

WOLF CREEK

NUCLEAR OPERATING CORPORATION

Gautam Sen
Manager Regulatory Affairs

April 30, 2012

RA 12-0040

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

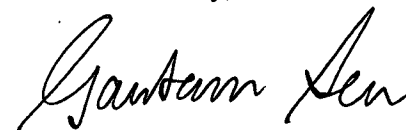
Subject: Docket No. 50-482: Wolf Creek Generating Station Annual Radioactive Effluent Release Report – Report 35

Gentlemen:

The purpose of this letter is to transmit the enclosed Wolf Creek Generating Station (WCGS) Annual Radioactive Effluent Release Report. The report covers the period from January 1, 2011, through December 31, 2011. It is being submitted pursuant to Section 5.6.3 of the WCGS Technical Specifications. The report provides procedures AP 07B-003, Revision 7, "Offsite Dose Calculation Manual," AP 07B-004, Revision 18, "Offsite Dose Calculation Manual (Radiological Environmental Monitoring Program)," and AP 31A-100, Revision 8, "Solid Radwaste Process Control Program" that are included as part of the report in accordance with Section 5.5.1 of the WCGS Technical Specifications. These procedures have the changes made during the reporting period marked as required.

This letter contains no commitments. If you have any questions concerning this matter, please contact me at (620) 364-4175, or Mr. William Muilenburg, at (620) 364-8831, ext. 4511.

Sincerely,



Gautam Sen

GS/rlt

Enclosure: 2011 Annual Radioactive Effluent Release Report – Report 35

cc: E. E. Collins (NRC), w/e
J. R. Hall (NRC), w/e
N. F. O'Keefe (NRC), w/e
Senior Resident Inspector (NRC), w/e

EE 48
NRR

Wolf Creek Nuclear Operating Corporation

Wolf Creek Generating Station

Docket No: **50-482**

Renewed Facility Operating License No: **NPF-42**

Annual Radioactive Effluent Release Report

Report No. 35

Reporting Period: January 1, 2011 - December 31, 2011

Table of Contents

	<u>Page</u>
<u>Executive Summary</u>	4
<u>Section I</u>	
Report of 2011 Radioactive Effluents: Liquid	5
2011 Liquid Effluents	7
2011 Liquid Cumulative Dose Summary – Table 1	9
2011 Liquid Cumulative Dose Summary – Table 2	10
Report of 2011 Radioactive Effluents: Airborne	11
2011 Gaseous Effluents	13
2011 Gaseous Cumulative Dose Summary – Table 1	15
2011 Gaseous Cumulative Dose Summary – Table 2	16
<u>Section II</u>	
Offsite Dose Calculation Manual Limits	17
Effluent Concentration Limits (ECLs)	17
Average Energy	18
Measurements and Approximations of Total Radioactivity (Liquid and Gaseous Effluents)	18
Batch Releases	20
Continuous Releases	20
Doses to a Member of the Public from Activities Inside the Site Boundary	20
Additional Information	20
2011 Effluent Concentration Limits	22
2011 Solid Waste Shipments	23
Irradiated Fuel Shipments	24
<u>Section III</u>	
Meteorological Data – Hours At Each Wind Speed and Direction	25
<u>Section IV</u>	
Unplanned or Abnormal Releases	34
Offsite Dose Calculation Manual	34
Major Changes to Liquid, Solid, or Gaseous Radioactive Waste Treatment Systems	34
Land Use Census	34
Radwaste Shipments	34
Inoperability of Effluent Monitoring Instrumentation	34
Storage Tanks	34
NEI Groundwater Protection Industry Initiative	35

Table of Contents

	<u>Page</u>
<u>Enclosures</u>	57
Enclosure I - WCGS Procedure AP 07B-003, Revision 7, "Offsite Dose Calculation Manual"	
Enclosure II - WCGS Procedure AP 07B-004, Revision 18, "Offsite Dose Calculation Manual (Radiological Environmental Monitoring Program)"	
Enclosure III - WCGS Procedure AP 31A-100, Revision 8, "Solid Radwaste Process Control Program"	

EXECUTIVE SUMMARY

This Annual Radioactive Effluent Release Report (Report # 35) documents the quantities of liquid and gaseous effluents and solid waste released by Wolf Creek Generating Station (WCGS) from January 1, 2011 through December 31, 2011. The format and content of this report are in accordance with Regulatory Guide 1.21, Revision 1, "Measuring, Evaluation, and Reporting Radioactivity in Solid Wastes and Releases of Radioactive Materials in Liquid and Gaseous Effluents from Light-Water-Cooled Nuclear Power Plants." Sections I, II, III, and IV of this report provide information required by NRC Regulatory Guide 1.21 and Section 7.2 of AP 07B-003, "Offsite Dose Calculation Manual" (ODCM).

Section I --- Section I contains, in detail, the quantities of radioactive liquid and gaseous effluents and cumulative dose summaries for 2011, tabulated for each quarter and for yearly totals. Specific ODCM effluent limits and dose limits are also listed in Section I, along with the percentage of the effluent limits actually released and the percentages of the dose limit actually received. No effluent or dose limits were exceeded during 2011.

An elevated release pathway does not exist at WCGS. All airborne releases are considered to be ground level releases. The gaseous pathway dose determination is met by the WCGS ODCM methodology of assigning all gaseous pathways to a hypothetical individual residing at the highest annual X/Q and D/Q location, as specified in the ODCM. 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 the effluent data. As stated above, no ODCM dose limits were exceeded in 2011.

Section II --- Section II includes supplemental information on continuous and batch releases, calculated doses, and solid waste disposal. There were 49 gaseous batch releases in 2011 versus 42 in 2010. There were 59 liquid batch releases in 2011 versus 42 in 2010. WCGS released 0.005 curies in liquid releases during 2011 versus 0.011 curies in 2010, excluding gas and tritium. Continuous release pathways remained the same as previous years and all continuous releases were monitored.

The report contains information on the following Condition Reports (CR):

CR-42403 – ODCM surveillance was late due to monthly composites being completed after the late date.

The report contains information on Carbon-14 evaluation.

The report contains information on Nickel-63 study.

Section III --- Section III documents WCGS meteorological data for wind speed, wind direction, and atmospheric stability.

Section IV --- Section IV documents unplanned and abnormal releases, changes to radwaste treatment systems, land use census, monitoring instruments, radwaste shipments, and storage tank quantities. There were no unplanned, unmonitored releases in 2011.

Changes to the land use census are noted. No changes or events occurred with monitoring instruments, radwaste shipments, and storage units.

SECTION I

REPORT OF 2011 RADIOACTIVE EFFLUENTS: LIQUID

	Unit	Quarter 1	Quarter 2
A. Fission and Activation Products			
1. Total Release (not including tritium, gases, alpha)	Ci	7.82E-04	1.34E-03
2. Average Diluted Concentration During Period	μCi/ml	5.59E-12	1.89E-11
3. Percent of Applicable Limit (1)	%	1.56E-02	2.67E-02
B. Tritium			
1. Total Release	Ci	5.10E+02	9.24E+01
2. Average Diluted Concentration During Period	μCi/ml	3.65E-06	1.31E-06
3. Percent of Applicable Limit (2) (ECL)	%	3.65E-01	1.31E-01
C. Dissolved and Entrained Gases			
1. Total Release	Ci	2.59E-02	9.69E-05
2. Average Diluted Concentration During Period	μCi/ml	1.85E-10	1.37E-12
3. Percent of Applicable Limit (3)	%	9.26E-05	6.84E-07
D. Gross Alpha Radioactivity			
1. Total Release	Ci	0.00E+00	0.00E+00
E. Volume of Waste Released (prior to dilution)	Liters	9.88E+07	2.72E+07
F. Volume of Dilution Water Used	Liters	1.40E+11	7.07E+10

NOTES:

- 1) The applicable limit for the WCGS 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 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:

$$\% \text{ of Applicable Limit} = \frac{(\text{Average Diluted Concentration}) (100)}{(\text{MPC or ECL, Appendix B, Table 2, 10CFR20})}$$

- 3) This value is derived by the following formula:

$$\% \text{ of Applicable Limit} = \frac{(\text{Average Diluted Concentration}) (100)}{(2E - 04 \text{ from ODCM Section 2.1})}$$

REPORT OF 2011 RADIOACTIVE EFFLUENTS: LIQUID

	Unit	Quarter 3	Quarter 4
A. Fission and Activation Products			
1. Total Release (not including tritium, gases, alpha)	Ci	2.00E-03	4.21E-04
2. Average Diluted Concentration During Period	μCi/ml	7.17E-12	1.74E-12
3. Percent of Applicable Limit (1)	%	3.99E-02	8.42E-03
B. Tritium			
1. Total Release	Ci	3.66E+01	4.97E+01
2. Average Diluted Concentration During Period	μCi/ml	1.31E-07	2.06E-07
3. Percent of Applicable Limit (2) (ECL)	%	1.31E-02	2.06E-02
C. Dissolved and Entrained Gases			
1. Total Release	Ci	2.86E-04	4.32E-06
2. Average Diluted Concentration During Period	μCi/ml	1.03E-12	1.79E-14
3. Percent of Applicable Limit (3)	%	5.14E-07	8.93E-09
D. Gross Alpha Radioactivity			
1. Total Release	Ci	0.00E+00	0.00E+00
E. Volume of Waste Released (prior to dilution)	liters	1.14E+08	1.66E+08
F. Volume of Dilution Water Used	liters	2.78E+11	2.41E+11

NOTES:

- 1) The applicable limit for the WCGS 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 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:

$$\% \text{ of Applicable Limit} = \frac{(\text{Average Diluted Concentration}) (100)}{(\text{MPC or ECL, Appendix B, Table 2, 10CFR20})}$$

- 3) This value is derived by the following formula:

$$\% \text{ of Applicable Limit} = \frac{(\text{Average Diluted Concentration}) (100)}{(2E - 04 \text{ from ODCM Section 2.1})}$$

2011 LIQUID EFFLUENTS

Nuclides Released	Unit	Continuous Mode		Batch Mode	
		Quarter 1	Quarter 2	Quarter 1	Quarter 2
H-3	Ci	1.28E+00	9.09E-01	5.08E+02	9.15E+01
Cr-51	Ci	N/A	N/A	N/A	N/A
Mn-54	Ci	<4.89E-02	<1.30E-02	1.35E-06	9.28E-07
Fe-55	Ci	<9.78E-02	<2.60E-02	<1.10E-03	<1.17E-03
Fe-59	Ci	<4.89E-02	<1.30E-02	<5.49E-04	<5.83E-04
Co-57	Ci	N/A	N/A	N/A	N/A
Co-58	Ci	6.13E-05	<1.30E-02	1.73E-05	8.33E-04
Co-60	Ci	<4.89E-02	<1.30E-02	4.02E-05	5.01E-05
Zn-65	Ci	<4.89E-02	<1.30E-02	<5.49E-04	<5.83E-04
Sr-89	Ci	<4.89E-03	<1.30E-03	<5.49E-05	<5.83E-05
Sr-90	Ci	<4.89E-03	<1.30E-03	<5.49E-05	<5.83E-05
Sr-91	Ci	N/A	N/A	N/A	N/A
Sr-92	Ci	N/A	N/A	N/A	N/A
Mo-99	Ci	<4.89E-02	<1.30E-02	<5.49E-04	<5.83E-04
Sb-124	Ci	N/A	N/A	N/A	N/A
Sb-125	Ci	N/A	N/A	4.95E-04	1.83E-04
I-131	Ci	<9.78E-02	<2.60E-02	<1.10E-03	<1.17E-03
I-133	Ci	N/A	N/A	N/A	N/A
Cs-134	Ci	<4.89E-02	<1.30E-02	<5.49E-04	<5.83E-04
Cs-136	Ci	N/A	N/A	N/A	N/A
Cs-137	Ci	<4.89E-02	<1.30E-02	1.71E-05	6.30E-06
Ce-141	Ci	<4.89E-02	<1.30E-02	<5.49E-04	<5.83E-04
Ce-144	Ci	<4.89E-02	<1.30E-02	<5.49E-04	<5.83E-04
Na-24	Ci	N/A	N/A	N/A	N/A
Rb-88	Ci	N/A	N/A	1.48E-04	N/A
Nb-95	Ci	N/A	N/A	N/A	N/A
Zr-95	Ci	N/A	N/A	N/A	N/A
Tc-99M	Ci	N/A	N/A	N/A	N/A
Ag-110M	Ci	N/A	N/A	9.89E-07	N/A
Sn-117M	Ci	N/A	N/A	N/A	N/A
Sb-122	Ci	N/A	N/A	N/A	N/A
Sb-126	Ci	N/A	N/A	N/A	N/A
Te-125M	Ci	N/A	N/A	N/A	2.62E-04
I-135	Ci	N/A	N/A	N/A	N/A
Gross Alpha	Ci	<9.78E-03	<2.60E-03	<1.10E-04	<1.17E-04
Ar-41	Ci	<9.78E-01	<2.60E-01	1.47E-05	<1.17E-02
Kr-85M	Ci	<9.78E-01	<2.60E-01	2.87E-05	<1.17E-02
Kr-85	Ci	<9.78E-01	<2.60E-01	<1.10E-02	<1.17E-02
Kr-87	Ci	<9.78E-01	<2.60E-01	<1.10E-02	<1.17E-02
Kr-88	Ci	<9.78E-01	<2.60E-01	1.66E-05	<1.17E-02
Xe-131M	Ci	<9.78E-01	<2.60E-01	<1.10E-02	<1.17E-02
Xe-133M	Ci	<9.78E-01	<2.60E-01	4.72E-04	<1.17E-02
Xe-133	Ci	<9.78E-01	<2.60E-01	2.20E-02	8.90E-05
Xe-135M	Ci	<9.78E-01	<2.60E-01	<1.10E-02	<1.17E-02
Xe-135	Ci	<9.78E-01	<2.60E-01	3.31E-03	7.88E-06

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.

