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APR 26 2010

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Serial No. 10-239
LIC/NW/R0
Docket No.: 50-305
License No.: DPR-43

DOMINION ENERGY KEWAUNEE, INC.
KEWAUNEE POWER STATION
2009 ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT

Enclosed is the Kewaunee Power Station (KPS) 2009 Annual Radioactive Effluent Release Report for January through December 2009. This report is submitted to meet the requirements of KPS Technical Specification 6.9.b.2 and 10 CFR 50.36a(a)(2).

If you have questions or require additional information, please feel free to contact Mr. Jack Gadzala at 920-388-8604.

Very truly yours,

Michael J. Wilson
Director Safety and Licensing

Commitments made by this letter: NONE

IE48
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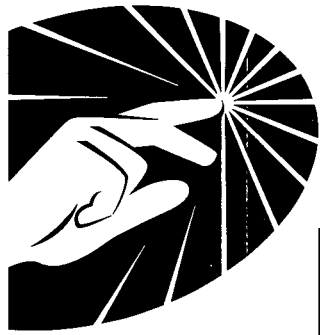
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**2009
Annual
Radioactive
Effluent
Release
Report**
Kewaunee Power Station

Dominion Energy Kewaunee, Inc.

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SUMMARY

During 2009 all solid, liquid, and gaseous radioactive effluents from the Kewaunee Power Station were well below regulatory limits. For individual effluent streams, the quarterly limit most closely approached was:

<u>GASEOUS:</u>	Ingestion Pathway-Organ	Total Body	
	Quarterly Limit (mRems)	7.5	
	Actual Dose (mRems)	0.0002482	(3 rd Quarter)
	% of Specification	0.00331	
<u>LIQUID:</u>	Ingestion Pathway-Organ	Total Body	
	Quarterly Limit (mRems)	1.5	
	Actual Dose (mRems)	3.662E-004	(4 th Quarter)
	% of Limit	0.02442	
<u>SOLID:</u>	No upper limit for solid radioactive waste applies.		
	Cubic Meters Shipped	39.4 m ³ (1390 ft ³)	

1.0 INTRODUCTION

This report is being submitted in accordance with the requirements of Kewaunee Technical Specifications, Section 6.9.b.2 and the Offsite Dose Calculation Manual, Section 3/4.7. It includes data from all effluent releases made from January 1 - December 31, 2009. The report contains summaries of the gaseous and liquid releases made to the environment including the quantity, characterization, time duration and calculated radiation dose at the site boundary resulting from these releases. The report also includes a summation of solid waste disposal, revisions to the Process Control Program and the Offsite Dose Calculation Manual, and addresses the cumulative meteorological data. Values indicated as 0 (zero) in this report refer to actual values less than the detection limits. A table of these less than (LLD) values is identified in sections 2.1 and 3.1.

1.1 Effluent Dose Limits

Specifications are set to ensure that offsite doses are maintained as low as reasonably achievable while still allowing for practical and dependable operation of the Kewaunee Power Station.

The Kewaunee Offsite Dose Calculation Manual (ODCM) describes the methodology and parameters used in:

- 1.) The calculation of radioactive liquid and gaseous effluent monitoring instrumentation alarm/trip setpoints.
- 2.) The calculation of radioactive liquid and gaseous concentrations, dose rates and cumulative quarterly and annual doses. The ODCM methodology is acceptable for use in demonstrating compliance with 10 CFR 20.106; 10 CFR 50, Appendix I; and 40 CFR 190.

2.0 GASEOUS EFFLUENTS

2.1 Lower Limits of Detection (LLD) for Gaseous Effluents

Gaseous radioactive effluents are released in both the continuous mode and the batch mode. The auxiliary building stack is sampled continuously for particulates, halogens and Strontium by an "off-line" sample train. This stack is also grab-sampled daily for gaseous gamma emitters. Batch releases are sampled prior to release for principal gaseous and particulate gamma emitters, halogens and tritium.

The LLD's for gaseous radioanalyses, as listed in Table 4.4 of the Kewaunee ODCM are:

Analysis	LLD ($\mu\text{Ci/ml}$)
Gaseous Gamma Emitters	1.00 E-04
Iodine 131	3.00 E-12
Particulate Gamma Emitters	1.00 E-11
Particulate Gross Alpha	1.00 E-11
Strontium 89, 90	1.00 E-11
Noble Gases, Gross Beta or Gamma	1.00 E-06

The nominal "a priori" LLD values are shown below.

Isotope	a priori LLD ($\mu\text{Ci/ml}$)
a. Gaseous emissions:	
Kr-87	5.61E-08
Kr-88	1.02E-07
Xe-133	6.68E-08
Xe-133m	2.75E-07
Xe-135	2.99E-08
Xe-138	1.13E-07

b. Particulate emissions:

Mn-54	1.11E-13
Fe-59	2.27E-13
Co-58	2.28E-13
Co-60	3.57E-13
Zn-65	1.68E-13
Mo-99	2.73E-13
Cs-134	4.69E-13
Cs-137	1.68E-13
Ce-141	2.08E-13
Ce-144	1.24E-12

c. Other identifiable gamma emitters:

Ar-41	3.97E-10
Kr-85	8.63E-05
Kr-85m	4.62E-08
Kr-89	2.04E-06
Xe-127	4.20E-08
Xe-131m	1.82E-06
Xe-135m	1.90E-08
Xe-137	2.88E-07
I-131	1.32E-13

d. Composite particulate samples:

Sr-89	1 E-14
Sr-90	1 E-14
Gross Alpha	1.00 E-14

These "a priori" LLDs represent the capabilities of the counting systems in use, not an after the fact "a posteriori" limit for a particular measurement.

2.2 Gaseous Batch Release Statistics

The following is a summation of all gaseous batch releases made during 2009.

Number of batch releases.....	52
Total time for all batch releases (min).....	6191.0
Maximum time for a batch release (min).....	1440.0
Average time for a batch release (min).....	119.1
Minimum time for a batch release (min).....	10.0

2.3 Gaseous Effluent Data

The following table 2.1 presents a quarterly summation of the total activity released and average release rates of four categories of gaseous effluents. Table 2.2 lists the quarterly sums of individual gaseous radionuclides released by continuous and batch modes. Table 2.3 is essentially the same data, but is presented as monthly summations. Table 2.4 presents the dose limits for gaseous effluents, and the calculated doses this year from gaseous effluents.

Table 2.1:
Annual Radioactive Effluent Release Report 2009
Gaseous Effluents - Summation of all Releases

Fission and Activation Gases	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter
Total Activity Released (Ci)	0.000E+000	1.080E-002	1.087E-001	6.538E-004
Average Release Rate (μ Ci/sec)	0.000E+000	1.373E-003	1.383E-002	8.315E-005
Iodines				
Total Activity Released (Ci)	0.000E+000	0.000E+000	0.000E+000	0.000E+000
Average Release Rate (μ Ci/sec)	0.000E+000	0.000E+000	0.000E+000	0.000E+000
Particulates				
Total Activity Released (Ci)	0.000E+000	0.000E+000	0.000E+000	0.000E+000
Average Release Rate (μ Ci/sec)	0.000E+000	0.000E+000	0.000E+000	0.000E+000
Gross Alpha Released (Ci)	0.000E+000	0.000E+000	0.000E+000	0.000E+000
Tritium				
Total Activity Released (Ci)	3.812E+000	2.741E+000	6.741E+000	3.257E+001
Average Release Rate (μ Ci/sec)	4.849E-001	3.486E-001	8.573E-001	4.143E+000

Table 2.2
Annual Radioactive Effluent Release Report 2009
Gaseous Effluents

	Nuclides Released (Ci)			
	Continuous Mode			
	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter
Fission Gases				
Total	0.000E+000	0.000E+000	0.000E+000	0.000E+000
Iodines				
Total	0.000E+000	0.000E+000	0.000E+000	0.000E+000
Particulates				
Total	0.000E+000	0.000E+000	0.000E+000	0.000E+000

Table 2.2(cont)
Annual Radioactive Effluent Release Report 2009
Gaseous Effluents

Nuclides Released (Ci)
Batch Mode

Fission Gases

Xe-133	0.000E+000	1.056E-002	1.007E-001	6.538E-004
Xe-133m	0.000E+000	1.235E-004	1.820E-003	0.000E+000
Xe-135	0.000E+000	1.181E-004	6.201E-003	0.000E+000
Total	0.000E+000	1.080E-002	1.087E-001	6.538E-004

Iodines

Total	0.000E+000	0.000E+000	0.000E+000	0.000E+000
-------	------------	------------	------------	------------

Particulates

Total	0.000E+000	0.000E+000	0.000E+000	0.000E+000
-------	------------	------------	------------	------------

Table 2.3A
Annual Radioactive Effluent Release Report 2009
1st Quarter Gaseous Release
Total of all Releases

Noble Gasses (Curies)

Isotope	January	February	March	Total
Total	0.000E+000	0.000E+000	0.000E+000	0.000E+000

Particulates (Curies)

Isotope	January	February	March	Total
Total	0.000E+000	0.000E+000	0.000E+000	0.000E+000

Halogens (Curies)

Isotope	January	February	March	Total
Total	0.000E+000	0.000E+000	0.000E+000	0.000E+000

Table 2.3A (Con't)
Annual Radioactive Effluent Release Report 2009
1st Quarter Gaseous Release
Total of all Releases

Summary	January	February	March	<u>Total</u>
Total Noble Gases (Ci)	0.000E+000	0.000E+000	0.000E+000	0.000E+000
Total Halogens (Ci)	0.000E+000	0.000E+000	0.000E+000	0.000E+000
Total Particulate Gross Beta-Gamma Half-Lives>8 Days (Ci)	0.000E+000	0.000E+000	0.000E+000	0.000E+000
Total Tritium (Ci)	1.043E+000	1.098E+000	1.671E+000	3.812E+000
Total Particulate Gross Alpha (Ci)	0.000E+000	0.000E+000	0.000E+000	0.000E+000

Table 2.3A (Con't)
Annual Radioactive Effluent Release Report 2009
2nd Quarter Gaseous Release
Total of all Releases

Noble Gasses (Curies)

Isotope	April	May	June	Total
Xe-133	1.056E-002	0.000E+000	0.000E+000	1.056E-002
Xe-133m	1.235E-004	0.000E+000	0.000E+000	1.235E-004
Xe-135	1.181E-004	0.000E+000	0.000E+000	1.181E-004
Total	1.080E-002	0.000E+000	0.000E+000	1.080E-002

Particulates (Curies)

Isotope	April	May	June	Total
Total	0.000E+000	0.000E+000	0.000E+000	0.000E+000

Halogens (Curies)

Isotope	April	May	June	Total
Total	0.000E+000	0.000E+000	0.000E+000	0.000E+000

Table 2.3A (Con't)
Annual Radioactive Effluent Release Report 2009
2nd Quarter Gaseous Release
Total of all Releases

Summary	April	May	June	<u>Total</u>
Total Noble Gases (Ci)	1.080E-002	0.000E+000	0.000E+000	1.080E-002
Total Halogens (Ci)	0.000E+000	0.000E+000	0.000E+000	0.000E+000
Total Particulate Gross Beta-Gamma Half-Lives>8 Days (Ci)	0.000E+000	0.000E+000	0.000E+000	0.000E+000
Total Tritium (Ci)	4.746E-001	7.991E-001	1.467E+000	2.741E+000
Total Particulate Gross Alpha (Ci)	0.000E+000	0.000E+000	0.000E+000	0.000E+000

Table 2.3A (con't)
Annual Radioactive Effluent Release Report 2009
3rd Quarter Gaseous Release
Total of all Releases

Noble Gasses (Curies)

Isotope	July	August	September	Total
Xe-133	2.684E-003	0.000E+000	9.802E-002	1.007E-001
Xe-133m	0.000E+000	0.000E+000	1.820E-003	1.820E-003
Xe-135	0.000E+000	0.000E+000	6.201E-003	6.201E-003
Total	2.684E-003	0.000E+000	1.060E-001	1.087E-001

Particulates (Curies)

Isotope	July	August	September	Total
Total	0.000E+000	0.000E+000	0.000E+000	0.000E+000

Halogens (Curies)

Isotope	July	August	September	Total
Total	0.000E+000	0.000E+000	0.000E+000	0.000E+000

Table 2.3A (Con't)
Annual Radioactive Effluent Release Report 2009
3rd Quarter Gaseous Release
Total of all Releases

Summary	July	August	September	<u>Total</u>
Total Noble Gases (Ci)	2.684E-003	0.000E+000	1.060E-001	1.087E-001
Total Halogens (Ci)	0.000E+000	0.000E+000	0.000E+000	0.000E+000
Total Particulate Gross Beta-Gamma Half-Lives>8 Days (Ci)	0.000E+000	0.000E+000	0.000E+000	0.000E+000
Total Tritium (Ci)	1.048E+000	1.303E+000	4.390E+000	6.741E+000
Total Particulate Gross Alpha (Ci)	0.000E+000	0.000E+000	0.000E+000	0.000E+000

Table 2.3A (Con't)
Annual Radioactive Effluent Release Report 2009
4th Quarter Gaseous Release
Total of all Releases

Noble Gasses (Curies)

