ENCLOSURE (1)

CALVERT CLIFFS NUCLEAR POWER PLANT

RADIOACTIVE EFFLUENT RELEASE REPORT

AND DOSE REPORT

Facility - Calvert Cliffs Nuclear Power Plant

Licensee – Calvert Cliffs Nuclear Power Plant, Inc.

I. REGULATORY LIMITS

A. Fission and Activation Gases

1. The instantaneous release rate of noble gases in gaseous effluents shall not result in a site boundary dose rate greater than 500 mRem/year to the whole body or greater than 3000 mRem/year to the skin [Offsite Dose Calculation Manual (ODCM) 3.11.2.1].

2. Gaseous Radwaste Treatment System and the Ventilation Exhaust Treatment System shall be used to reduce gaseous emissions when the calculated gamma-air dose due to gaseous effluents exceeds 1.20 mRad or the calculated beta-air dose due to gaseous effluents exceeds 2.40 mRad at the site boundary in a 92 day period (ODCM 3.11.2.4).

3. The air dose at the site boundary due to noble gases released in gaseous effluents shall not exceed (ODCM 3.11.2.2):

   10 mRad/qtr, gamma-air
   20 mRad/qtr, beta-air
   20 mRad/year, gamma-air
   40 mRad/year, beta-air

4. All of the above parameters are calculated according to the methodology specified in the ODCM.

B. Iodines and Particulates with Half Lives Greater than Eight Days

1. The instantaneous release rate of iodines and particulates in gaseous effluents shall not result in a site boundary dose-rate in excess of 1500 mRem/year to any organ (ODCM 3.11.2.1).

2. The Gaseous Radwaste Treatment System and the Ventilation Exhaust Treatment System shall be used to reduce radioactive materials in gaseous effluents when calculated doses exceed 1.8 mRem to any organ in a 92 day period at or beyond the site boundary (ODCM 3.11.2.4).

3. The dose to a member of the public at or beyond the site boundary from iodine-131 and particulates with half lives greater than eight days in gaseous effluents shall not exceed (ODCM 3.11.2.3):

   15 mRem/qtr, any organ
   30 mRem/year, any organ
   less than 0.1% of the above limits as a result of burning contaminated oil.

4. All of the above parameters are calculated according to the methodology specified in the ODCM.

C. Liquid Effluents

1. The concentrations of radionuclides in liquid effluents from the plant shall not exceed the values specified in 10 CFR Part 20, Appendix B, Table II, Column 2 for unrestricted areas (ODCM 3.11.1.1).

2. The liquid radwaste treatment system shall be used to reduce the concentration of radionuclides in liquid effluents from the plant when the calculated dose to unrestricted areas exceeds 0.36 mRem to the whole body, or 1.20 mRem to any organ in a 92 day period (ODCM 3.11.1.3).

3. The dose to a member of the public in unrestricted areas shall not exceed (ODCM 3.11.1.2):

   3 mRem/qtr, total body
   10 mRem/qtr, any organ
   6 mRem/year, total body
   20 mRem/year, any organ

4. All of the liquid dose parameters are calculated according to the methodology specified in the ODCM.

II. MAXIMUM PERMISSIBLE CONCENTRATIONS

A. Fission and Activation Gases

Prior to the batch release of gaseous effluents, a sample of the source is collected and analyzed by gamma spectroscopy for the principal gamma emitting radionuclides. The identified radionuclide concentrations are evaluated and an acceptable release rate is determined to ensure that the dose rate limits of ODCM 3.11.2.1 are not exceeded.

B. Iodines and Particulates with Half Lives Greater than Eight Days

Compliance with the dose rate limitations for iodines and particulates is demonstrated by analysis of the charcoal and particulate samples of the station main vents. The charcoal samples are analyzed by gamma spectroscopy for quantification of radioiodines. The particulate samples are analyzed by gamma spectroscopy for quantification of particulate radioactive material. All of the above parameters are calculated according to the methodology specified in the ODCM.

C. Liquid Effluents

The Maximum Permissible Concentrations (MPCs) used for radioactive materials released in liquid effluents are in accordance with ODCM 3.11.1.1 and the values from 10 CFR Part 20, Appendix B, Table II, Column 2 including applicable table notes. In all cases, the more restrictive (lower) MPC found for each radionuclide is used regardless of solubility.

III. TECHNICAL SPECIFICATION REPORTING REQUIREMENTS

A. Calvert Cliffs Nuclear Power Plant (CCNPP), Technical Specification 5.6.3

1. 2001 Dose Assessment Summary

	Actual Value	Percent of ODCM limit	ODCM Limit
Liquid Waste:			
Maximum Annual Organ Dose (mRem) [1]	0.43	2.2%	20
Maximum Whole Body Dose (mRem) [1]	0.005	0.08%	6
Gaseous Waste:			
Noble Gases:			
Maximum Quarterly Gamma Air Dose (mRad)	0.001	0.01%	10
Maximum Quarterly Beta Air Dose (mRad)	0.004	0.02%	20
Iodines and Particulates:			
Maximum Annual Organ Dose (mRem) [2]	0.035	0.12%	30

[1] The controlling pathway was the fish and shellfish pathway with adult as the controlling age group and the gastrointestinal tract representing the organ with the highest calculated dose during the calendar year of 2001.

[2] The controlling pathway was the child-infant-thyroid pathway representing the organ with the highest calculated dose during the calendar year of 2001. There is currently no known milk pathway in existence.

