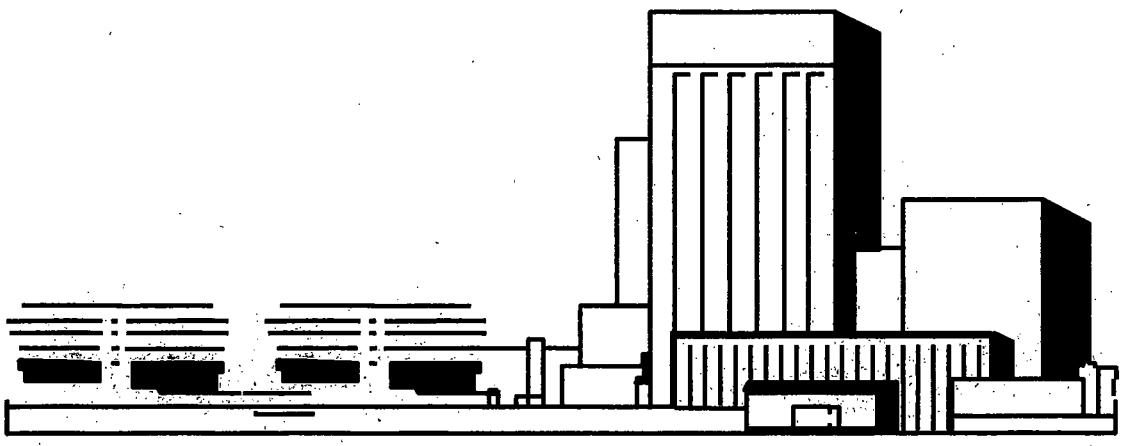
ENERGY NORTHWEST

Columbia Generating Station Annual Radioactive Effluent Release Report

January through December 2010



REFERENCES:
10 CFR 50.36a(a)(2)
10 CFR 72.44(d)(3)
CGS Technical Specification 5.6.2
ISFSI Technical Specification 5.4.c

Columbia Generating Station
Annual Radioactive Effluent Release Report

January through December 2010

Energy Northwest

Submitted
February 2011

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1.0 Introduction

This report has been prepared in compliance with Parts 50 and 72 of Title 10 of the Code of Federal Regulations (CFR), specifically 10 CFR 50.36a(a)(2) and 10 CFR 72.44(d)(3), Independent Spent Fuel Storage Installation (ISFSI) Technical Specification 5.4.c, and Columbia Generating Station (CGS) Technical Specification 5.6.2. It includes a summary of the quantities of radioactive liquid and gaseous effluents and solid radwaste released from Columbia Generating Station during calendar year 2010. Effluent data is summarized on a quarterly basis.

Throughout this report, units of activity and dose are as defined in 10 CFR 20.1004, 20.1005, and Nuclear Regulatory Commission (NRC) Regulatory Guide 1.109-1977.

The United States National Council on Radiation Protection published Report #160 in 2009 which can serve to put radiation dose into perspective for the reader of this report. It was determined that the average yearly dose to a person living in the United States is 620 mrem from all sources. Of this, ~50% is attributed to natural sources (radiation from gaseous radon, cosmic or space radiation, natural radioactive material in the ground, and natural radioactive materials in our bodies). About 48% is attributed to diagnostic and therapeutic medical exposure. Radiation dose from nuclear power was grouped into a category comprising <0.1% of the total.

2.0 Liquid Effluents

No planned releases of contaminated liquids from the liquid radwaste processing system were discharged to the Columbia River from Columbia Generating Station during calendar year 2010. The last planned discharge took place in 1998.

In 2010, there were no leaks to the environment of radioactive liquids. The Groundwater Monitoring Program did not indicate any increase in groundwater tritium levels that could be attributed to the operation of Columbia Generating Station.

During 2010, the Columbia Generating Station Sanitary Waste Treatment Facility (SWTF) received tritiated water from the Fast Flux Test Facility (FFTF) on the Hanford Site. This water was pumped by FFTF (at between 500 – 2,000 gallons/day) from wells on the Hanford Site and ultimately sent to the CGS SWTF. The concentration of tritium varied between 2,000 and 11,000 picoCuries (pCi) per liter. The total combined input into the SWTF averages 20,000 gallons/day from all sources. Approximately 1.5 – 2 million gallons of this water is discharged to the ground each year. Assuming an average concentration of 8,000 pCi/liter from FFTF, no evaporation, and no tritium absorption or rainout/washout addition from routine effluent gaseous releases, the released water would contain conservatively 640 pCi/liter and would total about 4.85E9 pCi (0.005 Ci) of tritium.

3.0 Gaseous Effluents

The gaseous radwaste effluents from Columbia Generating Station were released from three (3) release points:

Main Plant Vent -- mixed mode release
Turbine Building – mixed mode release
Radwaste Building -- ground level release

The gaseous source terms from each release point are listed in Tables 3-1, 3-2, and 3-3. The activation gas argon-41 is included in these tables under fission gases to allow a match with the fission and activation gas totals of Table 3-4. Table 3-4 provides a summation of the total activity released, the average release rate, gross alpha radioactivity, and the estimated total error associated with the measurements of radioactivity in the gaseous effluents.

Radioactivity measurements for gaseous effluent releases are performed for fission and activation gases by collecting the samples in a Marinelli beaker and analyzing them using gamma spectroscopy. Air is analyzed for tritium by collection of water vapor on a desiccant with subsequent distillation and liquid scintillation counting. Particulates and iodines are sampled continuously and the sample media (particulate filters and charcoal cartridges) are analyzed weekly using gamma spectroscopy. Each quarter a chemical separation process is used to isolate strontium from the composite particulate filters and quantification is accomplished with liquid scintillation detection. The average energy per disintegration of fission and activation gases is not included in this report as it is not required by Technical Specifications and is not used for gaseous effluent release rate limit calculations.

When a radioisotope is not positively identified at levels greater than the Minimum Detectable Activity (MDA), a value of zero is used for release concentrations and offsite dose assessments. Table 3-6 contains the Lower Limit of Detection (LLD) values corresponding to the sampling methods and analytical instruments used for each principal radioisotope.

Dose calculations were performed for releases using the NRC XOQDOQ and GASPAR II computer programs and parameter values as described in the Offsite Dose Calculation Manual (ODCM) with some exceptions. A Self-Assessment identified opportunities for improving the accuracy of values presented in ODCM Table 3-13 which describe the characteristics of gaseous effluent release points. The following table (3.0-A) shows values used as input to XOQDOQ which differ from those presented in the ODCM table.

Table 3.0-A; Deviations from Input Parameters in ODCM Table 3-13

		Reactor Bldg	Radwaste Bldg	Turbine Bldg
Vent Velocity (m/s)				
	Value in ODCM	10.9	3.4	19.5
	Value used in XOQDOQ	10.9	0	21.0
XOQDOQ requires the vertical exit velocity. Release from the Radwaste bldg is horizontal. Release from the Turbine bldg is vertical and was recalculated.				
Vent Inside Diameter (m)				
	Value in ODCM	2.1	3.8	3.3
	Value used in XOQDOQ	2.1	0	3.0
NUREG/CR-2919 recommends a value of 0 for ground mode release points (Radwaste bldg). The Turbine bldg value was recalculated.				
Average annual heat flow from release point [Heat Emission Rate] (cal/sec)				
	Value in ODCM	1.06E+06	2.90E+06	9.10E+05
	Value used in XOQDOQ	1.59E+05	1.04E+05	8.02E+05
The heat emission rates were recalculated				

The XOQDOQ program was also provided with updated terrain elevations out to a 25-mile radius of Columbia Generating Station in each sector. The above changes allowed better modeling of plume vertical momentum and buoyancy resulting in more accurate dispersion and deposition values from those presented in ODCM Tables 3-3, 3-10, and 3-11. The ODCM is in the process of revision to reflect the above changes.

Quarterly and annual doses to the potentially highest-exposed Member of the Public at and beyond the site boundary were calculated. In addition, quarterly and annual doses were calculated at actual resident locations identified in the annual land use census. ODCM limits are based 10 CFR 20 and Appendix I to 10 CFR 50. The threshold for air dose applies to fission and activation gases and is ten (10) mrad for beta and five (5) mrad for gamma quarterly and twenty (20) mrad for beta and ten (10) mrad for gamma annually. The threshold for organ dose applies to iodine, tritium, and particulates with half-lives greater than eight days and is seven and a half (7.5) mrem quarterly and fifteen (15) mrem annually. For fission and activation gases the dose rate limits are less than or equal to 500 mrem per year to the whole body and less than or equal to 3000 mrem per year to the skin. For iodines, particulates, and tritium the dose rate limit is less than or equal to 1500 mrem/year to any organ.

