ARKANSAS NUCLEAR ONE

UNIT 1 AND UNIT 2

OPERATING LICENSE NOS. DPR-51 AND NPF-6

ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT

JANUARY 1 THROUGH DECEMBER 31, 1999

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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 6.12.2.6 and Unit 2 TS 6.9.3. 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, 1999.

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, an attempt is made 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

   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 mrads gamma
   Less than or equal to 10 mrads beta

   Yearly

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

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

   Quarterly

   Less than or equal to 7.5 mrems to any organ

   Yearly

   Less than or equal to 15 mrems 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 10CFR20, 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

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, 1999. The summary of liquid effluents for both Unit 1 and Unit 2 is as follows:

	Unit 1	Unit 2
Number of releases:	790	249
Total time for all releases (minutes):	249090	547486
Maximum time for a release (minutes):	10165	11635
Average time for a release (minutes):	345	2214
Minimum time for a release (minutes):	10	2

The Unit 1 liquid releases consisted of:

789 Planned Releases

1 Unplanned Releases

The Unit 2 liquid releases consisted of:

249 Planned Releases

0 Unplanned Releases

ANNUAL SUMMATION FOR ALL RELEASES BY QUARTER
(ALL LIQUID EFFLUENTS)
January 1 through June 30, 1999

Unit 1

Type of Effluent	Units	Quarter 1	Quarter 2	Est. Total Error %
A. Fission and Activation Products				
1. Total Release (Not Including Tritium, Gases, Alpha)	Curies	1.622E-02	7.060E-03	0
2. Average Diluted Concentration During Period	µCi/ml	6.499E-11	2.074E-11	
3. Percent of Applicable Limit	%	2.166E-02	6.913E-03	
B. Tritium				
1. Total Release	Curies	1.693E+02	1.889E+02	0
2. Average Diluted Concentration During Period	µCi/ml	6.782E-07	5.548E-07	
3. Percent of Applicable Limit	%	2.261E-02	1.849E-02	
C. Dissolved and Entrained Gases				
1. Total Release	Curies	1.338E-02	3.269E-02	0
2. Average Diluted Concentration During Period	µCi/ml	5.362E-11	9.601E-11	
3. Percent of Applicable Limit	%	2.681E-05	4.800E-05	
D. Gross Alpha Radioactivity				
1. Total Release	Curies	0.000E+00	0.000E+00	0
E. Waste Vol Released (Pre-Dilution)	Liters	2.125E+07	1.852E+07	0
F. Volume of Dilution Water Used	Liters	2.495E+11	3.404E+11	0

ANNUAL SUMMATION FOR ALL RELEASES BY QUARTER
(ALL LIQUID EFFLUENTS)
July 1 through December 31, 1999

Unit 1

Type of Effluent	Units	Quarter 3	Quarter 4	Est. Total Error %
A. Fission and Activation Products				
1. Total Release (Not Including Tritium, Gases, Alpha)	Curies	9.383E-02	2.508E-01	0
2. Average Diluted Concentration During Period	µCi/ml	2.717E-10	8.276E-10	
3. Percent of Applicable Limit	%	9.058E-02	2.759E-01	
B. Tritium				
1. Total Release	Curies	2.731E+02	3.619E+01	0
2. Average Diluted Concentration During Period	µCi/ml	7.909E-07	1.194E-07	
3. Percent of Applicable Limit	%	2.636E-02	3.981E-03	
C. Dissolved and Entrained Gases				
1. Total Release	Curies	3.335E-01	6.802E-04	0
2. Average Diluted Concentration During Period	µCi/ml	9.659E-10	2.244E-12	
3. Percent of Applicable Limit	%	4.829E-04	1.122E-06	
D. Gross Alpha Radioactivity				
1. Total Release	Curies	5.498E-04	1.371E-03	0
E. Waste Vol Released (Pre-Dilution)	Liters	1.431E+07	1.903E+07	0
F. Volume of Dilution Water Used	Liters	3.453E+11	3.030E+11	0

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 1999

		CONTINUOUS RELEASES		BATCH RELEASES	
NUCLIDE	UNIT	QUARTER 1	QUARTER 2	QUARTER 1	QUARTER 2
ZR-95	CURIES	0.00E+00	0.00E+00	5.55E-05	0.00E+00
AG-110M	CURIES	0.00E+00	0.00E+00	6.42E-07	1.53E-06
I-135	CURIES	0.00E+00	0.00E+00	2.95E-04	5.72E-06
NB-95	CURIES	0.00E+00	0.00E+00	1.66E-04	7.00E-06
CO-57	CURIES	0.00E+00	0.00E+00	4.27E-05	1.13E-05
TE-132	CURIES	0.00E+00	0.00E+00	7.31E-05	1.82E-05
I-132	CURIES	0.00E+00	0.00E+00	8.64E-05	2.50E-05
I-133	CURIES	0.00E+00	0.00E+00	3.27E-04	3.58E-05
MN-54	CURIES	0.00E+00	0.00E+00	0.00E+00	4.25E-05
I-134	CURIES	0.00E+00	0.00E+00	4.75E-05	4.34E-05
CS-134	CURIES	0.00E+00	0.00E+00	1.65E-04	5.45E-05
XE-135	CURIES	0.00E+00	0.00E+00	0.00E+00	7.02E-05
XE-133M	CURIES	0.00E+00	0.00E+00	0.00E+00	9.30E-05
CS-138	CURIES	0.00E+00	0.00E+00	0.00E+00	1.51E-04
I-131	CURIES	0.00E+00	0.00E+00	2.17E-04	1.69E-04
SB-125	CURIES	0.00E+00	0.00E+00	5.58E-03	6.62E-04
CO-60	CURIES	0.00E+00	0.00E+00	9.13E-04	8.59E-04
NA-24	CURIES	0.00E+00	0.00E+00	1.77E-03	1.27E-03
CO-58	CURIES	0.00E+00	0.00E+00	3.76E-03	1.64E-03
CS-137	CURIES	0.00E+00	0.00E+00	2.72E-03	2.06E-03
XE-133	CURIES	0.00E+00	0.00E+00	1.34E-02	3.25E-02
H-3	CURIES	0.00E+00	0.00E+00	1.69E+02	1.89E+02
Total for Period	CURIES	0.00E+00	0.00E+00	1.69E+02	1.89E+02

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 1999

		CONTINUOUS RELEASES		BATCH RELEASES	
NUCLIDE	UNIT	QUARTER 3	QUARTER 4	QUARTER 3	QUARTER 4
NB-97	CURIES	0.00E+00	0.00E+00	1.32E-05	0.00E+00
LA-140	CURIES	0.00E+00	0.00E+00	1.90E-05	0.00E+00
SB-122	CURIES	0.00E+00	0.00E+00	5.82E-05	0.00E+00
XE-133M	CURIES	0.00E+00	0.00E+00	5.60E-03	0.00E+00
KR-85	CURIES	0.00E+00	0.00E+00	1.41E-02	0.00E+00
I-133	CURIES	0.00E+00	0.00E+00	3.50E-05	1.16E-06
MN-54	CURIES	0.00E+00	0.00E+00	8.52E-06	2.21E-06
ZR-95	CURIES	0.00E+00	0.00E+00	1.06E-05	6.99E-06
CS-134	CURIES	0.00E+00	0.00E+00	3.17E-04	3.33E-05
CO-57	CURIES	0.00E+00	0.00E+00	0.00E+00	5.73E-05
AG-110M	CURIES	0.00E+00	0.00E+00	1.06E-04	8.22E-05
SE-75	CURIES	0.00E+00	0.00E+00	0.00E+00	9.18E-05
I-132	CURIES	0.00E+00	0.00E+00	0.00E+00	9.20E-05
NB-95	CURIES	0.00E+00	0.00E+00	1.10E-05	9.99E-05
CR-51	CURIES	0.00E+00	0.00E+00	2.52E-03	1.07E-04
FE-59	CURIES	0.00E+00	0.00E+00	6.60E-05	2.40E-04
XE-135	CURIES	0.00E+00	0.00E+00	1.42E-02	2.52E-04
XE-133	CURIES	0.00E+00	0.00E+00	3.00E-01	4.28E-04
CS-137	CURIES	0.00E+00	0.00E+00	2.42E-03	8.77E-04
G-ALPHA	CURIES	0.00E+00	1.01E-03	5.50E-04	3.60E-04
I-131	CURIES	0.00E+00	0.00E+00	9.43E-04	1.91E-03
CO-60	CURIES	0.00E+00	0.00E+00	1.17E-03	2.92E-03
NA-24	CURIES	0.00E+00	3.25E-03	9.59E-04	9.55E-04
SB-124	CURIES	0.00E+00	0.00E+00	3.61E-04	7.07E-03
SB-125	CURIES	0.00E+00	0.00E+00	7.60E-02	5.15E-02
CO-58	CURIES	0.00E+00	0.00E+00	8.81E-03	1.82E-01
H-3	CURIES	0.00E+00	4.05E-02	2.73E+02	3.62E+01
Total for Period	CURIES	0.00E+00	4.48E-02	2.74E+02	3.64E+01

ANNUAL SUMMATION FOR ALL RELEASES BY QUARTER
(ALL LIQUID EFFLUENTS)
January 1 through June 30, 1999

Unit 2

Type of Effluent	Units	Quarter 1	Quarter 2	Est. Total Error %
A. Fission and Activation Products				
1. Total Release (Not Including Tritium, Gases, Alpha)	Curies	4.086E-02	3.035E-03	0
2. Average Diluted Concentration During Period	µCi/ml	1.637E-10	8.915E-12	
3. Percent of Applicable Limit	%	5.458E-02	2.972E-03	
B. Tritium				
1. Total Release	Curies	4.593E+01	5.043E+01	0
2. Average Diluted Concentration During Period	µCi/ml	1.840E-07	1.481E-07	
3. Percent of Applicable Limit	%	6.134E-03	4.937E-03	
C. Dissolved and Entrained Gases				
1. Total Release	Curies	1.148E-02	1.130E-03	0
2. Average Diluted Concentration During Period	µCi/ml	4.601E-11	3.320E-12	
3. Percent of Applicable Limit	%	2.300E-05	1.660E-06	
D. Gross Alpha Radioactivity				
1. Total Release	Curies	0.000E+00	4.389E-04	0
E. Waste Vol Released (Pre-Dilution)	Liters	1.704E+07	1.448E+07	0
F. Volume of Dilution Water Used	Liters	2.495E+11	3.404E+11	0

ANNUAL SUMMATION FOR ALL RELEASES BY QUARTER
(ALL LIQUID EFFLUENTS)
July 1 through December 31, 1999

Unit 2

Type of Effluent	Units	Quarter 3	Quarter 4	Est. Total Error %
A. Fission and Activation Products				
1. Total Release (Not Including Tritium, Gases, Alpha)	Curies	7.849E-03	3.344E-02	0
2. Average Diluted Concentration During Period	µCi/ml	2.273E-11	1.103E-10	
3. Percent of Applicable Limit	%	7.577E-03	3.678E-02	
B. Tritium				
1. Total Release	Curies	1.460E+02	3.453E+02	0
2. Average Diluted Concentration During Period	µCi/ml	4.229E-07	1.139E-06	
3. Percent of Applicable Limit	%	1.410E-02	3.798E-02	
C. Dissolved and Entrained Gases				
1. Total Release	Curies	7.075E-04	9.487E-03	0
2. Average Diluted Concentration During Period	µCi/ml	2.049E-12	3.130E-11	
3. Percent of Applicable Limit	%	1.024E-06	1.565E-05	
D. Gross Alpha Radioactivity				
1. Total Release	Curies	0.000E+00	0.000E+00	0
E. Waste Vol Released (Pre-Dilution)	Liters	2.099E+07	2.795E+07	0
F. Volume of Dilution Water Used	Liters	3.453E+11	3.030E+11	0

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 1999

		CONTINUOUS RELEASES		BATCH RELEASES	
NUCLIDE	UNIT	QUARTER 1	QUARTER 2	QUARTER 1	QUARTER 2
NB-97	CURIES	0.00E+00	0.00E+00	3.02E-05	0.00E+00
ZR-95	CURIES	0.00E+00	0.00E+00	4.39E-05	0.00E+00
SN-117M	CURIES	0.00E+00	0.00E+00	7.30E-05	0.00E+00
I-133	CURIES	0.00E+00	0.00E+00	9.64E-05	0.00E+00
SB-125	CURIES	0.00E+00	0.00E+00	1.35E-04	0.00E+00
I-131	CURIES	0.00E+00	0.00E+00	2.27E-04	0.00E+00
FE-59	CURIES	0.00E+00	0.00E+00	2.67E-04	0.00E+00
NA-24	CURIES	0.00E+00	0.00E+00	4.14E-04	0.00E+00
CR-51	CURIES	0.00E+00	0.00E+00	1.25E-03	0.00E+00
FE-55	CURIES	0.00E+00	0.00E+00	3.19E-02	0.00E+00
CS-134	CURIES	0.00E+00	0.00E+00	1.75E-04	1.31E-06
XE-135	CURIES	0.00E+00	0.00E+00	0.00E+00	1.52E-06
LA-140	CURIES	0.00E+00	0.00E+00	2.19E-05	1.10E-05
CO-60	CURIES	0.00E+00	0.00E+00	4.57E-04	5.60E-05
MN-54	CURIES	0.00E+00	0.00E+00	5.61E-05	6.88E-05
CS-137	CURIES	0.00E+00	0.00E+00	3.61E-04	7.10E-05
CO-58	CURIES	0.00E+00	0.00E+00	3.66E-03	3.56E-04
G-ALPHA	CURIES	0.00E+00	0.00E+00	0.00E+00	4.39E-04
XE-133	CURIES	0.00E+00	0.00E+00	1.15E-02	1.13E-03
AG-110M	CURIES	0.00E+00	0.00E+00	1.65E-03	2.47E-03
H-3	CURIES	0.00E+00	0.00E+00	4.59E+01	5.04E+01
Total for Period	CURIES	0.00E+00	0.00E+00	4.60E+01	5.04E+01

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 1999

		CONTINUOUS RELEASES		BATCH RELEASES	
NUCLIDE	UNIT	QUARTER 3	QUARTER 4	QUARTER 3	QUARTER 4
NA-24	CURIES	0.00E+00	0.00E+00	1.98E-04	0.00E+00
MN-54	CURIES	0.00E+00	0.00E+00	0.00E+00	3.11E-05
SB-126	CURIES	0.00E+00	0.00E+00	0.00E+00	6.08E-05
ZR-95	CURIES	0.00E+00	0.00E+00	0.00E+00	8.02E-05
TE-132	CURIES	0.00E+00	0.00E+00	0.00E+00	8.82E-05
LA-140	CURIES	0.00E+00	0.00E+00	0.00E+00	1.89E-04
I-132	CURIES	0.00E+00	0.00E+00	0.00E+00	2.11E-04
CS-137	CURIES	0.00E+00	0.00E+00	1.49E-04	2.35E-04
CO-60	CURIES	0.00E+00	0.00E+00	2.21E-04	3.38E-04
BE-7	CURIES	0.00E+00	0.00E+00	2.57E-04	4.11E-04
CR-51	CURIES	0.00E+00	0.00E+00	0.00E+00	9.55E-04
CO-58	CURIES	0.00E+00	0.00E+00	2.63E-04	1.03E-03
AG-110M	CURIES	0.00E+00	0.00E+00	4.52E-03	1.17E-03
SB-124	CURIES	0.00E+00	0.00E+00	2.51E-05	1.25E-03
FE-59	CURIES	0.00E+00	0.00E+00	0.00E+00	1.56E-03
XE-133	CURIES	0.00E+00	0.00E+00	7.07E-04	9.49E-03
SB-125	CURIES	0.00E+00	0.00E+00	2.21E-03	2.58E-02
H-3	CURIES	0.00E+00	4.85E-01	1.46E+02	3.44E+02
Total for Period	CURIES	0.00E+00	4.85E-01	1.46E+02	3.44E+02

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, 1999. The summary of gaseous effluents for both Unit 1 and Unit 2 is as follows:

	Unit 1	Unit 2
Number of releases:	125	165
Total time for all releases (minutes):	777337	1084332
Maximum time for a release (minutes):	10828	16295
Average time for a release (minutes):	6266	6590
Minimum time for a release (minutes):	1	3

The Unit 1 gaseous releases consisted of:

125 Planned vent & tank releases

0 Unplanned releases

The Unit 2 gaseous releases consisted of:

163 Planned vent & tank releases

2 Unplanned releases

ANNUAL SUMMATION FOR ALL RELEASES BY QUARTER
(ALL AIRBORNE EFFLUENTS)
January 1 through June 30, 1999

Unit 1

Type of Effluent	Units	Quarter 1	Quarter 2	Est. Total Error %
A. Fission and Activation Products				
1. Total Release	Curies	9.238E+01	0.000E+00	0
2. Average Release Rate for Period	μCi/Sec	1.188E+01	0.000E+00	
3. Percent of Applicable Limit	%	1.663E-01	0.000E+00	
B. Radioiodines				
1. Total Iodine-131	Curies	0.000E+00	0.000E+00	0
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	
C. Particulates				
1. Particulates (Half-Lives > 8 Days)	Curies	0.000E+00	0.000E+00	0
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	
D. Tritium				
1. Total Release	Curies	3.133E+00	2.525E+00	0
2. Average Release Rate for Period	μCi/Sec	4.029E-01	3.211E-01	
3. Percent of Applicable Limit	%	5.640E-04	4.496E-04	

ANNUAL SUMMATION FOR ALL RELEASES BY QUARTER
(ALL AIRBORNE EFFLUENTS)
July 1 through December 31, 1999