2. 40 CFR 190 Total Dose Compliance

Based upon the calendar year 2001 and the ODCM calculations, the maximum exposed individual would receive less than 1% of the allowable dose. During the calendar year 2001, there were no on-site sources of direct radiation that would have contributed to a significant or measurable off-site dose. The direct radiation contribution is measured by both on-site and off-site thermoluminescent dosimeters (TLDs). The results of these measurements did not indicate any statistical increase in the off-site radiation doses attributable to on-site sources. Therefore, no increase in the calculated offsite dose is attributed to the direct exposure from on-site sources. A more detailed evaluation will be reported in the Annual Radiological Environmental Operating Report.

3. Solid Waste Report Requirements

During 2001, the types of radioactive solid waste shipped from Calvert Cliffs were dry compressible waste, filters, and dewatered resins which were shipped in High Integrity Containers (HICs) within NRC approved casks, Sealand containers, and steel boxes. Appendix A provides a detailed breakdown of the waste shipments for 2001 per the categories specified in Technical Specification 5.6.3. At CCNPP, methods of waste and materials segregation are used to reduce the volume of solid waste shipped offsite for processing, volume reduction and burial.

4. Offsite Dose Calculation Manual (ODCM) and Process Control Program (PCP) Changes

The ODCM was revised on May 14, 2001, a copy is attached. There were no changes to the PCP.

B. Radioactive Effluent Monitoring Instrumentation

One effluent pathway was unmonitored for more than 30 consecutive days in 2001. The radiation monitor designated 0-RE-2201, Liquid Radwaste Discharge Radiation Monitor, was out of service from 11-May-2001 until 5-August-2001. A large amount of activity was introduced into the liquid radwaste system in April 2001. To reduce the activity, the liquid was recirculated through filters. This flow path included the radiation monitor's sample chamber. Filtration continued for an extended period of time. Although the activity in the radwaste system was reduced significantly, the radiation monitor became contaminated in May, causing elevated background on the radiation monitor. Due to the high "background" on the radiation monitor, it was taken out-of-service. Because filtering radwaste tanks continued, the radiation monitor could not be removed from service and decontaminated. Once the radiation monitor could be decontaminated, maintenance was performed to reduce background contamination. The internal surface of the radiation monitor's sample chamber was machined to remove fixed contamination. Following machining, an epoxy coating was applied to the internal surface to reduce the possibility of recontamination.

C. Independent Spent Fuel Storage Installation (ISFSI), ISFSI Technical Specification 6.1

No (0) casks of spent fuel were transferred to the ISFSI during 2001. No quantity of radionuclides was released to the environment during the ISFSI operation in 2001. Additional information regarding the ISFSI radiation-monitoring program is included in the Annual Radiological Environmental Operation Report.

IV. AVERAGE ENERGY

Not Applicable.

V. MEASUREMENTS AND APPROXIMATIONS AND TOTAL RADIOACTIVITY

A. Fission and Activation Gases

1. Batch Releases

Prior to each batch release of gas from a pressurized waste gas decay tank or containment, a sample is collected and analyzed by gamma spectroscopy using a Germanium (Ge) detector for the principal gamma emitting noble gas radionuclides. The total activity released is based on the pressure/volume relationship (gas laws).

2. Continuous Releases

A gas sample is collected at least weekly from the main vents and analyzed by gamma spectroscopy using a Ge detector for the principal gamma emitting noble gas radionuclides. The total activity released for the week is based on the total sample activity decay corrected to the sample time multiplied by the main vent flow for the week.

Prior to and after each containment purge, a gas sample is collected and analyzed by gamma spectroscopy using a Ge detector for the principal gamma emitting noble gas radionuclides. The total activity released is based on containment volume and purge rate.

A monthly composite sample is collected from the main vents and analyzed by liquid scintillation for tritium. The total tritium release for the month is based on the sample analysis and the main vent flow.

B. Iodine and Particulates

1. Batch Releases

The total activities of radioiodines and particulates released from pressurized waste gas decay tanks, containment purges, and containment vents are accounted for by the continuous samplers on the main vent.

2. Continuous Releases

During the release of gas from the main vents, samples of iodines and particulates are collected using a charcoal and particulate filter, respectively. The filters are removed weekly and are analyzed by gamma spectroscopy using a Ge detector for significant gamma emitting radionuclides. The total activity released for the week is based on the total sample activity decay corrected to the midpoint of the sample period multiplied by the main vent flow for the week. The weekly particulate filters are then composited to form monthly and quarterly composites for the gross alpha and strontium-89 and strontium-90 analyses.

C. Liquid Effluents

1. Batch Releases

Prior to the release of liquid from a waste tank, a sample is collected and analyzed by gamma spectroscopy for the principal gamma emitting radionuclides. To demonstrate compliance with the requirements addressed in Section I.C.1 above, the measured radionuclide concentrations are compared with the allowable MPCs; dilution in the discharge conduit is considered, and an allowable release rate is verified.

The total activity released in each batch is determined by multiplying the volume released by the concentration of each radionuclide. The actual volume released is based on the difference in tank levels prior to and after the release. A proportional composite sample is also withdrawn from each release, this is used in turn to prepare monthly tritium and quarterly gross alpha, iron-55, strontium-89, and strontium-90 samples for analysis.

2. Continuous Releases

To account for activity from continuous releases, a sample is collected and analyzed by gamma spectroscopy for the principal gamma emitting radionuclides. The measured radionuclide concentrations are compared with the allowable MPC concentrations in the discharge conduit, and an allowable release rate is verified.

