

**ARKANSAS NUCLEAR ONE**

**UNIT 1 AND UNIT 2**

**OPERATING LICENSE NOS. DPR-51, NPF-6, and 72-13 (ISFSI)**

**ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT**

**JANUARY 1 THROUGH DECEMBER 31, 2008**

**ANO-1 & 2 Annual Radioactive Effluent  
Release Report for 2008**

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**ANO-1 & 2 Annual Radioactive Effluent  
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**1. INTRODUCTION**

Arkansas Nuclear One (ANO) is a two unit site consisting of a Babcock & Wilcox (Unit 1) and a Combustion Engineering (Unit 2) nuclear steam supply system. Both liquid and gaseous effluents are released in accordance with the Offsite Dose Calculation Manual (ODCM). This report is a summary of the effluent data in accordance with Unit 1 TS 5.6.3 and Unit 2 TS 6.6.3. This report provides the following information:

- A. Routine radioactive effluent release reports covering the operation of the units and the independent spent fuel storage installation (ISFSI) during the reporting period.
- B. Description of unplanned releases to unrestricted areas.
- C. Description of changes to the Offsite Dose Calculation Manual (ODCM).
- D. Description of changes to the Process Control Program (PCP).
- E. Summary of radiation doses due to radiological effluents during the previous calendar year.
- F. Radiation dose to members of the public due to activities inside the site boundary.
- G. Description of licensee initiated major changes to the radioactive waste systems during the previous calendar year.
- H. Items to be reported in the Annual Radioactive Effluent Release Report per other miscellaneous ODCM requirements.

This report covers the period from January 1 through December 31, 2008.

**2. REGULATORY LIMITS**

The ODCM contains the limits to which ANO must adhere. Because of the "as low as reasonably achievable" (ALARA) philosophy at ANO, actions are taken to reduce the amount of radiation released to the environment. Liquid and gaseous release data show that the dose from both Unit 1 and Unit 2 is considerably below the ODCM limits. This data reveals that the radioactive effluents have an overall minimal dose contribution to the surrounding environment. The following are the limits required by the ODCM:

**A. Gaseous Effluents**

- 1. Dose rate due to radioactive materials released in gaseous effluent to unrestricted areas shall be limited to the following:
  - a. Noble gases
    - Less than or equal to 500 mrem/year to the total body
    - Less than or equal to 3000 mrem/year to the skin

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- b. Iodine-131, tritium, and for all radionuclides in particulate form with half lives greater than 8 days

Less than or equal to 1500 mrem/yr to any organ

2. Dose - Noble Gases

Quarterly

Less than or equal to 5 mrad gamma  
Less than or equal to 10 mrad beta

Yearly

Less than or equal to 10 mrad gamma  
Less than or equal to 20 mrad beta

3. Dose - Iodine-131, Tritium, and Radionuclides in Particulate Form

Quarterly

Less than or equal to 7.5 mrem to any organ

Yearly

Less than or equal to 15 mrem to any organ

B. Liquid Effluents

1. Concentration

The concentration of radioactive material released to the discharge canal shall be limited to the concentration specified in 10 CFR 20, Appendix B, Table II, Column 2, for radionuclides other than dissolved or entrained noble gases. For dissolved or entrained noble gases, the total concentration released shall be limited to 2E-4 microcuries/ml.

2. Dose

Quarterly

Less than or equal to 1.5 mrem total body  
Less than or equal to 5 mrem critical organ

Yearly

Less than or equal to 3 mrem total body  
Less than or equal to 10 mrem critical organ

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**3. SUMMARY OF LIQUID EFFLUENT DATA**

As required by Regulatory Guide 1.21, Rev. 1, *Radioactivity in Solid Wastes and Releases of Radioactive Materials in Liquid and Gaseous Effluents from Light-Water-Cooled Nuclear Power Plants*, a summary of data for liquid releases is provided in the Annual Radioactive Effluent Release Report. This summary covers releases from January 1 through December 31, 2008. The summary of liquid effluents for both Unit 1 and Unit 2 is as follows:

	<u>Unit 1</u>	<u>Unit 2</u>
Number of releases	199	78
Total time for all releases (minutes):	436169	435564
Maximum time for a release (minutes):	10405	10385
Average time for a release (minutes):	2192	5584
Minimum time for a release (minutes):	24	97

ANO-1 liquid releases consisted of:

199 Planned Releases  
0 Unplanned Releases

ANO-2 liquid releases consisted of:

78 Planned Releases  
0 Unplanned Releases

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**ANNUAL SUMMATION FOR ALL RELEASES BY QUARTER  
(ALL LIQUID EFFLUENTS)  
January 1 through June 30, 2008**

**Unit 1**

Type of Effluent	Units	Quarter 1	Quarter 2	Est. Total Error %
<b><u>A. Fission and Activation Products</u></b>				
1. Total Release (Not Including Tritium, Gases, Alpha)	Curies	4.110E-03	4.798E-03	25
2. Average Diluted Concentration During Period	μCi/ml	1.384E-11	1.387E-11	
3. Percent of Applicable Limit	%	4.613E-03	4.624E-03	
<b><u>B. Tritium</u></b>				
1. Total Release	Curies	1.239E+02	1.730E+02	25
2. Average Diluted Concentration During Period	μCi/ml	4.171E-07	5.002E-07	
3. Percent of Applicable Limit	%	1.390E-02	1.667E-02	
<b><u>C. Dissolved and Entrained Gases</u></b>				
1. Total Release	Curies	1.067E-02	5.029E-02	25
2. Average Diluted Concentration During Period	μCi/ml	3.594E-11	1.454E-10	
3. Percent of Applicable Limit	%	1.797E-05	7.270E-05	
<b><u>D. Gross Alpha Radioactivity</u></b>				
1. Total Release	Curies	3.229E-04	0.000E+00	25
<b><u>E. Waste Vol Released (Pre-Dilution)</u></b>				
	Liters	1.569E+07	1.420E+07	25
<b><u>F. Volume of Dilution Water Used</u></b>				
	Liters	2.969E+11	3.458E+11	25

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**ANNUAL SUMMATION FOR ALL RELEASES BY QUARTER  
(ALL LIQUID EFFLUENTS)  
July 1 through December 31, 2008**

**Unit 1**

Type of Effluent	Units	Quarter 3	Quarter 4	Est. Total Error %
<u>A. Fission and Activation Products</u>				
1. Total Release (Not Including Tritium, Gases, Alpha)	Curies	1.118E-02	2.231E-02	25
2. Average Diluted Concentration During Period	μCi/ml	3.062E-11	8.442E-11	
3. Percent of Applicable Limit	%	1.021E-02	2.814E-02	
<u>B. Tritium</u>				
1. Total Release	Curies	2.714E+02	9.277E+01	25
2. Average Diluted Concentration During Period	μCi/ml	7.432E-07	3.510E-07	
3. Percent of Applicable Limit	%	2.477E-02	1.170E-02	
<u>C. Dissolved and Entrained Gases</u>				
1. Total Release	Curies	9.454E-02	2.861E-01	25
2. Average Diluted Concentration During Period	μCi/ml	2.589E-10	1.083E-09	
3. Percent of Applicable Limit	%	1.295E-04	5.413E-04	
<u>D. Gross Alpha Radioactivity</u>				
1. Total Release	Curies	0.000E+00	0.000E+00	25
<u>E. Waste Vol Released (Pre-Dilution)</u>				
	Liters	1.320E+07	5.006E+06	25
<u>F. Volume of Dilution Water Used</u>				
	Liters	3.651E+11	2.643E+11	25

**ANO-1 & 2 Annual Radioactive Effluent  
Release Report for 2008**

**UNIT 1**

**REPORT CATEGORY                    ANNUAL LIQUID CONTINUOUS AND BATCH RELEASES  
TOTALS FOR EACH NUCLIDE RELEASED  
TYPE OF ACTIVITY                    ALL RADIONUCLIDES  
REPORTING PERIOD                    QUARTER # 1 AND QUARTER # 2 YEAR 2008**

NUCLIDE	UNIT	CONTINUOUS RELEASES		BATCH RELEASES	
		QUARTER 1	QUARTER 2	QUARTER 1	QUARTER 2
I-132	CURIES	0.00E+00	0.00E+00	1.46E-05	0.00E+00
I-133	CURIES	0.00E+00	0.00E+00	2.56E-05	0.00E+00
I-135	CURIES	0.00E+00	0.00E+00	3.04E-05	0.00E+00
G-ALPHA	CURIES	2.20E-04	0.00E+00	1.03E-04	0.00E+00
NB-97	CURIES	0.00E+00	0.00E+00	0.00E+00	2.27E-05
MN-54	CURIES	0.00E+00	0.00E+00	1.02E-04	3.14E-05
AG-110M	CURIES	0.00E+00	0.00E+00	0.00E+00	3.65E-05
ZR-95	CURIES	0.00E+00	0.00E+00	1.59E-04	6.18E-05
CR-51	CURIES	0.00E+00	0.00E+00	0.00E+00	7.78E-05
CS-134	CURIES	0.00E+00	0.00E+00	3.16E-04	9.50E-05
NB-95	CURIES	0.00E+00	0.00E+00	2.84E-04	1.71E-04
CS-137	CURIES	0.00E+00	0.00E+00	4.94E-04	1.78E-04
I-131	CURIES	0.00E+00	0.00E+00	6.08E-05	2.68E-04
SB-125	CURIES	0.00E+00	0.00E+00	5.65E-04	3.62E-04
CO-60	CURIES	0.00E+00	0.00E+00	3.40E-04	4.34E-04
FE-55	CURIES	0.00E+00	0.00E+00	2.22E-04	1.50E-03
CO-58	CURIES	0.00E+00	0.00E+00	1.50E-03	1.56E-03
XE-133	CURIES	0.00E+00	0.00E+00	1.23E-03	5.86E-03
KR-85	CURIES	0.00E+00	0.00E+00	9.44E-03	4.44E-02
H-3	CURIES	7.78E-02	3.81E-02	1.24E+02	1.73E+02
Total for Period	CURIES	7.80E-02	3.81E-02	1.24E+02	1.73E+02



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**UNIT 1**

**REPORT CATEGORY            ANNUAL LIQUID CONTINUOUS AND BATCH RELEASES  
TOTALS FOR EACH NUCLIDE RELEASED  
TYPE OF ACTIVITY            ALL RADIONUCLIDES  
REPORTING PERIOD            QUARTER # 3 AND QUARTER # 4 YEAR 2008**

NUCLIDE	UNIT	CONTINUOUS RELEASES		BATCH RELEASES	
		QUARTER 3	QUARTER 4	QUARTER 3	QUARTER 4
AG-110M	CURIES	0.00E+00	0.00E+00	7.29E-06	0.00E+00
MN-54	CURIES	0.00E+00	0.00E+00	2.03E-05	1.68E-05
CR-51	CURIES	0.00E+00	0.00E+00	0.00E+00	1.53E-04
XE-135	CURIES	0.00E+00	0.00E+00	4.20E-05	1.57E-04
ZR-95	CURIES	0.00E+00	0.00E+00	4.72E-05	1.79E-04
NB-95	CURIES	0.00E+00	0.00E+00	2.73E-04	2.52E-04
CO-60	CURIES	0.00E+00	0.00E+00	4.94E-04	3.18E-04
NA-24	CURIES	0.00E+00	0.00E+00	0.00E+00	3.67E-04
I-131	CURIES	0.00E+00	0.00E+00	9.45E-06	6.91E-04
SB-125	CURIES	0.00E+00	0.00E+00	5.25E-04	7.17E-04
XE-131M	CURIES	0.00E+00	0.00E+00	0.00E+00	9.91E-04
XE-133M	CURIES	0.00E+00	0.00E+00	0.00E+00	1.37E-03
FE-55	CURIES	0.00E+00	0.00E+00	1.51E-03	3.59E-03
CS-134	CURIES	0.00E+00	1.03E-05	2.93E-04	3.79E-03
CO-58	CURIES	0.00E+00	6.19E-06	6.93E-03	6.10E-03
CS-137	CURIES	0.00E+00	9.27E-06	1.07E-03	6.11E-03
KR-85	CURIES	0.00E+00	0.00E+00	1.70E-02	8.01E-02
XE-133	CURIES	0.00E+00	0.00E+00	7.75E-02	2.04E-01
H-3	CURIES	3.37E-02	2.08E-02	2.71E+02	9.28E+01
Total for Period	CURIES	3.37E-02	2.08E-02	2.71E+02	9.31E+01

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**ANNUAL SUMMATION FOR ALL RELEASES BY QUARTER  
(ALL LIQUID EFFLUENTS)  
January 1 through June 30, 2008**

Type of Effluent	Unit 2		Quarter 1	Quarter 2	Est. Total Error %
	Units				
<u>A. Fission and Activation Products</u>					
1. Total Release (Not Including Tritium, Gases, Alpha)	Curies		1.840E-02	1.643E-02	25
2. Average Diluted Concentration During Period	μCi/ml		6.196E-11	4.749E-11	
3. Percent of Applicable Limit	%		2.065E-02	1.583E-02	
<u>B. Tritium</u>					
1. Total Release	Curies		3.370E+02	5.034E+01	25
2. Average Diluted Concentration During Period	μCi/ml		1.135E-06	1.456E-07	
3. Percent of Applicable Limit	%		3.782E-02	4.852E-03	
<u>C. Dissolved and Entrained Gases</u>					
1. Total Release	Curies		4.626E-01	9.407E-02	25
2. Average Diluted Concentration During Period	μCi/ml		1.558E-09	2.720E-10	
3. Percent of Applicable Limit	%		7.790E-04	1.360E-04	
<u>D. Gross Alpha Radioactivity</u>					
1. Total Release	Curies		7.222E-04	0.000E+00	25
<u>E. Waste Vol Released (Pre-Dilution)</u>					
	Liters		1.323E+07	5.403E+06	25
<u>F. Volume of Dilution Water Used</u>					
	Liters		2.969E+11	3.458E+11	25

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**ANNUAL SUMMATION FOR ALL RELEASES BY QUARTER  
(ALL LIQUID EFFLUENTS)  
July 1 through December 31, 2008**

**Unit 2**

Type of Effluent	Units	Quarter 3	Quarter 4	Est. Total Error %
<b><u>A. Fission and Activation Products</u></b>				
1. Total Release (Not Including Tritium, Gases, Alpha)	Curies	5.984E-03	6.418E-03	25
2. Average Diluted Concentration During Period	μCi/ml	1.639E-11	2.428E-11	
3. Percent of Applicable Limit	%	5.463E-03	8.095E-03	
<b><u>B. Tritium</u></b>				
1. Total Release	Curies	4.602E+01	9.258E+01	25
2. Average Diluted Concentration During Period	μCi/ml	1.260E-07	3.503E-07	
3. Percent of Applicable Limit	%	4.202E-03	1.168E-02	
<b><u>C. Dissolved and Entrained Gases</u></b>				
1. Total Release	Curies	0.000E+00	1.728E-04	25
2. Average Diluted Concentration During Period	μCi/ml	0.000E+00	6.539E-13	
3. Percent of Applicable Limit	%	0.000E+00	3.270E-07	
<b><u>D. Gross Alpha Radioactivity</u></b>				
1. Total Release	Curies	0.000E+00	0.000E+00	25
<b><u>E. Waste Vol Released (Pre-Dilution)</u></b>				
	Liters	4.957E+06	5.366E+06	25
<b><u>F. Volume of Dilution Water Used</u></b>				
	Liters	3.651E+11	2.643E+11	25

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**UNIT 2**

**REPORT CATEGORY            ANNUAL LIQUID CONTINUOUS AND BATCH RELEASES  
TOTALS FOR EACH NUCLIDE RELEASED  
TYPE OF ACTIVITY            ALL RADIONUCLIDES  
REPORTING PERIOD            QUARTER # 1 AND QUARTER # 2 YEAR 2008**

NUCLIDE	UNIT	CONTINUOUS RELEASES		BATCH RELEASES	
		QUARTER 1	QUARTER 2	QUARTER 1	QUARTER 2
LA-140	CURIES	0.00E+00	0.00E+00	1.86E-05	0.00E+00
I-133	CURIES	0.00E+00	0.00E+00	2.20E-05	0.00E+00
XE-135	CURIES	0.00E+00	0.00E+00	2.97E-05	0.00E+00
I-131	CURIES	0.00E+00	0.00E+00	3.85E-05	0.00E+00
G-ALPHA	CURIES	7.03E-04	0.00E+00	1.90E-05	0.00E+00
XE-133M	CURIES	0.00E+00	0.00E+00	1.28E-03	0.00E+00
SB-125	CURIES	0.00E+00	0.00E+00	4.14E-04	3.70E-05
ZR-95	CURIES	0.00E+00	0.00E+00	6.02E-05	3.74E-05
FE-59	CURIES	0.00E+00	0.00E+00	8.91E-05	5.40E-05
MN-54	CURIES	0.00E+00	0.00E+00	7.42E-05	7.55E-05
AG-110M	CURIES	0.00E+00	0.00E+00	8.75E-05	1.33E-04
NB-95	CURIES	0.00E+00	0.00E+00	1.19E-04	1.54E-04
CS-134	CURIES	0.00E+00	0.00E+00	2.59E-04	1.58E-04
CS-137	CURIES	0.00E+00	0.00E+00	3.61E-04	2.31E-04
CO-60	CURIES	0.00E+00	0.00E+00	3.60E-04	3.22E-04
CR-51	CURIES	0.00E+00	0.00E+00	3.66E-04	1.02E-03
CO-58	CURIES	0.00E+00	0.00E+00	8.15E-04	4.20E-03
XE-131M	CURIES	0.00E+00	0.00E+00	6.50E-03	4.91E-03
FE-55	CURIES	0.00E+00	0.00E+00	1.53E-02	1.00E-02
KR-85	CURIES	0.00E+00	0.00E+00	1.18E-01	1.01E-02
XE-133	CURIES	0.00E+00	0.00E+00	3.37E-01	7.91E-02
H-3	CURIES	4.17E-02	1.36E-02	3.37E+02	5.03E+01
Total for Period	CURIES	4.24E-02	1.36E-02	3.37E+02	5.05E+01

