ATTACHMENT (1)

CALVERT CLIFFS NUCLEAR POWER PLANT
RADIOACTIVE EFFLUENT RELEASE REPORT
EFFLUENT AND WASTE DISPOSAL -
SUPPLEMENTAL INFORMATION

Calvert Cliffs Nuclear Power Plant - Units 1 & 2
Independent Spent Fuel Storage Installation
August 20, 1997

ATTACHMENT (1)

CALVERT CLIFFS NUCLEAR POWER PLANT
RADIOACTIVE EFFLUENT RELEASE REPORT
EFFLUENT AND WASTE DISPOSAL - 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 (Offsite Dose Calculation Manual (ODCM) 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-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 3/4.11.2.4).

3. The air dose at the site boundary due to noble gases released in gaseous effluents shall not exceed (ODCM 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 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 (ODCM 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 (ODCM 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 (ODCM 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 (ODCM 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 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 3/4.11.1.3).

3. The dose to a member of the public in unrestricted areas shall not exceed (ODCM 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 ODCM 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. 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 3/4.11.1.1 and the values from 10 CFR Part 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

A. Calvert Cliffs Nuclear Power Plant (CCNPP), Technical Specification 6.6.3

1. Second Half 1996 Dose Assessment Summary

During the second half of 1996, liquid releases from Calvert Cliffs resulted in a calculated maximum organ dose of 0.085 mrem and a maximum whole body dose of 0.0025 mrem. These doses are less than 0.43% of the ODCM yearly organ dose limit and less than 0.05% of the ODCM yearly dose limit for the whole body. 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 second half of 1996.

Gaseous Releases of noble gases resulted in a maximum, quarterly, gamma air dose of 0.001 mrad and a maximum, quarterly, beta air dose of 0.002 mrad. Iodines and particulates in gaseous effluents from Calvert Cliffs resulted in a maximum organ dose of 0.007 mrem for the second half of the year via the child-thyroid pathway. These doses were calculated using ODCM methodology. For the second half of 1996, calculated off-site doses via the gaseous release pathways were below 1% of their allowable ODCM limits.

2. 40 CFR 190 Total Dose Compliance

Based upon the second half releases of 1996 and the ODCM calculations, the maximum exposed individual would receive less than 1% of the allowable dose. During the second half of calendar year 1996, 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 the second half of 1996, the types of radioactive solid waste shipped from Calvert Cliffs were dry compressible waste, mechanical cartridge 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 the second half of 1996 per the categories specified in Technical Specification 6.6.3. 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

In October 1996, the ODCM was revised to incorporate the effluent controls of the Technical Specifications. This revision was performed in conjunction with License Amendments 217 and 194 for Units 1 and 2, respectively, which relocated the effluent controls from the Technical Specifications to the ODCM, in accordance with Generic Letter 89-01. Several minor changes to the ODCM were also included in this revision. A summary of those changes is found in the document. A copy of the revised ODCM is attached as Appendix (B) in accordance with Technical Specification 6.5.1.c.

Changes were made to the interdepartmental procedure RP-2-101 that contains discussion of the PCP. The procedure was revised to reflect administrative changes resulting from implementation of License Amendments 217 and 194 and to clarify limitations on storage of waste in the Materials Processing Facility. A summary of the changes is found in the document, a copy of which is included as Appendix (C).

B. Radioactive Gaseous Effluent Monitoring Instrumentation

None of the ODCM effluent monitors were out of service for greater than 30 days during the second half of 1996.

C. Independent Spent Fuel Storage Installation (ISFSI), Technical Specification 6.3

Five casks of spent fuel were transferred to the ISFSI during the second half of 1996. The casks were sealed within the confines of the Calvert Cliffs Auxiliary Building prior to transfer to the ISFSI facility. No quantity of radionuclides were released to the environment during the ISFSI operation in the second half of 1996. 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) of the tank.

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. Activity buildup while purging is also considered.

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 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. 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, iron 55, strontium 89 and 90, and tritium analyses.