When steam generator blowdown is discharged to the circulating water conduits, it is sampled at a minimum of three times per week and these samples are used in turn to prepare a weekly blowdown composite sample based on each day's blowdown. The weekly composite sample is analyzed by gamma spectroscopy for the principal gamma emitting radionuclides. These results are multiplied by the actual quantity of blowdown to determine the total activity released. The weekly composite is also used to prepare monthly composites for tritium analysis.

During periods of primary-to-secondary leakage, the secondary system becomes contaminated and subsequently, contaminates the Turbine Building sumps. The low-level activity water (predominantly tritium) contained in the Turbine Building sumps is (from 1-Jan-01 thru 14-May-01) released directly to the Chesapeake Bay or is discharged to the circulating water conduits (after 14-May-01). This water is sampled weekly and composited. The composite sample is analyzed at least monthly for tritium and principal gamma emitting radionuclides. The results are multiplied by the actual quantity of liquid released to determine the total activity released.

D. Estimation of Total Error

Total error for all releases was estimated using, as a minimum, the random counting error associated with typical releases. In addition to this random error, the following systematic errors were also examined:

1. Liquid
   a. Error in volume of liquid released prior to dilution during batch releases.
   b. Error in volume of liquid released via steam generator blowdown.
   c. Error in amount of dilution water used during the reporting period.

2. Gases
   a. Error in main vent release flow.
   b. Error in sample flow rate.
   c. Error in containment purge release flow.
   d. Error in gas decay tank pressure.

Where errors could be estimated they are usually considered additive.

VI. BATCH RELEASES

	2001			
	1ST QUARTER	2ND QUARTER	3RD QUARTER	4TH QUARTER
A. Liquid				
1. Number of batch releases	1.60E+01	2.00E+01	1.20E+01	1.20E+01
2. Total time period for batch releases (min)	7.43E+03	5.73E+03	4.63E+03	4.96E+03
3. Maximum time period for a batch release (min)	9.90E+02	5.75E+02	7.74E+02	7.20E+02
4. Average time period for batch releases (min)	4.65E+02	2.87E+02	3.86E+02	4.13E+02
5. Minimum time period for a batch release (min)	3.00E+01	1.80E+01	2.10E+01	2.80E+01
6. Average stream flow during periods of effluent into a flowing stream (liters/min of dilution water)	4.66E+06	4.65E+06	4.60E+06	4.66E+06
B. Gaseous				
1. Number of batch releases	5.00E+00	9.00E+00	2.00E+00	1.00E+00
2. Total time period for batch releases (min)	2.46E+02	2.27E+03	1.68E+02	1.10E+02
3. Maximum time period for a batch release (min)	1.39E+02	1.48E+03	1.20E+02	1.10E+02
4. Average time period for batch release (min)	4.91E+01	2.52E+02	8.40E+01	1.10E+02
5. Minimum time period for a batch release (min)	5.01E-01	2.21E+01	4.80E+01	1.10E+02

VII. ABNORMAL RELEASES

	2001			
	1ST QUARTER	2ND QUARTER	3RD QUARTER	4TH QUARTER
A. Liquid				
1. Number of releases	- 0 -	- 0 -	- 0 -	- 0 -
2. Total activity released (Curies)	- 0 -	- 0 -	- 0 -	- 0 -
B. Gaseous				
1. Number of releases	- 0 -	- 0 -	- 0 -	- 0 -
2. Total activity releases (Curies)	- 0 -	- 0 -	- 0 -	- 0 -

TABLE 1A - REG GUIDE 1.21
GASEOUS EFFLUENTS - SUMMATION OF ALL RELEASES

		UNITS	1ST QUARTER	2ND QUARTER	EST. TOTAL ERROR, %
A.	**FISSION AND ACTIVATION GASES**				
1.	Total Release	Ci	4.90E+01	1.01E+01	±1.20E+01
2.	Average release rate for period	µCi/sec	6.15E+00	1.28E+00	
3.	Percent of Tech. Spec. limit (1)	%	7.56E-04	1.34E-04	
4.	Percent of Tech. Spec. limit (2)	%	4.12E-04	1.20E-04	
5.	Percent of Tech. Spec. limit (3)	%	1.12E-02	1.92E-03	
6.	Percent of Tech. Spec. limit (4)	%	5.61E-03	9.59E-04	
7.	Percent of Tech. Spec. limit (5)	%	2.17E-02	5.73E-03	
8.	Percent of Tech. Spec. limit (6)	%	1.08E-02	2.87E-03	
B.	**IODINES**				
1.	Total Iodine - 131	Ci	5.68E-04	4.81E-04	±6.50E+00
2.	Average release rate for period	µCi/sec	7.12E-05	6.09E-05	
3.	Percent of Tech. Spec. limit (7)	%	1.69E-04	1.45E-04	
4.	Percent of Tech. Spec. limit (8)	%	1.09E-01	9.22E-02	
5.	Percent of Tech. Spec. limit (9)	%	5.44E-02	4.61E-02	
C.	**PARTICULATES**				
1.	Particulates with half lives greater than 8 days	Ci	(10)	(10)	N/A
2.	Average release rate for period	µCi/sec	(10)	(10)	
3.	Percent of Tech. Spec. limit (7)	%	(10)	(10)	
4.	Percent of Tech. Spec. limit (8)	%	(10)	(10)	
5.	Percent of Tech. Spec. limit (9)	%	(10)	(10)	
6.	Gross alpha radioactivity	Ci	(10)	(10)	N/A