Isotope	October	November	December	Total
Xe-133	4.956E-004	1.582E-004	0.000E+000	6.538E-004
Total	4.956E-004	1.582E-004	0.000E+000	6.538E-004

Particulates (Curies)

Isotope	October	November	December	Total
Total	0.000E+000	0.000E+000	0.000E+000	0.000E+000

Halogens (Curies)

Isotope	October	November	December	Total
Total	0.000E+000	0.000E+000	0.000E+000	0.000E+000

Table 2.3A (Con't)
Annual Radioactive Effluent Release Report 2009
4th Quarter Gaseous Release
Total of all Releases

Summary	October	November	December	<u>Total</u>
Total Noble Gases (Ci)	4.956E-004	1.582E-004	0.000E+000	6.538E-004
Total Halogens (Ci)	0.000E+000	0.000E+000	0.000E+000	0.000E+000
Total Particulate Gross Beta-Gamma Half-Lives>8 Days (Ci)	0.000E+000	0.000E+000	0.000E+000	0.000E+000
Total Tritium (Ci)	2.326E+001	8.576E+000	7.379E-001	3.257E+001
Total Particulate Gross Alpha (Ci)	0.000E+000	0.000E+000	0.000E+000	0.000E+000

Table 2.3B
Annual Radioactive Effluent Release Report 2009
1st Quarter Gaseous Release
Continuous Mode Only

Noble Gasses (Curies)

Isotope	January	February	March	Total
Total	0.000E+000	0.000E+000	0.000E+000	0.000E+000

Particulates (Curies)

Isotope	January	February	March	Total
Total	0.000E+000	0.000E+000	0.000E+000	0.000E+000

Halogens (Curies)

Isotope	January	February	March	Total
Total	0.000E+000	0.000E+000	0.000E+000	0.000E+000

Table 2.3B (Con't)
Annual Radioactive Effluent Release Report 2009
1st Quarter Gaseous Release
Continuous Mode Only

Summary	January	February	March	<u>Total</u>
Total Noble Gases (Ci)	0.000E+000	0.000E+000	0.000E+000	0.000E+000
Total Halogens (Ci)	0.000E+000	0.000E+000	0.000E+000	0.000E+000
Total Particulate Gross Beta-Gamma Half-Lives>8 Days (Ci)	0.000E+000	0.000E+000	0.000E+000	0.000E+000
Total Tritium (Ci)	1.037E+000	1.098E+000	1.671E+000	3.806E+000
Total Particulate Gross Alpha (Ci)	0.000E+000	0.000E+000	0.000E+000	0.000E+000

Table 2.3B (Con't):
Annual Radioactive Effluent Release Report 2009
2nd Quarter Gaseous Release
Continuous Mode Only

Noble Gasses (Curies)

Isotope	April	May	June	Total
Total	0.000E+000	0.000E+000	0.000E+000	0.000E+000

Particulates (Curies)

Isotope	April	May	June	Total
Total	0.000E+000	0.000E+000	0.000E+000	0.000E+000

Halogens (Curies)

Isotope	April	May	June	Total
Total	0.000E+000	0.000E+000	0.000E+000	0.000E+000

Table 2:3B (Con't)
Annual Radioactive Effluent Release Report 2009
2nd Quarter Gaseous Release
Continuous Mode Only

Summary	April	May	June	<u>Total</u>
Total Noble Gases (Ci)	0.000E+000	0.000E+000	0.000E+000	0.000E+000
Total Halogens (Ci)	0.000E+000	0.000E+000	0.000E+000	0.000E+000
Total Particulate Gross Beta-Gamma Half-Lives > 8 Days (Ci)	0.000E+000	0.000E+000	0.000E+000	0.000E+000
Total Tritium (Ci)	4.735E-001	7.972E-001	1.467E+000	2.738E+000
Total Particulate Gross Alpha (Ci)	0.000E+000	0.000E+000	0.000E+000	0.000E+000

Table 2.3B (con't)
Annual Radioactive Effluent Release Report 2009
3rd Quarter Gaseous Release
Continuous Mode Only

Noble Gasses (Curies)

Isotope	July	August	September	Total
Total	0.000E+000	0.000E+000	0.000E+000	0.000E+000

Particulates (Curies)

Isotope	July	August	September	Total
Total	0.000E+000	0.000E+000	0.000E+000	0.000E+000

Halogens (Curies)

Isotope	July	August	September	Total
Total	0.000E+000	0.000E+000	0.000E+000	0.000E+000

Table 2.3B (Con't)
Annual Radioactive Effluent Release Report 2009
3rd Quarter Gaseous Release
Continuous Mode Only

Summary	July	August	September	<u>Total</u>
Total Noble Gases (Ci)	0.000E+000	0.000E+000	0.000E+000	0.000E+000
Total Halogens (Ci)	0.000E+000	0.000E+000	0.000E+000	0.000E+000
Total Particulate Gross Beta-Gamma Half-Lives>8 Days (Ci)	0.000E+000	0.000E+000	0.000E+000	0.000E+000
Total Tritium (Ci)	1.048E+000	1.302E+000	1.426E+000	3.776E+000
Total Particulate Gross Alpha (Ci)	0.000E+000	0.000E+000	0.000E+000	0.000E+000

Table 2.3B (Con't)
Annual Radioactive Effluent Release Report 2009
4th Quarter Gaseous Release
Continuous Mode Only

Noble Gasses (Curies)

Isotope	October	November	December	Total
Total	0.000E+000	0.000E+000	0.000E+000	0.000E+000

Particulates (Curies)

Isotope	October	November	December	Total
Total	0.000E+000	0.000E+000	0.000E+000	0.000E+000

Halogens (Curies)

Isotope	October	November	December	Total
Total	0.000E+000	0.000E+000	0.000E+000	0.000E+000

Table 2.3B (Con't)
Annual Radioactive Effluent Release Report 2009
4th Quarter Gaseous Release
Continuous Mode Only

Summary	October	November	December	<u>Total</u>
Total Noble Gases (Ci)	0.000E+000	0.000E+000	0.000E+000	0.000E+000
Total Halogens (Ci)	0.000E+000	0.000E+000	0.000E+000	0.000E+000
Total Particulate Gross Beta-Gamma Half-Lives>8 Days (Ci)	0.000E+000	0.000E+000	0.000E+000	0.000E+000
Total Tritium (Ci)	2.326E+001	8.576E+000	7.378E-001	3.257E+001
Total Particulate Gross Alpha (Ci)	0.000E+000	0.000E+000	0.000E+000	0.000E+000

Table 2.3C
Annual Radioactive Effluent Release Report 2009
1st Quarter Gaseous Release
Batch Mode Only

Noble Gasses (Curies)

Isotope	January	February	March	Total
Total	0.000E+000	0.000E+000	0.000E+000	0.000E+000

Particulates (Curies)

Isotope	January	February	March	Total
Total	0.000E+000	0.000E+000	0.000E+000	0.000E+000

Halogens (Curies)

Isotope	January	February	March	Total
Total	0.000E+000	0.000E+000	0.000E+000	0.000E+000

Table 2.3C (Con't)
Annual Radioactive Effluent Release Report 2009
1st Quarter Gaseous Release
Batch Mode Only

Summary	January	February	March	<u>Total</u>
Total Noble Gases (Ci)	0.000E+000	0.000E+000	0.000E+000	0.000E+000
Total Halogens (Ci)	0.000E+000	0.000E+000	0.000E+000	0.000E+000
Total Particulate Gross Beta-Gamma Half-Lives>8 Days (Ci)	0.000E+000	0.000E+000	0.000E+000	0.000E+000
Total Tritium (Ci)	5.632E-003	2.460E-004	1.305E-004	6.008E-003
Total Particulate Gross Alpha (Ci)	0.000E+000	0.000E+000	0.000E+000	0.000E+000

Table 2.3C (Con't)
Annual Radioactive Effluent Release Report 2009
2nd Quarter Gaseous Release
Batch Mode Only

Noble Gasses (Curies)

Isotope	April	May	June	Total
Xe-133	1.056E-002	0.000E+000	0.000E+000	1.056E-002
Xe-133m	1.235E-004	0.000E+000	0.000E+000	1.235E-004
Xe-135	1.181E-004	0.000E+000	0.000E+000	1.181E-004
Total	1.080E-002	0.000E+000	0.000E+000	1.080E-002

Particulates (Curies)

Isotope	April	May	June	Total
Total	0.000E+000	0.000E+000	0.000E+000	0.000E+000

Halogens (Curies)

Isotope	April	May	June	Total
Total	0.000E+000	0.000E+000	0.000E+000	0.000E+000

Table 2.3C (Con't) :
Annual Radioactive Effluent Release Report 2009
2nd Quarter Gaseous Release
Batch Mode Only

Summary	April	May	June	<u>Total</u>
Total Noble Gases (Ci)	1.080E-002	0.000E+000	0.000E+000	1.080E-002
Total Halogens (Ci)	0.000E+000	0.000E+000	0.000E+000	0.000E+000
Total Particulate Gross Beta-Gamma Half-Lives>8 Days (Ci)	0.000E+000	0.000E+000	0.000E+000	0.000E+000
Total Tritium (Ci)	1.134E-003	1.828E-003	0.000E+000	2.962E-003
Total Particulate Gross Alpha (Ci)	0.000E+000	0.000E+000	0.000E+000	0.000E+000

Table 2.3C (Con't)
Annual Radioactive Effluent Release Report 2009
3rd Quarter Gaseous Release
Batch Mode Only

Noble Gasses (Curies)

Isotope	July	August	September	Total
Xe-133	2.684E-003	0.000E+000	9.802E-002	1.007E-001
Xe-133m	0.000E+000	0.000E+000	1.820E-003	1.820E-003
Xe-135	0.000E+000	0.000E+000	6.201E-003	6.201E-003
Total	2.684E-003	0.000E+000	1.060E-001	1.087E-001

Particulates (Curies)

Isotope	July	August	September	Total
Total	0.000E+000	0.000E+000	0.000E+000	0.000E+000

Halogens (Curies)

Isotope	July	August	September	Total
Total	0.000E+000	0.000E+000	0.000E+000	0.000E+000

Table 2.3C (Con't)
Annual Radioactive Effluent Release Report 2009
3rd Quarter Gaseous Release
Batch Mode Only

Summary	July	August	September	<u>Total</u>
Total Noble Gases (Ci)	2.684E-003	0.000E+000	1.060E-001	1.087E-001
Total Halogens (Ci)	0.000E+000	0.000E+000	0.000E+000	0.000E+000
Total Particulate Gross Beta-Gamma Half-Lives>8 Days (Ci)	0.000E+000	0.000E+000	0.000E+000	0.000E+000
Total Tritium (Ci)	3.571E-004	2.098E-004	2.964E+000	2.964E+000
Total Particulate Gross Alpha (Ci)	0.000E+000	0.000E+000	0.000E+000	0.000E+000

Table 2.3C (Con't)
Annual Radioactive Effluent Release Report 2009
4th Quarter Gaseous Release
Batch Mode Only

Noble Gasses (Curies)

Isotope	October	November	December	Total
Xe-133	4.956E-004	1.582E-004	0.000E+000	6.538E-004
Total	4.956E-004	1.582E-004	0.000E+000	6.538E-004

Particulates (Curies)

Isotope	October	November	December	Total
Total	0.000E+000	0.000E+000	0.000E+000	0.000E+000

Halogens (Curies)

Isotope	October	November	December	Total
Total	0.000E+000	0.000E+000	0.000E+000	0.000E+000

Table 2.3C (Con't)
Annual Radioactive Effluent Release Report 2009
4th Quarter Gaseous Release
Batch Mode Only

Summary	October	November	December	<u>Total</u>
Total Noble Gases (Ci)	4.956E-004	1.582E-004	0.000E+000	6.538E-004
Total Halogens (Ci)	0.000E+000	0.000E+000	0.000E+000	0.000E+000
Total Particulate Gross Beta-Gamma Half-Lives > 8 Days (Ci)	0.000E+000	0.000E+000	0.000E+000	0.000E+000
Total Tritium (Ci)	9.611E-004	2.953E-004	1.136E-004	1.370E-003
Total Particulate Gross Alpha (Ci)	0.000E+000	0.000E+000	0.000E+000	0.000E+000

Table 2.4
Annual Radioactive Effluent Release Report 2009
Dose From Gaseous Effluents

The offsite dose limits from radioactive materials in gaseous effluents are specified in Section 3/4.4 of the Kewaunee ODCM and can be summarized as follows:

Limit	Gamma Air	Beta Air	Organ
Quarterly	5.0 mRad	10.0 mRad	7.5 mRem
Annual	10.0 mRad	20.0 mRad	15.0 mRem

The total release of gaseous effluents during each quarter of 2009 was within limits. The following offsite doses were calculated using equations 2.7, 2.8, and 2.11 from the Kewaunee ODCM. Calculated offsite doses versus quarterly limits are shown below:

	1st Qtr	2nd Qtr	3rd Qtr	4th Qtr
1. Gamma-Air				
Specification (mRads)	5.000E+000	5.000E+000	5.000E+000	5.000E+000
Actual Dose (mRads)	0.000E+000	4.557E-007	5.483E-006	2.634E-008
% of Specification	0.000E+000	9.115E-006	1.097E-004	5.268E-007
2. Beta-Air				
Specification (mRads)	1.000E+001	1.000E+001	1.000E+001	1.000E+001
Actual Dose (mRads)	0.000E+000	1.319E-006	1.412E-005	7.834E-008
% of Specification	0.000E+000	1.319E-005	1.412E-004	7.834E-007
3. Ingestion Pathway-Organ				
Specification (mRems)	7.500E+000	7.500E+000	7.500E+000	7.500E+000
Actual Dose (mRems)	8.054E-005	5.790E-005	1.424E-004	6.881E-004
% of Specification	1.074E-003	7.720E-004	1.899E-003	9.174E-003
	Liver	Liver	Liver	Liver

Table 2.4 (Con't)
Annual Radioactive Effluent Release Report 2009
Dose From Gaseous Effluents

In addition, the cumulative annual offsite doses for the period January 1 - December 31, 2009 versus the ODCM annual limits were:

	Annual
1. Gamma-Air	
Specification (mRads)	1.000E+001
Actual Dose (mRads)	5.966E-006
% of Specification	5.966E-005
2. Beta-Air	
Specification (mRads)	2.000E+001
Actual Dose (mRads)	1.551E-005
% of Specification	7.756E-005
3. Ingestion Pathway-Organ	
Specification (mRems)	1.500E+001
Actual Dose (mRems)	9.689E-004
% of Specification	6.459E-003
Liver	

3.0 LIQUID EFFLUENTS

3.1 Lower Limits of Detection (LLD) for Liquid Effluents

Liquid radioactive effluents are released as both batch releases and continuous releases. Each batch is sampled prior to release and analyzed for gamma emitters and tritium. A fraction of each sample is retained for a monthly proportional composite which is then analyzed for Gross Alpha, Strontium 89, Strontium 90 and Iron 55.

