(4) Cr-51	6.45E+00
(5) Fe-59	3.50E+00
(6) Zn-65	1.79E+00
(7) Co-58	1.02E+00
(8) Other	7.60E-01

3. Suppression Pool Sludges

Nuclide	Percent
(1) Fe-55	6.38E+01
(2) Co-60	2.00E+01
(3) Mn-54	9.14E+00
(4) Zn-65	6.07E+00
(5) Other	9.90E-01

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SOLID WASTE AND IRRADIATED FUEL SHIPMENTS

4. Other: (to Vendor for Processing or Consolidation)

a. Dry Active Waste (Compactible and Non-Compactible)	
Nuclide	Percent
(1) Fe-55	5.23E+01
(2) Zn-65	2.20E+01
(3) Co-60	1.34E+01
(4) Mn-54	6.46E+00
(5) Cr-51	2.88E+00
(6) Fe-59	1.57E+00
(7) Other	1.39E+00
b. Spent Resins (Dewatered)	
Nuclide	Percent
(1) Fe-55	3.94E+01
(2) Co-60	3.11E+01
(3) Mn-54	1.50E+01
(4) Zn-65	1.05E+01
(5) Ni-63	1.04E+00
(6) Other	2.96E+00
c. Other Waste (Contaminated Oil)	
Nuclide	Percent
(1) Fe-55	6.67E+01
(2) Mn-54	1.11E+01
(3) Co-60	9.02E+00
(4) Cr-51	6.17E+00
(5) Fe-59	3.41E+00
(6) Zn-65	1.79E+00
(7) Co-58	1.01E+00
(8) Other	8.00E-01
d. Evaporator Bottoms	
Nuclide	Percent
(1) Fe-55	7.08E+01
(2) Co-60	2.11E+01
(3) Zn-65	4.34E+00
(4) Mn-54	2.27E+00
(5) Ni-63	1.27E+00
(6) Other	2.20E-01

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SOLID WASTE AND IRRADIATED FUEL SHIPMENTS

A.3. SOLID WASTE DISPOSITION

Number of Shipments	Mode of Transportation	Destination
14	Truck	GTS Duratek Oak Ridge, TN
5	Truck	GTS Duratek Kingston, TN
11	Truck	Studsvik Processing Facility, LLC Erwin, TN
3	Truck	Barnwell Waste Management Facility Barnwell, SC

B. IRRADIATED FUEL SHIPMENTS (DISPOSITION): There were no shipments.

Number of Shipments	Mode of Transportation	Destination
0	N/A	N/A

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SOLID WASTE AND IRRADIATED FUEL SHIPMENTS

C. SOLID WASTE SHIPPED OFF-SITE TO VENDORS FOR PROCESSING AND SUBSEQUENT BURIAL
Below is a summary of NMP-2 radwaste buried by vendor facilities during January – December 2002. These totals were reported separately from "10CFR61 Solid Waste Shipped for Burial" because waste classification and burial was performed by the vendors. The following data represents the actual shipments of our radwaste made to the off-site vendors (e.g., non-compacted trash, dry non-compressible waste, scrap metal, and resins) that were processed and commingled prior to burial.

C.1. TYPE OF WASTE – Non-compacted trash, dry non-compressible waste, scrap metals, and resins processed by vendor facilities prior to burial.

Burial Volume (m^3)	Activity (Ci)	Est. Total Error, %
6.74E+01	4.17E+02	5.00E+01

C.2 SOLID WASTE DISPOSITION

Number of Shipments	Mode of Transportation	Destination
77	Truck	Clive, UT
16	Truck	Barnwell, SC

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SOLID WASTE AND IRRADIATED FUEL SHIPMENTS

D. SEWAGE WASTES SHIPPED TO A TREATMENT FACILITY FOR PROCESSING AND BURIAL

There was no sewage sludge shipped off site during the reporting period.

D. 1 TYPE OF WASTE – Sewage Sludge	Burial Volume (m^3)	Activity (Ci)	Est. Total Error, %
	N/A	N/A	5.00E+01

D. 2 ESTIMATE OF MAJOR NUCLIDE COMPOSITION

Nuclide	Percent

D. 3 SOLID WASTE DISPOSITION

Number of Shipments	Mode of Transportation	Destination
N/A	N/A	N/A

Unit 1 ___ Unit 2 X Reporting Period January – December 2002

SUMMARY OF CHANGES TO THE OFF-SITE DOSE CALCULATION MANUAL (ODCM)

The Unit 2 Off-Site Dose Calculation Manual (ODCM) Revision 23 was implemented in December 2002. Administrative changes were made to reflect a change in reportability of the Stack or Vent noble gas activity monitor inoperable from a 14-day special report to a corrective action process. The ODCM changes do not reduce the overall conformance with existing criteria in accordance with Technical Specifications. A copy of the ODCM, Revision 23 is attached. The following is a summary of the changes accepted by the Station Operations Review Committee.

Old Page #	New Page #	New/Amended Section #	Change	Reason for Change
I 3.3-9	I 3.3-9	D 3.3.2	In F.2.2, replaces "In lieu of another required report, prepare and submit to the NRC, pursuant to D 4.1.1, a special report that:" with "Through a DER, determine:"	Using the corrective action process rather than a Special Report does not affect the levels of radioactive effluent control required by 10CFR 20.1302, 40 CFR 190, 10 CFR 50.36a, and 10 CFR 50, Appendix I, and does not adversely impact the accuracy of reliability of effluent, dose, or setpoint calculations. This is an administrative change.
I 3.3-9	I 3.3-9	D 3.3.2	In F.2.2(1) removed "Identifies".	Editorial clarification.
I 3.3-9	I 3.3-9	D 3.3.2	In F.2.2(2) removed "Outlines" and replaced "action" with "actions to be"	Editorial clarification.

Unit 1 ___ Unit 2 X Reporting Period January – December 2002

SUMMARY OF CHANGES TO THE PROCESS CONTROL PROGRAM (RPCP)

There were no changes to the RPCP during this reporting period.

Unit 1 ___ Unit 2 X Reporting Period January – December 2002

SUMMARY OF INOPERABLE MONITORS

Radiation Monitors 2RMS-CAB170 (Stack Gaseous Effluent Monitoring System (GEMS) noble gas activity monitor) and 2RMS-CAB180 (Vent GEMS noble gas channel) were inoperable from 6/27/02 14:16 to 9/13/02 16:09.

On 6/27/02 at 14:16, the exhaust stack was struck by two lightning strikes within 10 seconds of each other. The short duration between the two strikes did not allow sufficient time for the first strike to be completely discharged by the lightning suppression system. This resulted in an electrical surge which damaged the IO 2RMS-RAK170, and caused the GEMS system to fail.

The stack monitor was repaired on 7/9/02. After returning the stack monitor to service, the GEMS computer failure was identified. Repairs were not timely due to obsolescence of damaged components. On 9/13/02 all failed components had been identified and repaired/replaced, and the GEMS system was declared operable.

Unit 1 ___ Unit 2 _X_ Reporting Period January - December 2002

DOSES TO MEMBERS OF THE PUBLIC DUE TO THEIR ACTIVITIES INSIDE THE SITE BOUNDARY

Introduction

An assessment of the radiation dose received by a Member of the Public due to their activities inside the site boundary from Nine Mile Point Unit 2 (NMP2) liquid and gaseous effluents has been conducted for the period January through December 2002.

This assessment considers the likely maximum exposed individual and the various exposure pathways resulting from liquid and gaseous effluents to identify the maximum dose received by a Member of the Public during their activities within the site boundary.

Prior to September 11, 2001, fishing near the shoreline adjacent to the NMP Site was the onsite activity that resulted in the maximum dose received by a Member of the Public. Following September 11, 2001 access has been restricted and fishing by Members of the Public at locations on site is prohibited Although fishing was not conducted during 2002 the annual dose to a fisherman was still evaluated.

In addition to the dose received by a fisherman, dose received by a member of the National Guard was also evaluated For this reporting period the National Guard was conservatively assumed to be a Member of the Public.

Dose Pathways

Dose pathways considered for this evaluation included direct radiation, inhalation and external ground (shoreline sediment or soil doses) in accordance with the NMP2 Off-site Dose Calculation Manual (ODCM) Other pathways, such as ingestion pathways, are not considered because they are either not applicable, insignificant, or are considered as part of the evaluation of the total dose to a Member of the Public located off-site. In addition, only releases from the NMP2 stack and Vent were evaluated for the inhalation pathway. Dose from liquid effluent pathways due to aquatic activities is not applicable since swimming is prohibited and lake water is not utilized as a source of drinking water at NMPNS

Dose to a fisherman is received through the following pathways while standing on the shoreline fishing:

- External ground pathway, received from plant related radionuclides detected in the shoreline sediment,
- Inhalation pathway, received through inhalation of gaseous effluents released from NMP2 Stack and Vent, and
- Direct radiation pathway, resulting from the operation of NMP2, Nine Mile Point Unit 1 (NMP1) and James A. Fitzpatrick (JAF)

Similarly, dose to a member of the National Guard is received through the following pathways while performing security functions at the site:

- Inhalation pathway, and
- Direct radiation pathway

Any dose received by a member of the National Guard through the external ground pathway is considered insignificant as compared to the dose received through inhalation and direct radiation.

Methodologies for Determining Dose for Applicable Pathways

External Ground (Shoreline Sediment) Pathway

Dose from the external ground (shoreline sediment) is based on the methodology in the NMP2 ODCM as adapted from Regulatory Guide 1.109. For this evaluation it is assumed that the maximum exposed individual fished from the shoreline at all times

The total dose received by the whole body and skin of the maximum exposed individual during 2002 was calculated using the following input parameters:

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DOSES TO MEMBERS OF THE PUBLIC DUE TO THEIR ACTIVITIES INSIDE THE SITE BOUNDARY

- Usage Factor = 312 hours (fishing 8 hours per week, 39 weeks per year)
- Density in grams per square meter = 40,000
- Shore width factor = 0.3
- Whole body and skin dose factor for each radionuclide = Regulatory Guide 1.109, Table E-6.
- Fractional portion of the year = 1 (used average radionuclide concentration over total time period)
- Average Cs-137 concentration = 0 20 pCi/g

The total whole body and skin doses received by the maximum exposed fisherman from the external ground pathway is presented in Table 1, Exposure Pathway Dose.

Inhalation Pathway

The inhalation dose pathway is evaluated by utilizing the inhalation equation in the NMP2 ODCM, as adapted from Regulatory Guide 1.109. The total whole body dose and organ dose received by the maximum exposed fisherman and member of the National Guard during 2002 is calculated using the following input parameters for gaseous effluents released from both the NMP2 Stack and Vent for the time period exposure is received:

NMP 2 Stack:

Variable	Fisherman *	National Guard *
Average Stack flow rate (m^3/sec)	4 930E+01	5 012E+01
X/Q (s/m^3)	9.6E-07	2.3E-05
Inhalation dose factor	Regulatory Guide 1.109 Table E-7	
Annual air intake (m^3/year) (adult)	8000	8000
Fractional portion of the year (hours)	0 0356	0.2630
H-3 (pCi/m^3)	1.278E+04	1.524E+04
Mn-54 (pCi/m^3)	1.264E-02	1.402E-02
Fe-55 (pCi/m^3)	0 00E+00	2.451E-02
Co-60 (pCi/m^3)	9.854E-02	8 622E-02
Sr-89 (pCi/m^3)	6 477E-03	4.858E-03
Zr-95 (pCi/m^3)	1.608E-03	1.206E-03
I-131 (pCi/m^3)	1.590E-01	1.950E-01
I-133 (pCi/m^3)	1.292E+00	1.013E+00

NMP2 Vent:

Variable	Fisherman *	National Guard *
Average Vent flow rate (m^3/sec)	1.010E+02	1.020E+02
X/Q (s/m^3)	2.8E-06	3.0E-07
Inhalation dose factor	Regulatory Guide 1.109 Table E-7	
Annual air intake (m^3/year) (adult)	8000	8000
Fractional portion of the year (hours)	0.0356	0.2630

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DOSES TO MEMBERS OF THE PUBLIC DUE TO THEIR ACTIVITIES INSIDE THE SITE BOUNDARY

NMP2 Vent continued:

Variable	Fisherman *	National Guard *
H-3 (pCi/m³)	1.822E+03	1.884E+03
Mn-54 (pCi/m³)	2.626E-01	2.349E-01
Fe-55 (pCi/m³)	1.210E-01	3 052E-01
Fe-59 (pCi/m³)	1.649E-02	1.237E-02
Co-58 (pCi/m³)	7.107E-03	6.810E-03
Co-60 (pCi/m³)	4 045E-01	3.711E-01
Zn-65 (pCi/m³)	5.682E-02	4 262E-02
Cs-137 (pCi/m³)	1.141E-03	8 558E-04
Mo-99 (pCi/m³)	3.810E-03	2.858E-03
I-131 (pCi/m³)	0.00E+00	1.363E-02
I-133 (pCi/m³)	1.619E-02	1.215E-02

- The maximum exposed fisherman is assumed to be present on site during the period of April through December at a rate of 8 hours per week for 39 weeks per year equivalent to 312 hours for the year (fractional portion of the year = 0 0356) Therefore, the Average Stack and Vent flow rates and radionuclide concentrations used to determine the dose are represented by second, third and fourth quarter gaseous effluent flow and concentration values. The maximum exposed member of the National Guard is assumed to be on site 48 hours per week for 48 weeks per year equivalent to 2304 hours per year (fractional portion of the year = 0 2630). Therefore average Stack and Vent flow rates and average radionuclide concentrations used to determine the dose are represented by first, second, third and fourth quarter gaseous effluent flow and concentration data.

The total whole body dose and maximum organ dose received by the maximum exposed fisherman and member of the National Guard from the inhalation pathway is presented in Table 1, Exposure Pathway Dose.

Direct Radiation Pathway

The direct radiation pathway is evaluated in accordance with the methodology found in the NMP2 ODCM. This pathway considers four components: direct radiation from the generating facilities, direct radiation from any possible overhead plume, direct radiation from ground deposition and direct radiation from plume submersion. The direct radiation pathway is evaluated by the use of high sensitivity environmental Thermoluminescent Dosimeters (TLDs). Since fishing activities occur between April 1 - December 31, TLD data for the second, third, and fourth quarters of 2002 from TLDs placed in the general area where fishing occurs were used to determine an average dose to the maximum exposed fisherman from direct radiation. The average dose to the maximum exposed member of the National Guard from direct radiation was determined from TLD data for the first, second, third and fourth quarters 2002. All four quarters were used as a result of the assumption that the maximum exposed member of the National Guard spends 48 weeks per year onsite The following is a summary of the average dose rates and assumed time spent on site used to determine the total dose received by both a maximum exposed fisherman and member of the National Guard

Variable	Fisherman	National Guard
Average Dose Rate (mRem/hour)	1.32E-03	2 11E-04
Exposure time (hours)	312	2304

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DOSES TO MEMBERS OF THE PUBLIC DUE TO THEIR ACTIVITIES INSIDE THE SITE BOUNDARY

Total Doses received by the maximum exposed fisherman and member of the National Guard from direct radiation is presented in Table 1, Exposure Pathway Dose.