		UNITS	3RD QUARTER	4TH QUARTER	EST. TOTAL ERROR, %
A.	**FISSION AND ACTIVATION GASES**				
1.	Total Release	Ci	8.91E+00	4.59E+00	±1.20E+01
2.	Average release rate for period	µCi/sec	1.14E+00	5.84E-01	
3.	Percent of Tech. Spec. limit (1)	%	1.57E-04	6.42E-05	
4.	Percent of Tech. Spec. limit (2)	%	9.28E-05	4.70E-05	
5.	Percent of Tech. Spec. limit (3)	%	2.23E-03	9.22E-04	
6.	Percent of Tech. Spec. limit (4)	%	1.12E-03	4.61E-04	
7.	Percent of Tech. Spec. limit (5)	%	4.39E-03	2.34E-03	
8.	Percent of Tech. Spec. limit (6)	%	2.19E-03	1.17E-03	
B.	**IODINES**				
1.	Total Iodine - 131	Ci	7.68E-05	9.45E-05	±6.50E+00
2.	Average release rate for period	µCi/sec	9.78E-06	1.20E-05	
3.	Percent of Tech. Spec. limit (7)	%	2.32E-05	2.86E-05	
4.	Percent of Tech. Spec. limit (8)	%	1.47E-02	1.81E-02	
5.	Percent of Tech. Spec. limit (9)	%	7.35E-03	9.05E-03	
C.	**PARTICULATES**				
1.	Particulates with half lives greater than 8 days	Ci	(10)	(10)	N/A
2.	Average release rate for period	µCi/sec	(10)	(10)	
3.	Percent of Tech. Spec. limit (7)	%	(10)	(10)	
4.	Percent of Tech. Spec. limit (8)	%	(10)	(10)	
5.	Percent of Tech. Spec. limit (9)	%	(10)	(10)	
6.	Gross alpha radioactivity	Ci	(10)	(10)	N/A

TABLE 1A - REG GUIDE 1.21
GASEOUS EFFLUENTS - SUMMATION OF ALL RELEASES

D. TRITIUM	UNITS	1ST QUARTER	2ND QUARTER	EST. TOTAL ERROR, %
1. Total Release	Ci	2.59E+00	3.57E+00	±1.32E+01
2. Average release rate for period	μCi/sec	3.24E-01	4.52E-01	

D. TRITIUM	UNITS	3RD QUARTER	4TH QUARTER	EST. TOTAL ERROR, %
1. Total Release	Ci	3.37E+00	1.66E+00	±1.32E+01
2. Average release rate for period	μCi/sec	4.29E-01	2.12E-01	

NOTES TO TABLE 1A

(1) Percent of I.A.1 whole body dose rate limit (500 mRem/year)

(2) Percent of I.A.1 skin dose rate limit (3000 mRem/year)

(3) Percent of I.A.3 quarterly gamma-air dose limit (10 mRad)

(4) Percent of I.A.3 yearly gamma-air dose limit (20 mRad)

(5) Percent of I.A.3 quarterly beta-air dose limit (20 mRad)

(6) Percent of I.A.3 yearly beta-air dose limit (40 mRad)

(7) Percent of I.B.1 organ dose rate limit (1500 mRem/year)

(8) Percent of I.B.3 quarterly organ dose limit (15 mRem)

(9) Percent of I.B.3 yearly organ dose limit (30 mRem)

(10) Less than minimum detectable activity which meets the lower limit of detection (LLD) requirements of ODCM Surveillance Requirement 4.11.2.1.2.

TABLE 1C - REG GUIDE 1.21
GASEOUS EFFLUENTS - GROUND LEVEL RELEASES

		UNITS	CONTINUOUS MODE		BATCH MODE	
			1ST QUARTER	2ND QUARTER	1ST QUARTER	2ND QUARTER
1.	**FISSION AND ACTIVATION GASES**					
Argon	-41	Ci	(2)	(2)	9.52E-05	(2)
Krypton	-85	Ci	7.62E+00	(2)	2.06E+00	5.21E+00
Krypton	-85m	Ci	(2)	(2)	3.37E-04	(2)
Krypton	-87	Ci	(2)	(2)	2.27E-04	(2)
Krypton	-88	Ci	(2)	(2)	5.44E-04	(2)
Xenon	-131m	Ci	1.73E-01	(2)	1.26E-03	3.54E-02
Xenon	-133	Ci	3.77E+01	2.92E+00	5.15E-02	6.51E-01
Xenon	-133m	Ci	8.16E-02	6.49E-01	2.57E-04	4.63E-03
Xenon	-135	Ci	1.31E+00	6.12E-01	5.40E-03	1.21E-03
Xenon	-135m	Ci	(2)	(2)	7.12E-04	(2)
Xenon	-138	Ci	(2)	(2)	1.33E-04	(2)
Total for Period		Ci	4.69E+01	4.19E+00	2.12E+00	5.91E+00
2.	**HALOGENS**					
Iodine	-131	Ci	5.68E-04	4.81E-04	(1)	(1)
Iodine	-133	Ci	1.73E-03	9.55E-04	(1)	(1)
Bromine	-82	Ci	(2)	(2)	(1)	(1)
Total for Period		Ci	2.29E-03	1.44E-03	(1)	(1)

