

WOLF CREEK

NUCLEAR OPERATING CORPORATION

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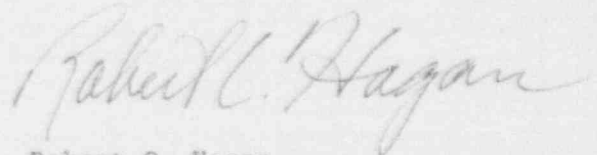
U. S. Nuclear Regulatory Commission
ATTN: Document Control Desk
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Washington, D. C. 20555

Subject: Docket No. 50-482: Semiannual Radioactive Effluent
Release Report

Gentlemen:

Enclosed is the Wolf Creek Generating Station (WCGS) Radioactive Effluent Release Report covering the period from July 1, 1992 to December 31, 1992. This report is submitted pursuant to section 6.9.1.7 of the WCGS, Unit No. 1, Technical Specifications.

Very truly yours,



Robert C. Hagan
Vice President
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RCH/jan

Enclosure

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WOLF CREEK NUCLEAR OPERATING CORPORATION

Wolf Creek Generating Station

Docket No: 50-482

Facility Operating License No: NPF-42

SEMIANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT

Report No: 16

Reporting Period: July 1, 1992 through December 31, 1992

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EXECUTIVE SUMMARY

The purpose of the Semiannual Radioactive Effluent Release Report is to report on the quantities of liquid and gaseous effluents and solid waste released from Wolf Creek Generating Station (WCGS). This report covers the period beginning on July 1, 1992, and ending on December 31, 1992.

Section I provides a summary of the quantities of radioactive liquid and gaseous effluents for this reporting period. The format is similar to that recommended in Regulatory Guide 1.21, Revision 1. An elevated release pathway does not exist at WCGS, therefore, all airborne releases are considered to be ground level releases. The concurrent meteorological condition gaseous pathway dose determination is met by the WCGS Offsite Dose Calculation Manual methodology of assigning all gaseous pathways to a hypothetical individual residing at the highest annual X/Q and D/Q location. This results in a conservative estimate of dose to a member of the public rather than determining each pathway dose for each release condition. A conservative error of thirty percent has been estimated in effluent data.

Sections II, III and IV provide additional information required by Regulatory Guide 1.21, Revision 1 and ODCM 7.2.

Attachment 1 provides actual values to replace the estimated values for airborne and liquid effluents provided in Semiannual Radioactive Effluent Release Report No. 15. Analysis results for the Second Quarter of Report No. 15 were not completed prior to submission of the report. Actual results of the Second Quarter airborne effluent monthly filter composites indicated the presence of Sr-90 in the Radwaste vent. The change increases the total particulate curies released, and increases the cumulative dose. Actual results of the Second Quarter liquid effluents indicated the presence of Fe-55 in the liquid batch composite. The change increases the total curies released, and increases the cumulative dose. Because analysis results for the Fourth Quarter of 1992 have not yet been completed, Fe-55, Sr-89 and Sr-90 activities and doses in the airborne and liquid effluents are presented as an estimate.

SECTION I

REPORT OF RADIOACTIVE EFFLUENTS (1992): LIQUID

	Unit	Quarter 3	Quarter 4
A. Fission and Activation Products			
1. Total Release (not including tritium, gases, alpha)	Ci	8.51E-02	4.07E-02 (4)
2. Average Diluted Concentration During Period	uCi/ml	2.05E-08	1.23E-08
3. Percent of Applicable Limit (1)	%	1.70E+00	8.14E-01
B. Tritium			
1. Total Release	Ci	1.50E+02	1.70E+02
2. Average Diluted Concentration During Period	uCi/ml	3.62E-05	5.13E-05
3. Percent of Applicable Limit (2)	%	1.21E+00	1.71E+00
C. Dissolved and Entrained Gases			
1. Total Release	Ci	1.63E-02	1.37E-01
2. Average Diluted Concentration During Period	uCi/ml	3.93E-09	4.14E-08
3. Percent of Applicable Limit (3)	%	1.97E-03	2.70E-02
D. Gross Alpha Radioactivity			
1. Total Release	Ci	3.02E-05	9.89E-06
E. Volume of waste released (prior to dilution)			
	liters	8.74E+05	1.38E+08
F. Volume of dilution water used			
	liters	4.15E+09	3.17E+09

- The applicable limit for the Wolf Creek Generating Station is 5 Curies per year. (Reference 10 CFR 50, Appendix I, "Guides On Design Objectives For Light-Water-Cooled Nuclear Power Reactors", paragraph A.2.) The value printed here is derived by dividing the total release Curies by 5 Curies and then multiplying the result by 100.
- This value is derived by the following formula:

$$\% \text{ of Applicable Limit} = \frac{(\text{Average Diluted Concentration}) (100)}{(10\text{CFR}20, \text{ Appendix B, Table II, MPC})}$$
- This value is derived by the following formula:

$$\% \text{ of Applicable Limit} = \frac{(\text{Average Diluted Concentration}) (100)}{(2\text{E}-4 \text{ from ODCM Section 2.1})}$$
- Curies in Quarter 4 are based on the October composite Fe-55 value, and the 3rd Quarter composite Sr-89 and SR-90 values.

LIQUID EFFLUENTS

NUCLIDES RELEASED	Unit	Continuous Mode		Batch Mode	
		Quarter 3	Quarter 4	Quarter 3	Quarter 4
H-3	Ci	1.40E-05	9.75E-03	1.50E+02	1.70E+02
Cr-51	Ci	0.00E+00	0.00E+00	0.00E+00	9.07E-05
Mn-54	Ci	1.04E-07	<6.85E-02	7.35E-04	8.10E-04
Fe-55	Ci	<4.92E-06	<1.37E-01	3.47E-02	1.21E-02(1)
Fe-59	Ci	<2.46E-06	<6.85E-02	<4.35E-04	<3.79E-04
Co-57	Ci	0.00E+00	0.00E+00	3.73E-04	9.44E-05
Co-58	Ci	3.56E-07	<6.85E-02	1.47E-02	1.34E-03
Co-60	Ci	1.19E-06	<6.85E-02	1.79E-02	1.53E-02
Zn-65	Ci	<2.46E-06	<6.85E-02	<4.35E-04	<3.79E-04
Sr-89	Ci	<2.46E-07	<6.85E-03	1.65E-03	1.44E-03(1)
Sr-90	Ci	<2.46E-07	<6.85E-03	4.61E-05	<4.01E-05(1)
Nb-95	Ci	1.17E-07	0.00E+00	2.55E-04	0.00E+00
Mo-99	Ci	<2.46E-06	<6.85E-02	<4.35E-04	<3.79E-04
Tc-99m	Ci	0.00E+00	0.00E+00	1.06E-04	0.00E+00
Ag-110M	Ci	0.00E+00	0.00E+00	1.76E-04	2.06E-04
Sn-113	Ci	0.00E+00	0.00E+00	0.00E+00	7.27E-06
Sb-124	Ci	0.00E+00	0.00E+00	2.98E-05	0.00E+00
Sb-125	Ci	3.50E-07	0.00E+00	1.01E-02	7.09E-03
I-131	Ci	<4.92E-06	<1.37E-01	<8.69E-04	1.69E-04
Cs-134	Ci	3.23E-07	<6.85E-02	1.61E-03	6.82E-04
Cs-137	Ci	3.12E-07	<6.85E-02	1.65E-03	6.70E-04
La-140	Ci	0.00E+00	0.00E+00	1.79E-04	0.00E+00
Ce-141	Ci	<2.46E-06	<6.85E-02	<4.35E-04	<3.79E-04
Ce-144	Ci	1.40E-07	<6.85E-02	9.09E-04	6.89E-04
Gross Alpha	Ci	<4.92E-07	<1.37E-02	3.02E-05	9.89E-06
Ar-41	Ci	<4.92E-05	<1.37E+00	<8.69E-03	<7.57E-03
Kr-85	Ci	<4.92E-05	<1.37E+00	<8.69E-03	1.21E-01
Kr-85m	Ci	<4.92E-05	<1.37E+00	<8.69E-03	<7.57E-03
Kr-87	Ci	<4.92E-05	<1.37E+00	<8.69E-03	<7.57E-03
Kr-88	Ci	<4.92E-05	<1.37E+00	<8.69E-03	<7.57E-03
Xe-131m	Ci	<4.92E-05	<1.37E+00	<8.69E-03	1.92E-03
Xe-133	Ci	<4.92E-05	<1.37E+00	1.62E-02	1.41E-02
Xe-133m	Ci	<4.92E-05	<1.37E+00	<8.69E-03	4.42E-05
Xe-135	Ci	<4.92E-05	<1.37E+00	5.81E-05	7.34E-05
Xe-135m	Ci	<4.92E-05	<1.37E+00	<8.69E-03	<7.57E-03

NOTE: Less than values are calculated using the lower limit of detection (LLD) values listed in Table 2-1 of the ODCM multiplied by the volume of waste discharged during the respective quarter.