2011 LIQUID EFFLUENTS

Nuclides Released	Unit	Continuous Mode		Batch Mode	
		Quarter 3	Quarter 4	Quarter 3	Quarter 4
H-3	Ci	2.33E+00	1.36E+00	3.42E+01	4.84E+01
Cr-51	Ci	N/A	N/A	N/A	N/A
Mn-54	Ci	<5.70E-02	<8.26E-02	<2.04E-04	<1.01E-04
Fe-55	Ci	<1.14E-01	<1.65E-01	<4.08E-04	<2.01E-04
Fe-59	Ci	<5.70E-02	<8.26E-02	<2.04E-04	<1.01E-04
Co-57	Ci	N/A	N/A	N/A	N/A
Co-58	Ci	<5.70E-02	<8.26E-02	2.97E-04	4.83E-05
Co-60	Ci	<5.70E-02	<8.26E-02	1.32E-05	9.35E-06
Zn-65	Ci	<5.70E-02	<8.26E-02	<2.04E-04	<1.01E-04
Rb-88	Ci	N/A	N/A	N/A	N/A
Sr-89	Ci	<5.70E-03	<8.26E-03	<2.04E-05	<1.01E-05
Sr-90	Ci	<5.70E-03	<8.26E-03	<2.04E-05	<1.01E-05
Mo-99	Ci	<5.70E-02	<8.26E-02	<2.04E-04	<1.01E-04
Sn-117M	Ci	N/A	N/A	N/A	N/A
Sb-124	Ci	N/A	N/A	3.66E-05	2.64E-06
Sb-125	Ci	N/A	N/A	1.65E-03	3.54E-04
I-131	Ci	<1.14E-01	<1.65E-01	<4.08E-04	<2.01E-04
I-133	Ci	N/A	N/A	N/A	N/A
I-135	Ci	N/A	N/A	N/A	N/A
Cs-134	Ci	<5.70E-02	<8.26E-02	<2.04E-04	<1.01E-04
Cs-136	Ci	N/A	N/A	N/A	N/A
Cs-137	Ci	<5.70E-02	<8.26E-02	6.08E-07	6.96E-06
Cs-138	Ci	N/A	N/A	N/A	N/A
Ba-140	Ci	N/A	N/A	N/A	N/A
Ce-141	Ci	<5.70E-02	<8.26E-02	<2.04E-04	<1.01E-04
Ce-144	Ci	<5.70E-02	<8.26E-02	<2.04E-04	<1.01E-04
Sr-91	Ci	N/A	N/A	N/A	N/A
Sr-92	Ci	N/A	N/A	N/A	N/A
Nb-95	Ci	N/A	N/A	N/A	N/A
Zr-95	Ci	N/A	N/A	N/A	N/A
Sb-122	Ci	N/A	N/A	N/A	N/A
Sb-126	Ci	N/A	N/A	N/A	N/A
Gross Alpha	Ci	<1.14E-02	<1.65E-02	<4.08E-05	<2.01E-05
Ar-41	Ci	<1.14E+00	<1.65E+00	<4.08E-03	<2.01E-03
Kr-85M	Ci	<1.14E+00	<1.65E+00	<4.08E-03	<2.01E-03
Kr-85	Ci	<1.14E+00	<1.65E+00	<4.08E-03	<2.01E-03
Kr-87	Ci	<1.14E+00	<1.65E+00	<4.08E-03	<2.01E-03
Kr-88	Ci	<1.14E+00	<1.65E+00	<4.08E-03	<2.01E-03
Xe-131M	Ci	<1.14E+00	<1.65E+00	<4.08E-03	<2.01E-03
Xe-133M	Ci	<1.14E+00	<1.65E+00	<4.08E-03	<2.01E-03
Xe-133	Ci	<1.14E+00	<1.65E+00	2.54E-04	4.32E-06
Xe-135M	Ci	<1.14E+00	<1.65E+00	<4.08E-03	<2.01E-03
Xe-135	Ci	<1.14E+00	<1.65E+00	3.24E-05	<2.01E-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.

LIQUID CUMULATIVE DOSE SUMMARY (2011) TABLE 1

QUARTER 1 OF 2011 (mrem)	ODCM CALCULATED DOSE	ODCM LIMIT(1)	% OF LIMIT
TOTAL DOSE FOR BONE	9.07E-05	5.00E+00	1.81E-03
TOTAL DOSE FOR LIVER	1.41E-01	5.00E+00	2.82E+00
TOTAL DOSE FOR TOTAL BODY	1.41E-01	1.50E+00	9.41E+00
TOTAL DOSE FOR THYROID	1.41E-01	5.00E+00	2.82E+00
TOTAL DOSE FOR KIDNEY	1.41E-01	5.00E+00	2.82E+00
TOTAL DOSE FOR LUNG	1.41E-01	5.00E+00	2.82E+00
TOTAL DOSE FOR GI-LLI	1.43E-01	5.00E+00	2.85E+00
QUARTER 2 OF 2011 (mrem)			
TOTAL DOSE FOR BONE	2.71E-05	5.00E+00	5.42E-04
TOTAL DOSE FOR LIVER	6.82E-02	5.00E+00	1.36E+00
TOTAL DOSE FOR TOTAL BODY	6.82E-02	1.50E+00	4.55E+00
TOTAL DOSE FOR THYROID	6.81E-02	5.00E+00	1.36E+00
TOTAL DOSE FOR KIDNEY	6.82E-02	5.00E+00	1.36E+00
TOTAL DOSE FOR LUNG	6.81E-02	5.00E+00	1.36E+00
TOTAL DOSE FOR GI-LLI	6.83E-02	5.00E+00	1.37E+00
QUARTER 3 OF 2011 (mrem)			
TOTAL DOSE FOR BONE	4.12E-06	5.00E+00	8.25E-05
TOTAL DOSE FOR LIVER	3.86E-03	5.00E+00	7.71E-02
TOTAL DOSE FOR TOTAL BODY	3.86E-03	1.50E+00	2.57E-01
TOTAL DOSE FOR THYROID	3.85E-03	5.00E+00	7.71E-02
TOTAL DOSE FOR KIDNEY	3.85E-03	5.00E+00	7.71E-02
TOTAL DOSE FOR LUNG	3.85E-03	5.00E+00	7.71E-02
TOTAL DOSE FOR GI-LLI	3.89E-03	5.00E+00	7.77E-02
QUARTER 4 OF 2011 (mrem)			
TOTAL DOSE FOR BONE	2.31E-05	5.00E+00	4.63E-04
TOTAL DOSE FOR LIVER	5.75E-03	5.00E+00	1.15E-01
TOTAL DOSE FOR TOTAL BODY	5.74E-03	1.50E+00	3.83E-01
TOTAL DOSE FOR THYROID	5.72E-03	5.00E+00	1.14E-01
TOTAL DOSE FOR KIDNEY	5.73E-03	5.00E+00	1.15E-01
TOTAL DOSE FOR LUNG	5.72E-03	5.00E+00	1.14E-01
TOTAL DOSE FOR GI-LLI	5.73E-03	5.00E+00	1.15E-01
TOTALS FOR 2011 (mrem)			
TOTAL DOSE FOR BONE	1.45E-04	1.00E+01	1.45E-03
TOTAL DOSE FOR LIVER	2.19E-01	1.00E+01	2.19E+00
TOTAL DOSE FOR TOTAL BODY	2.19E-01	3.00E+00	7.30E+00
TOTAL DOSE FOR THYROID	2.19E-01	1.00E+01	2.19E+00
TOTAL DOSE FOR KIDNEY	2.19E-01	1.00E+01	2.19E+00
TOTAL DOSE FOR LUNG	2.19E-01	1.00E+01	2.19E+00
TOTAL DOSE FOR GI-LLI	2.21E-01	1.00E+01	2.21E+00

1. Based on ODCM Section 2.2, which restricts dose to the whole body to ≤ 1.5 mRem per quarter and 3.0 mRem per year. Dose restriction of any organ is ≤ 5.0 mRem per quarter and 10.0 mRem per year.

LIQUID CUMULATIVE DOSE SUMMARY (2011) TABLE 2

		Quarter 1	Quarter 2	Quarter 3	Quarter 4	Total
A.	Fission and Activation Products (not including H-3, gases, alpha)					
1.	Total Release - (Ci)	7.82E-04	1.34E-03	2.00E-03	4.21E-04	4.53E-03
2.	Maximum Organ Dose (mRem)	1.68E-03	1.83E-04	3.37E-05	3.11E-05	1.90E-03
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-02	3.66E-03	6.73E-04	6.21E-04	1.90E-02
B.	Tritium					
1.	Total Release - (Ci)	5.10E+02	9.24E+01	3.66E+01	4.97E+01	6.88E+02
2.	Maximum Organ Dose (mRem)	1.41E-01	6.81E-02	3.85E-03	5.72E-03	2.19E-01
3.	Organ Dose Limit (mRem)	5.00E+00	5.00E+00	5.00E+00	5.00E+00	1.00E+01
4.	Percent of Limit	2.82E+00	1.36E+00	7.71E-02	1.14E-01	2.19E+00

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 that assumes that an individual drinks the water and eats the 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.

REPORT OF 2011 RADIOACTIVE EFFLUENTS: AIRBORNE

	Unit	Quarter 1	Quarter 2
A. Fission and Activation Gases			
1. Total Release	Ci	4.89E-01	6.19E-06
2. Average Release Rate for Period	μCi/sec	6.28E-02	7.88E-07
3. Percent of ODCM Limit (1)	%	5.82E-03	4.53E-09
B. Iodines			
1. Total Release	Ci	0.00E+00	0.00E+00
2. Average Release Rate for Period	μCi/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	0.00E+00
2. Average Release Rate for Period	μCi/sec	0.00E+00	0.00E+00
3. Percent of ODCM Limit (3)	%	0.00E+00	0.00E+00
4. Gross Alpha Radioactivity	Ci	0.00E+00	0.00E+00
D. Tritium			
1. Total Release	Ci	9.92E+00	1.76E+01
2. Average Release Rate for Period	μCi/sec	1.28E+00	2.24E+00
3. Percent of ODCM Limit (4)	%	1.01E-01	1.67E-01

NOTES:

- 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 air dose 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:

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

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

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

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

REPORT OF 2011 RADIOACTIVE EFFLUENTS: AIRBORNE

	Unit	Quarter 3	Quarter 4
A. Fission and Activation Gases			
1. Total Release	Ci	9.03E-02	9.00E-02
2. Average Release Rate for Period	μCi/sec	1.14E-02	1.13E-02
3. Percent of ODCM Limit (1)	%	1.16E-03	1.17E-03
B. Iodines			
1. Total Release	Ci	0.00E+00	0.00E+00
2. Average Release Rate for Period	μCi/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	0.00E+00
2. Average Release Rate for Period	μCi/sec	0.00E+00	0.00E+00
3. Percent of ODCM Limit (3)	%	0.00E+00	0.00E+00
4. Gross Alpha Radioactivity	Ci	0.00E+00	0.00E+00
D. Tritium			
1. Total Release	Ci	1.49E+01	8.31E+00
2. Average Release Rate for Period	μCi/sec	1.87E+00	1.04E+00
3. Percent of ODCM Limit (4)	%	1.38E-01	7.28E-02

NOTES:

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

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

The largest value calculated between Gamma and Beta air dose 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:

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

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

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

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

2011 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	N/A	N/A	4.47E-01	N/A
Kr-85	Ci	N/A	N/A	8.42E-04	N/A
Kr-85M	Ci	N/A	N/A	N/A	N/A
Kr-87	Ci	<9.04E+00	<9.09E+00	<2.47E-01	<1.43E-01
Kr-88	Ci	<9.90E+00	<9.95E+00	<2.70E-01	<1.57E-01
Xe-131M	Ci	N/A	N/A	N/A	N/A
Xe-133	Ci	<4.40E+00	<4.42E+00	4.05E-02	6.19E-06
Xe-133M	Ci	<1.17E+01	<1.17E+01	3.36E-04	<1.85E-01
Xe-135	Ci	<1.70E+00	<1.71E+00	2.00E-05	<2.70E-02
Xe-135M	Ci	N/A	N/A	N/A	N/A
Xe-138	Ci	<1.61E+02	<1.62E+02	<4.40E+00	<2.55E+00
Total	Ci	0.00E+00	0.00E+00	4.88E-01	6.19E-06
2. Halogens (Gaseous)					
I-131	Ci	<2.59E-04	<2.60E-04	<7.06E-06	<4.09E-06
I-133	Ci	<2.59E-02	<2.60E-02	<7.06E-04	<4.09E-04
Total	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00
3. Particulates and Tritium					
H-3	Ci	7.03E+00	1.67E+01	2.89E+00	9.48E-01
Mn-54	Ci	<2.59E-03	<2.60E-03	<7.06E-05	<4.09E-05
Fe-59	Ci	<2.59E-03	<2.60E-03	<7.06E-05	<4.09E-05
Co-58	Ci	<2.59E-03	<2.60E-03	<7.06E-05	<4.09E-05
Co-60	Ci	<2.59E-03	<2.60E-03	<7.06E-05	<4.09E-05
Zn-65	Ci	<2.59E-03	<2.60E-03	<7.06E-05	<4.09E-05
Mo-99	Ci	<2.59E-03	<2.60E-03	<7.06E-05	<4.09E-05
Cs-134	Ci	<2.59E-03	<2.60E-03	<7.06E-05	<4.09E-05
Cs-137	Ci	<2.59E-03	<2.60E-03	<7.06E-05	<4.09E-05
Ce-141	Ci	<2.59E-03	<2.60E-03	<7.06E-05	<4.09E-05
Ce-144	Ci	<2.59E-03	<2.60E-03	<7.06E-05	<4.09E-05
Sr-89	Ci	<2.59E-03	<2.60E-03	<7.06E-05	<4.09E-05
Sr-90	Ci	<2.59E-03	<2.60E-03	<7.06E-05	<4.09E-05
Gross Alpha	Ci	<2.59E-03	<2.60E-03	<7.06E-05	<4.09E-05
Total	Ci	7.03E+00	1.67E+01	2.89E+00	9.48E-01

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.

2011 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	N/A	N/A	8.93E-02	9.00E-02
Kr-85	Ci	N/A	N/A	1.45E-04	N/A
Kr-85M	Ci	N/A	N/A	N/A	N/A
Kr-87	Ci	<9.08E+00	<9.11E+00	<3.73E-03	<3.24E-03
Kr-88	Ci	<9.94E+00	<9.97E+00	<4.09E-03	<3.54E-03
Xe-131M	Ci	N/A	N/A	N/A	N/A
Xe-133	Ci	<4.41E+00	<4.43E+00	9.17E-04	<1.57E-03
Xe-133M	Ci	<1.17E+01	<1.18E+01	1.04E-05	<4.18E-03
Xe-135	Ci	<1.71E+00	<1.72E+00	<7.04E-04	<6.10E-04
Xe-135M	Ci	N/A	N/A	N/A	N/A
Xe-138	Ci	<1.62E+02	<1.62E+02	<6.65E-02	<5.77E-02
Total	Ci	0.00E+00	0.00E+00	9.03E-02	9.00E-02
2. Halogens (Gaseous)					
I-131	Ci	<2.60E-04	<2.60E-04	<1.07E-07	<9.25E-08
I-133	Ci	<2.60E-02	<2.60E-02	<1.07E-05	<9.25E-06
Total	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00
3. Particulates and Tritium					
H-3	Ci	1.48E+01	8.27E+00	8.27E-02	3.99E-02
Mn-54	Ci	<2.60E-03	<2.60E-03	<1.07E-06	<9.25E-07
Fe-59	Ci	<2.60E-03	<2.60E-03	<1.07E-06	<9.25E-07
Co-58	Ci	<2.60E-03	<2.60E-03	<1.07E-06	<9.25E-07
Co-60	Ci	<2.60E-03	<2.60E-03	<1.07E-06	<9.25E-07
Zn-65	Ci	<2.60E-03	<2.60E-03	<1.07E-06	<9.25E-07
Mo-99	Ci	<2.60E-03	<2.60E-03	<1.07E-06	<9.25E-07
Cs-134	Ci	<2.60E-03	<2.60E-03	<1.07E-06	<9.25E-07
Cs-137	Ci	<2.60E-03	<2.60E-03	<1.07E-06	<9.25E-07
Ce-141	Ci	<2.60E-03	<2.60E-03	<1.07E-06	<9.25E-07
Ce-144	Ci	<2.60E-03	<2.60E-03	<1.07E-06	<9.25E-07
Sr-89	Ci	<2.60E-03	<2.60E-03	<1.07E-06	<9.25E-07
Sr-90	Ci	<2.60E-03	<2.60E-03	<1.07E-06	<9.25E-07
Gross Alpha	Ci	<2.60E-03	<2.60E-03	<1.07E-06	<9.25E-07
Total	Ci	1.48E+01	8.27E+00	8.27E-02	3.99E-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.