		UNITS	CONTINUOUS MODE		BATCH MODE	
			3RD QUARTER	4TH QUARTER	3RD QUARTER	4TH QUARTER
1.	**FISSION AND ACTIVATION GASES**					
Argon	-41	Ci	(2)	(2)	(2)	(2)
Krypton	-85	Ci	(2)	(2)	2.63E+00	1.81E+00
Krypton	-85m	Ci	1.10E-01	(2)	8.20E-07	(2)
Krypton	-87	Ci	(2)	(2)	(2)	(2)
Krypton	-88	Ci	(2)	(2)	(2)	(2)
Xenon	-131m	Ci	(2)	(2)	(2)	(2)
Xenon	-133	Ci	5.58E+00	2.58E+00	5.12E-02	(2)
Xenon	-133m	Ci	(2)	(2)	2.70E-03	(2)
Xenon	-135	Ci	5.37E-01	1.97E-01	6.34E-04	(2)
Xenon	-135m	Ci	(2)	(2)	(2)	(2)
Xenon	-138	Ci	(2)	(2)	(2)	(2)
Total for Period		Ci	6.22E+00	2.78E+00	2.69E+00	1.81E+00
2.	**HALOGENS**					
Iodine	-131	Ci	7.68E-05	9.45E-05	(1)	(1)
Iodine	-133	Ci	7.60E-04	2.36E-04	(1)	(1)
Bromine	-82	Ci	(2)	(2)	(1)	(1)
Total For Period		Ci	8.37E-04	3.31E-04	(1)	(1)

TABLE 1C - REG GUIDE 1.21
GASEOUS EFFLUENTS - GROUND LEVEL RELEASES

	UNITS	CONTINUOUS MODE		BATCH MODE	
		1ST QUARTER	2ND QUARTER	1ST QUARTER	2ND QUARTER
3. PARTICULATES					
Manganese -54	Ci	(2)	(2)	(1)	(1)
Iron -59	Ci	(2)	(2)	(1)	(1)
Cobalt -58	Ci	(2)	(2)	(1)	(1)
Cobalt -60	Ci	(2)	(2)	(1)	(1)
Zinc -65	Ci	(2)	(2)	(1)	(1)
Strontium -89	Ci	(2)	(2)	(1)	(1)
Strontium -90	Ci	(2)	(2)	(1)	(1)
Molybdenum -99	Ci	(2)	(2)	(1)	(1)
Cesium -134	Ci	(2)	(2)	(1)	(1)
Cesium -137	Ci	(2)	(2)	(1)	(1)
Cerium -141	Ci	(2)	(2)	(1)	(1)
Cerium -144	Ci	(2)	(2)	(1)	(1)
Gross Alpha Radioactivity	Ci	(2)	(2)	(1)	(1)
Total For Period	Ci	(2)	(2)	(1)	(1)

	UNITS	CONTINUOUS MODE		BATCH MODE	
		3RD QUARTER	4TH QUARTER	3RD QUARTER	4TH QUARTER
3. PARTICULATES					
Manganese -54	Ci	(2)	(2)	(1)	(1)
Iron -59	Ci	(2)	(2)	(1)	(1)
Cobalt -58	Ci	(2)	(2)	(1)	(1)
Cobalt -60	Ci	(2)	(2)	(1)	(1)
Zinc -65	Ci	(2)	(2)	(1)	(1)
Strontium -89	Ci	(2)	(2)	(1)	(1)
Strontium -90	Ci	(2)	(2)	(1)	(1)
Molybdenum -99	Ci	(2)	(2)	(1)	(1)
Cesium -134	Ci	(2)	(2)	(1)	(1)
Cesium -137	Ci	(2)	(2)	(1)	(1)
Cerium -141	Ci	(2)	(2)	(1)	(1)
Cerium -144	Ci	(2)	(2)	(1)	(1)
Gross Alpha Radioactivity	Ci	(2)	(2)	(1)	(1)
Total For Period	Ci	(2)	(2)	(1)	(1)

NOTES TO TABLE 1C

(1) Iodines and particulates in batch releases are accounted for with the main vent continuous samplers when the release is made through the plant main vent.

(2) Less than minimum detectable activity which meets the LLD requirements of ODCM Surveillance Requirement 4.11.2.1.2.

TABLE 2A - REG GUIDE 1.21
LIQUID EFFLUENTS - SUMMATION OF ALL RELEASES

		UNITS	1ST QUARTER	2ND QUARTER	EST. TOTAL ERROR, %
A.	**FISSION AND ACTIVATION PRODUCTS**				
1.	Total Release (not including tritium, gases, alpha)	Ci	3.21E-02	4.30E-01	±1.03E+01
2.	Average diluted concentration during period	µCi/ml	8.64E-10	1.76E-08	
3.	Percent of Tech. Spec. limit (1)	%	2.05E-01	2.42E+00	
4.	Percent of Tech. Spec. limit (2)	%	1.03E-01	1.21E+00	
5.	Percent of Tech. Spec. limit (3)	%	5.39E-02	1.36E-01	
6.	Percent of Tech. Spec. limit (4)	%	2.70E-02	6.81E-02	
B.	**TRITIUM**				
1.	Total Release	Ci	4.41E+02	4.28E+02	±1.03E+01
2.	Average diluted concentration during period	µCi/ml	4.54E-07	4.91E-07	
3.	Percent of applicable limit (5)	%	1.51E-02	1.64E-02	
C.	**DISSOLVED AND ENTRAINED GASES**				
1.	Total Release	Ci	2.93E-02	2.47E-02	±1.03E+01
2.	Average diluted concentration during period	µCi/ml	9.10E-10	1.31E-09	

