CALVERT CLIFFS NUCLEAR POWER PLANT
EFFLUENT AND WASTE DISPOSAL SEMI-ANNUAL REPORT
SUPPLEMENTAL INFORMATION

Facility - Calvert Cliffs Nuclear Power Plant

Licensee - Baltimore Gas & Electric Company

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 (Technical Specification 3/4.11.2.1).

2. Gaseous Radwaste Treatment System and the Ventilation Exhaust Treatment System shall be used to reduce gaseous emissions when the calculated gamma dose due to gaseous effluents exceeds 1.20 mrad or the calculated beta dose due to gaseous effluents exceeds 2.40 mrad at the site boundary in a 92 day period (Technical Specification 3/4.11.2.4).

3. The air dose at the site boundary due to noble gases released in gaseous effluents shall not exceed (Technical Specification 3/4.11.2.2):

   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 Offsite Dose Calculation Manual (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 in excess of 1500 mrem/year to any organ (Technical Specification 3/4.11.2.1).

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 (Technical Specification 3/4.11.2.4).

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 (Technical Specification 3/4.11.2.3):

   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, for unrestricted areas (Technical Specification 3/4.11.1.1).

2. The liquid radwaste treatment system shall be used to reduce the concentration of radionuclides in liquid effluents from the plant when the calculated doses to unrestricted areas exceed 0.36 mrem to the whole body, or 1.20 mrem to any organ in a 92 day period (Technical Specification 3/4.11.1.3).

3. The dose to a member of the public in unrestricted areas shall not exceed (Technical Specification 3/4.11.1.2):

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 Technical Specification 3/4.11.2.1 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 any release of radioiodines. The particulate samples are analyzed by gamma spectroscopy for quantification of particulate radioactive material. Based on guidance provided in the ODCM, compliance with dose rate limits for the

radioiodines and particulates may be based on a comparison of the actual measured release quantity over a sample period with a pre-established upper bound.

C. Liquid Effluents

The MPCs used for radioactive materials released in liquid effluents are in accordance with Technical Specification 3/4.11.1.1 and the values from 10 CFR 20, Appendix B, 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 (Section 6.9.1.8)

A. Previous Calendar Year (1990) Dose Assessment Summary

During 1991 liquid releases from Calvert Cliffs resulted in a calculated maximum organ dose of 1.90E-01 mrem and a maximum whole body dose of 5.08E-02 mrem. These doses are less than 2% of the Technical Specification yearly organ dose limit and less than 2% of the Technical Specification yearly dose limit for the whole body. These doses were calculated using ODCM methodology. The controlling pathway was the fish and shellfish pathway with adult as the controlling age group, and the Gastro-Intestinal Tract representing the organ with the highest calculated dose.

Gaseous releases of noble gases resulted in a maximum air dose of 8.55E-02 mrad, gamma and 1.79E-01 mrad, beta. Iodine and particulate releases from Calvert Cliffs resulted in a maximum organ dose of 9.62E-02 mrem for the year via the milk-infant-thyroid pathway. These doses were calculated using ODCM methodology. For 1991, calculated offsite doses via the gaseous release pathways were below 3% of their allowable annual allowable Specification limits.

B. 40 CFR 190 Total Dose Compliance

Based upon all releases for 1991 and the ODCM calculations, the maximum exposed individual would receive less than 1% of the allowable dose. During 1991, there were no on-site sources of direct radiation that would have contributed to a significant or measurable offsite dose. The direct radiation contribution is measured by both on-site and off-site thermoluminescent dosimeters (TLD). The results of these measurements did not indicate any statistical increase in off-site radiation doses attributable to on-site sources. Therefore, no increase in the off-site calculated doses is attributable to the direct exposure from on-site sources. A more detailed evaluation will be reported in the Annual Radiological Environmental Monitoring Report.

C. Solid Waste Report Requirements

During the second half of 1991, the types of radioactive solid waste shipped from Calvert Cliffs were radioactive resin, which was dewatered and shipped in high integrity containers, irradiated hardware which was shipped in high integrity steel containers, and dry compressible waste, which was shipped as LSA waste in strong, tight containers. Also, Appendix A provides a detailed breakdown of the waste shipments for the second half of 1991 per the categories as specified in Technical Specification 6.9.1.8.