The LLD's for liquid batch release radioanalyses, as listed in Table 4.3 of the Kewaunee Offsite Dose Calculation Manual, are:

<u>Analysis</u>	<u>LLD (μCi/ml)</u>
Principal Gamma Emitters	1.00 E-06
Iodine 131	1.00 E-06
Tritium	1.00 E-05
Gross Alpha	5.00 E-07
Strontium 89, 90	5.00 E-08
Iron 55	1.00 E-06

The actual obtained "a priori" LLD values for batch releases are shown below.

Isotope	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter	Average a priori LLD (μCi/ml)
Mn-54	7.88E-08	7.88E-10	7.88E-08	8.20E-08	6.01E-08
Fe-59	1.75E-07	1.75E-09	1.75E-09	1.83E-07	9.04E-08
Co-58	7.73E-10	7.73E-10	7.73E-08	8.04E-08	3.98E-08
Co-60	1.05E-07	1.17E-09	1.17E-09	1.22E-07	5.72E-08
Zn-65	1.98E-09	1.98E-09	1.98E-09	2.06E-07	5.30E-08
Mo-99	5.56E-09	5.56E-09	5.56E-09	5.77E-07	1.49E-07
Cs-134	1.29E-07	6.13E-10	6.13E-10	7.78E-08	5.20E-08
Cs-137	1.39E-07	7.59E-10	7.59E-10	7.88E-08	5.47E-08
Ce-141	3.97E-08	3.97E-08	1.22E-07	4.26E-08	6.09E-08
Ce-144	3.53E-07	7.48E-07	2.12E-07	2.31E-07	3.86E-07
I-131	4.64E-10	4.64E-10	4.64E-10	4.81E-08	1.24E-08
H-3	4.82E-06	3.61E-06	3.87E-06	2.92E-06	3.80E-06
Sr-89	1.28E-08	1.94E-08	1.54E-08	9.98E-09	1.44E-08
Sr-90	7.45E-09	1.12E-08	7.37E-09	8.23E-09	8.56E-09
Gross Alpha	9.39E-09	8.88E-09	5.88E-09	1.28E-08	9.24E-09
Fe-55	6.77E-07	8.47E-07	7.52E-07	9.18E-07	7.99E-07

Continuous liquid releases are grab sampled weekly and analyzed for principal gamma emitters. A fraction of each weekly sample is retained for a monthly proportional composite which is then analyzed for Tritium, Gross Alpha, Strontium 89, Strontium 90 and Iron 55.

The LLD's for liquid continuous release radioanalyses, as listed in Table 4.3 of the Kewaunee Offsite Dose Calculation Manual, are:

Analysis	LLD ($\mu\text{Ci/ml}$)
Principal Gamma Emitters	5.00 E-07
Iodine 131	1.00 E-06
Tritium	1.00 E-05
Gross Alpha	5.00 E-07
Strontium 89, 90	5.00 E-08
Iron 55	1.00 E-06

The actual obtained "a priori" LLD values for continuous releases are shown below.

Isotope	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter	Average a priori LLD ($\mu\text{Ci/ml}$)
Mn-54	5.64E-11	6.78E-09	1.13E-08	6.05E-09	6.04E-09
Fe-59	1.52E-08	1.27E-10	1.42E-08	1.36E-08	1.08E-08
Co-58	6.65E-09	1.28E-08	1.66E-08	9.69E-09	1.14E-08
Co-60	1.07E-08	1.56E-08	1.02E-08	1.29E-08	1.23E-08
Zn-65	1.43E-10	2.86E-08	1.60E-08	1.53E-08	1.50E-08
Mo-99	1.27E-07	1.30E-07	1.03E-07	7.47E-08	1.09E-07
Cs-134	1.45E-08	1.67E-08	1.13E-08	1.19E-08	1.36E-08
Cs-137	1.75E-08	1.76E-08	2.33E-08	1.36E-08	1.80E-08
Ce-141	2.27E-08	2.40E-08	2.12E-08	1.39E-08	2.04E-08
Ce-144	1.33E-10	9.79E-08	8.88E-08	8.05E-08	6.68E-08
I-131	9.04E-09	3.24E-11	1.73E-08	6.95E-09	8.33E-09
H-3	4.82E-06	3.61E-06	3.87E-06	2.92E-06	3.80E-06
Sr-89	1.48E-08	1.54E-08	1.76E-08	1.39E-08	1.54E-08
Sr-90	8.77E-09	8.73E-09	8.01E-09	1.02E-08	8.93E-09
Gross Alpha	5.97E-09	6.08E-09	5.55E-09	6.33E-09	5.98E-09
Fe-55	6.79E-07	8.48E-07	7.61E-07	9.02E-07	7.97E-07

3.2 Liquid Batch Release Statistics

The following is a summation of all liquid batch releases made during 2009.

<u>Release Type</u>	<u>Number</u>	<u>Gallons Released</u>
A & B WCT	2	3,460
A CVC MONITOR TANK	12	71,995
A SGBT MONITOR TANK	10	89,814
B CVC MONITOR TANK	11	73,325
B SGBT MONITOR TANK	8	72,597

Total time for all batch releases..... 18,089.0 Min.

Maximum time for a batch release..... 679.0 Min.

Minimum time for a batch release..... 55.0 Min.

Average time for a batch release..... 420.7 Min.

3.3 Liquid Effluent Data

The following Table 3.1 presents a quarterly summation of the total activity released and average concentration for all liquid effluents. It also presents the gross alpha activity released, volume of waste released and volume of dilution water used. Tables 3.2 and 3.3 are monthly summations of the same information in Table 3.1. Table 3.2 contains the quantity of the individual isotopes released to the unrestricted area for batch releases. Table 3.3 presents a monthly summation of gross radioactivity, tritium, gross alpha and isotopic activity for the secondary blowdown and leakage releases. It also presents the monthly total volume for these releases and dilution volumes. Table 3.4 presents the doses from liquid effluents for each quarter and the calculated doses this year from liquid effluents.

TABLE 3.1
Annual Radioactive Effluent Release Report 2009
Liquid Effluents - Summation of all Releases

	1st Qtr	2nd Qtr	3rd Qtr	4th Qtr
Fission and Activation Products				
Total Release Excluding H3 and Dissolved Gases (Ci)	2.563E-003	3.845E-005	1.962E-003	6.831E-003
Average Concentration (µCi/ml)	1.984E-011	2.110E-013	8.446E-012	4.176E-011
Tritium				
Total Release (Ci)	2.438E+001	2.160E-001	7.286E+000	6.445E+001
Average Concentration (µCi/ml)	1.887E-007	1.186E-009	3.136E-008	3.941E-007
% of Tech. Spec. Limit(3.0E-3 µCi/ml)	6.290E-003	3.953E-005	1.045E-003	1.314E-002
Dissolved Gases				
Total Release (Ci)	0.000E+000	1.827E-005	1.612E-005	0.000E+000
Average Concentration (µCi/ml)	0.000E+000	1.003E-013	6.938E-014	0.000E+000
% of Tech. Spec. Limit(2.0E-4 µCi/ml)	0.000E+000	5.015E-008	3.469E-008	0.000E+000
Gross Alpha Activity				
Total Release (Ci)	0.000E+000	0.000E+000	0.000E+000	0.000E+000
Volume of Waste Released				
Batch (liters)	1.438E+005	2.320E+005	3.661E+005	4.359E+005
Continuous (liters)	2.419E+007	1.811E+007	2.147E+007	2.623E+007
Total (liters)	2.434E+007	1.834E+007	2.184E+007	2.667E+007
Volume of Dilution Water				
Batch (liters)	9.743E+008	4.970E+009	9.924E+009	7.678E+009
Continuous (liters)	1.282E+011	1.772E+011	2.224E+011	1.559E+011
Total (liters)	1.292E+011	1.822E+011	2.323E+011	1.635E+011

TABLE 3.2A
Annual Radioactive Effluent Release Report 2009
Liquid Effluents - Batch Releases

	January	February	March	Total
Gross Radioactivity				
Total Release Excluding H3 and Dissolved Gases (Ci)				
	6.602E-004	1.782E-003	1.209E-004	2.563E-003
Avg. Conc. (µCi/ml)				
	1.282E-009	8.984E-009	4.629E-010	
Tritium				
Total Release (Ci)				
	1.091E+001	6.599E+000	6.647E+000	2.416E+001
Avg. Conc. (µCi/ml)				
	2.120E-005	3.326E-005	2.545E-005	
Dissolved Gases				
Total Release (Ci)				
	0.000E+000	0.000E+000	0.000E+000	0.000E+000
Avg. Conc. (µCi/ml)				
	0.000E+000	0.000E+000	0.000E+000	
Gross Alpha Activity				
Total Release (Ci)				
	0.000E+000	0.000E+000	0.000E+000	0.000E+000
Avg. Conc. (µCi/ml)				
	0.000E+000	0.000E+000	0.000E+000	
Volume of Waste Released (liters)				
	6.963E+004	3.711E+004	3.709E+004	1.438E+005
Volume of Dilution Water (liters)				
	5.148E+008	1.983E+008	2.612E+008	9.743E+008

TABLE 3.2A (Con't)
Annual Radioactive Effluent Release Report 2009
Liquid Effluents - Batch Releases

Isotope (Ci)	January	February	March	Total
Ag-110m	0.000E+000	9.352E-005	0.000E+000	9.352E-005
Alpha	0.000E+000	0.000E+000	0.000E+000	0.000E+000
Co-58	4.334E-005	1.106E-004	0.000E+000	1.540E-004
Co-60	2.677E-005	2.694E-004	0.000E+000	2.962E-004
Cr-51	0.000E+000	0.000E+000	0.000E+000	0.000E+000
Fe-55	2.270E-004	1.210E-004	1.209E-004	4.689E-004
H-3	1.091E+001	6.599E+000	6.647E+000	2.416E+001
Mn-54	0.000E+000	0.000E+000	0.000E+000	0.000E+000
Sb-124	0.000E+000	0.000E+000	0.000E+000	0.000E+000
Sb-125	3.631E-004	1.188E-003	0.000E+000	1.551E-003
Sr-89	0.000E+000	0.000E+000	0.000E+000	0.000E+000
Sr-90	0.000E+000	0.000E+000	0.000E+000	0.000E+000
Xe-133	0.000E+000	0.000E+000	0.000E+000	0.000E+000
Total	1.091E+001	6.600E+000	6.647E+000	2.416E+001

TABLE 3.2B
Annual Radioactive Effluent Release Report 2009
Liquid Effluents - Batch Releases

	April	May	June	<u>Total</u>
Gross Radioactivity				
Total Release Excluding H3 and Dissolved Gases (Ci)				
	0.000E+000	0.000E+000	3.845E-005	3.845E-005
Avg. Conc. (µCi/ml)				
	0.000E+000	0.000E+000	4.668E-011	
Tritium				
Total Release (Ci)				
	1.267E-003	2.225E-003	5.862E-004	4.078E-003
Avg. Conc. (µCi/ml)				
	7.552E-010	9.009E-010	7.117E-010	
Dissolved Gases				
Total Release (Ci)				
	1.827E-005	0.000E+000	0.000E+000	1.827E-005
Avg. Conc. (µCi/ml)				
	1.089E-011	0.000E+000	0.000E+000	
Gross Alpha Activity				
Total Release (Ci)				
	0.000E+000	0.000E+000	0.000E+000	0.000E+000
Avg. Conc. (µCi/ml)				
	0.000E+000	0.000E+000	0.000E+000	
Volume of Waste Released (liters)				
	7.207E+004	1.266E+005	3.335E+004	2.320E+005
Volume of Dilution Water (liters)				
	1.678E+009	2.469E+009	8.236E+008	4.970E+009