		UNITS	3RD QUARTER	4TH QUARTER	EST. TOTAL ERROR, %
A.	**FISSION AND ACTIVATION PRODUCTS**				
1.	Total Release (not including tritium, gases, alpha)	Ci	1.09E-01	1.06E-01	±1.03E+01
2.	Average diluted concentration during period	µCi/ml	5.14E-09	4.70E-10	
3.	Percent of Tech. Spec. limit (1)	%	1.04E+00	5.96E-01	
4.	Percent of Tech. Spec. limit (2)	%	5.20E-01	2.98E-01	
5.	Percent of Tech. Spec. limit (3)	%	2.49E-02	6.84E-02	
6.	Percent of Tech. Spec. limit (4)	%	1.24E-02	3.42E-02	
B.	**TRITIUM**				
1.	Total Release	Ci	1.87E+02	3.66E+02	±1.03E+01
2.	Average diluted concentration during period	µCi/ml	2.26E-07	2.93E-07	
3.	Percent of applicable limit (5)	%	7.53E-03	9.78E-03	
C.	**DISSOLVED AND ENTRAINED GASES**				
1.	Total Release	Ci	2.20E-03	7.23E-03	±1.03E+01
2.	Average diluted concentration during period	µCi/ml	1.07E-10	3.16E-10	

TABLE 2A - REG GUIDE 1.21
LIQUID EFFLUENTS - SUMMATION OF ALL RELEASES

	UNITS	1ST QUARTER	2ND QUARTER	EST. TOTAL ERROR, %
D. GROSS ALPHA RADIOACTIVITY				
1. Total Release	Ci	(6)	(6)	N/A
E. VOLUME OF WASTE RELEASED (prior to dilution)	liters	3.43E+07	5.65E+07	±1.30E+00
F. VOLUME OF DILUTION WATER USED DURING PERIOD (7)	liters	7.46E+11	5.55E+11	±1.64E+01

	UNITS	3RD QUARTER	4TH QUARTER	EST. TOTAL ERROR, %
D. GROSS ALPHA RADIOACTIVITY				
1. Total Release	Ci	(6)	4.69E-05	±5.40E+01
E. VOLUME OF WASTE RELEASED (prior to dilution)	Liters	5.64E+07	6.82E+07	±1.30E+00
F. VOLUME OF DILUTION WATER USED DURING PERIOD (7)	Liters	8.20E+11	1.19E+12	±1.64E+01

NOTES TO TABLE 2A

(1) Percent of I.C.3 Quarterly Organ Dose Limit (10 mRem) to maximum exposed organ

(2) Percent of I.C.3 Yearly Organ Dose Limit (20 mRem) to maximum exposed organ

(3) Percent of I.C.3 Quarterly Whole Body Dose Limit (3 mRem)

(4) Percent of I.C.3 Yearly Whole Body Dose Limit (6 mRem)

(5) Limit used is 3×10^{-3} μCi/ml

(6) Less than minimum detectable activity which meets the LLD requirements of ODCM Surveillance Requirement 4.11.1.1.1.

(7) Volume only includes dilution water during periods of radioactive effluent discharges.

TABLE 2B - REG GUIDE 1.21
LIQUID EFFLUENTS

NUCLIDES RELEASED	Units	CONTINUOUS MODE		BATCH MODE	
		1ST QUARTER	2ND QUARTER	1ST QUARTER	2ND QUARTER
Beryllium – 7	Ci	(1)	(1)	(1)	(1)
Sodium – 24	Ci	(1)	(1)	(1)	4.66E-03
Chromium - 51	Ci	(1)	(1)	9.54E-04	4.98E-02
Manganese - 54	Ci	(1)	(1)	2.75E-04	2.64E-03
Iron – 55	Ci	(2)	(2)	1.26E-02	2.21E-02
Cobalt – 57	Ci	(1)	(1)	(1)	8.02E-04
Cobalt – 58	Ci	(1)	(1)	5.58E-03	2.45E-01
Iron – 59	Ci	(1)	(1)	9.81E-05	4.67E-03
Cobalt - 60	Ci	(1)	(1)	1.96E-03	7.25E-03
Zinc – 65	Ci	(1)	(1)	(1)	1.54E-06
Strontium - 89	Ci	(1)	(1)	(1)	2.62E-05
Strontium - 90	Ci	(1)	(1)	(1)	5.39E-06
Strontium - 92	Ci	(1)	(1)	(1)	(1)
Niobium - 95	Ci	(1)	(1)	2.89E-03	3.65E-02
Zirconium - 95	Ci	(1)	(1)	1.46E-03	2.32E-02
Niobium - 97	Ci	(1)	(1)	(1)	(1)
Zirconium - 97	Ci	(1)	(1)	5.61E-05	(1)
Molybdenum - 99	Ci	(1)	(1)	(1)	(1)
Technetium - 99m	Ci	(1)	(1)	(1)	(1)
Ruthenium - 103	Ci	(1)	(1)	(1)	5.42E-04
Rhodium - 105	Ci	(1)	(1)	(1)	(1)
Ruthenium - 105	Ci	(1)	(1)	(1)	(1)
Silver - 110m	Ci	(1)	(1)	1.86E-03	1.05E-02
Tin – 113	Ci	(1)	(1)	1.37E-04	2.47E-03
Tin – 117m	Ci	(1)	(1)	(1)	3.54E-04
Antimony - 122	Ci	(1)	(1)	(1)	(1)
Antimony - 124	Ci	(1)	(1)	(1)	3.35E-03
Antimony - 125	Ci	(1)	(1)	3.36E-03	8.95E-03
Tellurium – 125m	Ci	(1)	(1)	(1)	(1)
Tellurium - 132	Ci	(1)	(1)	(1)	(1)
Iodine - 131	Ci	(1)	(1)	5.71E-04	5.38E-04
Iodine - 132	Ci	(1)	(1)	(1)	(1)
Iodine – 133	Ci	(1)	(1)	8.10E-05	(1)
Iodine – 135	Ci	(1)	(1)	(1)	(1)
Cesium – 134	Ci	(1)	(1)	2.78E-05	2.87E-03
Cesium – 136	Ci	(1)	(1)	(1)	(1)
Cesium – 137	Ci	(1)	(1)	1.66E-04	7.92E-03
Barium – 140	Ci	(1)	(1)	(1)	(1)
Lanthanum - 140	Ci	(1)	(1)	(1)	(1)
Cerium – 144	Ci	(1)	(1)	(1)	7.08E-04
Europium – 154	Ci	(1)	(1)	(1)	(1)
Europium – 155	Ci	(1)	(1)	(1)	(1)
Tungsten – 187	Ci	(1)	(1)	(1)	(1)
Total For Period	Ci	(1)	(1)	3.21E-02	4.30E-01