(1) The Fe-55 value for the 4th Quarter is based on the October monthly composite value. The Sr-89 and Sr-90 values for Quarter 4 are based on the Quarter 3 composite values.

LIQUID CUMULATIVE DOSE SUMMARY (1992)

TABLE 1

	ODCM CALCULATED DOSE	ODCM ¹ LIMIT	% OF LIMIT
QUARTER 1 OF 1992			
TOTAL DOSE (mrem) FOR BONE	3.22E-02	5.00E+00	6.44E-01
TOTAL DOSE (mrem) FOR LIVER	7.46E-02	5.00E+00	1.49E+00
TOTAL DOSE (mrem) FOR TOTAL BODY	6.01E-02	1.50E+00	4.01E+00
TOTAL DOSE (mrem) FOR THYROID	1.68E-02	5.00E+00	3.36E-01
TOTAL DOSE (mrem) FOR KIDNEY	3.58E-02	5.00E+00	7.16E-01
TOTAL DOSE (mrem) FOR LUNG	2.33E-02	5.00E+00	4.66E-01
TOTAL DOSE (mrem) FOR GI-LLI	5.03E-02	5.00E+00	1.01E+00
QUARTER 2 OF 1992 ²			
TOTAL DOSE (mrem) FOR BONE	3.91E-03	5.00E+00	7.82E-02
TOTAL DOSE (mrem) FOR LIVER	1.83E-02	5.00E+00	3.66E-01
TOTAL DOSE (mrem) FOR TOTAL BODY	1.66E-02	1.50E+00	1.11E+00
TOTAL DOSE (mrem) FOR THYROID	1.16E-02	5.00E+00	2.32E-01
TOTAL DOSE (mrem) FOR KIDNEY	1.38E-02	5.00E+00	2.76E-01
TOTAL DOSE (mrem) FOR LUNG	1.24E-02	5.00E+00	2.48E-01
TOTAL DOSE (mrem) FOR GI-LLI	1.34E-02	5.00E+00	2.68E-01
QUARTER 3 OF 1992			
TOTAL DOSE (mrem) FOR BONE	1.06E-02	5.00E+00	2.12E-01
TOTAL DOSE (mrem) FOR LIVER	2.76E-02	5.00E+00	5.52E-01
TOTAL DOSE (mrem) FOR TOTAL BODY	2.35E-02	1.50E+00	1.57E+00
TOTAL DOSE (mrem) FOR THYROID	1.06E-02	5.00E+00	2.12E-01
TOTAL DOSE (mrem) FOR KIDNEY	1.62E-02	5.00E+00	3.24E-01
TOTAL DOSE (mrem) FOR LUNG	1.26E-02	5.00E+00	2.52E-01
TOTAL DOSE (mrem) FOR GI-LLI	1.63E-02	5.00E+00	3.26E-01
QUARTER 4 OF 1992 ³			
TOTAL DOSE (mrem) FOR BONE	5.64E-03	5.00E+00	1.13E-01
TOTAL DOSE (mrem) FOR LIVER	2.44E-02	5.00E+00	4.88E-01
TOTAL DOSE (mrem) FOR TOTAL BODY	2.25E-02	5.00E+00	1.50E+00
TOTAL DOSE (mrem) FOR THYROID	1.65E-02	5.00E+00	3.30E-01
TOTAL DOSE (mrem) FOR KIDNEY	1.88E-02	5.00E+00	3.76E-01
TOTAL DOSE (mrem) FOR LUNG	1.70E-02	5.00E+00	3.40E-01
TOTAL DOSE (mrem) FOR GI-LLI	1.82E-02	5.00E+00	3.64E-01
TOTALS FOR 1992			
TOTAL DOSE (mrem) FOR BONE	5.24E-02	1.00E+01	5.24E-01
TOTAL DOSE (mrem) FOR LIVER	1.45E-01	1.00E+01	1.45E+00
TOTAL DOSE (mrem) FOR TOTAL BODY	1.23E-01	3.00E+00	4.10E+00
TOTAL DOSE (mrem) FOR THYROID	5.55E-02	1.00E+01	5.55E-01
TOTAL DOSE (mrem) FOR KIDNEY	8.46E-02	1.00E+01	8.46E-01
TOTAL DOSE (mrem) FOR LUNG	6.53E-02	1.00E+01	6.53E-01
TOTAL DOSE (mrem) FOR GI-LLI	9.82E-02	1.00E+01	9.82E-01

NOTES:

1. Based on ODCM Section 2.2 which restricts dose to the whole body to less than or equal to 1.5 mrem per quarter and 3.0 mrem per year. Dose restriction to any organ is less than or equal to 5 mrem per quarter and 10 mrem per year.
2. The values for Quarter 2 of 1992 given above differ from the values reported in Semiannual Radioactive Effluent Release Report No. 15 due to adjustment for Fe-55, Sr-89, and Sr-90 composite data.
3. The Calculated Doses for the Fourth Quarter of 1992 given above are based on the October Fe-55 composite result, and the Third Quarter Sr-89 and Sr-90 composite results.

LIQUID CUMULATIVE DOSE SUMMARY (1992)
TABLE 2

A. Fission and Activation Products (not including H-3, gases, alpha)	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Total
1. Total Release - (Ci)	1.19E-01	3.23E-02	8.51E-02	4.07E-02	2.77E-01
2. Maximum Organ Dose (mrem)	5.78E-02	6.70E-03	1.69E-02	8.30E-02	8.98E-02
3. Organ Dose Limit (mrem)	5.00E+00	5.00E+00	5.00E+00	5.00E+00	1.00E+01
4. Percent of Limit	1.16E+00	1.34E-01	3.38E-01	1.66E-01	8.98E-01
B. Tritium					
1. Total Release (Ci)	1.01E+02	3.01E+01	1.50E+02	1.70E+02	4.51E+02
2. Maximum Organ Dose (mrem)	1.68E-02	1.16E-02	1.07E-02	1.61E-02	5.52E-02
3. Organ Dose Limit (mrem)	5.00E+00	5.00E+00	5.00E+00	5.00E+00	1.00E+01
4. Percent of Limit	3.36E-01	2.32E-01	2.14E-01	3.22E-01	5.52E-01

This table is included to show the correlation between Curies released and the associated calculated maximum organ dose. Wolf Creek ODCM methodology is used to calculate the maximum organ dose which assumes that an individual drinks the water and eats fish from the discharge point. ODCM Section 2.2 organ dose limits are used. The less than values are not included in the summation for the total release values.

NOTE: The Fourth Quarter Category A values were calculated based on the October Fe-55 composite result, and the Third Quarter Sr-89 and Sr-90 composite results. Also, the Second Quarter Category A values given above differ from the values reported in Semiannual Radioactive Effluent Release Report No. 15 due to adjustment for Fe-55, Sr-89, and Sr-90 composite data.

REPORT OF RADIOACTIVE EFFLUENTS (1992): AIRBORNE

	Unit	Quarter 3	Quarter 4
A. Fission and Activation Gases			
1. Total Release	Ci	2.35E+01	4.93E+01
2. Average Release Rate for Period	uCi/sec	3.10E+02	3.99E+01
3. Percent of ODCM Limit (1)	%	2.74E-02	4.70E-02
B. Iodines			
1. Total Iodine-131	Ci	0.00E+00	1.67E-05
2. Average Release Rate for Period	uCi/sec	0.00E+00	2.11E-06
3. Percent of Applicable Limit (2)	%	0.00E+00	1.67E-03
C. Particulates			
1. Particulates with Half-lives > 8 days	Ci	9.25E-07	0.00E+00
2. Average Release Rate for Period	uCi/sec	1.16E-07	0.00E+00
3. Percent of ODCM Limit (3)	%	5.44E-03	0.00E+00
4. Gross Alpha Radioactivity	Ci	0.00E+00	0.00E+00
D. Tritium			
1. Total Release	Ci	6.01E+00	3.47E+00
2. Average Release Rate for Period	uCi/sec	2.55E+00	9.00E-01
3. Percent of ODCM Limit (4)	%	5.67E-02	3.27E-02

1. The percent of ODCM limit for fission and activation gases is calculated using the following methodology:

$$\% \text{ of ODCM Limit} = \frac{(\text{Qtrly Total Beta Airdose})(100)}{10 \text{ mrad}} \text{ or } \frac{(\text{Qtrly Total Gamma Airdose})(100)}{5 \text{ mrad}}$$

The largest value calculated between Gamma and Beta airdose is listed as the % of ODCM Limit.