GASEOUS CUMULATIVE DOSE SUMMARY (2011) TABLE 1

QUARTER 1 OF 2011 (mRem)	ODCM CALCULATED DOSE	ODCM LIMIT (1)	% OF LIMIT
TOTAL DOSE FOR BONE	0.00E+00	7.50E+00	0.00E+00
TOTAL DOSE FOR LIVER	7.01E-03	7.50E+00	9.35E-02
TOTAL DOSE FOR TOTAL BODY	7.01E-03	7.50E+00	9.35E-02
TOTAL DOSE FOR THYROID	7.01E-03	7.50E+00	9.35E-02
TOTAL DOSE FOR KIDNEY	7.01E-03	7.50E+00	9.35E-02
TOTAL DOSE FOR LUNG	7.01E-03	7.50E+00	9.35E-02
TOTAL DOSE FOR GI-LLI	7.01E-03	7.50E+00	9.35E-02
QUARTER 2 OF 2011 (mRem)			
TOTAL DOSE FOR BONE	0.00E+00	7.50E+00	0.00E+00
TOTAL DOSE FOR LIVER	1.24E-02	7.50E+00	1.66E-01
TOTAL DOSE FOR TOTAL BODY	1.24E-02	7.50E+00	1.66E-01
TOTAL DOSE FOR THYROID	1.24E-02	7.50E+00	1.66E-01
TOTAL DOSE FOR KIDNEY	1.24E-02	7.50E+00	1.66E-01
TOTAL DOSE FOR LUNG	1.24E-02	7.50E+00	1.66E-01
TOTAL DOSE FOR GI-LLI	1.24E-02	7.50E+00	1.66E-01
QUARTER 3 OF 2011 (mRem)			
TOTAL DOSE FOR BONE	0.00E+00	7.50E+00	0.00E+00
TOTAL DOSE FOR LIVER	1.05E-02	7.50E+00	1.40E-01
TOTAL DOSE FOR TOTAL BODY	1.05E-02	7.50E+00	1.40E-01
TOTAL DOSE FOR THYROID	1.05E-02	7.50E+00	1.40E-01
TOTAL DOSE FOR KIDNEY	1.05E-02	7.50E+00	1.40E-01
TOTAL DOSE FOR LUNG	1.05E-02	7.50E+00	1.40E-01
TOTAL DOSE FOR GI-LLI	1.05E-02	7.50E+00	1.40E-01
QUARTER 4 OF 2011 (mRem)			
TOTAL DOSE FOR BONE	0.00E+00	7.50E+00	0.00E+00
TOTAL DOSE FOR LIVER	5.87E-03	7.50E+00	7.83E-02
TOTAL DOSE FOR TOTAL BODY	5.87E-03	7.50E+00	7.83E-02
TOTAL DOSE FOR THYROID	5.87E-03	7.50E+00	7.83E-02
TOTAL DOSE FOR KIDNEY	5.87E-03	7.50E+00	7.83E-02
TOTAL DOSE FOR LUNG	5.87E-03	7.50E+00	7.83E-02
TOTAL DOSE FOR GI-LLI	5.87E-03	7.50E+00	7.83E-02
TOTALS FOR 2011 (mRem)			
TOTAL DOSE FOR BONE	0.00E+00	1.50E+01	0.00E+00
TOTAL DOSE FOR LIVER	3.59E-02	1.50E+01	2.39E-01
TOTAL DOSE FOR TOTAL BODY	3.59E-02	1.50E+01	2.39E-01
TOTAL DOSE FOR THYROID	3.59E-02	1.50E+01	2.39E-01
TOTAL DOSE FOR KIDNEY	3.59E-02	1.50E+01	2.39E-01
TOTAL DOSE FOR LUNG	3.59E-02	1.50E+01	2.39E-01
TOTAL DOSE FOR GI-LLI	3.59E-02	1.50E+01	2.39E-01

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.

GASEOUS CUMULATIVE DOSE SUMMARY (2011)TABLE 2

Nuclides Released	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Total
A. Fission and Activation Gases					
1. Total Release - (Ci)	4.88E-01	6.19E-06	9.03E-02	9.00E-02	6.69E-01
2. Total Gamma Air dose (mRad)	2.91E-04	1.52E-10	5.79E-05	5.84E-05	4.07E-04
3. Gamma Air dose Limit (mRad)	5.00E+00	5.00E+00	5.00E+00	5.00E+00	1.00E+01
4. Percent of Gamma Air dose Limit	5.82E-03	3.05E-09	1.16E-03	1.17E-03	4.07E-03
5. Total Beta Air dose (mRad)	1.05E-04	4.53E-10	2.05E-05	2.06E-05	1.46E-04
6. Beta Air dose Limit (mRad)	1.00E+01	1.00E+01	1.00E+01	1.00E+01	2.00E+01
7. Percent of Beta Air dose Limit (mRad)	1.05E-03	4.53E-09	2.05E-04	2.06E-04	7.32E-04
B. Particulates					
1. Total Particulates (Ci)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2. Maximum Organ Dose (mRem)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
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	0.00E+00	0.00E+00
C. Tritium					
1. Total Release (Ci)	9.92E+00	1.76E+01	1.49E+01	8.31E+00	5.07E+01
2. Maximum Organ Dose (mRem)	7.56E-03	1.25E-02	1.03E-02	5.46E-03	3.59E-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	1.01E-01	1.67E-01	1.38E-01	7.28E-02	2.39E-01
D. Iodine					
1. Total I-131, I-133 (Ci)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2. Maximum Organ Dose (mRem)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
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	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.

SECTION II**SUPPLEMENTAL INFORMATION****1. Offsite Dose Calculation Manual Limits****A. For liquid waste effluents**

- A.1 The concentration of radioactive material released in liquid effluents to UNRESTRICTED AREAS shall be limited to 10 times the limit 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} microCuries/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 mrems to the whole body and to less than or equal to 5 mrems to any organ, and
 - b. During any calendar year to less than or equal to 3 mrems to the whole body and to less than or equal to 10 mrems to any organ.

B. For gaseous waste effluents

- B.1 The dose rate due to radioactive material 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 mrems/yr to the whole body and less than or equal to 3000 mrems/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 mrems/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 mrems to any organ, and
 - b. During any calendar year: Less than or equal to 15 mrems to any organ.

2. Effluent Concentration Limits (ECLs)

Water - covered in Section I.A.

Air - covered in Section I.B.

3. Average Energy

Average energy of fission and activation gaseous effluents is not applicable. See ODCM Section 3.1 for the methodology used in determining the release rate limits from 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 Tank	P Each Batch	P.H.A.	Principal Gamma Emitters
	P Each Batch	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 Tanks	P Each Batch	L.S. S.A.C.	H-3 Gross Alpha
	P	O.S.L.	Sr-89, Sr-90
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/Waste Water Treatment	Daily Grab Sample	L.S.	H-3
		S.A.C. O.S.L.	Gross Alpha Sr-89, Sr-90
c. Lime Sludge Pond	Daily Grab Sample	O.S.L.	Fe-55

P = prior to each batch

M = monthly

L. S. = Liquid scintillation detector

S.A.C. = scintillation alpha counter

O.S.L. = performed by an offsite laboratory

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. <hr/> Gas Bubbler and L.S.	Principal Gamma Emitters <hr/> H-3 (oxide)
Unit Vent	M Grab Sample	P.H.A. <hr/> Gas Bubbler and L.S.	Principal Gamma Emitters <hr/> 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 <hr/> I-133
	Continuous	P.H.A. 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**M = monthly****L.S. = Liquid scintillation detector****S.A.C. = scintillation alpha counter****O.S.L. = performed by an offsite laboratory****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 effluents, which takes place over a finite period of time, usually hours or days.

There were 49 gaseous batch releases during the reporting period. The longest gaseous batch release lasted 9,108 minutes, while the shortest lasted 56 minutes. The average release lasted 587 minutes with a total gaseous batch release time of 28,775 minutes.

There were 59 liquid batch releases during the reporting period. The longest liquid batch release lasted 272 minutes, while the shortest lasted 55 minutes. The average release lasted 131 minutes with a total liquid batch release time of 7,741 minutes.

6. Continuous Releases

A continuous release is a release of gaseous or liquid effluent, which is essentially uninterrupted for extended periods during normal operation of the facility. Four liquid release pathways were designated as continuous releases during this reporting period: Steam Generator Blowdown, Turbine Building Sump, Waste Water Treatment, and Lime Sludge Pond. Two gas release pathways were designated as continuous releases: Unit Vent and Radwaste Building Vent.

7. Doses to a Member of the Public from Activities Inside the Site Boundary

Four activities by members of the public were considered in this evaluation: personnel making deliveries to the plant, workers at the William Allen White Building located outside of the protected area boundary, the use of the access road south of the Radwaste Building, and public use of the cooling lake during times when fishing was allowed. The dose calculated for the maximum exposed individual for these four activities was as follows:

Plant Deliveries	3.86E-01 mRem
William Allen White Building Workers	8.36E-03 mRem
Access Road Users	3.96E-03 mRem
Lake Use	4.96E-02 mRem

The plant delivery calculations were based on deliveries 3 hours per week for 50 weeks per year. The William Allen White Building occupancy was based on normal working hours of 2000 per year. The usage factor for the access road south of the Radwaste Building was 25 hours per year. The dose to fishermen on the lake was based upon 3,504 hours (12 hours a day for 292 days, based on the number of days that the lake was open to fisherman). Pathways used in the calculation were gaseous inhalation, submersion, and ground plane. All calculations were performed in accordance with the methodology and parameters in the ODCM.

8. Additional Information

CR- 42403 – The July monthly liquid effluent composites were completed after the late date of August 7, 2011. Composites are due the 1st of each month, with a 25% grace period. All the necessary samples were available to make the composites, but there were no qualified technicians on site to perform the required calculations and preparations once it was recognized that composites were not done. Composites were completed satisfactorily on the next working day that qualified technicians were available, which was

August 8, 2011. This resulted in an Offsite Dose Calculation Manual surveillance being completed late. New surveillances were created and included in the site surveillance program to try to alleviate further instances of this happening.

Carbon-14 (CR 36059)

Regulation 10CFR50.36a requires nuclear power plants to report quantities of principal radionuclides in the annual radioactive effluent release report. In the early 1980s, the NRC decided that C-14 radionuclide would not be required to be reported because it would not make a significant contribution to dose. Since this time, technology has advanced both for effluent isotopic reduction and isotope detection and estimation. It is more likely the C-14 meets the definition of a principal radionuclide in accordance with the newly published Regulatory Guide 1.21 Revision 2 (June 2009).

The NRC allows the reporting of this isotope based on estimation methods. EPRI TR 1021106 developed an estimation method based on peer-reviewed research that incorporates parameters of Wolf Creek's reactor design to estimate the gross amount of C-14 produced annually. This value is fed into additional calculations, based on Regulatory Guide 1.109, Calculation of Annual Doses to Man From Routine Releases of Reactor Effluents For the Purpose of Evaluating Compliance with 10 CFR Part 50, Appendix I, to provide an estimation of annual dose. Based on the 2010 theoretical calculations and assuming the maximum percentage of inorganic C-14 compounds (30%), Wolf Creek has estimated the annual release of C-14 to be 10.7 curies and to contribute maximum dose values of 1.30 mrem/yr child bone dose and 0.259 mrem/yr child total body. This is well below the 10CFR50, Appendix I, ALARA design objective of 15 mrem/yr. Additionally, this value is on par with the dose expected from naturally occurring radiocarbon.

Nickel-63 Study

Regulation 10CFR50.36a requires nuclear power plants to report quantities of principal radionuclides in the annual radioactive effluent release report. To meet this requirement, periodic monitoring of potential isotopes in the waste streams is performed and any findings evaluated. Wolf Creek is not currently required by the ODCM to monitor for Ni-63 in the liquid effluents. However, to determine if Ni-63 is present in the liquid effluents, all 4th quarter liquid composites were analyzed for the nuclide. The Batch composite resulted in positive values of Ni-63. The remaining composites, Steam Generator Blowdown to the Lake, Waste Water Treatment, Turbine Building Sump and Lime Sludge Pond, were all none detected.

Using the Ni-63 detected in the quarterly Batch composite, the amount released for the year was conservatively estimated using the total liquid batch volume released and the total release duration for the year. Based on these estimates, Wolf Creek would release approximately 4.5E-04 mRem/year adult bone dose, which was the highest organ affected. Compared to 2.2E-01 mRem/year, which is the dose due to the highest organ for the year (adult Gi-LLI), the estimated Ni-63 bone dose is a minimal contributor. This estimation is well below the 10CFR50, Appendix I limit of 10 mRem/year to any organ.

2011 EFFLUENT CONCENTRATION LIMITS

<u>Nuclides</u>	<u>Curies</u>	<u>Average Diluted Concentration ($\mu\text{Ci/ml}$)</u>	<u>10 CFR 20 ECL ($\mu\text{Ci/ml}$)</u>	<u>% of ECL</u>
H-3	6.88E+02	9.42E-07	1.00E-03	9.42E-02
Na-24	N/A	N/A	5.00E-05	N/A
Cr-51	N/A	N/A	5.00E-04	N/A
Mn-54	2.28E-06	3.12E-15	3.00E-05	1.04E-08
Mn-56	N/A	N/A	7.00E-05	N/A
Fe-55	N/A	N/A	1.00E-04	N/A
Fe-59	N/A	N/A	1.00E-05	N/A
Co-57	N/A	N/A	6.00E-05	N/A
Co-58	1.26E-03	1.72E-12	2.00E-05	8.60E-06
Co-60	1.13E-04	1.55E-13	3.00E-06	5.17E-06
Ni-65	N/A	N/A	1.00E-04	N/A
Zn-65	N/A	N/A	5.00E-06	N/A
Rb-88	1.48E-04	2.03E-13	4.00E-04	5.08E-08
Sr-91	N/A	N/A	2.00E-05	N/A
Sr-92	N/A	N/A	4.00E-05	N/A
Nb-95	N/A	N/A	3.00E-05	N/A
Zr-95	N/A	N/A	2.00E-05	N/A
Nb-97	N/A	N/A	3.00E-04	N/A
Tc-99M	N/A	N/A	1.00E-03	N/A
Ag-110M	9.89E-07	1.35E-15	6.00E-06	2.25E-08
Sn-117M	N/A	N/A	3.00E-05	N/A
Sb-122	N/A	N/A	1.00E-05	N/A
Sb-124	3.92E-05	5.37E-14	7.00E-06	7.67E-07
Sb-125	2.68E-03	3.67E-12	3.00E-05	1.22E-05
Sb-126	N/A	N/A	7.00E-06	N/A
I-131	N/A	N/A	1.00E-06	N/A
I-133	N/A	N/A	7.00E-06	N/A
I-135	N/A	N/A	3.00E-05	N/A
Te-125M	2.62E-04	3.59E-13	2.00E-05	1.80E-06
Cs-134	N/A	N/A	9.00E-07	N/A
Cs-136	N/A	N/A	6.00E-06	N/A
Cs-137	3.10E-05	4.24E-14	1.00E-06	4.24E-06
Cs-138	N/A	N/A	4.00E-04	N/A
Ba-139	N/A	N/A	2.00E-04	N/A
Ba-140	N/A	N/A	8.00E-06	N/A
Ce-141	N/A	N/A	3.00E-05	N/A
W-187	N/A	N/A	3.00E-05	N/A
Ar-41	1.47E-05	2.01E-14	2.00E-04	1.00E-08
Kr-85	N/A	N/A	2.00E-04	N/A
Kr-85M	2.87E-05	3.93E-14	2.00E-04	1.96E-08
Kr-88	1.66E-05	2.27E-14	2.00E-04	1.14E-08
Xe-131M	N/A	N/A	2.00E-04	N/A
Xe-133M	4.72E-04	6.46E-13	2.00E-04	3.23E-07
Xe-133	2.23E-02	3.05E-11	2.00E-04	1.53E-05
Xe-135	3.35E-03	4.59E-12	2.00E-04	2.30E-06
Xe-138	N/A	N/A	2.00E-04	N/A

**EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT
2011 SOLID WASTE SHIPMENTS**

A. SOLID RADWASTE SHIPPED OFFSITE FOR BURIAL OR DISPOSAL (Not irradiated fuel)

1. Type of Waste	Unit	1- Year Period	Est. Total Error %
a. Spent resins, filter sludges evaporator bottoms, etc.	m3*	2.98E+01**	2.50E+01
	Ci	4.53E+02	
b. Dry compressible waste, contaminated equip. etc.	m3*	5.69E+02**	2.50E+01
	Ci	2.21E+01	
c. Irradiated components, control rods, etc.	m3*	0.00E+00	2.50E+01
	Ci	0.00E+00	
d. Other	m3*	1.54E+00	2.50E+01
	Ci	1.16E+00	

*m3 = cubic meters ** This is the volume sent offsite for volume reduction, prior to disposal.