Dose Received By The Maximum Exposed Member Of The Public During 2002

The following is a summary of the dose received by both the likely maximum exposed fisherman and likely maximum exposed member of the National Guard from Liquid and Gaseous effluents released from NMP2 during 2002:

Table 1

Exposure Pathway Dose

Exposure Pathway	Dose Type	Fisherman (mRem/year)	National Guard (mRem/year)
External Ground	Whole Body	3 11E-03	N/A
	Skin of Whole Body	3.62E-03	N/A
Inhalation	Whole Body	5.05E-05	5.86E-03
	Maximum Organ	Lung 8.03E-05	Thyroid: 7.23E-03
Direct Radiation	Whole Body	0 411	0.486

These doses are generally a result of the operation of NMP2, however, a portion of these doses for the direct radiation pathway may be attributable to the Nine Mile Point Unit 1 and James A. Fitzpatrick Facilities. Based on the above doses the total annual dose received by the maximum exposed Member of the Public as a result of their activities inside the site boundary during 2002 are summarized below:

Table 2

Annual Dose Summary

Total Annual Dose for 2002	Fisherman (mRem/year)	National Guard (mRem/year)
Total Whole Body	0.414	0.487
Skin of Whole Body	3 62E-03	N/A
Maximum Organ	Lung: 8.03E-05	Thyroid: 7.23E-04

Unit 1 ___ Unit 2 _X_ Reporting Period January - December 2002

DOSES TO MEMBERS OF THE PUBLIC DUE TO THEIR ACTIVITIES OUTSIDE THE SITE BOUNDARY

Introduction

An assessment of radiation doses received by the likely most exposed Member of the Public located beyond the site boundary was conducted for the period January through December 2002 for comparison against the 40 CFR 190 annual dose limits.

The intent of 40 CFR 190 requires that the effluents of Nine Mile Point Unit 2 (NMP2), as well as other nearby uranium fuel cycle facilities, be considered In this case, the effluents of NMP2, Nine Mile Point Unit 1 (NMP1) and the James A. FitzPatrick (JAF) facilities must be considered.

40 CFR 190 requires the annual radiation dose received by a Member of the Public in the general environment, as a result of plant operations be limited to:

- < 25 mRem wholebody
- < 25 mRem any organ (except thyroid)
- < 75 mRem thyroid

This evaluation compares doses resulting from Liquid and Gaseous effluents and direct radiation originating from the site as a result of the operation of the NMP2, NMP1 and JAF nuclear facilities to the limits of 40 CFR 190.

Dose Pathways

Dose pathways considered for this evaluation included doses resulting from liquid effluents, gaseous effluents and direct radiation from all nuclear operating facilities located on the Nine Mile Point Site.

Dose to the likely most exposed Member of the Public, outside the site boundary, is received through the following pathways:

- Fish consumption pathway, received from plant radionuclides that have concentrated in fish that is consumed by a Member of the Public,
- Shoreline Sediment, received as a result of an individual's exposure to plant radionuclides deposited in the shoreline sediment, which is used as a recreational area,
- Deposition, Inhalation and Ingestion pathways resulting from gaseous effluents, this dose is received through exposure of gaseous effluents released from NMP1, NMP2 and JAF operating facilities, and
- Direct Radiation pathway, resulting from the operation of NMP1, NMP2 and JAF facilities

Methodologies for Determining Dose for Applicable Pathways

Fish Consumption

Dose received as a result of fish consumption is based on the methodology specified in the NMP2 Off-site Dose Calculation Manual (ODCM) as adapted from Regulatory Guide 1.109. The dose for 2002 is calculated from actual analysis results of environmental fish samples taken near the site discharge points. For this evaluation it is assumed that the likely most exposed Member of the Public consumes fish taken near the site discharge points.

The total dose received by the whole body and organs of the likely most exposed Member of the Public during 2002 is calculated using the following input parameters:

- Average Cs-137 concentration = 1.60E-02 pCi/g (wet)
- Consumption Rate = 21 kg/yr
- Ingestion dose factor for Cs-137 = Regulatory Guide 1.109 Table E-11
- Fractional portion of the year = 1

Unit 1 ___ Unit 2 _X_ Reporting Period January - December 2002

DOSES TO MEMBERS OF THE PUBLIC DUE TO THEIR ACTIVITIES OUTSIDE THE SITE BOUNDARY

Shoreline Sediment

Dose received from shoreline sediment is based on the methodology in the NMP2 ODCM as adapted from Regulatory Guide 1.109. For this evaluation it is assumed that the likely most exposed Member of the Public spends 67 hours/year along the shoreline for recreational purposes.

The total dose received by the whole body and skin of the maximum exposed individual during 2002 is calculated using the following input parameters:

- Usage Factor = 67 hours per year
- Density in grams per square meter = 40,000
- Shore width factor = 0 3
- Whole body and skin dose factor for each radionuclide = Regulatory Guide 1.109, Table E-6
- Fractional portion of the year = 1
- Average Cs-137 Concentration = 0.049 pCi/g

Dose Pathways Resulting From Gaseous Effluents

Dose received by the likely most exposed Member of the Public due to gaseous effluents is calculated in accordance with the methodology provided in the NMP2 ODCM, NMP1 ODCM, and the JAF ODCM. These calculations consider deposition, inhalation and ingestion pathways. The total sum of doses resulting from gaseous effluents from NMP1, NMP2 and JAF during 2002 provide a total dose to the whole body and maximum organ dose for this pathway.

Direct Radiation Pathway

Dose as a result of direct gamma radiation from the site, encompasses doses from direct "shine" from the generating facilities, direct radiation from any overhead gaseous plumes, plume submersion and from ground deposition. This total dose is measured by environmental Thermoluminescent Dosimeters (TLDs). The critical location is based on the closest year-round residence from the generating facilities as well as the closest residence in the critical downwind sector in order to evaluate both direct radiation from the generating facilities and gaseous plumes as determined by the local meteorology. During 2002, the closest residence and the critical downwind residence are at the same location.

Dose Received by a Member of the Public Outside the Site Boundary During 2002

The following is a summary of doses received by the likely most exposed Member of the Public due to their activities outside the site boundary for 2002:

Exposure Pathway	Dose Type	Dose (mRem/year)
Fish Consumption	Total Whole Body	0 0240
	Total Maximum Organ	Liver: 0 0366
Shoreline Sediment	Total Whole Body	1.65E-04
	Total Skin of Whole Body	1.93E-04
Gaseous Effluents	Total Whole Body	1.18E-02
	Total Maximum Organ	Thyroid: 6.06E-02
Direct Radiation	Total Whole Body	No Dose

Unit 1 __ Unit 2 X Reporting Period January - December 2002

DOSES TO MEMBERS OF THE PUBLIC DUE TO THEIR ACTIVITIES OUTSIDE THE SITE BOUNDARY

Based on these values the maximum total annual dose received by the likely most exposed member of the public during 2002 is as follows:

- Total Whole Body: 0.036 mRem / year
- Total Skin of Whole Body: 1.93E-04 mRem / year
- Maximum Organ: Thyroid 0.061 mRem / year

40 CFR 190 Evaluation

The maximum total doses presented in this attachment are the result of operations at the NMP1, NMP2 and the JAF facilities. The maximum organ dose (Thyroid. 0.061 mRem) and the maximum whole body dose (0.036 mRem) are below the 40 CFR 190 criteria of 25 mRem per calendar year to the maximum exposed organ or the whole body, and below 75 mRem per calendar year to the thyroid.

ATTACHMENT 12

Off-Site Dose Calculation Manual (ODCM) Rev. 23

ORIGINAL

Constellation Energy Group
Nine Mile Point Nuclear Station

CONTROLLED

NINE MILE POINT NUCLEAR STATION

NINE MILE POINT UNIT 2

OFF-SITE DOSE CALCULATION MANUAL (ODCM)

APPROVALS	SIGNATURES	DATE
		REVISION 23
Prepared by:	T. M. Kurtz Health Physicist	12/19/02
Reviewed by:	G. R Stinson Health Physicist	12/19/02
Concurred by:	T. G. Kulczycky Supervisor, Analysis Services	12/19/02

L. A. Hopkins	Plant General Manager	12/20/02
B. S. Montgomery	Manager Engineering Services	12-19-02

SUMMARY OF REVISIONS

Revision 23 (Effective December 2002)

PAGE	*DATE*
I 3 3-13,14	August 2000
I 3.3-6	November 2000
I 4.0-1	November 2000
II 2-10,26,33-36,66,67,75,80	November 2000
ix, I 1.0-1, I 1.0-2, I B 3.3-2, I 4 1-1 & 1a, II 11, II 15, II 29, II 63, II 107, II 108	December 2001
I 3.3-9	December 2002

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PART II – CALCULATIONAL METHODOLOGIES

LIST OF FIGURES

INTRODUCTION

The OFFSITE DOSE CALCULATION MANUAL (ODCM) is a supporting document of the Technical Specifications Section 5.5.1. The previous Limiting Conditions for Operation that were contained in the Radiological Effluent Technical Specifications are now transferred to the ODCM as Radiological Effluent Controls. The ODCM contains two parts: Radiological Effluent Controls, Part I; and Calculational Methodologies, Part II. Radiological Effluent Controls, Part 1, includes the following: (1) The Radioactive Effluent Controls and Radiological Environmental Monitoring Programs required by Technical Specification 5.5.1 and (2) descriptions of the information that should be included in the Annual Radiological Environmental Operating and Radioactive Effluent Release Reports required by Technical Specifications 5.6.2 and 5.6.3. Calculational Methodologies, Part II, describes the methodology and parameters to be used in the calculation of liquid and gaseous effluent monitoring instrumentation alarm/trip setpoints and the calculation of offsite doses due to radioactive liquid and gaseous effluents The ODCM also contains a list and graphical description of the specific sample locations for the radiological environmental monitoring program, and liquid and gaseous radwaste treatment system configurations.

The ODCM follows the methodology and models suggested by NUREG-0133 and Regulatory Guide 1.109, Revision 1. Simplifying assumptions have been applied in this manual where applicable to provide a more workable document for implementing the Radiological Effluent Control requirements; this simplified approach will result in a more conservative dose evaluation for determining compliance with regulatory requirements.

The ODCM will be maintained for use as a reference and training document of accepted methodologies and calculations. Changes to the calculation methods or parameters will be incorporated into the ODCM to assure that the ODCM represents the present methodology in all applicable areas. Any changes to the ODCM will be implemented in accordance with Section 5.5.1 of the Technical Specifications

PART I - RADIOLOGICAL EFFLUENT CONTROLS

PART I - RADIOLOGICAL EFFLUENT CONTROLS

SECTION 1.0 DEFINITIONS

1.0 DEFINITIONS

---NOTE---

Technical Specifications defined terms and the following additional defined terms appear in capitalized type and are applicable throughout these specifications and bases.

TERM	DEFINITION
GASEOUS RADWASTE TREATMENT SYSTEM	A GASEOUS RADWASTE TREATMENT SYSTEM shall be any system designed and installed to reduce radioactive gaseous effluents by collecting offgases from the main condenser evacuation system and providing for delay or holdup for the purpose of reducing the total radioactivity prior to release to the environment.
MEMBER(S) OF THE PUBLIC	MEMBER(S) OF THE PUBLIC shall include all persons who are not occupationally associated with the Nine Mile Point Nuclear Station and James A. FitzPatrick Nuclear Power Plant. This category does not include employees of owners and operators of the Nine Mile Point Nuclear Station and James A. Fitzpatrick Nuclear Power Plant, their contractors or vendors Also excluded from this category are persons who enter the site to service equipment or to make deliveries This category does include persons who use portions of the site for recreational, occupational, or other purposes not associated with Nine Mile Point Nuclear Station and James A. FitzPatrick Nuclear Power Plant.
MILK SAMPLING LOCATION	A MILK SAMPLING LOCATION is a location where 10 or more head of milk animals are available for collection of milk samples
OFFSITE DOSE CALCULATION MANUAL	The OFFSITE DOSE CALCULATION MANUAL (ODCM) shall contain the current methodology and parameters used in the calculation of offsite doses that result from radioactive gaseous and liquid effluents, in the calculation of gaseous and liquid effluent monitoring Alarm/Trip Setpoints, and in the conduct of the environmental radiological monitoring program. The ODCM shall also contain: (1) the Radioactive Effluent Controls and Radiological Environmental Monitoring Program required by Specification 5.5.1 of Technical Specifications and, (2) descriptions of the information that should be included in the Annual Radiological Environmental Operating and Radioactive Effluent Release Reports required by Technical Specifications 5.6.2 and 5.6.3.

(continued)

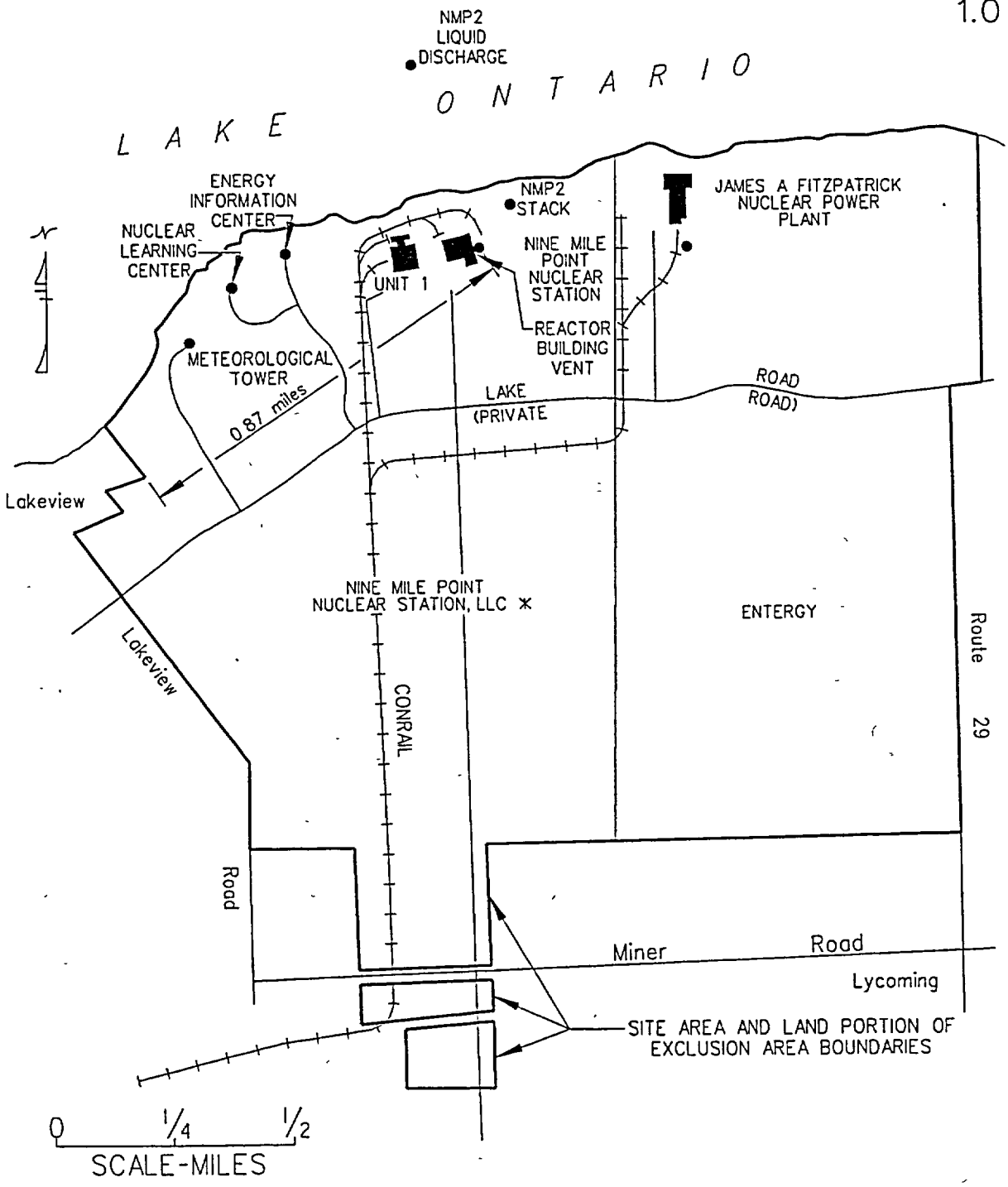
1.0 DEFINITIONS (continued)