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**UNIT 2**

**REPORT CATEGORY            ANNUAL LIQUID CONTINUOUS AND BATCH RELEASES  
TOTALS FOR EACH NUCLIDE RELEASED  
TYPE OF ACTIVITY            ALL RADIONUCLIDES  
REPORTING PERIOD            QUARTER # 3 AND QUARTER # 4 YEAR 2008**

NUCLIDE	UNIT	CONTINUOUS RELEASES		BATCH RELEASES	
		QUARTER 3	QUARTER 4	QUARTER 3	QUARTER 4
SN-117M	CURIES	1.55E-04	0.00E+00	2.78E-05	0.00E+00
ZR-95	CURIES	0.00E+00	0.00E+00	3.85E-05	0.00E+00
MN-54	CURIES	0.00E+00	0.00E+00	2.71E-05	6.65E-05
NB-95	CURIES	0.00E+00	0.00E+00	8.60E-05	9.19E-05
SB-124	CURIES	0.00E+00	0.00E+00	0.00E+00	9.75E-05
XE-133	CURIES	0.00E+00	0.00E+00	0.00E+00	1.73E-04
AG-110M	CURIES	0.00E+00	0.00E+00	7.44E-05	2.99E-04
CO-60	CURIES	0.00E+00	0.00E+00	1.94E-04	3.63E-04
CS-134	CURIES	0.00E+00	0.00E+00	2.67E-05	3.80E-04
CO-58	CURIES	0.00E+00	0.00E+00	1.47E-03	5.66E-04
FE-55	CURIES	0.00E+00	0.00E+00	3.52E-03	6.05E-04
BE-7	CURIES	0.00E+00	0.00E+00	3.52E-04	6.42E-04
CS-137	CURIES	0.00E+00	0.00E+00	1.68E-04	8.66E-04
SB-125	CURIES	0.00E+00	0.00E+00	0.00E+00	2.44E-03
H-3	CURIES	3.01E-02	4.96E-02	4.60E+01	9.26E+01
Total for Period	CURIES	3.01E-02	4.96E-02	4.60E+01	9.26E+01

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**4. SUMMARY OF GASEOUS EFFLUENT DATA**

As required by Regulatory Guide 1.21, Rev. 1, a summary of data for gaseous releases is provided in the Annual Radioactive Effluent Release Report. This summary covers releases from January 1 to December 31, 2008. The summary of gaseous effluents for both Unit 1 and Unit 2 is as follows:

	<u>Unit 1</u>	<u>Unit 2</u>
Number of releases	160	155
Total time for all releases (minutes):	1279486	1190859
Maximum time for a release (minutes):	10686	10632
Average time for a release (minutes):	7997	7683
Minimum time for a release (minutes):	14	3

ANO-1 gaseous releases consisted of:

- 160 Planned Vent and Tank Releases
- 0 Unplanned Releases

ANO-2 gaseous releases consisted of:

- 153 Planned Vent and Tank Releases
- 2 Unplanned Releases (See Section 9)

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**ANNUAL SUMMATION FOR ALL RELEASES BY QUARTER  
(ALL AIRBORNE EFFLUENTS)  
January 1 through June 30, 2008**

Type of Effluent	Unit 1			Est. Total Error %
	Units	Quarter 1	Quarter 2	
<u>A. Fission and Activation Products</u>				
1. Total Release	Curies	0.000E+00	0.000E+00	25
2. Average Release Rate for Period	μCi/Sec	0.000E+00	0.000E+00	
3. Percent of Applicable Limit	%	0.000E+00	0.000E+00	
<u>B. Radioiodines</u>				
1. Total Iodine-131	Curies	3.755E-06	0.000E+00	25
2. Average Release Rate for Period	μCi/Sec	4.776E-07	0.000E+00	
3. Percent of Applicable Limit	%	1.337E-06	0.000E+00	
<u>C. Particulates</u>				
1. Particulates (Half-Lives > 8 Days)	Curies	0.000E+00	0.000E+00	25
2. Average Release Rate for Period	μCi/Sec	0.000E+00	0.000E+00	
3. Percent of Applicable Limit	%	0.000E+00	0.000E+00	
4. Gross Alpha Radioactivity	Curies	0.000E+00	0.000E+00	
<u>D. Tritium</u>				
1. Total Release	Curies	8.390E+00	5.428E+00	25
2. Average Release Rate for Period	μCi/Sec	1.067E+00	6.903E-01	
3. Percent of Applicable Limit	%	1.494E-03	9.664E-04	

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**ANNUAL SUMMATION FOR ALL RELEASES BY QUARTER  
(ALL AIRBORNE EFFLUENTS)  
July 1 through December 31, 2008**

Unit 1				
Type of Effluent	Units	Quarter 3	Quarter 4	Est. Total Error %
<u>A. Fission and Activation Products</u>				
1. Total Release	Curies	0.000E+00	2.192E+01	25
2. Average Release Rate for Period	μCi/Sec	0.000E+00	2.757E+00	
3. Percent of Applicable Limit	%	0.000E+00	3.860E-02	
<u>B. Radioiodines</u>				
1. Total Iodine-131	Curies	0.000E+00	1.268E-04	25
2. Average Release Rate for Period	μCi/Sec	0.000E+00	1.596E-05	
3. Percent of Applicable Limit	%	0.000E+00	4.468E-05	
<u>C. Particulates</u>				
1. Particulates (Half-Lives > 8 Days)	Curies	0.000E+00	0.000E+00	25
2. Average Release Rate for Period	μCi/Sec	0.000E+00	0.000E+00	
3. Percent of Applicable Limit	%	0.000E+00	0.000E+00	
4. Gross Alpha Radioactivity	Curies	0.000E+00	0.000E+00	
<u>D. Tritium</u>				
1. Total Release	Curies	2.478E+00	9.928E+00	25
2. Average Release Rate for Period	μCi/Sec	3.117E-01	1.249E+00	
3. Percent of Applicable Limit	%	4.364E-04	1.749E-03	



**ANO-1 & 2 Annual Radioactive Effluent  
Release Report for 2008**

**UNIT 1**

**REPORT CATEGORY**

**ANNUAL AIRBORNE GROUND LEVEL  
CONTINUOUS AND BATCH RELEASES**

**TYPE OF ACTIVITY  
REPORTING PERIOD**

**TOTALS FOR EACH NUCLIDE RELEASED  
FISSION GASES, IODINES, AND PARTICULATES  
QUARTER # 1 AND QUARTER # 2 YEAR 2008**

<b>NUCLIDE</b>	<b>UNIT</b>	<b>CONTINUOUS RELEASES</b>		<b>BATCH RELEASES</b>	
		<b>QUARTER 1</b>	<b>QUARTER 2</b>	<b>QUARTER 1</b>	<b>QUARTER 2</b>

**Fission Gases**

NONE	CURIES	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total for Period	CURIES	0.00E+00	0.00E+00	0.00E+00	0.00E+00

**Iodines**

I-131	CURIES	0.00E+00	0.00E+00	3.75E-06	0.00E+00
Total for Period	CURIES	0.00E+00	0.00E+00	3.75E-06	0.00E+00

**Particulates**

NONE	CURIES	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total for Period	CURIES	0.00E+00	0.00E+00	0.00E+00	0.00E+00

**Other**

H-3	CURIES	0.00E+00	0.00E+00	8.39E+00	5.43E+00
Total for Period	CURIES	0.00E+00	0.00E+00	8.39E+00	5.43E+00

**ANO-1 & 2 Annual Radioactive Effluent  
Release Report for 2008**

**UNIT 1**

**REPORT CATEGORY            ANNUAL AIRBORNE GROUND LEVEL  
CONTINUOUS AND BATCH RELEASES  
TOTALS FOR EACH NUCLIDE RELEASED  
TYPE OF ACTIVITY            FISSION GASES, IODINES, AND PARTICULATES  
REPORTING PERIOD            QUARTER # 3 AND QUARTER # 4 YEAR 2008**

		<b>CONTINUOUS RELEASES</b>		<b>BATCH RELEASES</b>	
<b>NUCLIDE</b>	<b>UNIT</b>	<b>QUARTER 3</b>	<b>QUARTER 4</b>	<b>QUARTER 3</b>	<b>QUARTER 4</b>

Fission Gases

KR-85	CURIES	0.00E+00	0.00E+00	0.00E+00	8.93E-01
XE-133	CURIES	0.00E+00	0.00E+00	0.00E+00	2.10E+01
Total for Period	CURIES	0.00E+00	0.00E+00	0.00E+00	2.19E+01

Iodines

I-132	CURIES	0.00E+00	0.00E+00	0.00E+00	5.58E-07
I-133	CURIES	0.00E+00	0.00E+00	0.00E+00	5.22E-06
I-131	CURIES	0.00E+00	0.00E+00	0.00E+00	1.27E-04
Total for Period	CURIES	0.00E+00	0.00E+00	0.00E+00	1.33E-04

Particulates

NONE	CURIES	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total for Period	CURIES	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Other

H-3	CURIES	0.00E+00	0.00E+00	2.48E+00	9.93E+00
Total for Period	CURIES	0.00E+00	0.00E+00	2.48E+00	9.93E+00

**ANO-1 & 2 Annual Radioactive Effluent  
Release Report for 2008**

**ANNUAL SUMMATION FOR ALL RELEASES BY QUARTER  
(ALL AIRBORNE EFFLUENTS)  
January 1 through June 30, 2008**

Type of Effluent	Unit 2		Quarter 1	Quarter 2	Est. Total Error %
	Units				
<u>A. Fission and Activation Products</u>					
1. Total Release	Curies		7.414E+01	0.000E+00	25
2. Average Release Rate for Period	μCi/Sec		9.429E+00	0.000E+00	
3. Percent of Applicable Limit	%		1.320E-01	0.000E+00	
<u>B. Radioiodines</u>					
1. Total Iodine-131	Curies		5.453E-04	1.980E-04	25
2. Average Release Rate for Period	μCi/Sec		6.936E-05	2.518E-05	
3. Percent of Applicable Limit	%		1.942E-04	7.050E-05	
<u>C. Particulates</u>					
1. Particulates (Half-Lives > 8 Days)	Curies		0.000E+00	0.00E+00	25
2. Average Release Rate for Period	μCi/Sec		0.000E+00	0.00E+00	
3. Percent of Applicable Limit	%		0.000E+00	0.00E+00	
4. Gross Alpha Radioactivity	Curies		2.511E-07	2.923E-07	
<u>D. Tritium</u>					
1. Total Release	Curies		8.484E+00	6.357E+00	25
2. Average Release Rate for Period	μCi/Sec		1.079E+00	8.086E-01	
3. Percent of Applicable Limit	%		1.511E-03	1.132E-03	

**ANO-1 & 2 Annual Radioactive Effluent  
Release Report for 2008**

**ANNUAL SUMMATION FOR ALL RELEASES BY QUARTER  
(ALL AIRBORNE EFFLUENTS)  
July 1 through December 31, 2008**

Unit 2				
Type of Effluent	Units	Quarter 3	Quarter 4	Est. Total Error %
<u>A. Fission and Activation Products</u>				
1. Total Release	Curies	0.000E+00	0.000E+00	25
2. Average Release Rate for Period	μCi/Sec	0.000E+00	0.000E+00	
3. Percent of Applicable Limit	%	0.000E+00	0.000E+00	
<u>B. Radioiodines</u>				
1. Total Iodine-131	Curies	0.000E+00	1.948E-06	25
2. Average Release Rate for Period	μCi/Sec	0.000E+00	2.450E-07	
3. Percent of Applicable Limit	%	0.000E+00	6.861E-07	
<u>C. Particulates</u>				
1. Particulates (Half-Lives > 8 Days)	Curies	0.000E+00	1.024E-06	25
2. Average Release Rate for Period	μCi/Sec	0.000E+00	1.288E-07	
3. Percent of Applicable Limit	%	0.000E+00	3.607E-07	
4. Gross Alpha Radioactivity	Curies	0.000E+00	0.000E+00	
<u>D. Tritium</u>				
1. Total Release	Curies	5.240E+00	5.831E+00	25
2. Average Release Rate for Period	μCi/Sec	6.592E-01	7.336E-01	
3. Percent of Applicable Limit	%	9.229E-04	1.027E-03	

**ANO-1 & 2 Annual Radioactive Effluent  
Release Report for 2008**

**UNIT 2**

**REPORT CATEGORY                    ANNUAL AIRBORNE GROUND LEVEL  
CONTINUOUS AND BATCH RELEASES  
TOTALS FOR EACH NUCLIDE RELEASED  
TYPE OF ACTIVITY                    FISSION GASES, IODINES, AND PARTICULATES  
REPORTING PERIOD                    QUARTER # 1 AND QUARTER # 2 YEAR 2008**

		CONTINUOUS RELEASES		BATCH RELEASES	
NUCLIDE	UNIT	QUARTER 1	QUARTER 2	QUARTER 1	QUARTER 2

Fission Gases

KR-85M	CURIES	0.00E+00	0.00E+00	2.22E-04	0.00E+00
AR-41	CURIES	0.00E+00	0.00E+00	5.82E-02	0.00E+00
XE-135	CURIES	0.00E+00	0.00E+00	1.94E+00	0.00E+00
KR-85	CURIES	0.00E+00	0.00E+00	2.41E+00	0.00E+00
XE-133	CURIES	0.00E+00	0.00E+00	6.97E+01	0.00E+00
Total for Period	CURIES	0.00E+00	0.00E+00	7.41E+01	0.00E+00

Iodines

I-135	CURIES	0.00E+00	0.00E+00	6.73E-07	0.00E+00
I-132	CURIES	0.00E+00	0.00E+00	2.64E-06	0.00E+00
I-133	CURIES	0.00E+00	0.00E+00	1.01E-04	0.00E+00
I-131	CURIES	0.00E+00	0.00E+00	5.45E-04	1.98E-04
Total for Period	CURIES	0.00E+00	0.00E+00	6.49E-04	1.98E-04

Particulates

RB-88	CURIES	0.00E+00	0.00E+00	2.31E-05	0.00E+00
Total for Period	CURIES	0.00E+00	0.00E+00	2.31E-05	0.00E+00

Other

G-ALPHA	CURIES	0.00E+00	0.00E+00	2.51E-07	2.92E-07
H-3	CURIES	0.00E+00	0.00E+00	8.48E+00	6.36E+00
Total for Period	CURIES	0.00E+00	0.00E+00	8.48E+00	6.36E+00

**ANO-1 & 2 Annual Radioactive Effluent  
Release Report for 2008**

**UNIT 2**

**REPORT CATEGORY**

**ANNUAL AIRBORNE GROUND LEVEL  
CONTINUOUS AND BATCH RELEASES  
TOTALS FOR EACH NUCLIDE RELEASED  
FISSION GASES, IODINES, AND PARTICULATES  
QUARTER # 3 AND QUARTER # 4 YEAR 2008**

**TYPE OF ACTIVITY  
REPORTING PERIOD**

<b>NUCLIDE</b>	<b>UNIT</b>	<b>CONTINUOUS RELEASES</b>		<b>BATCH RELEASES</b>	
		<b>QUARTER 3</b>	<b>QUARTER 4</b>	<b>QUARTER 3</b>	<b>QUARTER 4</b>

Fission Gases

NONE	CURIES	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total for Period	CURIES	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Iodines

I-131	CURIES	0.00E+00	0.00E+00	0.00E+00	1.95E-06
Total for Period	CURIES	0.00E+00	0.00E+00	0.00E+00	1.95E-06

Particulates

CO-58	CURIES	0.00E+00	0.00E+00	0.00E+00	1.02E-06
Total for Period	CURIES	0.00E+00	0.00E+00	0.00E+00	1.02E-06

Other

H-3	CURIES	0.00E+00	0.00E+00	5.24E+00	5.83E+00
Total for Period	CURIES	0.00E+00	0.00E+00	5.24E+00	5.83E+00

**ANO-1 & 2 Annual Radioactive Effluent  
Release Report for 2008**

**5. SUMMARY OF RADIATION DOSES**

The following is a summary of the annual radiation doses due to radiological effluents during 2008 calculated in accordance with the Offsite Dose Calculation Manual.