2. The percent of ODCM limit for iodine is calculated using the following methodology:

$$\% \text{ of ODCM Limit} = \frac{(\text{Total Curies of Iodine-131})(100)}{1 \text{ Curie}}$$

3. The percent of ODCM limit for particulates is calculated using the following methodology:

$$\% \text{ of ODCM Limit} = \frac{(\text{Highest Organ Dose Due to Particulates})(100)}{7.5 \text{ mrem}}$$

4. The percent of ODCM limit for tritium is calculated using the following methodology:

$$\% \text{ of ODCM Limit} = \frac{(\text{Highest Organ Dose Due to H-3})(100)}{7.5 \text{ mrem}}$$

NOTE: This type of methodology is used since the Wolf Creek ODCM ties release limits to doses rather than Curie release rates.

GASEOUS EFFLUENTS

NUCLIDES RELEASED	Unit	Continuous Mode		Batch Mode	
		Quarter 3	Quarter 4	Quarter 3	Quarter 4
1. Fission and Activation Gases					
Ar-41	Ci	0.00E+00	0.00E+00	8.95E-02	1.10E-01
Kr-85	Ci	0.00E+00	0.00E+00	1.12E+01	3.33E-01
Kr-85M	Ci	0.00E+00	1.50E-01	0.00E+00	4.44E-05
Kr-87	Ci	<4.51E+01	<4.53E+01	<1.43E-02	<1.75E-02
Kr-88	Ci	<3.39E+01	5.46E-01	<1.07E-02	<1.31E-02
Xe-131M	Ci	0.00E+00	0.00E+00	1.96E-03	8.78E-02
Xe-133	Ci	8.61E+00	4.01E+01	4.23E-01	3.16E+00
Xe-133M	Ci	<5.06E+01	1.70E-01	6.42E-04	1.62E-02
Xe-135	Ci	3.12E+00	4.58E+00	4.12E-03	7.48E-03
Xe-138	Ci	<9.47E+01	<9.51E+01	<3.00E-02	<3.66E-02
<u>Total</u>	Ci	1.17E+01	4.55E+01	1.17E+01	3.71E+00
2. Halogens (Gaseous)					
I-131	Ci	<2.61E-04	1.67E-05	<8.26E-08	<1.01E-07
I-133	Ci	<2.61E-02	<2.62E-02	<8.26E-06	<1.01E-05
<u>Total</u>	Ci	0.00E+00	1.67E-05	0.00E+00	<0.00E+00
3. Particulates and Tritium					
H-3	Ci	5.85E+00	3.42E+00	1.60E-01	5.11E-02
Mn-54	Ci	<2.61E-03	<2.62E-03	<8.26E-07	<1.01E-06
Fe-59	Ci	<2.61E-03	<2.62E-03	<8.26E-07	<1.01E-06
Co-58	Ci	<2.61E-03	<2.62E-03	<8.26E-07	<1.01E-06
Co-60	Ci	4.88E-07	<2.62E-03	<8.26E-07	<1.01E-06
Zn-65	Ci	<2.61E-03	<2.62E-03	<8.26E-07	<1.01E-06
Mo-99	Ci	<2.61E-03	<2.62E-03	<8.26E-07	<1.01E-06
Cs-134	Ci	<2.61E-03	<2.62E-03	<8.26E-07	<1.01E-06
Cs-137	Ci	<2.61E-03	<2.62E-03	<8.26E-07	<1.01E-06
Ce-141	Ci	<2.61E-03	<2.62E-03	<8.26E-07	<1.01E-06
Ce-144	Ci	<2.61E-03	<2.62E-03	<8.26E-07	<1.01E-06
Sr-89	Ci	<2.61E-03	<2.62E-03	<8.26E-07	<1.01E-06
Sr-90	Ci	4.37E-07	<2.62E-03	<8.26E-07	<1.01E-06
Gross Alpha	Ci	<2.61E-03	<2.62E-03	<8.26E-07	<1.01E-06
<u>Total</u>	Ci	5.85E+00	3.42E+00	1.60E-01	5.11E-02

NOTE: Less than values for Noble Gases are calculated using the lower limit of detection (LLD) values obtained at Wolf Creek Generating Station multiplied by the volume of air discharged during the respective quarter. For the Halogens and Particulates the ODCM LLD values are used. The less than values are not included in the summation for the total release values.

GASEOUS CUMULATIVE DOSE SUMMARY (1992)

Table 1

	ODCM CALCULATED DOSE	ODCM ¹ LIMIT	% OF LIMIT
QUARTER 1 OF 1992			
TOTAL DOSE (mrem) FOR BONE	0.00E+00	7.50E+00	0.00E+00
TOTAL DOSE (mrem) FOR LIVER	2.66E-03	7.50E+00	3.55E-02
TOTAL DOSE (mrem) FOR TOTAL BODY	2.66E-03	7.50E+00	3.55E-02
TOTAL DOSE (mrem) FOR THYROID	2.66E-03	7.50E+00	3.55E-02
TOTAL DOSE (mrem) FOR KIDNEY	2.66E-03	7.50E+00	3.55E-02
TOTAL DOSE (mrem) FOR LUNG	2.66E-03	7.50E+00	3.55E-02
TOTAL DOSE (mrem) FOR GI-LLI	2.66E-03	7.50E+00	3.55E-02
QUARTER 2 OF 1992 ²			
TOTAL DOSE (mrem) FOR BONE	7.84E-05	7.50E+00	1.05E-03
TOTAL DOSE (mrem) FOR LIVER	2.99E-03	7.50E+00	3.99E-02
TOTAL DOSE (mrem) FOR TOTAL BODY	2.97E-03	7.50E+00	3.96E-02
TOTAL DOSE (mrem) FOR THYROID	2.95E-03	7.50E+00	3.93E-02
TOTAL DOSE (mrem) FOR KIDNEY	2.96E-03	7.50E+00	3.95E-02
TOTAL DOSE (mrem) FOR LUNG	2.96E-03	7.50E+00	3.95E-02
TOTAL DOSE (mrem) FOR GI-LLI	2.95E-03	7.50E+00	3.93E-02
QUARTER 3 OF 1992			
TOTAL DOSE (mrem) FOR BONE	4.08E-04	7.50E+00	5.44E-03
TOTAL DOSE (mrem) FOR LIVER	4.26E-03	7.50E+00	5.68E-02
TOTAL DOSE (mrem) FOR TOTAL BODY	4.36E-03	7.50E+00	5.81E-02
TOTAL DOSE (mrem) FOR THYROID	4.26E-03	7.50E+00	5.68E-02
TOTAL DOSE (mrem) FOR KIDNEY	4.26E-03	7.50E+00	5.68E-02
TOTAL DOSE (mrem) FOR LUNG	4.26E-03	7.50E+00	5.68E-02
TOTAL DOSE (mrem) FOR GI-LLI	4.26E-03	7.50E+00	5.68E-02
QUARTER 4 OF 1992 ³			
TOTAL DOSE (mrem) FOR BONE	2.91E-05	7.50E+00	3.88E-04
TOTAL DOSE (mrem) FOR LIVER	2.48E-03	7.50E+00	3.31E-02
TOTAL DOSE (mrem) FOR TOTAL BODY	2.47E-03	7.50E+00	3.29E-02
TOTAL DOSE (mrem) FOR THYROID	1.21E-03	7.50E+00	1.61E-01
TOTAL DOSE (mrem) FOR KIDNEY	2.50E-03	7.50E+00	3.33E-02
TOTAL DOSE (mrem) FOR LUNG	2.45E-03	7.50E+00	3.27E-02
TOTAL DOSE (mrem) FOR GI-LLI	2.45E-03	7.50E+00	3.27E-02
TOTALS FOR 1992			
TOTAL DOSE (mrem) FOR BONE	5.16E-04	1.50E+01	3.44E-03
TOTAL DOSE (mrem) FOR LIVER	1.24E-02	1.50E+01	8.27E-02
TOTAL DOSE (mrem) FOR TOTAL BODY	1.25E-02	1.50E+01	8.33E-02
TOTAL DOSE (mrem) FOR THYROID	2.20E-02	1.50E+01	1.47E-01
TOTAL DOSE (mrem) FOR KIDNEY	1.24E-02	1.50E+01	8.27E-02
TOTAL DOSE (mrem) FOR LUNG	1.23E-02	1.50E+01	8.20E-02
TOTAL DOSE (mrem) FOR GI-LLI	1.23E-02	1.50E+01	8.20E-02

NOTES:

1. Based on Wolf Creek ODCM Section 3.2.2 which restricts dose during any calendar quarter to less than or equal to 7.5 mrem to any organ and during any calendar year to less than or equal to 15 mrem to any organ.
2. Values for the Second Quarter of 1992 given above differ from the values reported in Semiannual Radioactive Effluent Release Report No. 15 due to adjustment for Sr-89 and Sr-90 composite data.
3. The calculated Doses for the Fourth Quarter of 1992 given above are based on the October Sr-89 and Sr-90 composite results.