TERM	DEFINITION
PURGE – PURGING	PURGE and PURGING shall be the controlled process of discharging air or gas from a confinement to maintain temperature, pressure, concentration, or other operating condition, in such a manner that replacement air or gas is required to purify the confinement.
REPORTABLE EVENT	A REPORTABLE EVENT shall be any of those conditions specified in 10 CFR 50.73.
SITE BOUNDARY	The SITE BOUNDARY shall be that line around the Nine Mile Point Nuclear Station beyond which the land is not owned, leased or otherwise controlled by the owners and operators of Nine Mile Point Nuclear Station and James A. Fitzpatrick Nuclear Power Plant. See Figure D 1.0-1.
SOURCE CHECK	A SOURCE CHECK shall be the qualitative assessment of channel response when the channel sensor is exposed to a source of increased radioactivity.
UNRESTRICTED AREA	An UNRESTRICTED AREA shall be any area at or beyond the SITE BOUNDARY, access to which is not controlled by the owners and operators of Nine Mile Point Nuclear Station and James A. Fitzpatrick Nuclear Power Plant for purposes of protection of individuals from exposure to radiation and radioactive materials, or any area within the SITE BOUNDARY used for residential quarters or for industrial, commercial, institutional, and/or recreational purposes.
VENTILATION EXHAUST TREATMENT SYSTEM	A VENTILATION EXHAUST TREATMENT SYSTEM shall be any system designed and installed to reduce gaseous radioiodine or radioactive material in particulate form in effluents by passing ventilation or vent exhaust gases through charcoal adsorbers and/or HEPA filters for the purpose of removing iodines or particulates from the gaseous exhaust stream prior to the release to the environment (such a system is not considered to have any effect on noble gas effluents). Engineered safety features (ESF) atmospheric cleanup systems are not considered to be VENTILATION EXHAUST TREATMENT SYSTEM components.

(continued)

1.0 DEFINITIONS (continued)

TERM	DEFINITION
VENTING	VENTING shall be the controlled process of discharging air or gas from a confinement to maintain temperature, pressure, concentration, or other operating condition, in such a manner that replacement air or gas is not provided or required during VENTING. Vent, used in system names, does not imply a VENTING process.



* Niagara Mohawk Power Corporation retains ownership in certain transmission line and switchyard facilities within the exclusion area boundary. Access and usage are controlled by Nine Mile Point Nuclear Station, LLC by agreement.

Figure D 1.0-1 (Page 1 of 1)
Site Area and Land Portion of Exclusion Area Boundaries

PART I - RADIOLOGICAL EFFLUENT CONTROLS

SECTION 3.0 APPLICABILITY

3.0 APPLICABILITY

The Offsite Dose Calculation Manual (ODCM) Specifications are contained in Section 3.0 of Part I. They contain operational requirements, Surveillance Requirements, and reporting requirements. Additionally, the Required Actions and associated Completion Times for degraded Conditions are specified The format is consistent with the Technical Specifications (Appendix A to the NMP2 Operating License)

The rules of usage for the ODCM Specification are the same as those for the Technical Specifications. These rules are found in Technical Specifications Sections 1.2, "Logical Connectors," 1.3, "Completion Times," and 1 4, "Frequency."

The ODCM Specifications are subject to Technical Specifications Section 3.0, "Limiting Condition for Operation (LCO) Applicability and Surveillance Requirement (SR) Applicability," with the following exceptions:

1. LCO 3.06, regarding support/supported system ACTIONS is not applicable to ODCM Specifications.

2. LCO 3.0.7, regarding allowances to change specified Technical Specifications is not applicable to ODCM Specifications.

3. Section 3.0 requirements are not required when so stated in notes within individual specifications

D 3.1 RADIOACTIVE LIQUID EFFLUENTS

D 3.1.1 Liquid Effluents Concentration

DLCO 3.1.1 The concentration of radioactive material released in liquid effluents to UNRESTRICTED AREAS (Figure D 1.0-1) shall be limited to:

a. Ten times the concentration specified in 10 CFR Part 20, Appendix B, Table 2, Column 2 for radionuclides other than dissolved or entrained noble gases; and

b. 2×10^{-4} μCi/ml total activity concentration for dissolved or entrained noble gases

APPLICABILITY: At all times.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. Concentration of radioactive material released in liquid effluents to UNRESTRICTED AREAS exceeds limits.	A.1 Initiate action to restore concentration to within limits.	Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
DSR 3.1.1.1	Perform radioactive liquid waste sampling and activity analysis	In accordance with Table D 3.1.1-1
DSR 3.1.1.2	Verify the results of the DSR 3.1.1.1 analyses to assure that the concentrations at the point of release are maintained within the limits of DLCO 3 1 1.	In accordance with Table D 3.1.1-1

Table D 3.1.1-1 (Page 1 of 2)
Radioactive Liquid Waste Sampling and Analysis

LIQUID RELEASE TYPE	SAMPLE TYPE	SAMPLE FREQUENCY	ANALYSIS FREQUENCY	SAMPLE ANALYSIS	SAMPLE LOWER LIMIT OF DETECTION (LLD) (a)
1 Batch Waste Release Tanks (b) a. 2LWS-TK4A b 2LWS-TK4B c 2LWS-TK5A d 2LWS-TK5B	Grab Sample	Each Batch (g)	Each Batch (g)	Principal Gamma Emitters (c)	5×10^{-7} µCi/ml
				I-131	1×10^{-6} µCi/ml
	Grab Sample	One batch/31 days (g)	31 days	Dissolved and Entrained Gases (gamma emitters)	1×10^{-5} µCi/ml
	Proportional Composite of grab samples (d)	Each batch (g)	31 days	H-3	1×10^{-5} µCi/ml
				Gross Alpha	1×10^{-7} µCi/ml
	Proportional Composite of grab samples (d)	Each batch (g)	92 days	Sr-89	5×10^{-8} µCi/ml
				Sr-90	5×10^{-8} µCi/ml
				Fe-55	1×10^{-6} µCi/ml
2 Continuous Releases a. Service Water Effluent A b Service Water Effluent B c Cooling Tower Blowdown	Grab Sample	31 days (e)	31 days (e)	Principal Gamma Emitters (c)	5×10^{-7} µCi/ml
	Grab Sample	31 days (e)	31 days (e)	I-131	1×10^{-6} µCi/ml
	Grab Sample	31 days (e)	31 days (e)	Dissolved and Entrained Gases (gamma emitters)	1×10^{-5} µCi/ml
	Grab Sample	31 days (e)	31 days (e)	H-3	1×10^{-5} µCi/ml
	Grab Sample	31 days (e)	31 days (e)	Gross Alpha	1×10^{-7} µCi/ml
	Grab Sample	92 days (e)	92 days (e)	Sr-89	5×10^{-8} µCi/ml
	Grab Sample	92 days (e)	92 days (e)	Sr-90	5×10^{-8} µCi/ml
	Grab Sample	92 days (e)	92 days (e)	Fe-55	1×10^{-6} µCi/ml
3. Continuous Release Auxiliary Boiler Pump Seal and Sample Cooling Discharge (Service Water)	Grab Sample	31 days (f)	31 days (f)	Principal Gamma Emitters (c)	5×10^{-7} µCi/ml
	Grab Sample	92 days (f)	92 days (f)	H-3	1×10^{-5} µCi/ml

Table D 3.1.1-1 (Page 2 of 2)
Radioactive Liquid Waste Sampling and Analysis

(a) The LLD is defined as the smallest concentration of radioactive material in a sample that will yield a net count, above system background, that will be detected with 95% probability with only 5% probability of falsely concluding that a blank observation represents a "real" signal

For a particular measurement system, which may include radiochemical separation

$$LLD = \frac{(4.66)(S_b)}{(E)(V)(2.22\times10^6)(Y)e^{-\lambda\Delta t}}$$

where:

LLD	=	The before-the-fact lower limit of detection (μCi per unit mass or volume),
S_b	=	The standard deviation of the background counting rate or of the counting rate of a blank sample as appropriate (counts per minute),
E	=	The counting efficiency (counts per disintegration),
V	=	The sample size (units of mass or volume),
2.22×10^6	=	The number of disintegrations per minute per μCi,
Y	=	The fractional radiochemical yield, when applicable,
λ	=	The radioactive decay constant for the particular radionuclide (sec^{-1}), and
Δt	=	The elapsed time between the midpoint of sample collection and the time of counting (seconds)

Typical values of E, V, Y, and Δt should be used in the calculation.

It should be recognized that the LLD is defined as a before-the-fact limit representing the capability of a measurement system and not as an after-the-fact limit for a particular measurement.

(b) A batch release is the discharge of liquid wastes of a discrete volume Prior to sampling for analyses, each batch shall be isolated, and then thoroughly mixed by the method described in Part II, Section 1 4 to assure representative sampling

(c) The principal gamma emitters for which the LLD applies include the following radionuclides: Mn-54, Fe-59, Co-58, Co-60, Zn-65, Mo-99, Cs-134, Cs-137, and Ce-141 Ce-144 shall also be measured, but with an LLD of 5×10^{-6} μCi/ml This list does not mean that only these nuclides are to be considered. Other gamma peaks that are identifiable, together with those of the above nuclides, shall also be analyzed and reported in the Radioactive Effluent Release Report pursuant to Technical Specification 5.6 3 in the format outlined in RG 1.21, Appendix B, Revision 1, June 1974

(d) A composite sample is one in which the quantity of liquid sampled is proportional to the quantity of liquid waste discharged and in which the method of sampling employed results in a specimen that is representative of the liquids released

(e) If the alarm setpoint of the effluent monitor is exceeded, the frequency of sampling shall be increased to daily until the condition no longer exists Frequency of analysis shall be increased to daily for principal gamma emitters and an incident composite for H-3, gross alpha, Sr-89, Sr-90, and Fe-55.

(f) If the alarm setpoint of Service Water Effluent Monitor A and/or B is exceeded, the frequency of sampling shall be increased to daily until the condition no longer exists Frequency of analysis shall be increased to daily for principal gamma emitters and an incident composite for H-3, gross alpha, Sr-89, Sr-90, and Fe-55.

(g) Complete prior to each release.

D 3.1 RADIOACTIVE LIQUID EFFLUENTS

D 3.1 2 Liquid Effluents Dose

DLCO 3 1.2 The dose or dose commitment to a MEMBER OF THE PUBLIC from radioactive materials released in liquid effluents from each unit to UNRESTRICTED AREAS (Figure D 1.0-1) shall be limited to.

a. ≤ 1.5 mrem to the whole body and ≤ 5 mrem to any organ during any calendar quarter; and

b. ≤ 3 mrem to the whole body and ≤ 10 mrem to any organ during any calendar year.

APPLICABILITY: At all times

ACTIONS

----------NOTES----------

1 LCO 3 0.3 is not applicable.

2. LCO 3.0.4 is not applicable.

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. Calculated dose to a MEMBER OF THE PUBLIC from the release of radioactive materials in liquid effluents to UNRESTRICTED AREAS exceeds limits	A.1 Prepare and submit to the NRC, pursuant to D 4.1.1, a Special Report that (1) Identifies the cause(s) for exceeding the limit(s) and (2) Defines the corrective actions that have been taken to reduce the releases and the proposed corrective actions to be taken to assure that subsequent releases will be in compliance with DLCO 3.1 2.	30 days

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
B. Calculated dose to a MEMBER OF THE PUBLIC from the release of radioactive materials in liquid effluents exceeds 2 times the limits	B.1 Calculate the annual dose to a MEMBER OF THE PUBLIC which includes contributions from direct radiation from the units (including outside storage tanks, etc.). AND B.2 Verify that the limits of DLCO 3.4 have not been exceeded.	Immediately Immediately
C. Required Action B.2 and Associated Completion time not met.	C.1 Prepare and submit to the NRC, pursuant to D 4.1.1, a Special Report, as defined in 10 CFR 20.2203 (a)(4), of Required Action A.1 shall also include the following: (1) The corrective action(s) to be taken to prevent recurrence of exceeding the limits of DLCO 3.4 and the schedule for achieving conformance, (2) An analysis that estimates the dose to a MEMBER OF THE PUBLIC from uranium fuel cycle sources, including all effluent pathways and direct radiation, for the calendar year that includes the release(s), and (3) Describes the levels of radiation and concentrations of radioactive material involved and the cause of the exposure levels or concentrations.	30 days

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
DSR 3.1.2.1	Determine cumulative dose contributions from liquid effluents for the current calendar quarter and the current calendar year.	31 days

D 3.1 RADIOACTIVE LIQUID EFFLUENTS

D 3.1.3 Liquid Radwaste Treatment System

DLCO 3.1.3 The liquid radwaste treatment system shall be OPERABLE.

APPLICABILITY: At all times.

ACTIONS

----------NOTES----------

1. LCO 3.0 3 is not applicable.

2 LCO 3.0.4 is not applicable.

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. Radioactive liquid waste being discharged without treatment. AND Projected doses due to the liquid effluent, from the unit, to UNRESTRICTED AREAS would exceed 0.06 mrem to the whole body or 0 2 mrem to any organ in a 31 day period. AND Any portion of the liquid radwaste treatment system not in operation.	A.1 Prepare and submit to the NRC, pursuant to D 4.1.1, a Special Report that includes. (1) An explanation of why liquid radwaste was being discharged without treatment, identification of any inoperable equipment or subsystems, and the reason for the inoperability, (2) Action(s) taken to restore the inoperable equipment to OPERABLE status, and (3) Summary description of action(s) taken to prevent a recurrence.	30 days

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
DSR 3.1.3 1	----------NOTE---------- Only required to be met when liquid radwaste treatment systems are not being fully utilized. ----------	
	Project the doses due to liquid effluents from each unit to UNRESTRICTED AREAS.	31 days

D 3.2 RADIOACTIVE GASEOUS EFFLUENTS

D 3.2 1 Gaseous Effluents Dose Rate

DLCO 3.2.1 The dose rate from radioactive materials released in gaseous effluents from the site to areas at or beyond the SITE BOUNDARY (Figure D 1.0-1) shall be limited to:

a For noble gases, ≤ 500 mrem/yr to the whole body and ≤ 3000 mrem/yr to the skin and

b. For I-131, I-133, H-3 and all radionuclides in particulate form with half-lives > 8 days, ≤ 1500 mrem/yr to any organ.