**UNIT 1**

Liquid Radwaste Effluents

Dose Limits (mRem): Total Body = 1.5/Qtr 3/Yr, Other Organs = 5/Qtr 10/Yr

<u>Organ</u>	<u>Qtr 1</u>	<u>%</u>	<u>Qtr 2</u>	<u>%</u>	<u>Qtr 3</u>	<u>%</u>	<u>Qtr 4</u>	<u>%</u>	<u>Year</u>	<u>%</u>
TBody	0.0007	0.05	0.0004	0.03	0.0010	0.07	0.0066	0.44	0.0087	0.29
Bone	0.0004	0.01	0.0001	0.00	0.0006	0.01	0.0052	0.10	0.0063	0.06
Liver	0.0009	0.02	0.0005	0.01	0.0012	0.02	0.0089	0.18	0.0116	0.12
Thyroid	0.0002	0.00	0.0004	0.01	0.0006	0.01	0.0005	0.01	0.0015	0.02
Kidney	0.0004	0.01	0.0003	0.01	0.0006	0.01	0.0031	0.06	0.0045	0.04
Lung	0.0003	0.01	0.0003	0.01	0.0005	0.01	0.0011	0.02	0.0021	0.02
GI-LLI	0.0003	0.01	0.0003	0.01	0.0005	0.01	0.0004	0.01	0.0015	0.02

Gaseous Radwaste Effluents

Iodine, H-3, and Particulate (ITP) - Dose Limits (mRem) = 7.5/Qtr 15/Yr

<u>Organ</u>	<u>Qtr 1</u>	<u>%</u>	<u>Qtr 2</u>	<u>%</u>	<u>Qtr 3</u>	<u>%</u>	<u>Qtr 4</u>	<u>%</u>	<u>Year</u>	<u>%</u>
TBody	0.0054	0.07	0.0033	0.04	0.0016	0.02	0.0062	0.08	0.0165	0.11
Bone	0.0000	0.00	0.0000	0.00	0.0000	0.00	0.0001	0.00	0.0001	0.00
Liver	0.0054	0.07	0.0033	0.04	0.0016	0.02	0.0062	0.08	0.0165	0.11
Thyroid	0.0062	0.08	0.0033	0.04	0.0016	0.02	0.0335	0.45	0.0446	0.30
Kidney	0.0054	0.07	0.0033	0.04	0.0016	0.02	0.0062	0.08	0.0166	0.11
Lung	0.0054	0.07	0.0033	0.04	0.0016	0.02	0.0061	0.08	0.0164	0.11
GI-LLI	0.0054	0.07	0.0033	0.04	0.0016	0.02	0.0061	0.08	0.0164	0.11

Noble Gas Air Dose Limits (mRad) = Gamma 5/Qtr 10/Yr, Beta 10/Qtr 20/Yr

<u>Type</u>	<u>Qtr 1</u>	<u>%</u>	<u>Qtr 2</u>	<u>%</u>	<u>Qtr 3</u>	<u>%</u>	<u>Qtr 4</u>	<u>%</u>	<u>Year</u>	<u>%</u>
Gamma	0.0000	0.00	0.0000	0.00	0.0000	0.00	0.0007	0.01	0.0007	0.01
Beta	0.0000	0.00	0.0000	0.00	0.0000	0.00	0.0021	0.02	0.0021	0.01

**ANO-1 & 2 Annual Radioactive Effluent  
Release Report for 2008**

**UNIT 2**

Liquid Radwaste Effluents

Dose Limits (mRem): Total Body = 1.5/Qtr 3/Yr, Other Organs = 5 /Qtr 10/Yr

<u>Organ</u>	<u>Qtr 1</u>	<u>%</u>	<u>Qtr 2</u>	<u>%</u>	<u>Qtr 3</u>	<u>%</u>	<u>Qtr 4</u>	<u>%</u>	<u>Year</u>	<u>%</u>
TBody	0.0010	0.07	0.0003	0.02	0.0001	0.01	0.0009	0.06	0.0023	0.08
Bone	0.0004	0.01	0.0002	0.00	0.0001	0.00	0.0006	0.01	0.0013	0.01
Liver	0.0012	0.02	0.0004	0.01	0.0002	0.00	0.0012	0.02	0.0030	0.03
Thyroid	0.0006	0.01	0.0001	0.00	0.0001	0.00	0.0002	0.00	0.0009	0.01
Kidney	0.0007	0.01	0.0002	0.00	0.0001	0.00	0.0005	0.01	0.0015	0.02
Lung	0.0006	0.01	0.0001	0.00	0.0001	0.00	0.0003	0.01	0.0011	0.01
GI-LLI	0.0007	0.01	0.0002	0.00	0.0001	0.00	0.0002	0.00	0.0012	0.01

Gaseous Radwaste Effluents

Iodine, H-3, and Particulate - Dose Limits (mRem) = 7.5/Qtr 15/Yr

<u>Organ</u>	<u>Qtr 1</u>	<u>%</u>	<u>Qtr 2</u>	<u>%</u>	<u>Qtr 3</u>	<u>%</u>	<u>Qtr 4</u>	<u>%</u>	<u>Year</u>	<u>%</u>
Tbody	0.0054	0.07	0.0040	0.05	0.0032	0.04	0.0036	0.05	0.0162	0.11
Bone	0.0004	0.00	0.0001	0.00	0.0000	0.00	0.0000	0.00	0.0005	0.00
Liver	0.0056	0.07	0.0040	0.05	0.0032	0.04	0.0036	0.05	0.0164	0.11
Thyroid	0.1230	1.64	0.0466	0.62	0.0032	0.04	0.0040	0.05	0.1768	1.18
Kidney	0.0058	0.08	0.0041	0.06	0.0032	0.04	0.0036	0.05	0.0168	0.11
Lung	0.0052	0.07	0.0039	0.05	0.0032	0.04	0.0036	0.05	0.0160	0.11
GI-LLI	0.0053	0.07	0.0039	0.05	0.0032	0.04	0.0036	0.05	0.0160	0.11

Noble Gas Air Dose Limits (mRad) = Gamma 5/Qtr 10/Yr, Beta 10/Qtr 20/Yr

<u>Type</u>	<u>Qtr 1</u>	<u>%</u>	<u>Qtr 2</u>	<u>%</u>	<u>Qtr 3</u>	<u>%</u>	<u>Qtr 4</u>	<u>%</u>	<u>Year</u>	<u>%</u>
Gamma	0.0026	0.05	0.0000	0.00	0.0000	0.00	0.0000	0.00	0.0026	0.03
Beta	0.0074	0.07	0.0000	0.00	0.0000	0.00	0.0000	0.00	0.0074	0.04



**ANO-1 & 2 Annual Radioactive Effluent  
Release Report for 2008**

**6. SUMMARY OF DOSE TO MEMBERS OF THE PUBLIC**

The following is a summary of the annual radiation dose to members of the public (in mrem) due to activities inside the site boundary.

**UNIT 1**

	<u>BONE</u>	<u>LIVER</u>	<u>TBODY</u>	<u>THYROID</u>	<u>KIDNEY</u>	<u>GI-LLI</u>	<u>LUNG</u>	<u>SKIN</u>
<u>Gaseous Effluent</u>								
Iodine/Tritium	1.57E-05	3.01E-03	3.00E-03	8.13E-3	3.02E-03	2.99E-03	2.99E-03	
Particulate								
Noble Gas			1.68E-04					4.29E-04
<u>Liquid Effluent</u>								
Fish	6.28E-03	1.16E-02	8.69E-03	1.52E-03	4.48E-03	2.15E-03	1.54E-03	
Sediment			1.03E-04					1.21E-04
Unit 1 Total	6.30E-03	1.46E-02	1.20E-02	9.65E-03	7.50E-03	5.14E-03	4.53E-03	5.50E-04

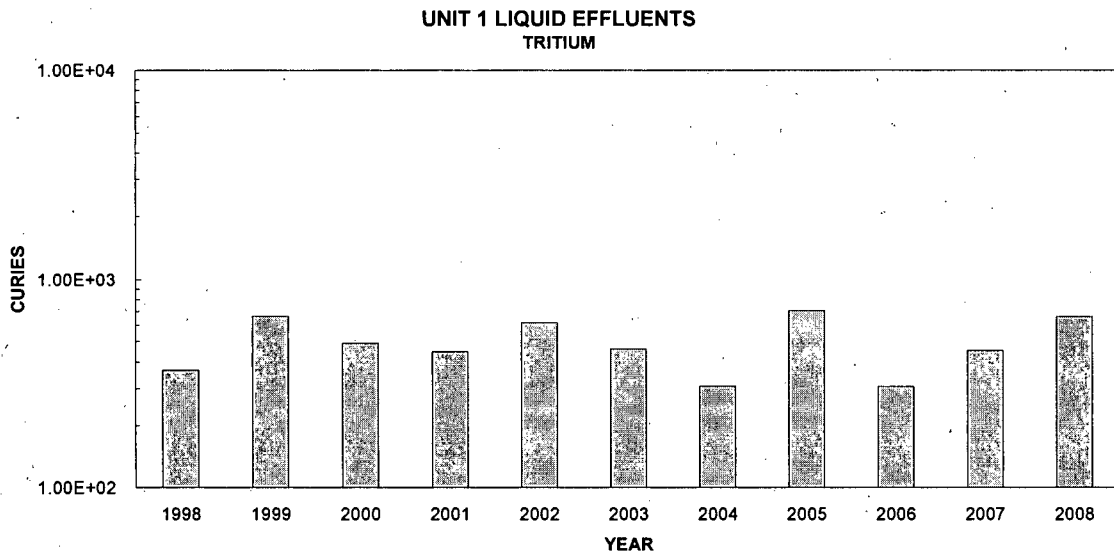
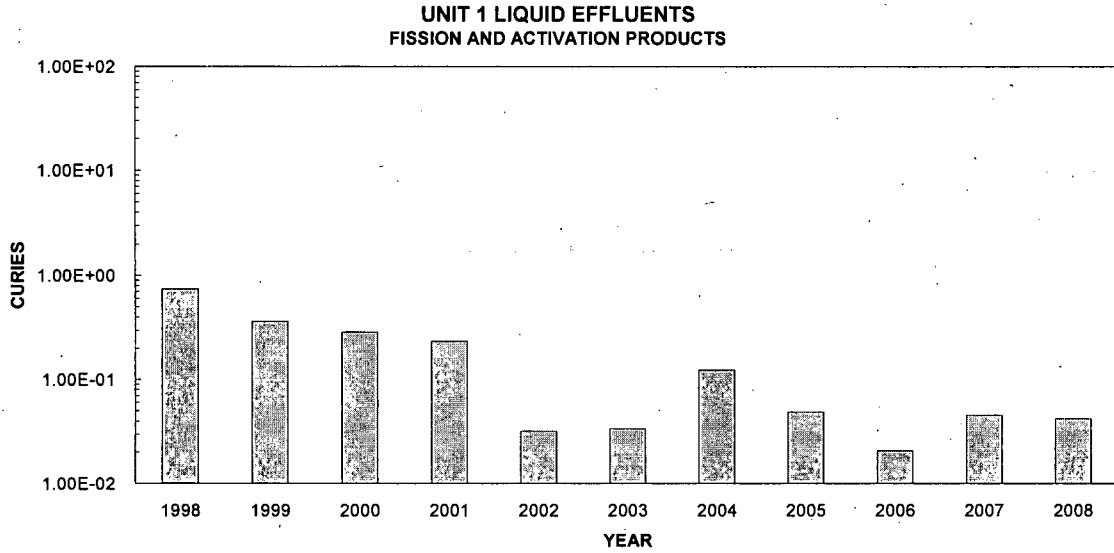
**UNIT 2**

<u>Gaseous Effluent</u>								
Iodine/Tritium	1.14E-04	3.82E-03	3.77E-03	4.10E-02	3.89E-03	3.71E-03	3.71E-03	
Particulate								
Noble Gas			6.67E-04					1.63E-03
<u>Liquid Effluent</u>								
Fish	1.33E-03	2.95E-03	2.33E-03	8.86E-04	1.52E-03	1.13E-03	1.16E-03	
Sediment			3.67E-05					4.30E-05
Unit 2 Total	1.44E-03	6.77E-03	6.80E-03	4.19E-02	5.41E-03	4.84E-03	4.87E-03	1.68E-03
Site Total	7.74E-03	2.14E-02	1.88E-02	5.16E-02	1.29E-02	9.98E-03	9.40E-03	2.23E-03
Limit (40CFR190)	25	25	75	25	25	25	25	25
% Limit	3.10E-02	8.56E-02	2.51E-02	2.06E-01	5.16E-02	3.99E-02	3.76E-02	8.91E-03

# ANO-1 & 2 Annual Radioactive Effluent Release Report for 2008

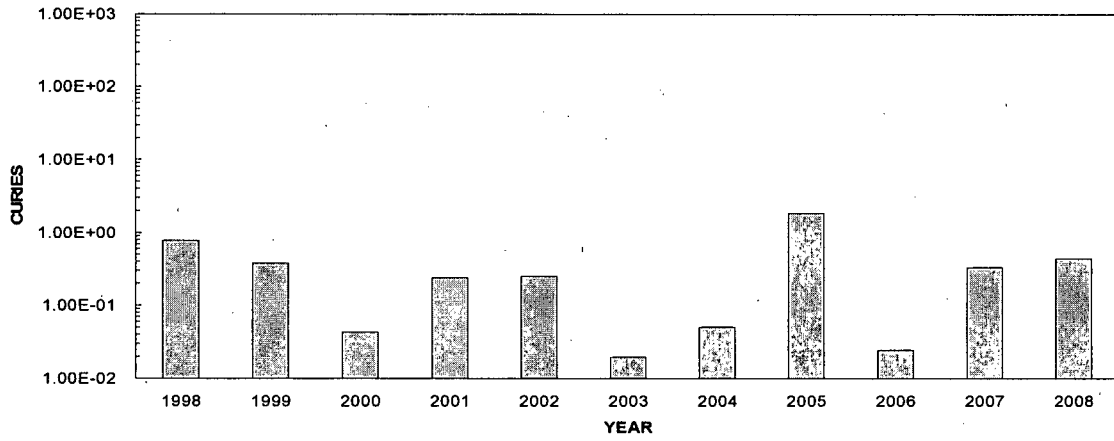
## 7. HISTORICAL EFFLUENT DATA

The following graphs show the historical release data for both units on a yearly basis. These graphs compare data from 1998 through 2008.