2. Estimate of Major Nuclide Composition (by type of waste).

[Nuclides listed with % abundance greater than 10 %]

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

<u>Nuclide Name</u>	<u>Percent Abundance</u>	<u>Curies</u>
Fe-55	33.04	1.50E+02
Ni-63	56.48	2.56E+02

b. Dry compressible waste, contaminated equipment, etc.

<u>Nuclide Name</u>	<u>Percent Abundance</u>	<u>Curies</u>
Co-58	38.00	8.26E-02
Nb-95	24.07	5.24E-02
Zr-95	17.21	3.74E-02

c. Irradiated components, control rods, etc. - None

d. Other – Polyvinyl alcohol garments (Orex)

Sealed Sources (Department of Energy Source Recovery Project (OSRP))

<u>Nuclide Name</u>	<u>Percent Abundance</u>	<u>Curies</u>
Am-241	99.00	1.15E+00

3. Solid Waste Disposition

<u>Number of Shipments</u>	<u>Mode of Transportation</u>	<u>Destination</u>
5	Truck (Hittman Transport Services)	Energy Solutions; Oak Ridge, TN (Bear Creek)
3	Truck (Hittman Transport Services)	Studsvik Processing Facility, LLC; Erwin, TN
5	Truck (Hittman Transport Services)	Energy Solutions; Oak Ridge, TN (Gallaher Road)
1	Truck (R&R Trucking)	Studsvik Processing Facility, LLC; Memphis, TN
1	Truck (Hittman Transport Services)	Toxco Materials Management; Oak Ridge, TN
1	Truck (Tri-State Motor Transit)	IMPACT Services; Oak Ridge, TN
1	Truck (Eastern Technologies Inc (ETI))	ETI; Ashford, AL
1	Truck (Eastern Technologies Inc)	IMPACT Services; Oak Ridge, TN
1	Truck (R&R Trucking)	NSSI/Sources & Services; Houston, TX

4. Class of Solid Waste

- a. Class B - Corresponding to 2a
- b. Class A - Corresponding to 2b
- c. Not applicable
- d. Waste Classification not determined for 2d

5. Type of Container

- a. LSA (General Design), Type A - corresponding to 2a
- b. LSA (General Design) - corresponding to 2b
- c. Not applicable
- d. Type A – corresponding to 2d OSRP, LSA (General Design) – corresponding to 2d (Orex)

6. Solidification Agent

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

B. IRRADIATED FUEL SHIPMENTS (Disposition)

No irradiated fuel shipments occurred during the 2011 period.

SECTION III**HOURS AT EACH WIND SPEED AND DIRECTION**

This section documents WCGS meteorological data for wind speed, wind direction, and atmospheric stability.

The meteorological data supplied in the following tables covers the period from January 1, 2011, through December 31, 2011, and indicates the number of hours at each wind speed and direction for each stability class. All gaseous releases at the WCGS are ground level releases.

Wolf Creek Generating Station met Regulatory Guide 1.23 requirement for data recovery, for all instruments. The 60 Meter Wind speed had 93.5% data recovery. The remaining instruments, both at 10 and 60 meters, met or exceeded a 95% meteorological data recovery for 2011.

HOURS AT EACH WIND SPEED AND DIRECTION

PERIOD OF RECORD: JANUARY 1 THROUGH DECEMBER 31, 2011

STABILITY CLASS: A

ELEVATION: 10 METERS

WIND DIRECTION	WIND SPEED (mph)						TOTAL
	1-3	4-7	8-12	13-18	19-24	> 24	
N	0.50	5.00	16.00	9.25	5.00	1.25	37.00
NNE	0.25	19.75	21.00	10.75	3.25	0.50	55.50
NE	1.00	24.25	22.00	3.00	0.00	0.00	50.25
ENE	0.75	18.00	18.25	1.25	0.00	0.00	38.25
E	1.00	17.75	17.25	2.25	0.00	0.00	38.25
ESE	1.00	8.50	23.25	10.75	0.25	0.00	43.75
SE	1.25	16.00	36.25	11.25	2.00	0.00	66.75
SSE	0.75	16.25	72.00	27.75	9.25	2.75	128.75
S	0.50	10.50	70.00	87.25	44.25	6.50	219.00
SSW	0.50	6.75	34.75	40.25	7.75	2.00	92.00
SW	0.50	1.50	21.25	8.75	0.75	0.00	32.75
WSW	0.75	5.00	8.75	8.25	2.50	0.00	25.25
W	0.25	12.25	23.75	5.75	0.75	0.00	42.75
WNW	3.00	10.25	15.75	10.50	2.00	0.25	41.75
NW	0.75	10.75	21.50	26.75	7.00	1.00	67.75
NNW	0.50	6.50	17.50	23.75	11.25	2.50	62.00
TOTAL	12.75	189.00	439.25	287.50	96.00	16.75	1041.75

PERIOD OF CALM
(HOURS): 9.75

HOURS AT EACH WIND SPEED AND DIRECTION

PERIOD OF RECORD: JANUARY 1 THROUGH DECEMBER 31, 2011

STABILITY CLASS: B

ELEVATION: 10 METERS

WIND DIRECTION	WIND SPEED (mph)						TOTAL
	1-3	4-7	8-12	13-18	19-24	> 24	
N	0.50	3.25	10.50	9.25	3.25	0.50	27.25
NNE	0.75	11.75	8.50	2.50	0.00	0.00	23.50
NE	1.75	17.75	9.25	0.25	0.00	0.00	29.00
ENE	0.25	12.00	10.75	0.75	0.00	0.00	23.75
E	1.25	12.75	10.25	1.00	0.00	0.00	25.25
ESE	1.00	13.75	9.00	2.25	0.00	0.00	26.00
SE	1.50	12.50	11.25	4.00	0.50	0.00	29.75
SSE	1.00	12.25	13.75	5.50	3.00	0.50	36.00
S	1.75	6.25	17.00	15.50	9.75	4.75	55.00
SSW	0.25	5.50	15.50	14.50	1.00	1.50	38.25
SW	1.25	3.00	10.50	3.00	1.25	0.00	19.00
WSW	0.75	10.00	3.25	2.75	1.50	0.00	18.25
W	0.75	9.25	9.75	4.25	1.25	0.00	25.25
WNW	0.25	5.25	7.25	8.50	1.00	0.00	22.25
NW	0.75	7.50	13.00	7.25	4.25	0.25	33.00
NNW	0.00	8.50	14.75	46.00	3.00	0.75	73.00
TOTAL	13.25	151.25	174.25	127.25	29.75	8.25	504.50

PERIOD OF CALM
(HOURS): 2.75

HOURS AT EACH WIND SPEED AND DIRECTION

PERIOD OF RECORD: JANUARY 1 THROUGH DECEMBER 31, 2011

STABILITY CLASS: C

ELEVATION: 10 METERS

WIND DIRECTION	WIND SPEED (mph)						TOTAL
	1-3	4-7	8-12	13-18	19-24	> 24	
N	0.75	2.75	9.75	10.50	3.00	0.00	26.75
NNE	2.00	12.50	9.75	3.00	0.00	0.00	27.25
NE	1.50	13.25	11.25	0.25	0.00	0.00	26.25
ENE	2.25	7.00	11.25	0.75	0.00	0.00	21.25
E	1.75	11.00	12.25	0.50	0.00	0.00	25.50
ESE	2.50	11.00	9.50	2.75	0.00	0.00	25.75
SE	1.50	10.75	9.50	2.00	0.25	0.00	24.00
SSE	1.00	10.25	14.50	8.00	1.25	1.25	36.25
S	2.25	5.50	13.75	16.00	7.50	5.50	50.50
SSW	2.00	5.25	15.00	12.75	3.75	3.75	42.50
SW	1.75	4.00	4.00	1.00	1.50	0.00	12.25
WSW	1.00	9.00	3.25	1.25	0.25	0.25	15.00
W	0.75	7.75	6.50	1.75	0.25	0.00	17.00
WNW	2.00	4.50	6.50	3.50	1.25	0.25	18.00
NW	1.50	4.25	12.00	12.25	2.50	2.00	34.50
NNW	1.75	5.00	21.00	14.50	3.75	1.00	47.00
TOTAL	25.50	123.75	169.75	90.75	25.25	14.00	449.75

PERIOD OF CALM
(HOURS): 3.75

HOURS AT EACH WIND SPEED AND DIRECTION

PERIOD OF RECORD: JANUARY 1 THROUGH DECEMBER 31, 2011

STABILITY CLASS: D

ELEVATION: 10 METERS

WIND DIRECTION	WIND SPEED (mph)						TOTAL
	1-3	4-7	8-12	13-18	19-24	> 24	
N	8.50	36.00	102.75	119.00	30.25	2.75	299.25
NNE	14.00	83.00	122.50	57.00	1.75	0.25	278.50
NE	26.00	81.75	80.75	16.00	0.00	0.00	204.50
ENE	12.50	55.25	68.75	22.75	1.75	0.00	161.00
E	17.50	69.75	77.00	18.00	0.50	0.00	182.75
ESE	9.50	51.00	56.50	14.25	0.00	0.00	131.25
SE	11.25	29.75	60.00	17.75	2.25	2.50	123.50
SSE	7.25	42.75	95.50	48.75	11.50	2.00	207.75
S	6.75	29.75	81.50	99.75	59.50	34.75	312.00
SSW	4.75	31.00	76.00	48.25	16.25	11.75	188.00
SW	10.25	32.00	19.50	8.00	1.50	0.00	71.25
WSW	4.75	19.50	23.25	5.25	0.75	0.25	53.75
W	4.75	18.75	24.00	12.50	1.25	0.50	61.75
WNW	4.00	17.75	42.50	30.75	2.25	0.25	97.50
NW	2.50	22.25	73.25	60.50	13.25	12.25	184.00
NNW	6.50	30.25	87.25	117.25	43.50	5.75	290.50
TOTAL	142.25	650.50	1091.00	695.75	186.25	73.00	2847.25

PERIOD OF CALM
(HOURS): 7.50

HOURS AT EACH WIND SPEED AND DIRECTION

PERIOD OF RECORD: JANUARY 1 THROUGH DECEMBER 31, 2011

STABILITY CLASS: E

ELEVATION: 10 METERS

WIND DIRECTION	WIND SPEED (mph)						TOTAL
	1-3	4-7	8-12	13-18	19-24	> 24	
N	7.25	31.75	35.50	15.75	2.50	0.00	92.75
NNE	17.50	40.50	37.25	5.25	0.00	0.00	100.50
NE	18.00	46.25	15.00	5.00	0.00	0.00	84.25
ENE	5.75	54.00	28.25	1.00	0.00	0.00	89.00
E	17.00	82.75	40.75	2.00	0.00	0.00	142.50
ESE	14.00	75.00	62.00	3.50	0.50	0.00	155.00
SE	10.50	66.50	80.50	28.50	3.00	0.25	189.25
SSE	7.00	88.50	174.50	89.50	16.50	0.25	376.25
S	6.25	59.75	137.25	132.75	59.50	18.75	414.25
SSW	7.75	49.50	69.25	20.75	2.25	2.25	151.75
SW	13.00	59.75	15.50	2.50	0.50	0.00	91.25
WSW	6.25	37.50	11.50	2.00	0.00	0.00	57.25
W	3.00	35.75	30.50	4.25	0.00	0.00	73.50
WNW	4.25	34.25	32.50	4.75	0.00	0.00	75.75
NW	4.00	47.50	64.50	5.25	0.50	0.50	122.25
NNW	5.50	55.00	40.50	17.25	2.50	0.75	121.50
TOTAL	139.75	864.25	875.25	340.00	87.75	22.75	2337.00

PERIOD OF CALM
(HOURS): 2.25

HOURS AT EACH WIND SPEED AND DIRECTION

PERIOD OF RECORD: JANUARY 1 THROUGH DECEMBER 31, 2011

STABILITY CLASS: F

ELEVATION: 10 METERS

WIND DIRECTION	WIND SPEED (mph)						TOTAL
	1-3	4-7	8-12	13-18	19-24	> 24	
N	9.75	42.50	11.00	0.00	0.00	0.00	63.25
NNE	19.50	50.75	7.25	0.00	0.00	0.00	77.50
NE	18.25	27.50	1.00	0.00	0.00	0.00	46.75
ENE	6.25	36.50	3.75	0.00	0.00	0.00	46.50
E	8.25	68.25	3.75	0.00	0.00	0.00	80.25
ESE	9.75	64.00	4.50	0.25	0.00	0.00	78.50
SE	8.75	87.00	18.50	0.25	0.00	0.00	114.50
SSE	6.50	78.75	34.25	9.00	0.50	0.00	129.00
S	5.00	26.00	21.75	12.25	9.00	2.25	76.25
SSW	4.25	14.25	10.50	0.75	0.00	0.00	29.75
SW	7.00	30.50	0.75	0.00	0.25	0.00	38.50
WSW	9.25	16.25	2.00	0.25	0.00	0.00	27.75
W	4.75	9.25	3.00	0.00	0.00	0.00	17.00
WNW	3.50	8.00	1.00	0.00	0.00	0.00	12.50
NW	9.25	32.50	4.75	0.00	0.00	0.00	46.50
NNW	12.00	42.00	18.50	0.50	0.00	0.00	73.00
TOTAL	132.25	634.00	146.25	23.25	9.75	2.25	957.50