APPLICABILITY: At all times.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A The dose rate(s) at or beyond the SITE BOUNDARY due to radioactive gaseous effluents exceeds limits	A.1 Restore the release rate to within the limit.	Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
DSR 3.2.1.1	The dose rate from noble gases in gaseous effluents shall be determined to be within the limits of DLCO 3.2 1.a.	In accordance with Table D 3.2.1-1
DSR 3.2 1.2	The dose rate from I-131, I-133, H-3 and all radionuclides in particulate form with half-lives > 8 days in gaseous effluents shall be determined to be within the limits of DLCO 3 2 1.b	In accordance with Table D 3.2 1-1

Table D 3.2.1-1 (Page 1 of 2)
Radioactive Gaseous Waste Sampling and Analysis

	GASEOUS RELEASE TYPE	SAMPLE TYPE	SAMPLE FREQUENCY	ANALYSIS FREQUENCY	SAMPLE ANALYSIS	SAMPLE LOWER LIMIT OF DETECTION (LLD) (a)
1.	Containment (b)	Grab Sample	Each Purge	(h)	Principal Gamma Emitters (c)	1×10^{-4} µCi/ml
				Each Purge	H-3 (oxide)	1×10^{-6} µCi/ml
				Each Purge	Principal Gamma Emitters (c)	1×10^{-4} µCi/ml
2	Main Stack, Radwaste/Reactor Building Vent	Grab Sample	31 days (d)	31 days (d)	Principal Gamma Emitters (c)	1×10^{-4} µCi/ml
		Grab Sample	31 days (e)	31 days (e)	H-3 (oxide)	1×10^{-6} µCi/ml
		Charcoal Sample	Continuous (f)	7 days (g)	I-131	1×10^{-12} µCi/ml
		Particulate Sample	Continuous (f)	7 days (g)	Principal Gamma Emitters (c)	1×10^{-11} µCi/ml
					Gross Alpha	1×10^{-11} µCi/ml
		Composite Particulate Sample	Continuous (f)	92 days	Sr-89	1×10^{-11} µCi/ml
					Sr-90	1×10^{-11} µCi/ml

See the notes on the next page.

Table D 3.2.1-1 (Page 2 of 2)
Radioactive Gaseous Waste Sampling and Analysis

(a) The LLD is defined as the smallest concentration of radioactive material in a sample that will yield a net count, above system background, that will be detected with 95% probability with only 5% probability of falsely concluding that a blank observation represents a "real" signal

For a particular measurement system, which may include radiochemical separation

$$LLD = \frac{(4.66)(S_b)}{(E)(V)(2.22\times10^6)(Y)e^{-\lambda\Delta t}}$$

where:

LLD	=	The before-the-fact lower limit of detection (μCi per unit mass or volume),
S_b	=	The standard deviation of the background counting rate or of the counting rate of a blank sample as appropriate (counts per minute),
E	=	The counting efficiency (counts per disintegration),
V	=	The sample size (units of mass or volume),
2.22×10^6	=	The number of disintegrations per minute per μCi,
Y	=	The fractional radiochemical yield, when applicable,
λ	=	The radioactive decay constant for the particular radionuclide (sec^{-1}), and
Δt	=	The elapsed time between the midpoint of sample collection and the time of counting (seconds)

Typical values of E, V, Y, and Δt should be used in the calculation.

It should be recognized that the LLD is defined as a before-the-fact limit representing the capability of a measurement system and not as an after-the-fact limit for a particular measurement.

(b) Sample and analysis before PURGE is used to determine permissible PURGE rates Sample and analysis during actual PURGE is used for offsite dose calculations

(c) The principal gamma emitters for which the LLD applies include the following radionuclides Kr-87, Kr-88, Xe-133, Xe-133m, Xe-135, and Xe-138 in noble gas releases and Mn-54, Fe-59, Co-58, Co-60, Zn-65, Mo-99, I-131, Cs-134, Cs-137, Ce-141 and Ce-144 in iodine and particulate releases This list does not mean that only these nuclides are to be considered Other gamma peaks that are identifiable, together with those of the above nuclides, shall also be analyzed and reported in the Radioactive Effluent Release Report pursuant to Technical Specification 5 6 3 in the format outlined in RG 1.21, Appendix B, Revision 1, June 1974

(d) If the main stack or reactor/radwaste building isotopic monitor is not OPERABLE, sampling and analysis shall also be performed following shutdown, startup, or when there is an alarm on the offgas pretreatment monitor

(e) H-3 grab samples shall be taken once every 7 days from the reactor/radwaste ventilation system when fuel is offloaded until stable H-3 release levels can be demonstrated.

(f) The ratio of the sample flow rate to the sampled stream flow rate shall be known for the time period covered by each dose or dose rate calculation made in accordance with DLCO 3 2.1 b and DLCO 3.2 3

(g) When the release rate of the main stack or reactor/radwaste building vent exceeds its alarm setpoint, the iodine and particulate device shall be removed and analyzed to determine the changes in iodine and particulate release rates The analysis shall be done once per 24 hours until the release no longer exceeds the alarm setpoint. When samples collected for 24 hours are analyzed, the corresponding LLDs may be increased by a factor of 10

(h) Complete prior to each release

D 3.2 RADIOACTIVE GASEOUS EFFLUENTS

D 3.2 2 Gaseous Effluents Noble Gas Dose

DLCO 3.2.2 The air dose from noble gases released in gaseous effluents from each unit to areas at or beyond the SITE BOUNDARY (Figure D 1.0-1) shall be limited to:

a. During any calendar quarter: ≤ 5 mrad for gamma radiation and ≤ 10 mrad for beta radiation and

b. During any calendar year: ≤ 10 mrad for gamma radiation and ≤ 20 mrad for beta radiation

APPLICABILITY: At all times.

ACTIONS

----------NOTES----------

1. LCO 3.0.3 is not applicable.
2. LCO 3.0.4 is not applicable

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. The air dose at or beyond the SITE BOUNDARY due to noble gases released in gaseous effluents exceeds limits.	A.1 Prepare and submit to the NRC, pursuant to D 4.1.1, a Special Report that (1) Identifies the cause(s) for exceeding the limit(s) and (2) Defines the corrective actions that have been taken to reduce the releases and the proposed corrective actions to be taken to assure that subsequent releases will be in compliance with DLCO 3.2.2.	30 days

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
B. Calculated dose to a MEMBER OF THE PUBLIC from the release of radioactive materials in gaseous effluents due to noble gases exceeds 2 times the limits.	B 1 Calculate the annual dose to a MEMBER OF THE PUBLIC which includes contributions from direct radiation from the units (including outside storage tanks, etc.) AND	Immediately
	B.2 Verify that the limits of DLCO 3.4 have not been exceeded.	Immediately
C. Required Action B.2 and Associated Completion time not met.	C.1 Special Report, as defined in 10 CFR 20 2203 (a)(4), of Required Action A 1 shall also include the following: (1) The corrective action(s) to be taken to prevent recurrence of exceeding the limits of DLCO 3.4 and the schedule for achieving conformance, (2) An analysis that estimates the dose to a MEMBER OF THE PUBLIC from uranium fuel cycle sources, including all effluent pathways and direct radiation, for the calendar year that includes the release(s), and (3) Describes the levels of radiation and concentrations of radioactive material involved and the cause of the exposure levels or concentrations	30 days

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
DSR 3.2.2.1	Determine cumulative dose contributions for the current calendar quarter and current calendar year.	31 days

D 3.2 RADIOACTIVE GASEOUS EFFLUENTS

D 3.2.3 Gaseous Effluents Dose – I-131, I-133, H-3 and Radioactive Material in Particulate Form

DLCO 3.2.3 The dose to a MEMBER OF THE PUBLIC from I-131, I-133, H-3, and all radioactive material in particulate form with half-lives > 8 days in gaseous effluents released, from each unit, to areas at or beyond the SITE BOUNDARY (Figure D 1.0-1) shall be limited to:

a. During any calendar quarter: ≤ 7.5 mrem to any organ and

b. During any calendar year: ≤ 15 mrem to any organ

APPLICABILITY: At all times

ACTIONS

----------NOTES----------

1. LCO 3.0.3 is not applicable
2. LCO 3.0 4 is not applicable

CONDITION	REQUIRED ACTION	COMPLETION TIME
A The dose from I-131, I-133, H-3 and radioactive material in particulate form with half-lives > 8 days released in gaseous effluents at or beyond the SITE BOUNDARY exceeds limits	A.1 Prepare and submit to the NRC, pursuant to D 4 1.1, a Special Report that (1) Identifies the cause(s) for exceeding the limit(s) and (2) Defines the corrective actions that have been taken to reduce the releases and the proposed corrective actions to be taken to assure that subsequent releases will be in compliance with DLCO 3.2.3.	30 days

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
B. Calculated dose to a MEMBER OF THE PUBLIC from the release of radioactive materials in gaseous effluents exceeds 2 times the limits.	B.1 Calculate the annual dose to a MEMBER OF THE PUBLIC which includes contributions from direct radiation from the units (including outside storage tanks, etc.). AND B.2 Verify that the limits of DLCO 3.4 have not been exceeded.	Immediately Immediately
C. Required Action B 2 and Associated Completion time not met	C.1 Special Report, as defined in 10 CFR 20.2203 (a)(4), of Required Action A.1 shall also include the following: (1)The corrective action(s) to be taken to prevent recurrence of exceeding the limits of DLCO 3.4 and the schedule for achieving conformance, (2)An analysis that estimates the dose to a MEMBER OF THE PUBLIC from uranium fuel cycle sources, including all effluent pathways and direct radiation, for the calendar year that includes the release(s), and (3)Describes the levels of radiation and concentrations of radioactive material involved and the cause of the exposure levels or concentrations.	30 days

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
DSR 3.2.3.1	Determine cumulative dose contributions for the current calendar quarter and current calendar year for I-131, I-133, H-3 and radioactive material in particulate form with half-lives > 8 days	31 days

D 3.2 RADIOACTIVE GASEOUS EFFLUENTS

D 3.2 4 Gaseous Radwaste Treatment System

DLCO 3.2.4 The GASEOUS RADWASTE TREATMENT SYSTEM shall be in operation.

APPLICABILITY: Whenever the main condenser air ejector system is in operation.

ACTIONS

----------NOTES ----------

1. LCO 3.0.3 is not applicable.

2 LCO 3.0.4 is not applicable.

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. The gaseous radwaste from the main condenser air ejector system is being discharged without treatment.	A.1 Restore treatment of gaseous radwaste effluent.	7 days
B Required Action and associated Completion Time not met.	B.1 Prepare and submit to the NRC, pursuant to D 4.1 1, a Special Report that includes the following: (1) Identification of any inoperable equipment or subsystems and the reason for the inoperability, (2) Action(s) taken to restore the inoperable equipment to OPERABLE status, and (3) Summary description of action(s) taken to prevent a recurrence	30 days

SURVEILLANCE REQUIREMENTS

	SURVEILLANCE	FREQUENCY
DSR 3.2.4 1	Check the readings of the relevant instruments to ensure that the GASEOUS RADWASTE TREATMENT SYSTEM is functioning	12 hours

D 3 2 RADIOACTIVE GASEOUS EFFLUENTS

D 3 2 5 Ventilation Exhaust Treatment System

DLCO 3.2.5 The VENTILATION EXHAUST TREATMENT SYSTEM shall be OPERABLE

APPLICABILITY: At all times.

ACTIONS

----------NOTES ----------
1. LCO 3 0.3 is not applicable
2. LCO 3.0 4 is not applicable

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. The radioactive gaseous waste is being discharged without treatment AND Projected doses in 31 days from iodine and particulate releases, from each unit, to areas at or beyond the SITE BOUNDARY (see Figure D 1.0-1) would exceed 0 3 mrem to any organ of a MEMBER OF THE PUBLIC	A.1 Prepare and submit to the NRC, pursuant to D 4 1 1, a Special Report that includes the following (1) Identification of any inoperable equipment or subsystems and the reason for the inoperability, (2) Action(s) taken to restore the inoperable equipment to OPERABLE status, and (3) Summary description of action(s) taken to prevent a recurrence	30 days

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
DSR 3.2 5.1	----------NOTE---------- Only required to be met when the VENTILATION EXHAUST TREATMENT SYSTEM is not being fully utilized. ---------- Project the doses from iodine and particulate releases from each unit to areas at or beyond the SITE BOUNDARY.	31 days

D 3 2 RADIOACTIVE GASEOUS EFFLUENTS

D 3.2.6 Venting or Purging

DLCO 3.2.6 VENTING or PURGING of the drywell and/or suppression chamber shall be through the standby gas treatment system

APPLICABILITY MODES 1, 2, and 3

ACTIONS

----------NOTES----------

1. LCO 3.0 3 is not applicable

2 LCO 3.0 4 is not applicable

CONDITION	REQUIRED ACTION	COMPLETION TIME
A VENTING or PURGING of the drywell and/or suppression chamber not through the standby gas treatment system	A 1 Suspend all VENTING and PURGING of the drywell and/or suppression chamber	Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
DSR 3.2 6 1	The drywell and/or suppression chamber shall be determined to be aligned for VENTING or PURGING through the standby gas treatment system	Within 4 hours before start of VENTING or PURGING AND 12 hours thereafter during VENTING or PURGING

D 3.3 INSTRUMENTATION

D 3.3 1 Radioactive Liquid Effluent Monitoring Instrumentation

DLCO 3 3 1 The radioactive liquid effluent monitoring instrumentation channels shown in Table D 3 3 1-1 shall be OPERABLE with.

a The minimum OPERABLE channel(s) in service

b The alarm/trip setpoints set to ensure that the limits of DLCO 3 1.1 are not exceeded.

