Calvert Cliffs Nuclear Power Plant
Constellation Generation Group, LLC

1650 Calvert Cliffs Parkway
Lusby, Maryland 20657

Constellation Energy

July 13, 2006

U. S. Nuclear Regulatory Commission
Washington, DC 20555

ATTENTION: Document Control Desk

SUBJECT: Calvert Cliffs Nuclear Power Plant; Unit Nos. 1 & 2; Docket Nos. 50-317 & 50-318
Independent Spent Fuel Storage Installation, Docket No. 72-8
2005 Radioactive Effluent Release Report

REFERENCES: (a) Calvert Cliffs Unit Nos. 1 and 2 Technical Specification 5.6.3

(b) Calvert Cliffs Unit Nos. 1 and 2 Technical Specification 5.5.1

(c) Calvert Cliffs Independent Spent Fuel Storage Installation Technical Specification 6.3

As required by References (a), (b), and (c), Enclosure (1) is provided. Meteorological data is kept in our onsite file and is available upon request.

Should you have questions regarding this matter, please contact Mr. L. S. Larragoite at (410) 495-4922.

Very truly yours,

Steven R. Sanders
General Supervisor - Chemistry

SRS/CAN/bjd

Enclosure: (1) Calvert Cliffs Nuclear Power Plant Effluent and Waste Disposal 2005 Annual Report

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ENCLOSURE (1)

CALVERT CLIFFS NUCLEAR POWER PLANT

EFFLUENT AND WASTE DISPOSAL

2005 ANNUAL REPORT

Calvert Cliffs Nuclear Power Plant, Inc.
July 13, 2006

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. 2005 Dose Assessment Summary

	Actual Value	Percent of ODCM limit	ODCM Limit
Liquid Waste:			
Maximum Annual Organ Dose (mRem) [1]	0.017	0.08%	20
Maximum Whole Body Dose (mRem) [1]	0.004	0.06%	6
Gaseous Waste:			
Noble Gases:			
Maximum Quarterly Gamma Air Dose (mRad)	0.002	0.02%	10
Maximum Quarterly Beta Air Dose (mRad)	0.008	0.04%	20
Iodines and Particulates:			
Maximum Annual Organ Dose (mRem) [2]	0.04	0.1%	30

[1] The controlling pathway was the fish and shellfish pathway with adult as the controlling age group and the bone representing the organ with the highest calculated dose during the calendar year of 2005.

[2] The controlling pathway was the child-infant-thyroid pathway representing the organ with the highest calculated dose during the calendar year of 2005. There is currently no milk pathway.

2. 40 CFR 190 Total Dose Compliance

Based upon the calendar year 2005 and the ODCM calculations, the maximum exposed individual would receive less than 1% of the allowable dose. During the calendar year 2005, 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 may be found in the ***Annual Radiological Environmental Operating Report.***

3. Solid Waste Report Requirements

During 2005, the types of radioactive solid waste shipped from Calvert Cliffs were dry compressible waste, spent resins, irradiated components, and cartridge filters which were shipped in either High Integrity Containers (HICs) within NRC approved casks, Sealand containers, or steel boxes. Appendix A provides a detailed breakdown of the waste shipments for 2005 per 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) Changes

The ODCM was not revised during calendar year 2005.

B. Radioactive Effluent Monitoring Instrumentation

In 2005, the minimum channels operable requirement for the radiation monitor on the steam generator blowdown release pathway for Calvert Cliffs Unit 1 was not satisfied for greater than 30 days. Per ODCM 3.3.3.10, Radioactive Liquid Effluents, Action b:

> *"with less than the minimum number of radioactive liquid effluent monitoring instrumentation channels operable, take the action shown in Table 3.3-13. Exert best efforts to return the instruments to operable status within 30 days and, if unsuccessful, explain in the next Annual Radioactive Effluent Release Report why the inoperability was not corrected in a timely manner."*

There are two radiation monitors on the Unit-1 steam generator blowdown line: 1-RE-4014 and 1-RE-4095. The ODCM requires that one channel remain operable in accordance with the minimum requirements of the ODCM. On 25-Mar-05, 1-RE-4014 was declared inoperable. On 30-Jun-2005, 1-RE-4095 was also declared out of service. At that time, the provisions of Action 29 (ODCM Table 3.3-13) were implemented. Those actions required:

> *"with the number of channels operable less than required by the minimum channels operable requirement, effluent releases via this pathway may continue provided grab samples are analyzed for gross radioactivity (beta or gamma) at the lower limit of detection defined in Table 4.11-1 at least every 48 hours when the specific activity of the secondary coolant is less than or equal to 0.01 microcuries/gram dose equivalent I-131."*

Chemistry sampling continued while system engineering attempted to execute a plan to return the radiation detector to service. On 30-Jul-05 at 15:15, 30 days had elapsed with no radiation monitors on the steam generator blowdown line. A suitable replacement detector was not available. Condition Report IRE-007-257 was written to address this issue. 1-RE-4014 was returned to service on 1-Nov-2005.

During calendar year 2005, the flow measuring instrumentation for monitoring waste gas decay tank discharges was out of service for greater than 30 days. On 15-Apr-05, the waste gas flow indicator 0-FI-2192 was declared inoperable. Flow indication was biased low based on routine comparison of radiation monitor responses (actual versus theoretical). A team was formed to address the issue. The old flow indicator had an orifice sized for measuring air (21% oxygen, 78% nitrogen). The new flow detector had an orifice sized for measuring predominately hydrogen (which is a typically a major component of the gases in the waste gas decay tanks). The flow indicator was replaced 29-Aug-05 and the flow indicator was returned to service.

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

There were two (2) casks of spent fuel transferred to the ISFSI during 2005. No quantity of radionuclides was released to the environment during the ISFSI operation in 2005. 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 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 germanium 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 germanium detector for the principal gamma emitting noble gas radionuclides. The total activity released is based on containment volume and purge rate. Alternatively, total activity released is based on continuous radiation monitor responses, grab samples, and purge fan flow 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. There was only one exception to this practice in 2005. The details are outlined below.

During November 2005, the Unit-1 main vent tritium analysis indicated tritium had increased more than 1 order of magnitude above the highest tritium reported during the previous 16 years. An investigation revealed that the sample was prepared using the high-activity glassware (rather than the low activity glassware). As a result, the November 2005 tritium analysis result for the Unit-1 main vent was biased high. The tritium values for the months before and after (October and December) indicated normal results with no adverse trend. Similarly, there were no adverse trends in the noble gas responses nor in iodine or particulate releases during November 2005. There were no plant transients or unusual discharges during November 2005. The primary source of tritium discharged in gaseous radwaste originates from evaporation of the spent fuel pool water. It is not possible for the order-of-magnitude increase in tritium to have originated from spent fuel pool since evaporation rates are relatively constant. Instead of reporting a tritium result that was known to be biased, it was decided to report the highest tritium concentration seen in any month in the last 16 years. As a result, instead of reporting 1.79E-7 uCi/cc tritium for Unit-1 in November, a value of 1.1E-8 uCi/cc was reported instead.

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 (or more often) and are analyzed by gamma spectroscopy using a germanium 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. A plate-out correction factor is applied to the results to account for the amount of iodine lost in the sample lines prior to sample collection. 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, and this is used to prepare monthly tritium and quarterly gross alpha, iron-55, nickel-63, strontium-89, and strontium-90 samples for analysis.

There were no major changes to the liquid radwaste system in calendar year 2005.

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 and gamma isotopic analysis is performed 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. 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 discharged to the circulating water conduits. 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.

E. Reporting and Recordkeeping for Decommissioning Planning

In accordance with 10 CFR 50.75.g, each licensee shall keep records of information important to the safe and effective decommissioning of the facility in an identified location until the license is terminated by the Commission. If records of relevant information are kept for other purposes, reference to these records and their locations may be used. Information the Commission considers important to decommissioning consists of records of spills or other unusual occurrences involving the spread of contamination in and around the facility, equipment, or site. These records may be limited to instances when significant contamination remains after any cleanup procedures or when there is reasonable likelihood that contaminants may have spread to inaccessible areas as in the case of possible seepage into porous materials such as concrete. These records must include any known information on identification of involved nuclides, quantities, forms, and concentrations.