Dose calculations were also conducted for Members of the Public within the site boundary. The results are discussed and tabulated in Section 6.0.

It is estimated that approximately 3.25E-03 Curies of tritium were released through unmonitored vents of the heating steam system within and outside the main power block (Turbine, Radwaste, Reactor, and General Services buildings).

No additional spent fuel storage containers (SFSC) were added to the ISFSI facility in calendar year 2010. A total of twenty seven (27) SFSCs were in place in the ISFSI facility at the end of 2010. All SFSCs are Operable and, as such, are performing as designed. Based on compliance with ISFSI Technical Specification

3.1.1 during 2010, there are no effluents from this facility. There were twelve SFSCs loaded in 2008 that are considered Operable (i.e. no measurable leakage) but nonconforming based on the vendor failing to leak test the canisters during fabrication. This was communicated to the NRC via Energy Northwest letter, GO2-10-157, submitted October 27, 2010.

Incidents of effluent monitor inoperability greater than 30 days:

> During 2010, the low range reactor building effluent monitor failed on high temperature. Following repair, it was noted that the temperature cycling damaged the semiconductor detector. A spare detector was installed, but the spare detector would not pass calibration. Following expedited repair of the initially removed detector and installation of a new cryostat, the detector would not cool down to operating temperature. The detector and cryostat were returned to the vendor for repair. Prior to returning to service, failure of a transformer (E-TR-7BC) resulted in extended out of service time. The monitor was out of service from 2/12/10 to 5/7/10 (about 84 days).

Gaseous Effluent Tables

Table 3-0 10 CFR Part 50 Appendix I Dose Compliance

Report Period: January -- December 2010

	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter	Year*
Noble Gas					
Gamma Air Dose (mrad)	1.28E-02	1.16E-02	1.65E-02	1.15E-02	5.15E-02
ODCM Limit	5	5	5	5	10
% of Limit	2.56E-01	2.32E-01	3.30E-01	2.30E-01	5.15E-01
Beta Air Dose (mrad)	4.52E-03	4.09E-03	5.82E-03	4.04E-03	1.82E-02
ODCM Limit	10	10	10	10	20
% of Limit	4.52E-02	4.09E-02	5.82E-02	4.04E-02	9.10E-02
Iodine-131, Iodine-133, Tritium, and Particulates with half-lives greater than eight days.					
Organ Dose (mrem)	1.40E-02	1.25E-02	1.77E-02	1.25E-02	5.57E-02
ODCM Limit	7.5	7.5	7.5	7.5	15
% of Limit	1.86E-01	1.67E-01	2.37E-01	1.66E-01	3.71E-01

* Calculated quarterly doses cannot be directly compared to the annual doses. Each above listed quarterly dose is the highest calculated dose based on a number of variables. Variables that make comparison difficult include location, meteorological data (quarterly joint frequency distribution (JFD) tables vs. annual JFD tables), receptor age, target organ, and characteristics of the emitted radionuclides. In the above chart, all dose is calculated to a hypothetical person at the site boundary.

Table 3-1 Main Plant Vent Releases
Fission Gases and Iodines

Report Period: January -- December 2010

Nuclides Released	1st Quarter (Ci)	2nd Quarter (Ci)	3rd Quarter (Ci)	4th Quarter (Ci)	Year (Ci)
A. Fission gases					
krypton-85	<MDA	<MDA	<MDA	<MDA	<MDA
krypton-85m	<MDA	1.51E-01	<MDA	<MDA	1.51E-01
krypton-87	<MDA	<MDA	<MDA	<MDA	<MDA
krypton-88	<MDA	<MDA	<MDA	<MDA	<MDA
xenon-133	<MDA	<MDA	<MDA	<MDA	<MDA
xenon-133m	<MDA	<MDA	<MDA	<MDA	<MDA
xenon-135	<MDA	<MDA	<MDA	<MDA	<MDA
xenon-135m	<MDA	<MDA	<MDA	<MDA	<MDA
xenon-138	<MDA	<MDA	<MDA	<MDA	<MDA
Others					
argon-41	3.86E+01	4.97E+01	4.27E+01	3.89E+01	1.70E+02
Total for period *	3.86E+01	4.99E+01	4.27E+01	3.89E+01	1.70E+02
B. Iodines					
iodine-131	<MDA	<MDA	<MDA	<MDA	<MDA
iodine-132	<MDA	<MDA	<MDA	<MDA	<MDA
iodine-133	<MDA	<MDA	1.11E-05	<MDA	1.11E-05
iodine-134	<MDA	<MDA	<MDA	<MDA	<MDA
iodine-135	<MDA	<MDA	<MDA	<MDA	<MDA
Total for period *	0.00E+00	0.00E+00	1.11E-05	0.00E+00	1.11E-05

MDA = Less than the "a posteriori" minimal detectable activity (microcuries per unit mass or volume).

* MDA values are not included in the totals.

Table 3-1 Main Plant Vent Releases (Continued)
Particulates and Tritium

Report Period: January -- December 2010

Nuclides Released	1st Quarter (Ci)	2nd Quarter (Ci)	3rd Quarter (Ci)	4th Quarter (Ci)	Year (Ci)
C. Particulates					
strontium-89	8.87E-07	7.73E-07	7.95E-07	6.50E-07	3.11E-06
strontium-90	<MDA	<MDA	<MDA	<MDA	<MDA
cesium-134	<MDA	<MDA	<MDA	<MDA	<MDA
cesium-137	<MDA	<MDA	<MDA	<MDA	<MDA
barium-lanthanum-140	<MDA	<MDA	<MDA	<MDA	<MDA
silver-110m	<MDA	<MDA	<MDA	<MDA	<MDA
cerium-141	<MDA	<MDA	<MDA	<MDA	<MDA
cerium-144	<MDA	<MDA	<MDA	<MDA	<MDA
cobalt-58	<MDA	<MDA	<MDA	<MDA	<MDA
cobalt-60	2.11E-05	4.38E-06	<MDA	2.31E-06	2.78E-05
iron-59	<MDA	<MDA	<MDA	<MDA	<MDA
manganese-54	<MDA	<MDA	<MDA	<MDA	<MDA
zinc-65	3.32E-06	2.60E-06	<MDA	<MDA	5.91E-06
chrome-51	<MDA	<MDA	<MDA	<MDA	<MDA
antimony-125	<MDA	<MDA	<MDA	<MDA	<MDA
Total for period*	2.54E-05	7.75E-06	7.95E-07	2.96E-06	3.69E-05
Others with T 1/2 < 8 days					
arsenic-76	<MDA	<MDA	<MDA	<MDA	<MDA
bromine-82	<MDA	<MDA	<MDA	<MDA	<MDA
copper-64	<MDA	<MDA	<MDA	<MDA	<MDA
molybdenum-99	<MDA	<MDA	<MDA	<MDA	<MDA
rhenium-188	<MDA	<MDA	<MDA	<MDA	<MDA
sodium-24	<MDA	<MDA	<MDA	<MDA	<MDA
technetium-99m	<MDA	<MDA	<MDA	<MDA	<MDA
zinc-69m	<MDA	<MDA	<MDA	<MDA	<MDA
Total with T 1/2 < 8 days*	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
D. Tritium					
tritium	8.64E-01	1.26E+00	1.16E+00	7.91E-01	4.08E+00

MDA = Less than the "a posteriori" minimal detectable activity (microcuries per unit mass or volume).
* MDA values are not included in the totals.

Table 3-2 Turbine Building Releases
Fission Gases and Iodines

Report Period: January -- December 2010

Nuclides Released	1st Quarter (Ci)	2nd Quarter (Ci)	3rd Quarter (Ci)	4th Quarter (Ci)	Year (Ci)
A. Fission gases					
krypton-85	<MDA	<MDA	<MDA	<MDA	<MDA
krypton-85m	<MDA	<MDA	<MDA	<MDA	<MDA
krypton-87	<MDA	<MDA	<MDA	<MDA	<MDA
krypton-88	<MDA	<MDA	<MDA	<MDA	<MDA
xenon-133	<MDA	<MDA	<MDA	<MDA	<MDA
xenon-133m	<MDA	<MDA	<MDA	<MDA	<MDA
xenon-135	<MDA	<MDA	<MDA	<MDA	<MDA
xenon-135m	<MDA	<MDA	<MDA	<MDA	<MDA
xenon-138	<MDA	<MDA	<MDA	<MDA	<MDA
Others					
argon-41	3.32E+00	<MDA	1.29E+01	<MDA	1.62E+01
Total for period *	3.32E+00	0.00E+00	1.29E+01	0.00E+00	1.62E+01
B. Iodines					
iodine-131	2.87E-06	3.32E-05	2.86E-05	8.23E-05	1.47E-04
iodine-132	<MDA	<MDA	<MDA	<MDA	<MDA
iodine-133	<MDA	2.23E-04	1.89E-04	4.07E-04	8.18E-04
iodine-134	<MDA	<MDA	<MDA	<MDA	<MDA
iodine-135	<MDA	<MDA	<MDA	<MDA	<MDA
Total for period *	2.87E-06	2.56E-04	2.17E-04	4.89E-04	9.65E-04

MDA = Less than the "a posteriori" minimal detectable activity (microcuries per unit mass or volume).