APPLICABILITY: According to Table D 3 3 1-1

ACTIONS

----------NOTES ----------

1. LCO 3.0.3 is not applicable.

2. LCO 3 0.4 is not applicable.

3 Separate condition entry is allowed for each channel

CONDITION	REQUIRED ACTION	COMPLETION TIME
A Liquid effluent monitoring instrumentation channel alarm/trip setpoint less conservative than required.	A 1 Suspend the release of radioactive liquid effluents monitored by the affected channel.	Immediately
	OR	
	A.2 Declare the channel inoperable.	Immediately
	OR	
	A.3 Change the setpoint so it is acceptably conservative.	Immediately

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
B One or more required channels inoperable	B 1 Enter the Condition referenced in Table D 3.3 1-1 for the channel AND B.2 Restore inoperable channel(s) to OPERABLE status	Immediately 30 days
C As required by Required Action B 1 and referenced in Table D 3.3.1-1	C 1 Analyze at least 2 independent samples in accordance with Table D 3 1.1-1. AND C.2 ----------NOTE---------- Verification Action will be performed by at least 2 separate technically qualified members of the facility staff ---------- Independently verify the release rate calculations and discharge line valving	Prior to initiating a release Prior to initiating a release
D As required by Required Action B 1 and referenced in Table D 3 3.1-1.	D 1 Collect and analyze grab samples for radioactivity at a limit of detection of at least 5×10^{-7} µCi/ml	12 hours AND Once per 12 hours thereafter

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
E As required by Required Action B 1 and referenced in Table D 3 3 1-1.	E.1 ----------NOTE---------- Pump performance curves generated in place may be used to estimate flow ---------- Estimate the flow rate during actual releases.	4 hours AND Once per 4 hours thereafter
F As required by Required Action B 1 and referenced in Table D 3 3.1-1	F.1 Estimate tank liquid level	Immediately AND During liquid additions to the tank
G Required Action B 2 and associated Completion Time not met	G 1 Explain in the next Radioactive Effluent Release Report why the inoperability was not corrected in a timely manner	In accordance with Radioactive Effluent Release Report
H. Required Action and associated Completion Time for Condition C, D, or E not met	H.1 Suspend liquid effluent releases monitored by the inoperable channel(s)	Immediately
I Required Action and associated Completion Time for Condition F not met	I 1 Suspend liquid additions to the tank monitored by the inoperable channel(s)	Immediately

SURVEILLANCE REQUIREMENTS

----------NOTE ----------
Refer to Table D 3.3 1-1 to determine which DSRs apply for each function
---

SURVEILLANCE		FREQUENCY
DSR 3 3.1 1	Perform CHANNEL CHECK	24 hours
DSR 3.3 1 2	Perform CHANNEL CHECK by verifying indication of flow during periods of release.	24 hours on any day on which continuous, periodic, or batch releases are made
DSR 3.3 1 3	Perform SOURCE CHECK	Prior to release
DSR 3.3 1 4	Perform SOURCE CHECK	31 days
DSR 3.3 1.5	Perform CHANNEL FUNCTIONAL TEST The CHANNEL FUNCTIONAL TEST shall also demonstrate that automatic isolation of this pathway and control room alarm annunciation occurs if the instrument indicates measured levels above the alarm/trip setpoint, and control room alarm annunciation occurs for instrument indication levels measured above the alarm setpoint, circuit failure, instrument indicating a downscale failure, or instrument controls not set in operate mode	31 days
DSR 3.3 1 6	Perform CHANNEL FUNCTIONAL TEST	92 days

(continued)

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE		FREQUENCY
DSR 3 3.1 7	Perform CHANNEL FUNCTIONAL TEST The CHANNEL FUNCTIONAL TEST shall also demonstrate control room alarm annunciation occurs for instrument indication levels measured above the alarm setpoint, circuit failure, instrument indicating a downscale failure, or instrument controls not set in operate mode	184 days
DSR 3 3.1 8	Perform CHANNEL CALIBRATION The initial CHANNEL CALIBRATION shall be performed using one or more of the reference standards certified by the National Institute of Standards and Technology (NIST), standards that are traceable to NIST standards, or using actual samples of liquid effluents that have been analyzed on a system that has been calibrated with NIST traceable sources These standards shall permit calibrating the system over its intended range of energy and measurement. For subsequent CHANNEL CALIBRATION, sources that have been related to the initial calibration may be used	18 months
DSR 3 3.1 9	Perform CHANNEL CALIBRATION	18 months

Table D 3.3 1-1 (page 1 of 1)
Radioactive Liquid Effluent Monitoring Instrumentation

	INSTRUMENT	APPLICABILITY OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS PER INSTRUMENT	CONDITIONS REFERENCED FROM REQUIRED ACTION B 1	SURVEILLANCE REQUIREMENTS
1	Radioactivity Monitors Providing Alarm and Automatic Termination of Release				
	Liquid Radwaste Effluent Line	(a)	1	C	DSR 3 3 1 1 DSR 3 3 1 3 DSR 3 3 1 5 DSR 3.3 1 8
2	Radioactivity Monitors Providing Alarm but not Providing Automatic Termination of Release				
	a Service Water Effluent Line A	(a)	1	D	DSR 3 3 1 1 DSR 3 3 1 4 DSR 3 3 1 7 DSR 3 3 1 8
	b Service Water Effluent Line B	(a)	1	D	DSR 3 3 1 1 DSR 3 3 1 4 DSR 3 3 1 7 DSR 3 3 1.8
	c Cooling Tower Blowdown Line	(a)	1	D	DSR 3 3 1 1 DSR 3 3 1 4 DSR 3 3 1 7 DSR 3 3 1 8
3.	Flow Rate Measurement Devices				
	a Liquid Radwaste Effluent Line	(a)	1	E	DSR 3 3 1 2 DSR 3 3 1 6 DSR 3 3 1 9
	b Service Water Effluent Line A	(a)	1	E	DSR 3 3 1 2 DSR 3 3 1 6 DSR 3.3 1 9
	c Service Water Effluent Line B	(a)	1	E	DSR 3 3 1 2 DSR 3 3 1 6 DSR 3 3 1 9
	d Cooling Tower Blowdown Line	(a)	1	E	DSR 3 3 1 2 DSR 3 3 1 6 DSR 3 3 1 9
4	Tank Level Indicating Devices (c)	(b)	1	F	DSR 3 3 1 1 DSR 3 3 1 6 DSR 3 3 1 9

(a) During releases via this pathway
(b) During liquid addition to the associated tank
(c) Tanks included in this DLCO are those outdoor tanks that are not surrounded by liners, dikes, or walls capable of holding the tank contents and do not have tank overflows and surrounding area drains connected to the liquid radwaste treatment system, such as temporary tanks

D 3 3 INSTRUMENTATION

D 3 3 2 Radioactive Gaseous Effluent Monitoring Instrumentation

DLCO 3 3.2 The radioactive gaseous effluent monitoring instrumentation channels shown in Table D 3 3 2-1 shall be OPERABLE with

a The minimum OPERABLE channel(s) in service.

b The alarm/trip setpoints set to ensure that the limits of DLCO 3 2.1 are not exceeded

APPLICABILITY: According to Table D 3 3.2-1.

ACTIONS

----------NOTES ----------

1 LCO 3.0 3 is not applicable

2 LCO 3 0 4 is not applicable

3. Separate condition entry is allowed for each channel

CONDITION	REQUIRED ACTION	COMPLETION TIME
A Gaseous effluent monitoring instrumentation channel alarm/trip setpoint less conservative than required	A 1 Suspend the release of radioactive gaseous effluents monitored by the affected channel	Immediately
	OR	
	A 2 Declare the channel inoperable	Immediately
	OR	
	A 3 Change the setpoint so it is acceptably conservative	Immediately

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
B One or more channels inoperable	B 1 Enter the Condition referenced in Table D 3.3 2-1 for the channel	Immediately
	AND	
	B 2 Restore inoperable channel(s) to OPERABLE status	30 days
C As required by Required Action B 1 and referenced in Table D 3 3 2-1	C 1 Place the inoperable channel in the tripped condition	12 hours
	OR	
	C 2 1 Take grab samples	12 hours
		AND
		Once per 12 hours thereafter
	AND	
	C 2 2 Analyze samples for gross activity	24 hours from time of sampling completion

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
D. As required by Required Action B 1 and referenced in Table D 3 3 2-1.	D.1 Estimate the flow rate for the inoperable channel(s)	4 hours AND Once per 4 hours thereafter
E As required by Required Action B 1 and referenced in Table D 3.3 2-1.	E.1 Continuously collect samples using auxiliary sampling equipment as required in Table D 3 2 1-1	8 hours
F As required by Required Action B 1 and referenced in Table D 3 3.2-1	F 1.1 Take grab samples. AND F 1 2 Analyze samples for gross activity with a radioactivity limit of detection of at least 1×10^{-4} µCi/ml AND F.2 1 Restore the inoperable channel(s) to OPERABLE status OR F 2 2 Through a DER, determine (1) The cause(s) of the inoperability. (2) The actions to be taken and the schedule for restoring the system to OPERABLE status.	12 hours AND Once per 12 hours thereafter 24 hours from time of sampling completion 72 hours 14 days

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
G. Required Action B 2 and associated Completion Time not met	G 1 Explain in the next Radioactive Effluent Release Report why the inoperability was not corrected in a timely manner	In accordance with Radioactive Effluent Release Report frequency
H Required Action and associated Completion Time for Condition C, D, E or F not met.	H 1 Suspend gaseous effluent releases monitored by the inoperable channel(s)	Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
DSR 3 3.2.1	Perform CHANNEL CHECK.	24 hours
DSR 3 3 2 2	Perform CHANNEL CHECK	7 days
DSR 3 3.2 3	Perform SOURCE CHECK	31 days
DSR 3 3 2 4	Perform CHANNEL FUNCTIONAL TEST The CHANNEL FUNCTIONAL TEST shall also demonstrate the automatic isolation capability of this pathway and that control room alarm annunciation occurs if the instrument indicates measured levels above the alarm/trip setpoint (each channel will be tested independently so as to not initiate isolation during operation), and control room alarm annunciation occurs for instrument indication levels measured above the alarm setpoint, circuit failure, instrument indicating a downscale failure, and instrument controls not set in operate mode	31 days
DSR 3.3 2 5	Perform CHANNEL FUNCTIONAL TEST.	92 days
DSR 3 3.2 6	Perform CHANNEL FUNCTIONAL TEST The CHANNEL FUNCTIONAL TEST shall also demonstrate control room alarm annunciation occurs for instrument indication levels measured above the alarm setpoint, circuit failure, instrument indicating a downscale failure, and instrument controls not set in operate mode	92 days

(continued)

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE		FREQUENCY
DSR 3 3.2 7	Perform CHANNEL CALIBRATION The initial CHANNEL CALIBRATION shall be performed using one or more of the reference standards certified by the National Institute of Standards and Technology (NIST) or using standards that have been obtained from suppliers that participate in measurement assurance activities with NIST, or using actual samples of gaseous effluents that have been analyzed on a system that has been calibrated with NIST traceable sources These standards shall permit calibrating the system over its intended range of energy and measurement. For subsequent CHANNEL CALIBRATION, sources that have been related to the initial calibration may be used The CHANNEL CALIBRATION shall also demonstrate that automatic isolation of this pathway occurs when the instrument channels indicate measured levels above the Trip Setpoint.	18 months
DSR 3.3 2.8	Perform CHANNEL CALIBRATION	18 months
DSR 3 3 2 9	Perform CHANNEL CALIBRATION. The initial CHANNEL CALIBRATION shall be performed using one or more of the reference standards certified by the National Institute of Standards and Technology (NIST) or using standards that have been obtained from suppliers that participate in measurement assurance activities with NIST, or using actual samples of gaseous effluents that have been analyzed on a system that has been calibrated with NIST traceable sources These standards shall permit calibrating the system over its intended range of energy and measurement For subsequent CHANNEL CALIBRATION, sources that have been related to the initial calibration may be used	18 months

Table D 3.3 2-1 (page 1 of 2)
Radioactive Gaseous Effluent Monitoring Instrumentation

	INSTRUMENT	APPLICABILITY OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS PER INSTRUMENT	CONDITIONS REFERENCED FROM REQUIRED ACTION B 1	SURVEILLANCE REQUIREMENTS
1	Offgas System				
	a Noble Gas Activity Monitor – Providing Alarm and Automatic Termination of Release	(a)	2	C	DSR 3 3 2 1 DSR 3 3 2 4 DSR 3 3 2 7
	b System Flow-Rate Measuring Device	(a)	1	D	DSR 3 3 2 1 DSR 3 3 2 5 DSR 3 3 2 8
	c Sample Flow-Rate Measuring Device	(a)	2	D	DSR 3 3 2 1 DSR 3 3 2 5 DSR 3 3 2 8
2	Radwaste/Reactor Building Vent Effluent System				
	a Noble Gas Activity Monitor (c)	(b)	1	F	DSR 3 3 2 1 DSR 3 3 2 3 DSR 3 3 2 6 DSR 3 3 2 9
	b Iodine Sampler	(b)	1	E	DSR 3 3 2 2
	c Particulate Sampler	(b)	1	E	DSR 3 3 2 2
	d Flow-Rate Monitor	(b)	1	D	DSR 3 3 2 1 DSR 3 3 2 5 DSR 3 3 2 8
	e Sample Flow-Rate Monitor	(b)	1	D	DSR 3 3 2 1 DSR 3 3 2 5 DSR 3 3 2 8

(continued)

(a) During offgas system operation

(b) At all times

(c) Includes high range noble gas monitoring capability

Table D 3 3.2-1 (page 2 of 2)
Radioactive Gaseous Effluent Monitoring Instrumentation

	INSTRUMENT	APPLICABILITY OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS PER INSTRUMENT	CONDITIONS REFERENCED FROM REQUIRED ACTION B 1	SURVEILLANCE REQUIREMENTS
3	Main Stack Effluent				
a	Noble Gas Activity Monitor (c)	(b)	1	F	DSR 3 3 2.1 DSR 3 3 2.3 DSR 3 3 2 6 DSR 3 3 2 9
b	Iodine Sampler	(b)	1	E	DSR 3 3 2 2
c	Particulate Sampler	(b)	1	E	DSR 3 3.2 2
d	Flow-Rate Monitor	(b)	1	D	DSR 3 3 2 1 DSR 3 3 2 5 DSR 3.3 2 8
e	Sample Flow-Rate Monitor	(b)	1	D	DSR 3 3 2 1 DSR 3 3 2.5 DSR 3 3 2 8

(b) At all times

(c) Includes high range noble gas monitoring capability

D 3 4 RADIOACTIVE EFFLUENTS TOTAL DOSE

D 3.4 Radioactive Effluents Total Dose

DLCO 3.4 The annual (calendar year) dose or dose commitment to any MEMBER OF THE PUBLIC due to releases of radioactivity and to radiation from uranium fuel cycle sources shall be limited to ≤ 25 mrem to the whole body or any organ, except the thyroid, which shall be limited to ≤ 75 mrem

APPLICABILITY At all times

ACTIONS

----------NOTES----------

1. LCO 3 0 3 is not applicable
2. LCO 3 0 4 is not applicable.

CONDITION	REQUIRED ACTION	COMPLETION TIME
A Estimated dose or dose commitment due to direct radiation and the release of radioactive materials in liquid or gaseous effluents exceeds the limits	A.1 Verify the condition resulting in doses exceeding these limits has been corrected	Immediately
B Required Action and associated Completion Time not met.	B.1 ----------NOTE---------- This is the Special Report required by D 3 1.2, D 3 2 2, or D 3 2 3 supplemented with the following ---------- Submit a Special Report, pursuant to D 4.1.1, including a request for a variance in accordance with the provisions of 40 CFR 190 This submission is considered a timely request, and a variance is granted until staff action on the request is complete.	30 days

D 3 5 RADIOLOGICAL ENVIRONMENTAL MONITORING

D 3.5 1 Monitoring Program

DLCO 3.5 1 The Radiological Environmental Monitoring Program shall be conducted as specified in Table D 3 5 1-1

APPLICABILITY At all times

ACTIONS

----------NOTES----------

1. LCO 3.0 3 is not applicable

2 LCO 3 0 4 is not applicable.

CONDITION	REQUIRED ACTION	COMPLETION TIME
A Radiological Environmental Monitoring Program not conducted as specified in Table D 3 5.1-1.	A 1 Prepare and submit to the NRC in the Annual Radiological Environmental Operating Report, a description of the reasons for not conducting the program as required and the plans for preventing a recurrence	In accordance with the Annual Radiological Environmental Operating Report frequency
B Level of radioactivity in an environmental sampling medium at a specified location exceeds the reporting levels of Table D 3 5 1-2 when averaged over any calendar quarter OR	B 1 ----------NOTES---------- 1. Only applicable if the radioactivity/radionuclides are the result of plant effluents. 2 For radionuclides other than those in Table D 3 5 1-2, this report shall indicate the methodology and parameters used to estimate the potential annual dose to a MEMBER OF THE PUBLIC ----------	