TABLE 2B - REG GUIDE 1.21
LIQUID EFFLUENTS

NUCLIDES RELEASED	Units	CONTINUOUS MODE		BATCH MODE	
		3RD QUARTER	4TH QUARTER	3RD QUARTER	4TH QUARTER
Beryllium - 7	Ci	(1)	(1)	(1)	(1)
Sodium - 24	Ci	(1)	(1)	(1)	(1)
Chromium - 51	Ci	(1)	(1)	5.33E-03	3.53E-04
Manganese - 54	Ci	(1)	(1)	1.73E-03	1.10E-03
Iron – 55	Ci	(2)	(2)	2.08E-02	5.15E-02
Cobalt - 57	Ci	(1)	(1)	2.54E-04	1.30E-04
Cobalt - 58	Ci	(1)	(1)	3.64E-02	1.73E-02
Iron – 59	Ci	(1)	(1)	2.50E-04	(1)
Cobalt - 60	Ci	(1)	(1)	5.30E-03	4.99E-03
Zinc – 65	Ci	(1)	(1)	(1)	(1)
Strontium - 89	Ci	(1)	(1)	7.37E-04	(1)
Strontium - 90	Ci	(1)	(1)	1.58E-05	(1)
Strontium - 92	Ci	(1)	(1)	(1)	(1)
Niobium - 95	Ci	(1)	(1)	1.37E-02	6.46E-03
Zirconium - 95	Ci	(1)	(1)	7.72E-03	3.49E-03
Niobium - 97	Ci	(1)	(1)	3.54E-05	(1)
Zirconium - 97	Ci	(1)	(1)	(1)	(1)
Molybdenum - 99	Ci	(1)	(1)	(1)	(1)
Technetium - 99m	Ci	(1)	(1)	(1)	(1)
Ruthenium - 103	Ci	(1)	(1)	(1)	(1)
Rhodium - 105	Ci	(1)	(1)	(1)	(1)
Ruthenium - 105	Ci	(1)	(1)	(1)	(1)
Silver - 110m	Ci	(1)	(1)	1.13E-02	1.08E-02
Tin – 113	Ci	(1)	(1)	1.87E-03	9.71E-04
Tin – 117m	Ci	(1)	(1)	2.32E-05	(1)
Antimony - 122	Ci	(1)	(1)	(1)	(1)
Antimony - 124	Ci	(1)	(1)	6.56E-05	(1)
Antimony - 125	Ci	(1)	(1)	1.73E-03	7.46E-03
Tellurium – 125m	Ci	(1)	(1)	(1)	(1)
Tellurium - 132	Ci	(1)	(1)	(1)	(1)
Iodine - 131	Ci	(1)	(1)	3.02E-04	1.08E-05
Iodine - 132	Ci	(1)	(1)	(1)	(1)
Iodine - 133	Ci	(1)	(1)	(1)	8.65E-06
Iodine - 135	Ci	(1)	(1)	(1)	(1)
Cesium - 134	Ci	(1)	(1)	3.76E-04	2.95E-05
Cesium - 136	Ci	(1)	(1)	(1)	(1)
Cesium - 137	Ci	(1)	8.52E-07	1.10E-03	2.08E-04
Barium - 140	Ci	(1)	(1)	(1)	(1)
Lanthanum - 140	Ci	(1)	(1)	(1)	(1)
Cerium - 144	Ci	(1)	(1)	(1)	4.80E-04
Europium - 154	Ci	(1)	(1)	(1)	6.99E-04
Europium - 155	Ci	(1)	(1)	(1)	2.23E-04
Tungsten - 187	Ci	(1)	(1)	(1)	(1)
Total For Period	Ci	(1)	8.52E-07	1.09E-01	1.06E-01

TABLE 2B - REG GUIDE 1.21
LIQUID EFFLUENTS

NUCLIDES RELEASED	Units	CONTINUOUS MODE		BATCH MODE	
		1ST QUARTER	2ND QUARTER	1ST QUARTER	2ND QUARTER
Krypton – 85	Ci	(1)	(1)	(1)	(1)
Xenon - 131m	Ci	(1)	(1)	(1)	(1)
Xenon – 133	Ci	(1)	(1)	2.92E-02	2.46E-02
Xenon – 133m	Ci	(1)	(1)	1.00E-04	(1)
Xenon – 135	Ci	(1)	(1)	7.68E-05	1.23E-04
Total For Period	Ci	(1)	(1)	2.93E-02	2.47E-02

NUCLIDES RELEASED	Units	CONTINUOUS MODE		BATCH MODE	
		3RD QUARTER	4TH QUARTER	3RD QUARTER	4TH QUARTER
Krypton - 85	Ci	(1)	(1)	(1)	(1)
Xenon-131m	Ci	(1)	(1)	(1)	(1)
Xenon - 133	Ci	(1)	(1)	2.20E-03	7.23E-03
Xenon – 133m	Ci	(1)	(1)	(1)	(1)
Xenon - 135	Ci	(1)	(1)	(1)	(1)
Total For Period	Ci	(1)	(1)	2.20E-03	7.23E-03

NOTES TO TABLE 2B

(1) Less than minimum detectable activity which meets the LLD requirements of ODCM Surveillance Requirement 4.11.1.1.1.