In calendar year 2005, low levels of tritium were found in a piezometer tube outside site buildings, but within the controlled area (on site property). Routine annual samples of four piezometer tubes were collected on 3-Dec-05. A piezometer tube is a shallow monitoring well which allows access to shallow groundwater beneath the site. Three of the four piezometer tube samples showed no positive, plant-related activity. Multiple samples from piezometer tube #11, however, indicated tritium was present at a concentration of approximately 1,800 pCi/liter (±900 pCi/liter). The tritium contamination is contained within the protected area, on site property. The shallow monitoring wells are not used for

drinking water, and the shallow groundwater at this location does not impact any drinking water pathway. The results of the piezometer tube analyses are reproduced below:

Groundwater Monitoring Sample Results

Sample location	Date	Tritium Concentration	
		microcuries/milliliter	picocuries/liter
11 Piezometer Tube	3-Dec-05 14:10	2.62E-6	2620
11 Piezometer Tube	3-Dec-05 14:10	1.72E-6	1720
11 Piezometer Tube	6-Dec-05 13:30	1.77E-6	1770
11 Piezometer Tube	6-Dec-05 13:30	1.84E-6	1840
11 Piezometer Tube	13-Dec-05 11:00	2.88E-6	2880
11 Piezometer Tube	21-Dec-05 12:25	2.16E-6	2160
11 Piezometer Tube	19-Jan-06 09:52	Not Detected, <1.48E-6	Not Detected, <1,480
11 Piezometer Tube	26-Jan-06 12:55	Not Detected, <1.36E-6	Not Detected, <1,360
11 Piezometer Tube	2-Feb-06 15:30	Not Detected, <1.50E-6	Not Detected, <1,500
11 Piezometer Tube	14-Feb-06 13:30	Not Detected, <1.57E-6	Not Detected, <1,570
11 Piezometer Tube	16-Mar-06 12:45	Not Detected, < 1.54E-6	Not Detected, <1,540
11 Piezometer Tube	18-Apr-06 13:05	Not Detected, < 1.53E-6	Not Detected, <1,530
11 Piezometer Tube	16-May-06 13:06	Not Detected, < 1.60E-6	Not Detected, <1,600
12 Piezometer Tube	13-Dec-05 10:35	Not Detected, <1.40E-6	Not Detected, <1,400
13 Piezometer Tube	13-Dec-05 10:30	Not Detected, <1.54E-6	Not Detected, <1,540
15 Piezometer Tube	13-Dec-05 10:20	Not Detected, <1.40E-6	Not Detected, <1,400
18 Piezometer Tube	13-Dec-05 10:36	Not Detected, <1.40E-6	Not Detected, <1,400

Since the groundwater sample campaign began at year's end and extended into calendar year 2006, the results through May 2006 are also included in the above list. As shown in the above table, positive tritium activity was detected on 3-Dec-2005, but approximately 45 days later (on 19-Jan-06) levels of tritium were below the detection limits. No gamma activity was detected in any of these samples. An entry was made in the decommissioning file to document tritium found in 11 Piezometer Tube. Calvert Cliffs submitted an industry operating experience report (OE21958) in 2006, and additional information is contained in that report. Since this tritium is believed to originate from normal radwaste discharges, the tritium activity released to the groundwater was reported in previous Annual Radioactive Effluent Release Reports.

VI. BATCH RELEASES

	2005			
	1ST QUARTER	2ND QUARTER	3RD QUARTER	4TH QUARTER
A. Liquid				
1. Number of batch releases	1.40E+01	1.00E+01	9.00E+00	1.00E+01
2. Total time period for batch releases (min)	5.77E+03	3.65E+03	3.55E+03	4.17E+03
3. Maximum time period for a batch release (min)	6.02E+02	6.36E+02	6.26E+02	5.94E+02
4. Average time period for batch releases (min)	4.12E+02	3.65E+02	3.94E+02	4.17E+02
5. Minimum time period for a batch release (min)	1.20E+01	2.80E+01	2.50E+01	2.50E+01
6. Average stream flow during periods of effluent into a flowing stream (liters/min of dilution water)	4.62E+06	4.62E+06	4.62E+06	4.62E+06
B. Gaseous				
1. Number of batch releases	7.00E+00	4.00E+00	3.00E+00	1.00E+00
2. Total time period for batch releases (min)	3.89E+03	4.76E+02	5.06E+02	1.31E+02
3. Maximum time period for a batch release (min)	1.44E+03	1.50E+02	2.23E+02	1.31E+02
4. Average time period for batch release (min)	5.56E+02	1.19E+02	1.69E+02	1.31E+02
5. Minimum time period for a batch release (min)	7.40E+01	5.30E+01	1.41E+02	1.31E+02