Unit 1

Type of Effluent	Units	Quarter 3	Quarter 4	Est. Total Error %
A. Fission and Activation Products				
1. Total Release	Curies	3.587E+00	4.179E+01	0
2. Average Release Rate for Period	µCi/Sec	4.513E-01	5.257E+00	
3. Percent of Applicable Limit	%	6.318E-03	7.360E-02	
B. Radioiodines				
1. Total Iodine-131	Curies	1.164E-06	1.100E-07	0
2. Average Release Rate for Period	µCi/Sec	1.465E-07	1.383E-08	
3. Percent of Applicable Limit	%	4.101E-07	3.873E-08	
C. Particulates				
1. Particulates (Half-Lives > 8 Days)	Curies	0.000E+00	3.319E-07	0
2. Average Release Rate for Period	µCi/Sec	0.000E+00	4.175E-08	
3. Percent of Applicable Limit	%	0.000E+00	1.169E-07	
4. Gross Alpha Radioactivity	Curies	0.000E+00	0.000E+00	
D. Tritium				
1. Total Release	Curies	5.137E+00	5.903E+00	0
2. Average Release Rate for Period	µCi/Sec	6.462E-01	7.427E-01	
3. Percent of Applicable Limit	%	9.047E-04	1.040E-03	

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 # 1 AND QUARTER # 2 YEAR 1999

NUCLIDE	UNIT	CONTINUOUS RELEASES QUARTER 1	CONTINUOUS RELEASES QUARTER 2	BATCH RELEASES QUARTER 1	BATCH RELEASES QUARTER 2
Fission Gases					
XE-135	CURIES	0.00E+00	0.00E+00	4.26E-01	0.00E+00
XE-133	CURIES	0.00E+00	0.00E+00	9.19E+01	0.00E+00
Total for Period	CURIES	0.00E+00	0.00E+00	9.24E+01	0.00E+00
Iodines					
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
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	3.13E+00	2.52E+00
Total for Period	CURIES	0.00E+00	0.00E+00	3.13E+00	2.52E+00

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 1999

NUCLIDE	UNIT	CONTINUOUS RELEASES QUARTER 3	CONTINUOUS RELEASES QUARTER 4	BATCH RELEASES QUARTER 3	BATCH RELEASES QUARTER 4
Fission Gases					
AR-41	CURIES	0.00E+00	0.00E+00	9.30E-02	0.00E+00
XE-135	CURIES	0.00E+00	0.00E+00	1.91E+00	0.00E+00
XE-131M	CURIES	0.00E+00	0.00E+00	0.00E+00	3.09E-03
KR-85	CURIES	0.00E+00	0.00E+00	8.59E-04	4.25E-01
XE-133	CURIES	0.00E+00	0.00E+00	1.58E+00	4.14E+01
Total for Period	CURIES	0.00E+00	0.00E+00	3.59E+00	4.18E+01
Iodines					
I-131	CURIES	0.00E+00	0.00E+00	1.16E-06	1.10E-07
Total for Period	CURIES	0.00E+00	0.00E+00	1.16E-06	1.10E-07
Particulates					
CO-57	CURIES	0.00E+00	0.00E+00	0.00E+00	3.32E-07
Total for Period	CURIES	0.00E+00	0.00E+00	0.00E+00	3.32E-07
Other					
H-3	CURIES	0.00E+00	0.00E+00	5.14E+00	5.90E+00
Total for Period	CURIES	0.00E+00	0.00E+00	5.14E+00	5.90E+00

ANNUAL SUMMATION FOR ALL RELEASES BY QUARTER
(ALL AIRBORNE EFFLUENTS)
January 1 through June 30, 1999

Unit 2

Type of Effluent	Units	Quarter 1	Quarter 2	Est. Total Error %
A. Fission and Activation Products				
1. Total Release	Curies	7.598E+00	0.000E+00	0
2. Average Release Rate for Period	μCi/Sec	9.771E-01	0.000E+00	
3. Percent of Applicable Limit	%	1.368E-02	0.000E+00	
B. Radioiodines				
1. Total Iodine-131	Curies	0.000E+00	0.000E+00	0
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	
C. Particulates				
1. Particulates (Half-Lives > 8 Days)	Curies	3.738E-05	0.000E+00	0
2. Average Release Rate for Period	μCi/Sec	4.807E-06	0.000E+00	
3. Percent of Applicable Limit	%	1.346E-05	0.000E+00	
4. Gross Alpha Radioactivity	Curies	0.000E+00	0.000E+00	
D. Tritium				
1. Total Release	Curies	5.039E+00	4.217E+00	0
2. Average Release Rate for Period	μCi/Sec	6.480E-01	5.364E-01	
3. Percent of Applicable Limit	%	9.072E-04	7.509E-04	

ANNUAL SUMMATION FOR ALL RELEASES BY QUARTER
(ALL AIRBORNE EFFLUENTS)
July 1 through December 31, 1999

Unit 2

Type of Effluent	Units	Quarter 3	Quarter 4	Est. Total Error %
A. Fission and Activation Products				
1. Total Release	Curies	7.763E+00	2.383E+01	0
2. Average Release Rate for Period	μCi/Sec	9.766E-01	2.998E+00	
3. Percent of Applicable Limit	%	1.367E-02	4.197E-02	
B. Radioiodines				
1. Total Iodine-131	Curies	0.000E+00	0.000E+00	0
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	
C. Particulates				
1. Particulates (Half-Lives > 8 Days)	Curies	1.112E-06	0.000E+00	0
2. Average Release Rate for Period	μCi/Sec	1.399E-07	0.000E+00	
3. Percent of Applicable Limit	%	3.916E-07	0.000E+00	
4. Gross Alpha Radioactivity	Curies	0.000E+00	0.000E+00	
D. Tritium				
1. Total Release	Curies	5.632E+00	2.179E+01	0
2. Average Release Rate for Period	μCi/Sec	7.085E-01	2.741E+00	
3. Percent of Applicable Limit	%	9.920E-04	3.837E-03	

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 1999

NUCLIDE	UNIT	CONTINUOUS RELEASES QUARTER 1	CONTINUOUS RELEASES QUARTER 2	BATCH RELEASES QUARTER 1	BATCH RELEASES QUARTER 2
Fission Gases					
XE-135	CURIES	0.00E+00	0.00E+00	3.57E-03	0.00E+00
KR-85	CURIES	0.00E+00	0.00E+00	1.36E+00	0.00E+00
XE-133	CURIES	0.00E+00	0.00E+00	6.23E+00	0.00E+00
Total for Period	CURIES	0.00E+00	0.00E+00	7.60E+00	0.00E+00
Iodines					
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
Particulates					
CS-137	CURIES	0.00E+00	0.00E+00	3.74E-05	0.00E+00
Total for Period	CURIES	0.00E+00	0.00E+00	3.74E-05	0.00E+00
Other					
H-3	CURIES	0.00E+00	0.00E+00	5.04E+00	4.22E+00
Total for Period	CURIES	0.00E+00	0.00E+00	5.04E+00	4.22E+00

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 # 3 AND QUARTER # 4 YEAR 1999

NUCLIDE	UNIT	CONTINUOUS RELEASES QUARTER 3	CONTINUOUS RELEASES QUARTER 4	BATCH RELEASES QUARTER 3	BATCH RELEASES QUARTER 4
Fission Gases					
XE-135	CURIES	0.00E+00	0.00E+00	0.00E+00	3.33E-03
XE-133	CURIES	0.00E+00	0.00E+00	7.76E+00	2.38E+01
Total for Period	CURIES	0.00E+00	0.00E+00	7.76E+00	2.38E+01
Iodines					
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
Particulates					
CO-58	CURIES	0.00E+00	0.00E+00	1.11E-06	0.00E+00
Total for Period	CURIES	0.00E+00	0.00E+00	1.11E-06	0.00E+00
Other					
H-3	CURIES	0.00E+00	0.00E+00	5.63E+00	2.18E+01
Total for Period	CURIES	0.00E+00	0.00E+00	5.63E+00	2.18E+01

5. SUMMARY OF RADIATION DOSES

The following is a summary of the annual radiation doses due to radiological effluents during 1999 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

Organ	Qtr 1	%	Qtr 2	%	Qtr 3	%	Qtr 4	%	Year	%
TBody	0.0027	0.18	0.0013	0.09	0.0016	0.10	0.0009	0.06	0.0065	0.22
Bone	0.0024	0.05	0.0011	0.02	0.0012	0.02	0.0006	0.01	0.0052	0.05
Liver	0.0038	0.08	0.0018	0.04	0.0021	0.04	0.0010	0.02	0.0087	0.09
Thyroid	0.0007	0.01	0.0004	0.01	0.0012	0.02	0.0013	0.03	0.0031	0.03
Kidney	0.0016	0.03	0.0008	0.02	0.0010	0.02	0.0003	0.01	0.0037	0.04
Lung	0.0008	0.02	0.0005	0.01	0.0006	0.01	0.0002	0.00	0.0020	0.02
GI-LLI	0.0030	0.06	0.0005	0.01	0.0006	0.01	0.0043	0.09	0.0084	0.08

Gaseous Radwaste Effluents

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

Organ	Qtr 1	%	Qtr 2	%	Qtr 3	%	Qtr 4	%	Year	%
TBody	0.0019	0.03	0.0016	0.02	0.0032	0.04	0.0036	0.05	0.0103	0.07
Bone	0.0000	0.00	0.0000	0.00	0.0000	0.00	0.0000	0.00	0.0000	0.00
Liver	0.0019	0.03	0.0016	0.02	0.0032	0.04	0.0036	0.05	0.0103	0.07
Thyroid	0.0019	0.03	0.0016	0.02	0.0034	0.05	0.0037	0.05	0.0106	0.07
Kidney	0.0019	0.03	0.0016	0.02	0.0032	0.04	0.0036	0.05	0.0103	0.07
Lung	0.0019	0.03	0.0016	0.02	0.0032	0.04	0.0036	0.05	0.0103	0.07
GI-LLI	0.0019	0.03	0.0016	0.02	0.0032	0.04	0.0036	0.05	0.0103	0.07

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

Type	Qtr 1	%	Qtr 2	%	Qtr 3	%	Qtr 4	%	Year	%
Gamma	0.0030	0.06	0.0000	0.00	0.0005	0.01	0.0013	0.03	0.0047	0.05
Beta	0.0087	0.09	0.0000	0.00	0.0006	0.01	0.0039	0.04	0.0132	0.07

UNIT 2

Liquid Radwaste Effluents

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

Organ	Qtr 1	%	Qtr 2	%	Qtr 3	%	Qtr 4	%	Year	%
TBody	0.0006	0.04	0.0001	0.01	0.0003	0.02	0.0007	0.05	0.0017	0.06
Bone	0.0006	0.01	0.0000	0.00	0.0001	0.00	0.0001	0.00	0.0009	0.01
Liver	0.0009	0.02	0.0001	0.00	0.0003	0.01	0.0008	0.02	0.0021	0.02
Thyroid	0.0003	0.01	0.0001	0.00	0.0001	0.00	0.0006	0.01	0.0012	0.01
Kidney	0.0003	0.01	0.0001	0.00	0.0002	0.00	0.0007	0.01	0.0013	0.01
Lung	0.0003	0.01	0.0001	0.00	0.0002	0.00	0.0006	0.01	0.0012	0.01
GI-LLI	0.0004	0.01	0.0001	0.00	0.0002	0.00	0.0008	0.02	0.0014	0.01

Gaseous Radwaste Effluents

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

Organ	Qtr 1	%	Qtr 2	%	Qtr 3	%	Qtr 4	%	Year	%
Tbody	0.0035	0.05	0.0026	0.03	0.0035	0.05	0.0134	0.18	0.0230	0.15
Bone	0.0012	0.02	0.0000	0.00	0.0000	0.00	0.0000	0.00	0.0012	0.01
Liver	0.0043	0.06	0.0026	0.03	0.0035	0.05	0.0134	0.18	0.0237	0.16
Thyroid	0.0033	0.04	0.0026	0.03	0.0035	0.05	0.0134	0.18	0.0228	0.15
Kidney	0.0036	0.05	0.0026	0.03	0.0035	0.05	0.0134	0.18	0.0231	0.15
Lung	0.0035	0.05	0.0026	0.03	0.0035	0.05	0.0134	0.18	0.0229	0.15
GI-LLI	0.0034	0.04	0.0026	0.03	0.0035	0.05	0.0134	0.18	0.0228	0.15

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

Type	Qtr 1	%	Qtr 2	%	Qtr 3	%	Qtr 4	%	Year	%
Gamma	0.0002	0.00	0.0000	0.00	0.0002	0.00	0.0007	0.01	0.0012	0.01
Beta	0.0008	0.01	0.0000	0.00	0.0007	0.01	0.0022	0.02	0.0038	0.02

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

	BONE	LIVER	TBODY	THYROID	KIDNEY	GI-LLI	LUNG	SKIN
Gaseous Effluent								
Iodine/Tritium Particulate	3.67E-07	4.49E-03	4.49E-03	4.61E-03	4.49E-03	4.49E-03	4.49E-03	
Noble Gas			1.21E-03					2.84E-03
Liquid Effluent								
Fish	5.21E-03	8.70E-03	6.45E-03	3.13E-03	3.68E-03	2.00E-03	8.42E-03	
Sediment			2.01E-04					2.35E-04
Unit 1 Total	5.21E-03	1.32E-02	1.22E-02	7.75E-03	8.18E-03	6.49E-03	1.29E-02	3.08E-03

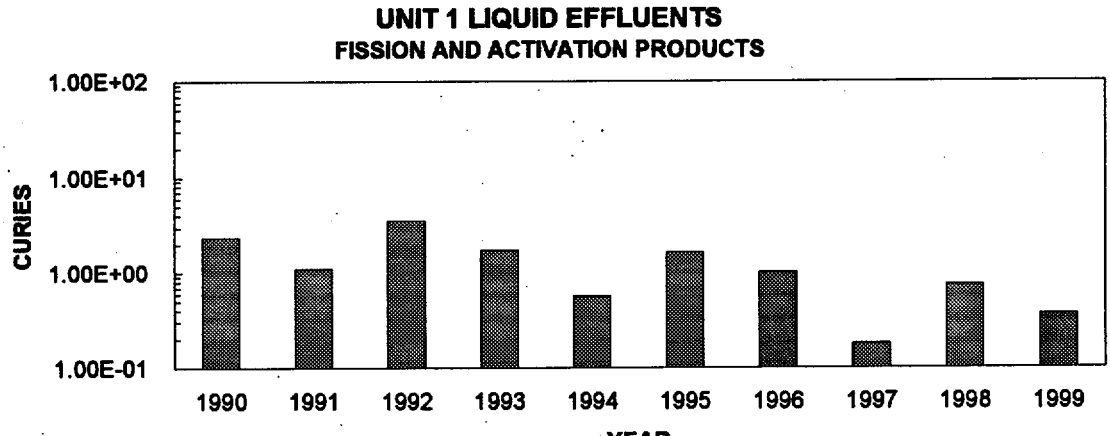
UNIT 2

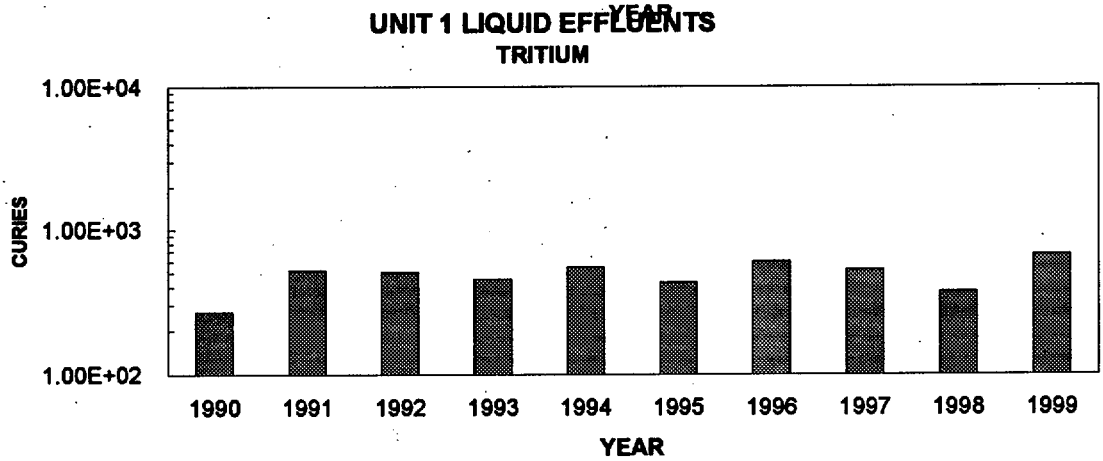
Gaseous Effluent								
Iodine/Tritium Particulate	5.20E-04	1.04E-02	1.00E-02	9.97E-03	1.01E-02	1.00E-02	9.98E-03	
Noble Gas			3.03E-04					7.64E-04
Liquid Effluent								
Fish	8.68E-04	2.15E-03	1.72E-03	1.19E-03	1.31E-03	1.18E-03	1.43E-03	
Sediment			4.81E-05					5.62E-05
Unit 2 Total	1.39E-03	1.25E-02	1.21E-02	1.12E-02	1.14E-02	1.12E-02	1.14E-02	8.21E-04