* MDA values are not included in the totals.

Table 3-2 Turbine Building Releases (Continued)
Particulates and Tritium

Report Period: January -- December 2010

Nuclides Released	1st Quarter (Ci)	2nd Quarter (Ci)	3rd Quarter (Ci)	4th Quarter (Ci)	Year (Ci)
C. Particulates					
strontium-89	1.44E-05	1.71E-05	2.26E-05	2.48E-05	7.89E-05
strontium-90	<MDA	<MDA	<MDA	<MDA	<MDA
cesium-134	<MDA	<MDA	<MDA	<MDA	<MDA
cesium-137	<MDA	<MDA	<MDA	<MDA	<MDA
barium-lanthanum-140	<MDA	<MDA	<MDA	<MDA	<MDA
cerium-141	<MDA	<MDA	<MDA	<MDA	<MDA
cerium-144	<MDA	<MDA	<MDA	<MDA	<MDA
cobalt-58	<MDA	<MDA	<MDA	<MDA	<MDA
cobalt-60	<MDA	1.10E-05	<MDA	4.76E-05	5.85E-05
iron-59	<MDA	<MDA	<MDA	<MDA	<MDA
manganese-54	<MDA	<MDA	<MDA	<MDA	<MDA
zinc-65	<MDA	<MDA	<MDA	2.07E-04	2.07E-04
chrome-51	<MDA	<MDA	<MDA	<MDA	<MDA
Total for period*	1.44E-05	2.81E-05	2.26E-05	2.79E-04	3.44E-04
Others with T 1/2 < 8 days					
molybdenum-99	<MDA	<MDA	<MDA	<MDA	<MDA
Total with T 1/2 < 8 days*	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
D. Tritium					
tritium	6.36E+00	6.23E+00	8.48E+00	7.10E+00	2.82E+01

MDA = Less than the "a posteriori" minimal detectable activity (microcuries per unit mass or volume).

* MDA values are not included in the totals.

Table 3-3 Radwaste Building Releases
Fission Gases and Iodines

Report Period: January -- December 2010

Nuclides Released	1st Quarter (Ci)	2nd Quarter (Ci)	3rd Quarter (Ci)	4th Quarter (Ci)	Year (Ci)
A. Fission gases					
krypton-85	<MDA	<MDA	<MDA	<MDA	<MDA
krypton-85m	<MDA	<MDA	<MDA	<MDA	<MDA
krypton-87	<MDA	<MDA	<MDA	<MDA	<MDA
krypton-88	<MDA	<MDA	<MDA	<MDA	<MDA
xenon-133	<MDA	<MDA	<MDA	<MDA	<MDA
xenon-133m	<MDA	<MDA	<MDA	<MDA	<MDA
xenon-135	<MDA	<MDA	<MDA	<MDA	<MDA
xenon-135m	<MDA	<MDA	<MDA	<MDA	<MDA
xenon-138	<MDA	<MDA	<MDA	<MDA	<MDA
Others					
argon-41	<MDA	<MDA	<MDA	<MDA	<MDA
Total for period *	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
B. Iodines					
iodine-131	<MDA	<MDA	<MDA	<MDA	<MDA
iodine-132	<MDA	<MDA	<MDA	<MDA	<MDA
iodine-133	<MDA	<MDA	<MDA	<MDA	<MDA
iodine-134	<MDA	<MDA	<MDA	<MDA	<MDA
iodine-135	<MDA	<MDA	<MDA	<MDA	<MDA
Total for period *	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

MDA = Less than the "a posteriori" minimal detectable activity (microcuries per unit mass or volume).

* MDA values are not included in the totals.

Table 3-3 Radwaste Building Releases (Continued)
Particulates and Tritium

Report Period: January -- December 2010

Nuclides Released	1st Quarter (Ci)	2nd Quarter (Ci)	3rd Quarter (Ci)	4th Quarter (Ci)	Year (Ci)
C. Particulates					
strontium-89	1.35E-07	9.74E-08	2.49E-07	3.36E-07	8.18E-07
strontium-90	<MDA	<MDA	<MDA	<MDA	<MDA
cesium-134	<MDA	<MDA	<MDA	<MDA	<MDA
cesium-137	<MDA	<MDA	<MDA	<MDA	<MDA
barium-lanthanum-140	<MDA	<MDA	<MDA	<MDA	<MDA
cerium-141	<MDA	<MDA	<MDA	<MDA	<MDA
cerium-144	<MDA	<MDA	<MDA	<MDA	<MDA
cobalt-58	<MDA	<MDA	<MDA	<MDA	<MDA
cobalt-60	3.05E-06	<MDA	1.18E-06	<MDA	4.23E-06
iron-59	<MDA	<MDA	<MDA	<MDA	<MDA
manganese-54	1.84E-06	<MDA	<MDA	<MDA	1.84E-06
zinc-65	6.87E-07	<MDA	7.07E-07	<MDA	1.39E-06
Total for period*	5.72E-06	9.74E-08	2.13E-06	3.36E-07	8.28E-06
Others with T 1/2 < 8 days					
molybdenum-99	<MDA	<MDA	<MDA	<MDA	<MDA
Total with T 1/2 < 8 days*	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
D. Tritium					
tritium	1.03E-01	1.34E-01	1.79E-01	1.00E-01	5.16E-01

MDA = Less than the "a posteriori" minimal detectable activity (microcuries per unit mass or volume).

* MDA values are not included in the totals.

Table 3-4 Summation of Releases
Gaseous Effluents

Report Period: January -- December 2010

	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter	Year	Est* Total %Error
A. Fission and activation gases						
Total release (Ci)	4.19E+01	4.99E+01	5.56E+01	3.89E+01	1.86E+02	4.30E+01
Average release rate (µCi/s)	5.33E+00	6.34E+00	7.07E+00	4.95E+00	5.93E+00	
Percent of ODCM limit (%)	9.78E-03	8.83E-03	1.26E-02	1.05E-02	9.82E-03	
B. Iodines						
Total I-131 (Ci)	2.87E-06	3.32E-05	2.86E-05	8.23E-05	1.47E-04	4.60E+01
Average release rate (µCi/s)	3.65E-07	4.22E-06	3.63E-06	1.05E-05	4.67E-06	
Percent of ODCM limit (%)	1.17E-07	1.26E-06	1.43E-06	3.13E-06	1.45E-06	
C. Particulates						
Particulates with half-lives >8 days (Ci)	4.55E-05	3.59E-05	2.55E-05	2.83E-04	3.90E-04	4.50E+01
Average release rate (µCi/s)	5.79E-06	4.57E-06	3.25E-06	3.60E-05	1.24E-05	
Percent of ODCM limit (%)	3.44E-06	5.15E-07	6.57E-07	1.63E-06	1.37E-06	
Gross alpha radioactivity (Ci)	9.44E-07	4.81E-07	5.37E-07	1.37E-06	3.33E-06	7.30E+01
D. Tritium						
Total release (Ci)	7.33E+00	7.62E+00	9.82E+00	8.00E+00	3.28E+01	2.60E+01
Average release rate (µCi/s)	9.32E-01	9.70E-01	1.25E+00	1.02E+00	1.04E+00	
Percent of ODCM limit (%)	5.41E-05	3.17E-05	2.99E-05	1.90E-05	2.04E-05	

MDA = Less than the "a posteriori" minimal detectable activity (microcuries per unit mass or volume).

ODCM release rate limits are based on dose rate. For fission and activation gases the dose rate limits are less than or equal to 500 mrem/year to the whole body and less than or equal to 3000 mrem/year to the skin. For I-131, particulates, and tritium the dose rate limit is less than or equal to 1500 mrem/year to any organ. The ODCM dose factors and the highest site boundary dispersion value for each period were used in the calculation.

* Measurement errors are sample-specific. The values reported represent an approximate overall error. The major contributors of this error are measurements associated with sample volume, release point flow rates, and estimates of plateout factors.