VII. ABNORMAL RELEASES

	2005			
	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

A. FISSION AND ACTIVATION GASES	UNITS	1ST QUARTER	2ND QUARTER	EST. TOTAL ERROR, %
1. Total Release	Ci	8.32E+01	2.41E+01	±1.20E+01
2. Average release rate for period	µCi/sec	1.07E+01	3.07E+00	
3. Percent of Tech. Spec. limit (1)	%	1.49E-03	4.49E-04	
4. Percent of Tech. Spec. limit (2)	%	7.33E-04	2.65E-04	
5. Percent of Tech. Spec. limit (3)	%	2.14E-02	6.34E-03	
6. Percent of Tech. Spec. limit (4)	%	1.07E-02	3.17E-03	
7. Percent of Tech. Spec. limit (5)	%	3.61E-02	1.22E-02	
8. Percent of Tech. Spec. limit (6)	%	1.80E-02	6.12E-03	
B. IODINES				
1. Total Iodine - 131	Ci	8.18E-04	9.77E-05	±6.50E+00
2. Average release rate for period	µCi/sec	1.05E-04	1.24E-05	
3. Percent of Tech. Spec. limit (7)	%	2.50E-04	2.95E-05	
4. Percent of Tech. Spec. limit (8)	%	6.16E-03	7.36E-04	
5. Percent of Tech. Spec. limit (9)	%	3.08E-03	3.68E-04	
C. PARTICULATES				
1. Particulates with half lives greater than 8 days	Ci	8.20E-06	2.63E-06	±1.20E+01
2. Average release rate for period	µCi/sec	1.05E-06	3.35E-07	
3. Percent of Tech. Spec. limit (7)	%	1.75E-07	1.88E-06	
4. Percent of Tech. Spec. limit (8)	%	4.42E-06	4.74E-05	
5. Percent of Tech. Spec. limit (9)	%	2.21E-06	2.37E-05	
6. Gross alpha radioactivity	Ci	1.10E-06	1.69E-06	±3.00E+01

A. FISSION AND ACTIVATION GASES	UNITS	3RD QUARTER	4TH QUARTER	EST. TOTAL ERROR, %
1. Total Release	Ci	3.33E+01	5.05E+01	±1.20E+01
2. Average release rate for period	µCi/sec	4.18E+00	6.35E+00	
3. Percent of Tech. Spec. limit (1)	%	8.45E-04	1.12E-03	
4. Percent of Tech. Spec. limit (2)	%	3.59E-04	5.24E-04	
5. Percent of Tech. Spec. limit (3)	%	1.21E-02	1.63E-02	
6. Percent of Tech. Spec. limit (4)	%	6.05E-03	8.14E-03	
7. Percent of Tech. Spec. limit (5)	%	1.57E-02	2.52E-02	
8. Percent of Tech. Spec. limit (6)	%	7.83E-03	1.26E-02	
B. IODINES				
1. Total Iodine - 131	Ci	1.28E-04	3.17E-04	±6.50E+00
2. Average release rate for period	µCi/sec	1.61E-05	3.99E-05	
3. Percent of Tech. Spec. limit (7)	%	3.82E-05	9.48E-05	
4. Percent of Tech. Spec. limit (8)	%	9.63E-04	2.39E-03	
5. Percent of Tech. Spec. limit (9)	%	4.81E-04	1.19E-03	
C. PARTICULATES				
1. Particulates with half lives greater than 8 days	Ci	2.52E-06	1.24E-07	±1.20E+01
2. Average release rate for period	µCi/sec	3.17E-07	1.56E-08	
3. Percent of Tech. Spec. limit (7)	%	(10)	5.76E-09	
4. Percent of Tech. Spec. limit (8)	%	(10)	1.45E-07	
5. Percent of Tech. Spec. limit (9)	%	(10)	7.26E-08	
6. Gross alpha radioactivity	Ci	2.52E-06	(10)	±3.00E+01