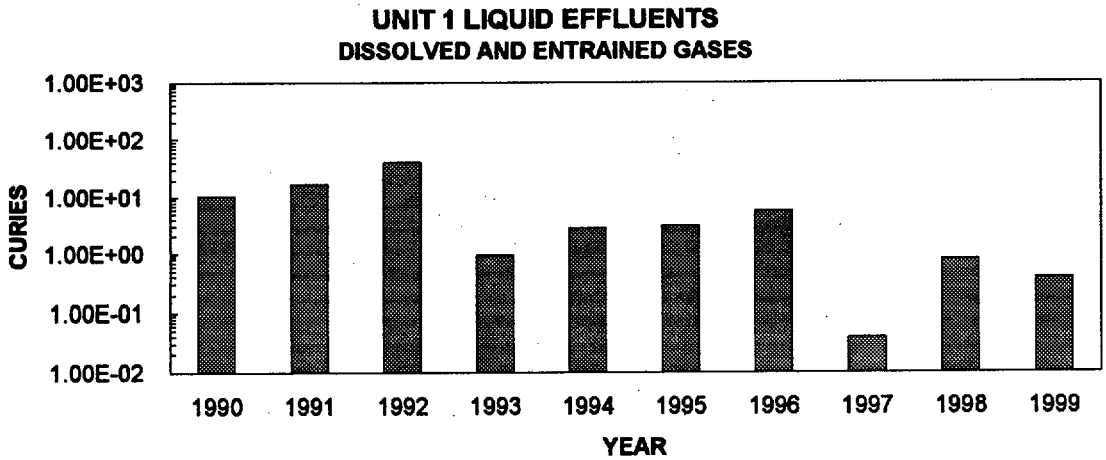
Site Total	6.60E-03	2.57E-02	2.42E-02	1.89E-02	1.96E-02	1.77E-02	2.43E-02	3.90E-03
Limit (40CFR190)	25	25	25	75	25	25	25	25
% Limit	2.64E-02	1.03E-01	9.69E-02	2.52E-02	7.84E-02	7.08E-02	9.73E-02	1.56E-02

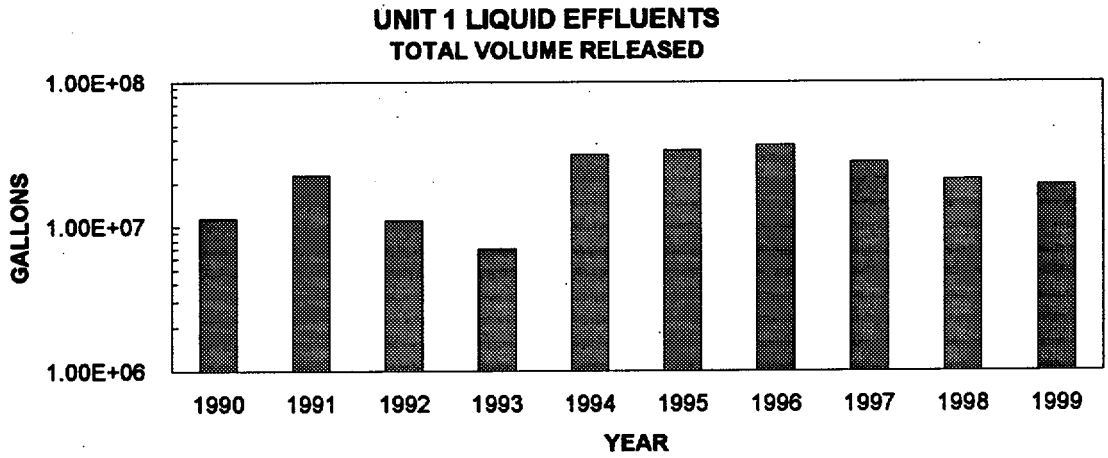
7. HISTORICAL EFFLUENT DATA

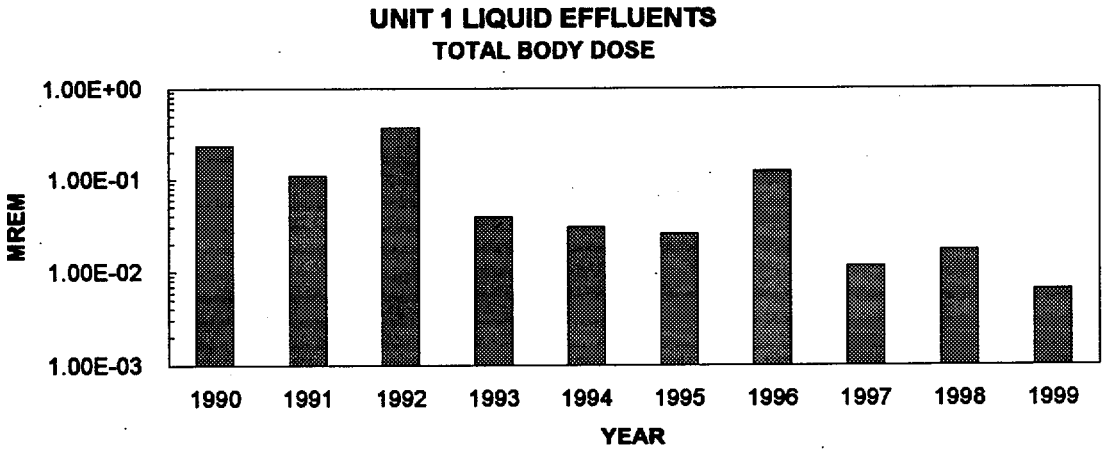
The following graphs show the historical release data for both units on a yearly basis. These graphs compare data from 1990 through 1999.

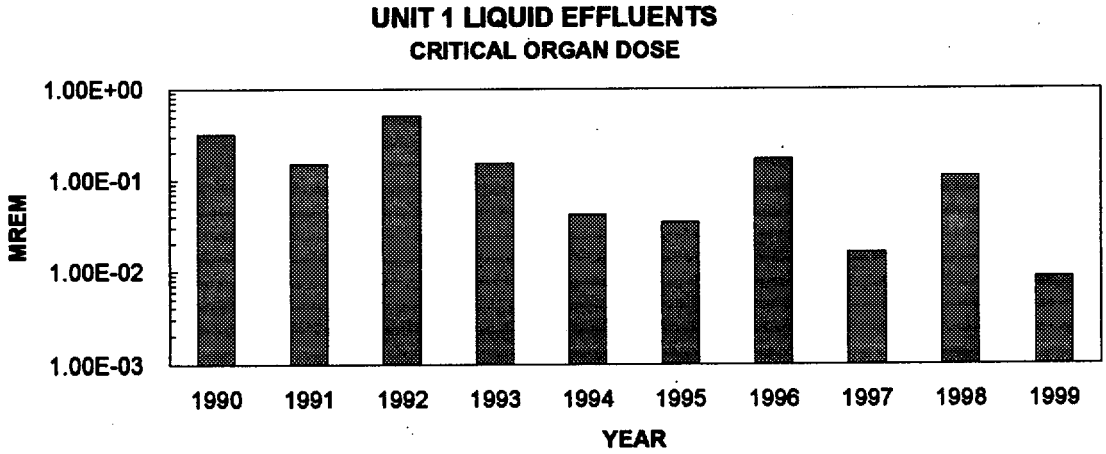


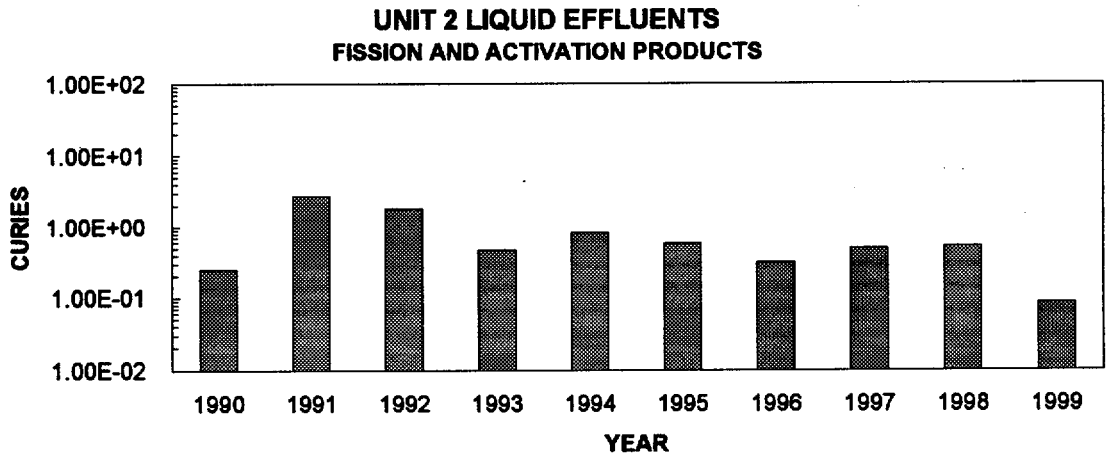


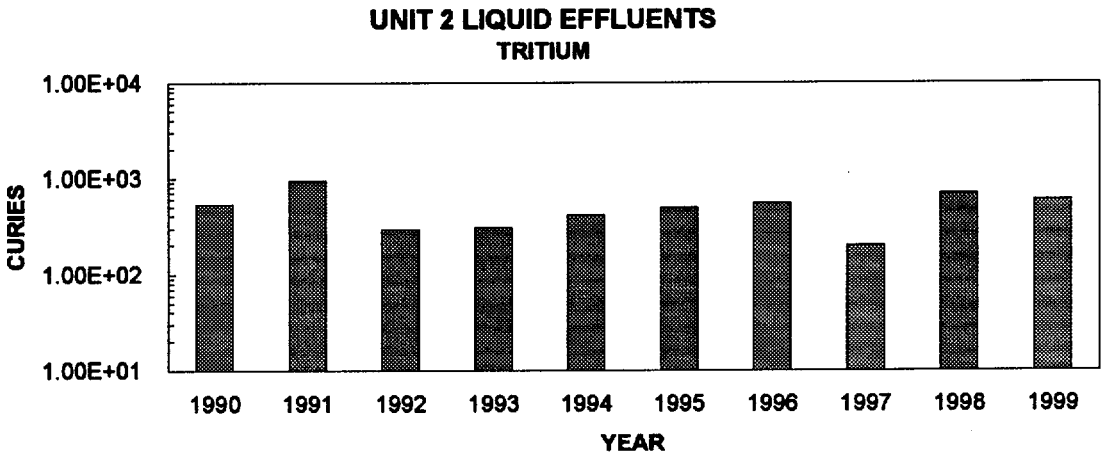


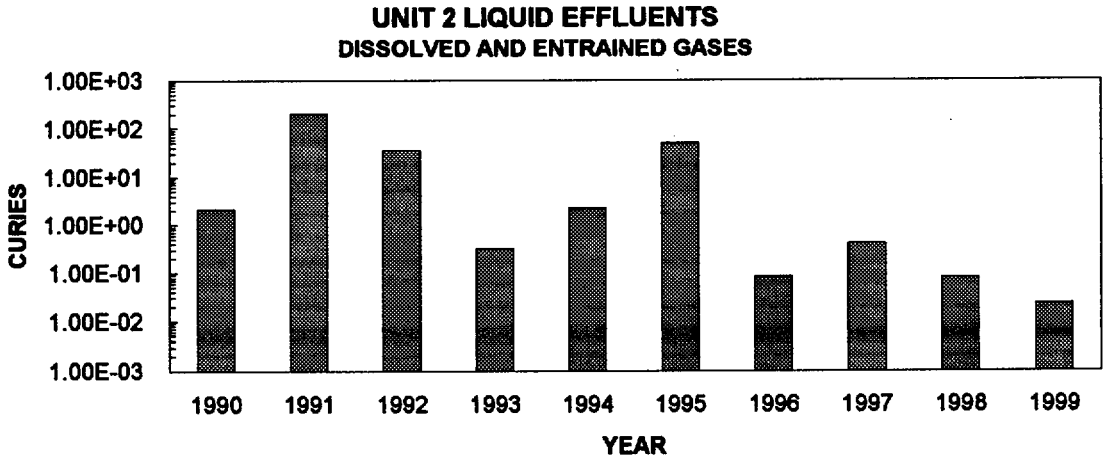

UNIT 1 LIQUID EFFLUENTS
TOTAL VOLUME RELEASED
GALLONS
1.00E+08
1.00E+07
1.00E+06
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
YEAR

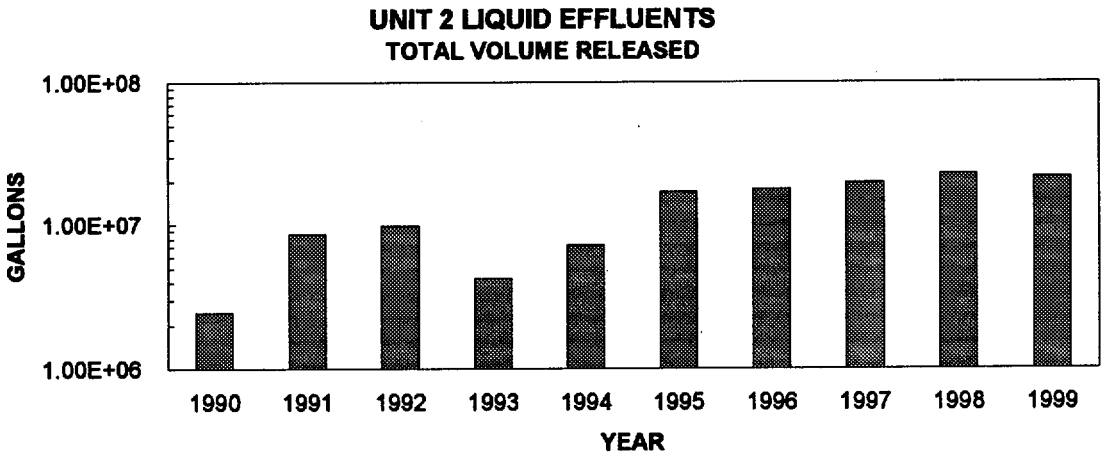

UNIT 1 LIQUID EFFLUENTS
TOTAL BODY DOSE
MREM
1.00E+00
1.00E-01
1.00E-02
1.00E-03
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
YEAR

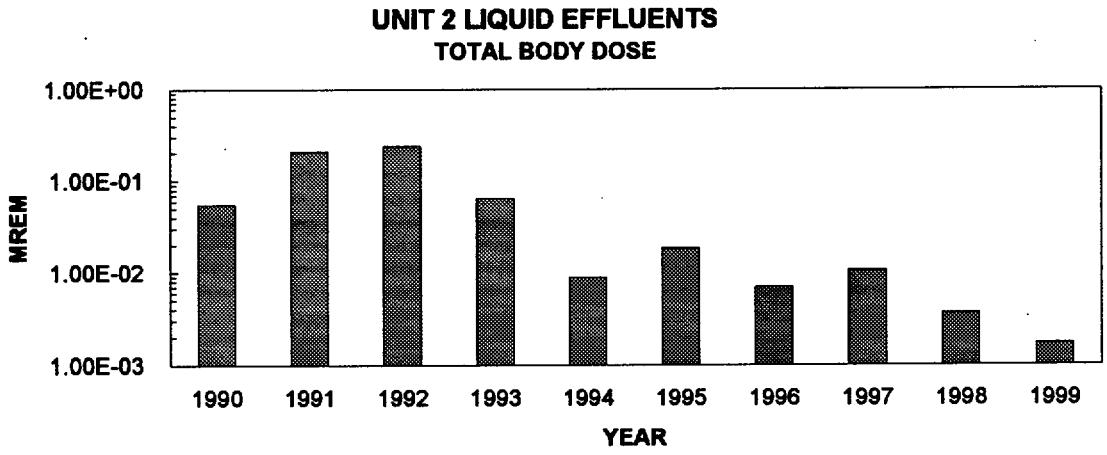

UNIT 1 LIQUID EFFLUENTS
CRITICAL ORGAN DOSE
MREM
1.00E+00
1.00E-01
1.00E-02
1.00E-03
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
YEAR

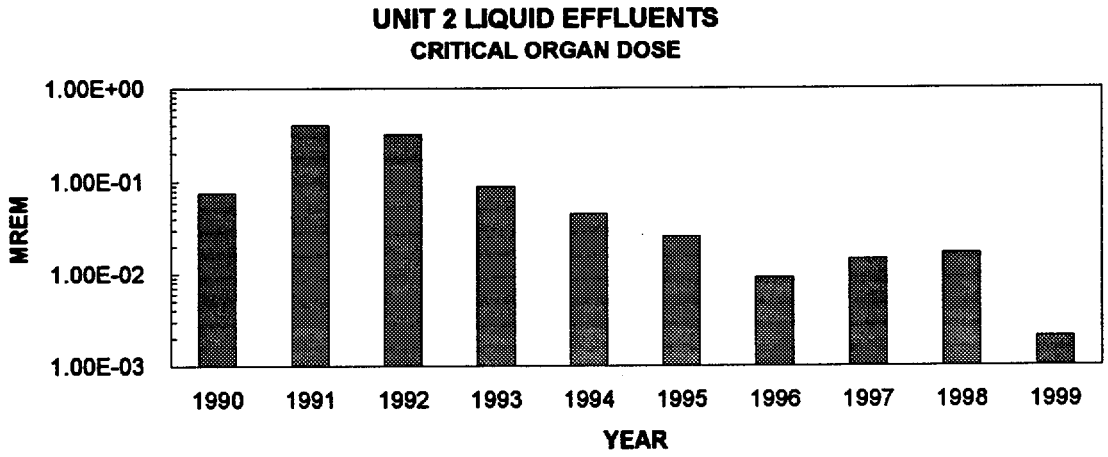

UNIT 2 LIQUID EFFLUENTS
FISSION AND ACTIVATION PRODUCTS
CURIES
1.00E+02
1.00E+01
1.00E+00
1.00E-01
1.00E-02
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
YEAR


UNIT 2 LIQUID EFFLUENTS
TRITIUM
CURIES
1.00E+04
1.00E+03
1.00E+02
1.00E+01
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
YEAR