Table 3-5 Gaseous Purges and Vents

Report Period: January -- December 2010

Type	Number	Total Time (hr.)	Maximum Time (hr.)	Minimum Time (hr.)	Mean Time (hr.)
Purge	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Vent	2.60E+01	2.97E+01	1.75E+00	4.83E-01	1.14E+00

Columbia Generating Station is a continuous release plant. All purges and vents are discharged through the Standby Gas Treatment System and released through the reactor building stack which is sampled and continuously monitored for radioactive gaseous waste.

Table 3-6 Lower Limits of Detection
Gaseous Effluents

Report Period: January -- December 2010

Fission Gases

Nuclide	Required LLD† (µCi/cc)	Achieved Analysis LLD (µCi/cc)
krypton-87	1.00E-04	1.05E-08
krypton-88	1.00E-04	1.29E-08
xenon-133	1.00E-04	1.00E-08
xenon-133m	1.00E-04	3.25E-08
xenon-135	1.00E-04	3.77E-09
xenon-138	1.00E-04	4.48E-08

Iodines

iodine-131	1.00E-12	6.04E-14
iodine-133	1.00E-10	1.28E-12

Particulates

strontium-89	1.00E-11	1.16E-14
strontium-90	1.00E-11	5.12E-15
cesium-134	1.00E-11	5.11E-14
cesium-137	1.00E-11	4.70E-14
molybdenum-99	1.00E-11	9.12E-13
cerium-141	1.00E-11	4.88E-14
cerium-144	1.00E-11	1.97E-13
cobalt-58	1.00E-11	4.44E-14
cobalt-60	1.00E-11	7.86E-14
iron-59	1.00E-11	1.07E-13
manganese-54	1.00E-11	4.56E-14
zinc-65	1.00E-11	1.01E-13
Gross Alpha	1.00E-11	9.01E-16

Tritium

hydrogen-3	1.00E-06	5.85E-11

† From ODCM Table 6.2.2.1-1

4.0 Solid Radwaste

This section of the annual effluent report provides information required by the Columbia Generating Station Offsite Dose Calculation Manual and recommended by Nuclear Regulatory Commission Regulatory Guide 1.21-1974.

Solid Radwaste Information required by the Offsite Dose Calculation Manual

January -- December 2010

Class A

1. Container Volumes

10 GAL DRUM	2.0 ft3
30 GAL DRUM	4.0 ft3
55 GAL DRUM	7.5 ft3
B-25 Steel Box	96 ft3
PL8-120 Polyethylene HIC	120.3 ft3
EL-142 Polyethylene HIC	132.4 ft3
ES-190 Steel Liner	138 ft3
Control Rod Guide Tube	19.2 ft3

2. Total Curies

   1.04E+03 Ci

3. Principal Radionuclides

Nuclide	Curies	Percent
Co-60	4.12E+02	3.97E+01
Zn-65	3.56E+02	3.44E+01
Fe-55	1.78E+02	1.72E+01
Mn-54	4.04E+01	3.90E+00
Co-58	3.23E+01	3.11E+00
Ni-63	1.30E+01	1.25E+00
C-14	1.70E+00	1.64E-01
Ag-110m	1.43E+00	1.38E-01
Cs-137	6.85E-01	6.61E-02
Cr-51	6.29E-01	6.07E-02
Sr-89	3.03E-01	2.92E-02
H-3	2.30E-01	2.22E-02
Fe-59	1.90E-01	1.83E-02

Nb-95	1.75E-01	1.68E-02
Ni-59	1.36E-01	1.32E-02
La-140	1.23E-01	1.19E-02
Ba-140	1.11E-01	1.07E-02
I-131	3.76E-02	3.63E-03
Sr-90	2.34E-02	2.26E-03
Pu-231	1.65E-02	1.59E-03
Zr-95	5.11E-03	4.93E-04
Sb-125	4.14E-03	4.00E-04
Ce-141	2.19E-03	2.11E-04

4. Source

Resins	1.04E+03 Ci
DAW	4.79E-01 Ci
Irradiated Components	7.50E-01 Ci
Other (Sealed Source & Mixed Waste)	1.67E-04 Ci

5. Type of Container

   All containers shipped as Limited Quantity, LSA, SCO or Radioactive material in IP-1, IP-2, Type A, or Type B (including casks) as appropriate.

6. Solidification Agent

   None

Class B

There were no Class B shipments made during calendar year 2010

Class C

1. Container Volumes

TN-RAM Liner	57.8 ft3
PL8-120 Polyethylene HIC	120.3 ft3
L8-120 Steel Liner	125.2 ft3

2. Total Curies

   3.95E+04 Ci

3. Principal Radionuclides

Nuclide	Curies	Percent
Co-60	2.39E+04	6.06E+01
Fe-55	1.26E+04	3.18E+01
Ni-63	2.80E+03	7.09E+00
Mn-54	1.29E+02	3.27E-01
Ta-182	2.08E+01	5.27E-02
Ni-59	1.57E+01	3.97E-02
Cr-51	1.50E+01	3.81E-02
Zn-65	1.32E+01	3.34E-02
Co-58	7.47E+00	1.89E-02
H-3	4.99E+00	1.26E-02
C-14	4.00E+00	1.01E-02
Cs-137	9.92E-01	2.51E-03
Zr-95	4.70E-01	1.19E-03
Sb-125	4.69E-01	1.19E-03
Nb-95	2.60E-01	6.95E-04
Ag-110m	1.85E-01	4.69E-04
Sr-89	1.81E-01	4.58E-04
Sb-124	1.57E-01	3.98E-04
Nb-94	8.11E-02	2.05E-04
Tc-99	2.25E-02	5.71E-05

4. Source

Resins	0.00E+00 Ci
DAW	0.00E+00 Ci
Irradiated Components	3.95E+04 Ci
Other (Sealed Source & Mixed Waste)	0.00E+00 Ci

5. Type of Container

All containers shipped as Type B (including casks).

6. Solidification Agent

None

Solid Radwaste Information Recommended by NRC Regulatory Guide 1.21

January -- December 2010

Solid waste shipped offsite for burial or disposal (not irradiated fuel).

1. Type of Waste

Waste Stream	Unit	Annual Cumulative	Est. Total Error %
a. Spent resins, filter sludge, evaporator bottoms, etc.	m^3	2.29E+02	
	Ci	1.04E+03	2.5E+01%
b. Dry Active Waste	m^3	8.16E+01	
	Ci	4.79E-01	2.5E+01%
c. Irradiated Components	m^3	1.73E+01	
	Ci	3.95E+04	2.5E+01%
d. Other Waste (Sealed Source & mixed waste)	m^3	6.12E+00	
	Ci	1.67E-04	2.5E+01%

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

a. Dewatered Spent Resins -- All Classes

Nuclide	Curies	Percent
Co-60	4.11E+02	3.97E+01
Zn-65	3.56E+02	3.43E+01
Fe-55	1.78E+02	1.72E+01
Mn-54	4.04E+01	3.90E+00
Co-58	3.22E+01	3.10E+00
Ni-63	1.28E+01	1.23E+00
C-14	1.70E+00	1.64E-01
Ag-110m	1.43E+00	1.38E-01
Cs-137	6.59E-01	6.55E-02
Cr-51	5.34E-01	5.15E-01
Sr-89	3.02E-01	2.92E-02
H-3	2.29E-01	2.21E-02
Fe-59	1.90E-01	1.83E-02
Nb-95	1.70E-01	1.64E-02
Ni-59	1.35E-01	1.30E-02
La-140	1.23E-01	1.18E-02
Ba-140	1.11E-01	1.07E-02
I-131	3.76E-02	3.62E-03

b. Dry Active Waste (DAW) -- All Classes

Nuclide	Curies	Percent
Co-60	1.53E-01	3.19E+01
Zn-65	1.24E-01	2.60E+01
Cr-51	9.54E-02	1.99E+01
Co-58	6.02E-02	1.26E+01
Mn-54	1.35E-02	2.82E+00
Fe-55	7.52E-03	1.57E+00
Cs-137	6.13E-03	1.28E+00
Nb-95	4.59E-03	9.57E-01
Zr-95	3.61E-03	7.54E-01
Sb-125	3.36E-03	7.01E-01
Ni-63	2.80E-03	5.83E-01
Ag-110m	1.79E-03	3.73E-01
Sb-124	1.17E-03	2.45E-01
Sr-89	1.11E-03	2.31E-01
H-3	4.62E-04	9.55E-02
C-14	7.31E-05	1.53E-02
Sr-90	2.94E-05	6.13E-03
Pu-239	2.94E-05	3.21E-04

c. Irradiated Components

Nuclide	Curies	Percent
Co-60	2.39E+04	6.06E+01
Fe-55	1.26E+04	3.18E+01
Ni-63	2.80E+03	7.09E+00
Mn-54	1.29E+02	3.27E-01
Ta-182	2.08E+01	5.27E-02
Ni-59	1.57E+01	3.97E-02
Cr-51	1.50E+01	3.81E-02
Zn-65	1.32E+01	3.34E-02
Co-58	7.47E+00	1.89E-02
H-3	4.99E+00	1.26E-02

