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 Specifcation 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 Specifiction 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 (1989) Dose Assessment Summary

During 1989 liquid releases from Calvert Cliffs resulted in a calculated maximum organ dose of 5.38E-01 mrem and a maximum whole body dose of 4.74E-02 mrem. These doses are less than 3% of the Technical Specification yearly organ dose limit and less than 1% 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. Adult was the controlling age group, and the Gastro-Intestinal Tract represented the organ with the highest calculated dose.

Gaseous releases of noble gases resulted in a maximum air dose of 1.19E-01 mrad, gamma and 2.63E-01 mrad, beta. Iodine and particulate releases from Calvert Cliffs resulted in a maximum organ dose of 8.78E-01 mrem for the year via the milk-infant-thyroid pathway. These doses were calculated using ODCM methodology. For 1989, calculated offsite doses via the gaseous release pathways were below 3% of their allowable Technical Specification limits.

B. 40 CFR 190 Total Dose Compliance

Based upon all releases for 1989 and the ODCM calculations, the maximum exposed individual would receive less than 3% of the allowable dose. During 1989, 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 offsite 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 1989, the types of radioactive solid waste shipped from Calvert Cliffs were radioactive resin, which was dewatered and shipped in high integrity containers, and dry compressible waste, which was shipped as LSA waste in strong, tight containers. Table 3A summarizes the waste shipment data. Also, Appendix A provides a detailed breakdown of the waste shipments for 1989 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 calendar year 1989. Each change was reviewed by POSRC and approved by the Manager, Calvert Cliffs Nuclear Power Plant, prior to implementation. The scope and basis for these changes are discussed in Appendix B. In keeping with the requirements of Technical Specification 6.17, a copy of the changes to the CCNPP ODCM are enclosed in Attachment 1. Vertical lines in the right margin of the text denote the above referenced changes with accompanying change number.

No changes were made in the PCP in the second half of 1989.

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

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.

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

		1989	
		3RD QUARTER	4TH QUARTER
A.	Liquid		
1.	Number of batch releases	2.20E+01	4.70E+01
2.	Total time period for batch releases (min)	7.16E+03	5.62E+03
3.	Maximum time period for a batch release (min)	6.28E+02	6.47E+02
4.	Average time period for batch releases (min)	3.25E+02	1.22E+02
5.	Minimum time period for a batch release (min)	8.00E+00	1.00E+00
6.	Average stream flow during periods of effluent into a flowing stream (liters/min of dilution water)	3.13E+06	2.36E+06
B.	Gaseous		
1.	Number of batch releases	2.80E+01	1.70E+01
2.	Total time period for batch releases (min)	2.03E+05	4.27E+04
3.	Maximum time period for a batch release (min)	1.07E+04	1.04E+04
4.	Average time period for batch release (min)	7.24E+03	2.51E+03
5.	Minimum time period for a batch release (min)	7.55E+02	1.00E+00

VII. ABNORMAL RELEASES

	1989 3RD QUARTER	1989 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

CALVERT CLIFFS NUCLEAR POWER PLANT
EFFLUENT AND WASTE DISPOSAL SEMI-ANNUAL REPORT
SECOND HALF - 1989

GASEOUS EFFLUENTS - SUMMATION OF ALL RELEASES

A. FISSION AND ACTIVATION GASES	UNITS	3RD QUARTER	4TH QUARTER	EST.TOTAL ERROR,%
1. Total Release	Ci	1.02E+00	6.83E-01	±6.20E+00
2. Average release rate for period	uCi/sec	1.30E-01	8.69E-02	
3. Percent of tech.spec.limit(1)	%	1.68E-05	6.15E-07	
4. Percent of tech.spec.limit(2)	%	6.60E-06	8.65E-06	
5. Percent of tech.spec.limit(3)	%	2.51E-04	8.19E-06	
6. Percent of tech.spec.limit(4)	%	1.25E-04	4.09E-06	
7. Percent of tech.spec.limit(5)	%	3.73E-04	4.64E-04	
8. Percent of tech.spec.limit(6)	%	1.86E-04	2.32E-04	
B. IODINES				
1. Total Iodine - 131	Ci	2.75E-03	(2)	±6.50E+00
2. Average release rate for period	uCi/sec	3.50E-04	-	
3. Percent of tech.spec.limit(7)	%	8.33E-04	-	
4. Percent of tech.spec.limit(8)	%	3.32E-01	-	
5. Percent of tech.spec.limit(9)	%	1.66E-01	-	
C. PARTICULATES				
1. Particulates with half lives greater than 8 days	Ci	(2)	8.28E-05	±2.80E+01
2. Average release rate for period	uCi/sec	-	1.05E-05	
3. Percent of tech.spec.limit(7)	%	-	2.50E-05	
4. Percent of tech.spec.limit(8)	%	-	1.00E-02	
5. Percent of tech.spec.limit(9)	%	-	5.00E-03	
6. Gross alpha radioactivity	Ci	6.41E-07	(2)	±6.54E+01