UNIT 2 LIQUID EFFLUENTS
DISSOLVED AND ENTRAINED GASES
CURIES
1.00E+03
1.00E+02
1.00E+01
1.00E+00
1.00E-01
1.00E-02
1.00E-03
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
YEAR


UNIT 2 LIQUID EFFLUENTS
TOTAL VOLUME RELEASED
GALLONS
1.00E+08
1.00E+07
1.00E+06
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
YEAR


UNIT 2 LIQUID EFFLUENTS
TOTAL BODY DOSE
MREM
1.00E+00
1.00E-01
1.00E-02
1.00E-03
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
YEAR


UNIT 2 LIQUID EFFLUENTS
CRITICAL ORGAN DOSE
MREM
1.00E+00
1.00E-01
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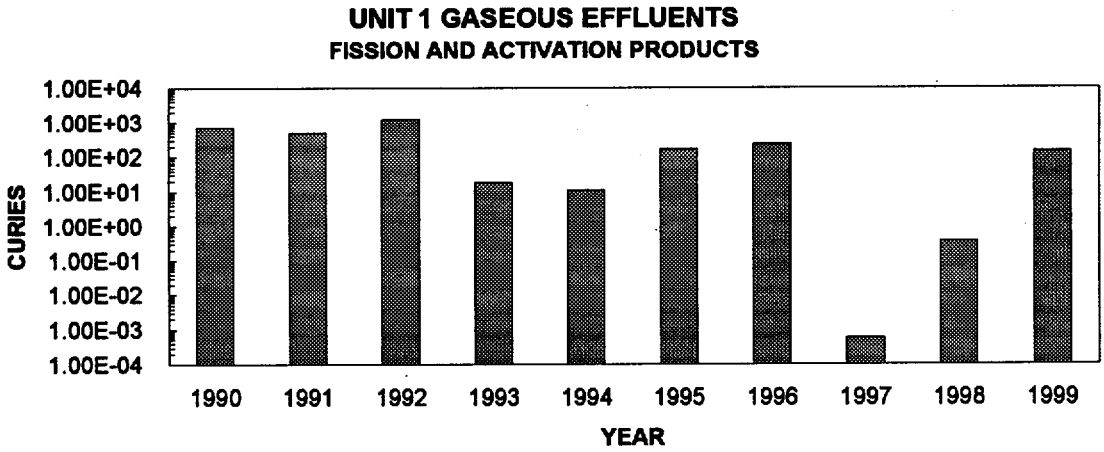
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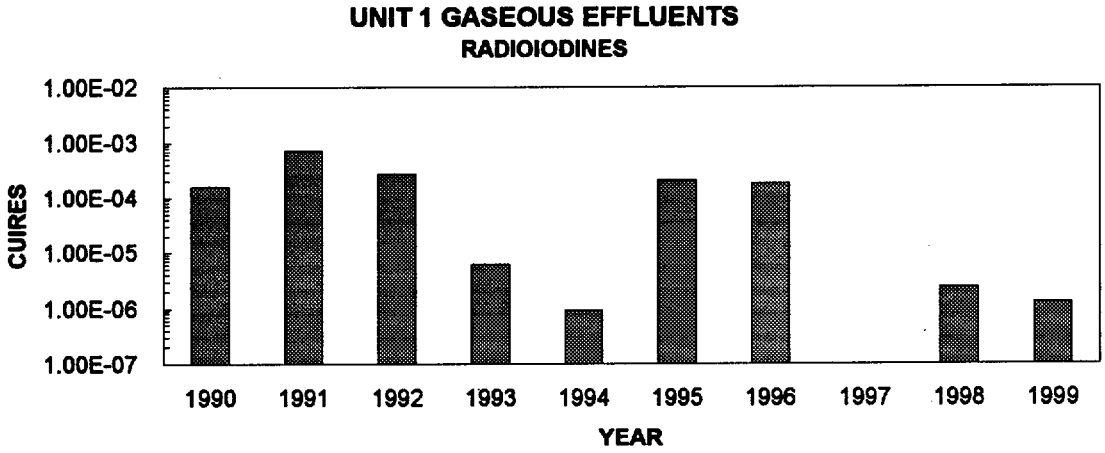
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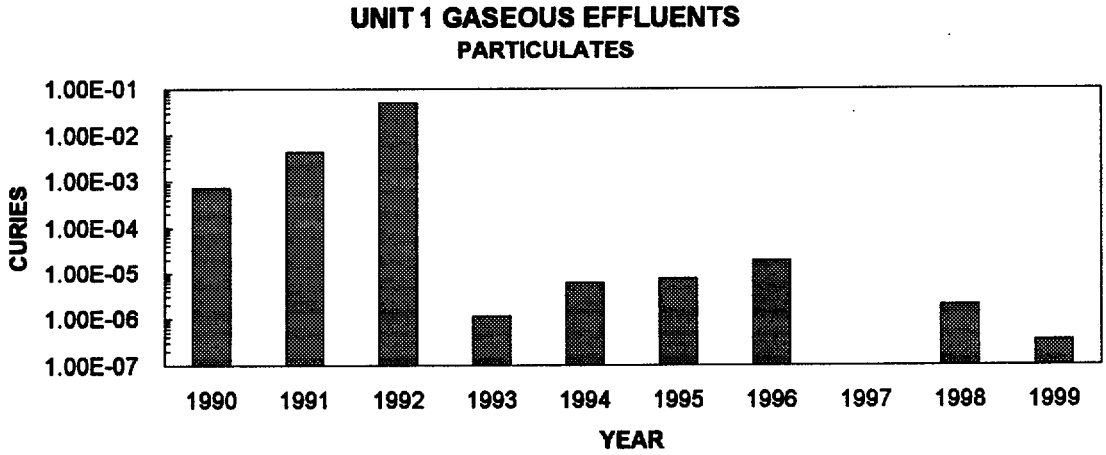
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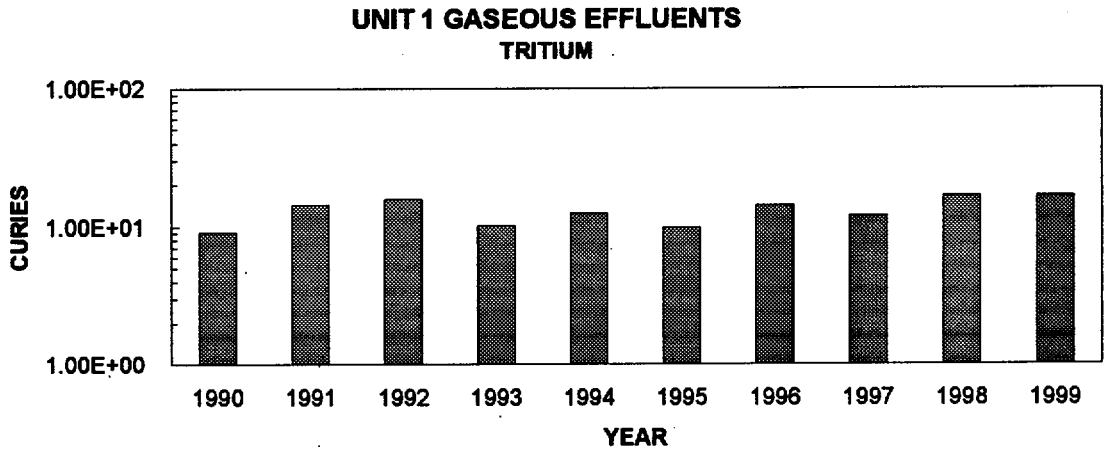
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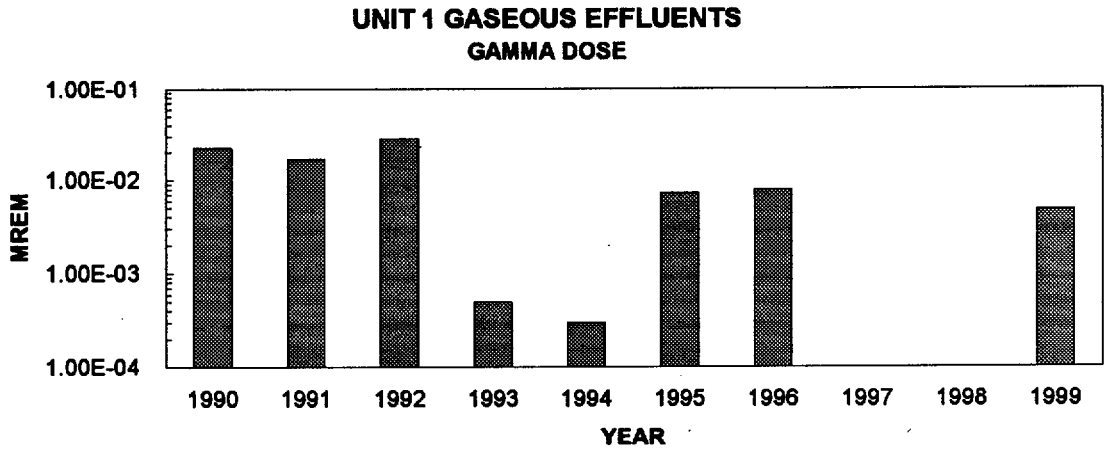
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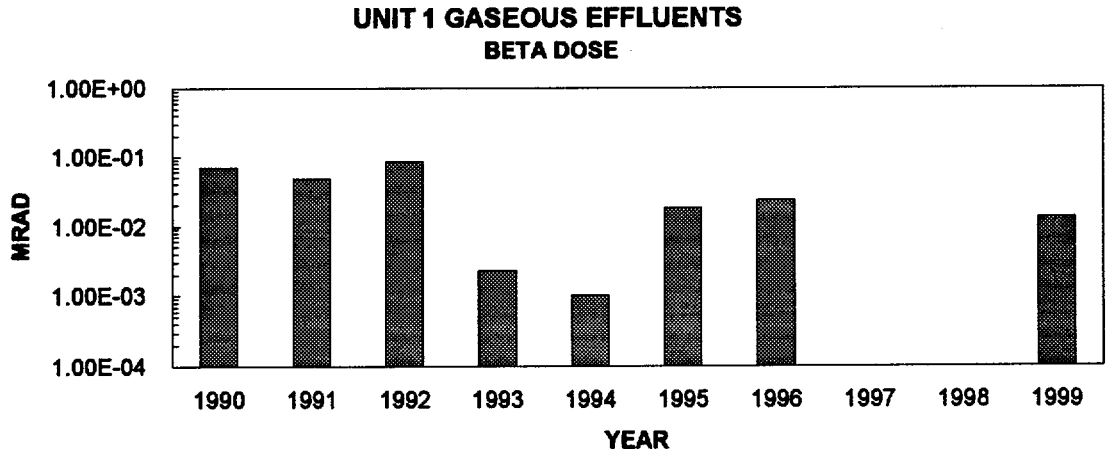
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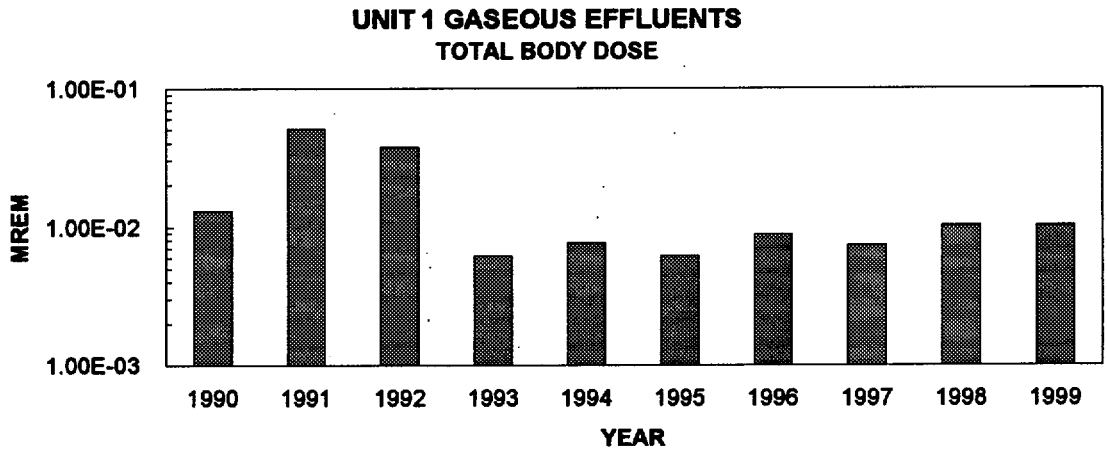
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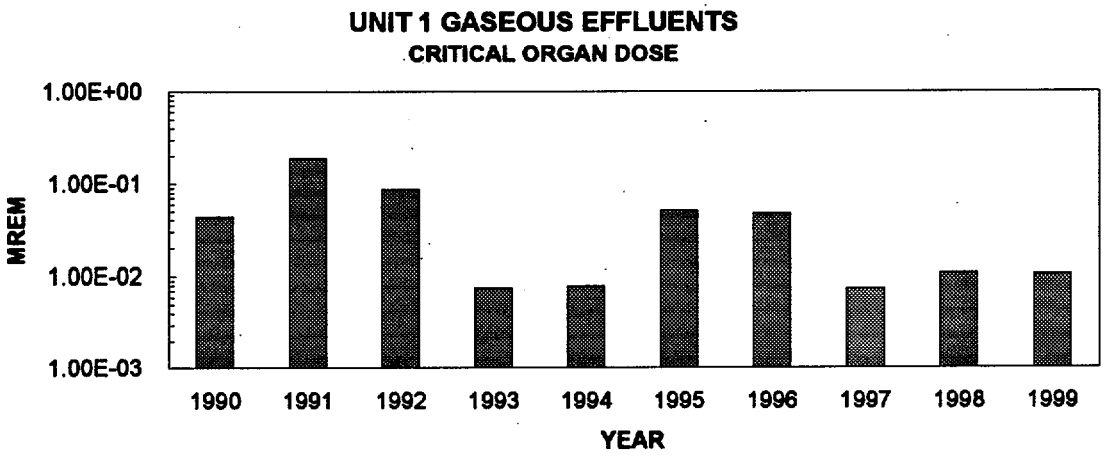
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MREM
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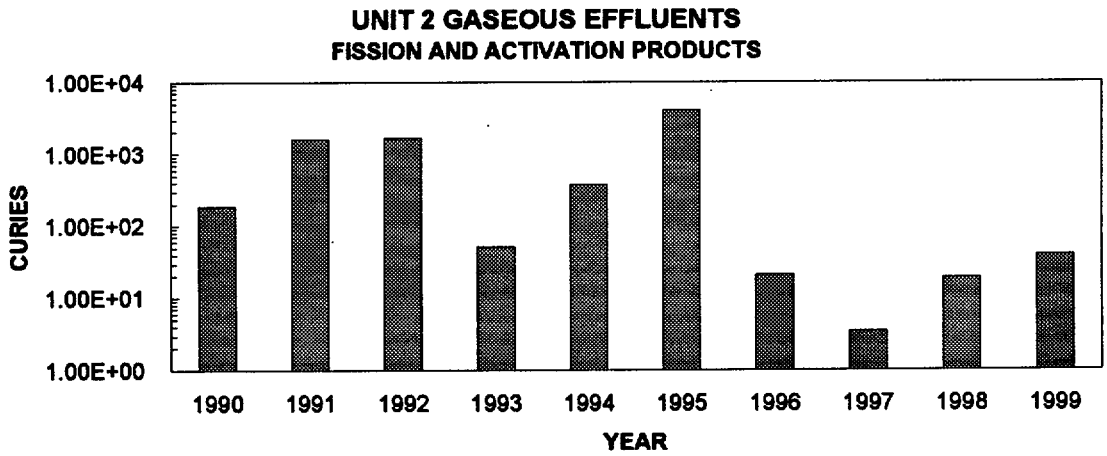
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FISSION AND ACTIVATION PRODUCTS
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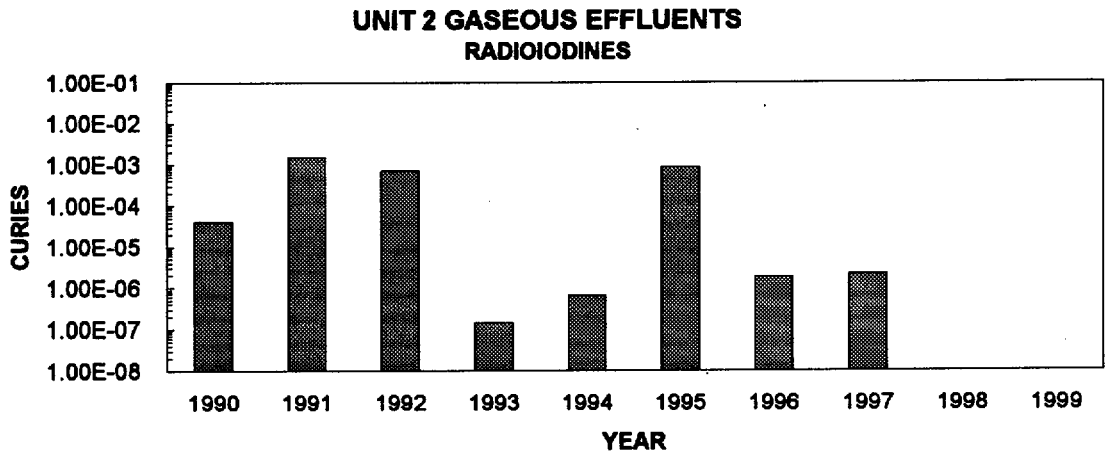
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RADIOIODINES
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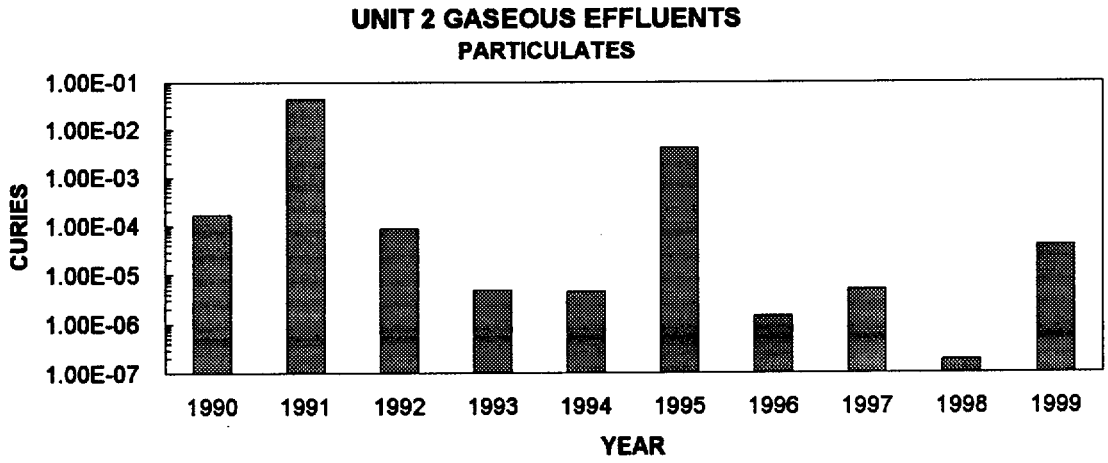
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PARTICULATES
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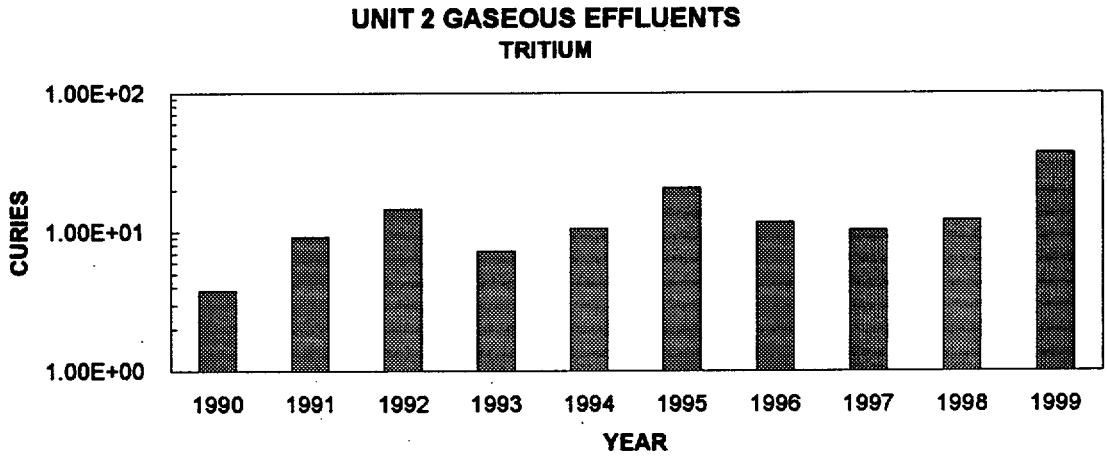
UNIT 2 GASEOUS EFFLUENTS
TRITIUM
CURIES
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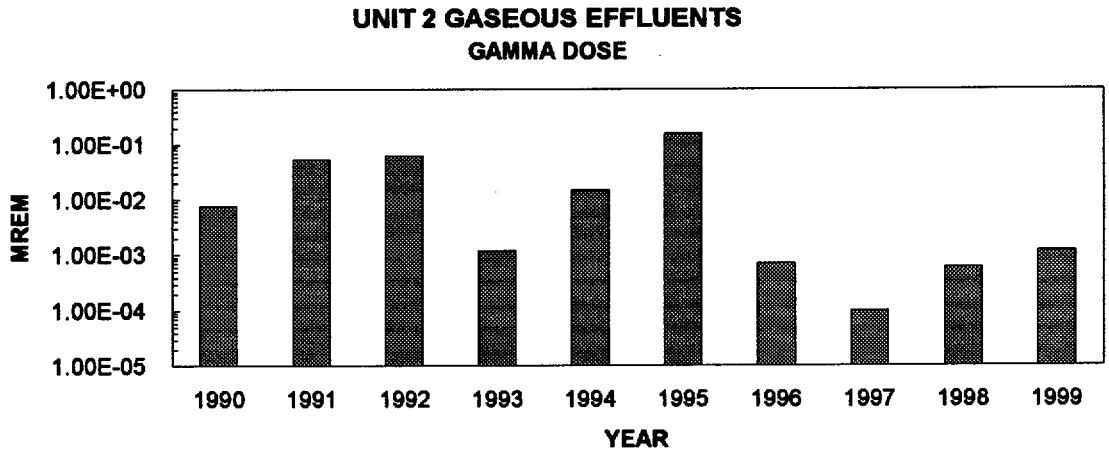
UNIT 2 GASEOUS EFFLUENTS
GAMMA DOSE
MREM
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1.00E-01
1.00E-02
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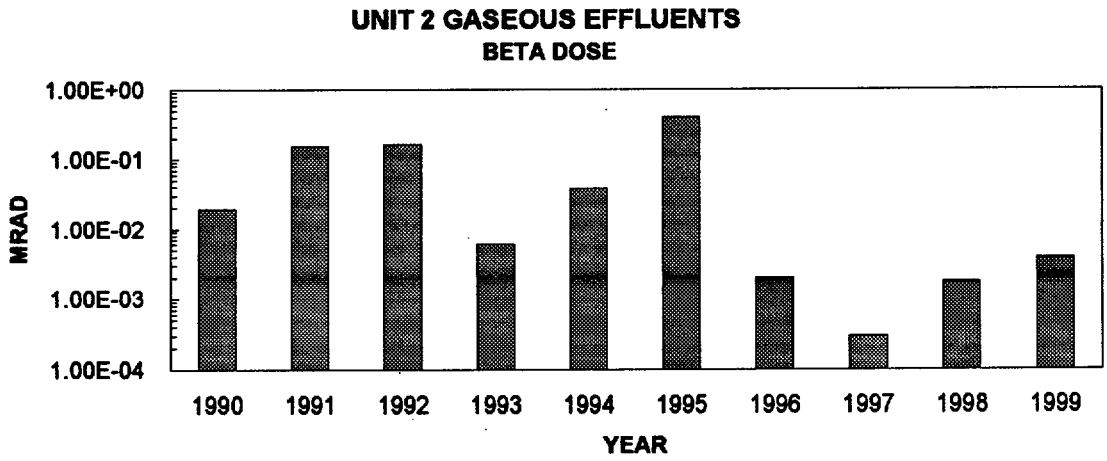
UNIT 2 GASEOUS EFFLUENTS
BETA DOSE
MRAD
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1.00E-01
1.00E-02
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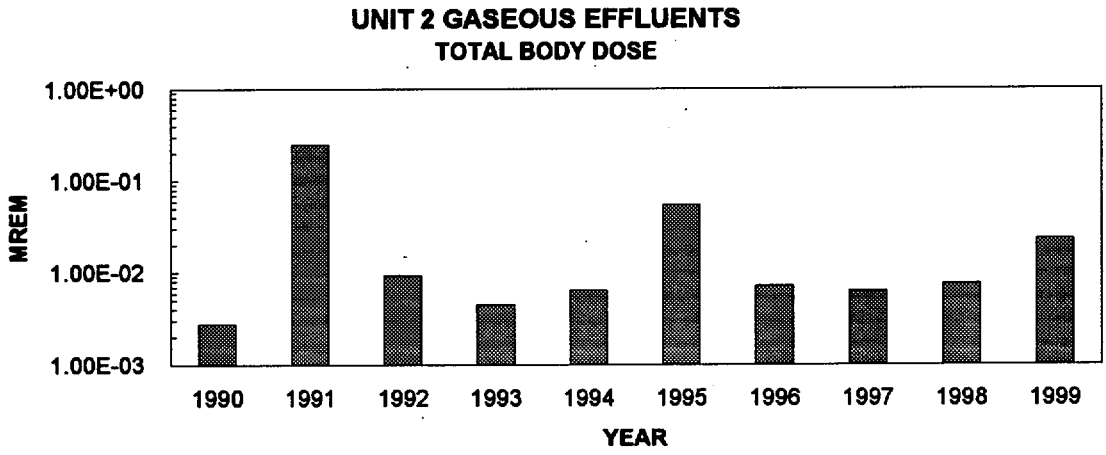
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TOTAL BODY DOSE
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1.00E-03
MREM
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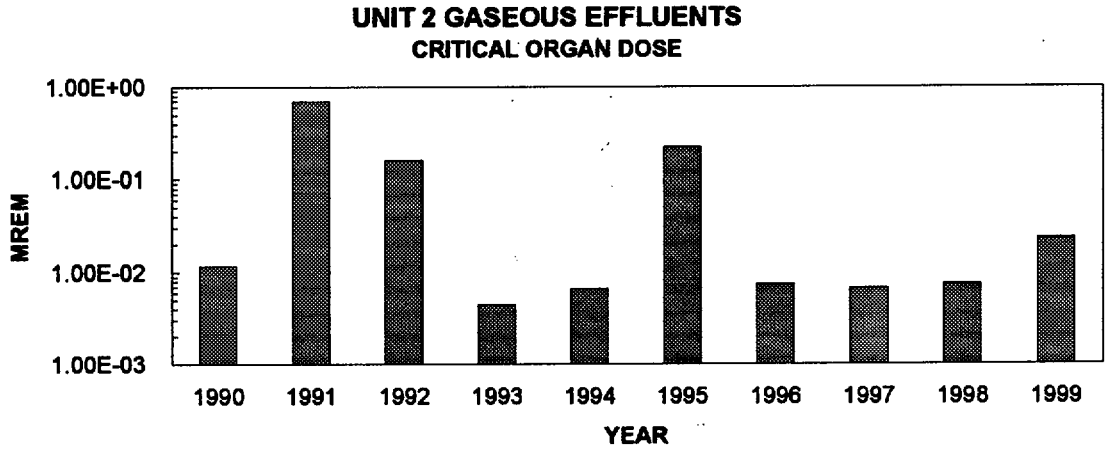
YEAR