GASEOUS CUMULATIVE DOSE SUMMARY (1992)
TABLE 2

Nuclides Released		Quarter 1	Quarter 2	Quarter3	Quarter 4	Total
A. Fission and Activation Gases						
1. Total Release (Ci)		1.77E+02	5.90E+01	2.35E+01	4.93E+01	3.09E+02
2. Total Gamma Airdose (mrad)		5.29E-04	9.97E-04	7.13E-04	2.35E-03	4.59E-03
3. Gamma Airdose Limit (mrad)		5.00E+00	5.00E+00	5.00E+00	5.00E+00	1.00E+01
4. Percent of Gamma Airdose Limit		1.06E-02	1.99E-02	1.43E-02	4.70E-02	4.59E-02
5. Total Beta Airdose (mrad)		2.41E-02	7.00E-03	2.74E-03	4.18E-03	3.80E-02
6. Beta Airdose Limit (mrad)		1.00E+01	1.00E+01	1.00E+01	1.00E+01	2.00E+01
7. Percent of Beta Airdose Limit (mrad)		2.41E-01	7.00E-02	2.74E-02	4.18E-02	1.90E-01
B. Particulates						
1. Total Particulates (Ci)		0.00E+00	4.91E-07	9.25E-07	0.00E+00	1.42E-06
2. Maximum Organ Dose (mrem)		0.00E+00	7.84E-05	4.08E-04	0.00E+00	4.86E-04
3. Organ Dose Limit (mrem)		7.50E+00	7.50E+00	7.50E+00	7.50E+00	1.50E+01
4. Percent of Limit		0.00E+00	1.05E-03	5.44E-03	0.00E+00	3.24E-03
C. Tritium						
1. Total Release (Ci)		3.74E+00	4.13E+00	6.01E+00	3.47E+00	1.74E+01
2. Maximum Organ Dose (mrem)		2.66E-03	2.95E-03	4.25E-03	2.45E-03	1.23E-02
3. Organ Dose Limit (mrem)		7.50E+00	7.50E+00	7.50E+00	7.50E+00	1.50E+01
4. Percent of Limit		3.55E-02	3.93E-02	5.67E-02	3.27E-02	8.20E-02
D. Iodine						
1. Total I-131, I-133 (Ci)		0.00E+00	0.00E+00	0.00E+00	1.67E-05	1.67E-05
2. Maximum Organ Dose (mrem)		0.00E+00	0.00E+00	0.00E+00	9.61E-03	9.61E-03
3. Organ Dose Limit (mrem)		7.50E+00	7.50E+00	7.50E+00	7.50E+00	1.50E+01
4. Percent of Limit		0.00E+00	0.00E+00	0.00E+00	1.28E-01	6.41E-02

This table is included to show the correlation between Curies released and the associated calculated maximum organ dose. The maximum organ dose is calculated using Wolf Creek ODCM methodology which assumes that an individual actually resides at the release point. ODCM Section 3.2.2 organ dose limits are used.

NOTE: The values for the Second Quarter Category B differ from the values reported in Semiannual Radioactive Effluent Release Report No. 15 due to adjustment for Sr-89 and Sr-90 composite data.

SECTION II

Supplemental Information

Facility: Wolf Creek Generating Station

License Number: NPF-42

1. ODCM Limits

A. For liquid waste effluents

- A.1 The concentration of radioactive material released in liquid effluents to UNRESTRICTED AREAS shall be limited to the concentrations 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 concentration shall be limited to 2×10^{-4} microCurie/ml total activity.
- A.2 The dose or dose commitment to a MEMBER OF THE PUBLIC from radioactive materials in liquid effluents released, from each unit, to UNRESTRICTED AREAS shall be limited:
- a. During any calendar quarter to less than or equal to 1.5 mrem to the whole body and to less than or equal to 5 mrem to any organ, and
 - b. During any calendar year to less than or equal to 3 mrem to the whole body and to less than or equal to 10 mrem to any organ.

B. For gaseous waste effluents

- B.1 The dose rate due to radioactive materials released in gaseous effluents from the site to areas at and beyond the SITE BOUNDARY shall be limited to the following:
- a. For noble gases: Less than or equal to 500 mrem/yr to the whole body and less than or equal to 3000 mrem/yr to the skin, and
 - b. For Iodine-131, Iodine-133, tritium, and all radionuclides in particulate form with half-lives greater than 8 days: Less than or equal to 1500 mrem/yr to any organ.
- B.2 The air dose due to noble gases released in gaseous effluents, from each unit, to areas at and beyond the SITE BOUNDARY shall be limited to the following:
- a. During any calendar quarter: Less than or equal to 5 mrad for gamma radiation and less than or equal to 10 mrad for beta radiation, and
 - b. During any calendar year: Less than or equal to 10 mrad for gamma radiation and less than or equal to 20 mrad for beta radiation.

B.3 The dose from Iodine-131, Iodine-133, tritium, and all radionuclides in particulate form with half-lives greater than 8 days in gaseous effluents released to areas at and beyond the SITE BOUNDARY shall be limited to the following:

- a. During any calendar quarter: Less than or equal to 7.5 mrem to any organ, and
- b. During any calendar year: Less than or equal to 15 mrem to any organ.

2. Maximum Permissible Concentrations (MPC's)

Water - covered in Section 1.A.

Air - covered in Section 1.B.

3. Average energy of fission and activation gaseous effluents is not applicable. See ODCM section 3.1.2 for the methodology used in determining the release rate limits for noble gas releases.

4. Measurements and Approximations of Total Radioactivity

A. Liquid Effluents

LIQUID RELEASE TYPE	SAMPLING FREQUENCY	METHOD OF ANALYSIS	TYPE OF ACTIVITY ANALYSIS		
1. Batch Waste Release Tanks	P Each Batch	P.H.A.	Principal Gamma Emitters		
		P.H.A.	I-131		
	a. Waste Monitor Tank	P One Batch/M	P.H.A.	Dissolved and Entrained Gases (Gamma Emitters)	
			b. Secondary Liquid Waste Monitor Tank	P Each Batch	L.S.
	S.A.C.	Gross Alpha			
	F Each Batch	O.S.L.		Sr-89, Sr-90	
		O.S.L.		Fe-55	
	2. Continuous Releases	Daily Grab Sample	P.H.A.	Principal Gamma Emitters	
			P.H.A.	I-131	
		a. Steam Generator Blowdown	M Grab Sample	P.H.A.	Dissolved and Entrained Gases (Gamma Emitters)
b. Turbine Building Sump				Daily Grab Sample	L.S.
		S.A.C.	Gross Alpha		
		c. Lime Sludge Pond	Daily Grab Sample	O.S.L.	Sr-89, Sr-90
				O.S.L.	Fe-55

P = prior to each batch S.A.C. = scintillation alpha counter
 M = monthly O.S.L. = performed by an offsite laboratory
 L. S. = liquid scintillation detector
 P.H.A. = gamma spectrum pulse height analysis using a High Purity Germanium detector.

B. Gaseous Waste Effluents

GASEOUS, RELEASE TYPE	SAMPLING FREQUENCY	METHOD OF ANALYSIS	TYPE OF ACTIVITY ANALYSIS
Waste Gas Decay Tank	P Each Tank Grab Sample	P.H.A.	Principal Gamma Emitters
Containment Purge or Vent	P Each Purge Grab Sample	P.H.A. Gas bubbler and L.S.	Principal Gamma Emitters H-3 (oxide)
Unit Vent	M Grab Sample	P.H.A. Gas bubbler and L.S.	Principal Gamma Emitters H-3 (oxide)
Radwaste Building Vent	M Grab Sample	P.H.A.	Principal Gamma Emitters
For Unit Vent and Radwaste Building Vent release types listed above.	Continuous	P.H.A.	I-131
	Continuous	P.H.A.	I-133
	Continuous	Particulate Sample	Principal Gamma Emitters
	Continuous Composite	S.A.C. Particulate Sample	Gross Alpha
	Continuous	O.S.L. Composite Particulate Sample	Sr-89, Sr-90

P = prior to each batch S.A.C. = scintillation alpha counter
 M = monthly O.S.L. = performed by an offsite laboratory
 L. S. = liquid scintillation detector
 P.H.A. = gamma spectrum pulse height analysis using a High Purity Germanium detector.

5. Batch Releases

A batch release is the discontinuous release of gaseous or liquid effluent which takes place over a finite period of time usually hours or days.

There were 37 gaseous batch releases during the reporting period. The longest gaseous batch release lasted 847 minutes, while the shortest lasted 74 minutes. The average release lasted 164 minutes with a total gaseous batch release time of 6,071 minutes.

There were 35 liquid batch releases during the reporting period. The longest liquid batch release lasted 156 minutes, while the shortest lasted 35 minutes. The average release lasted 105 minutes with a total liquid batch release time of 3,673 minutes.

6. Continuous Releases

A continuous release is a release of gaseous or liquid effluent which is essentially uninterrupted for extended periods during normal operations of the facility.

There were three liquid release pathways designated as continuous releases during this reporting period. They were the Steam Generator Blowdown, Turbine Building Sump, and Lime Sludge Pond. There were two gas release pathways designated as continuous releases. These were the Unit Vent and Radwaste Building Vent.