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	1.29E+00	8.13E-01	±1.32E+01
2. Average release rate for period	µCi/sec	1.65E-01	1.03E-01	

D. TRITIUM	UNITS	3RD QUARTER	4TH QUARTER	EST. TOTAL ERROR, %
1. Total Release	Ci	1.80E+00	2.58E+00	±1.32E+01
2. Average release rate for period	µCi/sec	2.26E-01	3.25E-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 1ST QUARTER	CONTINUOUS MODE 2ND QUARTER	BATCH MODE 1ST QUARTER	BATCH MODE 2ND QUARTER
1. FISSION AND ACTIVATION GASES			(2)			
Argon	-41	Ci	(2)	(2)	2.87E-03	(2)
Krypton	-85	Ci	9.01E+00	(2)	3.09E+00	7.67E+00
Krypton	-85m	Ci	2.17E-02	(2)	3.89E-05	(2)
Krypton	-87	Ci	(2)	(2)	(2)	(2)
Krypton	-88	Ci	9.06E-03	(2)	(2)	(2)
Xenon	-131m	Ci	6.27E-01	(2)	1.52E-02	1.31E-02
Xenon	-133	Ci	6.61E+01	1.44E+01	2.95E-01	4.54E-02
Xenon	-133m	Ci	6.08E-01	(2)	2.17E-03	(2)
Xenon	-135	Ci	3.44E+00	2.01E+00	1.76E-03	(2)
Xenon	-135m	Ci	(2)	(2)	(2)	(2)
Xenon	-138	Ci	(2)	(2)	(2)	(2)
Total for Period		Ci	7.98E+01	1.64E+01	3.41E+00	7.73E+00
2. HALOGENS						
Iodine	-131	Ci	8.18E-04	9.77E-05	(1)	(1)
Iodine	-133	Ci	3.35E-04	5.05E-04	(1)	(1)
Bromine	-82	Ci	(2)	(2)	(1)	(1)
Total for Period		Ci	1.15E-03	6.02E-04	(1)	(1)

		UNITS	CONTINUOUS MODE 3RD QUARTER	CONTINUOUS MODE 4TH QUARTER	BATCH MODE 3RD QUARTER	BATCH MODE 4TH QUARTER
1. FISSION AND ACTIVATION GASES						
Argon	-41	Ci	(2)	(2)	(2)	(2)
Krypton	-85	Ci	(2)	(2)	1.61E+00	8.55E-01
Krypton	-85m	Ci	(2)	(2)	4.99E-05	0.00E+00
Krypton	-87	Ci	(2)	(2)	(2)	(2)
Krypton	-88	Ci	(2)	(2)	(2)	(2)
Xenon	-131m	Ci	(2)	(2)	1.61E-03	(2)
Xenon	-133	Ci	2.77E+01	4.60E+01	9.75E-02	1.27E-03
Xenon	-133m	Ci	(2)	(2)	7.04E-04	(2)
Xenon	-135	Ci	3.84E+00	3.61E+00	1.03E-03	(2)
Xenon	-135m	Ci	(2)	(2)	(2)	(2)
Xenon	-138	Ci	(2)	(2)	(2)	(2)
Total for Period		Ci	3.15E+01	4.97E+01	1.71E+00	8.57E-01
2. HALOGENS						
Iodine	-131	Ci	1.28E-04	3.17E-04	(1)	(1)
Iodine	-133	Ci	9.49E-04	1.27E-03	(1)	(1)
Bromine	-82	Ci	(2)	(2)	(1)	(1)
Total For Period		Ci	1.08E-03	1.58E-03	(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 -55	Ci	(2)	(2)	(1)	(1)
Iron -59	Ci	(2)	(2)	(1)	(1)
Cobalt -58	Ci	7.09E-06	(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)	9.43E-07	(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	1.10E-06	1.69E-06	(1)	(1)
Total For Period	Ci	8.20E-06	2.63E-06	(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)
Iron -55	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)	1.24E-07	(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	2.52E-06	(2)	(1)	(1)
Total For Period	Ci	2.52E-06	1.24E-07	(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	9.02E+00	7.89E+01	±1.03E+01
2. Average diluted concentration during period	µCi/ml	3.38E-10	4.68E-09	
3. Percent of Tech. Spec. limit (1)	%	6.14E-03	9.74E-03	
4. Percent of Tech. Spec. limit (2)	%	3.07E-03	4.87E-03	
5. Percent of Tech. Spec. limit (3)	%	7.97E-03	4.87E-03	
6. Percent of Tech. Spec. limit (4)	%	3.98E-03	2.43E-03	
B. TRITIUM				
1. Total Release	Ci	2.67E+02	2.13E+02	±1.03E+01
2. Average diluted concentration during period	µCi/ml	4.92E-07	3.47E-07	
3. Percent of applicable limit (5)	%	1.64E-02	1.16E-02	
C. DISSOLVED AND ENTRAINED GASES				
1. Total Release	Ci	1.15E-01	2.03E-03	±1.03E+01
2. Average diluted concentration during period	µCi/ml	4.32E-09	1.21E-10	