UNIT 2 GASEOUS EFFLUENTS
CRITICAL ORGAN DOSE
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1.00E-02
1.00E-03
MREM
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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, 1999. The summary for solid waste shipments is as follows:

REGULATORY GUIDE 1.21 REPORT
WASTE DISPOSAL ANNUAL SUMMARY REPORT
SOLID WASTE AND IRRADIATED FUEL SHIPMENTS
JANUARY 1, 1999 THROUGH JUNE 30, 1999

A. Solid Waste Shipped Offsite for Burial or Disposal (Not Irradiated Fuel)

1. Type of Waste	Unit	6-Month Period	Est. Total Error, %
a. Spent resins, filter sludge, evaporator bottoms, etc.	m^3	0.00E+00	
	Ci	0.00E+00	0.00E+00
b. Dry compressible waste, contaminated equipment, etc.	m^3	8.83E+01	
	Ci	7.26E-01	±2.5E+01
c. Irradiated components, control rods, etc.	m^3	0.00E+00	
	Ci	0.00E+00	0.00E+00
d. Other (describe)	m^3	0.00E+00	
	Ci	0.00E+00	0.00E+00

2. Estimate of Major Nuclide Composition (by Type of Waste)

a. Spent resins, filter sludges, evaporator bottoms, etc.

None

b. Dry compressible waste, contaminated equipment, etc.

	%	Curies
CS-137	79.07	5.74E-01
CE-144	5.12	3.72E-02
CO-60	4.76	3.46E-02
FE-55	4.40	3.20E-02
NI-63	4.36	3.17E-02
C-14	2.29	1.66E-02

c. Irradiated components, control rods, etc.

None

d. Other

None

3. Solid Waste Disposition

Number of Shipments	Mode of Transportation	Destination
2	Flatbed/Sea Van	Oak Ridge, TN

B. Irradiated Fuel Shipments (Disposition)

Number of Shipments	Mode of Transportation	Destination
None		

REGULATORY GUIDE 1.21 REPORT
WASTE DISPOSAL ANNUAL SUMMARY REPORT
SOLID WASTE AND IRRADIATED FUEL SHIPMENTS
JULY 1, 1999 THROUGH DECEMBER 31, 1999

A. Solid Waste Shipped Offsite for Burial or Disposal (Not Irradiated Fuel)

1. Type of Waste	Unit	6-Month Period	Est. Total Error, %
a. Spent resins, filter sludges, evaporator bottoms, etc.	m^3	3.22E+02	
	Ci	1.86E-01	±2.5E+01
b. Dry compressible waste, contaminated equip, etc.	m^3	4.56E+02	
	Ci	2.69E+00	±2.5E+01
c. Irradiated components, control rods, etc.	m^3	0.00E+00	
	Ci	0.00E+00	0
d. Other (describe): Waste Oil	m^3	1.14E+01	
	Ci	8.18E-03	±2.5E+01

2. Estimate of Major Nuclide Composition (by Type of Waste from Section 8.A.1)

a. Spent resins, filter sludges, evaporator bottoms, etc.

	%	Curies
C-14	80.07	1.49E-01
H-3	9.35	1.74E-02
CS-137	8.25	1.54E-02
CS-134	2.00	3.74E-03
NI-63	0.17	3.20E-04
CO-60	0.14	2.54E-04
SB-125	0.02	2.99E-05
MN-54	0.00	6.03E-06
RU-103	0.00	6.14E-07

b. Dry compressible waste, contaminated equipment, etc.

	%	Curies
CS-137	83.63	2.26E+00
CO-60	4.81	1.30E-01
NI-63	4.50	1.21E-01
FE-55	4.41	1.20E-01
C-14	1.89	5.09E-02
CE-144	0.76	2.06E-02

c. Irradiated components, control rods, etc.

None

d. Other (Waste Oil)

	%	Curies
CS-137	39.84	3.26E-03
C-14	24.23	1.98E-03
NI-63	14.31	1.17E-03
CO-60	11.51	9.42E-04
FE-55	10.11	8.27E-04

3. Solid Waste Disposition

Number of Shipments	Mode of Transportation	Destination
30	Flatbed/Sea Van	Oak Ridge, TN

B. Irradiated Fuel Shipments (Disposition)

Number of Shipments	Mode of Transportation	Destination
None		

9. UNPLANNED RELEASES

An unplanned release is defined as any release of radioactive material to the environment that does not meet the following criteria:

A. Sample analysis prior to release, and
B. Release calculations performed prior to release.

During 1999, there were three unplanned releases to an unrestricted area.

On June 13, 1999, ANO personnel noted water dripping at a rate of 2 drops and 15 drops per minute from pipe caps located on the blowdown lines for Unit 1 Main Steam line traps ST-6 and ST-7. ST-6 and ST-7 are located in Room 40 beneath the ICW coolers. The water was found to be leaking to the discharge flume via a floor drain located in Room 40. Immediate actions included installation of new pipe caps which successfully secured the unmonitored release. Samples of the liquid were collected and analyzed for release purposes. It was found that only trace amounts of tritium were detected in samples. Chemistry generated a release permit to account for the unmonitored and unplanned release. A Condition Report was issued to document and track the corrective actions. Additionally, an Engineering Request (ER) has been initiated to reroute the floor drain to a monitored pathway and plug the existing floor drain in Room 40. There were no ODCM limits exceeded as a result of this condition. A copy of the release permit 1LR1999-0440 is included in Attachment 1.

On November 29, 1999, it was identified that the Unit 2 Waste Gas Decay Tank pressures for 2T18B and 2T18C had been decreasing over the previous several days. 2T18B was measured to be loosing 6 to 10 pounds of pressure a day and 2T18C was measured to be loosing 3 pounds of pressure per day. A Condition Report was issued to document and issue required corrective actions. A review of the condition concluded that the Nitrogen Supply Isolation Valves 2N2-19A, B, and C were leaking allowing pressure to escape from 2T18B and C. 2T18A had been previously declared inoperable and had no pressure at the time of the unplanned releases. 2T18B and C were declared inoperable due to the leakage. Gaseous Radwaste Release Permits were generated for the gas already released from 2T18B and 2T18C using the tanks initial pressures and sample analysis of the gas remaining in the tank. Additional permits were generated to release the remaining contents of 2T18B and C. A Condition Report Action was issued to Unit 2 Maintenance to follow up on a previously submitted MAI 15604 that documented the degraded valve internals of 2N2-19A. The Waste Gas Decay Tanks will remain out of service until the Nitrogen Supply Isolation Valves are repaired. Although the leakage was monitored by SPING 6 on the Aux. Bldg. exhaust plenum, this condition does not meet the definition of an Unplanned Release as defined in Chemistry Procedure 1604.016, "Analysis of Gaseous Waste Decay Tanks". There were no ODCM limits exceeded as a result of this condition. Copies of the unplanned release permits (2GR1999-0153 and 2GR1999-0155) are included in Attachment 2.