D. ODCM and PCP Changes

Two changes were made to the ODCM during the second half of 1991. The changes were reviewed by POSRC and approved by the Plant General Manager, Calvert Cliffs Nuclear Power Plant, prior to implementation. The scope and basis for this change is discussed in Appendix B. In keeping with the requirement of the Technical Specification 6.17, a copy of the change to the CCNPP ODCM is enclosed in Attachment 1. Vertical lines in the right margin of the text denote the above referenced change with accompanying change number.

No changes were made in the PCP in the second half of 1991.

E. Radioactive Gaseous Effluent Monitoring Instrumentation

The Unit 2 Main Vent Header Noble Gas effluent monitor (2-RI-5415) was out of service for greater than 30 days during the second half of 1991. This notice is required by Technical Specification 3.3.3.9. This monitor was declared inoperable on August 9, 1991 because of frequent RMS pump failures. The source of the failures was a blocked discharge line fitting but the source of the problem was not immediately identified despite extensive troubleshooting efforts. The RMS effluent monitor was restored to service on September 12, 1991.

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 gas decay tank, a 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 the pressure/volume relationship (gas laws) of the tank.

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. Activity buildup while purging is also considered.

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 midpoint of the sample period multiplied by the main vent flow for the week.

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 this sample analysis and the vent flow.

B. Iodine and Particulates

1. Batch Releases

The total activities of radioiodines and particulates released from a pressurized gas decay tank, 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. These weekly particulate filters are then composited to form monthly and quarterly composites for the gross alpha and strontium 89 and 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 for each release and this is used in turn to prepare monthly and quarterly composites for the gross alpha, strontium 89 and 90, and tritium analyses.

2. Continuous Releases

Prior to discharge of any 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 daily and these samples are used in turn to prepare a weekly blowdown composite based on each day's blowdown. The weekly composite 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 and quarterly composites for tritium, gross alpha, and strontium 89 and 90 analyses.

During primary to secondary leakage, the secondary system becomes contaminated and subsequently, contaminates the turbine plant sumps. This low level activity (mostly tritium) water is released directly to the Chesapeake Bay. This water is sampled at least weekly and composited. These samples are added to a composite based on the amount released during that week. The composite sample is analyzed monthly for tritium and for the principal gamma emitting radionuclides. The results are multiplied by the actual quantity of liquid released to determine the total activity released. This composite is used to prepare quarterly samples for strontium 89 and 90 analyses.

D. Estimation of Total Error

Total error on 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

			1991	
			3RD QUARTER	4TH QUARTER
A.	Liquid			
	1.	Number of batch releases	3.10E+01	3.70E+01
	2.	Total time period for batch releases (min)	1.40E+04	3.32E+04
	3	Maximum time period for a batch release (min)	1.63E+03	1.32E+04
	4.	Average time period for batch releases (min)	4.51E+02	8.97E+02
	5.	Minimum time period for a batch release (min)	6.00E+00	1.00E+00
	6.	Average stream flow during periods of effluent into a flowing stream (liters/min of dilution water)	4.46E+06	4.47E+06
B.	Gaseous			
	1.	Number of batch releases	1.50E+01	2.00E+01
	2.	Total time period for batch releases (min)	8.55E+04	3.06E+04
	3.	Maximum time period for a batch release (min)	6.74E+04	9.33E+03
	4.	Average time period for batch release (min)	5.70E+03	1.53E+03
	5.	Minimum time period for a batch release (min)	1.00E+00	1.00E+00

VII. ABNORMAL RELEASES

			1991 3RD QUARTER	1991 4TH QUARTER
A.	Liquid			
	1.	Number of releases	- 0 -	- 0 -
	2.	Total activity released (Curies)	- 0 -	- 0 -
B.	Gaseous			
	1.	Number of releases	- 0 -	- 0 -
	2.	Total activity releases (Curies)	- 0 -	- 0 -