	UNITS	3RD QUARTER	4TH QUARTER	EST. TOTAL ERROR, %
A. FISSION AND ACTIVATION PRODUCTS				
1. Total Release (not including tritium, gases, alpha)	Ci	1.93E+01	2.97E+00	±1.03E+01
2. Average diluted concentration during period	µCi/ml	1.18E-09	1.54E-10	
3. Percent of Tech. Spec. limit (1)	%	2.67E-03	6.41E-03	
4. Percent of Tech. Spec. limit (2)	%	1.34E-03	3.21E-03	
5. Percent of Tech. Spec. limit (3)	%	6.37E-03	1.25E-02	
6. Percent of Tech. Spec. limit (4)	%	3.18E-03	6.25E-03	
B. TRITIUM				
1. Total Release	Ci	2.24E+02	2.87E+02	±1.03E+01
2. Average diluted concentration during period	µCi/ml	2.17E-07	4.54E-07	
3. Percent of applicable limit (5)	%	7.23E-03	1.51E-02	
C. DISSOLVED AND ENTRAINED GASES				
1. Total Release	Ci	2.63E-03	2.17E-02	±1.03E+01
2. Average diluted concentration during period	µCi/ml	1.60E-10	1.12E-09	

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)				
1. Volume processed through radwaste system	liters	2.44E+06	1.51E+06	±1.30E+00
2. Volume low activity from secondary system	liters	7.91E+07	6.32E+07	±1.30E+00
F. VOLUME OF DILUTION WATER USED DURING PERIOD (7)	liters	1.03E+12	1.18E+12	±1.64E+01

	UNITS	3RD QUARTER	4TH QUARTER	EST. TOTAL ERROR, %
D. GROSS ALPHA RADIOACTIVITY				
1. Total Release	Ci	(6)	(6)	N/A
E. VOLUME OF WASTE RELEASED (prior to dilution)				
1. Volume processed through radwaste system	liters	1.44E+06	1.66E+06	±1.30E+00
2. Volume low activity from secondary system	liters	3.24E+07	2.50E+07	±1.30E+00
F. VOLUME OF DILUTION WATER USED DURING PERIOD (7)	liters	1.20E+12	1.20E+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) Includes dilution water used during continuous discharges.