TABLE 3.2B (Con't)
Annual Radioactive Effluent Release Report 2009
Liquid Effluents - Batch Releases

Isotope (Ci)	April	May	June	Total
Ag-110m	0.000E+000	0.000E+000	0.000E+000	0.000E+000
Alpha	0.000E+000	0.000E+000	0.000E+000	0.000E+000
Co-58	0.000E+000	0.000E+000	0.000E+000	0.000E+000
Co-60	0.000E+000	0.000E+000	0.000E+000	0.000E+000
Cr-51	0.000E+000	0.000E+000	0.000E+000	0.000E+000
Fe-55	0.000E+000	0.000E+000	0.000E+000	0.000E+000
H-3	1.267E-003	2.225E-003	5.862E-004	4.078E-003
Mn-54	0.000E+000	0.000E+000	0.000E+000	0.000E+000
Sb-124	0.000E+000	0.000E+000	0.000E+000	0.000E+000
Sb-125	0.000E+000	0.000E+000	3.845E-005	3.845E-005
Sr-89	0.000E+000	0.000E+000	0.000E+000	0.000E+000
Sr-90	0.000E+000	0.000E+000	0.000E+000	0.000E+000
Xe-133	1.827E-005	0.000E+000	0.000E+000	1.827E-005
Total	1.285E-003	2.225E-003	6.247E-004	4.135E-003

TABLE 3.2C
Annual Radioactive Effluent Release Report 2009
Liquid Effluents - Batch Releases

	July	August	September	Total
Gross Radioactivity				
Total Release Excluding H3 and Dissolved Gases (Ci)				
	3.672E-004	1.112E-003	4.468E-004	1.926E-003
Avg. Conc. (μCi/ml)				
	2.355E-010	1.730E-010	2.307E-010	
Tritium				
Total Release (Ci)				
	1.182E-003	4.073E-003	7.156E-000	7.161E+000
Avg. Conc. (μCi/ml)				
	7.580E-010	6.335E-010	3.695E-006	
Dissolved Gases				
Total Release (Ci)				
	0.000E+000	1.612E-005	0.000E+000	1.612E-005
Avg. Conc. (μCi/ml)				
	0.000E+000	2.508E-012	0.000E+000	
Gross Alpha Activity				
Total Release (Ci)				
	0.000E+000	0.000E+000	0.000E+000	0.000E+000
Avg. Conc. (μCi/ml)				
	0.000E+000	0.000E+000	0.000E+000	
Volume of Waste Released (liters)				
	6.724E+004	2.317E+005	6.724E+004	3.661E+005
Volume of Dilution Water (liters)				
	1.559E+009	6.428E+009	1.936E+009	9.924E+009

TABLE 3.2C (Con't)
Annual Radioactive Effluent Release Report 2009
Liquid Effluents - Batch Releases

Isotope (Ci)	July	August	September	Total
Ag-110m	0.000E+000	0.000E+000	2.259E-005	2.259E-005
Alpha	0.000E+000	0.000E+000	0.000E+000	0.000E+000
Co-58	0.000E+000	0.000E+000	0.000E+000	0.000E+000
Co-60	7.543E-005	1.064E-004	1.238E-004	3.057E-004
Cr-51	0.000E+000	0.000E+000	0.000E+000	0.000E+000
Fe-55	2.918E-004	1.005E-003	2.918E-004	1.589E-003
H-3	1.182E-003	4.073E-003	7.156E+000	7.161E+000
Mn-54	0.000E+000	0.000E+000	8.547E-006	8.547E-006
Sb-124	0.000E+000	0.000E+000	0.000E+000	0.000E+000
Sb-125	0.000E+000	0.000E+000	0.000E+000	0.000E+000
Sr-89	0.000E+000	0.000E+000	0.000E+000	0.000E+000
Sr-90	0.000E+000	0.000E+000	0.000E+000	0.000E+000
Xe-133	0.000E+000	1.612E-005	0.000E+000	1.612E-005
Total	1.549E-003	5.201E-003	7.156E+000	7.163E+000

TABLE 3.2D
Annual Radioactive Effluent Release Report 2009
Liquid Effluents - Batch Releases

	October	November	December	Total
Gross Radioactivity				
Total Release Excluding H3 and Dissolved Gases (Ci)				
	2.198E-003	2.673E-003	1.960E-003	6.831E-003
Avg. Conc. (μ Ci/ml)				
	1.673E-009	6.505E-010	8.687E-010	
Tritium				
Total Release (Ci)				
	9.941E+000	2.941E+001	2.510E+001	6.445E+001
Avg. Conc. (μ Ci/ml)				
	7.568E-006	7.158E-006	1.112E-005	
Dissolved Gases				
Total Release (Ci)				
	0.000E+000	0.000E+000	0.000E+000	0.000E+000
Avg. Conc. (μ Ci/ml)				
	0.000E+000	0.000E+000	0.000E+000	
Gross Alpha Activity				
Total Release (Ci)				
	0.000E+000	0.000E+000	0.000E+000	0.000E+000
Avg. Conc. (μ Ci/ml)				
	0.000E+000	0.000E+000	0.000E+000	
Volume of Waste Released				
(liters)	1.031E+005	1.657E+005	1.671E+005	4.359E+005
Volume of Dilution Water				
(liters)	1.313E+009	4.109E+009	2.256E+009	7.678E+009

TABLE 3.2D (Con't)
Annual Radioactive Effluent Release Report 2009
Liquid Effluents - Batch Releases

Isotope (Ci)	October	November	December	Total
Ag-110m	4.603E-005	2.054E-004	1.886E-004	4.400E-004
Alpha	0.000E+000	0.000E+000	0.000E+000	0.000E+000
Co-58	6.292E-004	5.215E-004	1.287E-004	1.279E-003
Co-60	7.970E-005	2.403E-004	2.038E-004	5.238E-004
Cr-51	3.219E-004	0.000E+000	0.000E+000	3.219E-004
Fe-55	8.874E-004	1.427E-003	1.439E-003	3.753E-003
H-3	9.941E+000	2.941E+001	2.510E+001	6.445E+001
Mn-54	0.000E+000	0.000E+000	0.000E+000	0.000E+000
Sb-124	0.000E+000	1.588E-005	0.000E+000	1.588E-005
Sb-125	2.335E-004	2.629E-004	0.000E+000	4.964E-004
Sr-89	0.000E+000	0.000E+000	0.000E+000	0.000E+000
Sr-90	0.000E+000	0.000E+000	0.000E+000	0.000E+000
Xe-133	0.000E+000	0.000E+000	0.000E+000	0.000E+000
Total	9.943E+000	2.942E+001	2.510E+001	6.446E+001

TABLE 3.3A
Annual Radioactive Effluent Release Report 2009
Liquid Effluents - Continuous Releases

	January	February	March	Total
Gross Radioactivity				
Total Release Excluding H3 and Dissolved Gases (Ci)				
	0.000E+000	0.000E+000	0.000E+000	0.000E+000
Avg. Conc. (µCi/ml)				
	0.000E+000	0.000E+000	0.000E+000	
Tritium				
Total Release (Ci)				
	8.929E-002	4.095E-002	9.071E-002	2.210E-001
Avg. Conc. (µCi/ml)				
	2.818E-009	1.268E-009	1.412E-009	
Dissolved Gases				
Total Release (Ci)				
	0.000E+000	0.000E+000	0.000E+000	0.000E+000
Avg. Conc. (µCi/ml)				
	0.000E+000	0.000E+000	0.000E+000	
Gross Alpha Activity				
Total Release (Ci)				
	0.000E+000	0.000E+000	0.000E+000	0.000E+000
Avg. Conc. (µCi/ml)				
	0.000E+000	0.000E+000	0.000E+000	
Volume of Waste Released				
(liters)	7.154E+006	6.805E+006	1.023E+007	2.419E+007
Volume of Dilution Water				
(liters)	3.167E+010	3.229E+010	6.422E+010	1.282E+011

TABLE 3.3A (Con't)
Annual Radioactive Effluent Release Report 2009
Liquid Effluents - Continuous Releases

Isotope (Ci)	January	February	March	Total
Ag-110m	0.000E+000	0.000E+000	0.000E+000	0.000E+000
Alpha	0.000E+000	0.000E+000	0.000E+000	0.000E+000
Co-58	0.000E+000	0.000E+000	0.000E+000	0.000E+000
Co-60	0.000E+000	0.000E+000	0.000E+000	0.000E+000
Cr-51	0.000E+000	0.000E+000	0.000E+000	0.000E+000
Fe-55	0.000E+000	0.000E+000	0.000E+000	0.000E+000
H-3	8.929E-002	4.095E-002	9.071E-002	2.210E-001
Mn-54	0.000E+000	0.000E+000	0.000E+000	0.000E+000
Sb-124	0.000E+000	0.000E+000	0.000E+000	0.000E+000
Sb-125	0.000E+000	0.000E+000	0.000E+000	0.000E+000
Sr-89	0.000E+000	0.000E+000	0.000E+000	0.000E+000
Sr-90	0.000E+000	0.000E+000	0.000E+000	0.000E+000
Xe-133	0.000E+000	0.000E+000	0.000E+000	0.000E+000
Total	8.929E-002	4.095E-002	9.071E-002	2.210E-001

TABLE 3.3B
Annual Radioactive Effluent Release Report 2009
Liquid Effluents - Continuous Releases

	April	May	June	Total
Gross Radioactivity				
Total Release Excluding H3 and Dissolved Gases (Ci)				
	0.000E+000	0.000E+000	0.000E+000	0.000E+000
Avg. Conc. (µCi/ml)				
	0.000E+000	0.000E+000	0.000E+000	
Tritium				
Total Release (Ci)				
	9.066E-002	4.263E-002	7.868E-002	2.120E-001
Avg. Conc. (µCi/ml)				
	2.313E-009	6.908E-010	1.031E-009	
Dissolved Gases				
Total Release (Ci)				
	0.000E+000	0.000E+000	0.000E+000	0.000E+000
Avg. Conc. (µCi/ml)				
	0.000E+000	0.000E+000	0.000E+000	
Gross Alpha Activity				
Total Release (Ci)				
	0.000E+000	0.000E+000	0.000E+000	0.000E+000
Avg. Conc. (µCi/ml)				
	0.000E+000	0.000E+000	0.000E+000	
Volume of Waste Released				
(liters)	6.673E+006	5.656E+006	5.776E+006	1.811E+007
Volume of Dilution Water				
(liters)	3.918E+010	6.171E+010	7.629E+010	1.772E+011

TABLE 3.3B (Con't)
Annual Radioactive Effluent Release Report 2009
Liquid Effluents - Continuous Releases.

Isotope (Ci)	April	May	June	Total
Ag-110m	0.000E+000	0.000E+000	0.000E+000	0.000E+000
Alpha	0.000E+000	0.000E+000	0.000E+000	0.000E+000
Co-58	0.000E+000	0.000E+000	0.000E+000	0.000E+000
Co-60	0.000E+000	0.000E+000	0.000E+000	0.000E+000
Cr-51	0.000E+000	0.000E+000	0.000E+000	0.000E+000
Fe-55	0.000E+000	0.000E+000	0.000E+000	0.000E+000
H-3	9.066E-002	4.263E-002	7.868E-002	2.120E-001
Mn-54	0.000E+000	0.000E+000	0.000E+000	0.000E+000
Sb-124	0.000E+000	0.000E+000	0.000E+000	0.000E+000
Sb-125	0.000E+000	0.000E+000	0.000E+000	0.000E+000
Sr-89	0.000E+000	0.000E+000	0.000E+000	0.000E+000
Sr-90	0.000E+000	0.000E+000	0.000E+000	0.000E+000
Xe-133	0.000E+000	0.000E+000	0.000E+000	0.000E+000
Total	9.066E-002	4.263E-002	7.868E-002	2.120E-001

TABLE 3.3C
Annual Radioactive Effluent Release Report 2009
Liquid Effluents - Continuous Releases

	July	August	September	Total
Gross Radioactivity				
Total Release Excluding H3 and Dissolved Gases (Ci)				
	0.000E+000	0.000E+000	3.654E-005	3.654E-005
Avg. Conc. (µCi/ml)				
	0.000E+000	0.000E+000	7.069E-013	
Tritium				
Total Release (Ci)				
	4.302E-002	4.359E-002	3.832E-002	1.249E-001
Avg. Conc. (µCi/ml)				
	4.567E-010	5.694E-010	7.414E-010	
Dissolved Gases				
Total Release (Ci)				
	0.000E+000	0.000E+000	0.000E+000	0.000E+000
Avg. Conc. (µCi/ml)				
	0.000E+000	0.000E+000	0.000E+000	
Gross Alpha Activity				
Total Release (Ci)				
	0.000E+000	0.000E+000	0.000E+000	0.000E+000
Avg. Conc. (µCi/ml)				
	0.000E+000	0.000E+000	0.000E+000	
Volume of Waste Released				
(liters)	7.338E+006	7.201E+006	6.933E+006	2.147E+007
Volume of Dilution Water				
(liters)	9.418E+010	7.654E+010	5.168E+010	2.224E+011

TABLE 3.3C (Con't)
Annual Radioactive Effluent Release Report 2009
Liquid Effluents - Continuous Releases