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 released directly to the Chesapeake Bay. This water is sampled at least three times per week 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

		1996	
		3RD QUARTER	4TH QUARTER
A.	Liquid		
1.	Number of batch releases	2.40E+01	2.60E+01
2.	Total time period for batch releases (min)	7.15E+03	7.82E+03
3	Maximum time period for a batch release (min)	5.85E+02	5.95E+02
4.	Average time period for batch releases (min)	2.98E+02	3.01E+02
5.	Minimum time period for a batch release (min)	2.50E+01	2.50E+01
6.	Average stream flow during periods of effluent into a flowing stream (liters/min of dilution water)	7.67E+06	8.91E+06
B.	Gaseous		
1.	Number of batch releases	6.00E+00	2.00E+00
2.	Total time period for batch releases (min)	2.30E+03	3.18E+04
3.	Maximum time period for a batch release (min)	1.47E+03	3.17E+04
4.	Average time period for batch release (min)	3.84E+02	1.59E+04
5.	Minimum time period for a batch release (min)	7.00E+01	1.35E+02

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VII. ABNORMAL RELEASES

	1996	
	3RD QUARTER	4TH QUARTER
A. Liquid		
1. Number of releases	- 0 -	- 0 -
2. Total activity released (Curies)	- 0 -	- 0 -
B. Gaseous		
1. Number of releases	1	- 0 -
2. Total activity releases (Curies)	1.07E+00	- 0 -

Approximately 36 m^3 was inadvertently discharged from the Gaseous Radwaste Treatment System during September and October 1996. This abnormal release was detected when the in-service decay tank pressure did not trend upward, as is expected when a decay tank is in service. Investigation revealed that the relief valve on the No. 12 waste gas compressor was leaking. Subsequent to the repair of this relief valve, the waste gas surge tank relief valve was found to be leaking. Following extensive planning on how to meet the challenges of isolating this valve from the system, the valve was successfully replaced in March 1997. The time interval for the abnormal release was determined to have begun when in-service decay tank pressure leveled off in September and ended in October when the release pathway was identified. From October through December, the releases via the waste gas surge tank relief valve were accounted for as a normal release.

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TABLE 1A - REGULATORY GUIDE 1.21
SECOND HALF - 1996
GASEOUS EFFLUENTS - SUMMATION OF ALL RELEASES

A. FISSION AND ACTIVATION GASES	UNITS	3RD QUARTER	4TH QUARTER	EST. TOTAL ERROR %
1. Total Release	Ci	4.50E+00	1.51E+01	±1.20E+01
2. Average release rate for period	uCi/sec	5.66E-01	1.90E+00	
3. Percent of Technical Specification limit(1)	%	1.44E-04	6.06E-04	
4. Percent of Technical Specification limit(2)	%	1.28E-04	4.86E-04	
5. Percent of Technical Specification limit(3)	%	2.00E-03	8.38E-03	
6. Percent of Technical Specification limit(4)	%	9.99E-04	4.19E-03	
7. Percent of Technical Specification limit(5)	%	2.49E-03	7.95E-03	
8. Percent of Technical Specification limit(6)	%	1.24E-03	3.98E-03	
B. IODINES				
1. Total Iodine - 131	Ci	1.18E-04	1.17E-04	±6.50E+00
2. Average release rate for period	uCi/sec	1.48E-05	1.47E-05	
3. Percent of Technical Specification limit(7)	%	3.53E-05	3.50E-05	
4. Percent of Technical Specification limit(8)	%	8.89E-04	8.81E-04	
5. Percent of Technical Specification limit(9)	%	4.44E-04	4.41E-04	
C. PARTICULATES				
1. Particulates with half lives greater than 8 days	Ci	(10)	1.33E-06	±2.80E+01
2. Average release rate for period	uCi/sec	(10)	1.67E-07	
3. Percent of Technical Specification limit(7)	%	(10)	2.25E-08	
4. Percent of Technical Specification limit(8)	%	(10)	1.46E-05	
5. Percent of Technical Specification limit(9)	%	(10)	7.30E-06	
6. Gross alpha radioactivity	Ci	(10)	(10)	N/A
D. TRITIUM				
1. Total Release	Ci	1.03E+00	4.60E-01	±1.32E+01
2. Average release rate for period	uCi/sec	1.30E-01	5.79E-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 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 LLD requirements of ODCM Surveillance Requirement 4.11.2.1.2.