TABLE 2B - REG GUIDE 1.21

LIQUID EFFLUENTS

		CONTINUOUS MODE		BATCH MODE	
NUCLIDES RELEASED	Units	1ST QUARTER	2ND QUARTER	1ST QUARTER	2ND QUARTER
Beryllium – 7	Ci	(1)	(1)	(1)	(1)
Sodium – 24	Ci	(1)	(1)	(1)	(1)
Chromium - 51	Ci	(1)	(1)	1.22E-04	2.67E-04
Manganese - 54	Ci	(1)	(1)	1.14E-05	2.01E-05
Iron – 55	Ci	(2)	(2)	7.88E-04	6.51E-02
Cobalt – 57	Ci	(1)	(1)	(1)	1.39E-06
Cobalt – 58	Ci	(1)	(1)	1.23E-03	1.00E-03
Iron – 59	Ci	(1)	(1)	4.08E-06	1.25E-05
Cobalt – 60	Ci	(1)	(1)	2.57E-04	1.21E-04
Nickel-63	Ci	(1)	(1)	3.17E-04	4.92E-03
Zinc – 65	Ci	(1)	(1)	(1)	(1)
Strontium - 89	Ci	(1)	(1)	2.75E-04	7.54E-05
Strontium - 90	Ci	(1)	(1)	(1)	(1)
Strontium - 92	Ci	(1)	(1)	(1)	(1)
Niobium - 95	Ci	(1)	(1)	2.81E-05	1.24E-04
Zirconium - 95	Ci	(1)	(1)	2.30E-05	8.81E-05
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)	(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)	(1)
Tin – 113	Ci	(1)	(1)	(1)	(1)
Tin – 117m	Ci	(1)	(1)	6.10E-05	6.72E-05
Antimony - 122	Ci	(1)	(1)	(1)	(1)
Antimony - 124	Ci	(1)	(1)	(1)	(1)
Antimony - 125	Ci	(1)	(1)	8.57E-06	(1)
Tellurium – 125m	Ci	(1)	(1)	5.68E-03	7.02E-03
Tellurium - 132	Ci	(1)	(1)	(1)	(1)
Iodine - 131	Ci	(1)	(1)	1.45E-04	2.59E-06
Iodine - 132	Ci	(1)	(1)	(1)	(1)
Iodine – 133	Ci	(1)	(1)	2.32E-06	4.38E-06
Iodine – 135	Ci	(1)	(1)	(1)	(1)
Cesium – 134	Ci	(1)	(1)	2.25E-05	3.02E-05
Cesium – 136	Ci	(1)	(1)	(1)	(1)
Cesium – 137	Ci	(1)	(1)	4.58E-05	3.49E-05
Barium – 140	Ci	(1)	(1)	(1)	(1)
Lanthanum - 140	Ci	(1)	(1)	(1)	(1)
Cerium – 144	Ci	(1)	(1)	(1)	(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)	9.02E-03	7.89E-02

TABLE 2B - REG GUIDE 1.21

LIQUID EFFLUENTS

		CONTINUOUS MODE		BATCH MODE	
NUCLIDES RELEASED	Units	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)	(1)	(1)
Manganese - 54	Ci	(1)	(1)	5.39E-06	4.22E-06
Iron – 55	Ci	(2)	(2)	1.81E-02	2.71E-03
Cobalt - 57	Ci	(1)	(1)	(1)	(1)
Cobalt - 58	Ci	(1)	(1)	1.21E-04	3.97E-05
Iron – 59	Ci	(1)	(1)	(1)	(1)
Cobalt - 60	Ci	(1)	(1)	1.99E-04	1.67E-05
Nickel-63	Ci	(1)	(1)	7.82E-04	1.40E-04
Zinc – 65	Ci	(1)	(1)	(1)	(1)
Strontium - 89	Ci	(1)	(1)	3.25E-05	(1)
Strontium - 90	Ci	(1)	(1)	(1)	(1)
Strontium - 92	Ci	(1)	(1)	(1)	(1)
Niobium - 95	Ci	(1)	(1)	4.41E-06	3.88E-06
Zirconium - 95	Ci	(1)	(1)	4.38E-06	1.95E-06
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)	(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)	9.78E-06	(1)
Tin – 113	Ci	(1)	(1)	(1)	(1)
Tin – 117m	Ci	(1)	(1)	(1)	(1)
Antimony - 122	Ci	(1)	(1)	(1)	(1)
Antimony - 124	Ci	(1)	(1)	(1)	(1)
Antimony - 125	Ci	(1)	(1)	(1)	(1)
Tellurium – 125m	Ci	(1)	(1)	(1)	(1)
Tellurium - 132	Ci	(1)	(1)	(1)	(1)
Iodine - 131	Ci	(1)	(1)	4.39E-06	6.35E-06
Iodine - 132	Ci	(1)	(1)	(1)	(1)
Iodine - 133	Ci	(1)	(1)	4.91E-06	4.24E-06
Iodine - 135	Ci	(1)	(1)	(1)	(1)
Cesium - 134	Ci	(1)	(1)	1.48E-05	8.03E-06
Cesium - 136	Ci	(1)	(1)	(1)	(1)
Cesium - 137	Ci	(1)	(1)	1.97E-05	3.17E-05
Barium - 140	Ci	(1)	(1)	(1)	(1)
Lanthanum - 140	Ci	(1)	(1)	(1)	(1)
Cerium - 144	Ci	(1)	(1)	(1)	(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)	1.93E-02	2.97E-03