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 1999, RX-9820 (SPING 1 Unit 1 Containment Purge Super Particulate Iodine and Noble Gas ventilation effluent monitor) remained out of service until September 17, 1999. SPING 1 originally exceeded the 30 day out of service time clock on May 1, 1998, which was described in Section 10 of the 1998 Annual Radioactive Effluent Report. In summary, SPING 1 was taken out of service from April 2, 1998, at 1430 hours until May 1, 1998, at 0355 hours in support of a modification to the reactor building purge isolation valves. During modification testing on May 2, 1998, at 0627 hours, Channel 10 (ventilation flow rate) of the SPING monitor indicated zero (0) CFM while indication on process monitor RR-4830 indicated the flow rate to be 1.8E4 CFM. The design modification caused a reduction in the actual flow rate to approximately 1/4 of the design flow rate. This flow rate was below the cutoff set point of ~45% of design flow rate for the SPING monitor. Channel 10 is an input parameter for dose assessment determination. An evaluation (ER951020-E104) was performed during 1R15 to establish a new design flow rate for the containment purge pathway. Based on this evaluation of the flow, Chemistry Procedures 1604.014, "Reactor Building Purge Analysis" and 1604.051, "Eberline Radiation Monitoring System" were revised to include the design flows determined by ER951020-E104. SPING 1 channel 10 was declared operable on September 17, 1999.

No other radioactive effluent instrumentation was inoperable for longer than 30 days during 1999.

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 (PCP) shall be included in the annual Radioactive Effluent Release Report for the period in which the change was made effective.

During 1999, there were no changes made to the PCP.

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.

During 1999, two changes were made to the ODCM as follows:

Revision 13 PC-2

This change established a minimum circulating water pump dilution flow of no less than 100,000 gpm when releasing radioactive liquid from the site. Normally, two or more circulating water pumps are in operation. However, there are certain occasions when it is necessary to throttle the condenser waterbox inlet valves (CV-3630, CV-3626, CV-3622, and CV-3618). With these valves throttled, the circulating water pump flow is reduced below the normal 191,500 gpm. Additionally, Appendix 1 Limitation L3.3.1 and Appendix 2 Limitation L3.3.1 were revised to correct a grammatical error that was introduced during Revision 13. The words "prior to" were replaced with "by" to be consistent with what is found in U1 TS Section 6.12.2.5 and Unit 2 TS Section 6.9.4. The error occurred while moving the Radiological Effluent Technical Specifications into the ODCM.

Revision 13 PC-3

This change added definitions for "Batch" and "Continuous" releases to the Definitions section of Appendices 1 & 2. Table 2.3-1 of both Appendices was revised to include requirements concerning "Continuous" release sampling frequencies, type and minimum analysis frequencies, and lower limit of detection data.

Additionally, ODCM Revision 13, PC-3 revised Section 2.6, Table 2.6-1 and Table 2.6-2 of Appendices 1 & 2 [Radiological Environmental Monitoring Program (REMP)] to be consistent with the format of the NRC Branch Technical Position, Revision 1, November 1979, for Regulatory Guide 4.8, "Environmental Technical Specifications for Nuclear Power Plants" (BTP). In accordance with the BTP, Program Requirements, ANO modified the REMP using historical analytical data as justification. These changes are also represented in Section 2.6, Table 2.6-1 and Table 2.6-2 of Appendices 1 & 2 and Table 4-1.

A current copy of the ODCM (with this past year's changes indicated) is being forwarded to you along with this report as required by Unit 1 and Unit 2 Technical Specifications. The ODCM is included in Attachment 3.

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 1999, 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 1999, there were no instances where milk or fresh leafy vegetable samples were unavailable. However, there were ten environmental sampling location changes that affected the milk and fresh leafy vegetable sample stations during the reporting period. The changes were incorporated in ODCM Revision 13, PC-3, which was implemented on October 25, 1999.

Attachment 3 contains the revised pages of Table 4-1.

B. Increase in Calculated Dose Commitment

There were no environmental sampling locations identified during 1999 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 1999 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 1999. However it was identified on 4/14/99 that charcoal cartridges used to collect unit vent iodine samples have historically been positioned backwards in the collection chamber of the Eberline Super Particulate Iodine Noble Gas (SPING) monitors. In the reversed position, the iodine collected on the backside of the charcoal cartridge instead of the face side. Furthermore, the charcoal cartridge was counted with the face side toward the gamma spectroscopy detector. A Condition Report Action was issued to evaluate what effects, if any, the reversed position of the charcoal cartridge would have on determining the amount of iodine activity present on the cartridge. A test, consisting of counting the charcoal efficiency standard in the normal configuration and then in the reverse direction, was performed to determine the error introduced by reversing the cartridge. It was

determined that the average error ranged from 38% to 50%. For comparison purposes, previous years iodine, particulate, and tritium (ITP) doses were increased by 50% to determine what impact the increase would have on ODCM release limits. Based on the evaluation, it was found that even with the previous years ITP doses increased by 50%, the values remained far below the ODCM limit of 1500 mRem/yr. Additionally, it was determined that LLDs remained well below the required ODCM levels even when increased by 50%.

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

No effluent releases occurred from the ISFSI during 1999.

Attachment 1

Liquid Release Permit
1LR1999-0440

ıtergy Operations Inc.
Arkansas Nuclear One Unit 1
Liquid Radioactive Waste Release Permit 1LR1999-0440
Post-Release Permit Update

PART III: ACTUAL RELEASE DATA

Release Point (15): NRL-SECONDARY WATER LOSS TO FLUM
Discharge Point (6): NON ROUTINE LIQUID
Dilution Stream (1): CIRCULATION WATER

Permit Issued: 17-jun-1999 15:29:58 Release Type: Batch

Rad Monitor: ( )
Rad Monitor Bckgrnd: 0.0000E+00 CPM

Sample entry number: 440

Average Dilution Flow: 3.8300E+05 GPM Avg. Waste Flow: 4.5455E-03 GPM
Total Dilution Vol.: 1.0111E+09 GAL Total Waste Vol.: 1.2000E+01 GAL
Dilution Factor (Act): 8.4260E+07 Release Duration: 2640.00 MIN
Actual Release Start: 12-jun-1999 00:00:00
Actual Release End: 13-jun-1999 20:00:00

rformed By: Dale McEntyre by [illegible] Date 6/17/99
Approved By: [illegible] 6/17/99

ıtergy Operations Inc.
Arkansas Nuclear One Unit 1
Liquid Radioactive Waste Release Permit 1LR1999-0440
Post-Release Permit Update

RELEASE ACTIVITY - Unit 1

Isotope		Pre-Dilut. Measured uCi/ml	Pre-Dilut. Measured Conc/MPC	Pre-Dilut. Measured Conc/Total	Post Dilution uCi/ml	Post Dilution Conc/MPC	Estimated Curies Released
H-3	O:	2.37E-05	7.89E-03	1.00E+00	2.81E-13	9.36E-11	1.07E-06
Totals		2.37E-05	7.89E-03		2.81E-13	9.36E-11	1.07E-06

ıtergy Operations Inc.
Arkansas Nuclear One Unit 1
Liquid Radioactive Waste Release Permit 1LR1999-0440
Post-Release Permit Update

Report Category : Cumulative Maximum Individual Dose (mrem) for Controlling Age Group at Controlling Location
Type of Activity : Radioiodines and Particulates
Age Group & Pathway(s) : Adult . pw sff
Location : S at 1.050 km.
Unit number : 1

	Bone	Liver	Tot-body	Thyroid	Kidney	Lung	GI-LLI
This Release	0.00E+00	1.58E-12	1.58E-12	1.58E-12	1.58E-12	1.58E-12	1.58E-12
31D After Release	2.81E-04	4.26E-04	2.94E-04	4.77E-05	1.70E-04	8.16E-05	4.75E-05
31 Day Limit	6.25E-01	6.25E-01	1.80E-01	6.25E-01	6.25E-01	6.25E-01	6.25E-01
% 31 Day Limit	0.05%	0.07%	0.16%	0.01%	0.03%	0.01%	0.01%
Qtr After Release	7.67E-04	1.29E-03	9.37E-04	2.81E-04	5.97E-04	3.56E-04	3.78E-04
Quarterly Limit	5.00E+00	5.00E+00	1.50E+00	5.00E+00	5.00E+00	5.00E+00	5.00E+00
% Quarter Limit	0.02%	0.03%	0.06%	0.01%	0.01%	0.01%	0.01%
Ann After Release	3.12E-03	5.05E-03	3.60E-03	9.56E-04	2.16E-03	1.15E-03	3.37E-03
Annual Limit	1.00E+01	1.00E+01	3.00E+00	1.00E+01	1.00E+01	1.00E+01	1.00E+01
% Annual Limit	0.03%	0.05%	0.12%	0.01%	0.02%	0.01%	0.03%

ıtergy Operations Inc.
Arkansas Nuclear One Unit 1
17-jun-1999 15:33:42
Weekly Proportional Composite Report

Release Point (15): NRL-SECONDARY WATER LOSS TO FLUM
Unit Number : 1
Complete Through : 1LR1999-0440 12-jun-1999 22:00:00
Initial % : 0.
Final % : 0.

Volume this release	:	12. Gallons
Volume released today	:	27932. Gallons
Volume released in week 2	:	387559. Gallons
Volume released for the month	:	917732. Gallons
Volume from NTTK's this week	:	131697. Gallons
Volume from NRL's this week	:	255862. Gallons

Radwaste Composite: Combine 0. MLs of the NRL-S sample with 3900. MLs of the week 2 radwaste composite.

ıtergy Operations Inc.
Arkansas Nuclear One Unit 1
Liquid Radioactive Waste Release Permit 1LR1999-0440
Pre-Release Report

Release Point (15): NRL-SECONDARY WATER LOSS TO FLUM
Discharge Point (6): NON ROUTINE LIQUID
Dilution Stream (1): CIRCULATION WATER

Estim. Release Start: 12-jun-1999 00:00:00
Estim. Release End: 13-jun-1999 20:00:00

Estim. Waste Flow: 4.5455E-03 GPM
Estim. Waste Vol.: 1.2000E+01 GAL
Estim. Duration: 2640.00 MIN

Sample Entry # : 440 Allocation Fraction: 1.0000E-02
Permit Issued : 17-jun-1999 15:29:58 Release Type: Batch

Rad Monitor: ( )
Rad Monitor Bkg: 0.0000E+00 CPM

CircW Pumps	Min Dilution (GPM)	Max Waste (GPM)	Max Setpoint (CPM)	Flag
2	3.8300E+05	4.5455E-03	0.00E+00	
3	5.7450E+05	4.5455E-03	0.00E+00	
4	7.6600E+05	4.5455E-03	0.00E+00	

Flags: A-Release Curies > Local Limit W-Waste Flow > Max Allowable

Performed By: P.M. Ely Date 6/17/99
Approved By: [illegible] 6/17/99

ıtergy Operations Inc.
Arkansas Nuclear One Unit 1
Liquid Radioactive Waste Release Permit 1LR1999-0440
Pre-Release Report

ISOTOPIC IDENTIFICATION - Unit 1

Isotope	Pre-Dilut. Measured uCi/ml	Pre-Dilut. Measured Conc/MPC	Pre-Dilut. Measured Conc/Total	Post Dilution uCi/ml	Post Dilution Conc/MPC	Estimated Curies Released
H-3 O:	2.37E-05	7.89E-03	1.00E+00	2.81E-13	9.36E-11	1.07E-06
Totals	2.37E-05	7.89E-03		2.81E-13	9.36E-11	1.07E-06

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ntergy Operations Inc.
rkansas Nuclear One
Unit 1
17-jun-1999 15:32:5 1LR1999- 0440

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1. The concentration of radioactive material released to the discharge canal in this release = 9.360e-11 MPCs. This value must be less than 1.0 in accordance with ODCM L-2.3.1.A ACTION 1.

2. The quarterly Total Body Dose = 9.372e-04 mRem. (The quarterly limit is 1.5 mRem per ODCM L-2.3.2.A.1. The NRC must be notified if this value is exceeded per ODCM L-2.3.2.A ACTION 1. The absolute limit is 3.0 mRem per ODCM L-2.5.1.A. The NRC must be notified if this value is exceeded per ODCM L-2.5.1.A ACTIONS 1 and 2).

3. The quarterly Critical Organ Dose = 1.294e-03 mRem. (The quarterly limit is 5.0 mRem per ODCM L-2.3.2.A.1. The NRC must be notified if this value is exceeded per ODCM L-2.3.2.A ACTION 1. The absolute limit is 10.0 mRem per ODCM L-2.5.1.A. The NRC must be notified if this value is exceeded per ODCM L-2.5.1.A ACTIONS 1 and 2).

4. The yearly Total Body Dose = 3.595e-03 mRem. (The yearly limit is 3.0 mRem per ODCM L-2.3.2.A.2. The NRC must be notified if this value is exceeded per ODCM L-2.3.2.A ACTION 1. The absolute limit is 6.0 mRem per ODCM L-2.5.1.A. The NRC must be notified if this value is exceeded per ODCM L-2.5.1.A ACTIONS 1 and 2).

5. The yearly Critical Organ Dose = 5.045e-03 mRem. (The yearly limit is 10.0 mRem per ODCM L-2.3.2.A.2. The NRC must be notified if this value is exceeded per ODCM L-2.3.2.A ACTION 1. The absolute limit is 20.0 mRem per ODCM L-2.5.1.A. The NRC must be notified if this value is exceeded per ODCM L-2.5.1.A ACTIONS 1 and 2).

6. The quarterly projected Total Body Dose = 1.168e-03 mRem. (The quarterly limit is 0.180 mRem per ODCM L-2.3.3.A. If this value is exceeded all future releases must be processed prior to discharge per ODCM L-2.3.3.A).

7. The quarterly projected Critical Organ Dose = 1.613e-03 mRem. (The quarterly limit is 0.625 mRem per ODCM L-2.3.3.A. If this value is exceeded all future releases must be processed prior to discharge per ODCM L-2.3.3.A).

8. Additional comments:

   This release Total Body Dose = 1.578e-12 mRem.
   This release Critical Organ Dose = 1.578e-12 mRem.
   Total Qtrly Discharge Canal Flow = 7.110e+10 gal.
   Effective Dilution Flowrate = 6.798e+05 gpm.

Entergy Operations : ANO - Nuclear Chemistry Department - 13-JUN-1999 22:20

Main Spectra: 99-07115 Bkg Spectra : 99-07102

Sample date : 13-JUN-1999 19:25:0 Isolation date : 13-JUN-1999 19:25:0
Sample ID : MS-1056 Sample Quantity : 6.00000E+01 ml
Comments : Drip from steam trap
Geometry : TABLE 301 60 CC BOTTLE CAVE 3 SHELF 1

Calib date : 13-JUN-1999 00:02:0 Acquisition date : 13-JUN-1999 21:50:0
keV/channel : 5.00077E-01 Elapsed live time: 0 00:30:00.00
offset : -1.50879E-02 Percent deadtime : 0.0%

Decay limit : 8.00000 Peak Sensitivity : 3.00000
Abundance : 30.00000 Energy tolerance : 1.50000
Library : Libark Nuclear Chemist : DMCENTY

Peak Search performed from channel : 100 to 4050

Post-NID Peak Search Report
***** No peaks found *****

Nuclide Line Activity Report
Sample ID : MS-1056 Acquisition date : 13-JUN-1999 21:50:09

Nuclide	Sbhr	Energy	Area	%Abn	Eff	uCi/unit	1 Sig Err

Unidentified Energy Lines

None

Flags: "T" = Tentatively associated

Summary of Nuclide Activity

Total number of peaks in spectrum 0
Number of peaks identified by NID 0 100.00%

Nuclide	Sbhr	Halflife	Decay	uCi/unit	1 Sig Err

Interference correction summary

Isotope uCi/cc Corrections applied BPS : below peak sensitivity

Cs-137eq= < 1.005E-07

Xe-133eq= < 1.034E-07

Interference report Completed

ANO - Nuclear Chemistry : Gross Beta & Tritium Report : 9-JUN-1999 08:02

Analysis Num: 99-06932

Sample date : 9-JUN-1999 06:00:00
Sample ID : 1CPD B&H3
Instrument : Packard 2300TR

Background Data			Sample Data		
H-3 [cpm]	:	14.73	H-3 [cpm]	:	97.26
Beta [cpm]	:	22.44	H-3 [dpm]	:	262.64
Count time [min]	:	10.00	Count time [min]	:	10.00
QIP [glass bkg]	:	363.00	Beta [cpm]	:	0.00
H-3 MDA [uCi/ml]	:	1.636E-06	Beta [dpm]	:	0.00
Beta MDA [uCi/ml]	:	2.382E-06	Volume [ml]	:	5.00

	Activity	Error	
Beta <	2.382E-06	N/A	uCi/ml
H-3 =	2.366E-05	+/- 5.619E-07	uCi/ml

Calculated by : JDUDLEY

See door 608

Steam Traps

2 drips/min

15 drips/min

BWST SS?
Chemistry
x3115
Danny Akins

41.1

ER → (467) Richard Ellison Page #

Security Door logon the Door!

Fitz?