TABLE 1A - REG GUIDE 1.21

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GASEOUS EFFLUENTS - SUMMATION OF ALL RELEASES

A. FISSION AND ACTIVATION GASES	UNITS	3RD QUARTER	4TH QUARTER	EST. TOTAL ERROR, %
1. Total Release	Ci	5.05E+02	6.75E+02	±5.40E+00
2. Average release rate for period	uCi/sec	2.12E+01	3.81E+01	
3. Percent of Tech. Spec. limit(1)	%	3.42E-03	4.62E-03	
4. Percent of Tech. Spec. limit(2)	%	1.30E-03	1.79E-03	
5. Percent of Tech. Spec. limit(3)	%	1.93E-01	2.61E-01	
6. Percent of Tech. Spec. limit(4)	%	9.65E-02	1.30E-01	
7. Percent of Tech. Spec. limit(5)	%	2.17E-01	3.95E-01	
8. Percent of Tech. Spec. limit(6)	%	1.08E-01	1.48E-01	
B. IODINES				
1. Total Iodine - 131	Ci	1.23E-02	1.74E-02	±6.50E+00
2. Average release rate for period	uCi/sec	5.16E-04	9.84E-04	
3. Percent of Tech. Spec. limit(7)	%	1.23E-03	2.34E-03	
4. Percent of Tech. Spec. limit(8)	%	2.85E+00	4.03E+00	
5. Percent of Tech. Spec. limit(9	%	1.42E+00	2.02E+00	
C. PARTICULATES				
1. Particulates with half lives greater than 8 days	Ci	7.91E-05	4.62E-08	±2.80E+01
2. Average release rate for period	uCi/sec	3.33E-06	2.61E-09	
3. Percent of Tech. Spec. limit(7)	%	7.91E-07	6.20E-09	
4. Percent of Tech. Spec. limit(8)	%	1.83E-02	1.07E-05	
5. Percent of Tech. Spec. limit(9)	%	9.16E-03	5.35E-06	
6. Gross alpha radioactivity	Ci	3.06E+00	2.52E+00	±5.36E+01

TABLE 1A - REG GUIDE 1.21 (Cont.)

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GASEOUS EFFLUENTS - SUMMATION OF ALL RELEASES

D. TRITIUM	UNITS	3RD QUARTER	4TH QUARTER	EST. TOTAL ERROR, %
1. Total Release	Ci	4.69E+00	6.39E-01	±1.32E+01
2. Average release rate for period	uCi/sec	2.98E-01	4.06E-02	

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 gamma quarterly dose limit (10 mrad)

(4) Percent of I.A.3 gamma yearly dose limit (20 mrad)

(5) Percent of I.A.3 beta quarterly dose limit (20 mrad)

(6) Percent of I.A.3 beta yearly dose limit (40 mrad)

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

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

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

(10) Less than minimum detectable activity which meets the LLD requirements of Technical Specification Surveillance Requirement 4.11.2.1.2.

TABLE IC - REG GUIDE 1.21

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GASEOUS EFFLUENTS - GROUND LEVEL RELEASES

		CONTINUOUS MODE		BATCH MODE	
1. FISSION AND ACTIVATION GASES	UNITS	3RD QUARTER	4TH QUARTER	3RD QUARTER	4TH QUARTER
Argon -41	Ci	(2)	(2)	3.44E-05	1.58E-03
Krypton -85	Ci	(2)	(2)	1.58E+00	5.70E+00
Krypton -85m	Ci	4.49E+00	5.73E+00	2.37E-05	(2)
Krypton -87	Ci	(2)	1.07E+00	(2)	(2)
Kryton -88	Ci	(2)	(2)	(2)	(2)
Xenon -131m	Ci	(2)	(2)	8.51E-02	6.16E-01
Xenon -133	Ci	4.35E+02	5.51E+02	8.12E-01	3.19E+01
Xenon -133m	Ci	(2)	(2)	4.64E-04	5.66E-01
Xenon -135	Ci	6.18E+01	7.76E+01	4.07E-04	3.04E-01
Xenon 138	Ci	(2)	(2)	(2)	(2)
Total for Period	Ci	5.02+02	6.36E+02	2.48E+00	3.84E+01
2. HALOGENS					
Iodine -131	Ci	1.42E-03	7.12E-03	(1)	(1)
Iodine -133	Ci	1.08E-02	1.03E-02	(1)	(1)
Total For Period	Ci	1.22E-02	1.74E-02	(1)	(1)

TABLE 1C - REG GUIDE 1.21 (Cont.)