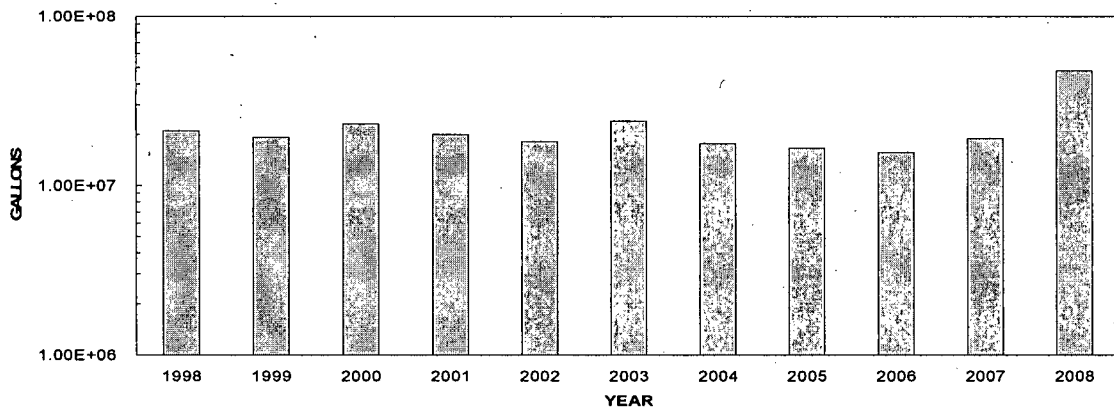


# ANO-1 & 2 Annual Radioactive Effluent Release Report for 2008

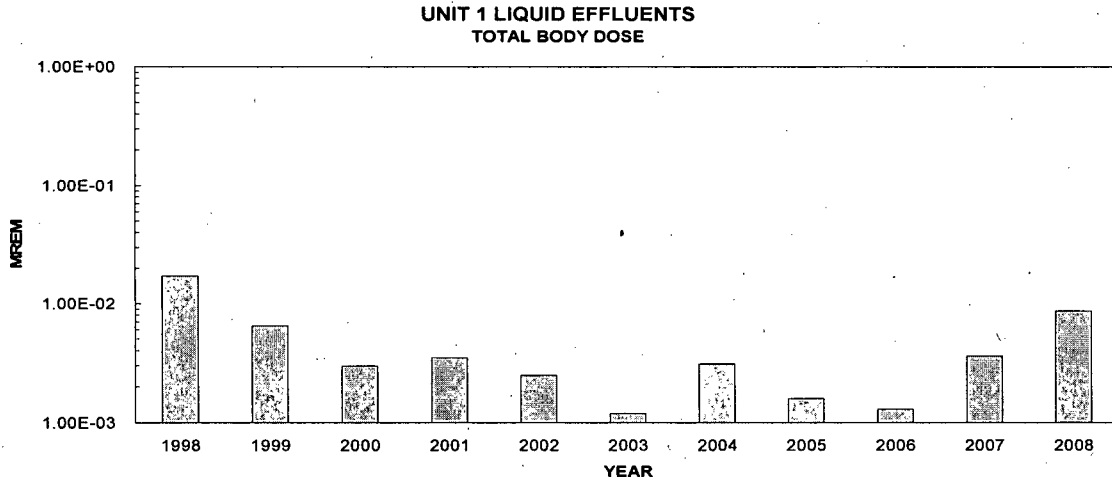
## UNIT 1 LIQUID EFFLUENTS DISSOLVED AND ENTRAINED GASES



## UNIT 1 LIQUID EFFLUENTS TOTAL VOLUME RELEASED

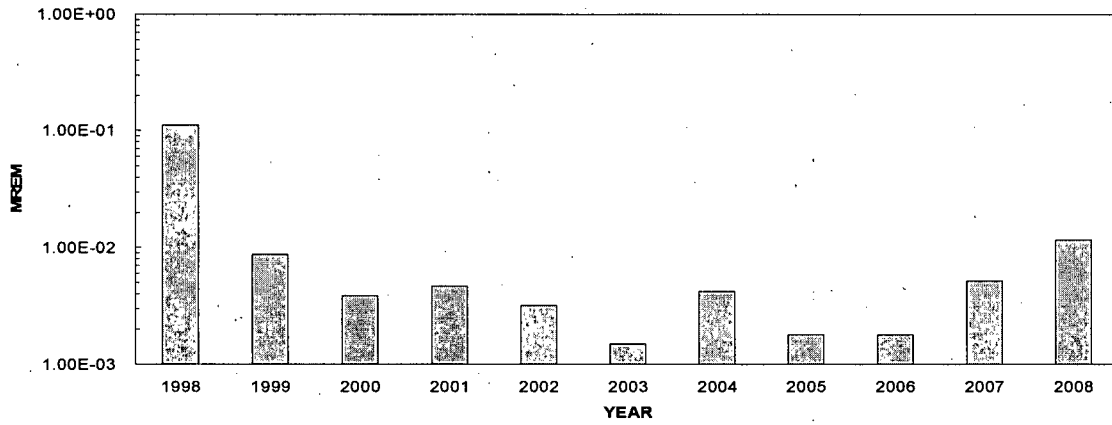


# ANO-1 & 2 Annual Radioactive Effluent Release Report for 2008

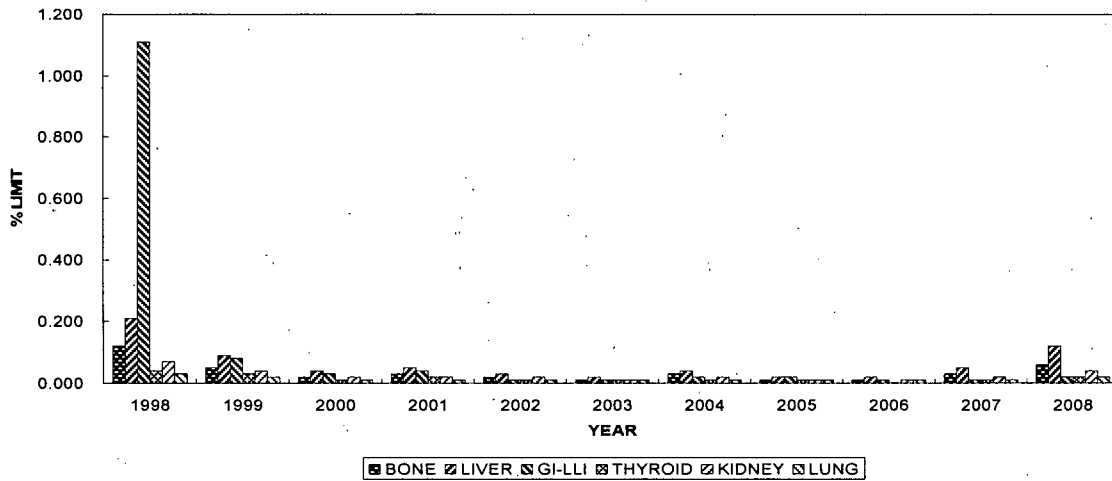


# ANO-1 & 2 Annual Radioactive Effluent Release Report for 2008

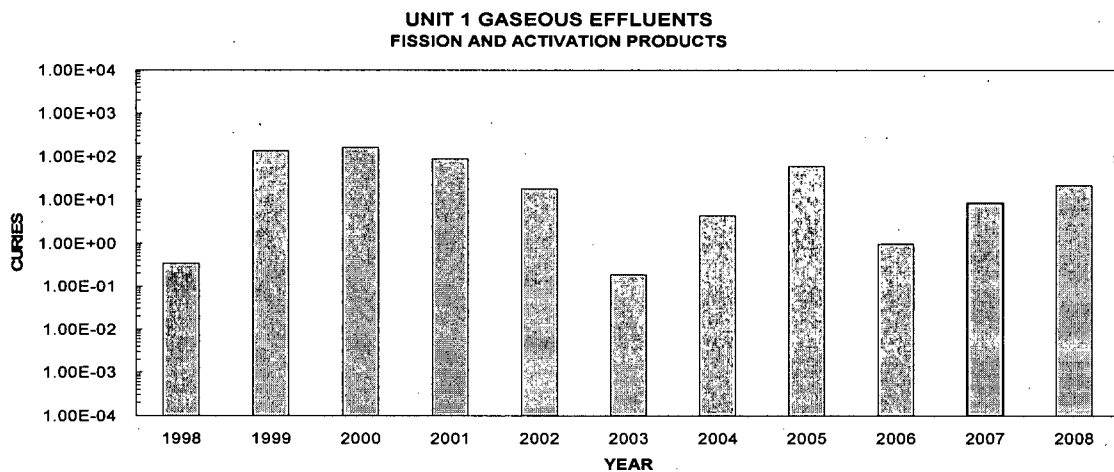
**UNIT 1 LIQUID EFFLUENTS  
CRITICAL ORGAN DOSE**



**UNIT 1 LIQUID EFFLUENTS  
COLLECTIVE DOSES**

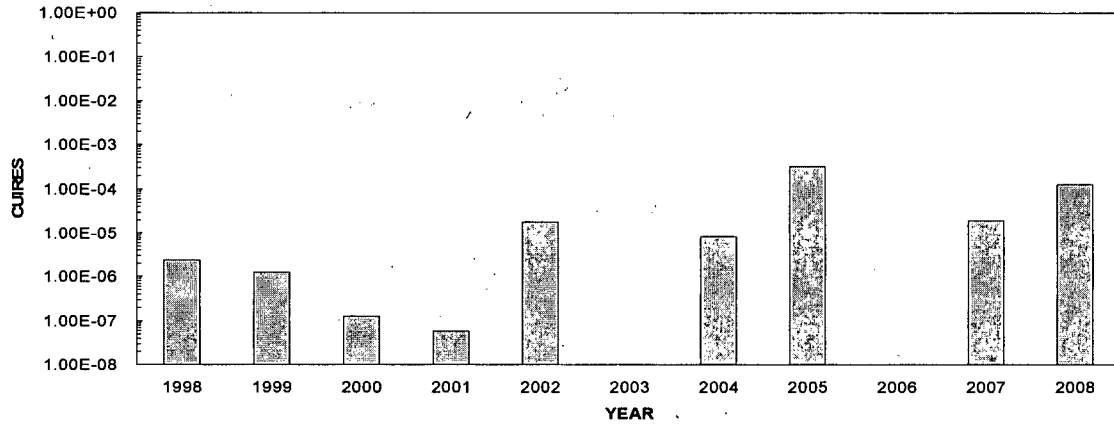


# ANO-1 & 2 Annual Radioactive Effluent Release Report for 2008

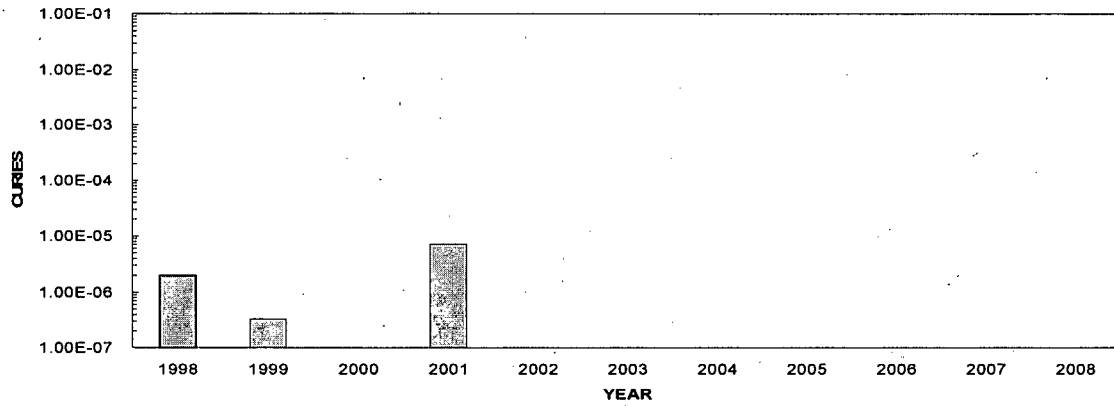


# ANO-1 & 2 Annual Radioactive Effluent Release Report for 2008

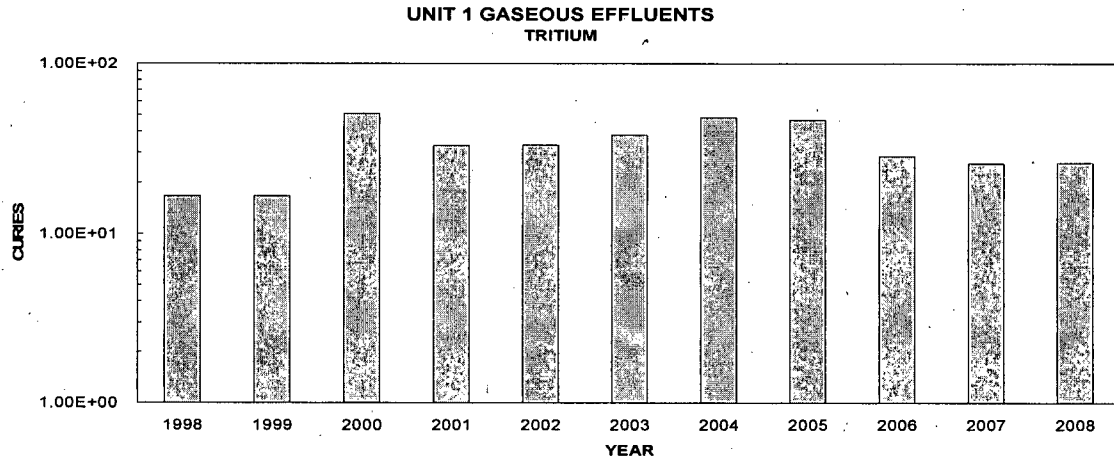
## UNIT 1 GASEOUS EFFLUENTS RADIOIODINES



## UNIT 1 GASEOUS EFFLUENTS PARTICULATES



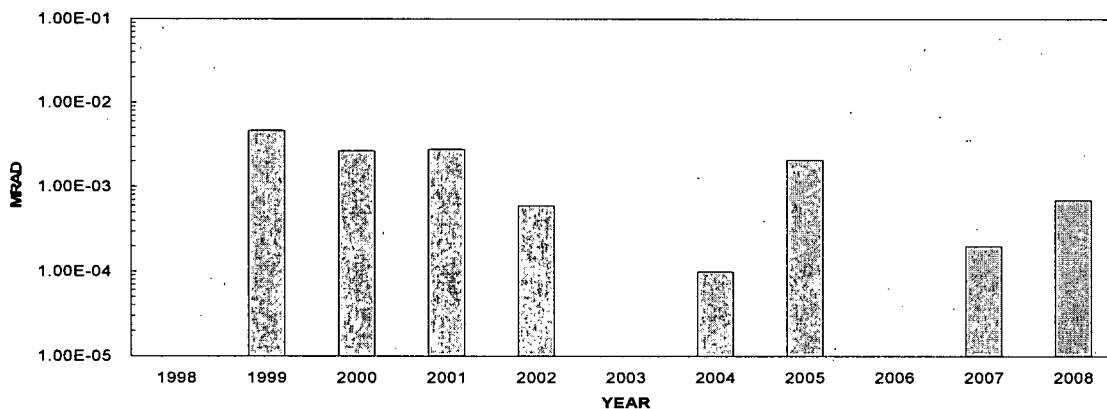
# ANO-1 & 2 Annual Radioactive Effluent Release Report for 2008