8/17/99 - Expected

Engineers? 1-97-95 97-245

Rick Ellison
McCormic
Don Dobbins

MAX 7739

ER980123

CR-ANO-1-98-0620

Open CR
CRTAB
LAstone

LAST Action
MAITH

ANO - Nuclear Chemistry : Gross Beta & Tritium Report : 15-JUN-1999 13:29

Analysis Num: 99-07189

Sample date : 15-JUN-1999 09:30:0
Sample ID : 1MS H-3
Instrument : Packard 2300TR

Background Data		Sample Data	
H-3 [cpm] :	14.89	H-3 [cpm] :	92.13
Beta [cpm] :	21.37	H-3 [dpm] :	246.78
Count time [min] :	10.00	Count time [min] :	10.00
QIP [glass bkg] :	361.00	Beta [cpm] :	0.00
H-3 MDA [uCi/ml] :	1.651E-06	Beta [dpm] :	0.00
Beta MDA [uCi/ml] :	2.279E-06	Volume [ml] :	5.00

	Activity	Error	
Beta <	2.279E-06	N/A	uCi/ml
H-3 =	2.223E-05	+/- 5.469E-07	uCi/ml

Calculated by : JDUDLEY

Protocol #: 2 Name:5 MLS.1 CNT 15-Jun-1999 13:11
Region A: LL-UL= 0.0-18.6 Lcr= 0 Bkg=14.89 %2 Sigma=0.00
Region B: LL-UL=18.6-2000 Lcr= 0 Bkg=21.37 %2 Sigma=0.00
Region C: LL-UL= 0.0- 0.0 Lcr= 0 Bkg= 0.00 %2 Sigma=0.00
Time = 10.00 QIP = tSIE ES Terminator = Count
H-3 ACT >1E-5
Conventional DPM
Nuclide 1 = 219010 Nuclide 2 = 115534 LP Steam 6-15-99 @ 0930 v = 5 mls

S#	TIME	CPMA	DPM1	CPMB	DPM2	tSIE	FLAG	H3 ACT	B- ACT
1	10.00	92.13	246.78	0.00	0.00	367.		0.000022	0.000000

UNIT: ONE TWO (circle one)

SOURCE OF LIQUID RELEASE: Secondary Water loss to flume

SAMPLE DATA

SAMPLE TIME: 6-12-99 / 1925

BY: DMc

OIL AND GREASE COLLECTED: YES NO (circle one)

pH OF SAMPLE: NA NA (6.0 - 9.0)

RADIOLOGICAL DATA

GAMMA SPEC #: 99-07115 H-3 HOT Gamma COLD (circle one)

UNPLANNED YES NO (circle one)

RELEASE #: LR1999-0400

RELEASE DATA

START TIME: 6-12-99 @ 0000

STOP TIME: 6-13-99 @ 2000

VOLUME RELEASED: 12 gal

17 ml/min leak from steam trap.

REMARKS: (describe method used to determine volume)

Volume obtained from unit one operations

FORM TITLE:	FORM NO.	CHANGE
MISCELLANEOUS LIQUID RELEASE SAMPLE REPORT	1604.017C	017-06-0

Attachment 2

Gaseous Release Permits
2GR1999-0153 and 2GR1999-0155

Entergy Operations Inc.
Arkansas Nuclear One Unit 2
Gaseous Radioactive Waste Release Permit
Post-Release Permit Update 2GR1999-0153

PART III: ACTUAL RELEASE DATA

Release Point (46): 2T18B WASTE GAS DECAY TANK
Discharge Point (17): DISC. PT. 17 - 2 RAD WASTE AREA

Permit Issued: 03-dec-1999 08:36:36 Release Type: Batch

Sample entry number: 153

Average Waste Flow: 1.9526E-01 CFM
Total Waste Volume: 2.8166E+03 CF
Actual Release Start: 23-nov-1999 08:20:00
Actual Release End: 03-dec-1999 08:45:00
Release Duration: 14425.0000 MIN

Initial Pressure : 155.00
Final Pressure : 20.00

Performed By: [illegible] Date 12/3/99
Approved By: [illegible] 12/8/99

Unplanned Release due to valve leakage.

MZ 12/8/99

Entergy Operations Inc.
Arkansas Nuclear One Unit 2
Gaseous Radioactive Waste Release Permit
Post-Release Permit Update 2GR1999-0153

RELEASE ACTIVITY - Unit 2

Isotope		Pre-Disp. Measured uCi/cc	Pre-Disp. Measured Conc/MPC	Pre-Disp. Measured Conc/Total	Conc/Total by Type	Release Rate uCi/sec	Curies Released
H-3	O:	7.60E-07	3.80E+00	1.83E-01	1.00E+00	7.01E-05	6.07E-05
XE-133	N:	3.40E-06	1.13E+01	8.17E-01	1.00E+00	3.14E-04	2.71E-04
Totals		4.16E-06	1.51E+01			3.84E-04	3.32E-04

Entergy Operations Inc.
Arkansas Nuclear One Unit 2
Gaseous Radioactive Waste Release Permit 2GR1999-0153
Pre-Release Supplementary Data

PART I: PRE-RELEASE DATA

Release Point (46): 2T18B WASTE GAS DECAY TANK
Discharge Point (17): DISC. PT. 17 - 2 RAD WASTE AREA

Permit Issued: 03-dec-1999 08:36:36 Release Type: Batch

Rad Monitor: (2429) 2RE-2429
Rad Monitor Bckgrnd: 1.0000E+02 CPM

Estim. Waste Flow: 1.0000E+01 CFM
Estim. Waste Volume: 2.8166E+03 CF
Estim. Release Start: 23-nov-1999 08:20:00✓ Initial Pressure : 155.00
Estim. Release End: 23-nov-1999 13:01:40 Final Pressure : 20.00
Estim. Duration: 281.6633 MIN

PART II: PRE-RELEASE CALCULATIONS

Sample Entry # : 153
Gas sample time: Sampled by:

Gas Monitor Response: 1.26E+02 CPM
Total Body Dose Rate: 9.25E-06 mrem/yr % Limit = 0.0%
Skin Dose Rate: 2.18E-05 mrem/yr % Limit = 0.0%
Max Organ Dose Rate: 3.04E-05 mrem/yr % Limit = 0.0%

Max Monitor Setpoints:	2RE-2429 CPM	2RX-9825 uCi/cc
Noble Gas :	2.3E+02	4.0E-06

Flag:
Flags: A-Release Curies > Local Limit N-Noble Gas Dose Rate > Limit
S-Release Curies > Site Limit O-Organ Dose Rate > Limit

	Analysis Date	Measured Concen.	Est. Curies
Noble Gases		3.40E-06 uCi/cc	2.71E-04
Particulates		0.00E+00 uCi/cc	0.00E+00
Radioiodines		0.00E+00 uCi/cc	0.00E+00

Performed By: [signature] Date 12/8/99
Approved By: [signature] 12/8/99

Entergy Operations Inc.
Arkansas Nuclear One Unit 2
Gaseous Radioactive Waste Release Permit
Pre-Release Supplementary Data

2GR1999-0153

ISOTOPIC IDENTIFICATION - Unit 2

Isotope		Pre-Disp. Measured uCi/cc	Pre-Disp. Measured Conc/MPC	Pre-Disp. Measured Conc/Total	Conc/Total by Type	Release Rate uCi/sec	Estimated Curies Released
H-3	O:	7.60E-07	3.80E+00	1.83E-01	1.00E+00	3.59E-03	6.07E-05
XE-133	N:	3.40E-06	1.13E+01	8.17E-01	1.00E+00	1.61E-02	2.71E-04
Totals		4.16E-06	1.51E+01			1.96E-02	3.32E-04

Entergy Operations Inc.
Arkansas Nuclear One
Unit 2
03-dec-1999 08:43:0

2GR1999- 0153

1. The noble gases Total Body dose rate = 9.252e-06 mRem/yr. It must be <= 500 mRem/yr per ODCM L-2.4.1.A.1. If exceeding this limit, without delay restore the release rate to comply with this limit. During periods of containment purging the dose rate may be averaged over a one hour interval.

2. The noble gases Skin dose rate = 2.185e-05 mRem/yr. It must be <= 3000 mRem/yr per ODCM L-2.4.1.A.1. If exceeding this limit, without delay restore the release rate to comply with this limit. During periods of containment purging the dose rate may be averaged over a one hour interval.

3. The ITP critical organ dose rate = 3.043e-05 mRem/yr. It must be <= 1500 mRem/yr per ODCM L-2.4.1.A.2. If exceeding this limit, without delay restore the release rate to comply with this limit. During periods of containment purging the dose rate may be averaged over a one hour interval.

4. The quarterly Gamma Air dose = 7.470e-04 mRad. If the dose exceeds 5 mRad per ODCM L-2.4.2.A.1 notify the NRC per ODCM L-2.4.2.A ACTION 1. The total dose limit is 10 mRad per ODCM L-2.5.1.A. The NRC must be notified if this value is exceeded per ODCM L-2.5.1.A ACTIONS 1 and 2.

5. The quarterly Beta Air dose = 2.221e-03 mRad. If the dose exceeds 10 mRad per ODCM L-2.4.2.A.1 notify the NRC per ODCM L-2.4.2.A ACTION 1. The total dose limit is 20 mRad per ODCM L-2.5.1.A. The NRC must be notified if this value is exceeded per ODCM L-2.5.1.A ACTIONS 1 and 2.

6. The quarterly ITP dose = 1.272e-02 mRem. If the dose exceeds 7.5 mRem per ODCM L-2.4.3.A.1 notify the NRC per ODCM L-2.4.3.A ACTION 1. The total dose limit is 15 mRem per ODCM L-2.5.1.A. The NRC must be notified if this value is exceeded per ODCM L-2.5.1.A ACTIONS 1 and 2.

7. The yearly Gamma Air dose = 1.188e-03 mRad. If the dose exceeds 10 mRad per ODCM L-2.4.2.A.2 notify the NRC per ODCM L-2.4.2.A ACTION 1. The total dose limit is 20 mRad per ODCM L-2.5.1.A. The NRC must be notified if this value is exceeded per ODCM L-2.5.1.A ACTIONS 1 and 2.

8. The yearly Beta Air dose = 3.762e-03 mRad. If the dose exceeds 20 mRad per ODCM L-2.4.2.A.2 notify the NRC per ODCM L-2.4.2.A ACTION 1. The total dose limit is 40 mRad per ODCM L-2.5.1.A. The NRC must be notified if this value is exceeded per ODCM L-2.5.1.A ACTIONS 1 and 2.

9. The yearly ITP dose = 2.304e-02 mRem. If the dose exceeds 15 mRad per ODCM L-2.4.3.A.2 notify the NRC per ODCM L-2.4.3.A ACTION 1. The total dose limit is 30 mRad per ODCM L-2.5.1.A. The NRC must be notified if this value is exceeded per ODCM L-2.5.1.A ACTIONS 1 and 2.

10. The projected quarterly Gamma Air Dose = 1.284e-03 mRad. If the dose exceeds 0.625 mRad ODCM L-2.4.4.A and ODCM L-2.4.4.B and releases being discharged without treatment notify NRC per ODCM L-2.4.4 ACTION 1. Contact Engineering Programs to verify Treatment System Operability if the projected quarterly dose exceeds 0.625 mRad.

11. The projected quarterly Beta Air Dose = 3.816e-03 mRad. If the dose exceeds 1.25 mRad ODCM L-2.4.4.A and ODCM L-2.4.4.B and releases being discharged without treatment notify NRC per ODCM L-2.4.4 ACTIONS 1&2. Contact Engineering Programs to verify Treatment System Operability if the projected quarterly dose exceeds 1.25 mRad.

12. The projected quarterly ITP Dose = 2.186e-02 mRem. If the dose exceeds 1.0 mRem ODCM L-2.4.4.A and releases are being discharged without treatment notify the NRC per ODCM L-2.4.4 ACTION 1 Contact Engineering Programs to verify Treatment System Operability if the projected quarterly dose exceeds 1.0 mRem.

13. Additional comments:

Gamma	Air Dose for release =	8.502e-09 mRad
Beta	Air Dose for release =	2.529e-08 mRad
ITP	Dose for the release =	3.734e-08 mRem

ITP = I-131, H-3, and particulates with halflives > 8 days

ANO - Nuclear Chemistry : Gross Beta & Tritium Report : 30-NOV-1999 17:17

Analysis Num: 99-15156

Sample date : 30-NOV-1999 14:43:0
Sample ID : 2t-18b
Instrument : Packard 2300TR

Background Data

H-3 [cpm]	:	15.29
Beta [cpm]	:	23.91
Count time [min]	:	10.00
QIP [glass bkg]	:	370.00
H-3 MDA [uCi/ml]	:	3.381E-09
Beta MDA [uCi/ml]	:	5.046E-09

Sample Data

H-3 [cpm]	:	1565.53
H-3 [dpm]	:	4220.83
Count time [min]	:	10.00
Beta [cpm]	:	0.00
Beta [dpm]	:	0.00
Volume [ml]	:	2500.00

		Activity	Error	
Beta	<	5.046E-09	N/A	uCi/ml
H-3	=	7.605E-07 ✓	+/- 4.509E-09	uCi/ml

Calculated by : CJAMES

(1 missing vial)
3 10.00 1565.53 4220.83 1.47 1.59 32.081 365. B

Entergy Operations : ANO - Nuclear Chemistry Department - 30-NOV-1999 16:16

Main Spectra: 99-15149 Bkg Spectra : 99-15097

Sample date : 30-NOV-1999 14:31:0 Isolation date : 30-NOV-1999 14:31:0
Sample ID : 2T18B Gas 2GR- Sample Quantity : 9.80000E+01 ml
Comments :
Geometry : TABLE 320 100CC MARINELLI CAVE 3 SHELF 1

Calib date : 29-NOV-1999 21:02:0 Acquisition date : 30-NOV-1999 16:01:2
keV/channel : 4.99880E-01 Elapsed live time: 0 00:15:00.00
offset : -2.68555E-04 Percent deadtime : 0.0%

Decay limit : 8.00000 Peak Sensitivity : 4.66000
Abundance : 30.00000 Energy tolerance : 1.50000
Library : Libark Nuclear Chemist : JDUDLEY

Peak Search performed from channel : 100 to 4050

Post-NID Peak Search Report

It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	%Err	Fit	Nuclides
1	81.03	133	39	0.95	162.10	156	12	13.9	1.45E+00	XE-133 XE-133

Nuclide Line Activity Report
Sample ID : 2T18B Gas 2GR- Acquisition date : 30-NOV-1999 16:01:25

Nuclide	Sbhr	Energy	Area	%Abn	Eff	uCi/unit	1 Sig Err
XE-133	FG	79.62	133.	0.22	3.264E-02	5.737E-04	7.951E-05
		81.00	133.	37.10*	3.264E-02	3.402E-06	4.715E-07

Unidentified Energy Lines

None

Flags: "T" = Tentatively associated

Summary of Nuclide Activity

Total number of peaks in spectrum 1
Number of peaks identified by NID 1 100.00%

Nuclide	Sbhr	Halflife	Decay	uCi/unit	1 Sig Err
XE-133	FG	5.29D	1.009	3.402E-06	4.715E-07

Interference correction summary

Isotope uCi/cc Corrections applied BPS : below peak sensitivity

XE-133 = 3.402E-06 ✓

Xe-133eq= 3.355E-06

Interference report Completed

WGDT Projected Max Curie Report

Sample ID : 2T18B GAS 2GR-

Sampled : 30-NOV-1999 14:31:00
Acquired: 30-NOV-1999 16:01:25

Nuclide	Xe-133DE Ci
XE-133	7.93233E-04
Total Xe-133de	7.93233E-04

Percent of 82400. Ci limit = 9.62662E-07

Entergy Operations : ANO - Nuclear Chemistry Department - 30-NOV-1999 17:06

Main Spectra: 99-15151 Bkg Spectra : 99-15094

Sample date : 30-NOV-1999 14:37:0 Isolation date : 30-NOV-1999 14:37:0
Sample ID : 2T18B Char 2GR- Sample Quantity : 5.00000E+04 cc
Comments :
Geometry : Table 131 F&J Char Cart CAVE 1 SHELF 1

Calib date : 29-NOV-1999 19:46:2 Acquisition date : 30-NOV-1999 16:50:3
keV/channel : 4.99823E-01 Elapsed live time: 0 00:15:00.00
offset : -2.57813E-01 Percent deadtime : 0.0%

Decay limit : 8.00000 Peak Sensitivity : 4.66000
Abundance : 30.00000 Energy tolerance : 1.50000
Library : Libark Nuclear Chemist : CJAMES

Peak Search performed from channel : 100 to 4050

Post-NID Peak Search Report

It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	%Err	Fit	Nuclides
1	81.13	8886	911	0.83	162.83	155	14	1.3	9.26E+00	XE-133
1	163.94	26	11	1.56	328.51	324	9	36.6	1.91E+00	XE-131M

Nuclide Line Activity Report
Sample ID : 2T18B Char 2GR- Acquisition date : 30-NOV-1999 16:50:31

Nuclide	Sbhr	Energy	Area	%Abn	Eff	uCi/unit	1 Sig Err
XE-131M	FG	163.93	26.	1.96*	5.620E-02	1.442E-08	5.277E-09
XE-133	FG	81.00	8886.	37.10*	4.420E-02	3.296E-07	4.242E-09

Unidentified Energy Lines

None

Flags: "T" = Tentatively associated

Summary of Nuclide Activity

Total number of peaks in spectrum 2
Number of peaks identified by NID 2 100.00%

Nuclide	Sbhr	Halflife	Decay	uCi/unit	1 Sig Err
XE-131M	FG	11.80D	1.006	1.442E-08	5.277E-09
XE-133	FG	5.29D	1.013	3.296E-07	4.242E-09

Interference correction summary

Isotope uCi/cc Corrections applied BPS : below peak sensitivity

XE-131M = 1.442E-08

XE-133 = 3.296E-07

Cs-137eq= 4.231E-07

Xe-133eq= 3.387E-07

Interference report Completed

Entergy Operations : ANO - Nuclear Chemistry Department - 30-NOV-1999 17:14

Main Spectra: 99-15154 Bkg Spectra : 99-15098

Sample date : 30-NOV-1999 14:37:0 Isolation date : 30-NOV-1999 07:00:0
Sample ID : 2T18B Part 2GR- Sample Quantity : 5.00000E+04 ml
Comments :
Geometry : Table 417 2 IN PART FLTR CAVE 4 SHELF 1

Calib date : 29-NOV-1999 21:46:0 Acquisition date : 30-NOV-1999 16:58:1
keV/channel : 4.99151E-01 Elapsed live time: 0 00:15:00.00
offset : 2.28149E-01 Percent deadtime : 0.0%