TABLE 1A - REG GUIDE 1.21 (Cont.)

CALVERT CLIFFS NUCLEAR POWER PLANT
EFFLUENT AND WASTE DISPOSAL SEMI-ANNUAL REPORT
SECOND HALF - 1989

GASEOUS EFFLUENTS - SUMMATION OF ALL RELEASES

D. TRITIUM	UNITS	3RD QUARTER	4TH QUARTER	EST.TOTAL ERROR,%
1. Total Release	Ci	2.19E+00	2.49E-01	±1.32E+01
2. Average release rate for period	uCi/sec	2.79E-01	3.17E-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)

TABLE IC - REG GUIDE 1.21

CALVERT CLIFFS NUCLEAR POWER PLANT
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SECOND HALF - 1989

GASEOUS EFFLUENTS - GROUND LEVEL RELEASES

		CONTINUOUS MODE		BATCH MODE	
1. FISSION AND ACTIVATION GASES	UNITS	3RD QUARTER	4TH QUARTER	3RD QUARTER	4TH QUARTER
Krypton -85	Ci	(2)	(2)	(2)	6.83E-01
Krypton -87	Ci	(2)	(2)	(2)	(2)
Kryton -88	Ci	(2)	(2)	(2)	(2)
Xenon -133	Ci	9.96E-01	(2)	2.24E-02	(2)
Xenon -133m	Ci	(2)	(2)	(2)	(2)
Xenon -135	Ci	(2)	(2)	(2)	(2)
Xenon -138	Ci	(2)	(2)	(2)	(2)
Total for Period	Ci	9.96E-01	(2)	2.24E-02	6.83E-01
2. HALOGENS					
Iodine -131	Ci	2.75E-03	(2)	(1)	(1)
Total For Period	Ci	2.75E-03	(2)	(1)	(1)

TABLE 1C -REG GUIDE 1.21 (Cont.)

CALVERT CLIFFS NUCLEAR POWER PLANT
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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)
Cobalt -58	Ci	(2)	(2)	(1)	(1)
Iron -59	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)	7.34E-05	(1)	(1)
Cerium -141	Ci	(2)	(2)	(1)	(1)
Cerium -144	Ci	(2)	9.36E-06	(1)	(1)
Total For Period	Ci	(2)	8.28E-05	(1)	(1)

(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) Analysis not completed for 4th Quarter.

TABLE 2A - REG GUIDE 1.21

CALVERT CLIFFS NUCLEAR POWER PLANT
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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	8.65E-01	1.06E-01	±1.03E+01
2. Average diluted concentration during period	uCi/ml	2.11E-09	3.43E-10	
3. Percent of tech.spec.limit(1)	%	3.05E+00	5.56E-01	
4. Percent of tech.spec.limit(2)	%	1.52E+00	2.78E-01	
5. Percent of tech.spec.limit(3)	%	6.66E-01	6.10E-02	
6. Percent of tech.spec.limit(4)	%	3.33E-01	3.05E-02	
B. TRITIUM				
1. Total Release	Ci	9.56E+00	5.12E+00	±1.04E+01
2. Average diluted concentration during period	uCi/ml	2.33E-08	1.66E-08	
3. Percent of applicable limit(5)	%	7.77E-04	5.53E-04	
C. DISSOLVED AND ENTRAINED GASES				
1. Total Release	Ci	2.16E-04	2.05E-04	±4.80E+00
2. Average diluted concentration during period	uCi/ml	5.27E-13	6.64E-13	

TABLE 2A - REG GUIDE 1.21 (Cont.)