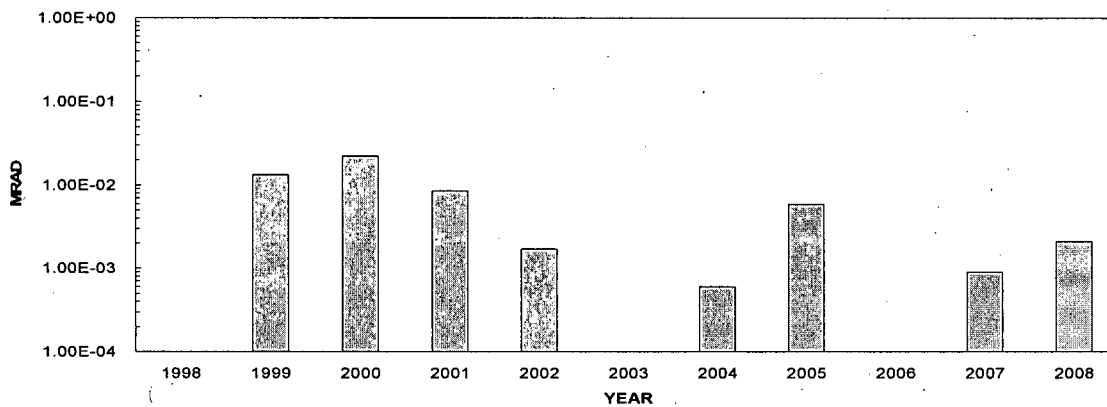


# ANO-1 & 2 Annual Radioactive Effluent Release Report for 2008

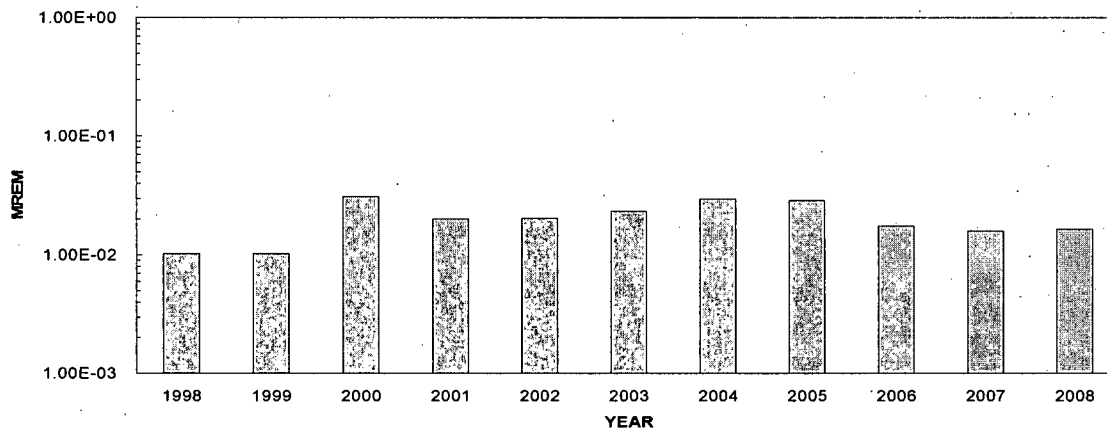
## UNIT 1 GASEOUS EFFLUENTS GAMMA DOSE



## UNIT 1 GASEOUS EFFLUENTS BETA DOSE

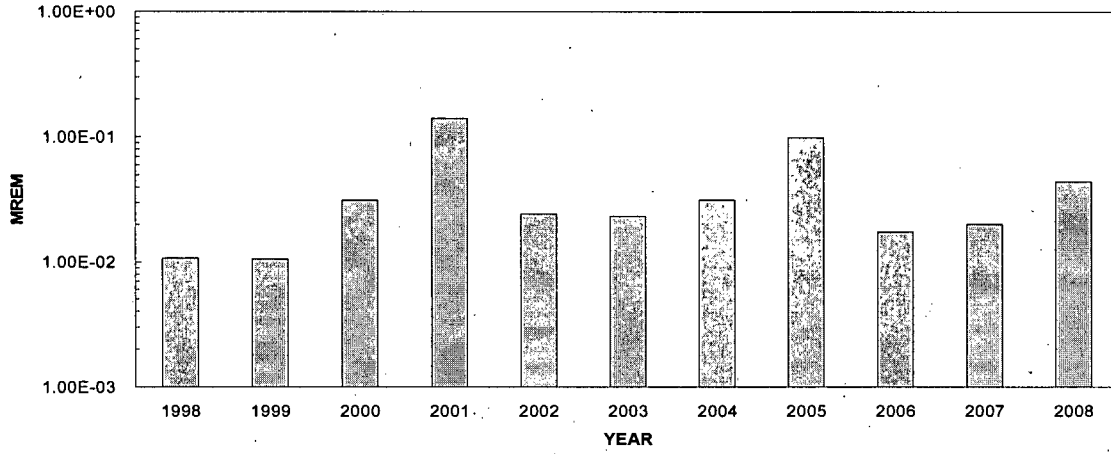


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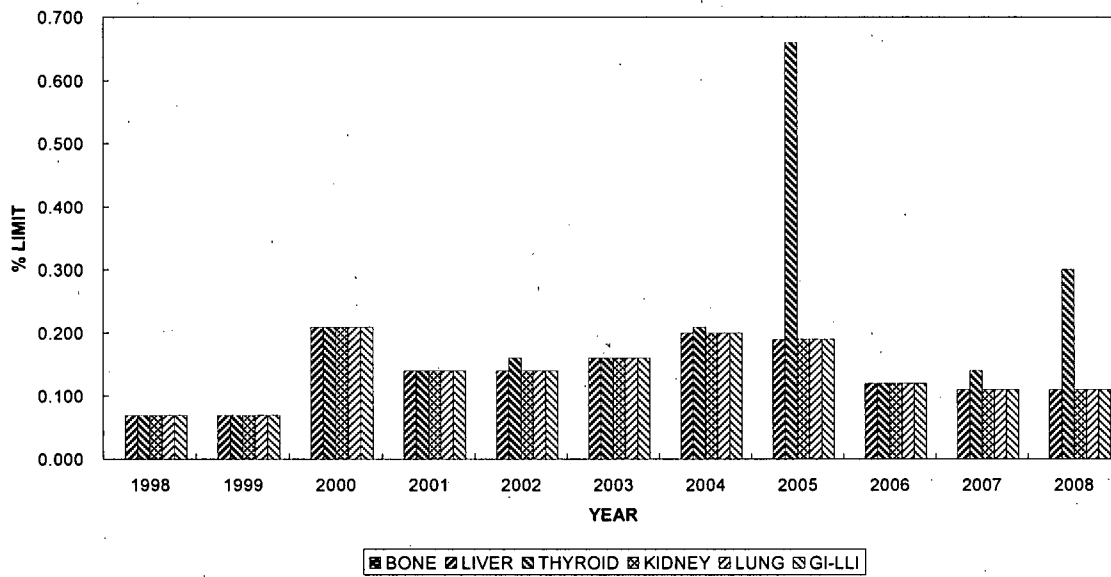


# ANO-1 & 2 Annual Radioactive Effluent Release Report for 2008

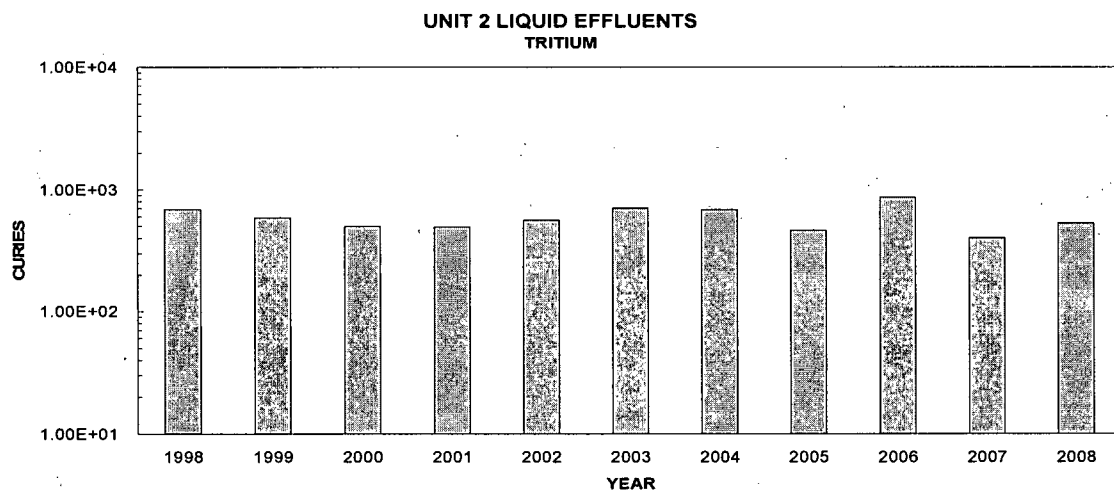
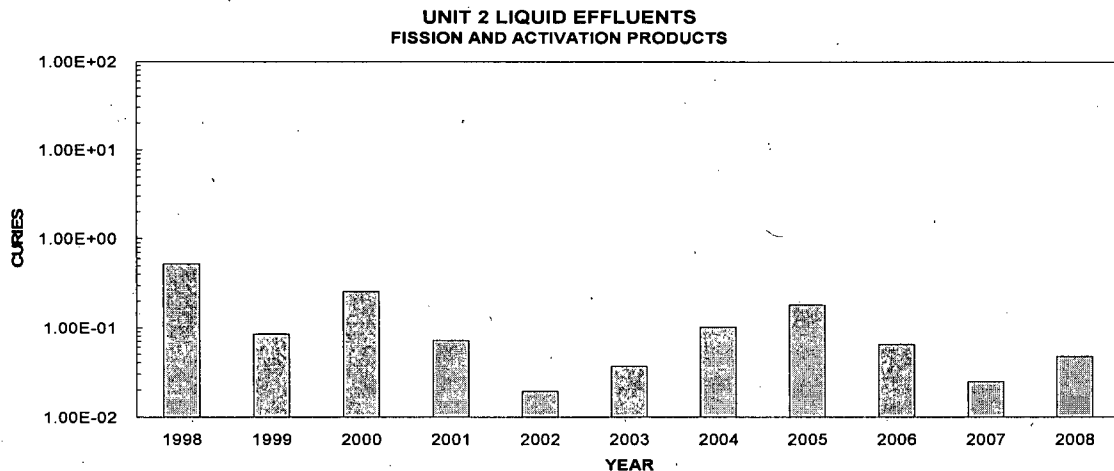
### UNIT 1 GASEOUS EFFLUENTS CRITICAL ORGAN DOSE



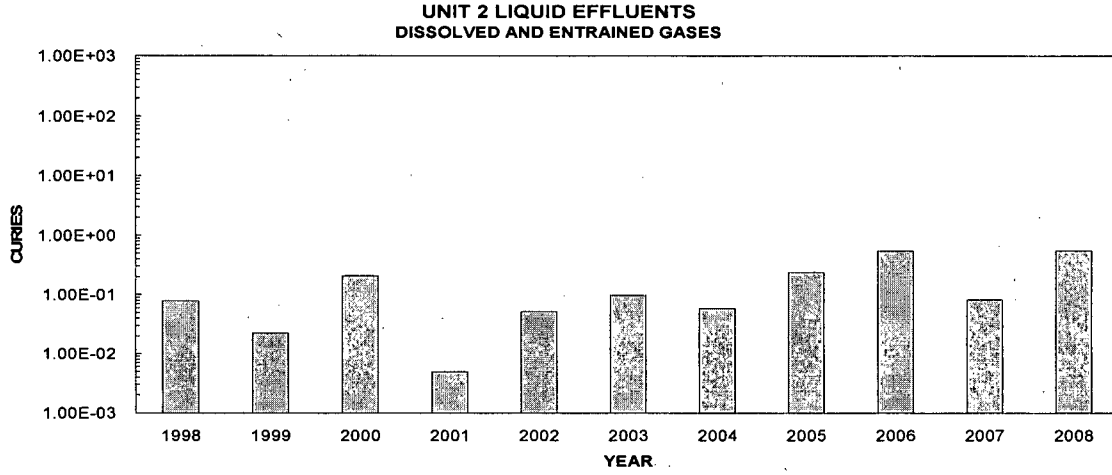
### UNIT 1 GASEOUS EFFLUENTS COLLECTIVE DOSES



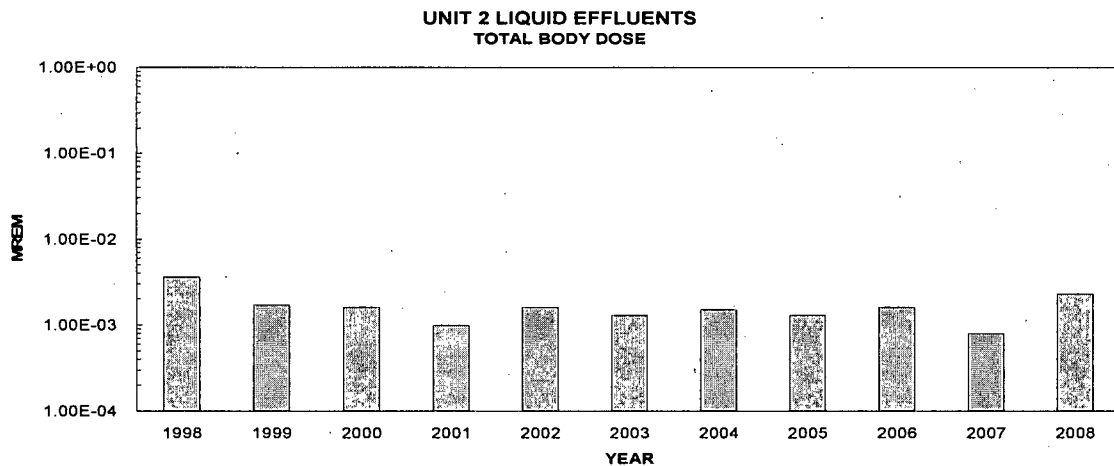
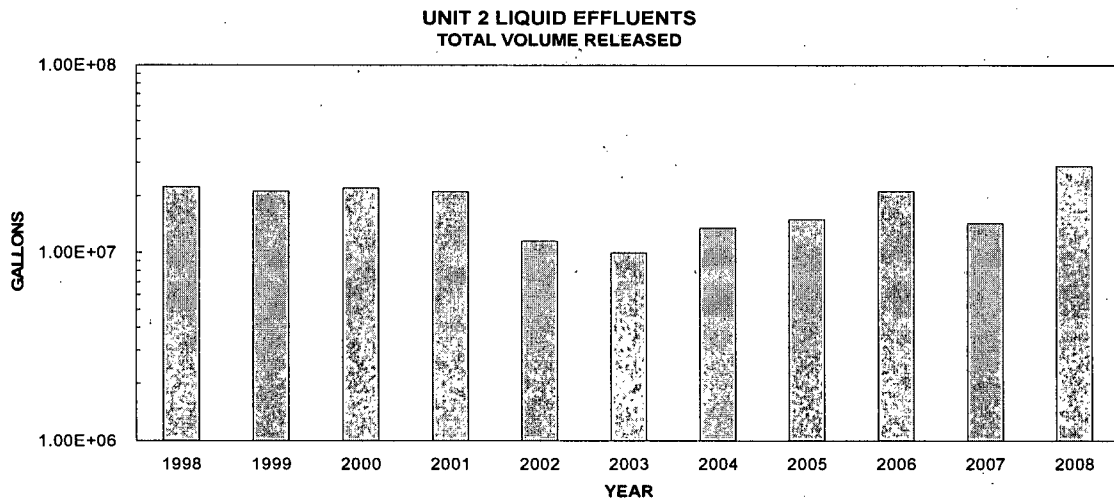
# ANO-1 & 2 Annual Radioactive Effluent Release Report for 2008



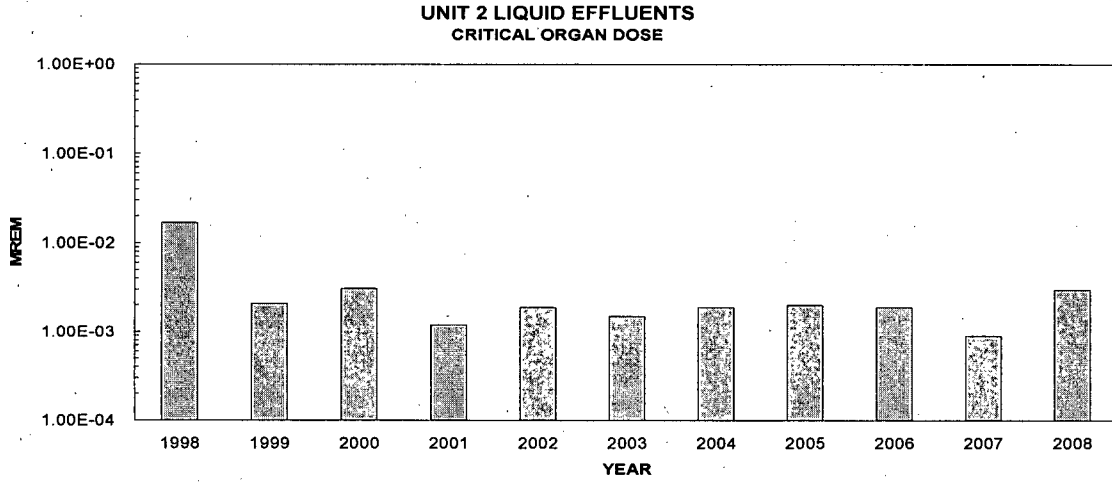
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# ANO-1 & 2 Annual Radioactive Effluent Release Report for 2008