Isotope (Ci)	July	August	September	Total
Ag-110m	0.000E+000	0.000E+000	0.000E+000	0.000E+000
Alpha	0.000E+000	0.000E+000	0.000E+000	0.000E+000
Co-58	0.000E+000	0.000E+000	3.654E-005	3.654E-005
Co-60	0.000E+000	0.000E+000	0.000E+000	0.000E+000
Cr-51	0.000E+000	0.000E+000	0.000E+000	0.000E+000
Fe-55	0.000E+000	0.000E+000	0.000E+000	0.000E+000
H-3	4.302E-002	4.359E-002	3.832E-002	1.249E-001
Mn-54	0.000E+000	0.000E+000	0.000E+000	0.000E+000
Sb-124	0.000E+000	0.000E+000	0.000E+000	0.000E+000
Sb-125	0.000E+000	0.000E+000	0.000E+000	0.000E+000
Sr-89	0.000E+000	0.000E+000	0.000E+000	0.000E+000
Sr-90	0.000E+000	0.000E+000	0.000E+000	0.000E+000
Xe-133	0.000E+000	0.000E+000	0.000E+000	0.000E+000
Total	4.302E-002	4.359E-002	3.836E-002	1.250E-001

TABLE 3.3D
Annual Radioactive Effluent Release Report 2009
Liquid Effluents - Continuous Releases

	October	November	December	Total
Gross Radioactivity				
Total Release Excluding H3 and Dissolved Gases (Ci)				
	0.000E+000	0.000E+000	0.000E+000	0.000E+000
Avg. Conc. (µCi/ml)				
	0.000E+000	0.000E+000	0.000E+000	
Tritium				
Total Release (Ci)				
	0.000E+000	0.000E+000	0.000E+000	0.000E+000
Avg. Conc. (µCi/ml)				
	0.000E+000	0.000E+000	0.000E+000	
Dissolved Gases				
Total Release (Ci)				
	0.000E+000	0.000E+000	0.000E+000	0.000E+000
Avg. Conc. (µCi/ml)				
	0.000E+000	0.000E+000	0.000E+000	
Gross Alpha Activity				
Total Release (Ci)				
	0.000E+000	0.000E+000	0.000E+000	0.000E+000
Avg. Conc. (µCi/ml)				
	0.000E+000	0.000E+000	0.000E+000	
Volume of Waste Released				
(liters)	1.114E+007	8.116E+006	6.975E+006	2.623E+007
Volume of Dilution Water				
(liters)	3.580E+010	7.722E+010	4.283E+010	1.559E+011

TABLE 3.3D (Con't)
Annual Radioactive Effluent Release Report 2009
Liquid Effluents - Continuous Releases

Isotope (Ci)	October	November	December	Total
Ag-110m	0.000E+000	0.000E+000	0.000E+000	0.000E+000
Alpha	0.000E+000	0.000E+000	0.000E+000	0.000E+000
Co-58	0.000E+000	0.000E+000	0.000E+000	0.000E+000
Co-60	0.000E+000	0.000E+000	0.000E+000	0.000E+000
Cr-51	0.000E+000	0.000E+000	0.000E+000	0.000E+000
Fe-55	0.000E+000	0.000E+000	0.000E+000	0.000E+000
H-3	0.000E+000	0.000E+000	0.000E+000	0.000E+000
Mn-54	0.000E+000	0.000E+000	0.000E+000	0.000E+000
Sb-124	0.000E+000	0.000E+000	0.000E+000	0.000E+000
Sb-125	0.000E+000	0.000E+000	0.000E+000	0.000E+000
Sr-89	0.000E+000	0.000E+000	0.000E+000	0.000E+000
Sr-90	0.000E+000	0.000E+000	0.000E+000	0.000E+000
Xe-133	0.000E+000	0.000E+000	0.000E+000	0.000E+000
Total	0.000E+000	0.000E+000	0.000E+000	0.000E+000

Table 3.4
Annual Radioactive Effluent Report 2009
Dose From Liquid Effluents

The dose to a member of the public from total liquid radioactive releases for each quarter was below the ODCM limits of 1.5 mrems to the total body and less than or equal to 5 mrems to any organ. Additionally, the dose to a member of the public from total liquid radioactive releases for the year was below the ODCM limits of 3 mrems to the total body and less than or equal to 10 mrems to any organ.

Instantaneous release concentrations are limited by the individual radionuclide concentrations established in 10 CFR 20, Appendix B, for unrestricted areas. During the report period, none of the isotopes released exceed the concentrations specified in Appendix B. The following offsite doses were calculated using equation 1.5 from the Kewaunee ODCM:

Organ 1st Qtr Dose	Dose Total mRem	Quarterly Limit mRem	Percent of Limit
Total Body	1.832E-004	1.5	1.221E-02
Bone	7.049E-006	5.0	1.410E-04
Liver	1.844E-004	5.0	3.687E-03
Thyroid	1.776E-004	5.0	3.553E-03
Kidney	1.776E-004	5.0	3.553E-03
Lung	1.804E-004	5.0	3.609E-03
GI-LLI	2.213E-004	5.0	4.427E-03

Organ 2nd Qtr Dose	Dose Total mRem	Quarterly Limit mRem	Percent of Limit
Total Body	1.023E-006	1.5	6.817E-05
Bone	2.569E-009	5.0	5.138E-08
Liver	1.022E-006	5.0	2.044E-05
Thyroid	1.022E-006	5.0	2.044E-05
Kidney	1.022E-006	5.0	2.044E-05
Lung	1.024E-006	5.0	2.048E-05
GI-LLI	1.050E-006	5.0	2.101E-05

Table 3.4 (Con't)
Annual Radioactive Effluent Report 2009
Dose From Liquid Effluents

Organ 3rd Qtr Dose	Dose Total mRem	Quarterly Limit mRem	Percent of Limit
Total Body	3.063E-005	1.5	2.042E-03
Bone	1.159E-005	5.0	2.318E-04
Liver	3.597E-005	5.0	7.194E-04
Thyroid	2.661E-005	5.0	5.321E-04
Kidney	2.673E-005	5.0	5.346E-04
Lung	3.107E-005	5.0	6.214E-04
GI-LLI	5.039E-005	5.0	1.008E-03

Organ 4th Qtr Dose	Dose Total mRem	Quarterly Limit mRem	Percent of Limit
Total Body	3.662E-004	1.5	2.442E-02
Bone	4.174E-005	5.0	8.348E-04
Liver	3.833E-004	5.0	7.666E-03
Thyroid	3.504E-004	5.0	7.008E-03
Kidney	3.504E-004	5.0	7.008E-03
Lung	3.665E-004	5.0	7.331E-03
GI-LLI	4.522E-004	5.0	9.043E-03

Calculated Dose This Year			
Organ	Dose Total mRem	Quarterly Limit mRem	Percent of Limit
Total Body	5.811E-004	3.0	1.937E-02
Bone	6.038E-005	10.0	6.038E-04
Liver	6.047E-004	10.0	6.047E-03
Thyroid	5.557E-004	10.0	5.557E-03
Kidney	5.558E-004	10.0	5.558E-03
Lung	5.791E-004	10.0	5.791E-03
GI-LLI	7.249E-004	10.0	7.249E-03

3.4 GROUND WATER MONITORING

Sample Point	Sample Collection Date	H-3 (pCi/l)	Total Gamma Activity (µCi/ml)
Settling Plug C - Inner	02/23/2009 10:55	<2000	None Detected
Settling Plug G - Inner	02/23/2009 10:55	<241	None Detected
Settling Plug B - Inner	02/23/2009 11:15	<2000	None Detected
AB712	03/10/2009 13:29	<241	None Detected
AB711	03/10/2009 14:05	415	None Detected
AB717	03/12/2009 9:11	<241	None Detected
MW706	03/12/2009 9:55	<241	None Detected
MW705	03/12/2009 12:45	<241	None Detected
AB709	03/12/2009 13:05	<241	None Detected
AB715	03/13/2009 8:40	689	None Detected
AB710	03/13/2009 10:57	303	None Detected
AB708	03/13/2009 12:50	487	None Detected
MW702	03/16/2009 11:00	<241	None Detected
Settling Plug G - Outer	03/26/2009 14:00	8099	None Detected
AB711	05/28/2009 13:00	<2000	None Detected
AB710	05/28/2009 14:00	<2000	None Detected
AB717	05/29/2009 8:10	<2000	None Detected
MW705	05/29/2009 8:40	<2000	None Detected
AB712	05/29/2009 10:55	<2000	None Detected
AB715	05/29/2009 11:30	<2000	None Detected
AB709	05/29/2009 11:55	<2000	None Detected
AB707	05/29/2009 13:25	1479	None Detected
AB708	05/29/2009 14:05	<2000	None Detected
MW701	06/01/2009 8:58	<2000	None Detected
MW702	06/01/2009 10:53	<2000	None Detected
MW703	06/01/2009 11:37	<2000	None Detected
MW704	06/01/2009 12:11	<2000	None Detected
Settling Plug G - Inner	06/08/2009 8:30	2956	None Detected
Settling Plug C - Inner	06/08/2009 10:00	466	

Sample Point	Sample Collection Date	H-3 (pCi/l)	Total Gamma Activity (µCi/ml)
Settling Plug B - Inner	06/08/2009 10:30	<227	
Settling Plug G - Outer	06/11/2009 9:10	4997	
Settling Plug B - Inner	06/14/2009 9:00	<2000	None Detected
Settling Plug C - Inner	06/14/2009 9:00	<2000	None Detected
Settling Plug G - Outer	06/16/2009 12:00	4420	
Settling Plug G - Inner	06/24/2009 9:00	<224	
Settling Plug G - Outer	06/24/2009 10:00	4543	
Settling Plug G - Inner	06/30/2009 10:00	<236	
Settling Plug G - Outer	06/30/2009 10:00	4163	
AB717	07/15/2009 13:20	<2000	None Detected
MW705	07/15/2009 13:40	<2000	None Detected
AB709	07/15/2009 14:05	<2000	None Detected
AB712	07/16/2009 8:00	<2000	None Detected
MW701	07/16/2009 11:05	<2000	None Detected
AB711	07/16/2009 12:22	<2000	None Detected
AB710	07/16/2009 12:55	<2000	None Detected
AB715	07/17/2009 8:30	<2000	None Detected
AB708	07/17/2009 9:15	<2000	None Detected
AB707	07/17/2009 9:45	1123	None Detected
MW702	07/17/2009 13:10	<2000	None Detected
MW704	07/17/2009 13:50	<2000	None Detected
MW703	07/17/2009 14:16	<2000	None Detected
MW706	07/17/2009 14:45	<2000	None Detected
Settling Plug G - Outer	08/13/2009 9:00	3793	None Detected
Settling Plug G - Inner	08/13/2009 9:15	<216	None Detected
Settling Plug H - Inner	08/13/2009 9:30	<216	None Detected
Settling Plug E - Inner	08/13/2009 11:35	9334	None Detected
Settling Plug D - Inner	08/13/2009 11:45	598	None Detected
Settling Plug C - Inner	08/13/2009 11:50	<239	None Detected
Settling Plug C - Outer	08/13/2009 12:00	873	None Detected
Settling Plug B - Inner	08/13/2009 12:35	309	None Detected

Sample Point	Sample Collection Date	H-3 (pCi/l)	Total Gamma Activity (µCi/ml)
Settling Plug G - Outer	09/09/2009 9:00	3385	
AB710	11/04/2009 14:25	756	None Detected
MW705	11/05/2009 9:00	475	None Detected
AB717	11/05/2009 9:50	<263	None Detected
MW701	11/05/2009 10:40	<252	None Detected
AB712	11/05/2009 11:00	<263	None Detected
AB711	11/05/2009 12:50	<263	None Detected
AB715	11/05/2009 13:15	936	None Detected
AB709	11/05/2009 13:40	1450	None Detected
AB708	11/05/2009 14:20	1552	None Detected
AB707	11/06/2009 10:02	1899	None Detected
MW706	11/06/2009 10:27	<252	None Detected
MW702	11/06/2009 12:40	<252	None Detected
MW703	11/06/2009 13:18	<252	None Detected
MW704	11/06/2009 13:45	<252	None Detected
AB707	11/18/2009 10:30	1630	
Settling Plug G - Outer	12/02/2009 8:00	2597	None Detected
Settling Plug G - Inner	12/02/2009 8:15	165	None Detected
Settling Plug H - Inner	12/02/2009 8:30	<159	None Detected
Settling Plug E - Inner	12/02/2009 14:30	9000	None Detected
Settling Plug D - Inner	12/02/2009 14:45	723	None Detected
Settling Plug C - Inner	12/10/2009 9:00	1673	None Detected
Settling Plug B - Inner	12/10/2009 9:15	706	None Detected
Settling Plug C - Outer	12/23/2009 8:30	1303	None Detected

Ground water monitoring wells MW-701,703&704 and AB-707 were not sampled in March 2009 due to inaccessibility of the wells caused by snow and ice covering.

4.0 UNPLANNED RELEASES

CR350761 – On 10/04/09 a minor release of radioactive material in liquid occurred resulting in discharge of a maximally estimated 19 uCi of Co-58 and 483 uCi of H-3. The release was determined to be a factor of 400 below any ODCM release limits.