CALVERT CLIFFS NUCLEAR POWER PLANT
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SECOND HALF - 1989

LIQUID EFFLUENTS - SUMMATION OF ALL RELEASES

	UNITS	3RD QUARTER	4TH QUARTER	EST. TOTAL ERROR, %
D. GROSS ALPHA RADIOACTIVITY				
1. Total Release	Ci	5.06E-05	1.01E-04	±3.34E+01
E. VOLUME OF WASTE RELEASES (prior to dilution)	liters	2.99E+06	1.97E+06	±1.30E+00
F. VOLUME OF DILUTION WATER USED DURING PERIOD	liters	4.10E+11	3.09E+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^{-7} µci/ml

TABLE 2B - REG GUIDE 1.21

CALVERT CLIFFS NUCLEAR POWER PLANT
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LIQUID EFFLUENTS

NUCLIDES RELEASED		UNITS	CONTINUOUS MODE 3RD QUARTER	CONTINUOUS MODE 4TH QUARTER	BATCH MODE 3RD QUARTER	BATCH MODE 4TH QUARTER
Chromium	-51	Ci	(1)	(1)	9.27E-03	(2)
Manganese	-54	Ci	(1)	(1)	1.04E-02	3.50E-03
Cobalt	-57	Ci	(1)	(1)	5.33E-04	2.05E-04
Cobalt	-58	Ci	(1)	(1)	9.95E-02	7.64E-03
Iron	-59	Ci	(1)	(1)	(2)	(2)
Cobalt	-60	Ci	(1)	(1)	4.71E-02	2.02E-02
Zinc	-65	Ci	(1)	(1)	3.32E-05	6.06E-05
Strontium	-89	Ci	(1)	(1)	1.52E-03	(3)
Strontium	-90	Ci	(1)	(1)	1.27E-03	(3)
Strontium	-92	Ci	(1)	(1)	(2)	7.36E-06
Zirconium	-95	Ci	(1)	(1)	1.47E-02	1.33E-03
Niobium	-95	Ci	(1)	(1)	3.56E-02	5.50E-03
Niobium	-97	Ci	(1)	(1)	(2)	9.90E-05
Ruthenium	-103	Ci	(1)	(1)	2.90E-03	(2)
Ruthenium	-106	Ci	(1)	(1)	1.76E-02	7.14E-04
Silver	-110m	Ci	(1)	(1)	3.76E-02	8.83E-03
Tin	-113	Ci	(1)	(1)	2.70E-03	4.40E-04
Antimony	-125	Ci	(1)	(1)	3.85E-02	8.65E-03
Iodine	-131	Ci	(1)	(1)	(2)	2.39E-06
Cesium	-134	Ci	(1)	(1)	1.45E-01	9.72E-03

TABLE 2B - REG GUIDE 1.21 (Cont.)

CALVERT CLIFFS NUCLEAR POWER PLANT
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LIQUID EFFLUENTS

NUCLIDES RELEASED	UNITS	CONTINUOUS MODE 3RD QUARTER	CONTINUOUS MODE 4TH QUARTER	BATCH MODE 3RD QUARTER	BATCH MODE 4TH QUARTER
Cesium -137	Ci	(1)	(1)	3.85E-01	3.10E-02
Cerium -139	Ci	(1)	(1)	2.42E-04	1.26E-06
Cerium -141	Ci	(1)	(1)	1.52E-04	6.05E-05
Cerium -144	Ci	(1)	(1)	1.57E-02	8.33E-03
Barium -140	Ci	(1)	(1)	4.57E-06	(2)
Total For Period	Ci	(1)	(1)	8.65E-01	1.06E-01
Krypton -88	Ci	(1)	(1)	(2)	(2)
Xenon -133	Ci	(1)	(1)	2.16E-04	2.05E-04
Xenon -133m	Ci	(1)	(1)	(2)	(2)
Xenon -135	Ci	(1)	(1)	(2)	(2)
Total For Period	Ci	(1)	(1)	2.16E-04	2.05E-04

(1) There were no continuous liquid releases during the 3rd and 4th quarters.

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

(3) Analysis not completed for 4th Quarter.