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
More than one of the radionuclides in Table D 3.5 1-2 are detected in the environmental sampling medium and Concentration 1 + reporting level 1 concentration 2 + ... ≥ 1.0 reporting level 2 OR Radionuclides other than those in Table D 3.5 1-2 are detected in an environmental sampling medium at a specified location which are the result of plant effluents and the potential annual dose to a MEMBER OF THE PUBLIC from all radionuclides is ≥ the calendar year limits of D 3.1 2, D 3.2 2 or D 3 2 3	Prepare and submit to the NRC, pursuant to D 4.1 1, a Special Report that (1) Identifies the cause(s) for exceeding the limit(s) and (2) Defines the corrective actions to be taken to reduce radioactive effluents so that the potential annual dose to a MEMBER OF THE PUBLIC is less than the calendar year limits of D 3 1 2, D 3 2 2, or D 3 2 3 OR B 2 ----------NOTES---------- 1 Only applicable if the radioactivity/radionuclides are not the result of plant effluents 2 For radionuclides other than those in Table D 3 5 1-2, this report shall indicate the methodology and parameters used to estimate the potential annual dose to a MEMBER OF THE PUBLIC ---------- Report and describe the condition in the Annual Radiological Environmental Operating Report	30 days In accordance with the Annual Radiological Environmental Operating Report frequency

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
C. Milk or fresh leafy vegetation samples unavailable from one or more of the sample locations required by Table D 3 5 1-1.	C.1 Identify specific locations for obtaining replacement samples and add them to the Radiological Environmental Monitoring Program	30 days
	AND	
	C 2 Delete the specific locations from which samples were unavailable from the Radiological Environmental Monitoring Program.	30 days
	AND	
	C 3 Pursuant to Technical Specification 5.6 3, submit in the next Radioactive Effluent Release Report documentation for a change in the ODCM reflecting the new location(s) with supporting information identifying the cause of the unavailability of samples and justifying the selection of the new location(s) for obtaining samples	In accordance with the Radioactive Effluent Release Report
D Environmental samples required in Table D 3 5.1-1 are unobtainable due to sampling equipment malfunctions	D.1 Ensure all efforts are made to complete corrective action(s)	Prior to the end of the next sampling period
	AND	
	D.2 Report all deviations from the sampling schedule in the Annual Radiological Environmental Operating Report.	In accordance with the Annual Radiological Environmental Operating Report

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION		COMPLETION TIME
E Samples required by Table D 3 5.1-1 not obtained in the media of choice, at the most desired location, or at the most desired time	E 1	Choose suitable alternative media and locations for the pathway in question.	30 days
	AND		
	E 2	Make appropriate substitutions in the Radiological Environmental Monitoring Program	30 days
	AND		
	E 3	Submit in the next Radioactive Effluent Release Report documentation for a change in the ODCM reflecting the new location(s) with supporting information identifying the cause of the unavailability of samples for that pathway and justifying the selection of the new location(s) for obtaining samples	In accordance with the Radioactive Effluent Release Report

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
DSR 3 5 1.1	Collect and analyze radiological environmental monitoring samples pursuant to the requirements of Table D 3 5 1-1 and the detection capabilities required by Table D 3 5 1-3	In accordance with Table D 3 5.1-1

Table D 3 5.1-1 (page 1 of 4)
Radiological Environmental Monitoring Program

EXPOSURE PATHWAY AND/OR SAMPLE	NUMBER OF SAMPLES STATIONS	SAMPLE LOCATIONS (a)	SAMPLING AND COLLECTION FREQUENCY	TYPE AND FREQUENCY OF ANALYSIS
1 Direct Radiation	32 routine monitoring stations (b)	(1) An inner ring of stations, one in each meteorological sector in the general area of the SITE BOUNDARY (2) An outer ring of stations, one in each land base meteorological sector in the 4 to 5 mile (c) range from the site (3) The balance of the stations should be placed in special interest areas such as population centers, nearby residences, schools, and in one or two areas to serve as control stations (d)	Once per 3 months	Gamma dose once per 3 months
2 Airborne Radioiodine and Particulates	5 locations	(1) 3 samples from offsite locations close to the site boundary (within 1 mile) in different sectors (e) (2) 1 sample from the vicinity of an established year-round community (e) (3) 1 sample from a control location, at least 10 miles distant and in a least prevalent wind direction (d)	Continuous sampler operation with sample collection weekly or more frequently if required by dust loading	Radioiodine canister Analyze weekly for I-131 Particulate sampler (1) Analyze for gross beta radioactivity ≥ 24 hours following filter change (f) (2) Perform gamma isotopic analysis on each sample (g) in which gross beta activity is > 10 times the previous yearly mean of control samples (3) Gamma isotopic analysis of composite sample (g) (by location) once per 3 months
3 Waterborne				
a. Surface	1 sample	Upstream (d) (h)	Composite sample over a one month period (i)	(1) Gamma isotopic analysis of each sample (g) once per month (2) H-3 analysis of each composite sample and once per 3 months
	1 sample	Site's downstream cooling water intake (h)		
b Ground	As required	From one or two sources if likely to be affected (j)	Grab sample once per 3 months	(1) Gamma isotopic analysis of each sample (g) once per 3 months (2) H-3 analysis of each sample once per 3 months

(continued)

Table D 3.5.1-1 (page 2 of 4)
Radiological Environmental Monitoring Program

EXPOSURE PATHWAY AND/OR SAMPLE	NUMBER OF SAMPLES	SAMPLE LOCATIONS (a)	SAMPLING AND COLLECTION FREQUENCY	TYPE AND FREQUENCY OF ANALYSIS
3 Waterborne (continued)				
c Drinking	1 sample of each	One to three of the nearest water supplies that could be affected by its discharge (k)	When I-131 analysis is performed, a composite sample over a two week period (i), otherwise, a composite sample monthly	(1) I-131 analysis on each composite sample when the dose calculated for the consumption of the water is greater than 1 mrem/yr (l) (2) Gross beta and gamma isotopic analyses of each composite sample (g) monthly (3) H-3 analysis of each composite sample once per 3 months
d Sediment from Shoreline	1 sample	From a downstream area with existing or potential recreational value	Twice per year	Gamma isotopic analysis of each sample (g)
4 Ingestion				
a. Milk	(1) 3 samples from MILK SAMPLING LOCATIONS	In 3 locations within 3 5 miles (e)	Twice per month, April through December (m)	(1) Gamma isotopic (g) and I-131 analysis of each sample twice per month April through December (2) Gamma isotopic (g) and I-131 analysis of each sample once per month January through March if required
	(2) If there are none, then 1 sample from MILK SAMPLING LOCATIONS	In each of 3 areas 3 5-5 0 miles distant (e)		
	(3) 1 sample from a MILK SAMPLING LOCATION	At a control location 9-20 miles distant and in a least prevalent wind direction (d)		
b Fish	(1) 1 sample each of 2 commercially or recreationally important species (n)	In the vicinity of a plant discharge area	Twice per year	Gamma isotopic analysis of each sample (g) on edible portions twice per year
	(2) 1 sample of the same species	In areas not influenced by station discharge (d)		

(continued)

Table D 3.5 1-1 (page 3 of 4)
Radiological Environmental Monitoring Program

EXPOSURE PATHWAY AND/OR SAMPLE	NUMBER OF SAMPLES	SAMPLE LOCATIONS (a)	SAMPLING AND COLLECTION FREQUENCY	TYPE AND FREQUENCY OF ANALYSIS
4 Ingestion (continued)				
c Food Products	(1) 1 sample of each principal class of food products	Any area that is irrigated by water in which liquid plant wastes have been discharged (o)	At time of harvest (p)	Gamma isotopic (g) and I-131 analysis of each sample of edible portions
	(2) Samples of 3 different kinds of broad leaf vegetation (such as vegetables)	Grown nearest to each of 2 different offsite locations (e)	Once per year during the harvest season-	
	(3) 1 sample of each of the similar broad leaf vegetation	Grown at least 9 3 miles distant in a least prevalent wind direction	Once per year during the harvest season	

Table D 3 5 1-1 (page 3 of 4)
Radiological Environmental Monitoring Program

(a) Specific parameters of distance and direction sector from the centerline of one reactor, and additional descriptions where pertinent, shall be provided for each and every sample location in Table D 3 5 1-1 Refer to NUREG-0133, "Preparation of Radiological Effluent Technical Specifications for Nuclear Power Plants," October 1978, and to Radiological Assessment Branch Technical Position on Environmental Monitoring, Revision 1, November 1979. Deviations are permitted from the required sampling schedule if specimens are unobtainable because of such circumstances as hazardous conditions, seasonal unavailability (which includes theft and uncooperative residents), or malfunction of automatic sampling equipment

(b) One or more instruments, such as a pressurized ion chamber, for measuring and recording dose rate continuously may be used in place of, or in addition to integrating dosimeters Each of the 32 routine monitoring stations shall be equipped with 2 or more dosimeters or with 1 instrument for measuring and recording dose rate continuously For the purpose of this table, a thermoluminescent dosimeter (TLD) is considered to be one phosphor, 2 or more phosphors in a packet are considered as 2 or more dosimeters Film badges shall not be used as dosimeters for measuring direct radiation

(c) At this distance, 8 windrose sectors (W, WNW, NW, NNW, N, NNE, NE, and ENE) are over Lake Ontario

(d) The purpose of these samples is to obtain background information. If it is not practical to establish control locations in accordance with the distance and wind direction criteria, other sites, which provide valid background data, may be substituted

(e) Having the highest calculated annual site average ground-level D/Q based on all site licensed reactors.

(f) Airborne particulate sample filters shall be analyzed for gross beta activity 24 hours or more after sampling to allow for radon and thoron daughter decay

(g) Gamma isotopic analysis means the identification and quantification of gamma –emitting radionuclides that may be attributable to the effluents from the facility

(h) The upstream sample shall be taken at a distance beyond significant influence of the discharge The downstream sample shall be taken in an area beyond but near the mixing zone.

(i) In this program, representative composite sample aliquots shall be collected at time intervals that are very short (e g , hourly) relative to the compositing period (e g , monthly) in order to assure obtaining a representative sample

(j) Groundwater samples shall be taken when this source is tapped for drinking or irrigation purposes in areas where the hydraulic gradient or recharge properties are suitable for contamination.

(k) Drinking water samples shall be taken only when drinking water is a dose pathway

(l) Analysis for I-131 may be accomplished by Ge-Li analysis provided that the lower limit of detection (LLD) for I-131 in water samples found on Table D 3 5 1-2 can be met Doses shall be calculated for the maximum organ and age group

(m) Samples will be collected January through March if I-131 is detected in November and December of the preceding year

(n) In the event 2 commercially or recreationally important species are not available, after 3 attempts of collection, then 2 samples of one species or other species not necessarily commercially or recreationally important may be utilized

(o) Applicable only to major irrigation projects within 9 miles of the site in the general downcurrent direction.

(p) If harvest occurs more than once/year, sampling shall be performed during each discrete harvest If harvest occurs continuously, sampling shall be taken monthly Attention should be paid to including samples of tuberous and root food products

Table D 3 5.1-2 (page 1 of 1)
Reporting Levels for Radioactivity in Environmental Samples

RADIONUCLIDE ANALYSIS	WATER (pCi/L)	AIRBORNE PARTIUCLATE OR GASES (pCi/m^3)	FISH (pCi/kg, wet)	MILK (pCi/L)	FOOD PRODUCTS (pCi/kg, wet)
H-3	20,000 (a)				
Mn-54	1,000		30,000		
Fe-59	400		10,000		
Co-58	1,000		30,000		
Co-60	300		10,000		
Zn-65	300		20,000		
Zr-95	400				
Nb-95	400				
I-131	2 (b)	0.9		3	100
Cs-134	30	10	1,000	60	1,000
Cs-137	50	20	2,000	70	2,000
Ba-140	200			300	
La-140	200			300	

(a) For drinking water samples This is a 40 CFR 141 value If no drinking water pathway exists, a value of 30,000 pCi/L may be used

(b) If no drinking water pathway exists, a value of 20 pCi/L may be used

Table D 3.5 1-3 (page 1 of 2)
Detection Capabilities for Environmental Sample Analysis [a] [b]

	LOWER LIMIT OF DETECTION (LLD)[c]					
RADIONUCLIDE ANALYSIS	WATER (pCi/L)	AIRBORNE PARTIUCLATE OR GASES (pCi/m^3)	FISH (pCi/kg, wet)	MILK (pCi/L)	FOOD PRODUCTS (pCi/kg, wet)	SEDIMENT (pCi/kg, dry)
Gross Beta	4	0 01				
H-3	2,000 [d]					
Mn-54	15		130			
Fe-59	30		260			
Co-58	15		130			
Co-60	15		130			
Zn-65	30		260			
Zr-95	15					
Nb-95	15					
I-131	1 [e]	0 07		1	60	
Cs-134	15	0 05	130	15	60	150
Cs-137	18	0 06	150	18	80	180
Ba-140	15			15		
La-140	15			15		

See the notes on the next page

Table 3 5 1-3 (page 2 of 2)
Detection Capabilities for Environmental Sample Analysis [a] [b]

(a) This list does not mean that only these nuclides are to be considered. Other peaks that are identifiable, together with those of the above nuclides, shall also be analyzed and reported in the Annual Radiological Environmental Operating Report

(b) Required detection capabilities for thermoluminescent dosimeters used for environmental measurements are given in ANSI N-545, Section 4 3 1975 Allowable exceptions to ANSI N-545, Section 4 3 are contained in the ODCM

(c) The LLD is defined as the smallest concentration of radioactive material in a sample that will yield a net count, above system background, that will be detected with 95% probability with only 5% probability of falsely concluding that a blank observation represents a "real" signal

For a particular measurement system, which may include radiochemical separation

$$LLD = \frac{(4\ 66)(S_b)}{(E)(V)(2\ 22)(Y)e^{-\lambda\Delta t}}$$

where:

LLD	=	The before-the-fact lower limit of detection (pCi per unit mass or volume),
S_b	=	The standard deviation of the background counting rate or of the counting rate of a blank sample as appropriate (counts per minute),
E	=	The counting efficiency (counts per disintegration),
V	=	The sample size (units of mass or volume),
2 22	=	The number of disintegrations per minute per pCi,
Y	=	The fractional radiochemical yield, when applicable,
λ	=	The radioactive decay constant for the particular radionuclide (sec^{-1}), and
Δt	=	The elapsed time between environmental collection or end of the sample collection period, and the time of counting (seconds)

Typical values of E, V, Y, and Δt should be used in the calculation

It should be recognized that the LLD is defined as a before-the-fact limit representing the capability of a measurement system and not as an after-the-fact limit for a particular measurement Analyses shall be performed in such a manner that the stated LLDs will be achieved under routine conditions Occasionally background fluctuations, unavoidable small sample sizes, the presence of interfering nuclides, or other uncontrollable circumstances may render these LLDs unachievable In such cases, the contributing factors shall be identified and described in the Annual Radiological Environmental Operating Report.