CR 348412 – On 09/14/09 due to an open valve gas from an additional waste gas decay tank was released during a permitted waste gas decay tank release. Maximal estimates were used to create a discharge permit, which is included in the results presented in this report. No release thresholds or monitor set points were reached.

5.0 METEOROLOGICAL DATA

See Appendix A for missing meteorological data and the joint frequency distribution tables.

6.0 SOLID WASTE DISPOSAL

Table 6.1 is a summation of solid wastes shipped during 2009. Presented are the types of wastes, major nuclide composition and disposition of the wastes. Table 6.1 contains the radionuclide content (curies) and percent abundance for each type of waste.

Table 6.1
Annual Radioactive Effluent Report 2009
Solid Waste and Irradiated Fuel Shipments

A. SOLID WASTE SHIPPED OFFSITE FOR BURIAL OR DISPOSAL

1. Type of Waste

	<u>Ci</u>	<u>Ci % Error</u>	<u>M³</u>
a. Resins, Filters and Evap Bottoms	4.36E+01	±25.0	5.66E+00
b. Dry Active Waste (DAW)	4.45E-02	±25.0	3.37E+01
c. Irradiated Components	0.00E+00	±25.0	0.00E+00
d. Other Waste	0.00E+00	±25.0	0.00E+00

2. Estimate of Major Nuclide by Composition

a. Resins, Filters and Evap Bottoms

<u>Nuclide</u>	<u>% Abundance</u>	<u>Ci</u>
H-3	1.894	8.25E-01
C-14	0.095	4.14E-02
Cr-51	1.236	5.38E-01
Mn-54	3.756	1.64E+00
Fe-55	5.673	2.47E+00
Co-57	0.399	1.74E-01
Co-58	1.178	5.13E-01
Co-60	19.751	8.60E+00
Ni-59	0.496	2.16E-01
Ni-63	63.026	2.74E+01
Sr-89	0.005	2.31E-03
Sr-90	0.006	2.63E-03
Nb-94	0.020	8.75E-03
Ag-110m	0.030	1.31E-02
Sb-125	1.624	7.07E-01
Cs-137	0.637	2.77E-01
Ce-144	0.077	3.37E-02
Pu-238	0.000	1.48E-05
Pu-241	0.097	4.23E-02

b. Dry Active Waste (DAW)

<u>Nuclide</u>	<u>% Abundance</u>	<u>Ci</u>
H-3	1.824	8.13E-04
C-14	1.671	7.44E-04
Cr-51	4.436	1.98E-03
Mn-54	5.879	2.62E-03
Fe-55	12.650	5.63E-03
Fe-59	0.447	1.99E-04
Co-57	0.388	1.73E-04
Co-58	51.664	2.30E-02
Co-60	7.505	3.34E-03
Ni-63	2.487	1.11E-03
Zr-95	2.847	1.27E-03
Nb-95	6.979	3.11E-03
Sb-125	0.761	3.39E-04
Cs-137	0.134	5.97E-05
Ce-144	0.329	1.47E-04

c. Irradiated Components

<u>Nuclide</u>	<u>% Abundance</u>	<u>Ci</u>
None	N/A	N/A

d. Other Waste

<u>Nuclide</u>	<u>% Abundance</u>	<u>Ci</u>
None	N/A	N/A

3. Solid Waste Disposition

<u>Date of Shipment</u>	<u>Mode of Transportation</u>	<u>Destination</u>
09/23/09	Hittman Transport	Duratek Services Inc.
11/04/09	Hittman Transport	Studs vik Processing Facility
11/18/09	Hittman Transport	Studs vik Processing Facility
12/10/09	Hittman Transport	Duratek Services Inc.

B. IRRADIATED FUEL SHIPMENTS

No irradiated fuel shipments were made from the Kewaunee Nuclear Power Plant during 2009.

7.0 PROGRAM REVISIONS

In accordance with Technical Specifications 6.18.b.3 and 6.19.a, the revisions to the Offsite Dose Calculation Manual and radioactive waste treatment systems are listed below.

7.1 **Offsite Dose Calculation Manual**

The Offsite Dose Calculation Manual (ODCM) has not been revised during this report period.

7.2 **Major Changes to the Radioactive Liquid, Gaseous and Solid Waste Treatment Systems**

There were no changes to the radioactive waste systems (liquid, gaseous, or solid) during this report period.

8.0 REPORTABLE OCCURRENCES

8.1 CR353211: KEWA - Monthly Liquid Composites dumped prior to Quarterly Composites being made :

The July 2009 Monthly composites, 2-one liter bottles for each composite for S/G blowdown, TBS and Rad. Batch discharges were dumped.

The August 2009 Monthly composites, 1 of the 2 liter bottles for each composite for S/G blowdown, TBS, and Rad. Batch discharges were dumped.

Each Month the weekly discharge samples are composited, then these monthly composites are combined to make a quarterly composite for the TBS, S/G and Batch releases. The Composite is then sent out for analysis by an outside vender for Fe-59, Sr 89 & 90 and tritium Analysis.

Representative samples were made from other representative samples.

July composite was made using September weekly samples to create a representative sample. S/G samples from the weeks of 8/31/09 – 9/7/09 and 9/21/09 – 9/29/09 were used to represent July S/G composites.

TBS samples from the weeks of 8/31/09 – 9/7/09, 9/7/09 – 9/14/09, 9/14/09 – 9/21/09, 9/21/09 – 9/28/09 will be used to represent July TBS composites.

Batch Discharge samples from 09-0091L (A SGBT MT) and 09-0095L (B SGBT MT) were used to represent July Rad. Discharge composites which were two SGBT tanks.

8.2 CR334624 Errors were found in the 2006 Annual Radioactive Effluent Release Report in section 6.0, Solid Waste Disposal. The number of curies and volume of solid waste shipped offsite for burial or disposal listed in Table 6.1, titled "Annual Radioactive Effluent Report, Solid Waste and Irradiated Fuel Shipments" on page 59 of 63, is shown in section A.1.c, Irradiated components, control rods, etc. but should be shown in section A.1.b, Dry compressible waste, contaminated equipment, etc.. There was no irradiated components or control rods, etc. that were shipped in 2006. Only dry compressible waste, contaminated equipment, etc. was shipped in 2006. The numbers are correct, just listed in the wrong spot. The rest of the data in that section appears to be correct. The following shows the error and its correction.

Table 6.1
Annual Radioactive Effluent Report 2006
Solid Waste and Irradiated Fuel Shipments

A. SOLID WASTE SHIPPED OFFSITE FOR BURIAL OR DISPOSAL

1. Type of Waste

	<u>Ci</u>	<u>M³</u>
a. Spent resins, filter sludges, evaporator bottom	None	None
b. Dry compressible waste, contaminated equipment, etc.	None	None
c. Irradiated components, control rods, etc.	2.60E-01	9.34E+01
d. Other	None	None

Appendix A

Kewaunee Power Station

2009 Meteorological Data

Missing Data

First Quarter: 0.0 hours

Second Quarter: 133.25 hours

Third Quarter: 0.25 hours

Fourth Quarter: 45.0 hours

Note: A total of 178.5 hours of data is missing or otherwise unavailable. This represents the availability of 97.96% of the data for the year.

APPENDIX A
Kewaunee Power Station 2009 Meteorological Data

First Quarter 2009

Stability Class A

Total Hours Missing = 0

Wind Direction

	CALM	1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N	0	0	2	10	11.5	6.5	0	30
NNE	0	0	1.75	15.5	13.5	9.75	6.5	47
NE	0	0.25	12.5	21.5	17.5	0.25	0	52
ENE	0	0	6	7.25	8.75	0	0	22
E	0	0.25	1.25	7.75	4.25	0	0	13.5
ESE	0	1.75	5.75	9.25	10.25	3	2.25	32.25
SE	0	0.5	3.75	14.5	12.75	2.75	0.5	34.75
SSE	0	0	3.25	9.5	30.25	2.5	0	45.5
S	0	0	26.75	60.75	13.75	0	0	101.25
SSW	0	2.75	26.5	34.5	4	0	0	67.75
SW	0	1.5	16	19	5.75	0	0	42.25
WSW	0	0.5	24.25	24.25	3	2	0.25	54.25
W	0	0.5	19.75	88	47.5	4.25	0	160
WNW	0	1.75	29	55.25	21	0	0	107
NW	0	1.5	21	36.75	38.25	6.5	0	104
NNW	0	0.75	5.5	33	21.75	13.75	0.5	75.25
TOTAL	0	12	205	446.75	263.75	51.25	10	988.75

Stability Class B

Wind Direction

	CALM	1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N	0	0	0.25	0.75	0	0	0	1
NNE	0	0	0	0	0.75	0	0	0.75
NE	0	0	0	0	0.5	0	0	0.5
ENE	0	0.25	0.5	0	0	0	0	0.75
E	0	0.75	2	1.25	0	0	0	4
ESE	0	0.5	1.75	0.75	0.25	0	0	3.25
SE	0	0.25	0.5	1	1.75	0.75	0	4.25
SSE	0	0	0	0.75	1	0	0	1.75
S	0	0	2.25	8	0.25	0	0	10.5
SSW	0	0	2	1.5	0	0	0	3.5
SW	0	0.75	2	4.75	0	0	0	7.5
WSW	0	0	3.5	2.75	2.5	0.5	0	9.25
W	0	0	2.5	9.5	5.25	0	0	17.25
WNW	0	0	2.75	8	0.25	0	0	11
NW	0	0	2.25	4.5	2.5	0	0	9.25
NNW	0	0	0.25	3.25	0	0.75	0	4.25
TOTAL	0	2.5	22.5	46.75	15	2	0	88.75

APPENDIX A
Kewaunee Power Station 2009 Meteorological Data

Stability Class C

Wind Direction

	CALM	1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N	0	0	0	0.75	0	0	0	0.75
NNE	0	0	0	0.75	3.75	0	0	4.5
NE	0	0	0	3.5	1.75	0	0	5.25
ENE	0	0	2.5	1	0	0	0	3.5
E	0	0	1	1.5	0	0	0	2.5
ESE	0	0	0	0.5	0	0	0	0.5
SE	0	0	0.75	0.75	0.5	1.25	1	4.25
SSE	0	0	0.5	0.25	0.75	0	0	1.5
S	0	0	1	7	0.25	0	0	8.25
SSW	0	0.25	3	4	0	0	0	7.25
SW	0	0	1.5	4	0	0	0	5.5
WSW	0	0.25	3.25	5.5	2	0.5	0.25	11.75
W	0	0.5	3.25	8	6.5	3.75	0	22
WNW	0	0	2	11.25	2.5	0	0	15.75
NW	0	0	2.25	1.5	3.5	0	0	7.25
NNW	0	0.25	0.75	4	0.25	0.75	0	6
TOTAL	0	1.25	21.75	54.25	21.75	6.25	1.25	106.5

Stability Class D

Wind Direction

	CALM	1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N	0	0	0.25	1.5	0.75	0	0	2.5
NNE	0	0	0	1.5	3	0	0	4.5
NE	0	0.25	0	3	0.75	0	0	4
ENE	0	0	1.75	7	0	0	0	8.75
E	0	0.25	1.25	3.75	0	0	0	5.25
ESE	0	0	0	2	2.5	3.25	0.5	8.25
SE	0	0	0.75	0.25	0.25	0	0.25	1.5
SSE	0	0	3.75	3.25	5.5	0	0	12.5
S	0	0	4.75	11.5	0	0	0	16.25
SSW	0	0	5.5	8.75	0.25	0.75	0	15.25
SW	0	0.5	7.25	18.75	1.75	0	0	28.25
WSW	0	0.5	4.75	12.25	10.75	4	0.5	32.75
W	0	0	6.75	23	13	2	0	44.75
WNW	0	0.75	5.25	24.25	7	0	0	37.25
NW	0	0.25	5	14.5	6.75	0	0	26.5
NNW	0	0.25	2.25	9.25	2.5	0	0	14.25
TOTAL	0	2.75	49.25	144.5	54.75	10	1.25	262.5

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Kewaunee Power Station 2009 Meteorological Data

Stability Class E

Wind Direction

	CALM	1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N	0	0.25	2	0	0	0	0	2.25
NNE	0	0	0.25	0	0	0	0	0.25
NE	0	0	0.25	0	0	0	0	0.25
ENE	0	0	0	0.25	0	0	0	0.25
E	0	0	0	0	0	0	0	0
ESE	0	0	0	0.75	0	0	0	0.75
SE	0	0.25	3	3.75	3	0.5	0	10.5
SSE	0	0	5.75	7.75	4.75	1.5	0	19.75
S	0	1	16.75	2.75	0.75	0.25	0	21.5
SSW	0	0	12.25	6	0	0	0	18.25
SW	0	1.5	14.5	5.75	2.75	1.25	0	25.75
WSW	0	1.5	13.5	10.5	9	2.25	0	36.75
W	0	1	16.5	23	4.5	0	0	45
WNW	0	1.75	11.25	21.5	3.75	0	0	38.25
NW	0	0.75	15.25	32.75	1.25	0	0	50
NNW	0	0.5	2.75	8.25	0	0	0	11.5
TOTAL	0	8.5	114	123	29.75	5.75	0	281