TABLE 3A

CALVERT CLIFFS NUCLEAR POWER PLANT
EFFLUENT AND WASTE DISPOSAL SEMI-ANNUAL REPORT
SECOND HALF - 1989

SOLID WASTE AND IRRADIATED FUEL SHIPMENTS

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

1. Type of Waste	UNITS	6-MONTH PERIOD	EST. TOTAL ERROR%
a. Dewatered spent resin	m^3	5.82E+00	
	Ci	2.20E+01	2.00E+01
b. Dry Compressible Waste, Contaminated Equipment, etc.	m^3	6.11E+01	
	Ci	2.96E+00	5.00E+01
c. Irradiated Components, Control Rods, etc.	m^3	-----	
	Ci	-----	5.00E+01
d. Other (CVCS Filters)	m^3	-----	
	Ci	-----	2.00E+01

2. Estimate of Major Nuclides (By Type of Waste)*

a.	Iron	-55	2.50E+00 %
	Cobalt	-58	1.24E+01 %
	Cobalt	-60	2.50E+00 %
	Nickel	-63	3.70E+00 %
	Antimony	-125	2.40E+00 %
	Cesium	-134	1.95E+01 %
	Cesium	-137	5.48E+01 %
b.	Iron	-55	4.10E+01 %
	Cobalt	-58	3.20E+00 %
	Cobalt	-60	1.40E+01 %
	Nickel	-63	8.90E+00 %
	Cesium	-134	8.30E+00 %
	Cesium	-137	2.10E+01 %

* Only nuclides greater than 1% are reported

3. Solid Waste Disposition

Number of Shipments	Mode of Transportation	Destination
1	Motor Surface Transit	Barnwell, S.C.
3	Motor Surface Transit	Scientific Ecology Group Oak Ridge, TN

APPENDIX A

SOLID RADWASTE SHIPMENT DATA

FOR

SEMI-ANNUAL EFFLUENT RELEASE REPORTING

1989

APPENDIX A

SOLID RADWASTE SHIPMENT DATA FOR SEMI-ANNUAL EFFLUENT RELEASE REPORTING 1989

TYPE WASTE: DAW

10 CFR 61 WASTE CLASS: A

SOURCE OF WASTE: Radiologically Controlled Areas

SHIPPING CONTAINER: CPC B-25 Box

TOTAL CURIE QUANTITY: 4.7 Ci

HOW DETERMINED: Dose rate correlation to radionuclide distribution

TOTAL WASTE VOLUME: 4986 ft^3

HOW DETERMINED: Container volume and number of containers shipped

SOLIDIFICATION AGENT OR ABSORBENT: None

PRINCIPAL NUCLIDES >1% ABUNDANCE:

Fe-55	Ni-63
Co-58	Cs-134
Co-60	Cs-137

TYPE WASTE: Dewatered Resin

10 CFR 61 WASTE CLASS: A

SOURCE OF WASTE: Miscellaneous Liquid Radwaste Processing

SHIPPING CONTAINER: High Integrity Container, PL-8-120 (120.3 ft^3)

TOTAL CURIE QUANTITY: 3.28 Ci

HOW DETERMINED: Gamma spectral analysis of waste sample and scaling factors for correlating the hard-to-identify radionuclides.

TOTAL WASTE VOLUME: 86.6 ft^3

HOW DETERMINED: Weight of resin in liner

SOLIDIFICATION AGENT OR ABSORBENT: None

PRINCIPAL NUCLIDES >1% ABUNDANCE:

Mn-54	Ni-63
Fe-55	Cs-134
Co-58	Cs-137
Co-60	

APPENDIX A

SOLID RADWASTE SHIPMENT DATA FOR SEMI-ANNUAL EFFLUENT RELEASE REPORTING 1989

TYPE WASTE: Dewatered Resin

10 CFR 61 WASTE CLASS: B

SOURCE OF WASTE: Miscellaneous Liquid Radwaste Processing

SHIPPING CONTAINER: High Integrity Container, PL-14-215 Liner (205.8 ft^3)

TOTAL CURIE QUANTITY: 28.96 Ci

HOW DETERMINED: Gamma spectral analysis of waste sample and scaling factors for correlating the hard-to-identify radionuclides.

TOTAL WASTE VOLUME: 281 ft^3

HOW DETERMINED: Weight of resin in liner

SOLIDIFICATION AGENT OR ABSORBENT: None

PRINCIPAL NUCLIDES >1% ABUNDANCE:

Fe-55	Ni-63	Cs-134
Co-58	Mn-54	Cs-137
Co-60	Sb-125	Ce-144

TYPE WASTE: Filters

10 CFR 61 WASTE CLASS: C

SOURCE OF WASTE: CVCS Processing

SHIPPING CONTAINER: L-8-120 In Situ Liner (125.2 ft^3)

TOTAL CURIE QUANTITY: 369 Ci

HOW DETERMINED: Gamma scan and use of scaling factors for correlating hard-to-identify radionuclides.