(d) If no drinking water pathway exists, a value of 3,000 pCi/L may be used

(e) If no drinking water pathway exists, a value of 15 pCi/L may be used

D 3 5 RADIOLOGICAL ENVIRONMENTAL MONITORING

D 3.5 2 Land Use Census

DLCO 3 5 2 A land use census shall.

a Be conducted,

b Identify within a distance of 5 miles the location in each of the 16 meteorological sectors of the nearest milk animal and the nearest residence, and the nearest garden (broad leaf vegetation sampling controlled by Table D 3.5 1-1, part 5.c may be performed in lieu of the garden census) of > 500 ft^2 producing broad leaf vegetation, and

c For elevated releases, identify within a distance of 3 miles the locations in each of the 16 meteorological sectors of all milk animals and all gardens (broad leaf vegetation sampling controlled by Table D 3.5 1-1, part 5.c may be performed in lieu of the garden census) > 500 ft^2 producing broad leaf vegetation.

APPLICABILITY: At all times

ACTIONS

----------NOTES ----------

1 LCO 3 0 3 is not applicable

2 LCO 3 0 4 is not applicable

CONDITION	REQUIRED ACTION	COMPLETION TIME
A Land use census identifies location(s) that yields a calculated dose, dose commitment, or D/Q value > than the values currently being calculated in DSR 3 2.3 1	A.1 Identify the new location(s) in the next Radioactive Effluent Release Report	In accordance with the Radioactive Effluent Release Report

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
B Land use census identifies location(s) that yields a calculated dose, dose commitment, or D/Q value (via the same exposure pathway) 50% > than at a location from which samples are currently being obtained in accordance with Table D 3 5.1-1.	B 1 Add the new location(s) to the Radiological Environmental Monitoring Program AND	30 days
	B.2 Delete the sampling location(s), excluding the control station location, having the lowest calculated dose, dose commitment(s) or D/Q value, via the same exposure pathway, from the Radiological Environmental Monitoring Program. AND	After October 31 of the year in which the land use census was conducted
	B 3 Submit in the next Radioactive Effluent Release Report documentation for a change in the ODCM including revised figure(s) and table(s) for the ODCM reflecting the new location(s) with information supporting the change in sampling locations.	In accordance with the Radioactive Effluent Release Report

SURVEILLANCE REQUIREMENTS

	SURVEILLANCE	FREQUENCY
DSR 3 5 2.1	Conduct the land use census during the growing season using that information that will provide the best results, such as by a door-to-door survey, aerial survey, or by consulting local agriculture authorities	366 days
DSR 3.5 2 2	Report the results of the land use census in the Annual Radiological Environmental Operating Report	In accordance with the Annual Radiological Environmental Operating Report

D 3.5 RADIOLOGICAL ENVIRONMENTAL MONITORING

D 3 5.3 Interlaboratory Comparison Program

DLCO 3 5 3 The Interlaboratory Comparison Program shall be described in the ODCM

AND

Analyses shall be performed on all radioactive materials, supplied as part of an Interlaboratory Comparison Program that has been approved by the NRC, that correspond to samples required by Table D 3 5 1-1 Participation in this program shall include media for which environmental samples are routinely collected and for which intercomparison samples are available

APPLICABILITY: At all times

ACTIONS

---------- NOTES ----------

1. LCO 3.0 3 is not applicable.

2. LCO 3 0 4 is not applicable

CONDITION	REQUIRED ACTION	COMPLETION TIME
A Analyses not performed as required	A 1 Report the corrective actions taken to prevent a recurrence to the NRC in the Annual Radiological Environmental Operating Report	In accordance with the Annual Radiological Environmental Operating Report

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
DSR 3.5.3.1	Report a summary of the results obtained as part of the Interlaboratory Comparison Program in the Annual Radiological Environmental Operating Report	In accordance with the Annual Radiological Environmental Operating Report

PART I - RADIOLOGICAL EFFLUENT CONTROLS

BASES

B 3 1 RADIOACTIVE LIQUID EFFLUENTS

B 3 1.1 Liquid Effluents Concentration

BASES

This is provided to ensure that the concentration of radioactive materials released in liquid waste effluents to UNRESTRICTED AREAS will be less than ten times the concentration levels specified in 10 CFR 20, Appendix B, Table 2, Column 2 This limitation provides additional assurance that the levels of radioactive materials in bodies of water in UNRESTRICTED AREAS will result in exposures within (1) the Section II A design objectives of Appendix I to 10 CFR 50, to a MEMBER OF THE PUBLIC and (2) the levels required by 10 CFR 20 1301(e) to the population The concentration limit for dissolved or entrained noble gases is based upon the assumption that Xe-135 is the controlling radioisotope and its effluent concentration in air (submersion) was converted to an equivalent concentration in water using the methods described in International Commission on Radiological Protection (ICRP) Publication 2

This applies to the release of radioactive materials in liquid effluents from all units at the site

The required detection capabilities for radioactive materials in liquid waste samples are tabulated in terms of the lower limits of detection (LLDs). Detailed discussion of the LLD, and other detection limits can be found in L A Currie, "Lower Limit of Detection Definition and Elaboration of a Proposed Position for Radiological Effluent and Environmental Measurements," NUREG/CR-4007 (September 1984), and in the HASL Procedures Manual, HASL-300 (revised annually)

B 3 1 RADIOACTIVE LIQUID EFFLUENTS

B 3.1 2 Liquid Effluents Dose

BASES

This is provided to implement the requirements of Sections II A, III A, and IV A of Appendix I to 10 CFR 50. This implements the guides set forth in Section II A of Appendix I. The ACTION statements provide the required operating flexibility and at the same time implement the guides set forth in Section IV A of Appendix I to assure that the releases of radioactive materials in liquid effluents to UNRESTRICTED AREAS will be kept as low as is reasonably achievable Also, for fresh water sites with drinking water supplies that can be potentially affected by plant operations, there is reasonable assurance that the operation of the facility will not result in radionuclide concentrations in the potable drinking water that are in excess of the requirements of 40 CFR 141. For sites containing up to four reactors, it is highly unlikely that the resultant dose to a MEMBER OF THE PUBLIC will exceed the dose limits of 40 CFR 190 if the individual reactors remain within twice the dose design objectives of Appendix I, and if direct radiation doses from the units including outside storage tanks, etc , are kept small The Special Report will describe a course of action that should result in the limitation of the annual dose to a MEMBER OF THE PUBLIC to within the 40 CFR 190 limits For the purposes of the Special Report, it may be assumed that the dose commitment to the MEMBERS OF THE PUBLIC from other uranium fuel cycle sources is negligible, with the exception that dose contributions from other nuclear fuel cycle facilities at the same site or within a radius of 5 miles must be considered The dose calculation methodology and parameters implement the requirements in Section III A of Appendix I that conformance with the guides of Appendix I be shown by Calculational procedures based on models and data, so that the actual exposure of a MEMBER OF THE PUBLIC through appropriate pathways is unlikely to be substantially underestimated. The equations specified for calculating the doses that result from actual release rates of radioactive material in liquid effluents are consistent with the methodology provided in RG 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 and R G 1 113, "Estimating Aquatic Dispersion of Effluents from Accidental and Routine Reactor Releases for the Purpose of Implementing Appendix I," April 1977. This applies to the release of radioactive materials in liquid effluents from each unit at the site. For units with shared radwaste treatment systems, the liquid effluents from the shared system are to be proportioned among the units sharing that system

B 3 1 RADIOACTIVE LIQUID EFFLUENTS

B 3 1 3 Liquid Radwaste Treatment System

BASES

The installed liquid radwaste treatment system shall be considered OPERABLE by meeting DLCO 3 1 1 and DLCO 3 1 2 The OPERABILITY of the liquid radwaste treatment system ensures that this system will be available for use whenever liquid effluents require treatment before release to the environment. The requirement that the appropriate portions of this system be used when specified provides assurance that the releases of radioactive materials in liquid effluents will be kept as low as is reasonably achievable This implements the requirements of 10 CFR 50 36a, GDC 60 of Appendix A to 10 CFR 50 and the design objective given in Section II D of Appendix I to 10 CFR 50 The specified limits governing the use of appropriate portions of the liquid radwaste treatment system were specified as a suitable fraction of the dose design objectives set forth in Section II A of Appendix I to 10 CFR 50 for liquid effluents This applies to the release of radioactive materials in liquid effluents from each unit at the site For units with shared radwaste treatment systems, the liquid effluents from the shared system are to be proportioned among the units sharing that system

B 3 2 RADIOACTIVE GASEOUS EFFLUENTS

B 3.2.1 Gaseous Effluents Dose Rate

BASES

This is provided to ensure that the dose rate at any time at and beyond the SITE BOUNDARY from gaseous effluents from all units on the site will be within the annual dose limits of 10 CFR 20 to UNRESTRICTED AREAS

The annual dose limits are the doses associated with the concentrations of 10 CFR 20, Appendix B, Table 2, Column 1. These limits provide reasonable assurance that radioactive material discharged in gaseous effluents will not result in the exposure of a MEMBER OF THE PUBLIC in an UNRESTRICTED AREA, either within or outside the SITE BOUNDARY, to annual average concentrations exceeding the limits specified in Appendix B, Table 2 of 10 CFR 20 or as governed by 10 CFR 20.1302(c) For MEMBERS OF THE PUBLIC who may at times be within the SITE BOUNDARY, the occupancy of that MEMBER OF THE PUBLIC will usually be sufficiently low to compensate for any increase in the atmospheric diffusion factor above that for the SITE BOUNDARY Examples of calculations for such MEMBERS OF THE PUBLIC, with the appropriate occupancy factors, shall be given in Part II. The specified release rate limits restrict, at all times, the corresponding gamma and beta dose rates above background to a MEMBER OF THE PUBLIC at or beyond the SITE BOUNDARY to less than or equal to 500 mrem/year to the whole body or to less than or equal to 3000 mrem/year to the skin. These release rate limits also restrict, at all times, the corresponding thyroid dose rate above background to a child via the inhalation pathway to less than or equal to 1500 mrem/year This applies to the release of radioactive materials in gaseous effluents from all units at the site

The required detection capabilities for radioactive materials in gaseous waste samples are tabulated in terms of the lower limits of detection (LLDs) Detailed discussion of the LLD, and other detection limits can be found in L. A Currie, "Lower Limit of Detection Definition and Elaboration of a Proposed Position for Radiological Effluent and Environments Measurements," NUREG/CR-4007 (September 1984), and in the HASL Procedures Manual, HASL-300 (revised annually)

B 3 2 RADIOACTIVE GASEOUS EFFLUENTS

B 3 2 2 Gaseous Effluents Noble Gas Dose

BASES

This is provided to implement the requirements of Section II B, III A, and IV A of Appendix I to 10 CFR 50 The DLCO implements the guides set forth in Section II B of Appendix I The REQUIRED ACTIONS provide the required operating flexibility and, at the same time, implement the guides set forth in Section IV A of Appendix I to assure that the releases of radioactive material in gaseous effluents to UNRESTRICTED AREAS will be kept as low as is reasonably achievable. The Surveillance Requirements implement the requirements in Section III.A of Appendix I that conformance with the guidelines of Appendix I be shown by calculational procedures based on models and data so that the actual exposure of a MEMBER OF THE PUBLIC through appropriate pathways is unlikely to be substantially underestimated For sites containing up to four reactors, it is highly unlikely that the resultant dose to a MEMBER OF THE PUBLIC will exceed the dose limits of 40 CFR 190 if the individual reactors remain within twice the dose design objectives of Appendix I, and if direct radiation doses from the units including outside storage tanks, etc , are kept small The Special Report will describe a course of action that should result in the limitation of the annual dose to a MEMBER OF THE PUBLIC to within the 40 CFR 190 limits For the purposes of the Special Report, it may be assumed that the dose commitment to the MEMBER OF THE PUBLIC from other uranium fuel cycle sources is negligible, with the exception that dose contributions from other nuclear fuel cycle facilities at the same site or within a radius of 5 miles must be considered The dose calculation methodology and parameters for calculating the doses from the actual release rates of radioactive noble in gaseous effluents are consistent with the methodology provided in RG 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, and RG 1.111, "Methods for Estimating Atmospheric Transport and Dispersion of Gaseous Effluents in Routine Releases from Light-Water Cooled Reactors," Revision 1," July 1977 The ODCM equations provided for determining the air doses at or beyond the SITE BOUNDARY are based upon real-time meteorological conditions or the historical average atmospheric conditions This applies to the release of radioactive material in gaseous effluents from each unit at the site

B 3 2 RADIOACTIVE GASEOUS EFFLUENTS

B 3 2 3 Gaseous Effluents Dose – Iodine-131, Iodine-133, Tritium, and Radioactive Material In Particulate Form

BASES

This is provided to implement the requirements of Sections II C, III A, and IV A of Appendix I to 10 CFR 50 The DLCO implements the guides set forth in Section II C of Appendix I The REQUIRED ACTIONS provide the required operating flexibility and at the same time implement the guides set forth in Section IV.A of Appendix I to assure that the releases of radioactive materials in gaseous effluents to UNRESTRICTED AREAS will be kept as low as is reasonably achievable The calculational methods specified in the Surveillance Requirements implement the requirements in Section III A of Appendix I that conformance with the guides of Appendix I be shown by calculational procedures based on models and data, so that the actual exposure of a MEMBER OF THE PUBLIC through appropriate pathways is unlikely to be substantially underestimated . For sites containing up to four reactors, it is highly unlikely that the resultant dose to a MEMBER OF THE PUBLIC will exceed the dose limits of 40 CFR 190 if the individual reactors remain within twice the dose design objectives of Appendix I, and if direct radiation doses from the units including outside storage tanks, etc., are kept small The Special Report will describe a course of action that should result in the limitation of the annual dose to a MEMBER OF THE PUBLIC to within the 40 CFR 190 limits For the purposes of the Special Report, it may be assumed that the dose commitment to the MEMBER OF THE PUBLIC from other uranium fuel cycle sources is negligible, with the exception that dose contributions from other nuclear fuel cycle facilities at the same site or within a radius of 5 miles must be considered The calculational methodology and parameters for calculating the doses from the actual release rates of the subject materials are consistent with the methodology provided in RG 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, and RG 1 111, "Methods for Estimating Atmospheric Transport and Dispersion of Gaseous Effluents in Routine Releases from Light-Water-Cooled Reactors," Revision 1, July 1977 These equations also provide for determining the actual doses based upon the historical average atmospheric conditions The release rate DLCO for iodine-131, iodine-133, tritium, and radioactive material in particulate form with half-lives greater than 8 days are dependent upon the existing radionuclide pathways to man, in the areas at or beyond the SITE BOUNDARY. The pathways that were examined in the development of these calculations were (1) individual inhalation of airborne radioactive material, (2) deposition of radioactive material onto green leafy vegetation

B 3.2 3 Gaseous Effluents Dose – Iodine-131, Iodine-133, Tritium, and Radioactive Material In Particulate Form (continued)

with subsequent consumption by man, (3) deposition onto grassy areas where milk-producing animals and meat-producing animals graze (human consumption of the milk and meat is assumed), and (4) deposition on the ground with subsequent exposure to man This applies to the release of radioactive materials in gaseous effluents from each unit at the site For units with shared radwaste treatment systems, the gaseous effluents from the shared system are proportioned among the units sharing that system