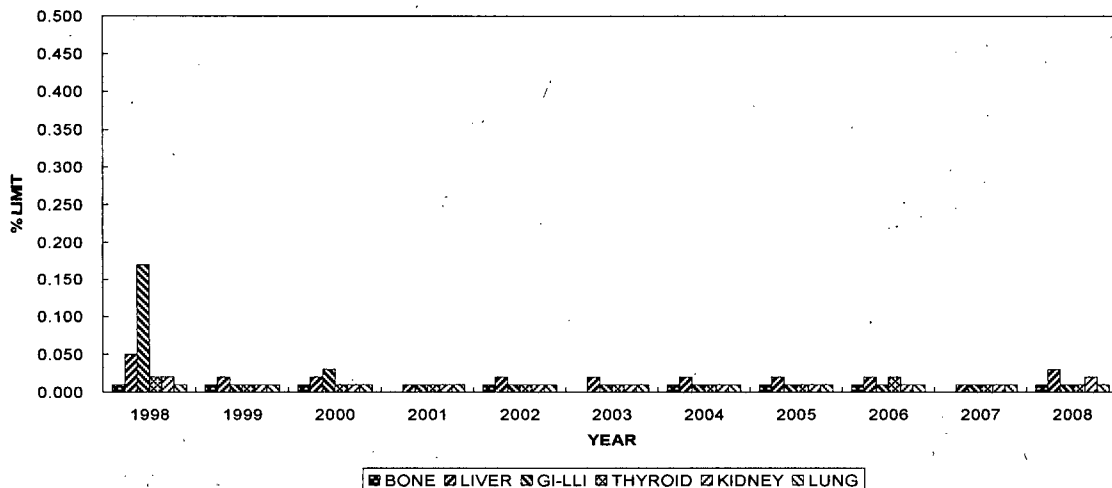


# ANO-1 & 2 Annual Radioactive Effluent Release Report for 2008

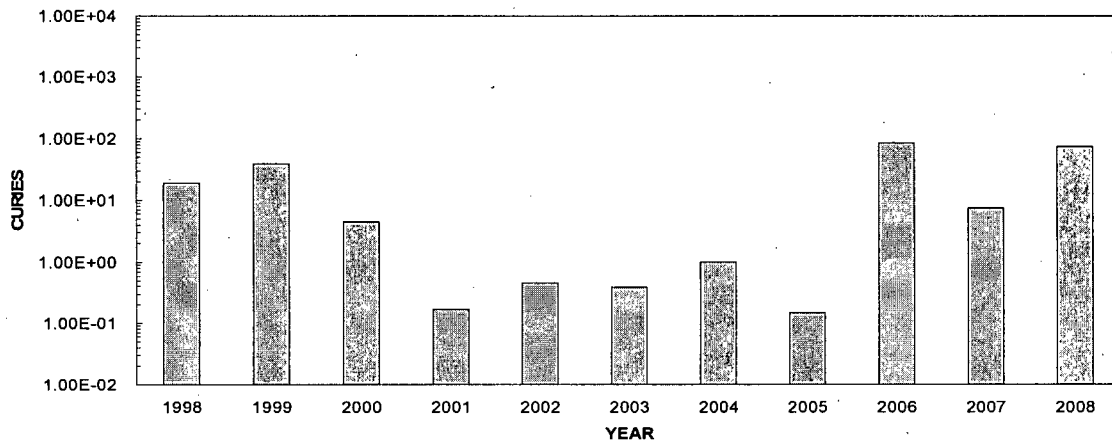


# ANO-1 & 2 Annual Radioactive Effluent Release Report for 2008

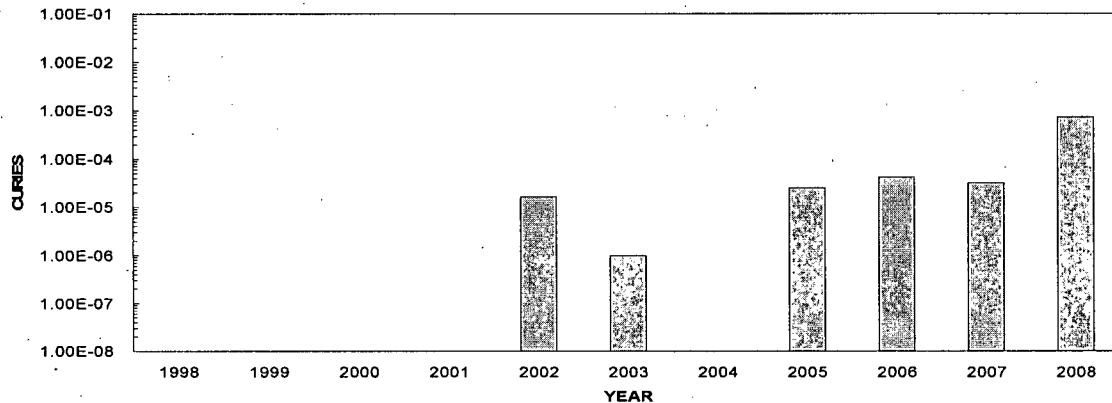
## UNIT 2 LIQUID EFFLUENTS COLLECTIVE DOSES



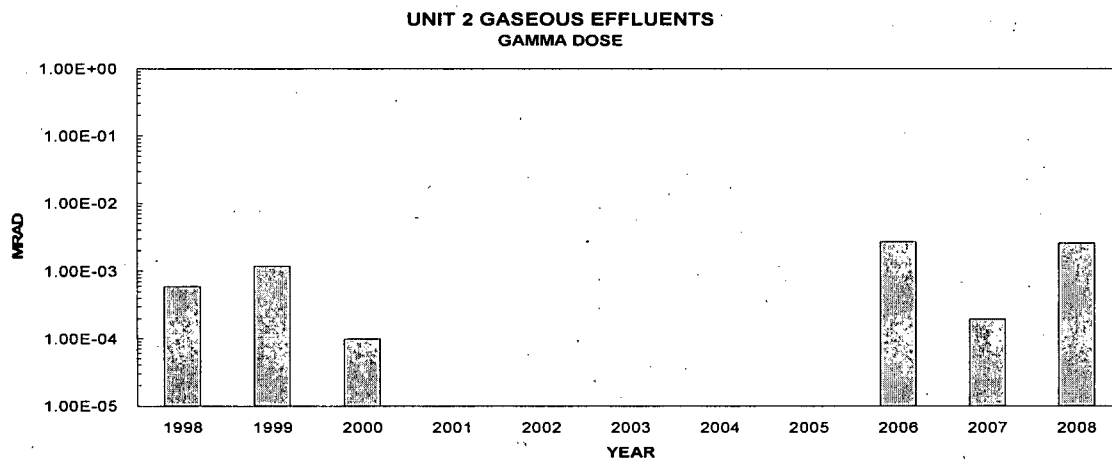
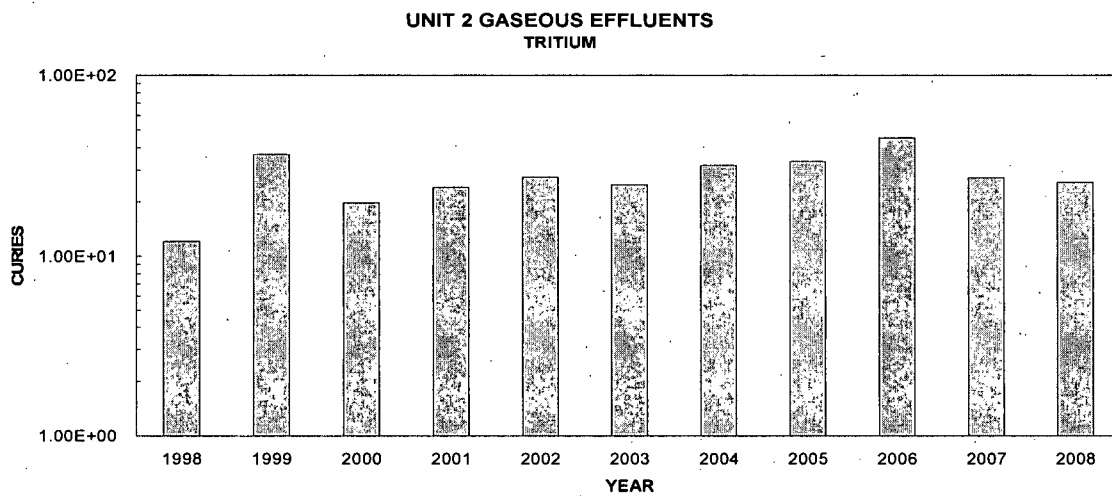
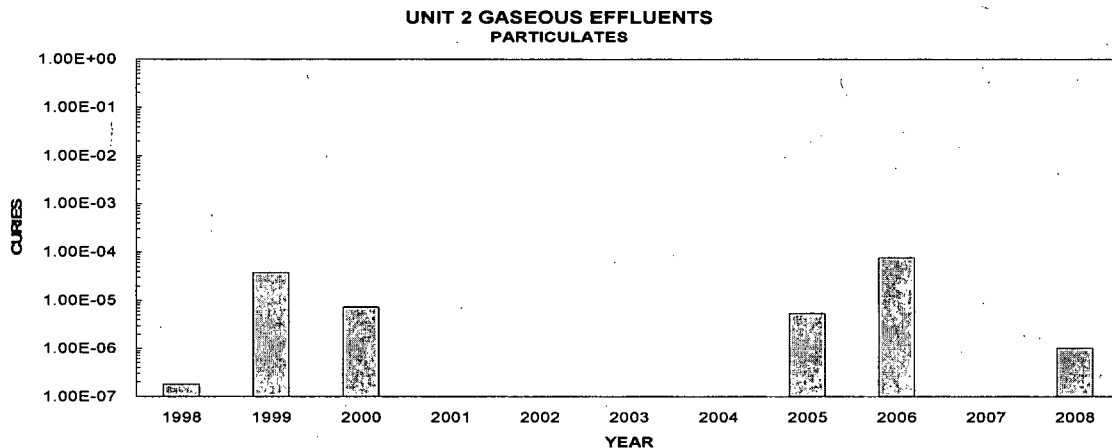
## UNIT 2 GASEOUS EFFLUENTS FISSION AND ACTIVATION PRODUCTS



## UNIT 2 GASEOUS EFFLUENTS RADIOIODINES



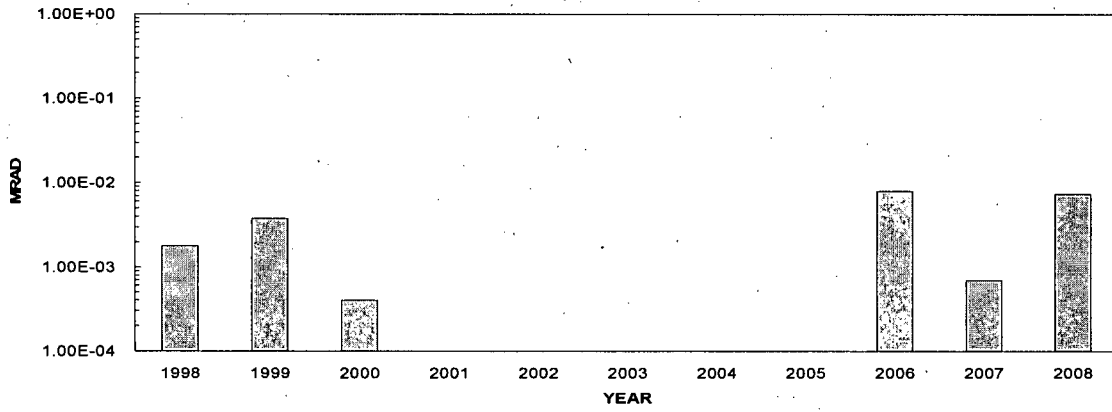
# ANO-1 & 2 Annual Radioactive Effluent Release Report for 2008



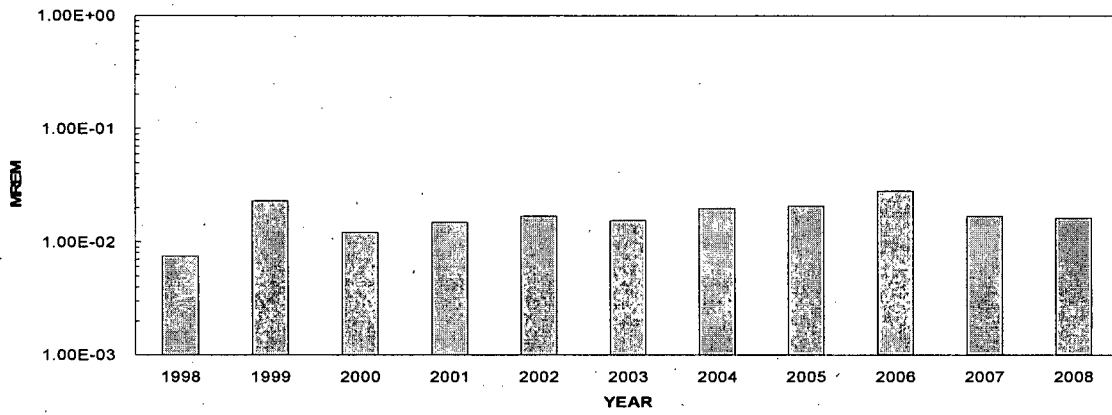


# ANO-1 & 2 Annual Radioactive Effluent Release Report for 2008

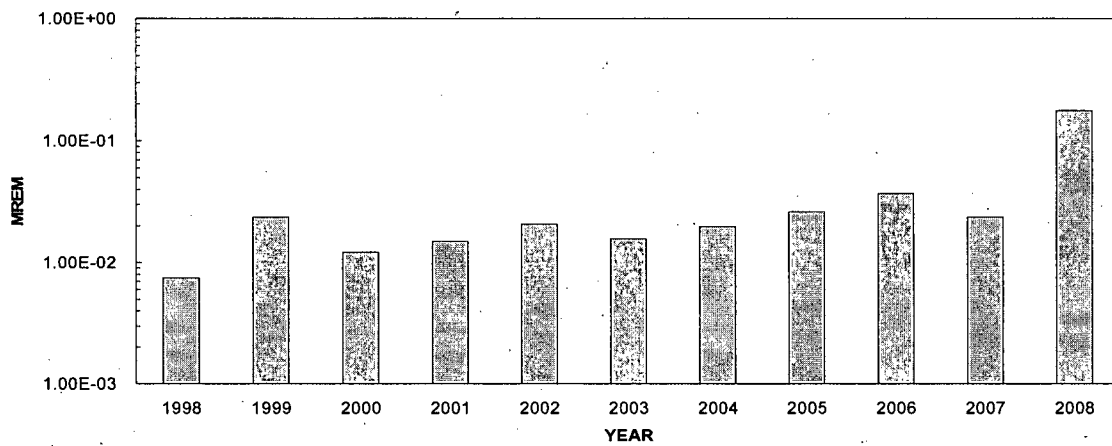
### UNIT 2 GASEOUS EFFLUENTS BETA DOSE



### UNIT 2 GASEOUS EFFLUENTS TOTAL BODY DOSE

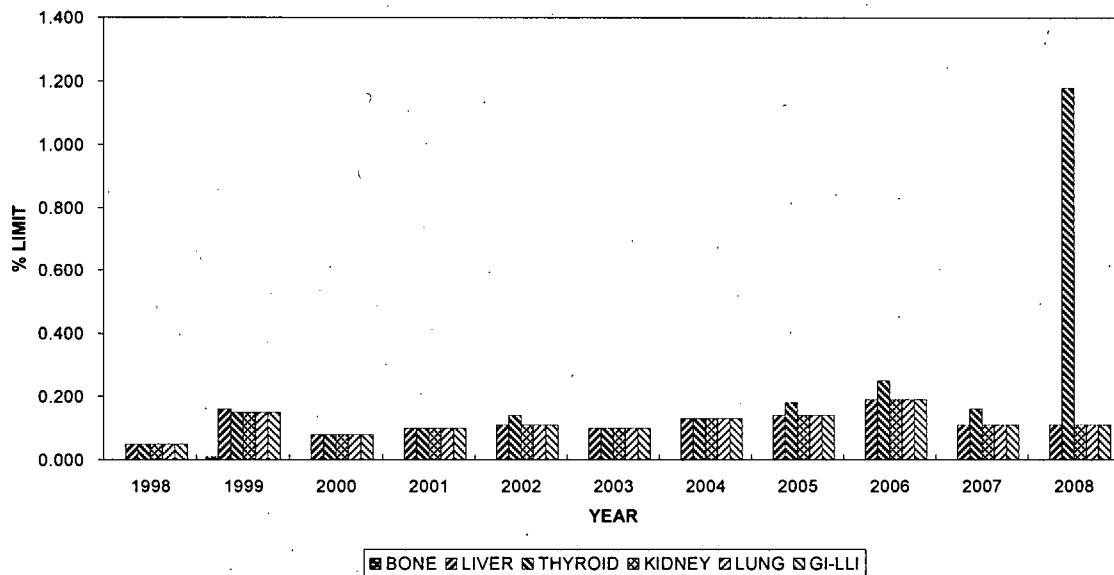


### UNIT 2 GASEOUS EFFLUENTS CRITICAL ORGAN DOSE



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## UNIT 2 GASEOUS EFFLUENTS COLLECTIVE DOSES



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**8. SOLID WASTE SUMMARY**

As required by Regulatory Guide 1.21, Rev. 1, a summary of data for solid wastes shipped offsite is provided in the Annual Radioactive Effluent Release Report.

This summary covers shipments from January 1 through December 31, 2008. The summary for solid waste shipments is as follows:

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Solid Waste Shipped Offsite for Disposal and Estimates of Major Nuclides by Waste Class and Stream  
During Period From 01/01/2008 to 06/30/2008 Percent Cutoff: 0

Waste Stream : Resins, Filters, and Evap Bottoms

Waste Class	Volume		Curies Shipped	% Error (Ci)
	Ft^3	M^3		
A	0.00E+00	0.00E+00	0.00E+00	+/- 25%
B	0.00E+00	0.00E+00	0.00E+00	+/- 25%
C	0.00E+00	0.00E+00	0.00E+00	+/- 25%
All	0.00E+00	0.00E+00	0.00E+00	+/- 25%

Waste Stream : Dry Active Waste

Comp Trash in SV      Metal Trash in SV      Metal trash/Comp trashMetal/Comp Trash  
empty sea-land

Waste Class	Volume		Curies Shipped	%Error (Ci)
	Ft^3	M^3		
A	1.48E+04	4.18E+02	8.70E-01	+/-25%
B	0.00E+00	0.00E+00	0.00E+00	+/-25%
C	0.00E+00	0.00E+00	0.00E+00	+/-25%
All	1.48E+04	4.18E+02	8.70E-01	+/-25%

Waste Stream : Irradiated Components

Waste Class	Volume		Curies Shipped	% Error (Ci)
	Ft^3	M^3		
A	0.00E+00	0.00E+00	0.00E+00	+/-25%
B	0.00E+00	0.00E+00	0.00E+00	+/-25%
C	0.00E+00	0.00E+00	0.00E+00	+/-25%
All	0.00E+00	0.00E+00	0.00E+00	+/-25%

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Solid Waste Shipped Offsite for Disposal and Estimates of Major Nuclides by Waste Class and Stream  
During Period From 01/01/2008 to 06/30/2008 Percent Cutoff: 0

Waste Stream : Other Waste  
Non Comp Trash : High Presure Turbine

Waste Class	Volume		Curies Shipped	% Error (Ci)
	Ft^3	M^3		
A	2.82E+03	7.99E+01	2.30E-02	+/-25%
B	0.00E+00	0.00E+00	0.00E+00	+/-25%
C	0.00E+00	0.00E+00	0.00E+00	+/-25%
All	2.82E+03	7.99E+01	2.30E-02	+/-25%

Waste Stream : Sum of All 4 Categories  
Comp Trash in SV : Metal Trash in SV : Metal trash/Comp tras : Metal/Comp Trash  
Non Comp Trash : High Presure Turbine : empty sea-land

Waste Class	Volume		Curies Shipped	% Error (Ci)
	Ft^3	M^3		
A	1.76E+04	4.98E+02	8.93E-01	+/-25%
B	0.00E+00	0.00E+00	0.00E+00	+/-25%
C	0.00E+00	0.00E+00	0.00E+00	+/-25%
All	1.76E+04	4.98E+02	8.93E-01	+/-25%

-Combined Waste Type Shipment, Major Volume Waste Type Shown

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Solid Waste Shipped Offsite for Disposal and Estimates of Major Nuclides by Waste Class and Stream  
During Period From 01/01/2008 to 06/30/2008