EFFLUENT AND WASTE DISPOSAL SEMIANNUAL REPORT (1992)
SOLID WASTE SHIPMENTS

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.	m3* Ci	5.90E+00 1.37E+02	2.50E+01
b. Dry compressible waste, contaminated equip. etc.	m3* Ci	2.27E+01 1.02E+01	2.50E+01
c. Irradiated components, control rods, etc.	m3* Ci	0.00E+00 0.00E+00	0.00E+00
d. Other	m3* Ci	0.00E+00 0.00E+00	0.00E+00

m3* = cubic meters

2. Estimate of major nuclide composition (by type of waste)

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

<u>Nuclide Name</u>	<u>Percent Abundance</u>	<u>Curies</u>
Cs-134	40.918%	5.62E+01
Cs-137	37.933%	5.21E+01
Fe-55	6.468%	8.89E+00
Ni-63	6.120%	8.41E+00
Co-60	3.602%	4.95E+00
Be-7	2.991%	4.11E+00
Mn-54	1.019%	1.40E+00
Co-58	.666%	9.15E-01
C-14	.125%	1.72E-01
Sr-90	.103%	1.42E-01
Ce-144	.029%	4.01E-02
Sb-125	.013%	1.78E-02
H-3	.010%	1.35E-02
Tc-99	.003%	4.41E-03
Pu-238	.000%	1.81E-04
Cm243/44	.000%	8.48E-05
Pu239/40	.000%	6.12E-05
Am-241	.000%	2.04E-05
Cm-242	.000%	0.00E+00
Pu-241	.000%	0.00E+00
I-129	.000%	0.00E+00
Nb-94	.000%	0.00E+00
Ni-59	.000%	0.00E+00

b. Dry compressible waste, contaminated equipment, etc.

<u>Nuclide</u> <u>Name</u>	<u>Percent</u> <u>Abundance</u>	<u>Curies</u>
Fe-55	60.103%	6.13E+00
Co-60	23.085%	2.56E+00
Ni-63	7.558%	7.71E-01
Co-58	1.719%	1.75E-01
Nb-95	1.596%	1.63E-01
Cs-137	1.456%	1.49E-01
Mn-54	1.436%	1.47E-01
Cs-134	1.022%	1.04E-01
H-3	.021%	2.12E-03
C-14	.003%	3.45E-04
Cm-242	.000%	0.00E+00
Pu-241	.000%	0.00E+00
I-129	.000%	0.00E+00
Tc-99	.000%	0.00E+00
Sr-90	.000%	0.00E+00
Nb-94	.000%	0.00E+00
Ni-59	.000%	0.00E+00

c. Irradiated components, control rods, etc.
none

d. Other
none

3. Solid Waste Disposition

<u>Number of Shipments</u>	<u>Mode of Transportation</u>	<u>Destination</u>
6	Truck	Barnwell, South Carolina
2	Truck	Richland, Washington
1	Truck	Beatty, Nevada

4. Class of Solid Waste

- a. Class A, Class B - corresponding to 2a
- b. Class A - corresponding to 2b
- c. Not applicable
- d. Not applicable

5. Type of Container

- a. LSA (Strong, tight) - corresponding to 2a
- b. LSA (Strong, tight) - corresponding to 2b
- c. Not applicable
- d. Not applicable

6. Solidification Agent

- a. Not applicable
- b. Not applicable
- c. Not applicable
- d. Not applicable

B. IRRADIATED FUEL SHIPMENTS (Disposition)

There were no irradiated fuel shipments during this reporting period.

SECTION III

HOURS AT EACH WIND SPEED AND DIRECTION

All gaseous releases at the Wolf Creek Generating Station are ground level releases. The meteorological data supplied in these tables covers the period from January 1, 1992 to December 31, 1992, and indicates the number of hours at each wind speed and direction for each stability class.

HOURS AT EACH WIND SPEED AND DIRECTION

PERIOD OF RECORD: JANUARY 1 - DECEMBER 31 1992

STABILITY CLASS: A

ELEVATION: 10 Meters

Wind Direction	Wind Speed (MPH) at 10M L ² +1						TOTAL
	1-3	4-7	8-12	13-18	19-24	25-30	
N	0	0	0	0	0	0	0
NNE	0	0	0	0	0	0	0
NE	0	0	0	0	0	0	0
ENE	0	0	1	0	0	0	1
E	0	0	0	0	0	0	0
ESE	0	0	0	0	0	0	0
SE	0	0	0	0	0	0	0
SSE	0	0	0	0	0	0	0
S	0	0	0	0	0	0	0
SSW	0	0	0	0	0	0	0
SW	0	0	0	0	0	0	0
WSW	0	0	0	0	0	0	0
W	0	0	0	0	0	0	0
WNW	0	0	0	0	0	0	0
NW	0	0	0	0	0	0	0
NNW	0	0	2	1	0	0	3
VARIABLE	0	0	0	0	0	0	0
TOTAL	0	0	13	1	0	0	14

Period of 12.0 hours

HOURS AT EACH WIND SPEED AND DIRECTION

PERIOD OF RECORD: JANUARY 1 - DECEMBER 31 1992

STABILITY CLASS: B

ELEVATION: 10 Meters

Wind	Wind Speed (MPH) at 10M Level						TOTAL
Direction	1-3	4-7	8-12	13-18	19-24	25-29	
N	0	0	0	7	4	0	11
NNE	0	0	1	1	0	0	2
NE	0	0	3	0	0	0	3
ENE	0	0	0	0	0	0	0
E	0	0	0	0	0	0	0
ESE	0	0	1	0	0	0	1
SE	0	0	0	1	0	0	1
SSE	0	0	2	2	1	0	5
S	0	0	0	1	2	0	3
SSW	0	0	3	6	0	0	9
SW	0	2	0	0	0	0	2
WSW	2	1	0	0	0	1	4
W	0	0	2	0	0	0	2
WNW	0	1	2	0	0	0	3
NW	0	2	2	0	0	0	4
NNW	0	0	1	14	4	0	19
VARIABLE	0	0	0	0	0	0	0
TOTAL	2	6	17	32	11	1	69

Period of calm (hours): 0

ELEVATION: 10 Meters

Period of calm (hours): 0

HOURS AT EACH WIND SPEED AND DIRECTION

PERIOD OF RECORD: JANUARY 1 - DECEMBER 31 1992

STABILITY CLASS: 0

ELEVATION: ----- 10 Meters -----

Wind Direction	1-3	4-7	8-12	13-18	19-24	25-30	TOTAL
N	5	36	103	88	29	7	268
NNE	6	39	80	73	18	4	220
NE	5	53	59	9	0	0	126
ENE	5	31	82	7	0	0	125
E	2	29	63	13	0	0	107
ESE	1	40	57	17	1	0	116
SE	2	29	75	39	2	0	147
SSE	5	62	129	88	9	0	293
S	2	46	133	190	62	2	435
SSW	9	30	77	75	16	0	207
SW	3	28	28	10	0	0	69
WSW	4	21	30	15	10	0	80
W	2	29	40	19	6	18	114
WNW	5	17	34	50	30	6	142
NW	5	22	66	92	32	3	220
NNW	2	46	123	73	35	6	285
VARIABLE	0	0	0	0	0	0	0
TOTAL	52	558	1179	858	250	46	2943

Period of calm (hours): 0

HOURS AT EACH WIND SPEED AND DIRECTION

PERIOD OF RECORD: JANUARY 1 - DECEMBER 31 1992

STABILITY CLASS: E

ELEVATION: 10 Meters

Wind Direct	1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N	14	41	128	100	36	5	324
NNE	8	47	54	26	6	5	146
NE	31	77	20	10	0	0	138
ENE	17	75	69	16	0	1	178
E	10	50	72	35	0	0	167
ESE	8	90	107	25	1	0	231
SE	4	70	161	45	5	0	285
SSE	9	69	168	153	40	1	440
S	8	42	234	258	86	9	637
SSW	6	41	100	68	28	4	247
SW	3	45	52	13	0	0	113
WSW	1	31	38	7	2	0	79
W	3	46	56	21	0	0	126
WNW	1	13	47	19	2	0	82
NW	7	37	74	33	9	1	161
NNW	7	47	96	39	18	0	207
VARIABLE	0	0	0	0	0	0	0
TOTAL	115	921	1476	868	233	26	3539

Period of calm (hours): 0

HOURS AT EACH WIND SPEED AND DIRECTION

PERIOD OF RECORD:

JANUARY 1 - DECEMBER 31 1992

STABILITY CLASS:

F

ELEVATION: 10 Meters

Wind Direction	Wind Speed (MPH) at 10M Level						TOTAL
	1-3	4-7	8-12	13-18	19-24	25+	
N	4	34	15	5	0	0	58
NNE	3	41	17	1	0	0	72
NE	25	33	1	2	0	0	61
ENE	7	53	9	0	0	0	69
E	5	48	17	4	0	0	74
ESE	2	71	31	4	0	0	108
SE	4	71	37	4	0	0	116
SSE	5	47	45	8	0	0	125
S	4	24	82	26	2	0	138
SSW	5	17	24	12	0	0	58
SW	3	19	10	1	0	0	33
WSW	2	21	10	0	0	0	33
W	2	9	8	1	0	0	20
WNW	1	9	7	0	0	0	17
NW	7	25	15	0	0	0	47
NNW	5	31	24	0	0	0	60
VARIABLE	0	0	0	0	0	0	0
TOTAL	77	552	382	68	2	0	1082

Period of calm (hours): 0

HOURS AT EACH WIND SPEED AND DIRECTION

PERIOD OF RECORD: JANUARY 1 - DECEMBER 31 1992

STABILITY CLASS: G

ELEVATION: 10 Meters

Wind Diract	Wind Speed (MPH) at 10M Level					TOTAL
	1-3	4-7	8-12	13-18	19-24	
N	1	9	5	0	0	15
NNE	0	30	29	1	0	60
NE	7	31	1	0	0	39
ENE	4	16	2	0	0	22
E	3	12	4	0	0	26
ESE	4	46	5	0	0	55
SE	2	29	2	0	0	33
SSE	1	17	12	0	0	30
S	2	7	11	0	0	20
SSW	0	5	4	3	0	12
SW	0	3	0	0	0	3
WSW	0	4	2	0	0	6
W	2	3	1	0	0	6
WNW	2	6	1	0	0	9
NW	3	15	0	0	0	18
NNW	3	13	0	0	0	16
VARIABLE	0	0	0	0	0	0
TOTAL	33	253	79	4	0	369

Period of calm (hours): 0

HOURS AT EACH WIND SPEED AND DIRECTION

PERIOD OF RECORD:

JANUARY 1 - DECEMBER 31 1992

STABILITY CLASS:

ALL

ELEVATION: 10 Meters

Wind Direction	Wind Speed (MPH) at 10M Level						TOTAL
	1-3	4-7	8-12	13-18	19-24	25+	
N	24	120	251	205	72	12	684
NNE	17	157	192	104	24	9	503
NE	48	194	86	21	0	0	349
NNE	33	175	179	23	0	1	411
E	10	146	157	52	0	0	375
ESE	15	247	201	46	2	0	511
SE	12	199	275	91	7	0	584
SSE	20	196	379	252	50	1	898
S	16	119	464	479	152	11	1241
SSW	20	93	209	166	45	4	537
SW	9	98	90	26	0	0	223
WSW	9	78	81	22	13	1	204
W	9	87	107	42	6	20	271
WNW	9	46	91	69	32	6	253
NW	22	101	157	125	41	4	450
NNW	17	138	251	131	62	6	605
VARIABLE	0	0	0	0	0	0	0
TOTAL	320	2194	3170	1854	506	75	8119

Period of calm (hours): 0

SECTION IV

Additional Information

1. Unplanned or Abnormal Releases

There were no unplanned or abnormal releases during this time period.

2. Offsite Dose Calculation Manual (ODCM)

There were no revisions to the ODCM during this time period.

3. Major Changes to Radwaste Treatment Systems

No plant modifications to the radwaste treatment systems are currently reportable.

4. Land Use Census

There were no new locations for dose calculations identified during this report period.

5. Radioactive Shipments

There were nine shipments of radioactive radwaste during this report period. Six shipments were to Barnwell, South Carolina, two were to Richland, Washington, and one went to Beatty, Nevada. All nine shipments were by truck.

6. Inoperability of Effluent Monitoring Instrumentation

There were no events that involved inoperable liquid or gaseous effluent monitoring instrumentation not being corrected within the time specified in Technical Specifications 3.3.3.10 or 3.3.3.11.

7. Storage Tanks

There were no events leading to liquid holdup tanks or gas storage tanks exceeding the limits of Technical Specifications 3.11.1.4 or 3.11.2.6.

ATTACHMENT 1

Attachment 1 provides actual values to replace the estimated values for liquid effluents provided in Semiannual Radioactive Effluent Release Report 15. New values are denoted by bold face type.

SECTION I

REPORT OF RADIOACTIVE EFFLUENTS (1992): LIQUID

	Unit	Quarter 1	Quarter 2
A. Fission and Activation Products			
1. Total Release (not including tritium, gases, alpha)	Ci	1.19E-01	3.23E-02 ⁴
2. Average Diluted Concentration During Period	uCi/ml	1.14E-08	1.38E-08
3. Percent of Applicable Limit (1)	%	2.38E+00	6.46E-01
B. Tritium			
1. Total Release	Ci	1.01E+02	3.01E+01
2. Average Diluted Concentration During Period	uCi/ml	9.67E-06	1.29E-05
3. Percent of Applicable Limit (2)	%	3.22E-01	4.30E-01
C. Dissolved and Entrained Gases			
1. Total Release	Ci	8.36E-03	3.21E-04
2. Average Diluted Concentration During Period	uCi/ml	8.00E-10	1.37E-10
3. Percent of Applicable Limit (3)	%	4.00E-04	6.85E-05
D. Gross Alpha Radioactivity			
1. Total Release	Ci	1.68E-05	9.56E-06
E. Volume of waste released (prior to dilution)			
	liters	1.45E+08	6.03E+07
F. Volume of dilution water used			
	liters	1.03E+10	2.28E+09
1. The applicable limit for the Wolf Creek Generating Station is 5 Curies per year. (Reference 10 CFR 50, Appendix I, "Guides On Design Objectives For Light-Water-Cooled Nuclear Power Reactors", paragraph A.2.) The value printed here is derived by dividing the total release Curies by 5 Curies and then multiplying the result by 100.			
2. This value is derived by the following formula: $\% \text{ of Applicable Limit} = \frac{(\text{Average Diluted Concentration}) (100)}{(\text{MPC, Appendix B, Table II 10CFR20})}$			
3. This value is derived by the following formula: $\% \text{ of Applicable Limit} = \frac{(\text{Average Diluted Concentration}) (100)}{(2E-4 \text{ from ODCM Section 2.1})}$			
4. Curies in Quarter 2 are based on April composite results for Fe-55 and 1st Quarter composite results for Sr-89 and Sr-90. Estimated values for Quarter 2 have now been replaced with actual composite results.			

LIQUID EFFLUENTS

NUCLIDES RELEASED	Unit	Continuous Mode		Batch Mode	
		Quarter 1	Quarter 2	Quarter 1	Quarter 2
H-3	Ci	3.61E-02	2.30E-01	1.01E+02	2.99E+01
Be-7	Ci	0.00E+00	0.00E+00	0.00E+00	3.98E-05
Cr-51	Ci	0.00E+00	0.00E+00	3.21E-03	5.86E-05
Mn-54	Ci	<7.18E-02	<2.99E-02	2.13E-03	5.12E-04 ¹
Fe-55	Ci	<1.44E-01	<5.98E-02	4.45E-02	1.41E-02¹
Fe-59	Ci	<7.18E-02	<2.99E-02	2.14E-04	<2.53E-04
Co-57	Ci	0.00E+00	0.00E+00	2.39E-04	8.65E-05
Co-58	Ci	<7.18E-02	<2.99E-02	1.49E-02	4.54E-03
Co-60	Ci	<7.18E-02	<2.99E-02	2.85E-02	5.53E-03
Zn-65	Ci	<7.18E-02	<2.99E-02	<7.29E-04	<2.53E-04
Sr-89	Ci	<7.18E-03	<2.99E-03	<7.29E-05	<2.53E-05 ¹
Sr-90	Ci	<7.18E-03	<2.99E-03	7.59E-06	5.56E-06¹
Sr-92	Ci	0.00E+00	0.00E+00	5.33E-05	0.00E+00
Nb-95	Ci	0.00E+00	0.00E+00	1.65E-03	8.11E-05
Zr-95	Ci	0.00E+00	0.00E+00	7.39E-04	4.29E-05
Mo-99	Ci	<7.18E-02	<2.99E-02	<7.29E-04	<2.53E-04
Tc-99m	Ci	0.00E+00	0.00E+00	0.00E+00	9.80E-06
Ru-103	Ci	0.00E+00	0.00E+00	1.38E-04	0.00E+00
Ag-110M	Ci	0.00E+00	0.00E+00	3.20E-04	1.50E-04
Sn-113	Ci	0.00E+00	0.00E+00	9.85E-05	0.00E+00
Sb-124	Ci	0.00E+00	0.00E+00	9.25E-04	9.02E-05
Sb-125	Ci	0.00E+00	0.00E+00	1.18E-02	5.50E-03
I-131	Ci	<1.44E-01	<5.98E-02	<1.46E-03	2.08E-06
Cs-134	Ci	6.89E-05	<2.99E-02	3.94E-03	6.39E-04
Cs-137	Ci	8.10E-05	<2.99E-02	3.97E-03	6.80E-04
Ce-141	Ci	<7.18E-02	<2.99E-02	<7.29E-04	<2.53E-04
Ce-144	Ci	<7.18E-02	<2.99E-02	1.11E-03	2.41E-04
Gross Alpha	Ci	<1.44E-02	<5.98E-03	1.68E-05	9.56E-06
Ar-41	Ci	<1.44E+00	<5.98E-01	<1.46E-02	<5.05E-03
Kr-85	Ci	<1.44E+00	<5.98E-01	<1.46E-02	<5.05E-03
Kr-85m	Ci	<1.44E+00	<5.98E-01	<1.46E-02	<5.05E-03
Kr-87	Ci	<1.44E+00	<5.98E-01	<1.46E-02	<5.05E-03
Kr-88	Ci	<1.44E+00	<5.98E-01	<1.46E-02	<5.05E-03
Xe-131m	Ci	<1.44E+00	<5.98E-01	<1.46E-02	<5.05E-03
Xe-133	Ci	<1.44E+00	<5.98E-01	7.82E-03	3.18E-04
Xe-133m	Ci	<1.44E+00	<5.98E-01	<1.46E-02	<5.05E-03
Xe-135	Ci	<1.44E+00	<5.98E-01	5.37E-04	3.08E-06
Xe-135m	Ci	<1.44E+00	<5.98E-01	<1.46E-02	<5.05E-03