PERIOD OF CALM
(HOURS): 1.25

HOURS AT EACH WIND SPEED AND DIRECTION

PERIOD OF RECORD: JANUARY 1 THROUGH DECEMBER 31, 2011

STABILITY CLASS: G

ELEVATION: 10 METERS

WIND DIRECTION	WIND SPEED (mph)						TOTAL
	1-3	4-7	8-12	13-18	19-24	> 24	
N	11.75	24.25	3.25	0.00	0.00	0.00	39.25
NNE	25.75	46.25	3.50	0.25	0.00	0.00	75.75
NE	25.00	21.75	1.00	0.00	0.00	0.00	47.75
ENE	6.25	31.25	0.50	0.00	0.00	0.00	38.00
E	7.75	34.25	0.25	0.00	0.00	0.00	42.25
ESE	6.00	35.75	0.50	0.75	0.00	0.00	43.00
SE	4.25	41.25	1.25	0.25	0.00	0.00	47.00
SSE	3.75	24.50	3.75	1.00	0.50	0.00	33.50
S	2.50	8.50	4.00	0.25	0.00	0.00	15.25
SSW	1.75	5.50	2.50	0.00	0.00	0.00	9.75
SW	3.00	4.50	0.00	0.25	0.00	0.00	7.75
WSW	2.25	4.50	0.00	0.00	0.00	0.00	6.75
W	3.25	1.75	0.00	0.00	0.00	0.00	5.00
WNW	5.50	2.00	0.00	0.00	0.00	0.00	7.50
NW	8.00	12.75	1.75	0.00	0.00	0.00	22.50
NNW	14.50	34.25	5.50	0.00	0.00	0.00	54.25
TOTAL	119.50	333.00	27.75	2.75	0.50	0.00	495.25

PERIOD OF CALM
(HOURS): 4.50

HOURS AT EACH WIND SPEED AND DIRECTION

PERIOD OF RECORD: JANUARY 1 THROUGH DECEMBER 31, 2011

STABILITY CLASS: ALL

ELEVATION: 10 METERS

WIND DIRECTION	WIND SPEED (mph)						TOTAL
	1-3	4-7	8-12	13-18	19-24	> 24	
N	39.00	145.50	188.75	163.75	44.00	4.50	585.50
NNE	79.75	264.50	209.75	78.75	5.00	0.75	638.50
NE	91.50	232.50	140.25	24.50	0.00	0.00	488.75
ENE	34.00	214.00	141.50	26.50	1.75	0.00	417.75
E	54.50	296.50	161.50	23.75	0.50	0.00	536.75
ESE	43.75	259.00	165.25	34.50	0.75	0.00	503.25
SE	39.00	263.75	217.25	64.00	8.00	2.75	594.75
SSE	27.25	273.25	408.25	189.50	42.50	6.75	947.50
S	25.00	146.25	345.25	363.75	189.50	72.50	1142.25
SSW	21.25	117.75	223.50	137.25	31.00	21.25	552.00
SW	36.75	135.25	71.50	23.50	5.75	0.00	272.75
WSW	25.00	101.75	52.00	19.75	5.00	0.50	204.00
W	17.50	94.75	97.50	28.50	3.50	0.50	242.25
WNW	22.50	82.00	105.50	58.00	6.50	0.75	275.25
NW	26.75	137.50	190.75	112.00	27.50	16.00	510.50
NNW	40.75	181.50	205.00	219.25	64.00	10.75	721.25
TOTAL	624.25	2945.75	2923.50	1567.25	435.25	137.00	8633.00

PERIOD OF CALM
(HOURS): 31.75

Maximum
Hours of
Invalid
Data: 95.5

SECTION IV

ADDITIONAL INFORMATION

1. **Unplanned or Abnormal Releases**

No unplanned, unmonitored release occurred in 2011.

2. **Offsite Dose Calculation Manual (ODCM)**

The ODCM is in the form of two separate Wolf Creek Nuclear Operating Corporation (WCNOC) administrative procedures. One of these procedures, the WCNOC "Offsite Dose Calculation Manual", AP 07B-003, Revision 7, is included with this report as Enclosure I. The other procedure, "Offsite Dose Calculation Manual (Radiological Environmental Monitoring Program)," AP 07B-004, Revision 18, is included with this report as Enclosure II.

3. **Major Changes to Liquid, Solid, or Gaseous Radioactive Waste Treatment Systems**

No major modifications were made to the Solid, Liquid or Gaseous Radwaste Systems in 2011 that alter the capacity or handling of Radioactive Wastes or differ in the method of treatment.

4. **Land Use Census**

There were 3 changes to the nearest occupied residence and 7 changes for the nearest garden producing broadleaf vegetation (per AP 07B-004, Offsite Dose Calculation Manual [Radiological Environmental Monitoring Program]).

5. **Radwaste Shipments**

Nineteen shipments of radioactive waste occurred during this report period. Section II, Subsection 3 of this report (Solid Waste Shipments) contains specific details regarding each shipment's mode of transportation and destination.

6. **Inoperability of Effluent Monitoring Instrumentation**

No events occurred that potentially violated ODCM Requirements Tables 2-2 and 3-2, liquid or gaseous effluent monitoring instrumentation.

7. **Storage Tanks**

At no time during the year 2011 was there an event that led to liquid holdup tanks or gas storage tanks exceeding the limits of Technical Requirements Manual Sections 3.10.1 or 3.10.3. Technical Specification requirements for the program are now covered by Technical Requirements Manual Section 3.10, "Explosive Gas and Storage Tank Radioactivity Monitoring."

8. NEI Groundwater Protection Industry Initiative

ONSITE GROUNDWATER PROTECTION PROGRAM MONITORING

Objective

The objective of onsite groundwater protection program monitoring is to detect potential leaks of radioactivity from systems, structures, or components to the groundwater. At the Wolf Creek Generating Station, some background tritium influences from lake water are normal and expected.

Basis

The onsite groundwater protection program monitoring sample results are being reported in the Radioactive Effluent Release Report per guidance received in association with the Nuclear Energy Institute (NEI) Groundwater Protection Industry Initiative. The following information is also being reported in association with the NEI 07-07 Groundwater Protection Industry Initiative:

1. Describe any onsite licensed radioactive materials releases or spills that were voluntarily communicated to State/Local officials during the calendar year. - None
2. Describe any onsite groundwater sample results that exceeded the reporting thresholds that were voluntarily communicated to State/Local officials during the calendar year. - None

Onsite Groundwater Protection Program Monitoring Description

In March of 2006, Wolf Creek Generating Station (WCGS) established an onsite groundwater protection monitoring program. During 2008, thirteen monitoring wells were added to the onsite groundwater protection monitoring program. The onsite groundwater protection program monitoring is implemented via procedure AI 07-007, *Onsite Groundwater Protection Program Monitoring*. The onsite groundwater samples were collected by the WCGS Environmental Management group and were analyzed by Environmental, Inc., Midwest Laboratory. Onsite groundwater samples were collected quarterly and were analyzed by gamma isotopic analysis, radiochemical analysis for I-131 and tritium analysis. The vendor lab participated in an interlaboratory comparison program. The following tables describe the sample locations, the lower limits of detection and the reporting levels for radioactivity detected.

Sample Location	Sample Location Description
AUX	Dewatering Well located near the Auxiliary Building, on East Side
EAST ESW-W	Essential Service Water Dewatering Well, East Group, West well, located southeast of the reactor
MW-01A	Monitoring Well, shallow depth, located northeast of the reactor
MW-01B	Monitoring Well, mid-range depth, located northeast of the reactor
MW-01C	Monitoring Well, deep depth, located northeast of the reactor
MW-02A	Monitoring Well, shallow depth, located northwest of the reactor
MW-02B	Monitoring Well, mid-range depth, located northwest of the reactor
MW-03A	Monitoring Well, shallow depth, located southwest of the reactor
MW-03B	Monitoring Well, mid-range depth, located southwest of the reactor
MW-03C	Monitoring Well, deep depth, located southwest of the reactor
MW-04A	Monitoring Well, shallow depth, located southwest of the reactor
MW-04B	Monitoring Well, mid-range depth, located southwest of the reactor
MW-05A	Monitoring Well, shallow depth, located south of the reactor
MW-05B	Monitoring Well, mid-range depth, located south of the reactor
MW-05C	Monitoring Well, deep depth, located south of the reactor
WEST ESW-W	Essential Service Water Dewatering Well, West Group, West well, located south of the reactor

Onsite Groundwater Lower Limits of Detection

Analysis	(pCi/L)	Analysis	(pCi/L)
H-3	2,000	Zr-Nb-95	15
Mn-54	15	I-131	1
Co-58	15	Cs-134	15
Fe-59	30	Cs-137	18
Co-60	15	Ba-La-140	15
Zn-65	30		

Reporting Levels for Radioactivity Detected in Onsite Groundwater

Analysis	(pCi/L)	Analysis	(pCi/L)
H-3	20,000	Zr-Nb-95	400
Mn-54	1,000	I-131	2
Co-58	1,000	Cs-134	30
Fe-59	400	Cs-137	50
Co-60	300	Ba-La-140	200
Zn-65	300		

Discussion of Results

Low levels of tritium continue to be detected in the West Essential Service Water Dewatering Well and in the Dewatering Well located near the Auxiliary Building, all within areas of backfill during plant construction. This has been attributed to the Plant's reuse of tritiated lake water, and consistent with gaseous tritium deposition during normal operation. Lake water is used for plant cooling, which includes essential service water, and in the Fire Protection System. The location with the highest level of tritium detected was WEST ESW-W (2,097 +/- 154 pCi/L), which likely resulted from direct lake water inputs from an essential service water pipe leak. The leak has since been repaired. The measured tritium levels are significantly lower than the tritium levels routinely detected in surface water collected from Coffey County Lake (2011 range was 9,847 to 15,523 pCi/L). Tritium activity was not detected in any of the groundwater samples obtained from the onsite monitoring wells that were drilled in 2008, indicating no tritium infiltration to the natural geological strata.

The tritium activity was the only activity detected in the onsite groundwater samples. Lower limits of detection were met and sample analysis results were below the applicable reporting levels.

Subsurface Water

Due to Industry Operating Experience, the Wolf Creek Generating Station started collecting and analyzing subsurface water during 2010. Subsurface water monitoring is a portion of the Groundwater Protection Program and is implemented via procedure AI 07-007, *Onsite Groundwater Protection Program Monitoring*. The definitions for subsurface water include:

1. Water that is encountered below grade while excavating, trenching, or drilling outside of the Radiologically Controlled Area and within the area displayed in Figure 2 (of AI 07-007). This excludes recent rainfall build-up in open excavation trenches.
2. Water that is encountered below grade or water that needs to be removed that is outside of a building, outside of the Radiologically Controlled Area and within the area displayed in Figure 2 (of AI 07-007). Examples may include electrical vaults, piping vaults, valve pits, manholes, concrete pits, etc. Excludes removing water from powerblock sumps, sanitary sewers, spill containment berms or from within buildings.

The collection of subsurface water samples was coordinated by the WCGS Environmental Management group and the samples were analyzed by the WCGS Chemistry Laboratory. The subsurface water samples were analyzed for tritium. The following table identifies the sample dates, sample locations, and the analysis results.

Date	Location	Tritium (pCi/L)	Notes
3/16/11	Essential Service Water (ESW) Vault, piping, West of Control Building	3,739	No Gamma Emitters Detected
4/30/11	Cable Pull Manhole 120, Between Turbine Building and Shop Building, north end.	Less Than Minimum Detectable Activity	No Gamma Emitters Detected
6/23/11	XMA01A, XMA01B, XMA01C & XMA02 Transformer Discharge Vault	<1,931	
6/23/11	XMA01D Transformer Discharge Vault	<1,913	
6/23/11	XMR01 Transformer Discharge Vault	2,860	
6/23/11	XPB03 & XPB04 Transformer Discharge Vault	<1,936	
6/23/11	XNB01 & XNB02 Transformer Discharge Vault	<1,913	

As expected, tritium activity was detected in two of the subsurface water samples. The sample from the ESW vault was also analyzed for gamma activity and gamma emitters were not detected. Again, the detected tritium activity is likely due to the Plant's reuse of tritiated lake water. Lake water is used for plant cooling, which includes essential service water, and in the Fire Protection System. The measured tritium levels from subsurface water monitoring are lower than the tritium levels routinely detected in surface water collected from Coffey County Lake (2011 range was 9,847 to 15,523 pCi/L).

Conclusion

Based upon the results of the water samples that were analyzed in association with the Onsite Groundwater Protection Program, no potential leaks of radioactivity from systems, structures, or components were identified.

**Onsite Groundwater Results
Concentration (pCi/L)**

LOCATION	DUPLICATE	COLLECTION DATE	NUCLIDE	ACTIVITY	SIGN	ERROR
AUX		28-Feb-11	MN-54		<	2.7
AUX		28-Feb-11	CO-58		<	3.1
AUX		28-Feb-11	FE-59		<	3.7
AUX		28-Feb-11	CO-60		<	2.5
AUX		28-Feb-11	ZN-65		<	4.4
AUX		28-Feb-11	ZR-NB-95		<	2.7
AUX		28-Feb-11	CS-134		<	2.8
AUX		28-Feb-11	CS-137		<	3.0
AUX		28-Feb-11	BA-LA-140		<	2.1
AUX		28-Feb-11	H-3	679	+/-	106
AUX		28-Feb-11	I-131 (CHEM)		<	0.450
AUX		21-May-11	MN-54		<	2.2
AUX		21-May-11	CO-58		<	2.0
AUX		21-May-11	FE-59		<	4.8
AUX		21-May-11	CO-60		<	3.1
AUX		21-May-11	ZN-65		<	5.0
AUX		21-May-11	ZR-NB-95		<	2.5
AUX		21-May-11	CS-134		<	2.9
AUX		21-May-11	CS-137		<	3.2
AUX		21-May-11	BA-LA-140		<	3.1
AUX		21-May-11	H-3	1337	+/-	124
AUX		21-May-11	I-131 (CHEM)		<	0.317
AUX		17-Aug-11	MN-54		<	2.8
AUX		17-Aug-11	CO-58		<	3.3
AUX		17-Aug-11	FE-59		<	3.4
AUX		17-Aug-11	CO-60		<	2.3
AUX		17-Aug-11	ZN-65		<	4.0
AUX		17-Aug-11	ZR-NB-95		<	2.8
AUX		17-Aug-11	CS-134		<	3.3
AUX		17-Aug-11	CS-137		<	2.8
AUX		17-Aug-11	BA-LA-140		<	3.0
AUX		17-Aug-11	H-3	1999	+/-	141
AUX		17-Aug-11	I-131 (CHEM)		<	0.421
AUX		9-Nov-11	MN-54		<	4.1
AUX		9-Nov-11	CO-58		<	4.4
AUX		9-Nov-11	FE-59		<	5.0
AUX		9-Nov-11	CO-60		<	4.1
AUX		9-Nov-11	ZN-65		<	3.1
AUX		9-Nov-11	ZR-NB-95		<	3.7
AUX		9-Nov-11	CS-134		<	3.7