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GASEOUS EFFLUENTS - GROUND LEVEL RELEASES

		CONTINUOUS MODE		BATCH MODE	
3. PARTICULATES	UNITS	3RD QUARTER	4TH QUARTER	3RD QUARTER	4TH QUARTER
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)	(3)	(1)	(1)
Strontium -90	Ci	(2)	(3)	(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)
Total For Period	Ci	-	-	(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 Technical Specification Surveillance Requirement 4.11.2.1.2.

(3) The fourth quarter strontium results will be available in a supplemental report as soon as the activity values are available.

TABLE 2A - REG GUIDE 1.21

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LIQUID EFFLUENTS - SUMMATION OF ALL RELEASES

A. FISSION AND ACTIVATION PRODUCTS	UNITS	3RD QUARTER	4TH QUARTER	EST. TOTAL ERROR, %
1. Total Release (not including tritium, gases, alpha)	Ci	5.87E-01	1.62E-01	±3.30E+00
2. Average diluted concentration during period	uCi/ml	1.18E-08	8.28E-10	
3. Percent of Tech. Spec. limit(1)	%	8.45E-02	1.75E-04	
4. Percent of Tech. Spec. limit(2)	%	4.25E-02	8.75E-02	
5. Percent of Tech. Spec. limit(3)	%	5.59E-01	2.50E-02	
6. Percent of Tech. Spec. limit(4)	%	2.79E-01	1.25E-02	
B. TRITIUM				
1. Total Release	Ci	4.33E+02	4.52E+02	±9.80E+00
2. Average diluted concentration during period	uCi/ml	8.66E-06	2.28E-06	
3. Percent of applicable limit(5)	%	2.89E-01	7.60E-02	
C. DISSOLVED AND ENTRAINED GASES				
1. Total Release	Ci	2.95E-02	1.76E-01	±4.60E+00
2. Average diluted concentration during period	uCi/ml	5.95E-10	9.00E-10	

TABLE 2A - REG GUIDE * 21 (Cont.)

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LIQUID EFFLUENTS - SUMMATION OF ALL RELEASES

D. GROSS ALPHA RADIOACTIVITY	UNITS	3RD QUARTER	4TH QUARTER	EST. TOTAL ERROR, %
1. Total Release	Ci	2.23E-05	8.35E-05	±5.36E+01
E. VOLUME OF WASTE RELEASES (prior to dilution)	liters	9.73E+06	2.14E+07	±1.30E+00
F. VOLUME OF DILUTION WATER USED DURING PERIOD	liters	5.00E+11	1.98E+11	±1.64E+01

NOTES TO TABLE 2A

(1) Percent of I.C.3 Quarterly Organ Dose Limit (10 mrem)

(2) Percent of I.C.3 Yearly Organ Dose Limit (20 mrem)

(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} uCi/ml

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

TABLE 2B - REG GUIDE 1.21

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LIQUID EFFLUENTS

		CONTINUOUS MODE		BATCH MODE	
NUCLIDES RELEASED	UNITS	3RD QUARTER	4TH QUARTER	3RD QUARTER	4TH QUARTER
Sodium -24	Ci	(1)	(1)	8.74E-05	(1)
Chromium -51	Ci	(1)	(1)	(1)	1.24E-04
Manganese -54	Ci	(1)	(1)	1.02E-03	1.92E-04
Cobalt -57	Ci	(1)	(1)	(1)	(1)
Cobalt -58	Ci	(1)	(1)	1.50E-02	7.35E-02
Iron -59	Ci	(1)	(1)	(1)	(1)
Cobalt -60	Ci	(1)	(1)	8.47E-03	4.82E-03
Zinc -65	Ci	(1)	(1)	(1)	(1)
Strontium -89	Ci	(1)	(1)	3.28E-03	(2)
Strontium -90	Ci	(1)	(1)	2.93E-04	(2)
Strontium -92	Ci	(1)	(1)	(1)	(1)
Niobium -95	Ci	(1)	(1)	2.85E-04	1.78E-03
Niobium -97	Ci	(1)	(1)	1.41E-04	1.10E-03
Zirconium -95	Ci	(1)	(1)	(1)	8.95E-04
Molybdenum -99	Ci	(1)	(1)	(1)	(1)
Technetium -99m	Ci	(1)	(1)	5.72E-04	3.05E-04
Ruthenium -106	Ci	(1)	(1)	(1)	(1)
Silver -110m	Ci	(1)	(1)	5.82E-03	1.92E-03
Tin -113	Ci	(1)	(1)	(1)	(1)
Antimony -122	Ci	(1)	(1)	3.71E-05	6.04E-06
Antimony -125	Ci	(1)	(1)	1.39E-02	1.63E-05
Technetium -132	Ci	(1)	(1)	(1)	(1)