C-14	4.00E+00	1.01E-02
Cs-137	9.92E-01	2.51E-03
Zr-95	4.70E-01	1.19E-03
Sb-125	4.69E-01	1.19E-03
Nb-95	2.60E-01	6.59E-04
Ag-110m	1.85E-01	4.69E-04
Sr-89	1.81E-01	4.58E-04
Sb-124	1.57E-01	3.98E-04

d. Other Waste (Sealed Source & Mixed Waste)

Nuclide	Curies	Percent
Co-60	9.34E-05	5.59E+01
Fe-55	6.69E-05	4.01E+01
Mn-54	5.52E-06	3.30E+00
Sb-125	4.71E-07	2.82E-01
Cs-137	4.12E-07	2.47E-01
Ag-110m	1.52E-07	9.08E-02
Co-58	1.41E-07	8.44E-02

3. Solid Waste Disposition

Number of Shipments	Mode of Transportation	Destination
32	Tractor - Trailer via Public Highway	US Ecology, Inc. P.O. Box 638 Hanford Reservation Richland, WA. 99352
3*	Tractor - Trailer via Public Highway	Perma-Fix Northwest 2025 Battelle Boulevard Richland, WA 99352

(* After processing, portions of this shipment may be forwarded for disposal.)

Irradiated Fuel Shipments (Disposition)

Number of Shipments	Mode of Transportation	Destination
None	N/A	N/A

5.0 Meteorological Data

The meteorological data contained in Tables 5-1 through 5-10 was obtained from the meteorological tower located 2500 feet (762 m) west of Columbia Generating Station. Data was recovered from instruments at the 33-foot (10 meter) and 245- foot (75 meter) levels. The meteorological data is a composite file generated from the automated data recovery systems for the calendar year 2010. Data is archived on the Energy Northwest Local Area Network.

Meteorological data recovery for 2010 was 95.7% from the 33-foot level and 96.9% from the 245-foot level. Redundant wind and temperature sensors are installed at both levels of the meteorological tower. Data from the two systems is mixed to permit maximum data recovery for defined date ranges.

The data in Tables 5-1 through 5-8 lists the joint frequency distributions at the 33- foot and 245-foot levels by quarter for 2010. These tables show the total hours at various wind speeds for each sector and stability class. The NRC stability classes A through G and eleven wind speed categories along with the 16 wind direction sectors were used to prepare each joint frequency table. Table 5-9 and 5-10 list the annual joint frequency distributions for those levels for 2010.

Wind speed is measured in miles per hour in the following tables and speeds below 1.0 MPH were recorded as calms.

Atmospheric factors which affect dispersion and deposition of gaseous effluents as measured or documented at the Hanford Meteorological Station during 2010 were snow (15.9 inches total which fell in November and December), total precipitation (10.19 inches), dust or blowing dust (1 day), fog (49 days), thunderstorms (7 days), and atmospheric smoke (1 day).

Rainfall as recorded at the Columbia Generating Station meteorological tower was 6.65 inches.

Joint Frequency Distribution Tables for 2010

Table 5-1 1st Quarter Average, 33 Ft Above Ground Level AGL

Hours at each wind speed and direction during time period

Elevation: 33	Start Date: 1/1/2010	Total number of Periods: 2159
Period: 1st Quarter	Stop Date: 3/31/2010	Periods of No Data Recovery: 9
		System Percent Data Recovery: 99.6%

Stability Class: A

Wind Speed Min	Max	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	TOTAL
1.0	2.2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2.2	4.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4.5	6.7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6.7	8.9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
8.9	11.2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11.2	13.4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
13.4	17.9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17.9	22.4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
22.4	29.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29.1	40.3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
40.3	90.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTALS		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1

Stability Class: B

Wind Speed Min	Max	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	TOTAL
1.0	2.2	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
2.2	4.5	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	3
4.5	6.7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	2
6.7	8.9	3	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	5
8.9	11.2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11.2	13.4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
13.4	17.9	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1
17.9	22.4	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1
22.4	29.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29.1	40.3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
40.3	90.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTALS		4	2	0	0	0	0	0	0	0	0	0	1	0	1	1	4	13

Stability Class: C

Wind Speed Min	Max	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	TOTAL
1.0	2.2	3	1	1	0	0	0	0	0	0	0	0	0	0	0	2	1	8
2.2	4.5	8	2	1	0	0	0	0	0	0	0	0	0	0	0	0	14	25
4.5	6.7	7	4	0	0	0	0	0	0	0	0	0	2	0	0	2	7	22
6.7	8.9	10	1	0	0	0	0	0	0	1	0	0	1	0	0	0	7	20
8.9	11.2	4	3	0	0	0	0	0	0	1	1	2	0	3	2	0	1	17
11.2	13.4	2	0	0	0	0	0	0	0	0	0	2	0	1	3	1	1	10
13.4	17.9	3	0	0	0	0	0	0	0	0	1	4	1	0	2	0	1	12
17.9	22.4	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1
22.4	29.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29.1	40.3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
40.3	90.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTALS		37	11	2	0	0	0	0	0	2	2	8	5	4	7	5	32	115

Stability Class: D

Wind Speed Min	Max	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	TOTAL
1.0	2.2	5	9	4	1	4	2	1	5	6	10	1	5	4	3	5	10	75
2.2	4.5	25	17	11	2	0	2	12	15	16	5	7	5	6	1	13	29	166
4.5	6.7	13	18	8	1	0	1	1	19	8	5	2	2	5	4	10	34	131
6.7	8.9	4	4	0	0	0	0	5	11	9	8	4	1	1	3	30	23	103
8.9	11.2	0	5	0	0	0	0	1	3	4	5	2	1	1	3	19	8	52
11.2	13.4	2	1	2	0	0	0	1	2	1	4	3	0	3	3	3	0	25
13.4	17.9	1	0	0	0	0	0	1	0	1	4	6	5	1	0	2	1	22
17.9	22.4	0	0	0	0	0	0	0	2	2	6	7	1	2	0	1	0	21
22.4	29.1	0	0	0	0	0	0	0	0	0	2	1	2	0	0	0	0	5
29.1	40.3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
40.3	90.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTALS		50	54	25	4	4	5	22	57	47	49	33	22	23	17	83	105	600

Table 5-1 1st Quarter Average, 33 Ft AGL (Continued)

Stability Class: E

Wind Speed Min	Max	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	TOTAL
1.0	2.2	3	4	2	1	3	0	5	4	7	13	4	4	6	4	6	13	79
2.2	4.5	16	13	6	3	1	4	6	6	20	17	2	7	3	8	26	24	162
4.5	6.7	14	7	9	5	0	2	2	13	9	1	5	3	4	7	26	25	132
6.7	8.9	2	1	1	0	0	0	4	32	13	5	4	2	0	7	31	10	112
8.9	11.2	0	0	0	0	0	0	3	8	3	7	3	0	2	8	10	5	49
11.2	13.4	0	0	0	0	1	0	3	4	6	7	0	0	0	6	4	2	33
13.4	17.9	0	0	0	0	0	0	0	3	3	9	3	0	0	1	3	0	22
17.9	22.4	0	0	0	0	0	0	0	0	0	2	1	0	1	0	0	0	4
22.4	29.1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1
29.1	40.3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
40.3	90.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTALS		35	25	18	9	5	6	23	70	61	62	22	16	16	41	106	79	594

Stability Class: F

Wind Speed Min	Max	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	TOTAL
1.0	2.2	9	7	2	4	1	3	3	8	5	5	8	4	7	5	7	8	86
2.2	4.5	23	15	12	4	1	1	3	12	21	9	5	4	2	9	22	24	167
4.5	6.7	8	2	5	1	0	0	2	12	6	5	4	0	1	6	15	33	100
6.7	8.9	2	0	0	0	0	0	1	16	7	2	2	1	0	2	24	4	61
8.9	11.2	0	0	0	0	0	0	4	12	3	0	0	0	0	4	4	0	27
11.2	13.4	0	0	0	0	0	0	1	0	1	0	0	0	0	0	1	0	3
13.4	17.9	0	0	0	0	0	0	0	2	1	0	0	0	0	0	0	0	3
17.9	22.4	0	0	0	0	0	0	0	0	1	2	0	0	0	0	0	0	3
22.4	29.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29.1	40.3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
40.3	90.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTALS		42	24	19	9	2	4	14	62	45	23	19	9	10	26	73	69	450