TOTAL WASTE VOLUME: 24.97 ft^3

HOW DETERMINED: Filter Measurement

SOLIDIFICATION AGENT OR ABSORBENT: Cement

PRINCIPAL NUCLIDES >1% ABUNDANCE:

Cr-51	Fe-55	Nb-95	Te-125m
Co-58	Ni-63	Ru-103	Sb-125
Co-60	Zr-95	Ru-106	Ce-144

APPENDIX A

SOLID RADWASTE SHIPMENT DATA FOR SEMI-ANNUAL EFFLUENT RELEASE REPORTING 1989

TYPE WASTE: Absorbed Biological Waste

10 CFR 61 WASTE CLASS: A

SOURCE OF WASTE: Radiologically Controlled Areas

SHIPPING CONTAINER: DOT 17H 55-gal Drum and CPC B-25 Box, 17 drums @7.5 ft^3 each and 8 boxes @90.0 ft^3 each.

TOTAL CURIE QUANTITY: 0.906 Ci

HOW DETERMINED: Dose rate correlation to radionuclide distribution.

TOTAL WASTE VOLUME: 847.5 ft^3

HOW DETERMINED: Container volumes

SOLIDIFICATION AGENT OR ABSORBENT: Absorbent and lime

PRINCIPAL NUCLIDES >1% ABUNDANCE:

Fe-55	Ni-63
Co-58	Cs-134
Co-60	Cs-137

APPENDIX B

SUMMARY OF CHANGES TO THE CCNPP OCDM

1989

APPENDIX B

CHANGES TO THE CCNPP ODCM IN 1989
SUMMARY AND BASES

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 requirement of CCNPP Technical Specification 6.17.

Two changes were made to the ODCM during the calendar year 1989. Each change was reviewed by POSRC and approved by the Manager - CCNPP, prior to implementation. The first change was reviewed and approved on September 8, 1989, and is designated as #89-191. The second change was reviewed and approved on December 29, 1989, and designated as change #89-230. Change bars in the right margin of the ODCM text are provided to identify these changes.

The purpose of the change #89-191 was to allow for discharges of liquid radwaste with fewer than 5 Circulating Water pumps operating. Prior to this change, a minimum of 5 Circulating Water pumps were required to be operating in order to conduct a liquid radwaste release. This operating condition imposed an unnecessary restriction, especially during periods of plant outage where Circulating Water pump maintenance may yield fewer than 5 pumps available for use. This change in the required number of pumps does not reduce the plant's capability for ensuring that releases are maintained within the release rate limits (Technical Specification 3/4.11.1.1) or that cumulative doses are maintained ALARA (Technical Specification 3/4.11.1.2). The allowable release rate is determined prior to each release by a comparison of the radionuclide concentrations in the release and the actual dilution water flow at that time (i.e., the number of Circulating Water pumps operating). Radiation monitor setpoints are appropriately changed or release rate reduced as needed to reflect the change in the dilution water flow. The dose calculations that are performed for demonstrating compliance with limits of Technical Specification 3/4.11.1.2 are also based on the actual Circulating

Water flow at the time of the release. This change in the **ODCM** does not reduce the accuracy or reliability of the dose calculations or setpoint determinations.

The purpose of change #89-230 was to incorporate the results of the Annual Land Use Census required by Technical Specification 3/4.12.2. The goat-milk-infant thyroid pathway was added as the new controlling pathway for the evaluation of radioiodine and particulate releases in gaseous effluents. Additionally, a review of past effluents was conducted to ensured that the "simplified equations" in the **ODCM** continue to provide a reasonable conservative method for dose calculation. These "simplified equations" provide a simple method for approximating the potential dose associated with effluents; this method is most useful for evaluating individual batch releases to ensure **ALARA** for radioactive effluents when a detailed nuclide-by-nuclide dose analysis may not be available. Based on a comparison with the nuclide-by-nuclide dose calculation method for the 1988 effluents, no changes were needed to the "simplified equations" to ensure continued conservatism. Additional administrative changes (e.g., change in nomenclature from Appendix to Basis) were incorporated in change #89-230. Several of the environmental sample location designations were also changed to reflect the change in road designations by the State of Maryland (e.g., old State Route 4 has been renamed to Rt. 765). These changes in the **ODCM** do not reduce the accuracy or reliability of the dose calculations or setpoint determinations.