TABLE 2B - REG GUIDE 1.21

LIQUID EFFLUENTS

		CONTINUOUS MODE		BATCH MODE	
NUCLIDES RELEASED	Units	1ST QUARTER	2ND QUARTER	1ST QUARTER	2ND QUARTER
Krypton – 85	Ci	(1)	(1)	(1)	(1)
Xenon - 131m	Ci	(1)	(1)	1.92E-03	(1)
Xenon – 133	Ci	(1)	(1)	1.13E-01	2.03E-03
Xenon – 133m	Ci	(1)	(1)	6.99E-04	(1)
Xenon – 135	Ci	(1)	(1)	5.28E-05	(1)
Total For Period	Ci	(1)	(1)	1.15E-01	2.03E-03

		CONTINUOUS MODE		BATCH MODE	
NUCLIDES RELEASED	Units	3RD QUARTER	4TH QUARTER	3RD QUARTER	4TH QUARTER
Krypton - 85	Ci	(1)	(1)	(1)	6.42E-03
Xenon-131m	Ci	(1)	(1)	(1)	(1)
Xenon - 133	Ci	(1)	(1)	2.63E-03	1.52E-02
Xenon – 133m	Ci	(1)	(1)	(1)	(1)
Xenon - 135	Ci	(1)	(1)	(1)	(1)
Total For Period	Ci	(1)	(1)	2.63E-03	2.17E-02

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	1.42E+01 1.23E+02	2.50E+01
b)	Dry compressible waste, contaminated equipment, etc.	m^3 Ci	6.84E+02 2.16E+00	2.50E+01
c)	Irradiated components, control rods, etc.	m^3 Ci	4.13E-01 3.78E-01	2.50E+01
d)	Other (Cartridge Filters)	m^3 Ci	1.07E+02 2.31E+01	2.50E+01

Volume shipped represents waste generated prior to offsite volume reduction.

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

a)	Fe-55	9.48E+00%
	Co-58	1.98E+00%
	Co-60	3.32E+00%
	Ni-63	1.91E+01%
	Cs-134	2.54E+01%
	Cs-137	3.76E+01%
	Cr-51	1.32E+00%
	Mn-54	3.83E+00%
b)	Fe-55	2.57E+01%
	Co-58	1.55E+01%
	Co-60	1.88E+01%
	Ni-63	1.70E+01%
	Nb-95	7.59E+00%
	Zr-95	3.36E+00%
	Sb-125	1.38E+00%
	Cs-137	1.26E+00%
c)	Mn-54	2.33E+00%
	Fe-55	3.76E+01%
	Co-60	5.06E+01%
	Ni-63	7.41E+00%
d)	Fe-55	6.54E+01%
	Co-60	9.03E+00%
	Ni-63	1.91E+01%
	Sb-125	4.03E+00%
	Cs-134	2.58E+01%
	Cs-137	3.49E+01%

3. Solid Waste Disposition

Number of Shipments	Mode of Transportation	Destination
1	Motor Surface Transit	Chem. Nuclear Systems, Inc. Barnwell, SC
4	Motor Surface Transit	Duratek Oak Ridge, TN
6	Motor Surface Transit	Studsvik, Inc
15	Motor Surface Transit	RACE, Inc

B. IRRADIATED FUEL SHIPMENTS (DISPOSITION) N/A