Decay limit : 8.00000 Peak Sensitivity : 4.66000
Abundance : 30.00000 Energy tolerance : 1.50000
Library : Libark Nuclear Chemist : CJAMES

Peak Search performed from channel : 100 to 4050

Post-NID Peak Search Report
***** No peaks found *****

Nuclide Line Activity Report
Sample ID : 2T18B Part 2GR- Acquisition date : 30-NOV-1999 16:58:14

Nuclide	Sbhr	Energy	Area	%Abn	Eff	uCi/unit	1 Sig Err

Unidentified Energy Lines

None

Flags: "T" = Tentatively associated

Summary of Nuclide Activity

Total number of peaks in spectrum 0
Number of peaks identified by NID 0 100.00%

Nuclide	Sbhr	Halflife	Decay	uCi/unit	1 Sig Err

Interference correction summary

Isotope uCi/cc Corrections applied BPS : below peak sensitivity

Cs-137eq= < 1.901E-10

Xe-133eq= < 1.694E-10

Interference report Completed

Entergy Operations Inc.
Arkansas Nuclear One Unit 2
Gaseous Radioactive Waste Release Permit
Post-Release Permit Update 2GR1999-0155

PART III: ACTUAL RELEASE DATA

Release Point (47): 2T18C WASTE GAS DECAY TANK
Discharge Point (17): DISC. PT. 17 - 2 RAD WASTE AREA

Permit Issued: 04-dec-1999 15:52:19 Release Type: Batch

Sample entry number: 155

Average Waste Flow: 9.8590E-02 CFM
Total Waste Volume: 1.6065E+03 CF
Actual Release Start: 23-nov-1999 08:20:00
Actual Release End: 04-dec-1999 15:55:00
Release Duration: 16295.0000 MIN

Initial Pressure : 151.00
Final Pressure : 74.00

Performed By: AM Date 12/4/99
Approved By: [signature] 12/8/99

Entergy Operations Inc.
Arkansas Nuclear One Unit 2
Gaseous Radioactive Waste Release Permit
Post-Release Permit Update 2GR1999-0155

RELEASE ACTIVITY - Unit 2

Isotope		Pre-Disp. Measured uCi/cc	Pre-Disp. Measured Conc/MPC	Pre-Disp. Measured Conc/Total	Conc/Total by Type	Release Rate uCi/sec	Curies Released
H-3	O:	5.90E-07	2.95E+00	5.99E-02	1.00E+00	2.75E-05	2.69E-05
XE-133	N:	9.27E-06	3.09E+01	9.40E-01	1.00E+00	4.32E-04	4.22E-04
Totals		9.86E-06	3.39E+01			4.59E-04	4.49E-04

Entergy Operations Inc.
Arkansas Nuclear One Unit 2
Gaseous Radioactive Waste Release Permit
Pre-Release Supplementary Data 2GR1999-0155

PART I: PRE-RELEASE DATA

Release Point (47): 2T18C WASTE GAS DECAY TANK
Discharge Point (17): DISC. PT. 17 - 2 RAD WASTE AREA

Permit Issued: 04-dec-1999 15:52:19 Release Type: Batch

Rad Monitor: (2429) 2RE-2429
Rad Monitor Bckgrnd: 1.0000E+02 CPM

Estim. Waste Flow: 1.0000E+01 CFM
Estim. Waste Volume: 1.6065E+03 CF
Estim. Release Start: 23-nov-1999 08:20:00 Initial Pressure : 151.00
Estim. Release End: 23-nov-1999 11:00:39 Final Pressure : 74.00
Estim. Duration: 160.6524 MIN

PART II: PRE-RELEASE CALCULATIONS

Sample Entry # : 155
Gas sample time: Sampled by:

Gas Monitor Response: 1.33E+02 CPM
Total Body Dose Rate: 2.52E-05 mrem/yr % Limit = 0.0%
Skin Dose Rate: 5.96E-05 mrem/yr % Limit = 0.0%
Max Organ Dose Rate: 2.36E-05 mrem/yr % Limit = 0.0%

Max Monitor Setpoints:	2RE-2429 CPM	2RX-9825 uCi/cc
Noble Gas :	2.4E+02	1.1E-05

Flag:
Flags: A-Release Curies > Local Limit N-Noble Gas Dose Rate > Limit
S-Release Curies > Site Limit O-Organ Dose Rate > Limit

	Analysis Date	Measured Concen.	Est. Curies
Noble Gases		9.27E-06 uCi/cc	4.22E-04
Particulates		0.00E+00 uCi/cc	0.00E+00
Radioiodines		0.00E+00 uCi/cc	0.00E+00

Performed By: AM Date 12/4/99
Approved By: [signature] 12/8/99

Entergy Operations Inc.
Arkansas Nuclear One Unit 2
Gaseous Radioactive Waste Release Permit
Pre-Release Supplementary Data 2GR1999-0155

ISOTOPIC IDENTIFICATION - Unit 2

Isotope		Pre-Disp. Measured uCi/cc	Pre-Disp. Measured Conc/MPC	Pre-Disp. Measured Conc/Total	Conc/Total by Type	Release Rate uCi/sec	Estimated Curies Released
H-3	O:	5.90E-07	2.95E+00	5.99E-02	1.00E+00	2.79E-03	2.69E-05
XE-133	N:	9.27E-06	3.09E+01	9.40E-01	1.00E+00	4.38E-02	4.22E-04
Totals		9.86E-06	3.39E+01			4.66E-02	4.49E-04

1. The noble gases Total Body dose rate = 2.522e-05 mRem/yr. It must be <= 500 mRem/yr per ODCM L-2.4.1.A.1. If exceeding this limit, without delay restore the release rate to comply with this limit. During periods of containment purging the dose rate may be averaged over a one hour interval.

2. The noble gases Skin dose rate = 5.956e-05 mRem/yr. It must be <= 3000 mRem/yr per ODCM L-2.4.1.A.1. If exceeding this limit, without delay restore the release rate to comply with this limit. During periods of containment purging the dose rate may be averaged over a one hour interval.

3. The ITP critical organ dose rate = 2.363e-05 mRem/yr. It must be <= 1500 mRem/yr per ODCM L-2.4.1.A.2. If exceeding this limit, without delay restore the release rate to comply with this limit. During periods of containment purging the dose rate may be averaged over a one hour interval.

4. The quarterly Gamma Air dose = 7.470e-04 mRad. If the dose exceeds 5 mRad per ODCM L-2.4.2.A.1 notify the NRC per ODCM L-2.4.2.A ACTION 1. The total dose limit is 10 mRad per ODCM L-2.5.1.A. The NRC must be notified if this value is exceeded per ODCM L-2.5.1.A ACTIONS 1 and 2.

5. The quarterly Beta Air dose = 2.221e-03 mRad. If the dose exceeds 10 mRad per ODCM L-2.4.2.A.1 notify the NRC per ODCM L-2.4.2.A ACTION 1. The total dose limit is 20 mRad per ODCM L-2.5.1.A. The NRC must be notified if this value is exceeded per ODCM L-2.5.1.A ACTIONS 1 and 2.

6. The quarterly ITP dose = 1.272e-02 mRem. If the dose exceeds 7.5 mRem per ODCM L-2.4.3.A.1 notify the NRC per ODCM L-2.4.3.A ACTION 1. The total dose limit is 15 mRem per ODCM L-2.5.1.A. The NRC must be notified if this value is exceeded per ODCM L-2.5.1.A ACTIONS 1 and 2.

7. The yearly Gamma Air dose = 1.188e-03 mRad. If the dose exceeds 10 mRad per ODCM L-2.4.2.A.2 notify the NRC per ODCM L-2.4.2.A ACTION 1. The total dose limit is 20 mRad per ODCM L-2.5.1.A. The NRC must be notified if this value is exceeded per ODCM L-2.5.1.A ACTIONS 1 and 2.

8. The yearly Beta Air dose = 3.762e-03 mRad. If the dose exceeds 20 mRad per ODCM L-2.4.2.A.2 notify the NRC per ODCM L-2.4.2.A ACTION 1. The total dose limit is 40 mRad per ODCM L-2.5.1.A. The NRC must be notified if this value is exceeded per ODCM L-2.5.1.A ACTIONS 1 and 2.

9. The yearly ITP dose = 2.304e-02 mRem. If the dose exceeds 15 mRad per ODCM L-2.4.3.A.2 notify the NRC per ODCM L-2.4.3.A ACTION 1. The total dose limit is 30 mRad per ODCM L-2.5.1.A. The NRC must be notified if this value is exceeded per ODCM L-2.5.1.A ACTIONS 1 and 2.

10. The projected quarterly Gamma Air Dose = 1.286e-03 mRad. If the dose exceeds 0.625 mRad ODCM L-2.4.4.A and ODCM L-2.4.4.B and releases being discharged without treatment notify NRC per ODCM L-2.4.4 ACTION 1. Contact Engineering Programs to verify Treatment System Operability if the projected quarterly dose exceeds 0.625 mRad.

11. The projected quarterly Beta Air Dose = 3.822e-03 mRad. If the dose exceeds 1.25 mRad ODCM L-2.4.4.A and ODCM L-2.4.4.B and releases being discharged without treatment notify NRC per ODCM L-2.4.4 ACTIONS 1&2. Contact Engineering Programs to verify Treatment System Operability if the projected quarterly dose exceeds 1.25 mRad.

12. The projected quarterly ITP Dose = 2.190e-02 mRem. If the dose exceeds 1.0 mRem ODCM L-2.4.4.A and releases are being discharged without treatment notify the NRC per ODCM L-2.4.4 ACTION 1 Contact Engineering Programs to verify Treatment System Operability if the projected quarterly dose exceeds 1.0 mRem.

13. Additional comments:

Gamma	Air Dose for release =	1.322e-08 mRad
Beta	Air Dose for release =	3.932e-08 mRad
ITP	Dose for the release =	1.653e-08 mRem

ITP = I-131, H-3, and particulates with halflives > 8 days

ANO - Nuclear Chemistry : Gross Beta & Tritium Report : 4-DEC-1999 15:48

Analysis Num: 99-15157

Sample date : 30-NOV-1999 15:00:0
Sample ID : 2t-18c
Instrument : Packard 2300TR

Background Data		
H-3 [cpm]	:	15.29
Beta [cpm]	:	23.91
Count time [min]	:	10.00
QIP [glass bkg]	:	370.00
H-3 MDA [uCi/ml]	:	3.381E-09
Beta MDA [uCi/ml]	:	5.046E-09

Sample Data		
H-3 [cpm]	:	1213.91
H-3 [dpm]	:	3276.46
Count time [min]	:	10.00
Beta [cpm]	:	0.00
Beta [dpm]	:	0.00
Volume [ml]	:	2500.00

		Activity	Error	
Beta	<	5.046E-09	N/A	uCi/ml
H-3	=	5.904E-07	+/- 3.970E-09	uCi/ml

Calculated by : AMOATS

Entergy Operations : ANO - Nuclear Chemistry Department - 4-DEC-1999 15:44

Main Spectra: 99-15150 Bkg Spectra : 99-15096

Sample date : 30-NOV-1999 14:46:0 Isolation date : 30-NOV-1999 14:46:0
Sample ID : 2T18C Gas 2GR- Sample Quantity : 9.80000E+01 ml
Comments :
Geometry : TABLE 220 100CC MARINELLI CAVE 2 SHELF 1

Calib date : 29-NOV-1999 20:46:3 Acquisition date : 30-NOV-1999 16:27:0
keV/channel : 4.99899E-01 Elapsed live time: 0 00:15:00.00
offset : 2.20850E-01 Percent deadtime : 0.0%

Decay limit : 8.00000 Peak Sensitivity : 4.66000
Abundance : 30.00000 Energy tolerance : 1.50000
Library : Libark Nuclear Chemist : JDUDLEY

Peak Search performed from channel : 100 to 4050

Post-NID Peak Search Report

It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	%Err	Fit	Nuclides
1	81.07	115	18	1.07	161.73	159	9	11.4	7.46E-01	XE-133 XE-133

Nuclide Line Activity Report
Sample ID : 2T18C Gas 2GR- Acquisition date : 30-NOV-1999 16:27:00

Nuclide	Sbhr	Energy	Area	%Abn	Eff	uCi/unit	1 Sig Err
XE-133	FG	79.62	115.	0.22	1.036E-02	1.564E-03	1.783E-04
		81.00	115.	37.10*	1.036E-02	9.274E-06	1.057E-06

Unidentified Energy Lines

None

Flags: "T" = Tentatively associated

Summary of Nuclide Activity

Total number of peaks in spectrum 1
Number of peaks identified by NID 1 100.00%

Nuclide	Sbhr	Halflife	Decay	uCi/unit	1 Sig Err
XE-133	FG	5.29D	1.010	9.274E-06	1.057E-06

Interference correction summary

Isotope	uCi/cc
XE-133	= 9.274E-06

Corrections applied BPS : below peak sensitivity

Xe-133eq= 9.438E-06

Interference report Completed

WGDT Projected Max Curie Report

Sample ID : 2T18C GAS 2GR-

Sampled : 30-NOV-1999 14:46:00
Acquired: 30-NOV-1999 16:27:00

Nuclide	Xe-133DE Ci
XE-133	2.16250E-03
Total Xe-133de	2.16250E-03

Percent of 82400. Ci limit = 2.62440E-06

Entergy Operations : ANO - Nuclear Chemistry Department - 4-DEC-1999 15:46

Main Spectra: 99-15158 Bkg Spectra : 99-15096

Sample date : 30-NOV-1999 14:53:0 Isolation date : 30-NOV-1999 14:53:0
Sample ID : 2t-18c part Sample Quantity : 5.00000E+01 ml
Comments : particulate
Geometry : Table 217 2 inch Part CAVE 2 SHELF 1

Calib date : 29-NOV-1999 20:46:3 Acquisition date : 30-NOV-1999 17:09:0
keV/channel : 4.99899E-01 Elapsed live time: 0 00:15:00.00
offset : 2.20850E-01 Percent deadtime : 0.0%

Decay limit : 8.00000 Peak Sensitivity : 3.00000
Abundance : 30.00000 Energy tolerance : 1.50000
Library : Libark Nuclear Chemist : CJAMES

Peak Search performed from channel : 100 to 4050

Post-NID Peak Search Report
***** No peaks found *****

Nuclide Line Activity Report
Sample ID : 2t-18c part Acquisition date : 30-NOV-1999 17:09:07

Nuclide	Sbhr	Energy	Area	%Abn	Eff	uCi/unit	1 Sig Err

Unidentified Energy Lines

None

Flags: "T" = Tentatively associated

Summary of Nuclide Activity

Total number of peaks in spectrum 0
Number of peaks identified by NID 0 100.00%

Nuclide	Sbhr	Halflife	Decay	uCi/unit	1 Sig Err

Interference correction summary

Isotope uCi/cc Corrections applied BPS : below peak sensitivity

Cs-137eq= < 1.965E-07

Xe-133eq= < 2.204E-07

Interference report Completed

Entergy Operations : ANO - Nuclear Chemistry Department - 4-DEC-1999 15:45

Main Spectra: 99-15161 Bkg Spectra : 99-15096

Sample date : 30-NOV-1999 14:53:0 Isolation date : 30-NOV-1999 14:53:0
Sample ID : 2t-18c char. Sample Quantity : 5.00000E+01 cc
Comments : charcoal
Geometry : Table 231 F&J Char Cart Cave 2 Shelf 1

Calib date : 29-NOV-1999 20:46:3 Acquisition date : 30-NOV-1999 17:37:2
keV/channel : 4.99899E-01 Elapsed live time: 0 00:15:00.00
offset : 2.20850E-01 Percent deadtime : 0.0%

Decay limit : 8.00000 Peak Sensitivity : 3.00000
Abundance : 30.00000 Energy tolerance : 1.50000
Library : Libark Nuclear Chemist : CJAMES

Peak Search performed from channel : 100 to 4050

Post-NID Peak Search Report

It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	%Err	Fit	Nuclides
6	81.20	6358	247	0.95	161.99	155	13	1.3		XE-133
1	164.17	35	10	1.00	327.96	324	11	22.4	4.96E-01	XE-131M
1	810.53	30	0	1.58	1620.95	1616	12	18.5	2.77E-01	CO-58

Nuclide Line Activity Report
Sample ID : 2t-18c char. Acquisition date : 30-NOV-1999 17:37:27

Nuclide	Sbhr	Energy	Area	%Abn	Eff	uCi/unit	1 Sig Err
CO-58	AP	810.75	30.	99.45*	6.587E-03	2.724E-06	5.028E-07
XE-131M	FG	163.93	35.	1.96*	2.698E-02	4.050E-05	9.086E-06
XE-133	FG	81.00	6358.	37.10*	1.636E-02	6.391E-04	8.476E-06

Unidentified Energy Lines

None

Flags: "T" = Tentatively associated

Summary of Nuclide Activity

Total number of peaks in spectrum 3
Number of peaks identified by NID 3 100.00%

Nuclide	Sbhr	Halflife	Decay	uCi/unit	1 Sig Err
XE-131M	FG	11.80D	1.007	4.050E-05	9.086E-06
XE-133	FG	5.29D	1.016	6.391E-04	8.476E-06
CO-58	AP	70.78D	1.001	2.724E-06	5.028E-07

Interference correction summary
Sample ID : 2t-18c char.

Acquisition date : 30-NOV-1999 17:37:27

Corrections applied BPS : below peak sensitivity

Isotope	uCi/cc
CO-58	= 2.724E-06
XE-131M	= 4.050E-05
XE-133	= 6.391E-04
Cs-137eq	= 5.831E-04
Xe-133eq	= 7.167E-04

Interference report Completed