Stability Class: G

Wind Speed Min	Max	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	TOTAL
1.0	2.2	3	3	3	0	1	1	1	1	1	3	0	2	2	3	10	10	44
2.2	4.5	24	11	1	0	0	0	2	7	7	5	4	1	1	5	11	30	109
4.5	6.7	4	1	5	1	0	0	0	11	2	1	0	0	0	2	17	13	57
6.7	8.9	0	0	0	0	0	0	0	4	7	0	0	0	1	2	6	4	24
8.9	11.2	0	0	0	0	0	0	0	8	2	0	0	0	0	1	3	0	14
11.2	13.4	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1
13.4	17.9	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1
17.9	22.4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
22.4	29.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29.1	40.3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
40.3	90.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTALS		31	15	9	1	1	1	3	31	21	9	4	3	4	13	47	57	250

Stability Class: All

Wind Speed Min	Max	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	TOTAL
1.0	2.2	23	25	12	6	9	6	10	18	19	31	13	15	19	15	30	42	293
2.2	4.5	97	59	31	9	2	7	23	40	64	36	18	17	12	23	72	122	632
4.5	6.7	46	32	27	8	0	3	5	55	25	12	11	7	10	19	70	114	444
6.7	8.9	21	6	1	0	0	0	10	63	37	15	10	5	2	14	92	50	326
8.9	11.2	4	8	0	0	0	0	8	31	13	13	7	1	6	18	36	14	159
11.2	13.4	4	1	2	0	1	0	5	6	9	11	5	0	4	12	9	3	72
13.4	17.9	4	0	0	0	0	0	1	5	6	14	13	6	1	4	5	2	61
17.9	22.4	0	0	0	0	0	0	0	2	3	10	8	3	3	0	1	0	30
22.4	29.1	0	0	0	0	0	0	0	0	0	3	1	2	0	0	0	0	6
29.1	40.3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
40.3	90.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTALS		199	131	73	23	12	16	62	220	176	145	86	56	57	105	315	347	2023

Periods of Calm while in Stability Class:

A	B	C	D	E	F	G	Total
0	0	1	30	46	35	13	127

Table 5-2 1st Quarter Average, 245 Ft AGL

Hours at each wind speed and direction during time period

Elevation: 245
Period: 1st Quarter

Start Date: 1/1/2010
Stop Date: 3/31/2010

Total number of Periods: 2159
Periods of No Data Recovery: 9
System Percent Data Recovery: 99.6%

Stability Class: A

Wind Speed Min	Max	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	TOTAL
1.0	2.2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2.2	4.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4.5	6.7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6.7	8.9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8.9	11.2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
11.2	13.4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
13.4	17.9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17.9	22.4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
22.4	29.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29.1	40.3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
40.3	90.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTALS		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1

Stability Class: B

Wind Speed Min	Max	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	TOTAL
1.0	2.2	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1
2.2	4.5	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2
4.5	6.7	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	3
6.7	8.9	1	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	3
8.9	11.2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2
11.2	13.4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
13.4	17.9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17.9	22.4	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1
22.4	29.1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1
29.1	40.3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
40.3	90.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTALS		5	0	1	0	0	0	0	0	0	0	1	0	0	1	2	3	13

Stability Class: C

Wind Speed Min	Max	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	TOTAL
1.0	2.2	1	0	1	0	0	0	0	0	0	0	0	0	0	0	2	1	5
2.2	4.5	9	3	0	0	0	0	0	0	0	0	0	0	0	0	0	9	21
4.5	6.7	3	2	0	0	0	0	0	0	0	0	0	0	0	0	1	10	16
6.7	8.9	10	2	0	0	0	0	0	0	0	0	0	0	2	1	0	7	22
8.9	11.2	6	2	0	0	0	0	0	0	0	1	0	1	0	1	0	3	14
11.2	13.4	4	1	0	0	0	0	0	0	1	1	2	0	4	0	0	1	14
13.4	17.9	4	0	0	0	0	0	0	0	0	0	2	0	1	4	0	2	13
17.9	22.4	0	0	0	0	0	0	0	0	0	1	5	0	0	2	0	0	8
22.4	29.1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1
29.1	40.3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
40.3	90.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTALS		37	10	1	0	0	0	0	0	1	3	9	2	7	8	3	33	114

Stability Class: D

Wind Speed Min	Max	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	TOTAL
1.0	2.2	3	6	1	2	5	1	3	2	7	5	1	3	0	4	3	5	51
2.2	4.5	16	12	9	4	1	1	5	12	13	6	9	6	6	3	12	19	134
4.5	6.7	10	10	8	0	0	2	10	16	9	4	3	2	1	3	10	29	117
6.7	8.9	9	11	4	1	0	0	1	9	5	6	2	0	3	2	15	23	91
8.9	11.2	1	4	1	0	0	0	2	6	6	7	2	2	2	3	18	14	68
11.2	13.4	0	4	0	0	0	0	0	4	4	2	2	0	1	6	17	5	45
13.4	17.9	4	1	2	0	0	0	1	2	3	8	6	2	1	10	11	2	53
17.9	22.4	0	0	0	0	0	0	2	0	0	1	4	4	1	1	2	0	15
22.4	29.1	0	0	0	0	0	0	0	2	2	8	10	2	1	1	0	0	26
29.1	40.3	0	0	0	0	0	0	0	0	0	3	2	2	2	0	0	0	9
40.3	90.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTALS		43	48	25	7	6	4	24	53	49	50	41	23	18	33	88	97	609

Table 5-2 1st Quarter Average, 245 Ft AGL (Continued)

Stability Class: E

Wind Speed Min	Max	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	TOTAL
1.0	2.2	5	3	4	3	0	2	2	6	2	6	3	2	1	2	3	1	45
2.2	4.5	6	4	6	3	4	4	6	8	11	4	3	2	5	2	7	10	85
4.5	6.7	6	4	8	4	4	2	8	7	7	4	2	2	3	4	13	19	97
6.7	8.9	3	4	2	2	0	1	1	8	4	2	3	0	1	3	18	16	68
8.9	11.2	4	5	3	2	0	0	3	7	12	3	2	2	3	7	21	14	88
11.2	13.4	1	0	2	0	0	0	2	11	14	3	5	2	1	7	30	10	88
13.4	17.9	2	0	0	0	0	1	3	10	6	11	6	0	2	14	18	8	81
17.9	22.4	0	0	0	0	1	0	2	3	4	6	8	0	0	12	7	4	47
22.4	29.1	0	0	0	0	0	0	0	3	0	5	3	1	0	5	0	0	17
29.1	40.3	0	0	0	0	0	0	0	0	0	4	1	0	0	0	0	0	5
40.3	90.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTALS		27	20	25	14	9	10	27	63	60	48	36	11	16	56	117	82	621

Stability Class: F

Wind Speed Min	Max	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	TOTAL
1.0	2.2	1	3	4	1	1	2	1	1	1	0	0	1	3	0	2	0	21
2.2	4.5	6	3	8	10	6	4	4	9	10	6	7	4	0	4	3	10	94
4.5	6.7	8	8	5	4	0	0	3	10	8	7	3	1	3	6	6	14	86
6.7	8.9	5	3	10	5	0	0	2	13	4	3	5	3	1	3	14	14	85
8.9	11.2	6	1	3	0	0	0	3	3	5	3	2	1	1	2	14	13	57
11.2	13.4	0	3	1	0	0	0	5	3	10	3	1	0	1	3	10	6	46
13.4	17.9	1	0	0	0	0	0	0	11	3	4	0	0	1	14	17	11	62
17.9	22.4	0	0	0	0	0	0	0	2	2	0	0	0	0	9	3	1	17
22.4	29.1	0	0	0	0	0	0	0	1	0	1	0	0	0	2	0	0	4
29.1	40.3	0	0	0	0	0	0	0	0	0	2	1	0	0	0	0	0	3
40.3	90.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTALS		27	21	31	20	7	6	18	53	43	29	19	10	10	43	69	69	475