Number of Shipments	Mode of Transportation	Destination
16	Hittman Transport	Bear Creek Operations
1	Tri-State Motor Transit	Bear Creek Operations
1	Union Pacific Railroad	Clive Disposal Facility (Bulk)
1	Hittman Transport	Gallaher Road Operations

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Solid Waste Shipped Offsite for Disposal and Estimates of Major Nuclides by Waste Class and Stream  
During Period From 01/01/2008 to 06/30/2008 Percent Cutoff: 0

Dry Active Waste		
Waste Class A		
Nuclide Name	Percent Abundance	Curies
H-3	0.564%	4.91E-03
C-14	0.250%	2.18E-03
Cr-51	1.400%	1.22E-02
Mn-54	2.382%	2.07E-02
Fe-55	32.937%	2.86E-01
Fe-59	0.182%	1.58E-03
Co-57	0.200%	1.74E-03
Co-58	24.776%	2.16E-01
Co-60	6.557%	5.70E-02
Ni-63	24.051%	2.09E-01
Zn-65	0.069%	6.02E-04
Sr-89	0.009%	8.19E-05
Sr-90	0.006%	5.10E-05
Zr-95	1.450%	1.26E-02
Nb-95	1.980%	1.72E-02
Sn-113	0.109%	9.52E-04
Sb-125	0.663%	5.76E-03
Cs-134	0.594%	5.16E-03
Cs-137	1.687%	1.47E-02
Ce-144	0.116%	1.01E-03
Am-241	0.009%	8.20E-05
Cm-243	0.005%	4.18E-05
Cm-244	0.005%	4.18E-05
Dry Active Waste		
Waste Class All		
Nuclide Name	Percent Abundance	Curies
H-3	0.564%	4.91E-03
C-14	0.250%	2.18E-03
Cr-51	1.400%	1.22E-02
Mn-54	2.382%	2.07E-02
Fe-55	32.937%	2.86E-01
Fe-59	0.182%	1.58E-03
Co-57	0.200%	1.74E-03
Co-58	24.776%	2.16E-01
Co-60	6.557%	5.70E-02
Ni-63	24.051%	2.09E-01
Zn-65	0.069%	6.02E-04
Sr-89	0.009%	8.19E-05
Sr-90	0.006%	5.10E-05
Zr-95	1.450%	1.26E-02
Nb-95	1.980%	1.72E-02
Sn-113	0.109%	9.52E-04
Sb-125	0.663%	5.76E-03
Cs-134	0.594%	5.16E-03
Cs-137	1.687%	1.47E-02
Ce-144	0.116%	1.01E-03

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Solid Waste Shipped Offsite for Disposal and Estimates of Major Nuclides by Waste Class and Stream  
During Period From 01/01/2008 to 06/30/2008 Percent Cutoff: 0

Am-241	0.009%	8.20E-05
Cm-243	0.005%	4.18E-05
Cm-244	0.005%	4.18E-05
<b>Other Waste</b>		
<b>Waste Class A</b>		
<b>Nuclide Name</b>	<b>Percent Abundance</b>	<b>Curies</b>
H-3	0.613%	1.41E-04
C-14	0.273%	6.27E-05
Cr-51	0.753%	1.73E-04
Mn-54	2.468%	5.68E-04
Fe-55	35.340%	8.13E-03
Fe-59	0.130%	2.98E-05
Co-57	0.205%	4.72E-05
Co-58	20.994%	4.83E-03
Co-60	7.089%	1.63E-03
Ni-63	26.194%	6.02E-03
Zn-65	0.071%	1.62E-05
Sr-89	0.007%	1.63E-06
Sr-90	0.006%	1.47E-06
Zr-95	1.192%	2.74E-04
Nb-95	1.241%	2.85E-04
Sn-113	0.103%	2.37E-05
Sb-125	0.711%	1.64E-04
Cs-134	0.634%	1.46E-04
Cs-137	1.836%	4.22E-04
Ce-144	0.119%	2.75E-05
Am-241	0.010%	2.36E-06
Cm-243	0.005%	1.20E-06
Cm-244	0.005%	1.20E-06
<b>Other Waste</b>		
<b>Waste Class All</b>		
<b>Nuclide Name</b>	<b>Percent Abundance</b>	<b>Curies</b>
H-3	0.613%	1.41E-04
C-14	0.273%	6.27E-05
Cr-51	0.753%	1.73E-04
Mn-54	2.468%	5.68E-04
Fe-55	35.340%	8.13E-03
Fe-59	0.130%	2.98E-05
Co-57	0.205%	4.72E-05
Co-58	20.994%	4.83E-03
Co-60	7.089%	1.63E-03
Ni-63	26.194%	6.02E-03
Zn-65	0.071%	1.62E-05
Sr-89	0.007%	1.63E-06
Sr-90	0.006%	1.47E-06
Zr-95	1.192%	2.74E-04
Nb-95	1.241%	2.85E-04
Sn-113	0.103%	2.37E-05
Sb-125	0.711%	1.64E-04



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Solid Waste Shipped Offsite for Disposal and Estimates of Major Nuclides by Waste Class and Stream  
During Period From 01/01/2008 to 06/30/2008 Percent Cutoff: 0

Cs-134	0.634%	1.46E-04
Cs-137	1.836%	4.22E-04
Ce-144	0.119%	2.75E-05
Am-241	0.010%	2.36E-06
Cm-243	0.005%	1.20E-06
Cm-244	0.005%	1.20E-06
Sum of All 4 Categories		
Waste Class A		
Nuclide Name	Percent Abundance	Curies
H-3	0.565%	5.05E-03
C-14	0.251%	2.24E-03
Cr-51	1.383%	1.23E-02
Mn-54	2.384%	2.13E-02
Fe-55	32.999%	2.95E-01
Fe-59	0.181%	1.61E-03
Co-57	0.200%	1.78E-03
Co-58	24.678%	2.20E-01
Co-60	6.571%	5.87E-02
Ni-63	24.106%	2.15E-01
Zn-65	0.069%	6.18E-04
Sr-89	0.009%	8.36E-05
Sr-90	0.006%	5.25E-05
Zr-95	1.443%	1.29E-02
Nb-95	1.961%	1.75E-02
Sn-113	0.109%	9.76E-04
Sb-125	0.664%	5.93E-03
Cs-134	0.595%	5.31E-03
Cs-137	1.691%	1.51E-02
Ce-144	0.116%	1.03E-03
Am-241	0.009%	8.43E-05
Cm-243	0.005%	4.30E-05
Cm-244	0.005%	4.30E-05
Sum of All 4 Categories		
Waste Class All		
Nuclide Name	Percent Abundance	Curies
H-3	0.565%	5.05E-03
C-14	0.251%	2.24E-03
Cr-51	1.383%	1.23E-02
Mn-54	2.384%	2.13E-02
Fe-55	32.999%	2.95E-01
Fe-59	0.181%	1.61E-03
Co-57	0.200%	1.78E-03
Co-58	24.678%	2.20E-01
Co-60	6.571%	5.87E-02
Ni-63	24.106%	2.15E-01
Zn-65	0.069%	6.18E-04
Sr-89	0.009%	8.36E-05
Sr-90	0.006%	5.25E-05
Zr-95	1.443%	1.29E-02

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Solid Waste Shipped Offsite for Disposal and Estimates of Major Nuclides by Waste Class and Stream  
During Period From 01/01/2008 to 06/30/2008 Percent Cutoff: 0

Nb-95	1.961%	1.75E-02
Sn-113	0.109%	9.76E-04
Sb-125	0.664%	5.93E-03
Cs-134	0.595%	5.31E-03
Cs-137	1.691%	1.51E-02
Ce-144	0.118%	1.03E-03
Am-241	0.009%	8.43E-05
Cm-243	0.005%	4.30E-05
Cm-244	0.005%	4.30E-05

Solid Waste Shipped Offsite for Disposal and Estimates of Major Nuclides by Waste Class and Stream  
During Period From 01/01/2008 to 06/30/2008

Manifest Number	Date Shipped	Waste Volume Used	Burial volume Used
RSR 08-045	6/5/2008	Yes	
RSR 08-048	6/5/2008	Yes	
RSR 08-044	6/4/2008	Yes	
RSR 08-043	6/3/2008	Yes	
RSR 08-041	5/22/2008	Yes	
RSR 08-040	5/20/2008	Yes	
RSR 08-036	5/15/2008	Yes	
RSR 08-023	4/1/2008	Yes	
RSR 08-021	3/31/2008	Yes	
RSR 08-019	3/25/2008	Yes	
RSR 08-012	2/29/2008	Yes	
RSR 08-010	2/20/2008	Yes	
RSR 08-008	2/13/2008	Yes	
RSR 08-007	2/5/2008	Yes	
RSR 08-006	1/30/2008	Yes	
RSR 08-005	1/23/2008	Yes	
RSR 08-004	1/21/2008	Yes	
RSR 08-003	1/17/2008	Yes	
RSR 08-002	1/15/2008	Yes	

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Solid Waste Shipped Offsite for Disposal and Estimates of Major Nuclides by Waste Class and Stream  
During Period From 07/01/2008 to 12/31/2008 Percent Cutoff: 0

Waste Stream : Resins, Filters, and Evap Bottoms

Waste Class	Volume		Curies Shipped	% Error (Ci)
	Ft^3	M^3		
A	0.00E+00	0.00E+00	0.00E+00	+/- 25%
B	0.00E+00	0.00E+00	0.00E+00	+/- 25%
C	0.00E+00	0.00E+00	0.00E+00	+/- 25%
All	0.00E+00	0.00E+00	0.00E+00	+/- 25%

Waste Stream : Dry Active Waste

Comp Trash in SV    Metal Trash in SV    Metal trash/Comp trashMetal/Comp Trash  
Non Compactable Tras Shroud

Waste Class	Volume		Curies Shipped	%Error (Ci)
	Ft^3	M^3		
A	1.89E+04	5.34E+02	1.03E+00	+/-25%
B	0.00E+00	0.00E+00	0.00E+00	+/-25%
C	0.00E+00	0.00E+00	0.00E+00	+/-25%
All	1.89E+04	5.34E+02	1.03E+00	+/-25%

Waste Stream : Irradiated Components

Waste Class	Volume		Curies Shipped	% Error (Ci)
	Ft^3	M^3		
A	0.00E+00	0.00E+00	0.00E+00	+/-25%
B	0.00E+00	0.00E+00	0.00E+00	+/-25%
C	0.00E+00	0.00E+00	0.00E+00	+/-25%
All	0.00E+00	0.00E+00	0.00E+00	+/-25%

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Solid Waste Shipped Offsite for Disposal and Estimates of Major Nuclides by Waste Class and Stream  
During Period From 07/01/2008 to 12/31/2008 Percent Cutoff: 0

Waste Stream : Other Waste  
Oil in SV

Waste Class	Volume		Curies Shipped	% Error (Ci)
	Ft^3	M^3		
A	2.25E+02	6.37E+00	3.08E-03	+/-25%
B	0.00E+00	0.00E+00	0.00E+00	+/-25%
C	0.00E+00	0.00E+00	0.00E+00	+/-25%
All	2.25E+02	6.37E+00	3.08E-03	+/-25%

Waste Stream : Sum of All 4 Categories

Comp Trash in SV    Metal Trash in SV    Oil in SV    Metal trash/Comp trash  
Metal/Comp Trash    Non Compactable Tra: Shroud

Waste Class	Volume		Curies Shipped	% Error (Ci)
	Ft^3	M^3		
A	1.91E+04	5.41E+02	1.04E+00	+/-25%
B	0.00E+00	0.00E+00	0.00E+00	+/-25%
C	0.00E+00	0.00E+00	0.00E+00	+/-25%
All	1.91E+04	5.41E+02	1.04E+00	+/-25%

-Combined Waste Type Shipment, Major Volume Waste Type Shown

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Page 1

Report Date : 1/13/2009

Solid Waste Shipped Offsite for Disposal and Estimates of Major Nuclides by Waste Class and Stream  
During Period From 07/01/2008 to 12/31/2008

Number of Shipments	Mode of Transportation	Destination
15	Hittman Transport	Bear Creek Operations
2	Tri-State Motor Transit	Bear Creek Operations

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Page 1

Report Date : 1/13/2009

Solid Waste Shipped Offsite for Disposal and Estimates of Major Nuclides by Waste Class and Stream  
During Period From 07/01/2008 to 12/31/2008 Percent Cutoff: 0

Dry Active Waste		
Waste Class A		
Nuclide Name	Percent Abundance	Curies
H-3	0.035%	3.61E-04
C-14	0.710%	7.35E-03
Cr-51	0.149%	1.54E-03
Mn-54	2.836%	2.93E-02
Fe-55	28.299%	2.93E-01
Fe-59	0.137%	1.42E-03
Co-57	0.243%	2.51E-03
Co-58	19.904%	2.06E-01
Co-60	10.415%	1.08E-01
Ni-59	0.163%	1.69E-03
Ni-63	28.863%	2.99E-01
Zn-65	0.005%	4.85E-05
Sr-85	0.000%	2.05E-11
Sr-89	0.001%	8.83E-06
Sr-90	0.011%	1.12E-04
Y-88	0.000%	2.85E-08
Zr-95	0.635%	6.57E-03
Nb-95	1.054%	1.09E-02
Tc-99	0.000%	3.50E-07
Cd-109	0.000%	1.13E-06
Sn-113	0.065%	6.69E-04
Sb-125	1.357%	1.40E-02
Cs-134	2.449%	2.53E-02
Cs-137	2.562%	2.65E-02
Ce-139	0.000%	1.88E-08
Ce-144	0.102%	1.06E-03
Hg-203	0.000%	1.25E-12
Pu-238	0.001%	6.25E-06
Am-241	0.002%	1.73E-05
Cm-243	0.002%	1.72E-05
Cm-244	0.002%	1.72E-05
Dry Active Waste		
Waste Class All		
Nuclide Name	Percent Abundance	Curies
H-3	0.035%	3.61E-04
C-14	0.710%	7.35E-03
Cr-51	0.149%	1.54E-03
Mn-54	2.836%	2.93E-02
Fe-55	28.299%	2.93E-01
Fe-59	0.137%	1.42E-03
Co-57	0.243%	2.51E-03
Co-58	19.904%	2.06E-01
Co-60	10.415%	1.08E-01
Ni-59	0.163%	1.69E-03
Ni-63	28.863%	2.99E-01
Zn-65	0.005%	4.85E-05

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Solid Waste Shipped Offsite for Disposal and Estimates of Major Nuclides by Waste Class and Stream  
During Period From 07/01/2008 to 12/31/2008 Percent Cutoff: 0

Sr-85	0.000%	2.05E-11
Sr-89	0.001%	8.83E-06
Sr-90	0.011%	1.12E-04
Y-88	0.000%	2.85E-08
Zr-95	0.635%	6.57E-03
Nb-95	1.054%	1.09E-02
Tc-99	0.000%	3.50E-07
Cd-109	0.000%	1.13E-06
Sn-113	0.065%	6.89E-04
Sb-125	1.357%	1.40E-02
Cs-134	2.449%	2.53E-02
Cs-137	2.562%	2.65E-02
Ce-139	0.000%	1.88E-08
Ce-144	0.102%	1.06E-03
Hg-203	0.000%	1.25E-12
Pu-238	0.001%	6.25E-06
Am-241	0.002%	1.73E-05
Cm-243	0.002%	1.72E-05
Cm-244	0.002%	1.72E-05
Other Waste		
Waste Class A		
Nuclide Name	Percent Abundance	Curies
Co-60	52.243%	1.61E-03
Cs-137	47.757%	1.47E-03
Other Waste		
Waste Class All		
Nuclide Name	Percent Abundance	Curies
Co-60	52.243%	1.61E-03
Cs-137	47.757%	1.47E-03
Sum of All 4 Categories.		
Waste Class A		
Nuclide Name	Percent Abundance	Curies
H-3	0.035%	3.61E-04
C-14	0.708%	7.35E-03
Cr-51	0.149%	1.54E-03
Mn-54	2.828%	2.93E-02
Fe-55	28.214%	2.93E-01
Fe-59	0.136%	1.42E-03
Co-57	0.242%	2.51E-03
Co-58	19.845%	2.06E-01
Co-60	10.540%	1.09E-01
Ni-59	0.162%	1.69E-03
Ni-63	28.777%	2.99E-01
Zn-65	0.005%	4.85E-05
Sr-85	0.000%	2.05E-11
Sr-89	0.001%	8.83E-06
Sr-90	0.011%	1.12E-04
Y-88	0.000%	2.85E-08

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Solid Waste Shipped Offsite for Disposal and Estimates of Major Nuclides by Waste Class and Stream  
During Period From 07/01/2008 to 12/31/2008 Percent Cutoff: 0