**Onsite Groundwater Results
Concentration (pCi/L)**

LOCATION	DUPLICATE	COLLECTION DATE	NUCLIDE	ACTIVITY	SIGN	ERROR
AUX		9-Nov-11	CS-137		<	4.4
AUX		9-Nov-11	BA-LA-140		<	6.1
AUX		9-Nov-11	H-3	1915	+/-	144
AUX		9-Nov-11	I-131 (CHEM)		<	0.463
EAST ESW-W		28-Feb-11	MN-54		<	2.5
EAST ESW-W		28-Feb-11	CO-58		<	1.8
EAST ESW-W		28-Feb-11	FE-59		<	7.3
EAST ESW-W		28-Feb-11	CO-60		<	2.9
EAST ESW-W		28-Feb-11	ZN-65		<	4.8
EAST ESW-W		28-Feb-11	ZR-NB-95		<	3.5
EAST ESW-W		28-Feb-11	CS-134		<	3.7
EAST ESW-W		28-Feb-11	CS-137		<	1.7
EAST ESW-W		28-Feb-11	BA-LA-140		<	3.1
EAST ESW-W		28-Feb-11	H-3		<	152
EAST ESW-W		28-Feb-11	I-131 (CHEM)		<	0.448
EAST ESW-W		21-May-11	MN-54		<	3.2
EAST ESW-W		21-May-11	CO-58		<	3.9
EAST ESW-W		21-May-11	FE-59		<	6.1
EAST ESW-W		21-May-11	CO-60		<	2.0
EAST ESW-W		21-May-11	ZN-65		<	4.7
EAST ESW-W		21-May-11	ZR-NB-95		<	2.4
EAST ESW-W		21-May-11	CS-134		<	4.1
EAST ESW-W		21-May-11	CS-137		<	3.6
EAST ESW-W		21-May-11	BA-LA-140		<	5.4
EAST ESW-W		21-May-11	H-3		<	141
EAST ESW-W		21-May-11	I-131 (CHEM)		<	0.454
EAST ESW-W		17-Aug-11	MN-54		<	2.5
EAST ESW-W		17-Aug-11	CO-58		<	3.5
EAST ESW-W		17-Aug-11	FE-59		<	3.7
EAST ESW-W		17-Aug-11	CO-60		<	1.7
EAST ESW-W		17-Aug-11	ZN-65		<	3.7
EAST ESW-W		17-Aug-11	ZR-NB-95		<	3.7
EAST ESW-W		17-Aug-11	CS-134		<	2.6
EAST ESW-W		17-Aug-11	CS-137		<	2.4
EAST ESW-W		17-Aug-11	BA-LA-140		<	2.9
EAST ESW-W		17-Aug-11	H-3		<	139
EAST ESW-W		17-Aug-11	I-131 (CHEM)		<	0.240
EAST ESW-W		9-Nov-11	MN-54		<	2.6
EAST ESW-W		9-Nov-11	CO-58		<	2.3
EAST ESW-W		9-Nov-11	FE-59		<	5.7
EAST ESW-W		9-Nov-11	CO-60		<	1.4

**Onsite Groundwater Results
Concentration (pCi/L)**

LOCATION	DUPLICATE	COLLECTION DATE	NUCLIDE	ACTIVITY	SIGN	ERROR
EAST ESW-W		9-Nov-11	ZN-65		<	6.2
EAST ESW-W		9-Nov-11	ZR-NB-95		<	4.1
EAST ESW-W		9-Nov-11	CS-134		<	3.2
EAST ESW-W		9-Nov-11	CS-137		<	3.2
EAST ESW-W		9-Nov-11	BA-LA-140		<	3.7
EAST ESW-W		9-Nov-11	H-3		<	147
EAST ESW-W		9-Nov-11	I-131 (CHEM)		<	0.448
MW-01A		28-Feb-11	MN-54		<	5.5
MW-01A		28-Feb-11	CO-58		<	5.0
MW-01A		28-Feb-11	FE-59		<	9.5
MW-01A		28-Feb-11	CO-60		<	3.4
MW-01A		28-Feb-11	ZN-65		<	7.8
MW-01A		28-Feb-11	ZR-NB-95		<	4.3
MW-01A		28-Feb-11	CS-134		<	4.7
MW-01A		28-Feb-11	CS-137		<	5.9
MW-01A		28-Feb-11	BA-LA-140		<	6.9
MW-01A		28-Feb-11	H-3		<	152
MW-01A		28-Feb-11	I-131 (CHEM)		<	0.429
MW-01A		19-May-11	MN-54		<	2.3
MW-01A		19-May-11	CO-58		<	1.8
MW-01A		19-May-11	FE-59		<	5.6
MW-01A		19-May-11	CO-60		<	2.3
MW-01A		19-May-11	ZN-65		<	6.5
MW-01A		19-May-11	ZR-NB-95		<	2.8
MW-01A		19-May-11	CS-134		<	2.0
MW-01A		19-May-11	CS-137		<	2.8
MW-01A		19-May-11	BA-LA-140		<	3.9
MW-01A		19-May-11	H-3		<	141
MW-01A		19-May-11	I-131 (CHEM)		<	0.416
MW-01A		29-Aug-11	MN-54		<	3.4
MW-01A		29-Aug-11	CO-58		<	1.7
MW-01A		29-Aug-11	FE-59		<	2.5
MW-01A		29-Aug-11	CO-60		<	1.7
MW-01A		29-Aug-11	ZN-65		<	7.2
MW-01A		29-Aug-11	ZR-NB-95		<	3.0
MW-01A		29-Aug-11	CS-134		<	3.2
MW-01A		29-Aug-11	CS-137		<	3.5
MW-01A		29-Aug-11	BA-LA-140		<	2.9
MW-01A		29-Aug-11	H-3		<	151
MW-01A		29-Aug-11	I-131 (CHEM)		<	0.265
MW-01A		9-Nov-11	MN-54		<	2.1

**Onsite Groundwater Results
Concentration (pCi/L)**

LOCATION	DUPLICATE	COLLECTION DATE	NUCLIDE	ACTIVITY	SIGN	ERROR
MW-01A		9-Nov-11	CO-58		<	3.3
MW-01A		9-Nov-11	FE-59		<	5.7
MW-01A		9-Nov-11	CO-60		<	2.0
MW-01A		9-Nov-11	ZN-65		<	5.0
MW-01A		9-Nov-11	ZR-NB-95		<	3.7
MW-01A		9-Nov-11	CS-134		<	3.0
MW-01A		9-Nov-11	CS-137		<	3.2
MW-01A		9-Nov-11	BA-LA-140		<	2.7
MW-01A		9-Nov-11	H-3		<	147
MW-01A		9-Nov-11	I-131 (CHEM)		<	0.340
MW-01B		28-Feb-11	MN-54		<	2.7
MW-01B		28-Feb-11	CO-58		<	1.7
MW-01B		28-Feb-11	FE-59		<	3.8
MW-01B		28-Feb-11	CO-60		<	2.8
MW-01B		28-Feb-11	ZN-65		<	3.2
MW-01B		28-Feb-11	ZR-NB-95		<	2.6
MW-01B		28-Feb-11	CS-134		<	2.6
MW-01B		28-Feb-11	CS-137		<	2.8
MW-01B		28-Feb-11	BA-LA-140		<	2.5
MW-01B		28-Feb-11	H-3		<	161
MW-01B		28-Feb-11	I-131 (CHEM)		<	0.384
MW-01B		19-May-11	MN-54		<	2.1
MW-01B		19-May-11	CO-58		<	2.2
MW-01B		19-May-11	FE-59		<	4.7
MW-01B		19-May-11	CO-60		<	1.8
MW-01B		19-May-11	ZN-65		<	3.6
MW-01B		19-May-11	ZR-NB-95		<	2.7
MW-01B		19-May-11	CS-134		<	2.2
MW-01B		19-May-11	CS-137		<	2.7
MW-01B		19-May-11	BA-LA-140		<	2.5
MW-01B		19-May-11	H-3		<	141
MW-01B		19-May-11	I-131 (CHEM)		<	0.430
MW-01B		29-Aug-11	MN-54		<	2.1
MW-01B		29-Aug-11	CO-58		<	3.0
MW-01B		29-Aug-11	FE-59		<	3.7
MW-01B		29-Aug-11	CO-60		<	1.5
MW-01B		29-Aug-11	ZN-65		<	5.2
MW-01B		29-Aug-11	ZR-NB-95		<	1.7
MW-01B		29-Aug-11	CS-134		<	2.9
MW-01B		29-Aug-11	CS-137		<	2.5
MW-01B		29-Aug-11	BA-LA-140		<	2.4

**Onsite Groundwater Results
Concentration (pCi/L)**

LOCATION	DUPLICATE	COLLECTION DATE	NUCLIDE	ACTIVITY	SIGN	ERROR
MW-01B		29-Aug-11	H-3		<	151
MW-01B		29-Aug-11	I-131 (CHEM)		<	0.286
MW-01B		9-Nov-11	MN-54		<	2.9
MW-01B		9-Nov-11	CO-58		<	2.4
MW-01B		9-Nov-11	FE-59		<	4.8
MW-01B		9-Nov-11	CO-60		<	2.7
MW-01B		9-Nov-11	ZN-65		<	5.8
MW-01B		9-Nov-11	ZR-NB-95		<	2.1
MW-01B		9-Nov-11	CS-134		<	2.8
MW-01B		9-Nov-11	CS-137		<	2.9
MW-01B		9-Nov-11	BA-LA-140		<	2.4
MW-01B		9-Nov-11	H-3		<	147
MW-01B		9-Nov-11	I-131 (CHEM)		<	0.395
MW-01C		28-Feb-11	MN-54		<	2.8
MW-01C		28-Feb-11	CO-58		<	1.9
MW-01C		28-Feb-11	FE-59		<	3.0
MW-01C		28-Feb-11	CO-60		<	1.3
MW-01C		28-Feb-11	ZN-65		<	2.3
MW-01C		28-Feb-11	ZR-NB-95		<	1.8
MW-01C		28-Feb-11	CS-134		<	2.2
MW-01C		28-Feb-11	CS-137		<	2.8
MW-01C		28-Feb-11	BA-LA-140		<	2.1
MW-01C		28-Feb-11	H-3		<	161
MW-01C		28-Feb-11	I-131 (CHEM)		<	0.354
MW-01C		19-May-11	MN-54		<	2.3
MW-01C		19-May-11	CO-58		<	1.7
MW-01C		19-May-11	FE-59		<	2.7
MW-01C		19-May-11	CO-60		<	1.7
MW-01C		19-May-11	ZN-65		<	3.2
MW-01C		19-May-11	ZR-NB-95		<	2.6
MW-01C		19-May-11	CS-134		<	2.1
MW-01C		19-May-11	CS-137		<	2.5
MW-01C		19-May-11	BA-LA-140		<	1.4
MW-01C		19-May-11	H-3		<	141
MW-01C		19-May-11	I-131 (CHEM)		<	0.340
MW-01C		29-Aug-11	MN-54		<	2.9
MW-01C		29-Aug-11	CO-58		<	2.1
MW-01C		29-Aug-11	FE-59		<	2.5
MW-01C		29-Aug-11	CO-60		<	2.7
MW-01C		29-Aug-11	ZN-65		<	3.7
MW-01C		29-Aug-11	ZR-NB-95		<	2.5

**Onsite Groundwater Results
Concentration (pCi/L)**

LOCATION	DUPLICATE	COLLECTION DATE	NUCLIDE	ACTIVITY	SIGN	ERROR
MW-01C		29-Aug-11	CS-134		<	3.0
MW-01C		29-Aug-11	CS-137		<	2.7
MW-01C		29-Aug-11	BA-LA-140		<	2.6
MW-01C		29-Aug-11	H-3		<	149
MW-01C		29-Aug-11	I-131 (CHEM)		<	0.253
MW-01C		9-Nov-11	MN-54		<	2.7
MW-01C		9-Nov-11	CO-58		<	3.1
MW-01C		9-Nov-11	FE-59		<	5.9
MW-01C		9-Nov-11	CO-60		<	2.4
MW-01C		9-Nov-11	ZN-65		<	2.8
MW-01C		9-Nov-11	ZR-NB-95		<	2.6
MW-01C		9-Nov-11	CS-134		<	3.0
MW-01C		9-Nov-11	CS-137		<	4.1
MW-01C		9-Nov-11	BA-LA-140		<	2.1
MW-01C		9-Nov-11	H-3		<	147
MW-01C		9-Nov-11	I-131 (CHEM)		<	0.298
MW-02A		28-Feb-11	MN-54		<	2.5
MW-02A		28-Feb-11	CO-58		<	2.2
MW-02A		28-Feb-11	FE-59		<	6.1
MW-02A		28-Feb-11	CO-60		<	3.7
MW-02A		28-Feb-11	ZN-65		<	5.3
MW-02A		28-Feb-11	ZR-NB-95		<	3.0
MW-02A		28-Feb-11	CS-134		<	3.2
MW-02A		28-Feb-11	CS-137		<	3.1
MW-02A		28-Feb-11	BA-LA-140		<	3.0
MW-02A		28-Feb-11	H-3		<	161
MW-02A		28-Feb-11	I-131 (CHEM)		<	0.422
MW-02A		19-May-11	MN-54		<	1.7
MW-02A		19-May-11	CO-58		<	1.5
MW-02A		19-May-11	FE-59		<	4.5
MW-02A		19-May-11	CO-60		<	1.5
MW-02A		19-May-11	ZN-65		<	2.4
MW-02A		19-May-11	ZR-NB-95		<	2.9
MW-02A		19-May-11	CS-134		<	3.2
MW-02A		19-May-11	CS-137		<	2.4
MW-02A		19-May-11	BA-LA-140		<	4.0
MW-02A		19-May-11	H-3		<	141
MW-02A		19-May-11	I-131 (CHEM)		<	0.485
MW-02A		29-Aug-11	MN-54		<	3.2
MW-02A		29-Aug-11	CO-58		<	1.3
MW-02A		29-Aug-11	FE-59		<	4.9

**Onsite Groundwater Results
Concentration (pCi/L)**

LOCATION	DUPLICATE	COLLECTION DATE	NUCLIDE	ACTIVITY	SIGN	ERROR
MW-02A		29-Aug-11	CO-60		<	2.9
MW-02A		29-Aug-11	ZN-65		<	5.2
MW-02A		29-Aug-11	ZR-NB-95		<	2.3
MW-02A		29-Aug-11	CS-134		<	2.5
MW-02A		29-Aug-11	CS-137		<	3.1
MW-02A		29-Aug-11	BA-LA-140		<	3.2
MW-02A		29-Aug-11	H-3		<	151
MW-02A		29-Aug-11	I-131 (CHEM)		<	0.264
MW-02A		9-Nov-11	MN-54		<	2.7
MW-02A		9-Nov-11	CO-58		<	2.1
MW-02A		9-Nov-11	FE-59		<	6.9
MW-02A		9-Nov-11	CO-60		<	3.5
MW-02A		9-Nov-11	ZN-65		<	3.7
MW-02A		9-Nov-11	ZR-NB-95		<	5.3
MW-02A		9-Nov-11	CS-134		<	3.0
MW-02A		9-Nov-11	CS-137		<	4.9
MW-02A		9-Nov-11	BA-LA-140		<	5.0
MW-02A		9-Nov-11	H-3		<	147
MW-02A		9-Nov-11	I-131 (CHEM)		<	0.471
MW-02B		28-Feb-11	MN-54		<	5.6
MW-02B		28-Feb-11	CO-58		<	3.9
MW-02B		28-Feb-11	FE-59		<	8.7
MW-02B		28-Feb-11	CO-60		<	2.3
MW-02B		28-Feb-11	ZN-65		<	9.4
MW-02B		28-Feb-11	ZR-NB-95		<	2.7
MW-02B		28-Feb-11	CS-134		<	3.7
MW-02B		28-Feb-11	CS-137		<	3.8
MW-02B		28-Feb-11	BA-LA-140		<	4.5
MW-02B		28-Feb-11	H-3		<	161
MW-02B		28-Feb-11	I-131 (CHEM)		<	0.464
MW-02B		19-May-11	MN-54		<	2.9
MW-02B		19-May-11	CO-58		<	2.6
MW-02B		19-May-11	FE-59		<	3.6
MW-02B		19-May-11	CO-60		<	1.5
MW-02B		19-May-11	ZN-65		<	2.8
MW-02B		19-May-11	ZR-NB-95		<	3.2
MW-02B		19-May-11	CS-134		<	3.1
MW-02B		19-May-11	CS-137		<	1.4
MW-02B		19-May-11	BA-LA-140		<	1.8
MW-02B		19-May-11	H-3		<	141
MW-02B		19-May-11	I-131 (CHEM)		<	0.422