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TABLE 1C - REGULATORY GUIDE 1.21
SECOND HALF - 1996
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)	(2)	(2)
Krypton -85	Ci	(2)	(2)	1.05E+00	7.86E-01
Krypton -85m	Ci	(2)	(2)	(2)	(2)
Krypton -87	Ci	(2)	(2)	(2)	(2)
Krypton -88	Ci	(2)	(2)	(2)	(2)
Xenon -131m	Ci	(2)	(2)	(2)	5.92E-03
Xenon -133	Ci	2.13E+00	9.38E+00	2.76E-01	4.72E-01
Xenon -133m	Ci	(2)	(2)	1.43E-03	6.86E-03
Xenon -135	Ci	1.04E+00	4.43E+00	3.28E-04	6.39E-03
Xenon -138	Ci	(2)	(2)	(2)	(2)
Total for Period	Ci	3.17E+00	1.38E+01	1.33E+00	1.28E+00
2. HALOGENS					
Iodine -131	Ci	1.18E-04	1.17E-04	(1)	(1)
Iodine -133	Ci	1.63E-03	1.21E-03	(1)	(1)
Total For Period Ci	Ci	1.75E-03	1.33E-03	(1)	(1)
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)	1.33E-06	(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	Ci	(2)	1.33E-06	(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.

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EFFLUENT AND WASTE DISPOSAL - SUPPLEMENTAL INFORMATION

TABLE 2A - REGULATORY GUIDE 1.21
SECOND HALF - 1996
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	6.90E-02	2.88E-02	±1.03E+01
2.	Average diluted concentration during period	uCi/ml	6.77E-11	2.44E-11	
3.	Percent of Technical Specification limit(1)	%	6.42E-01	2.10E-01	
4.	Percent of Technical Specification limit(2)	%	3.21E-01	1.05E-01	
5.	Percent of Technical Specification limit(3)	%	5.97E-02	2.49E-02	
6.	Percent of Technical Specification limit(4)	%	2.99E-02	1.25E-02	
B.	**TRITIUM**				
1.	Total Release	Ci	8.35E+01	3.08E+02	±1.04 E+01
2.	Average diluted concentration during period	uCi/ml	8.19E-08	2.61E-07	
3.	Percent of applicable limit(5)	%	2.73E-03	8.70E-03	
C.	**DISSOLVED AND ENTRAINED GASES**				
1.	Total Release	Ci	9.20E-04	8.56E-03	±1.20E+01
2.	Average diluted concentration during period	uCi/ml	9.02E-13	7.26E-12	
D.	**GROSS ALPHA RADIOACTIVITY**				
1.	Total Release	Ci	(6)	(6)	
E.	**VOLUME OF WASTE RELEASED** (prior to dilution)	liters	5.37E+07	9.47E+07	±1.30E+00
F.	**VOLUME OF DILUTION WATER USED DURING PERIOD**	liters	1.02E+12	1.18E+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} uCi/ml

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

TABLE 2B - REGULATORY GUIDE 1.21
SECOND HALF - 1996
LIQUID EFFLUENTS

NUCLIDES RELEASED		UNITS	CONTINUOUS MODE		BATCH MODE	
			3RD QUARTER	4TH QUARTER	3RD QUARTER	4TH QUARTER
Sodium	-24	Ci	(1)	(1)	(1)	(1)
Chromium	-51	Ci	(1)	(1)	4.37E-03	6.06E-04
Manganese	-54	Ci	(1)	(1)	1.04E-03	5.09E-04
Iron	-55	Ci	(2)	(2)	2.36E-02	1.11E-02
Cobalt	-57	Ci	(1)	(1)	(1)	1.64E-05
Cobalt	-58	Ci	(1)	(1)	9.94E-03	3.07E-03
Iron	-59	Ci	(1)	(1)	2.89E-03	6.17E-05
Cobalt	-60	Ci	(1)	(1)	3.12E-03	2.42E-03
Zinc	-65	Ci	(1)	(1)	(1)	(1)
Strontium	-89	Ci	(1)	(1)	2.14E-05	(1)
Strontium	-90	Ci	(1)	(1)	1.04E-05	(1)
Strontium	-92	Ci	(1)	(1)	5.02E-05	(1)
Niobium	-95	Ci	(1)	(1)	8.35E-03	2.66E-03
Zirconium	-95	Ci	(1)	(1)	4.72E-03	1.67E-03
Niobium	-97	Ci	(1)	(1)	(1)	(1)
Zirconium	-97	Ci	(1)	(1)	(1)	(1)
Molybdenum	-99	Ci	(1)	(1)	(1)	(1)
Technetium	-99m	Ci	(1)	(1)	4.51E-06	(1)
Ruthenium	-103	Ci	(1)	(1)	4.24E-04	(1)
Ruthenium	-106	Ci	(1)	(1)	(1)	(1)
Silver	-110m	Ci	(1)	(1)	3.89E-03	2.17E-03
Tin	-113	Ci	(1)	(1)	1.61E-03	2.87E-04