NOTE: Less than values are calculated using the lower limit of detection (LLD) values listed in Table 2-1 of the ODCM multiplied by the volume of waste discharged during the respective quarter. The less than values are not included in the summation for the total release values.

¹ The Fe-55 value for the 2nd Quarter is based on the April monthly composite value. The Sr-89 and Sr-90 values for Quarter 2 are based on the Quarter 1 composite values. Estimated values for Quarter 2 have now been replaced with actual composite results.

LIQUID CUMULATIVE DOSE SUMMARY (1992)
TABLE 1

	ODCM CALCULATED DOSE	ODCM ¹ LIMIT	% OF LIMIT
QUARTER 1 OF 1992			
TOTAL DOSE (mrem) FOR BONE	3.22E-02	5.00E+00	6.44E-01
TOTAL DOSE (mrem) FOR LIVER	7.46E-02	5.00E+00	1.49E+00
TOTAL DOSE (mrem) FOR TOTAL BODY	6.01E-02	1.50E+00	4.01E+00
TOTAL DOSE (mrem) FOR THYROID	1.68E-02	5.00E+00	3.36E-01
TOTAL DOSE (mrem) FOR KIDNEY	3.58E-02	5.00E+00	7.16E-01
TOTAL DOSE (mrem) FOR LUNG	2.33E-02	5.00E+00	4.66E-01
TOTAL DOSE (mrem) FOR GI-LLI	5.03E-02	5.00E+00	1.01E+00
QUARTER 2 OF 1992			
TOTAL DOSE (mrem) FOR BONE	3.51E-03	5.00E+00	7.82E-02
TOTAL DOSE (mrem) FOR LIVER	1.83E-02*	5.00E+00	3.66E-01*
TOTAL DOSE (mrem) FOR TOTAL BODY	1.66E-02*	1.50E+00	1.11E+00*
TOTAL DOSE (mrem) FOR THYROID	1.16E-02	5.00E+00	2.32E-01
TOTAL DOSE (mrem) FOR KIDNEY	1.38E-02	5.00E+00	2.76E-01
TOTAL DOSE (mrem) FOR LUNG	1.24E-02*	5.00E+00	2.48E-01*
TOTAL DOSE (mrem) FOR GI-LLI	1.34E-02*	5.00E+00	2.68E-01*
TOTAL FOR 1992			
TOTAL DOSE (mrem) FOR BONE	3.61E-02	1.00E+01	3.61E-01
TOTAL DOSE (mrem) FOR LIVER	9.29E-02*	1.00E+01	9.29E-01*
TOTAL DOSE (mrem) FOR TOTAL BODY	7.67E-02*	3.00E+00	2.56E+00*
TOTAL DOSE (mrem) FOR THYROID	2.84E-02	1.00E+01	2.84E-01
TOTAL DOSE (mrem) FOR KIDNEY	4.96E-02	1.00E+01	4.96E-01
TOTAL DOSE (mrem) FOR LUNG	3.57E-02*	1.00E+01	3.57E-01*
TOTAL DOSE (mrem) FOR GI-LLI	6.37E-02*	1.00E+01	6.37E-01*

¹ Based on ODCM Section 2.2 which restricts dose to the whole body to less than or equal to 1.5 mrem per quarter and 3.0 mrem per year. Dose restriction to any organ is less than or equal to 5 mrem per quarter and 10 mrem per year.

* There were no significant changes to these values and they are therefore reported the same as the values in Report 15.

NOTE: The values above have been adjusted to reflect actual composite data.

LIQUID CUMULATIVE DOSE SUMMARY (1992)

TABLE 2

A. Fission and Activation Products (not including H-3, gases, alpha)	Quarter 1	Quarter 2	Total
1. Total Release - (Ci)	1.19E-01	3.23E-02	1.51E-01
2. Maximum Organ Dose (mrem)	6.31E-02	6.70E-03	6.98E-02*
3. Organ Dose Limit (mrem)	5.00E+00	5.00E+00	1.00E+01
4. Percent of Limit	1.26E+00	1.34E-01	6.98E-01*
B. Tritium			
1. Total Release (Ci)	1.01E+02	3.01E+01	1.31E+02
2. Maximum Organ Dose (mrem)	1.16E-02	1.16E-02	2.32E-02
3. Organ Dose Limit (mrem)	5.00E+00	5.00E+00	1.00E+01
4. Percent of Limit	2.32E-01	2.32E-01	2.32E-01

This table is included to show the correlation between Curies released and the associated calculated maximum organ dose. Wolf Creek ODCM methodology is used to calculate the maximum organ dose which assumes that an individual drinks the water and eats fish from the discharge point. ODCM Section 2.2 organ dose limits are used.

NOTE: The 2nd Quarter Category A values were calculated based on the April Fe-55 composite results and First Quarter Sr-89 and Sr-90 composite results. Estimated values for Quarter 2 have now been replaced with actual composite results.

* There were no significant changes to these values and they are therefore reported that same as the values in Report 15.

REPORT OF RADIOACTIVE EFFLUENTS (1992): AIRBORNE

	Unit	Quarter 1	Quarter 2
A. Fission and Activation Gases			
1. Total Release	Ci	1.77E+02	5.90E+01
2. Average Release Rate for Period	uCi/sec	2.71E+02	5.85E+02
3. Percent of ODCM Limit (1)	%	2.41E-01	7.00E-02
B. Iodines			
1. Total Iodine-131	Ci	0.00E+00	0.00E+00
2. Average Release Rate for Period	uCi/sec	0.00E+00	0.00E+00
3. Percent of Applicable Limit (2)	%	0.00E+00	0.00E+00
C. Particulates			
1. Particulates with Half-lives > 8 days	Ci	0.00E+00	4.91E-07
2. Average Release Rate for Period	uCi/sec	0.00E+00	6.25E-08
3. Percent of ODCM Limit (3)	%	0.00E+00	1.05E-03
4. Gross Alpha Radioactivity	Ci	0.00E+00	0.00E+00
D. Tritium			
1. Total Release	Ci	3.74E+00	4.13E+00
2. Average Release Rate for Period	uCi/sec	5.09E-01	1.01E+00
3. Percent of ODCM Limit (4)	%	3.55E-02	3.93E-02

1. The percent of ODCM limit for fission and activation gases is calculated using the following methodology:

$$\% \text{ of ODCM Limit} = \frac{(\text{Qtrly Total Beta Airdose})(100)}{10 \text{ mrad}} \text{ or } \frac{(\text{Qtrly Total Gamma Airdose})(100)}{5 \text{ mrad}}$$

The largest value calculated between Gamma and Beta airdose is listed as the % of ODCM Limit.

2. The percent of ODCM limit for iodine is calculated using the following methodology:

$$\% \text{ of ODCM Limit} = \frac{(\text{Total Curies of Iodine-131})(100)}{1 \text{ Curie}}$$

3. The percent of ODCM limit for particulates is calculated using the following methodology:

$$\% \text{ of ODCM Limit} = \frac{(\text{Highest Organ Dose Due to Particulates})(100)}{7.5 \text{ mrem}}$$

4. The percent of ODCM limit for tritium is calculated using the following methodology:

$$\% \text{ of ODCM Limit} = \frac{(\text{Highest Organ Dose Due to H-3})(100)}{7.5 \text{ mrem}}$$

NOTE: This type of methodology is used since the Wolf Creek ODCM ties release limits to doses rather than Curie release rates. Also, the values in Category C of Quarter 2 have been adjusted to reflect actual Sr-90 composite data.