Stability Class: G

Wind Speed Min	Max	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	TOTAL
1.0	2.2	1	1	0	2	1	2	0	0	3	2	5	0	3	1	1	2	24
2.2	4.5	6	6	4	3	0	4	4	3	6	1	0	2	2	2	4	6	53
4.5	6.7	15	9	3	1	0	0	1	2	2	1	1	0	1	1	1	6	44
6.7	8.9	6	4	3	0	0	0	0	8	4	4	1	0	0	0	4	14	48
8.9	11.2	4	0	2	0	0	0	1	2	3	1	0	0	0	0	11	10	34
11.2	13.4	2	0	0	0	0	0	1	5	3	0	0	0	0	1	7	5	24
13.4	17.9	0	0	0	0	0	0	2	4	1	3	0	0	0	3	10	6	29
17.9	22.4	0	0	0	0	0	0	0	2	0	1	0	0	0	0	0	2	5
22.4	29.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29.1	40.3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
40.3	90.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTALS		34	20	12	6	1	6	9	26	22	13	7	2	6	8	38	51	261

Stability Class: All

Wind Speed Min	Max	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	TOTAL
1.0	2.2	11	13	11	8	7	7	6	9	13	13	9	6	7	7	11	9	147
2.2	4.5	44	28	27	20	11	13	19	32	40	17	19	14	13	11	26	55	389
4.5	6.7	44	33	24	9	4	4	22	35	26	16	9	5	8	14	31	79	363
6.7	8.9	34	24	19	8	0	1	4	38	17	15	11	3	7	9	53	74	317
8.9	11.2	22	12	9	2	0	0	9	18	26	15	6	6	6	13	64	56	264
11.2	13.4	7	8	3	0	0	0	8	23	32	9	10	2	7	17	64	27	217
13.4	17.9	11	1	2	0	0	1	6	27	13	26	14	2	5	45	56	29	238
17.9	22.4	0	0	0	0	1	0	4	7	6	9	17	4	1	25	12	7	93
22.4	29.1	0	0	0	0	0	0	0	6	2	14	14	4	1	8	0	0	49
29.1	40.3	0	0	0	0	0	0	0	0	0	9	4	2	2	0	0	0	17
40.3	90.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTALS		173	119	95	47	23	26	78	195	175	143	113	48	57	149	317	336	2094

Periods of Calm while in Stability Class:

A	B	C	D	E	F	G	Total
0	0	2	21	19	10	4	56

Table 5-3 2nd Quarter Average, 33 Ft AGL

Hours at each wind speed and direction during time period

Elevation: 33	Start Date: 4/1/2010	Total number of Periods: 2184
Period: 2nd Quarter	Stop Date: 6/30/2010	Periods of No Data Recovery: 341
		System Percent Data Recovery: 84.4%

Stability Class: A

Wind Speed Min	Max	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	TOTAL
1.0	2.2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2.2	4.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4.5	6.7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6.7	8.9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
8.9	11.2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11.2	13.4	0	0	0	0	0	0	0	0	2	0	0	0	0	0	1	0	3
13.4	17.9	0	0	0	0	0	0	0	0	2	0	3	0	0	0	0	1	6
17.9	22.4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
22.4	29.1	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	4
29.1	40.3	0	0	0	0	0	0	0	0	0	0	0	3	2	0	0	0	5
40.3	90.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTALS		0	0	0	0	0	0	0	0	4	0	3	3	2	4	1	2	19

Stability Class: B

Wind Speed Min	Max	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	TOTAL
1.0	2.2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2.2	4.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4.5	6.7	1	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	3
6.7	8.9	4	1	0	0	0	0	0	0	2	0	1	0	0	0	0	3	11
8.9	11.2	1	1	1	0	0	0	0	0	2	1	0	0	0	0	0	1	7
11.2	13.4	0	0	0	0	0	0	0	0	6	2	0	0	0	0	0	0	8
13.4	17.9	2	2	0	0	0	0	1	0	0	5	4	0	0	1	0	2	17
17.9	22.4	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1
22.4	29.1	0	0	0	0	0	0	0	0	0	1	0	2	0	0	0	0	3
29.1	40.3	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1
40.3	90.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTALS		8	5	1	0	0	0	1	0	11	10	5	3	0	1	0	6	51

Stability Class: C

Wind Speed Min	Max	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	TOTAL
1.0	2.2	1	2	1	0	0	2	0	0	0	0	0	0	0	0	0	2	8
2.2	4.5	1	0	2	0	0	0	1	3	2	0	1	0	0	1	3	3	17
4.5	6.7	6	5	3	1	1	0	2	7	5	0	3	3	3	0	3	6	48
6.7	8.9	3	6	0	0	1	2	3	8	5	4	1	2	3	1	3	4	46
8.9	11.2	1	2	3	1	1	0	0	3	14	8	2	3	1	2	1	1	43
11.2	13.4	1	0	1	0	0	0	0	1	13	8	3	3	2	1	1	1	35
13.4	17.9	0	1	0	0	0	0	1	0	6	5	5	1	2	1	2	0	24
17.9	22.4	0	0	0	0	0	0	0	0	0	1	4	2	0	1	1	0	9
22.4	29.1	0	0	0	0	0	0	0	0	0	0	1	0	1	2	0	0	4
29.1	40.3	0	0	0	0	0	0	0	0	0	1	0	0	1	1	0	0	3
40.3	90.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTALS		13	16	10	2	3	4	7	22	45	27	20	14	13	10	14	17	237

Stability Class: D

Wind Speed Min	Max	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	TOTAL
1.0	2.2	0	3	6	4	3	0	4	5	1	6	3	3	1	0	2	2	43
2.2	4.5	2	8	13	4	2	4	26	14	11	8	5	9	7	6	3	6	128
4.5	6.7	3	10	9	3	2	6	16	25	11	8	11	11	4	4	2	3	128
6.7	8.9	1	4	6	3	2	4	16	14	11	8	5	7	3	7	6	3	100
8.9	11.2	0	1	2	0	3	1	10	9	18	8	3	4	6	15	9	5	94
11.2	13.4	0	2	0	1	0	1	5	7	9	5	4	7	2	7	0	2	52
13.4	17.9	3	3	2	0	0	1	5	6	9	8	5	6	4	14	2	6	74
17.9	22.4	0	0	0	0	0	0	2	0	0	5	4	3	1	18	6	0	39
22.4	29.1	0	0	0	0	0	0	0	0	1	3	0	1	4	13	2	0	24
29.1	40.3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
40.3	90.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTALS		9	31	38	15	12	17	84	80	71	59	40	51	32	84	32	27	682

Table 5-3 2nd Quarter Average, 33 Ft AGL (Continued)

Stability Class: E

Wind Speed Min	Max	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	TOTAL
1.0	2.2	1	2	0	0	0	0	2	0	0	3	1	1	2	2	2	3	19
2.2	4.5	7	5	1	1	0	3	7	8	9	7	5	11	6	7	8	6	91
4.5	6.7	5	4	2	1	0	1	4	10	8	8	6	7	6	7	6	7	82
6.7	8.9	0	1	2	0	0	1	7	13	10	6	5	1	12	10	5	3	76
8.9	11.2	0	1	0	0	0	0	7	1	4	5	7	6	9	15	7	5	67
11.2	13.4	0	2	0	0	0	0	1	2	3	13	2	1	3	11	4	3	45
13.4	17.9	0	0	0	0	0	0	1	1	1	5	5	2	1	22	0	1	39
17.9	22.4	0	0	0	0	0	0	0	0	3	5	4	5	1	5	0	0	23
22.4	29.1	0	0	0	0	0	0	0	0	1	1	1	1	1	2	0	0	7
29.1	40.3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
40.3	90.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTALS		13	15	5	2	0	5	29	35	39	53	36	35	41	81	32	28	449

Stability Class: F

Wind Speed Min	Max	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	TOTAL
1.0	2.2	3	3	3	3	0	0	3	6	3	1	2	1	1	0	2	4	35
2.2	4.5	8	4	2	1	0	2	8	13	13	3	2	0	5	8	8	10	87
4.5	6.7	3	3	1	0	0	0	5	16	15	5	2	1	5	8	7	5	76
6.7	8.9	1	1	0	0	0	0	2	9	9	4	0	1	2	4	3	0	36
8.9	11.2	0	0	0	0	0	0	1	4	0	3	0	0	2	0	1	0	11
11.2	13.4	0	0	0	0	0	0	0	2	1	1	0	0	0	1	0	0	5
13.4	17.9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17.9	22.4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
22.4	29.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29.1	40.3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
40.3	90.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTALS		15	11	6	4	0	2	19	50	41	17	6	3	15	21	21	19	250

Stability Class: G

Wind Speed Min	Max	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	TOTAL
1.0	2.2	3	1	2	0	0	0	0	2	3	0	1	1	0	1	1	3	18
2.2	4.5	4	7	3	0	0	0	4	9	3	1	1	0	0	1	2	5	40
4.5	6.7	3	4	2	0	0	0	5	6	1	2	0	0	0	0	2	5	30
6.7	8.9	0	0	0	0	0	0	0	5	3	2	0	0	0	0	1	2	13
8.9	11.2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11.2	13.4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
13.4	17.9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17.9	22.4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
22.4	29.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29.1	40.3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
40.3	90.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTALS		10	12	7	0	0	0	9	22	10	5	2	1	0	2	6	15	101