TABLE 2B - REG GUIDE 1.21 (Cont.)

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LIQUID EFFLUENTS

			CONTINUOUS MODE		BATCH MODE	
NUCLIDES RELEASED		UNITS	3RD QUARTER	4TH QUARTER	3RD QUARTER	4TH QUARTER
Iodine	-131	Ci	(1)	(1)	1.85E-02	1.71E-02
Iodine	-132	Ci	(1)	(1)	(1)	8.29E-06
Iodine	-133	Ci	(1)	(1)	1.82E-02	1.93E-03
Iodine	-135	Ci	(1)	(1)	1.86E-04	(1)
Cesium	-134	Ci	(1)	(1)	9.42E-02	1.89E-02
Cesium	-136	Ci	(1)	(1)	(1)	1.12E-05
Cesium	-137	Ci	(1)	(1)	4.06E-01	3.82E-02
Barium	-140	Ci	(1)	(1)	1.33E-03	(1)
Lanthanum	-140	Ci	(1)	(1)	1.67E-03	5.25E-04
Cerium	-144	Ci	(1)	(1)	1.87E-04	(1)
Tungsten	-187	Ci	(1)	(1)	2.21E-04	(1)
Total For Period		Ci	(1)	(1)	5.50E-01	1.43E-01
Xenon	-131m	Ci	(1)	(1)	(1)	(1)
Xenon	-133	Ci	(1)	(1)	2.85E-02	1.18E-01
Xenon	-133m	Ci	(1)	(1)	(1)	1.50E-03
Xenon	-135	Ci	(1)	(1)	9.46E-04	7.37E-04
Xenon	-135m	Ci	(1)	(1)	(1)	(1)
Total For Period		Ci	(1)	(1)	2.95E-02	1.76E-01

TABLE 3A

CALVERT CLIFFS NUCLEAR POWER PLANT
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SOLID WASTE AND IRRADIATED FUEL SHIPMENTS

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

Waste	UNITS	6-MONTH PERIOD	EST. TOTAL ERROR %
a. Dewatered spent resin	m^3 Ci	6.81E+00 6.31E+01	±2.00E+01
b. Compressible Waste(Burial) Contaminated Equipment, etc. (Prior to Compaction)	m^3 Ci m^3	7.61E+01 1.32E+01 5.40E+02	±5.00E+01
c. Irradiated Components, Control Rods, etc.	m^3 Ci	6.20E-01 4.32E+03	±5.00E+01
d. Other (CVCS Filters)	m^3 Ci	- -	±2.00E+01

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

a.	Iron	-55	4.55E+00 %
	Cobalt	-58	1.55E+00 %
	Cobalt	-60	2.95E+00 %
	Nickel	-63	1.06E+01 %
	Antimony	-125	1.10E+00 %
	Cesium	-134	1.96E+01 %
	Cesium	-137	5.56E+01 %
b.	Carbon	-14	2.05E+00 %
	Chromium	-51	9.62E+00 %
	Iron	-55	3.55E+01 %
	Cobalt	-58	1.52E+00 %
	Cobalt	-60	1.01E+01 %
	Nickel	-63	1.31E+01 %
	Ruthenium	-106	2.52E+00 %
	Silver	-110	1.41E+00 %
	Antimony	-125	4.75E+00 %
	Cesium	-134	2.70E+00 %
	Cesium	-137	1.07E+01 %
c.	Manganese	-54	1.20E+00 %
	Iron	-55	5.66E+01 %
	Cobalt	-60	3.80E+01 %
	Nickel	-63	4.00E+00 %

TABLE 3A

CALVERT CLIFFS NUCLEAR POWER PLANT
EFFLUENT AND WASTE DISPOSAL SEMI-ANNUAL REPORT
SECOND HALF - 1991

SOLID WASTE AND IRRADIATED FUEL SHIPMENTS (Cont.)