Zr-95	0.634%	6.57E-03
Nb-95	1.051%	1.09E-02
Tc-99	0.000%	3.50E-07
Cd-109	0.000%	1.13E-06
Sn-113	0.065%	6.69E-04
Sb-125	1.353%	1.40E-02
Cs-134	2.442%	2.53E-02
Cs-137	2.696%	2.80E-02
Ce-139	0.000%	1.88E-08
Ce-144	0.102%	1.06E-03
Hg-203	0.000%	1.25E-12
Pu-238	0.001%	6.25E-06
Am-241	0.002%	1.73E-05
Cm-243	0.002%	1.72E-05
Cm-244	0.002%	1.72E-05
Sum of All 4 Categories		
Waste Class All		
Nuclide Name	Percent Abundance	Curies
H-3	0.035%	3.61E-04
C-14	0.708%	7.35E-03
Cr-51	0.149%	1.54E-03
Mn-54	2.828%	2.93E-02
Fe-55	28.214%	2.93E-01
Fe-59	0.136%	1.42E-03
Co-57	0.242%	2.51E-03
Co-58	19.845%	2.06E-01
Co-60	10.540%	1.09E-01
Ni-59	0.162%	1.69E-03
Ni-63	28.777%	2.99E-01
Zn-65	0.005%	4.85E-05
Sr-85	0.000%	2.05E-11
Sr-89	0.001%	8.83E-06
Sr-90	0.011%	1.12E-04
Y-88	0.000%	2.85E-08
Zr-95	0.634%	6.57E-03
Nb-95	1.051%	1.09E-02
Tc-99	0.000%	3.50E-07
Cd-109	0.000%	1.13E-06
Sn-113	0.065%	6.69E-04
Sb-125	1.353%	1.40E-02
Cs-134	2.442%	2.53E-02
Cs-137	2.696%	2.80E-02
Ce-139	0.000%	1.88E-08
Ce-144	0.102%	1.06E-03
Hg-203	0.000%	1.25E-12
Pu-238	0.001%	6.25E-06
Am-241	0.002%	1.73E-05
Cm-243	0.002%	1.72E-05
Cm-244	0.002%	1.72E-05



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Report Date : 1/13/2009

Solid Waste Shipped Offsite for Disposal and Estimates of Major Nuclides by Waste Class and Stream  
During Period From 07/01/2008 to 12/31/2008

Manifest Number	Date Shipped	Waste Volume Used	Burial volume Used
RSR 08-111	12/11/2008	Yes	
RSR 08-107	12/9/2008	Yes	
RSR 08-106	12/8/2008	Yes	
RSR 08-103	12/4/2008	Yes	
RSR 08-100	12/2/2008	Yes	
RSR 08-098	12/1/2008	Yes	
RSR 08-097	11/24/2008	Yes	
RSR 08-094	11/18/2008	Yes	
RSR 08-091	11/11/2008	Yes	
RSR 08-087	11/6/2008	Yes	
RSR 08-086	11/4/2008	Yes	
RSR 08-077	10/14/2008	Yes	
RSR 08-063	8/12/2008	Yes	
RSR 08-061	8/5/2008	Yes	
RSR 08-060	7/31/2008	Yes	
RSR 08-059	7/29/2008	Yes	
RSR 08-058	7/22/2008	Yes	

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### 9. UNPLANNED RELEASES

An unplanned release is the unintended discharge of a volume of liquid or airborne radioactivity to unrestricted areas per the definition found in ANO Station Procedures.

During 2008, there were two unplanned releases to an unrestricted area.

On March 16, during Unit 2 Refueling Outage 2R19, monitoring equipment located at the reactor building equipment hatch began exhibiting increased counts following the initial opening of the equipment hatch door. The reactor building ventilation had been secured at 19:26 hours on March 16 to allow opening of the hatch door and was re-started at 20:11 hours. Reactor building samples were collected inside the equipment hatch area to determine cause of increased counts. No airflow could be confirmed exiting the hatch at the time of increased counts. However, gaseous effluent release permit 2GR2008-0029 was generated using the activities measured from the samples collected inside the reactor building and the time the reactor building ventilation was secured to document the dose released. The dose values associated with this release were as follows: Iodine, Tritium, and Particulate (ITP) = 2.86E-06 mRem, Gamma = 1.964E-06 mRad, Beta = 4.478E-06 mRad. These values are well below the quarterly Offsite Dose Calculation Manual (ODCM) ITP, Gamma and Beta dose limits of 7.5, 5 and 10 mRem respectively and the annual ITP, Gamma and Beta dose limits of 15, 10 and 20 mRem. The release was conservatively categorized as "unplanned" even though no air flow could be confirmed exiting the hatch and the corresponding doses associated with the release were not significant in relation to the yearly goals for effluent releases or to the ODCM limits.

During a Quality Assurance (QA) audit on August 5, QA noticed Door DR-249 (Access to PASS Building) on elevation 354' in the Unit 2 was passing air from the Auxiliary Building into the PASS Building. Inspection of this condition revealed an air gap of ~ 1/4" between the sealing surface and the door frame along the hinge side of the door with one dog fully latched on the opposite side. Fully latching all dogs corrected the condition. The DR-249 hinge pin receivers are slotted. The purpose of this slot is to allow for movement of the door during latching of the dogs so that the door seal will compress on the door frame. Immediately following the identification of air flowing to the PASS building from the Unit 2 Auxiliary Building, Chemistry implemented effluent monitoring at the PASS door location (Auxiliary Building side) to identify any activity being released. No activity was detected in the initial sample. However, a tritium sample collected on August 6 indicated a small amount of tritium (3.93E-09 uCi/cc) present. An effluent release permit (2GR2008-0096) was performed to document the dose associated with the release (ITP dose = 2.70E-10 mRem). On August 18, tritium was detected (2.531E-08 uCi/cc) in effluent samples collected inside the PASS Building. An effluent release permit (2GR2008-0099) was performed to document the dose associated with the release (ITP dose = 2.63E-09 mRem). The doses associated with the two aforementioned releases were insignificant and well below the quarterly ODCM ITP dose limit of 7.5 mRem and the annual ITP dose limit of 15 mRem. All samples collected since August 18 have shown no radioactivity. Condition Report CR-ANO-2-2008-01887 was issued to document the air flow imbalance and to take action to correct the condition and to prevent air flow from passing into the PASS Building via DR-249. Release permit 2GR2008-0096 has been conservatively categorized as "unplanned" even though the initial samples collected inside the PASS Building did not detect radioactivity and the corresponding doses associated with the release were not significant in relation to the yearly goals for effluent releases or to the ODCM limits. Release permit 2GR2008-0099 was not categorized as "unplanned" since effluent release monitoring had been previously implemented.

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On August 6, Fuel Pool Purification Suction Air Trap (2F-174) was identified as a potential unmonitored release pathway. 2F-174 is located outside the Unit 2 Auxiliary Building on elevation 404. The air trap is vented to this location by design. Radiation Protection surveys of the catch containment device underneath the open pipe end of 2F-174 indicated 10,000 dpm/LAS and the smears inside the open pipe indicated 1000 dpm/100 cm<sup>2</sup>. No air could be measured exiting the 2F-174 vent. However, gaseous effluent samples were collected at the 2F-174 location and no radioactivity was detected. Chemistry implemented routine monitoring (tritium and gas samples daily, particulate and charcoal continuously) at the 2F-174 location to evaluate if radioactivity is being released from the open pipe. On September 3, a trace amount of tritium (8.038E-09 uCi/cc) was measured in the effluent sample. Gaseous release permit 2GR2008-0106 was generated to document the dose as a result of this release. The dose (3.30E-12 mRem) was insignificant and well below the quarterly ODCM ITP dose limit of 7.5 mRem and the annual ITP dose limit of 15 mRem. All samples collected since September 3 have shown no radioactivity. Condition Report CR-ANO-2-2008-01900 was issued to document this condition. Corrective Action #002 of this CR issued ECR #5462 to have the effluent of 2F-174 routed to a monitored pathway to eliminate the potential for an unmonitored release. Release permit 2GR2008-0106 was not categorized as "unplanned" since effluent release monitoring had been previously implemented.

During the 2008 NRC Inspection on Environmental Monitoring, Radioactive Effluents, Radioactive Material Control and Radioactive Material Transportation, it was identified that gaseous release report 2GR2006-00114 was classified as a planned release and reported as such in the 2006 Annual Radioactive Effluent Release Report (ARERR). The inspector stated that this release should have been classified as an unplanned release and reported as such in the 2006 Annual Report per the definition of unplanned release found in the 2006 ARERR. The 2006 ARERR defined an unplanned release as any release of radioactive material to the environment that sample analysis was not performed prior to the release and release calculations were not performed prior to release. This definition was not consistent with the definition found in ANO station procedures. 2GR2006-00114 was categorized as a planned release using the definition and criteria listed in Procedure 1604.015, "Analysis of Unit Vents", Attachment 2 "Definition of Unplanned Release". The definition found in Chemistry procedures is based upon Health Physics Position Paper (HPPOS), "Definition of Unplanned Release, Record #254". The HPPOS defined an unplanned release as the unintended discharge of a volume of liquid or airborne radioactivity to the environment. CR-ANO-C-2008-01354 was issued to document the issues identified with 2GR2006-00114. As a result, Section 9 of the 2008 ARERR was revised to be consistent with the definition of an unplanned release found in Chemistry procedures. However, Corrective Action #004 of CR-ANO-C-2008-01354 was issued to perform a review of the 2005, 2006, and 2007 effluent data to identify releases that would be considered unplanned releases per the definition found in the Section 9 of the 2005, 2006, and 2007 reports. The following releases were identified and are included in the 2008 ARERR per CR-ANO-C-2008-01354 CA #004:

### 2005:

1GR2005-0137 - A gaseous effluent release permit was generated to document the dose attributed to air flowing out of the Unit 1 reactor building hatch during Refueling Outage 1R19. The reactor building ventilation was in service; however, air was observed exiting the equipment hatch. No cause could be identified as to why air was exiting the hatch. Gaseous effluent release permit 1GR2005-0137 was generated to document the dose released as a result of this

## ANO-1 & 2 Annual Radioactive Effluent Release Report for 2008

condition. It was determined that a total of  $1.96\text{E-}04$  curies of tritium and  $1.56\text{E-}07$  curies of I-131 were released. The ITP dose attributed to the release was  $2.45\text{E-}07$  mRem, well below the quarterly and annual ODCM ITP dose limits of 7.5 and 15 mRem, respectively.

1GR2005-0138 - A gaseous effluent release permit was generated to document the dose attributed to air flowing out of the Unit 1 reactor building hatch during Refueling Outage 1R19. The reactor building ventilation was in service; however, air was observed exiting the equipment hatch. No cause could be identified as to why air was exiting the hatch. Gaseous effluent release permit 1GR2005-0138 was generated to document the dose released as a result of this condition. It was determined that a total of  $5.67\text{E-}05$  curies of tritium were released. The ITP dose attributed to the release was  $5.81\text{E-}09$  mRem, well below the quarterly and annual ODCM ITP dose limits of 7.5 and 15 mRem respectively. All curies and doses associated with the release were accounted for in the 2005 ARERR.

### 2006:

2GR2006-0114 - A gaseous effluent release permit was generated to document the dose attributed to air flowing out of the Unit 2 containment building hatch during Refueling Outage 2R18. The cause for the air exiting the containment building via the equipment hatch was attributed to containment building ventilation being secured due to 2RITS-8233 (Containment Purge Radmonitor) monitor reading exceeding the trip set point value. The count rate increase was due to Unit 2 Operations venting the Pressurizer to the Quench Tank and then to the containment building sump. Unit 2 Operations reset 2RITS-8233 and restarted the ventilation. The equipment hatch was closed as a result of the multiple trips of 2RITS-8233. Gaseous effluent release permit 2GR2006-0114 was generated to document the dose released via the equipment hatch as a result of this condition. It was determined that a total of  $8.66\text{E-}05$  curies of tritium and  $1.27\text{E-}01$  curies of noble gas were released. The ITP dose attributed to the release was  $8.87\text{E-}09$  mRem, the Gamma dose was  $4.42\text{E-}06$  mRad and the Beta dose was  $1.24\text{E-}05$  mRad. All dose values were well below the quarterly and annual ODCM dose limits (ITP Qrtly = 7.5 mRem, Yearly = 15 mRem; Gamma Qrtly = 5 mRad, Yearly = 10 mRad; Beta Qrtly = 10 mRad, Yearly = 20 mRad). All curies and doses associated with the release were accounted for in the 2006 ARERR.

2GR2006-0118 - A gaseous effluent release permit was generated to document the dose attributed to air flowing out of the Unit 2 containment building hatch during Refueling Outage 2R18. The cause for the air exiting the containment building via the equipment hatch was attributed to containment building ventilation being secured due to 2RITS-8233 (Containment Purge Radmonitor) monitor reading exceeding the trip set point value. Unit 2 Operations reset 2RITS-8233 and restarted the ventilation. Gaseous effluent release permit 2GR2006-0118 was generated to document the dose released as a result of this condition. It was determined that a total of  $1.17\text{E-}04$  curies of tritium,  $1.10\text{E-}07$  curies of Cs-137 and  $2.29\text{E-}3$  curies of Xe-133 were released. The ITP dose attributed to the release was  $1.14\text{E-}06$  mRem, the Gamma dose was  $7.16\text{E-}08$  mRad and the Beta dose was  $2.13\text{E-}07$  mRad. All dose values were well below the quarterly and annual ODCM dose limits (ITP Qrtly = 7.5 mRem, Yearly = 15 mRem; Gamma Qrtly = 5 mRad, Yearly = 10 mRad; Beta Qrtly = 10 mRad, Yearly = 20 mRad). All curies and doses associated with the release were accounted for in the 2006 ARERR.

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### 2007:

1GR2007-0060 – A gaseous effluent release permit was generated to document the dose attributed to air flowing out of the Unit 1 reactor building hatch during Refueling Outage 1R20. The cause for the air exiting the reactor building via the equipment hatch was attributed to reactor building ventilation being secured due to maintenance activities. Gaseous effluent release permit 1GR2007-0060 was generated to document the dose released as a result of this condition. It was determined that a total of 2.46E-03 curies of tritium were released. Additionally, 2.74E-10 curies of gross alpha were released as a result of composite data gross alpha measurements. The ITP dose attributed to the release was 2.52E-07 mRem, well below the quarterly and annual ODCM ITP dose limits of 7.5 and 15 mRem, respectively. All curies and doses associated with the release were accounted for in the 2007 ARERR.

### 10. RADIATION INSTRUMENTATION

As required by ODCM Appendices 1 and 2, any radioactive effluent instrumentation inoperable for more than 30 days shall be reported in the Annual Radioactive Effluent Release Report.

During 2008, there were no instances of radioactive effluent instrumentation inoperable for longer than 30 days.

### 11. CHANGES TO THE PROCESS CONTROL PROGRAM

As required by ODCM Appendices 1 and 2, a description of changes made to the Process Control Program (EN-RW-105) shall be included in the Annual Radioactive Effluent Release Report for the period in which the change was made effective.

Revision 1 of EN-RW-105 effective 7/30/08 included the following changes:

The revision to EN-RW-105 included a major re-write to provide updates to allow Vermont Yankee, Palisades and Indian Point to be included as sites implementing this Process Control Program.

- Waste management practices section replaced dry and liquid waste management.
- Waste stream sampling methods and frequency section added.
- Waste classification section added.
- Quality Control section added.
- Dewatering section added.
- Waste packaging section added.
- Miscellaneous section added for special tools/equipment & training requirements.

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**12. CHANGES TO THE OFFSITE DOSE CALCULATION MANUAL**

In accordance with Unit 1 and Unit 2 TS, changes to the ODCM shall be included in the Annual Radioactive Effluent Release Report for the period in which the change(s) was made effective.

There were no changes made to the ODCM during 2008.

**13. LLD LEVELS**

In accordance with ODCM Appendices 1 and 2, lower limits of detection (LLDs) higher than required shall be documented in the Annual Radioactive Effluent Release Report.

During 2008, there were no LLDs higher than required.

**14. RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM**

In accordance with ODCM Appendices 1 and 2 Limitations L2.6.1.A and L2.6.2.A, unavailability of milk or fresh, leafy vegetable samples, or an increase in an environmental sample location's calculated dose commitment must be identified in the annual Radioactive Effluent Release Report.

**A. Changes in Sample Locations**

During 2008, there were no changes to milk or fresh leafy vegetable sample locations or instances where milk or fresh leafy vegetable samples were unavailable.

**B. Increase in Calculated Dose Commitment**

There were no environmental sampling locations identified during 2008 that would yield a calculated dose commitment greater than the values currently being calculated.

**15. SUMMARY OF HOURLY METEOROLOGICAL DATA**

In accordance with ODCM Appendices 1 and 2 Limitations L3.2.1.D.1, in lieu of including a summary of the meteorological data in this report, the 2008 data is retained at ANO. This data is available for NRC review.

**16. DESCRIPTION OF MAJOR CHANGES TO RADIOACTIVE WASTE SYSTEMS**

There were no major changes made to the Unit 1 liquid and gaseous or Unit 2 liquid and gaseous radwaste systems during 2008.

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**17. INDEPENDENT SPENT FUEL STORAGE INSTALLATION (ISFSI) EFFLUENT RELEASES**

No effluent releases occurred from the ISFSI during 2008.