**Onsite Groundwater Results
Concentration (pCi/L)**

LOCATION	DUPLICATE	COLLECTION DATE	NUCLIDE	ACTIVITY	SIGN	ERROR
MW-02B		29-Aug-11	MN-54		<	2.5
MW-02B		29-Aug-11	CO-58		<	1.2
MW-02B		29-Aug-11	FE-59		<	2.3
MW-02B		29-Aug-11	CO-60		<	2.4
MW-02B		29-Aug-11	ZN-65		<	6.4
MW-02B		29-Aug-11	ZR-NB-95		<	2.7
MW-02B		29-Aug-11	CS-134		<	2.1
MW-02B		29-Aug-11	CS-137		<	3.8
MW-02B		29-Aug-11	BA-LA-140		<	2.3
MW-02B		29-Aug-11	H-3		<	151
MW-02B		29-Aug-11	I-131 (CHEM)		<	0.233
MW-02B		9-Nov-11	MN-54		<	5.0
MW-02B		9-Nov-11	CO-58		<	2.2
MW-02B		9-Nov-11	FE-59		<	8.0
MW-02B		9-Nov-11	CO-60		<	4.6
MW-02B		9-Nov-11	ZN-65		<	7.4
MW-02B		9-Nov-11	ZR-NB-95		<	4.9
MW-02B		9-Nov-11	CS-134		<	4.8
MW-02B		9-Nov-11	CS-137		<	3.5
MW-02B		9-Nov-11	BA-LA-140		<	4.7
MW-02B		9-Nov-11	H-3		<	147
MW-02B		9-Nov-11	I-131 (CHEM)		<	0.435
MW-03A		28-Feb-11	MN-54		<	2.7
MW-03A		28-Feb-11	CO-58		<	2.0
MW-03A		28-Feb-11	FE-59		<	4.4
MW-03A		28-Feb-11	CO-60		<	2.9
MW-03A		28-Feb-11	ZN-65		<	5.3
MW-03A		28-Feb-11	ZR-NB-95		<	2.4
MW-03A		28-Feb-11	CS-134		<	2.6
MW-03A		28-Feb-11	CS-137		<	2.7
MW-03A		28-Feb-11	BA-LA-140		<	2.8
MW-03A		28-Feb-11	H-3		<	161
MW-03A		28-Feb-11	I-131 (CHEM)		<	0.387
MW-03A		21-May-11	MN-54		<	4.0
MW-03A		21-May-11	CO-58		<	2.6
MW-03A		21-May-11	FE-59		<	3.6
MW-03A		21-May-11	CO-60		<	5.5
MW-03A		21-May-11	ZN-65		<	5.8
MW-03A		21-May-11	ZR-NB-95		<	4.2
MW-03A		21-May-11	CS-134		<	3.5
MW-03A		21-May-11	CS-137		<	3.9

**Onsite Groundwater Results
Concentration (pCi/L)**

LOCATION	DUPLICATE	COLLECTION DATE	NUCLIDE	ACTIVITY	SIGN	ERROR
MW-03A		21-May-11	BA-LA-140		<	5.9
MW-03A		21-May-11	H-3		<	141
MW-03A		21-May-11	I-131 (CHEM)		<	0.459
MW-03A		29-Aug-11	MN-54		<	2.7
MW-03A		29-Aug-11	CO-58		<	2.3
MW-03A		29-Aug-11	FE-59		<	3.3
MW-03A		29-Aug-11	CO-60		<	1.9
MW-03A		29-Aug-11	ZN-65		<	5.0
MW-03A		29-Aug-11	ZR-NB-95		<	2.9
MW-03A		29-Aug-11	CS-134		<	2.7
MW-03A		29-Aug-11	CS-137		<	2.5
MW-03A		29-Aug-11	BA-LA-140		<	3.0
MW-03A		29-Aug-11	H-3		<	151
MW-03A		29-Aug-11	I-131 (CHEM)		<	0.262
MW-03A		9-Nov-11	MN-54		<	3.2
MW-03A		9-Nov-11	CO-58		<	3.3
MW-03A		9-Nov-11	FE-59		<	3.7
MW-03A		9-Nov-11	CO-60		<	3.3
MW-03A		9-Nov-11	ZN-65		<	2.9
MW-03A		9-Nov-11	ZR-NB-95		<	4.3
MW-03A		9-Nov-11	CS-134		<	2.9
MW-03A		9-Nov-11	CS-137		<	3.3
MW-03A		9-Nov-11	BA-LA-140		<	1.7
MW-03A		9-Nov-11	H-3		<	147
MW-03A		9-Nov-11	I-131 (CHEM)		<	0.419
MW-03B		28-Feb-11	MN-54		<	2.4
MW-03B		28-Feb-11	CO-58		<	2.4
MW-03B		28-Feb-11	FE-59		<	4.1
MW-03B		28-Feb-11	CO-60		<	2.3
MW-03B		28-Feb-11	ZN-65		<	2.6
MW-03B		28-Feb-11	ZR-NB-95		<	1.6
MW-03B		28-Feb-11	CS-134		<	2.3
MW-03B		28-Feb-11	CS-137		<	2.5
MW-03B		28-Feb-11	BA-LA-140		<	2.5
MW-03B		28-Feb-11	H-3		<	161
MW-03B		28-Feb-11	I-131 (CHEM)		<	0.433
MW-03B		21-May-11	MN-54		<	1.8
MW-03B		21-May-11	CO-58		<	2.6
MW-03B		21-May-11	FE-59		<	5.5
MW-03B		21-May-11	CO-60		<	1.8
MW-03B		21-May-11	ZN-65		<	6.5

**Onsite Groundwater Results
Concentration (pCi/L)**

LOCATION	DUPLICATE	COLLECTION DATE	NUCLIDE	ACTIVITY	SIGN	ERROR
MW-03B		21-May-11	ZR-NB-95		<	2.9
MW-03B		21-May-11	CS-134		<	3.0
MW-03B		21-May-11	CS-137		<	3.2
MW-03B		21-May-11	BA-LA-140		<	2.9
MW-03B		21-May-11	H-3		<	141
MW-03B		21-May-11	I-131 (CHEM)		<	0.468
MW-03B		29-Aug-11	MN-54		<	1.6
MW-03B		29-Aug-11	CO-58		<	2.1
MW-03B		29-Aug-11	FE-59		<	5.9
MW-03B		29-Aug-11	CO-60		<	1.6
MW-03B		29-Aug-11	ZN-65		<	3.3
MW-03B		29-Aug-11	ZR-NB-95		<	1.9
MW-03B		29-Aug-11	CS-134		<	3.6
MW-03B		29-Aug-11	CS-137		<	3.4
MW-03B		29-Aug-11	BA-LA-140		<	1.4
MW-03B		29-Aug-11	H-3		<	151
MW-03B		29-Aug-11	I-131 (CHEM)		<	0.245
MW-03B		9-Nov-11	MN-54		<	2.2
MW-03B		9-Nov-11	CO-58		<	2.9
MW-03B		9-Nov-11	FE-59		<	4.8
MW-03B		9-Nov-11	CO-60		<	1.2
MW-03B		9-Nov-11	ZN-65		<	4.0
MW-03B		9-Nov-11	ZR-NB-95		<	3.7
MW-03B		9-Nov-11	CS-134		<	3.0
MW-03B		9-Nov-11	CS-137		<	3.0
MW-03B		9-Nov-11	BA-LA-140		<	2.7
MW-03B		9-Nov-11	H-3		<	147
MW-03B		9-Nov-11	I-131 (CHEM)		<	0.425
MW-03C		28-Feb-11	MN-54		<	3.9
MW-03C		28-Feb-11	CO-58		<	1.4
MW-03C		28-Feb-11	FE-59		<	6.6
MW-03C		28-Feb-11	CO-60		<	3.2
MW-03C		28-Feb-11	ZN-65		<	4.2
MW-03C		28-Feb-11	ZR-NB-95		<	3.7
MW-03C		28-Feb-11	CS-134		<	3.5
MW-03C		28-Feb-11	CS-137		<	3.6
MW-03C		28-Feb-11	BA-LA-140		<	3.3
MW-03C		28-Feb-11	H-3		<	161
MW-03C		28-Feb-11	I-131 (CHEM)		<	0.422
MW-03C		21-May-11	MN-54		<	2.8
MW-03C		21-May-11	CO-58		<	2.4

**Onsite Groundwater Results
Concentration (pCi/L)**

LOCATION	DUPLICATE	COLLECTION DATE	NUCLIDE	ACTIVITY	SIGN	ERROR
MW-03C		21-May-11	FE-59		<	3.8
MW-03C		21-May-11	CO-60		<	1.8
MW-03C		21-May-11	ZN-65		<	3.0
MW-03C		21-May-11	ZR-NB-95		<	2.5
MW-03C		21-May-11	CS-134		<	2.5
MW-03C		21-May-11	CS-137		<	3.4
MW-03C		21-May-11	BA-LA-140		<	3.8
MW-03C		21-May-11	H-3		<	141
MW-03C		21-May-11	I-131 (CHEM)		<	0.410
MW-03C		29-Aug-11	MN-54		<	2.8
MW-03C		29-Aug-11	CO-58		<	1.6
MW-03C		29-Aug-11	FE-59		<	3.4
MW-03C		29-Aug-11	CO-60		<	1.5
MW-03C		29-Aug-11	ZN-65		<	4.3
MW-03C		29-Aug-11	ZR-NB-95		<	2.3
MW-03C		29-Aug-11	CS-134		<	3.2
MW-03C		29-Aug-11	CS-137		<	1.8
MW-03C		29-Aug-11	BA-LA-140		<	1.7
MW-03C		29-Aug-11	H-3		<	151
MW-03C		29-Aug-11	I-131 (CHEM)		<	0.255
MW-03C		9-Nov-11	MN-54		<	2.5
MW-03C		9-Nov-11	CO-58		<	1.8
MW-03C		9-Nov-11	FE-59		<	4.6
MW-03C		9-Nov-11	CO-60		<	1.8
MW-03C		9-Nov-11	ZN-65		<	6.3
MW-03C		9-Nov-11	ZR-NB-95		<	3.1
MW-03C		9-Nov-11	CS-134		<	2.2
MW-03C		9-Nov-11	CS-137		<	3.1
MW-03C		9-Nov-11	BA-LA-140		<	2.8
MW-03C		9-Nov-11	H-3		<	147
MW-03C		9-Nov-11	I-131 (CHEM)		<	0.425
MW-04A		28-Feb-11	MN-54		<	3.3
MW-04A		28-Feb-11	CO-58		<	1.6
MW-04A		28-Feb-11	FE-59		<	4.6
MW-04A		28-Feb-11	CO-60		<	3.1
MW-04A		28-Feb-11	ZN-65		<	5.9
MW-04A		28-Feb-11	ZR-NB-95		<	3.4
MW-04A		28-Feb-11	CS-134		<	3.6
MW-04A		28-Feb-11	CS-137		<	3.9
MW-04A		28-Feb-11	BA-LA-140		<	1.9
MW-04A		28-Feb-11	H-3		<	161

**Onsite Groundwater Results
Concentration (pCi/L)**

LOCATION	DUPLICATE	COLLECTION DATE	NUCLIDE	ACTIVITY	SIGN	ERROR
MW-04A		28-Feb-11	I-131 (CHEM)		<	0.428
MW-04A		21-May-11	MN-54		<	2.3
MW-04A		21-May-11	CO-58		<	2.4
MW-04A		21-May-11	FE-59		<	2.7
MW-04A		21-May-11	CO-60		<	1.7
MW-04A		21-May-11	ZN-65		<	4.8
MW-04A		21-May-11	ZR-NB-95		<	2.2
MW-04A		21-May-11	CS-134		<	2.6
MW-04A		21-May-11	CS-137		<	3.1
MW-04A		21-May-11	BA-LA-140		<	3.3
MW-04A		21-May-11	H-3		<	141
MW-04A		21-May-11	I-131 (CHEM)		<	0.407
MW-04A		29-Aug-11	MN-54		<	5.1
MW-04A		29-Aug-11	CO-58		<	6.9
MW-04A		29-Aug-11	FE-59		<	12.5
MW-04A		29-Aug-11	CO-60		<	4.1
MW-04A		29-Aug-11	ZN-65		<	6.0
MW-04A		29-Aug-11	ZR-NB-95		<	3.7
MW-04A		29-Aug-11	CS-134		<	5.9
MW-04A		29-Aug-11	CS-137		<	4.1
MW-04A		29-Aug-11	BA-LA-140		<	5.6
MW-04A		29-Aug-11	H-3		<	149
MW-04A		29-Aug-11	I-131 (CHEM)		<	0.454
MW-04A		9-Nov-11	MN-54		<	2.9
MW-04A		9-Nov-11	CO-58		<	2.4
MW-04A		9-Nov-11	FE-59		<	5.4
MW-04A		9-Nov-11	CO-60		<	2.2
MW-04A		9-Nov-11	ZN-65		<	4.0
MW-04A		9-Nov-11	ZR-NB-95		<	2.5
MW-04A		9-Nov-11	CS-134		<	3.3
MW-04A		9-Nov-11	CS-137		<	3.3
MW-04A		9-Nov-11	BA-LA-140		<	1.8
MW-04A		9-Nov-11	H-3		<	147
MW-04A		9-Nov-11	I-131 (CHEM)		<	0.411
MW-04B		28-Feb-11	MN-54		<	2.7
MW-04B		28-Feb-11	CO-58		<	2.8
MW-04B		28-Feb-11	FE-59		<	5.2
MW-04B		28-Feb-11	CO-60		<	1.8
MW-04B		28-Feb-11	ZN-65		<	5.8
MW-04B		28-Feb-11	ZR-NB-95		<	3.1