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

3. Solid Waste Disposition

Number of Shipments	Mode of Transportation	Destination
4	Motor Surface Transit	Chem Nuclear Systems Inc. Barnwell, SC
1	Motor Surface Transit	Scientific Ecology Group Oak Ridge, TN

APPENDIX A

SOLID RADWASTE SHIPMENT DATA
FOR
SEMI-ANNUAL EFFLUENT RELEASE REPORTING
SECOND HALF - 1991

TYPE WASTE: DAW

10 CFR 61 WASTE CLASS: A

SOURCE OF WASTE: Radiologically Controlled Areas

SHIPPING CONTAINER: Sealed Container (2080 ft^3)

TOTAL CURIE QUANTITY: 13.2 Ci

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

TOTAL BURIED WASTE VOLUME: 2474 ft^3

HOW DETERMINED: Container volume and number of containers shipped

SOLIDIFICATION AGENT OR ABSORBENT: None

TYPE WASTE: Dewatered Resin

10 CFR 61 WASTE CLASS: A

SOURCE OF WASTE: Miscellaneous Liquid Radwaste Processing/CVCS Processing

SHIPPING CONTAINER: High Integrity L-8-120 liner (120.3 ft^3)

TOTAL CURIE QUANTITY: 13.2 Ci

HOW DETERMINED: Gamma scan using sample of resin

TOTAL WASTE VOLUME: 120.3 ft^3 buried/Resin volume 87.2 ft^3

HOW DETERMINED: Weighed liner and calculated volume of resin

SOLIDIFICATION AGENT OR ABSORBENT: None

TABLE 2B - REG GUIDE 1.21 (Cont.)

CALVERT CLIFFS NUCLEAR POWER PLANT
EFFLUENT AND WASTE DISPOSAL SEMI-ANNUAL REPORT
SECOND HALF - 1991

LIQUID EFFLUENTS

NOTES TO TABLE 2B

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

(2) The fourth quarter strontium results will be submitted in a supplemental report as soon as the concentration values are available.

APPENDIX A

SOLID RADWASTE SHIPMENT DATA
FOR
SEMI-ANNUAL EFFLUENT RELEASE REPORTING
SECOND HALF - 1991

TYPE WASTE: Dewatered Resin

10 CFR 61 WASTE CLASS: B

SOURCE OF WASTE: Miscellaneous Liquid Radwaste Processing/CVCS Processing

SHIPPING CONTAINER: High Integrity L-8-120 liner (120.3 ft^3)

TOTAL CURIE QUANTITY: 61.0 Ci

HOW DETERMINED: Gamma scan using sample from resin

TOTAL WASTE VOLUME: 120.3 ft^3 buried/Resin volume 83.2 ft^3

HOW DETERMINED: Weighed liner and calculated volume of resin

SOLIDIFICATION AGENT OR ABSORBENT: None

TYPE WASTE: Irradiated Hardware

10 CFR 61 WASTE CLASS: C

SOURCE OF WASTE: In-Core Instrumentation Wire

SHIPPING CONTAINER: High Integrity Steel Container

TOTAL CURIE QUANTITY: 4320 Ci

HOW DETERMINED: Calculation based on materials composition and neutron activation

TOTAL WASTE VOLUME: 22 ft

HOW DETERMINED: Container Volume

SOLIDIFICATION AGENT OR ABSORBANT: None

APPENDIX B

SUMMARY OF CHANGES TO THE CCNPP ODCM
SECOND HALF 1991

CHANGES TO THE CCNPP ODCM IN SECOND HALF 1991

SUMMARY AND BASIS

The Calvert Cliffs Offsite Dose Calculation Manual (**ODCM**) is contained in the Chemistry Procedure **CP-607**. Changes to this document are controlled through the normal procedure change review and approval process. This process meets the requirements of **CCNPP** Technical Specification 6.17.