TABLE 2B - REGULATORY GUIDE 1.21 (Continued)
CALVERT CLIFFS NUCLEAR POWER PLANT
EFFLUENT AND WASTE DISPOSAL SEMI-ANNUAL REPORT
SECOND HALF - 1996
LIQUID EFFLUENTS

			CONTINUOUS MODE		BATCH MODE	
NUCLIDES RELEASED		UNITS	3RD QUARTER	4TH QUARTER	3RD QUARTER	4TH QUARTER
Tin	-117m	Ci	(1)	(1)	1.77E-04	1.67E-05
Antimony	-122	Ci	(1)	(1)	(1)	(1)
Antimony	-124	Ci	(1)	(1)	(1)	(1)
Antimony	-125	Ci	(1)	(1)	3.73E-03	3.09E-03
Tellurium	-127	Ci	(1)	(1)	(1)	(1)
Tellurium	-129	Ci	(1)	(1)	(1)	(1)
Iodine	-131	Ci	(1)	(1)	6.84E-05	5.61E-04
Iodine	-133	Ci	(1)	(1)	8.62E-05	8.61E-05
Iodine	-135	Ci	(1)	(1)	(1)	1.93E-05
Cesium	-134	Ci	(1)	(1)	1.84E-04	1.12E-04
Cesium	-136	Ci	(1)	(1)	4.55E-06	(1)
Cesium	-137	Ci	(1)	(1)	6.01E-04	3.49E-04
Barium	-139	Ci	(1)	(1)	(1)	(1)
Barium	-140	Ci	(1)	(1)	(1)	(1)
Cerium	-139	Ci	(1)	(1)	(1)	(1)
Lanthanum	-140	Ci	(1)	(1)	(1)	(1)
Cerium	-141	Ci	(1)	(1)	(1)	2.07E-05
Cerium	-144	Ci	(1)	(1)	1.37E-04	(1)
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)	6.90E-02	2.88E-02
Krypton	-85	Ci	(1)	(1)	(1)	(1)
Xenon	-131m	Ci	(1)	(1)	(1)	(1)
Xenon	-133	Ci	(1)	(1)	9.13E-04	8.52E-03
Xenon	-133m	Ci	(1)	(1)	(1)	(1)
Xenon	-135	Ci	(1)	(1)	7.09E-06	4.09E-05
Xenon	-135m	Ci	(1)	(1)	(1)	(1)
Total For Period		Ci	(1)	(1)	9.20E-04	8.56E-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
CALVERT CLIFFS NUCLEAR POWER PLANT
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	1.70E+01	
		Ci	2.11E+02	±2.00E+01
b.	Dry Compressible Waste (Shipped)	m^3	3.46E+02	
	Contaminated Equipment, etc.	Ci	4.82E-01	±5.00E+01
b.*	Dry Compressible Waste (Buried)	m^3	1.37E+01	
	Contaminated Equipment, etc.	Ci	4.62E-01	±5.00E+01
c.	Irradiated Components,	m^3	0.00E+00	
	Control Rods, etc.	Ci	0.00E+00	N/A
d.	Other (Cartridge Filters)	m^3	6.80E+00	
		Ci	2.17E+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.

Fe-55	1.27E+01%
Co-58	6.16E+00%
Co-60	1.35E+01%
Ni-63	3.85E+01%
Cs-134	8.10E+00%
Cs-137	1.76E+01%

b.