**Onsite Groundwater Results
Concentration (pCi/L)**

LOCATION	DUPLICATE	COLLECTION DATE	NUCLIDE	ACTIVITY	SIGN	ERROR
MW-04B		28-Feb-11	CS-134		<	2.7
MW-04B		28-Feb-11	CS-137		<	3.1
MW-04B		28-Feb-11	BA-LA-140		<	2.1
MW-04B		28-Feb-11	H-3		<	161
MW-04B		28-Feb-11	I-131 (CHEM)		<	0.423
MW-04B		21-May-11	MN-54		<	2.5
MW-04B	Duplicate	21-May-11	MN-54		<	3.7
MW-04B		21-May-11	CO-58		<	3.1
MW-04B	Duplicate	21-May-11	CO-58		<	3.8
MW-04B		21-May-11	FE-59		<	2.5
MW-04B	Duplicate	21-May-11	FE-59		<	6.0
MW-04B		21-May-11	CO-60		<	2.6
MW-04B	Duplicate	21-May-11	CO-60		<	2.6
MW-04B		21-May-11	ZN-65		<	5.8
MW-04B	Duplicate	21-May-11	ZN-65		<	5.4
MW-04B		21-May-11	ZR-NB-95		<	2.9
MW-04B	Duplicate	21-May-11	ZR-NB-95		<	3.1
MW-04B		21-May-11	CS-134		<	3.7
MW-04B	Duplicate	21-May-11	CS-134		<	3.8
MW-04B		21-May-11	CS-137		<	2.7
MW-04B	Duplicate	21-May-11	CS-137		<	3.5
MW-04B		21-May-11	BA-LA-140		<	3.5
MW-04B	Duplicate	21-May-11	BA-LA-140		<	5.2
MW-04B		21-May-11	H-3		<	141
MW-04B	Duplicate	21-May-11	H-3		<	141
MW-04B		21-May-11	I-131 (CHEM)		<	0.438
MW-04B	Duplicate	21-May-11	I-131 (CHEM)		<	0.495
MW-04B		29-Aug-11	MN-54		<	3.9
MW-04B		29-Aug-11	CO-58		<	4.6
MW-04B		29-Aug-11	FE-59		<	3.9
MW-04B		29-Aug-11	CO-60		<	2.2
MW-04B		29-Aug-11	ZN-65		<	4.7
MW-04B		29-Aug-11	ZR-NB-95		<	3.3
MW-04B		29-Aug-11	CS-134		<	4.6
MW-04B		29-Aug-11	CS-137		<	3.8
MW-04B		29-Aug-11	BA-LA-140		<	3.6
MW-04B		29-Aug-11	H-3		<	149
MW-04B		29-Aug-11	I-131 (CHEM)		<	0.239
MW-04B		9-Nov-11	MN-54		<	2.1
MW-04B		9-Nov-11	CO-58		<	1.2
MW-04B		9-Nov-11	FE-59		<	4.8

**Onsite Groundwater Results
Concentration (pCi/L)**

LOCATION	DUPLICATE	COLLECTION DATE	NUCLIDE	ACTIVITY	SIGN	ERROR
MW-04B		9-Nov-11	CO-60		<	2.3
MW-04B		9-Nov-11	ZN-65		<	3.7
MW-04B		9-Nov-11	ZR-NB-95		<	3.2
MW-04B		9-Nov-11	CS-134		<	2.6
MW-04B		9-Nov-11	CS-137		<	3.5
MW-04B		9-Nov-11	BA-LA-140		<	1.8
MW-04B		9-Nov-11	H-3		<	147
MW-04B		9-Nov-11	I-131 (CHEM)		<	0.263
MW-05A		28-Feb-11	MN-54		<	4.0
MW-05A		28-Feb-11	CO-58		<	4.8
MW-05A		28-Feb-11	FE-59		<	7.8
MW-05A		28-Feb-11	CO-60		<	2.9
MW-05A		28-Feb-11	ZN-65		<	2.7
MW-05A		28-Feb-11	ZR-NB-95		<	5.6
MW-05A		28-Feb-11	CS-134		<	4.4
MW-05A		28-Feb-11	CS-137		<	2.7
MW-05A		28-Feb-11	BA-LA-140		<	4.9
MW-05A		28-Feb-11	H-3		<	161
MW-05A		28-Feb-11	I-131 (CHEM)		<	0.435
MW-05A		21-May-11	MN-54		<	2.2
MW-05A		21-May-11	CO-58		<	1.6
MW-05A		21-May-11	FE-59		<	4.6
MW-05A		21-May-11	CO-60		<	2.4
MW-05A		21-May-11	ZN-65		<	3.2
MW-05A		21-May-11	ZR-NB-95		<	3.4
MW-05A		21-May-11	CS-134		<	3.4
MW-05A		21-May-11	CS-137		<	3.2
MW-05A		21-May-11	BA-LA-140		<	3.7
MW-05A		21-May-11	H-3		<	141
MW-05A		21-May-11	I-131 (CHEM)		<	0.250
MW-05A		29-Aug-11	MN-54		<	3.0
MW-05A		29-Aug-11	CO-58		<	1.6
MW-05A		29-Aug-11	FE-59		<	7.6
MW-05A		29-Aug-11	CO-60		<	3.0
MW-05A		29-Aug-11	ZN-65		<	2.5
MW-05A		29-Aug-11	ZR-NB-95		<	3.3
MW-05A		29-Aug-11	CS-134		<	3.2
MW-05A		29-Aug-11	CS-137		<	2.8
MW-05A		29-Aug-11	BA-LA-140		<	1.5
MW-05A		29-Aug-11	H-3		<	149
MW-05A		29-Aug-11	I-131 (CHEM)		<	0.223

**Onsite Groundwater Results
Concentration (pCi/L)**

LOCATION	DUPLICATE	COLLECTION DATE	NUCLIDE	ACTIVITY	SIGN	ERROR
MW-05A		9-Nov-11	MN-54		<	2.2
MW-05A		9-Nov-11	CO-58		<	2.4
MW-05A		9-Nov-11	FE-59		<	2.3
MW-05A		9-Nov-11	CO-60		<	2.1
MW-05A		9-Nov-11	ZN-65		<	2.1
MW-05A		9-Nov-11	ZR-NB-95		<	2.1
MW-05A		9-Nov-11	CS-134		<	3.1
MW-05A		9-Nov-11	CS-137		<	3.5
MW-05A		9-Nov-11	BA-LA-140		<	2.7
MW-05A		9-Nov-11	H-3		<	147
MW-05A		9-Nov-11	I-131 (CHEM)		<	0.380
MW-05B		28-Feb-11	MN-54		<	2.8
MW-05B		28-Feb-11	CO-58		<	1.6
MW-05B		28-Feb-11	FE-59		<	3.0
MW-05B		28-Feb-11	CO-60		<	3.5
MW-05B		28-Feb-11	ZN-65		<	5.9
MW-05B		28-Feb-11	ZR-NB-95		<	2.5
MW-05B		28-Feb-11	CS-134		<	2.7
MW-05B		28-Feb-11	CS-137		<	2.5
MW-05B		28-Feb-11	BA-LA-140		<	1.3
MW-05B		28-Feb-11	H-3		<	161
MW-05B		28-Feb-11	I-131 (CHEM)		<	0.373
MW-05B		21-May-11	MN-54		<	1.8
MW-05B		21-May-11	CO-58		<	1.5
MW-05B		21-May-11	FE-59		<	1.9
MW-05B		21-May-11	CO-60		<	2.3
MW-05B		21-May-11	ZN-65		<	5.7
MW-05B		21-May-11	ZR-NB-95		<	3.2
MW-05B		21-May-11	CS-134		<	1.8
MW-05B		21-May-11	CS-137		<	3.0
MW-05B		21-May-11	BA-LA-140		<	2.6
MW-05B		21-May-11	H-3		<	141
MW-05B		21-May-11	I-131 (CHEM)		<	0.379
MW-05B		29-Aug-11	MN-54		<	2.4
MW-05B		29-Aug-11	CO-58		<	2.5
MW-05B		29-Aug-11	FE-59		<	4.7
MW-05B		29-Aug-11	CO-60		<	2.0
MW-05B		29-Aug-11	ZN-65		<	3.5
MW-05B		29-Aug-11	ZR-NB-95		<	1.8
MW-05B		29-Aug-11	CS-134		<	2.6
MW-05B		29-Aug-11	CS-137		<	2.5

**Onsite Groundwater Results
Concentration (pCi/L)**

LOCATION	DUPLICATE	COLLECTION DATE	NUCLIDE	ACTIVITY	SIGN	ERROR
MW-05B		29-Aug-11	BA-LA-140		<	2.4
MW-05B		29-Aug-11	H-3		<	149
MW-05B		29-Aug-11	I-131 (CHEM)		<	0.244
MW-05B		9-Nov-11	MN-54		<	5.0
MW-05B		9-Nov-11	CO-58		<	1.5
MW-05B		9-Nov-11	FE-59		<	7.7
MW-05B		9-Nov-11	CO-60		<	5.0
MW-05B		9-Nov-11	ZN-65		<	2.4
MW-05B		9-Nov-11	ZR-NB-95		<	3.0
MW-05B		9-Nov-11	CS-134		<	3.9
MW-05B		9-Nov-11	CS-137		<	3.5
MW-05B		9-Nov-11	BA-LA-140		<	2.4
MW-05B		9-Nov-11	H-3		<	147
MW-05B		9-Nov-11	I-131 (CHEM)		<	0.261
MW-05C		28-Feb-11	MN-54		<	1.9
MW-05C		28-Feb-11	CO-58		<	2.4
MW-05C		28-Feb-11	FE-59		<	2.9
MW-05C		28-Feb-11	CO-60		<	1.7
MW-05C		28-Feb-11	ZN-65		<	3.4
MW-05C		28-Feb-11	ZR-NB-95		<	3.5
MW-05C		28-Feb-11	CS-134		<	2.3
MW-05C		28-Feb-11	CS-137		<	3.0
MW-05C		28-Feb-11	BA-LA-140		<	2.1
MW-05C		28-Feb-11	H-3		<	161
MW-05C		28-Feb-11	I-131 (CHEM)		<	0.351
MW-05C		21-May-11	MN-54		<	1.7
MW-05C		21-May-11	CO-58		<	2.7
MW-05C		21-May-11	FE-59		<	4.8
MW-05C		21-May-11	CO-60		<	1.9
MW-05C		21-May-11	ZN-65		<	3.7
MW-05C		21-May-11	ZR-NB-95		<	2.1
MW-05C		21-May-11	CS-134		<	2.6
MW-05C		21-May-11	CS-137		<	3.3
MW-05C		21-May-11	BA-LA-140		<	3.0
MW-05C		21-May-11	H-3		<	141
MW-05C		21-May-11	I-131 (CHEM)		<	0.434
MW-05C		29-Aug-11	MN-54		<	2.3
MW-05C		29-Aug-11	CO-58		<	2.1
MW-05C		29-Aug-11	FE-59		<	4.7
MW-05C		29-Aug-11	CO-60		<	2.2
MW-05C		29-Aug-11	ZN-65		<	6.3

**Onsite Groundwater Results
Concentration (pCi/L)**

LOCATION	DUPLICATE	COLLECTION DATE	NUCLIDE	ACTIVITY	SIGN	ERROR
MW-05C		29-Aug-11	ZR-NB-95		<	3.2
MW-05C		29-Aug-11	CS-134		<	3.5
MW-05C		29-Aug-11	CS-137		<	3.1
MW-05C		29-Aug-11	BA-LA-140		<	2.8
MW-05C		29-Aug-11	H-3		<	149
MW-05C		29-Aug-11	I-131 (CHEM)		<	0.374
MW-05C		9-Nov-11	MN-54		<	2.2
MW-05C		9-Nov-11	CO-58		<	2.9
MW-05C		9-Nov-11	FE-59		<	6.1
MW-05C		9-Nov-11	CO-60		<	1.4
MW-05C		9-Nov-11	ZN-65		<	2.3
MW-05C		9-Nov-11	ZR-NB-95		<	3.7
MW-05C		9-Nov-11	CS-134		<	2.6
MW-05C		9-Nov-11	CS-137		<	4.2
MW-05C		9-Nov-11	BA-LA-140		<	2.8
MW-05C		9-Nov-11	H-3		<	147
MW-05C		9-Nov-11	I-131 (CHEM)		<	0.451
WEST ESW-W		28-Feb-11	MN-54		<	2.7
WEST ESW-W		28-Feb-11	CO-58		<	2.7
WEST ESW-W		28-Feb-11	FE-59		<	5.3
WEST ESW-W		28-Feb-11	CO-60		<	3.7
WEST ESW-W		28-Feb-11	ZN-65		<	4.9
WEST ESW-W		28-Feb-11	ZR-NB-95		<	2.2
WEST ESW-W		28-Feb-11	CS-134		<	3.6
WEST ESW-W		28-Feb-11	CS-137		<	4.2
WEST ESW-W		28-Feb-11	BA-LA-140		<	2.3
WEST ESW-W		28-Feb-11	H-3	2097	+/-	154
WEST ESW-W		28-Feb-11	I-131 (CHEM)		<	0.402
WEST ESW-W		21-May-11	MN-54		<	2.5
WEST ESW-W		21-May-11	CO-58		<	3.1
WEST ESW-W		21-May-11	FE-59		<	4.1
WEST ESW-W		21-May-11	CO-60		<	1.5
WEST ESW-W		21-May-11	ZN-65		<	3.5
WEST ESW-W		21-May-11	ZR-NB-95		<	1.9
WEST ESW-W		21-May-11	CS-134		<	2.2
WEST ESW-W		21-May-11	CS-137		<	2.7
WEST ESW-W		21-May-11	BA-LA-140		<	1.9
WEST ESW-W		21-May-11	H-3	1298	+/-	123
WEST ESW-W		21-May-11	I-131 (CHEM)		<	0.481
WEST ESW-W		17-Aug-11	MN-54		<	2.3
WEST ESW-W		17-Aug-11	CO-58		<	1.7

**Onsite Groundwater Results
Concentration (pCi/L)**

LOCATION	DUPLICATE	COLLECTION DATE	NUCLIDE	ACTIVITY	SIGN	ERROR
WEST ESW-W		17-Aug-11	FE-59		<	5.1
WEST ESW-W		17-Aug-11	CO-60		<	1.1
WEST ESW-W		17-Aug-11	ZN-65		<	1.6
WEST ESW-W		17-Aug-11	ZR-NB-95		<	4.3
WEST ESW-W		17-Aug-11	CS-134		<	2.9
WEST ESW-W		17-Aug-11	CS-137		<	4.2
WEST ESW-W		17-Aug-11	BA-LA-140		<	3.0
WEST ESW-W		17-Aug-11	H-3	1037	+/-	113
WEST ESW-W		17-Aug-11	I-131 (CHEM)		<	0.218
WEST ESW-W		9-Nov-11	MN-54		<	2.5
WEST ESW-W		9-Nov-11	CO-58		<	3.1
WEST ESW-W		9-Nov-11	FE-59		<	3.2
WEST ESW-W		9-Nov-11	CO-60		<	1.7
WEST ESW-W		9-Nov-11	ZN-65		<	6.2
WEST ESW-W		9-Nov-11	ZR-NB-95		<	2.6
WEST ESW-W		9-Nov-11	CS-134		<	2.3
WEST ESW-W		9-Nov-11	CS-137		<	2.3
WEST ESW-W		9-Nov-11	BA-LA-140		<	3.1
WEST ESW-W		9-Nov-11	H-3	1361	+/-	128
WEST ESW-W		9-Nov-11	I-131 (CHEM)		<	0.469

**ENCLOSURES TO WCGS
ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT – REPORT 35**

Changes to the Wolf Creek Generating Station (WCGS) Offsite Dose Calculation Manual (ODCM) are submitted annually with the Annual Radioactive Effluent Release Report. The WCGS ODCM is divided into two administrative procedures: WCNOG procedure AP 07B-003, "Offsite Dose Calculation Manual" and WCNOG procedure AP 07B-004, "Offsite Dose Calculation Manual (Radiological Environmental Monitoring Program)".

Enclosure I is AP 07B-003, Revision 7, "Offsite Dose Calculation Manual"

Enclosure II is AP 07B-004, Revision 18, "Offsite Dose Calculation Manual (Radiological Environmental Monitoring Program)"

Enclosure III is AP 31A-100, Revision 8, "Solid Radwaste Process Control Program"