Two changes were made to the **ODCM** during the second half of the year 1991. The changes were reviewed by the Plant Operations and Safety Review Committee (**POSRC**) and approved by the Plant General Manager, Calvert Cliffs Nuclear Power Plant, prior to implementation. Change bars are provided in the right margin of the **ODCM** text to identify the changes made.

The first change was reviewed and approved on September 16,1991, and designated as change 91-155. This change was made to describe an environmental sampling location in better detail.

The second change was reviewed and approved on December 3,1991 and designated as change 91-211. The purpose of this change was to correct site boundary direction designation. The atmospheric dispersion factor listed was correct.

ATTACHMENT (1)

ODCM (CP-607) TEXT WITH

CHANGES

ATTACHMENT 9 (CON'T)

LOCATIONS OF THE ENVIRONMENTAL SAMPLING SITES FOR THE CALVERT CLIFFS NUCLEAR POWER PLANT

SITE	SAMPLE	SECTOR	DISTANCE * KM	MI	DESCRIPTION
16	DR16	S	6.5	4.1	Across from Appeal School
17	DR17	SSE	5.9	3.7	Cove Point & Little Cove Point Roads
18	DR18	SE	7.1	4.5	Cove Point
19	DR19	NW	4.4	2.8	Long Beach
20	DR20	NNW	0.4	0.3	Onsite, near shore
21	DR21,A5, Ib7, Ib8, Ib9	WNW	19.3	12.1	At the Emergency Offsite Facility, off Route 231
22	DR22	S	12.5	7.8	Solomons Island
23	DR23	ENE	12.6	7.9	Taylors Island
24	Wa1,Ia1, Ia2	NNE&NE	0.2	0.1	Discharge Vicinity
25	Wa2	N	0.3	0.2	Discharge Area
26	Wb1	ESE	0.6	0.4	Shoreline at Camp Conoy
27	Ib1,Ib2, Ib3	SSE	2.6	1.6	Garden Plot off Bay Breeze Road
28	Ia4,Ia5	N/A**	N/A**	N/A**	Patuxent River
29	Ia3	E	0.9	0.6	Camp Conoy
30	Ia6	NNW	10.7	6.7	Kenwood Beach

PCR 91-155 [B511]

* From the Central Point Between the Two Containment Buildings.

** Sector and distance information is not given because these are control samples of free-swimming fish species required by T.S. 4.12.1 to be collected only "in areas not influenced by plant discharge". Exact sample location may therefore vary. [B511]

PCR 91-155

3.2.5 All iodines and particulate gamma emitters discharged from the plant shall be accounted for with the continuous main vent header samples since all gaseous effluents are discharged via this path.

3.2.6 A gaseous waste discharge permit shall be prepared for batch releases to document release conditions and approvals, sample analysis results and compliance with Technical Specifications.

3.2.7 Credit shall be taken for main vent dilution from the reactor unit through which a release is conducted.
Unit 1 - Main Vent Flow - 63.7 m^3/sec
Unit 2 - Main Vent Flow - 57.5 m^3/sec

3.3 Gaseous Effluent Dose Rate

3.3.1 Site Boundary Dose Rate (Total Body, Skin)
Technical Specification 3.11.2.1a limits the dose rate at the site boundary due to noble gas releases to ≤ 500 mrem/yr, total body ≤ 3000 mrem/yr, skin. If any of these are exceeded, review 40CFR302 to determine if a Reportable Quantity limit has been exceeded. (375B) Radiation monitor alarm setpoints are established to assure that these release limits are not exceeded. In the event any gaseous releases from the station results in the alarm setpoints being exceeded, an evaluation of the unrestricted area dose rate resulting from the release may be performed using the following equations: | PMF 90-102

$$\dot{D}_{tb} = X/Q \times (\Sigma K_i \times \dot{Q}_i)$$

$$\dot{D}_s = X/Q \times (\Sigma L_i + 1.1 M_i) \times \dot{Q}_i$$

Where:

$\dot{D}_{tb}$ = total body dose rate (mrem/yr)

X/Q = atmospheric dispersion to the SE site boundary 2.2E-06 (sec/m^3) | PMF 90-102 | PCR 91-211