GASEOUS EFFLUENTS

NUCLIDES RELEASED	Unit	Continuous Mode		Batch Mode	
		Quarter 1	Quarter 2	Quarter 1	Quarter 2
1. Fission and Activation Gases					
Ar-41	Ci	0.00E+00	0.00E+00	5.23E-02	1.22E-01
Kr-85	Ci	1.29E+02	0.00E+00	4.55E+01	3.74E+01
Kr-85M	Ci	0.00E+00	7.63E-02	0.00E+00	0.00E+00
Kr-87	Ci	<4.42E+01	<4.47E+01	<8.26E-01	<1.99E-02
Kr-88	Ci	4.27E-02	<3.36E+01	<6.22E-01	<1.50E-02
Xe-131M	Ci	0.00E+00	0.00E+00	3.55E-03	0.00E+00
Xe-133	Ci	1.99E-01	1.82E+01	2.28E-01	1.77E-02
Xe-133M	Ci	<4.96E+01	<5.02E+01	<9.28E-01	<2.24E-02
Xe-135	Ci	1.72E+00	3.13E+00	<7.66E-02	3.98E-04
Xe-138	Ci	<9.27E+01	<9.39E+01	<1.74E+00	<4.18E-02
Total	Ci	1.31E+02	2.14E+01	4.58E+01	3.75E+01
2. Halogens (Gaseous)					
I-131	Ci	<2.55E-04	<2.59E-04	<4.78E-06	<1.15E-07
I-133	Ci	<2.55E-02	<2.59E-02	<4.78E-04	<1.15E-05
Total	Ci	<2.58E-02	<2.62E-02	<4.83E-04	<1.16E-05
3. Particulates and Tritium					
H-3	Ci	3.53E+00	4.07E+00	2.07E-01	5.37E-02
Mn-54	Ci	<2.55E-03	<2.59E-03	<4.78E-05	<1.15E-06
Fe-59	Ci	<2.55E-03	<2.59E-03	<4.78E-05	<1.15E-06
Co-58	Ci	<2.55E-03	<2.59E-03	<4.78E-05	<1.15E-06
Co-60	Ci	<2.55E-03	<2.59E-03	<4.78E-05	<1.15E-06
Zn-65	Ci	<2.55E-03	<2.59E-03	<4.78E-05	<1.15E-06
Mo-99	Ci	<2.55E-03	<2.59E-03	<4.78E-05	<1.15E-06
Cs-134	Ci	<2.55E-03	<2.59E-03	<4.78E-05	<1.15E-06
Cs-137	Ci	<2.55E-03	4.52E-07	<4.78E-05	<1.15E-06
Ce-141	Ci	<2.55E-03	<2.59E-03	<4.78E-05	<1.15E-06
Ce-144	Ci	<2.55E-03	<2.59E-03	<4.78E-05	<1.15E-06
Sr-89	Ci	<2.55E-03	<2.59E-03	<4.78E-05	<1.15E-06
Sr-90	Ci	<2.55E-03	3.91E-08	<4.78E-05	<1.15E-06
Gross Alpha	Ci	<2.55E-03	<2.59E-03	<4.78E-05	<1.15E-06
Total	Ci	3.53E+00	4.07E+00*	2.07E-01	5.37E-02

NOTE: Less than values for Noble Gases are calculated using the lower limit of detection (LLD) values obtained at Wolf Creek Generating Station multiplied by the volume of air discharged during the respective quarter. For the Halogens and Particulates the ODCM LLD values are used.

* There was no significant change to this value and it is therefore reported the same as the value in Report 15.

GASEOUS CUMULATIVE DOSE SUMMARY (1992)

Table 1

	ODCM CALCULATED DOSE	ODCM ¹ LIMIT	% OF LIMIT
QUARTER 1 OF 1992			
TOTAL DOSE (mrem) FOR BONE	0.00E+00	7.50E+00	0.00E+00
TOTAL DOSE (mrem) FOR LIVER	2.66E-03	7.50E+00	3.55E-02
TOTAL DOSE (mrem) FOR TOTAL BODY	2.66E-03	7.50E+00	3.55E-02
TOTAL DOSE (mrem) FOR THYROID	2.66E-03	7.50E+00	3.55E-02
TOTAL DOSE (mrem) FOR KIDNEY	2.66E-03	7.50E+00	3.55E-02
TOTAL DOSE (mrem) FOR LUNG	2.66E-03	7.50E+00	3.55E-02
TOTAL DOSE (mrem) FOR GI-LLI	2.66E-03	7.50E+00	3.55E-02
QUARTER 2 OF 1992			
TOTAL DOSE (mrem) FOR BONE	7.84E-05	7.50E+00	1.05E-03
TOTAL DOSE (mrem) FOR LIVER	2.99E-03	7.50E+00	3.99E-02
TOTAL DOSE (mrem) FOR TOTAL BODY	2.97E-03	7.50E+00	3.96E-02
TOTAL DOSE (mrem) FOR THYROID	2.95E-03	7.50E+00	3.93E-02
TOTAL DOSE (mrem) FOR KIDNEY	2.96E-03	7.50E+00	3.95E-02
TOTAL DOSE (mrem) FOR LUNG	2.96E-03*	7.50E+00	3.95E-02*
TOTAL DOSE (mrem) FOR GI-LLI	2.95E-03*	7.50E+00	3.93E-02*
TOTALS FOR 1992			
TOTAL DOSE (mrem) FOR BONE	7.84E-05	1.50E+01	5.23E-04
TOTAL DOSE (mrem) FOR LIVER	5.65E-03	1.50E+01	3.77E-02
TOTAL DOSE (mrem) FOR TOTAL BODY	5.63E-03	1.50E+01	3.75E-02*
TOTAL DOSE (mrem) FOR THYROID	5.61E-03	1.50E+01	3.74E-02
TOTAL DOSE (mrem) FOR KIDNEY	5.62E-03	1.50E+01	3.75E-02
TOTAL DOSE (mrem) FOR LUNG	5.62E-03*	1.50E+01	3.75E-02*
TOTAL DOSE (mrem) FOR GI-LLI	5.61E-03*	1.50E+01	3.74E-02*

1. Based on Wolf Creek ODCM Section 3.2.2 which restricts dose during any calendar quarter to less than or equal to 7.5 mrem to any organ and during any calendar year to less than or equal to 15 mrem to any organ.

NOTE: The values above have been adjusted to reflect actual composite data.

* There were no significant changes to these values and they are therefore reported the same as the values in Report 15.

GASEOUS CUMULATIVE DOSE SUMMARY (1992)
TABLE 2

Nuclides Released		Quarter 1	Quarter 2	Total
A. Fission and Activation Gases				
1.	Total Release (Ci)	1.77E+02	5.90E+01	2.36E+02
2.	Total Gamma Airdose (mrad)	5.29E-04	9.97E-04	1.53E-03
3.	Gamma Airdose Limit (mrad)	5.00E+00	5.00E+00	1.00E+01
4.	Percent of Gamma Airdose Limit	1.06E-02	1.99E-02	1.53E-02
5.	Total Beta Airdose (mrad)	2.41E-02	7.00E-03	3.11E-02
6.	Beta Airdose Limit (mrad)	1.00E+01	1.00E+01	2.00E+01
7.	Percent of Beta Airdose Limit (mrad)	2.41E-01	7.00E-02	1.56E-01
B. Particulates				
1.	Total Particulates (Ci)	0.00E+00	4.91E-07	4.91E-07
2.	Maximum Organ Dose (mrem)	0.00E+00	7.84E-05	7.84E-05
3.	Organ Dose Limit (mrem)	7.50E+00	7.50E+00	1.50E+01
4.	Percent of Limit	0.00E+00	1.05E-03	5.23E-04
C. Tritium				
1.	Total Release (Ci)	3.74E+00	4.13E+00	7.87E+00
2.	Maximum Organ Dose (mrem)	2.66E-03	2.95E-03	5.61E-03
3.	Organ Dose Limit (mrem)	7.50E+00	7.50E+00	1.50E+01
4.	Percent of Limit	3.55E-02	3.93E-02	3.74E-02
D. Iodine				
1.	Total I-131, I-133 (Ci)	0.00E+00	0.00E+00	0.00E+00
2.	Maximum Organ Dose (mrem)	0.00E+00	0.00E+00	0.00E+00
3.	Organ Dose Limit (mrem)	7.50E+00	7.50E+00	1.50E+01
4.	Percent of Limit	0.00E+00	0.00E+00	0.00E+00

This table is included to show the correlation between Curies released and the associated calculated maximum organ dose. The maximum organ dose is calculated using Wolf Creek ODCM methodology which assumes that an individual actually resides at the release point. ODCM Section 3.2.2 organ dose limits are used.

NOTE: The values in category B of Quarter 2 have been adjusted to reflect actual Sr-90 composite data.