B 3 2 RADIOACTIVE GASEOUS EFFLUENTS

B 3 2 4 Gaseous Radwaste Treatment System

BASES

The OPERABILITY of the GASEOUS RADWASTE TREATMENT SYSTEM ensures that the system will be available for use whenever gaseous effluents require treatment before release to the environment The requirement that the appropriate portions of this system be used, when specified, provides reasonable assurance that the releases of radioactive materials in gaseous effluents will be kept as low as is reasonably achievable This implements the requirements of 10 CFR 50 36a, GDC 60 of Appendix A to 10 CFR 50, and the design objectives given in Section II D of Appendix I to 10 CFR 50. Limits governing the use of appropriate portions of the system were specified as a suitable fraction of the dose design objectives set forth in Sections II.B and II.C of Appendix I to 10 CFR 50, for gaseous effluents This applies to the release of radioactive materials in gaseous effluents from each unit at the site For units with shared radwaste treatment systems, the gaseous effluents from the shared system are proportional among the units sharing that system

B 3.2 RADIOACTIVE GASEOUS EFFLUENTS

B 3.2 5 Ventilation Exhaust Treatment System

BASES

The OPERABILITY of the VENTILATION EXHAUST TREATMENT SYSTEM ensures that the system will be available for use whenever gaseous effluents require treatment before release to the environment The requirement that the appropriate portions of this system be used, when specified, provides reasonable assurance that the releases of radioactive materials in gaseous effluents will be kept as low as is reasonably achievable This implements the requirements of 10 CFR 50 36a, GDC 60 of Appendix A to 10 CFR 50, and the design objectives given in Section II D of Appendix I to 10 CFR 50 Limits governing the use of appropriate portions of the system were specified as a suitable fraction of the dose design objectives set forth in Sections II.B and II C of Appendix I to 10 CFR 50, for gaseous effluents This applies to the release of radioactive materials in gaseous effluents from each unit at the site For units with shared radwaste treatment systems, the gaseous effluents from the shared system are proportional among the units sharing that system

The appropriate components, which affect iodine or particulate release, to be OPERABLE are

1) HEPA Filter – Radwaste Decon Area
2) HEPA Filter – Radwaste Equipment Area
3) HEPA Filter – Radwaste General Area

Whenever one of these filters is not OPERABLE, iodine and particulate dose projections will be made for 31-day intervals starting with filter inoperability, and continuing as long as the filter remains inoperable, in accordance with DSR 3 2.5 1

B 3 2 RADIOACTIVE GASEOUS EFFLUENTS

B 3 2 6 Venting or Purging

BASES

This provides reasonable assurance that releases from drywell and/or suppression chamber purging operations will not exceed the annual dose limits of 10 CFR 20 for unrestricted areas

B 3 3 INSTRUMENTATION

B 3.3 1 Radioactive Liquid Effluent Monitoring Instrumentation

BASES

The radioactive liquid effluent instrumentation is provided to monitor and control, as applicable, the releases of radioactive materials in liquid effluents during actual or potential releases of liquid effluents The alarm/trip setpoints for these instruments shall be calculated and adjusted in accordance with the methodology and parameters in Part II to ensure that the alarm/trip will occur before exceeding ten times the limits of 10 CFR 20 The OPERABILITY and use of this instrumentation is consistent with the requirements of GDC 60, 63, and 64 of Appendix A to 10 CFR 50 The purpose of tank level indicating devices is to assure the detection and control of leaks that if not controlled could potentially result in the transport of radioactive materials to UNRESTRICTED AREAS

Tanks included are those outdoor tanks that are not surrounded by liners, dikes, or walls capable of holding the tank contents and do not have tank overflows and surrounding area drains connected to the liquid radwaste treatment system, such as temporary tanks

B 3.3 INSTRUMENTATION

B 3 3 2 Radioactive Gaseous Effluent Monitoring Instrumentation

BASES

The radioactive gaseous effluent instrumentation is provided to monitor and control, as applicable, the releases of radioactive materials in gaseous effluents during actual or potential releases of gaseous effluents The alarm/trip setpoints for these instruments shall be calculated and adjusted in accordance with the methodology and parameters in Part II to ensure that the alarm/trip will occur before exceeding the limits of 10 CFR 20. Although the Offgas System Noble Gas Activity Monitor is listed in Table D 3.3.2-1, "Radioactive Gaseous Effluent Monitoring Instrumentation", these monitors are actually located upstream of the Main Stack noble gas activity monitor and are not effluent monitors They were included in Table D 3 3 2-1 in accordance with NUREG-0473 As such, Offgas System Noble Gas Activity Monitor alarm and trip setpoints are not based on 10CFR20 The offgas system noble gas monitor alert setpoint is set at 1 5 times nominal full power background to assure compliance with ITS SR 3.7 4 1 which requires offgas sampling be performed within four hours of a 50% increase in offgas monitoring readings, and to support MSLRM trip removal The offgas system noble gas monitor trip setpoint is based on the 10CFR100 limits for the limiting design basis gaseous waste system accident which is the offgas system rupture. The range of the noble gas channels of the main stack and radwaste/reactor building vent effluent monitors is sufficiently large to envelope both normal and accident levels of noble gas activity The capabilities of these instruments are consistent with the recommendations of Regulatory Guide 1.97, "Instrumentation for Light Water Cooled Nuclear Power Plants to Assess Plant Conditions During and Following an Accident," December 1980 and NUREG-0737, "Clarification of the TMI Action Plan Requirements," November 1980 This instrumentation also includes provisions for monitoring and controlling the concentrations of potentially explosive gas mixtures in the offgas system The OPERABILITY and use of this instrumentation is consistent with the requirements of GDC 60, 63, and 64 of Appendix A to 10 CFR 50

B 3.4 RADIOACTIVE EFFLUENTS TOTAL DOSE

BASES

This is provided to meet the dose limitations of 40 CFR 190 that have been incorporated into 10 CFR 20 by 46 FR 18525. This requires the preparation and submittal of a Special Report whenever the calculated doses from releases of radioactivity and from radiation from uranium fuel cycle sources exceed 25 mrem to the whole body or any organ, except the thyroid (which shall be limited to less than or equal to 75 mrem). If the dose to any MEMBER OF THE PUBLIC is estimated to exceed the requirements of 40 CFR 190, the Special Report with a request for a variance (provided the release conditions resulting in violation of 40 CFR 190 have not already been corrected), in accordance with the provisions of 40 CFR 190.11 and 10 CFR 20.405c, is considered to be a timely request and fulfills the requirements of 40 CFR 190 until NRC staff action is completed. The variance only relates to the limits of 40 CFR 190, and does not apply in any way to the other requirements for dose limitation of 10 CFR 20, as addressed in 3.1.1 and 3.2.1. An individual is not considered a MEMBER OF THE PUBLIC during any period in which the individual is engaged in carrying out any operation that is part of the nuclear fuel cycle.

B 3.5 RADIOLOGICAL ENVIRONMENTAL MONITORING

B 3.5.1 Monitoring Program

BASES

The Radiological Environmental Monitoring Program provides representative measurements of radiation and of radioactive materials in those exposure pathways and for those radionuclides that lead to the highest potential radiation exposure of MEMBERS OF THE PUBLIC resulting from the plant operation. This monitoring program implements Section IV.B.2 of Appendix I to 10 CFR 50 and thereby supplements the Radiological Effluent Monitoring Program by verifying that the measurable concentrations of radioactive materials and levels of radiation are not higher than expected on the basis of the effluent measurements and the modeling of the environmental exposure pathways. Guidance for this monitoring program is provided by the Radiological Assessment Branch Technical Position on Environmental Monitoring, Revision 1, November 1979. Program changes may be initiated based on operational experience

The required detection capabilities for environmental sample analyses are tabulated in terms of the lower limits of detection (LLDs). The LLDs required by Table D 3.5.1-3 are considered optimum for routine environmental measurements in industrial laboratories. It should be recognized that the LLD is defined as a before-the-fact limit representing the capability of a measurement system and not as an after-the-fact limit for a particular measurement.

Detailed discussion of the LLD, and other detection limits, can be found in L. A Currie, "Lower Limit of Detection: Definition and Elaboration of a Proposed Position for Radiological Effluent and Environmental Measurements," NUREG/CR-4007 (September 1984), and in the HASL Procedures Manual, HASL-300 (revised annually).

B 3 5 RADIOLOGICAL ENVIRONMENTAL MONITORING

B 3 5.2 Land Use Census

BASES

This is provided to ensure that changes in the use of areas at or beyond the SITE BOUNDARY are identified and that modifications to the Radiological Environmental Monitoring Program are made if required by the results of this census. The best information, such as from a door-to-door survey, from an aerial survey, or from consulting with local agricultural authorities, shall be used. This census satisfies the requirements of Section IV B.3 of Appendix I to 10 CFR 50. Restricting the census to gardens of greater than 500 square feet provides assurance that significant exposure pathways via leafy vegetables will be identified and monitored since a garden of this size is the minimum required to produce the quantity (26 kg/year) of leafy vegetables assumed in RG 1.109 for consumption by a child To determine this minimum garden size, the following assumptions were made: (1) 20% of the garden was used for growing broad leaf vegetation (i.e., similar to lettuce and cabbage) and (2) the vegetation yield was 2 kg/m^2.

A MILK SAMPLING LOCATION, as defined in Section 1.0, requires that at least 10 milking cows are present at a designated milk sample location It has been found from past experience, and as a result of conferring with local farmers, that a minimum of 10 milking cows is necessary to guarantee an adequate supply of milk twice a month for analytical purposes Locations with fewer than 10 milking cows are usually utilized for breeding purposes, eliminating a stable supply of milk for samples as a result of suckling calves and periods when the adult animals are dry. Elevated releases are defined in RG 1.111, Revision 1, July 1977.

B 3.5 RADIOLOGICAL ENVIRONMENTAL MONITORING

B 3.5.3 Interlaboratory Comparison Program

BASES

The requirement for participation in an approved Interlaboratory Comparison Program is provided to ensure that independent checks on the precision and accuracy of the measurements of radioactive materials in environmental sample matrices are performed as part of the quality assurance program for environmental monitoring in order to demonstrate that the results are valid for the purposes of Section IV.B 2 of Appendix I to 10 CFR 50

PART I - RADIOLOGICAL EFFLUENT CONTROLS

SECTION 4.0 ADMINISTRATIVE CONTROLS

4.0 ADMINISTRATIVE CONTROLS

The ODCM Specifications are subject to Technical Specifications Section 5.5.4, "Radioactive Effluent Controls Program," Section 5.6.2, "Annual Radiological Environmental Operating Report," Section 5.6.3, "Radioactive Effluent Release Report," and Section 5.5.1, "Offsite Dose Calculation Manual."

D 4.1 REPORTING REQUIREMENTS

D 4.1.1 Special Reports

Special Reports shall be submitted in accordance with 10 CFR 50.4 within the time period specified for each report.

D 4.1 2 Annual Radiological Environmental Operating Reports

In addition to the requirements of Technical Specification 5.6.2 the report shall also include the following:

A summary description of the Radiological Environmental Monitoring Program; at least two legible maps, one shall cover stations near the SITE BOUNDARY and the second shall include the more distant stations, covering all sample locations keyed to a table giving distances and directions from the centerline of one reactor; the results of license participation in the Interlaboratory Comparison Program, required by Control D 3.5.3; discussion of all deviations from the Sampling Schedule of Table D 3.5 1-1; and discussion of all analysis in which the LLD required by Table D 3.5.1-3 was not achievable.

D 4.1.3 Radioactive Effluent Release Report

The Radiological Effluent Release Report described in Technical Specification section 5.6.3 shall include

- An annual summary of hourly meteorological data collected over the previous year. This annual summary may be either in the form of an hour-by-hour listing on magnetic tape of wind speed, wind direction, atmospheric stability, and precipitation (if measured), or in the form of joint frequency distribution of wind speed, wind direction, and atmospheric stability. In lieu of submission with the Radiological Effluent Release Report, the licensee has the option of retaining this summary of required meteorological data on site in a file that shall be provided to the NRC upon request.
- An assessment of radiation doses from the radioactive liquid and gaseous effluents released from the unit during the previous year.

(Continued)

D 4.1.3 Radioactive Effluent Release Report (continued)

- As assessment of radiation doses from the radioactive liquid and gaseous effluents to MEMBERS OF THE PUBLIC from their activities inside the SITE BOUNDARY during the report period All assumptions used in making these assessments, i e., specific activity, exposure time, and location shall be included in these reports. The assessment of radiation doses shall be performed in accordance with the methodology and parameters in Part II.
- As assessment of doses to the likely most exposed MEMBER OF THE PUBLIC from reactor releases and other nearby uranium fuel cycle sources, including doses from primary effluent pathways and direct radiation, for the previous calendar year to show conformance with 40 CFR 190, "Environmental Radiation Protection Standards for Nuclear Power Operation." Acceptable methods for calculating the dose contribution from liquid and gaseous effluents are given in Part II.
- A list of unplanned releases from the site to UNRESTRICTED AREAS of radioactive materials in gaseous and liquid effluents made during the reporting period.
- Any changes made during the reporting period to the PROCESS CONTROL PROGRAM and to the OFFSITE DOSE CALCULATION MANUAL (ODCM).
- Any major changes to liquid, gaseous, or solid radwaste treatment systems pursuant to D 4.2.
- A listing of new locations for dose calculations and/or environmental monitoring identified by the land use census pursuant to Control D 3.5.2.
- An explanation of why the inoperability of liquid or gaseous effluent monitoring instrumentation was not corrected within the time specified in Controls D 3.3.1 and D 3.3.2.
- Description of events leading to liquid holdup tanks exceeding the limits of TRM 3.7.7.

D 4.2 MAJOR CHANGES TO LIQUID, GASEOUS, AND SOLID RADWASTE TREATMENT SYSTEM

----------NOTE----------
Licensees may choose to submit this information as part of the annual FSAR update
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Licensee-initiated major changes to the radwaste treatment systems (liquid, gaseous, and solid):

a Shall be reported to the Commission in the Radioactive Effluent Release report for the period in which the evaluation was reviewed by the SORC. The discussion of each change shall contain

1. A summary of the evaluation that led to the determination that the change could be made in accordance with 10 CFR 50.59.

2. Sufficient detailed information to totally support the reason for the change without benefit of additional or supplemental information,

3. A detailed description of the equipment, components, and processes involved and the interfaces with other plant systems;

4. An evaluation of the change, which shows the predicted releases of radioactive materials in liquid and gaseous effluents and/or quantity of solid waste that differ from those previously predicted in the license application and amendments thereto;

5. An evaluation of the change, which shows the expected maximum exposures to a MEMBER OF THE PUBLIC in the UNRESTRICTED AREA and to the general population that differ from those previously estimated in the license application and amendments thereto,

6. A comparison of the predicted releases of radioactive materials, in liquid and gaseous effluents and in solid waste, to the actual releases for the period that precedes the time when the change is to be made;

7. An estimate of the exposure to plant operating personnel as a result of the change; and

(Continued)

D 4.2 MAJOR CHANGES TO LIQUID, GASEOUS, AND SOLID RADWASTE TREATMENT SYSTEM (continued)

8. Documentation of the fact that the change was reviewed and found acceptable by the SORC.

b. Shall become effective upon review and acceptance by the SORC