H-3	1.84E+00%
C-14	1.52E+00%
Cr-51	8.75E+00%
Fe-55	2.27E+01%
Co-58	1.40E+01%
Co-60	2.29E+00%
Ni-63	1.58E+00%
Nb-95	1.71E+00%
Zr-95	1.33E+00%
Cs-134	1.32E+01%
Cs-137	2.96E+01%
Ce-144	1.16E+00%

c. N/A

d.	H-3	9.90E-02%
	C-14	9.95E+00%
	Cr-51	3.56E+00%
	Fe-55	3.95E+01%
	Co-58	1.73E+01%
	Co-60	2.29E+00%
	Ni-63	6.96E+00%
	Nb-95	5.91E+00%
	Zr-95	3.13E+00%
	Cs-134	9.41E-02%
	Cs-137	1.78E-01%
	Ce-144	9.64E-01%
	Sn-113	1.18E+00%
	Ru-106	1.12E+00%

Solid Waste Disposition

Number of Shipments	Mode of Transportation	Destination
3	Motor Surface Transit	Chem Nuclear Systems, Inc. Barnwell, SC
6	Motor Surface Transit	Scientific Ecology Group Oak Ridge, TN
3	Motor Surface Transit	Manufacturing Sciences Corp. Oak Ridge, TN
3	Motor Surface Transit	US Ecology, Inc. Oak Ridge, TN

APPENDIX (A)

WASTE SHIPMENTS
FOR THE
SECOND HALF OF 1996

Calvert Cliffs Nuclear Power Plant - Units 1 & 2
Independent Spent Fuel Storage Installation
August 20, 1997

APPENDIX A

CALVERT CLIFFS NUCLEAR POWER PLANT
RADIOACTIVE EFFLUENT RELEASE REPORT
WASTE SHIPMENTS FOR SECOND HALF OF 1996

TYPE WASTE:	DAW
10 CFR PART 61 WASTE CLASS:	A
SOURCE OF WASTE:	Radiologically Controlled Areas
SHIPPING CONTAINER	20' Sealand Containers, B-25 Metal Boxes, and 55 Gallon Drums
TOTAL CURIE QUANTITY:	0.482 Ci
HOW DETERMINED:	Dose to curie content, conversion by volume based on generic distribution and scaling factors
TOTAL SHIPPED WASTE VOLUME:	12,260 ft^3
TOTAL BURIAL WASTE VOLUME:	485.5 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

APPENDIX A

CALVERT CLIFFS NUCLEAR POWER PLANT
RADIOACTIVE EFFLUENT RELEASE REPORT
WASTE SHIPMENTS FOR SECOND HALF OF 1996

TYPE WASTE:	Dewatered Resin
10 CFR PART 61 WASTE CLASS:	A(S), and B
SOURCE OF WASTE:	Liquid Waste Processing Systems
SHIPPING CONTAINER:	High Integrity L-8-120 Liner (120.3)
TOTAL CURIE QUANTITY:	211.9 Ci
HOW DETERMINED:	Gamma scan analysis using resin sample, conversion by weight based on radionuclide distribution and scaling factors
TOTAL SHIPPED WASTE VOLUME:	601.5 ft^3
TOTAL BURIAL WASTE VOLUME:	601.5 ft^3
HOW DETERMINED:	Container volume and number of containers shipped
SOLIDIFICATION AGENT OR ABSORBENT:	None

APPENDIX A

CALVERT CLIFFS NUCLEAR POWER PLANT
RADIOACTIVE EFFLUENT RELEASE REPORT
WASTE SHIPMENTS FOR SECOND HALF OF 1996

TYPE WASTE	Mechanical Cartridge Filters
10 CFR PART 61 WASTE CLASS:	C
SOURCE OF WASTE:.	Liquid Waste Processing Systems
SHIPPING CONTAINER:	High Integrity L-8-120 Liner (120.3)
TOTAL CURIE QUANTITY:	21.7
HOW DETERMINED:	Dose to curie content, conversion by weight based on generic distribution and scaling factors
TOTAL SHIPPED WASTE VOLUME:	240.6 ft^3
TOTAL BURIAL WASTE VOLUME:	240.6 ft^3
HOW DETERMINED:	Container volume and number of containers shipped
SOLIDIFICATION AGENT OR ABSORBENT:	None