(2) Continuous mode effluents are not analyzed for Fe-55.

TABLE 3A
SOLID WASTE AND IRRADIATED FUEL SHIPMENTS

A. SOLID WASTE SHIPPED OFFSITE FOR BURIAL OR DISPOSAL (NOT IRRADIATED FUEL)

1.	Type of Waste		UNITS	12-MONTH PERIOD	EST. TOTAL ERROR %
	a.	Dewatered spent resin	m^3 Ci	1.34E+01 3.60E+02	±2.00E+01
	b.	Dry Compressible Waste (Shipped) Contaminated Equipment, etc.	m^3 Ci	5.60E+02 2.12E+00	±5.00E+01
	b.*	Dry Compressible Waste (Buried) Contaminated Equipment, etc.	m^3 Ci	7.62E+01 1.38E+00	±5.00E+01
	c.	Irradiated Components, Control Rods, etc.	m^3 Ci	0.00E+00 0.00E+00	N/A
	d.	Other (Cartridge Filters)	m^3 Ci	3.57E+00 4.51E+01	±5.00E+01

(b.) Volume shipped represents waste generated prior to offsite volume reduction.
(b.*) Represents waste buried after volume reduction at offsite processor.

2. Estimate of Major Nuclides (By Type of Waste - Only nuclides >1 % are reported)

a.

Mn-54	1.71E+00%
Fe-55	8.42E+00%
Co-58	4.63E+01%
Co-60	4.47E+00%
Ni-63	8.12E+00%
Cs-134	9.97E+00%
Cs-137	1.74E+01%

b.

Cr-51	1.06E+01%
Mn-54	2.02E+00%
Fe-55	2.59E+01%
Co-58	2.95E+01%
Co-60	7.56E+00%
Ni-63	6.17E+00%
Nb-95	8.11E+00%
Zr-95	5.29E+00%
Cs-137	1.26E+00%

c. N/A

d.

Cr-51	1.83E+01%
Fe-55	4.94E+01%
Co-58	1.16E+01%
Co-60	3.25E+00%
Ni-63	3.60E+00%
Nb-95	5.37E+00%
Zr-95	3.80E+00%

TABLE 3A
SOLID WASTE AND IRRADIATED FUEL SHIPMENTS

3. Solid Waste Disposition

Number of Shipments	Mode of Transportation	Destination
7	Motor Surface Transit	Chem. Nuclear Systems, Inc. Barnwell, SC
9	Motor Surface Transit	Duratek Oak Ridge, TN
9	Motor Surface Transit	US Ecology, Inc. Oak Ridge, TN
2	Motor Surface Transit	Studsvik Irwin, TN

TYPE WASTE: DAW

10 CFR PART 61 WASTE CLASS: A

SOURCE OF WASTE: Radiologically Controlled Areas

SHIPPING CONTAINER: 20' or 40' Sealand Containers, B-25 Metal Boxes, and 55-Gallon Drums

TOTAL CURIE QUANTITY: 2.12 Ci

HOW DETERMINED: Dose to curie analysis, conversion by volume based on generic distribution and scaling factors

TOTAL SHIPPED WASTE VOLUME: 19,800 ft^3

TOTAL BURIAL WASTE VOLUME: 2,694 ft^3

HOW DETERMINED: Container volume and number of containers shipped, Burial volume is determined from information provided by volume reduction processor.

SOLIDIFICATION AGENT OR ABSORBENT: None

TYPE WASTE: Dewatered Resin

10 CFR PART 61 WASTE CLASS: A (S), B, and C

SOURCE OF WASTE: Liquid Waste Processing Systems

SHIPPING CONTAINER: 8-120 High Integrity Container shipped in a 8-120A or 8-120B Shipping Cask

TOTAL CURIE QUANTITY: 360 Ci

HOW DETERMINED: Gamma scan analysis using resin sample, conversion by weight based on radionuclide distribution and scaling factors. Also, dose-to-curie relationship assuming resin radionuclide distribution.

TOTAL SHIPPED WASTE VOLUME: 474.4 ft^3

TOTAL BURIAL WASTE VOLUME: 382.3 ft^3

HOW DETERMINED: Waste volume determined by mass and assumed density of dewatered resin

SOLIDIFICATION AGENT OR ABSORBENT: None

TYPE WASTE: Cartridge Filters

10 CFR PART 61 WASTE CLASS: A (S) and C

SOURCE OF WASTE: Liquid Waste Processing Systems (Miscellaneous Waste and Spent Fuel Pool)

SHIPPING CONTAINER: 8-120 High Integrity Container shipped in a 8-120A or 8-120B Shipping Cask

TOTAL CURIE QUANTITY: 45.1 Ci

HOW DETERMINED: Dose – curie relationship assuming appropriate filter radionuclide distribution

TOTAL SHIPPED WASTE VOLUME: 126.1 ft^3

TOTAL BURIAL WASTE VOLUME: 481.2 ft^3

HOW DETERMINED: Waste volume determined by total number of filters and volume of each filter type.

SOLIDIFICATION AGENT OR ABSORBENT: None