Stability Class F

Wind Direction

	CALM	1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N	0	0.5	1	0	0	0	0	1.5
NNE	0	0	0	0	0	0	0	0
NE	0	0	0	0	0	0	0	0
ENE	0	0	0	0	0	0	0	0
E	0	0	0	0	0	0	0	0
ESE	0	0.25	0	0	0	0	0	0.25
SE	0	0	0	0	0	0	0	0
SSE	0	0	6.5	3.75	1.25	0	0	11.5
S	0	3.75	8.75	0.75	0	0	0	13.25
SSW	0	7.75	11	2	0.25	0	0	21
SW	0	4	12	7.75	2.25	0	0	26
WSW	0	2	7.25	13.25	0	0	0	22.5
W	0	2	20.75	11	0	0	0	33.75
WNW	0	3	16	12.25	0	0	0	31.25
NW	0	0.25	14.25	16	0	0	0	30.5
NNW	0	0.5	6	5.5	0	0	0	12
TOTAL	0	24	103.5	72.25	3.75	0	0	203.5

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Stability Class G

Wind Direction

	CALM	1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N	0	0.25	0	0	0	0	0	0.25
NNE	0	0	0	0	0	0	0	0
NE	0	0	0	0	0	0	0	0
ENE	0	0	0	0	0	0	0	0
E	0	0	0.25	0	0	0	0	0.25
ESE	0	0.25	0	0	0	0	0	0.25
SE	0	2.25	1.25	0	0	0	0	3.5
SSE	0	3	4.75	2	0	0	0	9.75
S	0	4.25	4.5	0.25	0	0	0	9
SSW	0	6.5	21.25	2	0	0	0	29.75
SW	0	3.75	27.75	1	0	0	0	32.5
WSW	0	2.25	34	5.25	0	0	0	41.5
W	0	1.75	32.25	17	0	0	0	51
WNW	0	2.5	33.25	0.25	0	0	0	36
NW	0	2.75	10.5	0	0	0	0	13.25
NNW	0	0.75	0.25	1	0	0	0	2
TOTAL	0	30.25	170	28.75	0	0	0	229

Second Quarter 2009

Stability Class A Total Hours Missing = 133.25

Wind Direction

	CALM	1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N	0	0	3	13.75	7	0.25	0	24
NNE	0	0	16.75	75.25	56.25	24.25	8	180.5
NE	0	0.5	25.5	27	1.25	0	0	54.25
ENE	0	2	4.25	5.25	0	0	0	11.5
E	0	1	4.75	1.25	0	0	0	7
ESE	0	1.75	7.5	0.25	0	0	0	9.5
SE	0	4.25	8.75	3	2.75	1.25	0	20
SSE	0	1	11.5	14.75	5.75	0	0	33
S	0	1	5.5	10.25	0.25	0	0	17
SSW	0	0.25	2	5	5	0	0	12.25
SW	0	0	2	5.25	1.75	2.75	0	11.75
WSW	0	0	3.75	8	3.25	0.25	0.25	15.5
W	0	0.25	5.75	13	8.75	0.75	0	28.5
WNW	0	0	1.75	19.75	3	0	0.25	24.75
NW	0	0	1	17	7.75	0	0	25.75
NNW	0	0.5	2.25	5.25	16.25	0.5	0	24.75
TOTAL	0	12.5	106	224	119	30	8.5	500

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Stability Class B

Wind Direction

	CALM	1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N	0	0	0	0.75	1.75	0	0	2.5
NNE	0	0	3	5	3.5	0.75	0	12.25
NE	0	0	1.75	2.25	0	0	0	4
ENE	0	0.25	1.5	0	0	0	0	1.75
E	0	0.25	3.25	0.25	0	0	0	3.75
ESE	0	0.75	1.25	0	0	0	0	2
SE	0	0.25	1.5	0.5	0.5	0.25	0	3
SSE	0	0.25	2.75	3	0.25	0.75	0	7
S	0	0.25	2.5	1	0.75	0	0	4.5
SSW	0	0	0.75	0	0.5	0	0	1.25
SW	0	0	1.5	1	0.25	0	0	2.75
WSW	0	0.25	1.75	2.75	2	0	0	6.75
W	0	0	4	16.5	3.5	0	0	24
WNW	0	0	0.25	1.75	0.5	0	0	2.5
NW	0	0	1.25	6	1.25	0	0	8.5
NNW	0	0.25	1	0.5	0.75	0	0	2.5
TOTAL	0	2.5	28	41.25	15.5	1.75	0	89

Stability Class C

Wind Direction

	CALM	1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N	0	0	0.5	1	0.25	0	0	1.75
NNE	0	0	4.75	18.5	12.75	0	0	36
NE	0	0	11.5	10	0	0	0	21.5
ENE	0	0.25	10.25	1.5	0	0	0	12
E	0	2.75	13.75	0	0	0	0	16.5
ESE	0	1.5	5.5	0	0	0	0	7
SE	0	1.5	4.75	4	0.5	0	0	10.75
SSE	0	0.25	4	3.25	6	0.75	0	14.25
S	0	0.25	2	1.25	0.5	0	0	4
SSW	0	0	0.25	0.5	0	0	0	0.75
SW	0	0	1.25	2.75	7.25	1.75	0	13
WSW	0	0	4	9	8.25	0.5	0	21.75
W	0	0	2.75	19.25	10.5	0	0	32.5
WNW	0	0.25	2.75	11.75	2	0	0	16.75
NW	0	0	1.5	5.75	1.25	0	0	8.5
NNW	0	0	0.25	2.5	1.75	0	0	4.5
TOTAL	0	6.75	69.75	91	51	3	0	221.5

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Kewaunee Power Station 2009 Meteorological Data

Stability Class D

Wind Direction

	CALM	1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N	0	0.25	3.5	5	0	0	0	8.75
NNE	0	0.25	10.75	29	31	1.25	0	72.25
NE	0	1.25	24.25	17	0.25	0	0	42.75
ENE	0	2.75	17.75	12.5	0	0	0	33
E	0	2	14	2.75	0	0	0	18.75
ESE	0	2.75	16	0.25	0	0	0	19
SE	0	4	17	5.75	6.25	0	0	33
SSE	0	2.5	14.25	14.5	9.25	1.5	0	42
S	0	1.25	10	6.25	4.5	0	0	22
SSW	0	0.25	1	4.5	2.75	0	0	8.5
SW	0	0	1.5	3.5	5.75	1.5	0	12.25
WSW	0	0	1.75	6	1.5	0.75	0	10
W	0	0.5	1.5	7.25	5.5	2	0	16.75
WNW	0	0.5	1.5	7.75	5.5	0	0	15.25
NW	0	0	4	4.75	7	0.75	0	16.5
NNW	0	0.25	1.5	4.25	1.75	0	0	7.75
TOTAL	0	18.5	140.25	131	81	7.75	0	378.5

Stability Class E

Wind Direction

	CALM	1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N	0	1	5	3.5	0	0	0	9.5
NNE	0	1.5	7.5	9	2.75	0	0	20.75
NE	0	3	15	4	0.25	0	0	22.25
ENE	0	2.25	7.25	2.75	0	0	0	12.25
E	0	2.25	4.75	0.5	0	0	0	7.5
ESE	0	3	9.75	0.5	0	0	0	13.25
SE	0	3	8.5	9.25	5	0.25	0	26
SSE	0	4.75	23.75	16	7	0.5	0	52
S	0	4.5	15	12.5	0.75	0	0	32.75
SSW	0	0.5	4.25	1.25	0.25	0	0	6.25
SW	0	1	2.25	5	0.75	0	0	9
WSW	0	1.5	3	7	1.5	0	0	13
W	0	0.5	8	8.25	2.25	0.25	0.25	19.5
WNW	0	0.5	3.75	3.5	0	0	0	7.75
NW	0	0.75	2.75	4.5	0	0	0	8
NNW	0	3.75	4.25	6.5	0	0	0	14.5
TOTAL	0	33.75	124.75	94	20.5	1	0.25	274.25

APPENDIX A
Kewaunee Power Station 2009 Meteorological Data

Stability Class F

Wind Direction

	CALM	1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N	0	2	5	0.75	0	0	0	7.75
NNE	0	2.75	1.75	0.75	0	0	0	5.25
NE	0	5	7.5	1	0	0	0	13.5
ENE	0	2.5	4.25	1.25	0	0	0	8
E	0	1.75	1.75	0.75	0	0	0	4.25
ESE	0	3.25	1.75	0.5	0.25	0	0	5.75
SE	0	2.5	6.75	3.5	2.25	0	0	15
SSE	0	5.5	20.75	10.5	1.5	0	0	38.25
S	0	3.5	18	2	0.25	0	0	23.75
SSW	0	4.25	9.5	0.5	0	0	0	14.25
SW	0	3.25	6	2.5	0	0	0	11.75
WSW	0	1.5	2	4	0.25	0	0	7.75
W	0	1	2.5	2	0	0	0	5.5
WNW	0	1.25	3	0.75	0	0	0	5
NW	0	1.25	1	0	0	0	0	2.25
NNW	0	1.25	3.25	0.25	0	0	0	4.75
TOTAL	0	42.5	94.75	31	4.5	0	0	172.75

Stability Class G

Wind Direction

	CALM	1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N	0	2	1.25	0	0	0	0	3.25
NNE	0	3	1.25	0.5	0	0	0	4.75
NE	0	3.5	5.25	0.25	0	0	0	9
ENE	0	3.5	0.75	0.25	0	0	0	4.5
E	0	1.25	0.5	1.5	0	0	0	3.25
ESE	0	1	3.5	3.5	0	0	0	8
SE	0	1.75	7.25	7.75	3.5	0	0	20.25
SSE	0	6.5	39.75	33.5	7.25	0	0	87
S	0	5	23.5	9.75	0.25	0	0	38.5
SSW	0	8.5	34.5	3.5	0	0	0	46.5
SW	0	15.25	30.5	11.5	0	0	0	57.25
WSW	0	8.5	26.5	11.5	0	0	0	46.5
W	0	11	16.75	8	0	0	0	35.75
WNW	0	10	9.5	0.5	0	0	0	20
NW	0	8.25	9.5	0	0	0	0	17.75
NNW	0	3.5	9	0	0	0	0	12.5
TOTAL	0	92.5	219.25	92	11	0	0	414.75

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Third Quarter 2009

Stability Class A

Total Hours Missing = 0.25

Wind Direction

	CALM	1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N	0	1.75	7.5	4.75	0.25	0	0	14.25
NNE	0	0.25	12.25	6.75	0.75	0	0	20
NE	0	0.75	13.5	1	0	0	0	15.25
ENE	0	0.25	5.5	0.75	0	0	0	6.5
E	0	1.75	9.75	0	0	0	0	11.5
ESE	0	1.5	6.75	4	0	0	0	12.25
SE	0	1.5	6	4	3.5	0	0	15
SSE	0	2	15.25	12.5	1.75	0	0	31.5
S	0	0.5	10	20.25	0	0	0	30.75
SSW	0	1	5.5	2.5	0.75	0	0	9.75
SW	0	1.25	7	0.75	0	0	0	9
WSW	0	0.5	5	3	0	0	0	8.5
W	0	0.75	13.75	10.25	2	0	0	26.75
WNW	0	0.5	17.25	7.5	8.25	0	0	33.5
NW	0	1	22.75	10.75	6.25	0	0	40.75
NNW	0	0.25	22.5	16.75	1.75	0	0	41.25
TOTAL	0	15.5	180.25	105.5	25.25	0	0	326.5

Stability Class B

Wind Direction

	CALM	1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N	0	0.25	2	1.5	0	0	0	3.75
NNE	0	0.5	2	1.25	0	0	0	3.75
NE	0	1.25	3.25	1.75	0	0	0	6.25
ENE	0	1	2.75	0.25	0	0	0	4
E	0	0.5	5	1.75	0	0	0	7.25
ESE	0	0.5	5	1.75	0	0	0	7.25
SE	0	0.75	2.75	1	0	0	0	4.5
SSE	0	0.25	3	0.25	0	0	0	3.5
S	0	0.25	3	3.75	0	0	0	7
SSW	0	0.5	0.5	3	1.5	0	0	5.5
SW	0	0.5	1.5	2.75	0	0	0	4.75
WSW	0	1	7	13.75	1	0	0	22.75
W	0	0	11.5	21	3.5	0	0	36
WNW	0	0	7	9	0	0	0	16
NW	0	0	4.75	4.25	0.25	0	0	9.25
NNW	0	0.25	2.75	3.5	0	0	0	6.5
TOTAL	0	7.5	63.75	70.5	6.25	0	0	148

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Stability Class C

Wind Direction

	CALM	1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N	0	0.25	1.75	1.5	0	0	0	3.5
NNE	0	0.25	6.25	6	0.25	0.25	0	13
NE	0	1.75	20.5	7	0	0	0	29.25
ENE	0	0.5	17.5	8.25	0	0	0	26.25
E	0	1.25	21.75	6.5	0	0	0	29.5
ESE	0	2	15.5	2.75	0	0	0	20.25
SE	0	1.5	27.25	13.75	0	0	0	42.5
SSE	0	1	5.25	1.5	0.25	0	0	8
S	0	0	3	6	0	0	0	9
SSW	0	0.25	2.5	0.75	0.5	0	0	4
SW	0	0.5	2.25	5.75	0.5	0	0	9
WSW	0	0.25	2.25	9	2.25	0	0	13.75
W	0	0	6	10.25	4.25	0	0	20.5
WNW	0	0.25	17.25	32.5	2.5	0	0	52.5
NW	0	0.5	15	23	1.25	0	0	39.75
NNW	0	0.25	4	5	0.25	0	0	9.5
TOTAL	0	10.5	168	139.5	12	0.25	0	330.25

Stability Class D

Wind Direction

	CALM	1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N	0	0.25	2.25	2	0.25	0	0	4.75
NNE	0	0.5	8.5	3.5	1.75	0.25	0	14.5
NE	0	1	18.25	1	0	0	0	20.25
ENE	0	1.25	18.5	4.25	0	0	0	24
E	0	1.75	11.25	1	0	0	0	14
ESE	0	2	33.5	2.5	0	0	0	38
SE	0	2	34	12	1.75	0	0	49.75
SSE	0	2	17.5	9	2.5	0	0	31
S	0	1	12.5	6	0.25	0	0	19.75
SSW	0	0.25	5.5	1	0	0	0	6.75
SW	0	0.5	3	0.5	0	0	0	4
WSW	0	2	2.75	1.25	0	0	0	6
W	0	1	6.75	4.75	0.25	0	0	12.75
WNW	0	0	12.5	12.75	1.5	0	0	26.75
NW	0	0	14.25	12	1	0	0	27.25
NNW	0	0.5	2.5	1.5	0.25	0	0	4.75
TOTAL	0	16	203.5	75	9.5	0.25	0	304.25

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Stability Class E

Wind Direction

	CALM	1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N	0	1.25	4	0.5	0	0	0	5.75
NNE	0	0.5	5	0.75	0	0	0	6.25
NE	0	1	8.75	0.25	0	0	0	10
ENE	0	0.75	2.25	0.5	0	0	0	3.5
E	0	2.75	2	0	0	0	0	4.75
ESE	0	2	5.75	1	0	0	0	8.75
SE	0	2.75	7.25	3.25	0	0	0	13.25
SSE	0	3.5	19.5	21.5	10.5	0	0	55
S	0	2.25	28.25	15.25	1	0	0	46.75
SSW	0	2.75	19.25	3.75	0	0	0	25.75
SW	0	2.5	7.5	3	1.75	0	0	14.75
WSW	0	2.25	7.75	0.5	0	0	0	10.5
W	0	2	15.75	1.5	0	0	0	19.25
WNW	0	0.25	18	3	0	0	0	21.25
NW	0	0.75	5	5	0	0	0	10.75
NNW	0	0.75	5.25	1	0	0	0	7
TOTAL	0	28	161.25	60.75	13.25	0	0	263.25

Stability Class F

Wind Direction

	CALM	1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N	0	1.25	2	0	0	0	0	3.25
NNE	0	1.75	3.5	0	0	0	0	5.25
NE	0	1.25	3	0	0	0	0	4.25
ENE	0	0.75	3.25	0	0	0	0	4
E	0	1.75	2.25	0	0	0	0	4
ESE	0	3.75	1.75	0	0	0	0	5.5
SE	0	2.5	4.75	0.25	0	0	0	7.5
SSE	0	4.75	15.5	17.25	3.25	0	0	40.75
S	0	4.75	25.25	7.5	0.5	0	0	38
SSW	0	6.25	26.5	1	0	0	0	33.75
SW	0	5	4.5	0.75	0	0	0	10.25
WSW	0	2.75	9	0.25	0	0	0	12
W	0	1	13.5	0	0	0	0	14.5
WNW	0	0.75	8.75	0.25	0	0	0	9.75
NW	0	2.5	4.75	0	0	0	0	7.25
NNW	0	1	9	0	0	0	0	10
TOTAL	0	41.75	137.25	27.25	3.75	0	0	210

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Stability Class G

Wind Direction

	CALM	1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N	0	2.75	2.75	0	0	0	0	5.5
NNE	0	3.5	1.75	0.5	0	0	0	5.75
NE	0	2.25	3.5	0	0	0	0	5.75
ENE	0	1.75	3.5	0.75	0	0	0	6
E	0	2	0.75	0	0	0	0	2.75
ESE	0	2.5	2.25	0	0	0	0	4.75
SE	0	5.5	5.25	0.75	0	0	0	11.5
SSE	0	8.5	30.75	20.5	0.75	0.25	0	60.75
S	0	12	22.75	6.25	0	0	0	41
SSW	0	26.25	26.25	0	0	0	0	52.5
SW	0	36.25	22.75	0	0	0	0	59
WSW	0	31.5	69	0	0	0	0	100.5
W	0	25.75	103.5	0	0	0	0	129.25
WNW	0	17.25	37.25	1.5	0	0	0	56
NW	0	26.75	25.75	0	0	0	0	52.5
NNW	0	12.75	18.5	0.75	0	0	0	32
TOTAL	0	217.25	376.25	31	0.75	0.25	0	625.5

Fourth Quarter 2009

Stability Class A

Total Hours Missing = 45

Wind Direction

	CALM	1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N	0	0.5	13.5	20.5	4	0	0.25	38.75
NNE	0	0	10.25	8.25	8.75	0	1.25	28.5
NE	0	0	12.25	19.75	4.5	3.25	0.25	40
ENE	0	0.25	4.5	8	14	10	0	36.75
E	0	0.5	8.5	17.25	31	6.5	3.75	67.5
ESE	0	0.5	10.25	9.25	31.75	5.75	0	57.5
SE	0	0.5	10.5	12.25	8.5	0.25	0	32
SSE	0	0	3.5	3	14.25	10.25	5	36
S	0	0.25	1.5	20.25	15	2.25	0	39.25
SSW	0	0.25	7.75	9.5	1.75	0	0	19.25
SW	0	0.25	5.25	10	4	0	0	19.5
WSW	0	1.25	7.5	18.75	13.5	0	0	41
W	0	0.5	11	31.25	10	0	0	52.75
WNW	0	2.75	20	14.25	6.75	0.5	0	44.25
NW	0	0	25.75	19.25	8.25	0	0.25	53.5
NNW	0	1.25	18	29.75	7.25	1.75	1.5	59.5
TOTAL	0	8.75	170	251.25	183.25	40.5	12.25	666

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Stability Class B

Wind Direction

	CALM	1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N	0	0.75	2.25	3.75	7.25	0.25	0	14.25
NNE	0	0.25	4	4.75	1	0	0	10
NE	0	0	3.5	4.25	0	0	0	7.75
ENE	0	0.25	0.75	0.25	0	2.5	3.5	7.25
E	0	0	3.5	3	4.25	1.25	0.5	12.5
ESE	0	0.75	4.25	4.25	7.5	1.25	0	18
SE	0	0	0.5	2.5	0.25	0	0	3.25
SSE	0	0	0	1.25	2.25	0.25	1.5	5.25
S	0	0	0.25	3	5.5	0.25	0	9
SSW	0	0	6.75	5.75	0.25	0	0	12.75
SW	0	0	1.25	3.5	0.75	0.25	0	5.75
WSW	0	0.75	2.5	2.5	1	0	0	6.75
W	0	0.5	6.75	14.75	5.75	0	0	27.75
WNW	0	0.5	2.5	9.25	0.25	0.25	0	12.75
NW	0	0	6	8.25	1	0	0	15.25
NNW	0	0.25	5.75	17.5	13.5	0.25	0	37.25
TOTAL	0	4	50.5	88.5	50.5	6.5	5.5	205.5

Stability Class C

Wind Direction

	CALM	1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N	0	0	0.75	3.75	0.5	0	0	5
NNE	0	0	0.75	2.25	3.5	0	0	6.5
NE	0	0	0.75	5	1.5	0	0	7.25
ENE	0	0.25	0	2.75	1.75	0	0	4.75
E	0	0.25	3.25	10.25	3.25	0	0	17
ESE	0	0.25	2.75	4.5	2.25	0.5	0.75	11
SE	0	0	1	3	0.75	0.25	0.75	5.75
SSE	0	0	0.75	0.75	2	0	0.75	4.25
S	0	0	0.25	4	2	1.75	0.5	8.5
SSW	0	0	7.75	10	0.75	0	0	18.5
SW	0	0	3.5	8.25	1.75	0.25	0	13.75
WSW	0	0.5	3.5	7.75	2.75	0	0	14.5
W	0	0.5	5	16	14.5	0	0	36
WNW	0	0.5	5.5	13	0.25	0	0	19.25
NW	0	0.5	3.5	2	2.25	0	0	8.25
NNW	0	0.5	2.25	10.5	0	0	0	13.25
TOTAL	0	3.25	41.25	103.75	39.75	2.75	2.75	193.5

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Stability Class D

Wind Direction

	CALM	1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N	0	0.25	7	4.5	0	0	0	11.75
NNE	0	0.25	4.75	2.75	2.75	0	0	10.5
NE	0	0.25	2.75	0.75	0	0	0	3.75
ENE	0	0	0.75	2.25	0	0	0	3
E	0	0	6.25	4	1.5	0	0	11.75
ESE	0	0	10.5	8.25	0.75	4	1.5	25
SE	0	0.75	7	2	1.5	2.25	3.5	17
SSE	0	0	4.75	5.75	5	0	0.25	15.75
S	0	0	8	19	8.5	2.75	5	43.25
SSW	0	0.25	17	10	0.5	0	0	27.75
SW	0	0.25	17	8.25	1.5	2.25	0	29.25
WSW	0	0.75	16	4.75	4.5	0	0	26
W	0	1.25	20.5	19.75	2	0	0	43.5
WNW	0	1.75	24.75	15	2.5	0	0	44
NW	0	1.25	11	12.25	1.5	0.25	0	26.25
NNW	0.25	1	13.75	12.25	1.25	0.25	0	28.75
TOTAL	0.25	8	171.75	131.5	33.75	11.75	10.25	367.25

Stability Class E

Wind Direction

	CALM	1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N	0	2.25	15	0.5	0	0	0	17.75
NNE	0	0.5	5.75	2.75	0	0	0	9
NE	0	0	6.5	0.25	0	0	0	6.75
ENE	0	1.25	8.25	1.25	0	0	0	10.75
E	0	1	3.5	2	2	0	0	8.5
ESE	0	0.75	2	1	0.25	0.5	1.75	6.25
SE	0	0.25	2.5	0.5	0	0.25	0	3.5
SSE	0	0	3.75	5.75	2.25	0	0.5	12.25
S	0	0.75	7.25	2.75	0.25	0	0	11
SSW	0	0.5	16.5	7.25	0	0	0	24.25
SW	0	0.75	8	0.5	0	0	0	9.25
WSW	0	1	11.25	10.5	3	0	0	25.75
W	0	2.25	27.75	26.5	2.5	0.25	0	59.25
WNW	0	5	20.75	16.5	0	0	0	42.25
NW	0	1	13.75	7.25	0.75	0	0	22.75
NNW	0	2	10.75	1.75	0	0	0	14.5
TOTAL	0	19.25	163.25	87	11	1	2.25	283.75

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Stability Class F

Wind Direction

	CALM	1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N	0	0	9.75	0.5	0	0	0	10.25
NNE	0	0.25	3.5	0.25	0	0	0	4
NE	0	0.75	3	0.25	0	0	0	4
ENE	0	0.5	2	0	0	0	0	2.5
E	0	0.25	1	0	0	0	0	1.25
ESE	0	0.75	0.5	0.5	0	0	0	1.75
SE	0	0	2.5	0	0	0	0	2.5
SSE	0	0	4.25	4	0	0	0	8.25
S	0	0.5	13	1.5	0	0	0	15
SSW	0	1.75	14	2.75	0	0	0	18.5
SW	0	2.75	14	2.75	0	0	0	19.5
WSW	0	2	9.75	6	1	0	0	18.75
W	0	4.75	12.25	10.75	0	0	0	27.75
WNW	0	2.5	13.25	2	0	0	0	17.75
NW	0	3	5.25	0.25	0	0	0	8.5
NNW	0	0.75	14.25	0.25	0	0	0	15.25
TOTAL	0	20.5	122.25	31.75	1	0	0	175.5

Stability Class G

Wind Direction

	CALM	1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N	0	2	8.5	0	0	0	0	10.5
NNE	0	1.5	5	0	0	0	0.25	6.75
NE	0	1	1.25	0	0	0	0	2.25
ENE	0	0.5	1.5	0	0	0	0	2
E	0	0.25	1	0	0	0	0	1.25
ESE	0	0	2.25	0	0	0	0	2.25
SE	0	0	0.25	0	0	0	0	0.25
SSE	0	0.25	6	0	0	0	0	6.25
S	0	2	12	1.25	0	0	0	15.25
SSW	0	0.75	28.5	0.25	0	0	0	29.5
SW	0	1.75	32.5	4.75	0	0	0	39
WSW	0	3.25	40.75	4.75	0	0	0	48.75
W	0	0.5	27.25	5.5	0	0	0	33.25
WNW	0	0	20	3.5	0	0	0	23.5
NW	0	1.75	27	0.5	0	0	0	29.25
NNW	0	1.75	19	0.75	0	0	0	21.5
TOTAL	0	17.25	232.75	21.25	0	0	0.25	271.5

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