Stability Class: All

Wind Speed Min	Max	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	TOTAL
1.0	2.2	8	11	12	7	3	2	9	13	7	10	7	6	4	3	7	14	123
2.2	4.5	22	24	21	6	2	9	46	47	38	19	14	20	18	23	24	30	363
4.5	6.7	21	27	17	5	3	7	32	64	41	23	22	22	18	19	20	26	367
6.7	8.9	9	13	8	3	3	7	28	49	40	24	12	11	20	22	18	16	283
8.9	11.2	2	5	6	1	4	1	18	17	38	25	12	13	18	32	18	12	222
11.2	13.4	1	4	1	1	0	1	6	12	34	29	9	11	7	20	6	6	148
13.4	17.9	5	6	2	0	0	1	8	7	18	23	22	9	7	38	4	10	160
17.9	22.4	0	0	0	0	0	0	2	0	3	12	12	10	2	24	7	0	72
22.4	29.1	0	0	0	0	0	0	0	0	2	5	2	4	6	21	2	0	42
29.1	40.3	0	0	0	0	0	0	0	0	0	1	0	4	3	1	0	0	9
40.3	90.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTALS		68	90	67	23	15	28	149	209	221	171	112	110	103	203	106	114	1789

Periods of Calm while in Stability Class:

A	B	C	D	E	F	G	Total
0	0	0	14	18	12	10	54

Table 5-4 2nd Quarter Average, 245 Ft AGL

Hours at each wind speed and direction during time period

Elevation: 245 Start Date: 4/1/2010 Total number of Periods: 2184
Period: 2nd Quarter Stop Date: 6/30/2010 Periods of No Data Recovery: 214
System Percent Data Recovery: 90.2%

Stability Class: A

Wind Speed Min	Max	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	TOTAL
1.0	2.2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2.2	4.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4.5	6.7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6.7	8.9	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
8.9	11.2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11.2	13.4	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1
13.4	17.9	0	0	0	0	0	0	0	0	1	1	0	0	0	0	1	1	4
17.9	22.4	0	0	0	0	0	0	0	0	0	2	2	0	0	0	0	0	4
22.4	29.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29.1	40.3	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	4
40.3	90.0	0	0	0	0	0	0	0	0	0	0	0	1	4	0	0	0	5
TOTALS		1	0	0	0	0	0	0	0	2	3	2	1	4	4	1	1	19

Stability Class: B

Wind Speed Min	Max	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	TOTAL
1.0	2.2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2.2	4.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4.5	6.7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6.7	8.9	1	5	0	0	0	0	0	0	1	0	0	0	0	0	0	0	7
8.9	11.2	1	1	1	0	0	0	0	0	1	1	1	0	0	0	0	3	9
11.2	13.4	0	1	1	0	0	0	0	0	1	3	0	0	0	0	0	0	6
13.4	17.9	1	1	0	0	0	0	0	0	3	3	2	0	0	0	1	1	12
17.9	22.4	1	1	0	0	0	0	1	0	0	4	3	2	0	1	0	0	13
22.4	29.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29.1	40.3	0	0	0	0	0	0	0	0	0	1	0	2	0	0	0	0	3
40.3	90.0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1
TOTALS		4	9	2	0	0	0	1	0	6	12	6	5	0	1	1	4	51

Stability Class: C

Wind Speed Min	Max	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	TOTAL
1.0	2.2	1	0	0	0	0	1	0	0	0	0	0	0	0	0	1	1	4
2.2	4.5	1	2	2	0	0	0	2	0	2	0	1	0	0	1	1	1	13
4.5	6.7	5	5	3	2	1	0	0	4	2	1	1	0	0	0	4	4	32
6.7	8.9	3	5	0	0	0	0	1	7	5	1	2	6	2	1	2	4	39
8.9	11.2	1	4	2	1	0	2	2	4	13	4	2	2	2	0	3	2	44
11.2	13.4	0	1	1	0	2	0	0	0	5	11	4	0	2	1	0	1	28
13.4	17.9	1	1	1	0	0	0	0	0	9	19	6	3	6	2	2	2	52
17.9	22.4	0	0	0	0	0	0	1	0	0	5	6	1	2	2	1	0	18
22.4	29.1	0	0	0	0	0	0	0	0	0	1	4	2	0	1	0	0	8
29.1	40.3	0	0	0	0	0	0	0	0	0	0	1	0	1	2	0	0	4
40.3	90.0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	2
TOTALS		12	18	9	3	3	3	6	15	36	43	27	14	16	10	14	15	244

Stability Class: D

Wind Speed Min	Max	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	TOTAL
1.0	2.2	1	1	7	4	3	1	3	1	6	3	2	3	0	1	1	1	38
2.2	4.5	2	5	11	5	3	2	8	18	9	6	7	5	6	7	4	6	104
4.5	6.7	2	3	8	4	0	5	16	23	13	8	8	7	5	2	2	2	108
6.7	8.9	1	9	9	7	2	2	10	13	22	5	7	12	2	4	6	2	113
8.9	11.2	1	2	2	4	2	4	11	5	15	9	10	5	4	5	6	2	87
11.2	13.4	1	0	2	0	2	1	4	3	13	8	5	3	4	10	10	5	71
13.4	17.9	1	1	1	0	2	2	11	12	12	14	10	8	7	11	2	3	97
17.9	22.4	1	3	2	0	0	2	2	2	3	9	4	1	5	10	1	6	51
22.4	29.1	0	0	0	0	0	2	0	0	0	5	3	5	5	15	6	0	41
29.1	40.3	0	0	0	0	0	0	0	0	0	4	5	1	4	19	5	0	38
40.3	90.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTALS		10	24	42	24	14	21	65	77	93	71	61	50	42	84	43	27	748

Table 5-4 2nd Quarter Average, 245 Ft AGL (Continued)

Stability Class: E

Wind Speed Min	Max	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	TOTAL
1.0	2.2	0	0	1	0	1	0	1	0	0	1	1	0	1	0	1	2	9
2.2	4.5	5	2	1	2	1	3	2	1	5	5	2	4	3	8	3	5	52
4.5	6.7	2	2	2	0	0	1	0	7	4	4	4	3	4	4	5	2	44
6.7	8.9	5	4	1	1	0	1	0	7	4	7	3	7	5	10	4	3	62
8.9	11.2	1	0	2	0	0	1	5	2	5	11	2	3	5	5	7	3	52
11.2	13.4	2	0	2	0	1	1	2	1	6	6	6	1	7	11	7	2	55
13.4	17.9	2	1	4	0	0	1	9	3	3	9	9	7	3	16	11	4	82
17.9	22.4	0	0	1	0	0	2	0	0	3	7	9	4	8	29	6	3	72
22.4	29.1	0	0	0	0	0	0	0	0	0	12	5	5	0	28	1	0	51
29.1	40.3	0	0	0	0	0	0	0	0	0	2	3	6	1	6	0	0	18
40.3	90.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTALS		17	9	14	3	3	10	19	21	30	64	44	40	37	117	45	24	497

Stability Class: F

Wind Speed Min	Max	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	TOTAL
1.0	2.2	2	1	0	0	0	0	1	0	3	0	3	0	0	1	1	0	12
2.2	4.5	4	6	1	3	0	2	3	8	2	1	5	2	1	3	5	0	46
4.5	6.7	2	6	1	0	0	1	6	2	8	3	7	3	1	3	2	5	50
6.7	8.9	1	5	2	1	0	0	2	2	10	10	0	5	4	1	7	6	56
8.9	11.2	1	2	2	0	0	0	5	5	5	6	2	2	0	5	7	1	43
11.2	13.4	0	0	0	0	0	0	0	3	2	3	0	1	2	3	3	0	17
13.4	17.9	0	0	0	0	0	0	2	1	2	4	2	0	4	12	10	1	38
17.9	22.4	0	0	0	0	0	0	0	0	2	0	1	0	1	6	1	0	11
22.4	29.1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1
29.1	40.3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
40.3	90.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTALS		10	20	6	4	0	3	19	21	34	27	20	13	13	35	36	13	274

Stability Class: G

Wind Speed Min	Max	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	TOTAL
1.0	2.2	3	0	0	1	0	0	1	2	1	2	2	0	0	0	1	1	14
2.2	4.5	0	0	2	2	0	0	1	2	5	4	1	1	2	1	1	0	22
4.5	6.7	2	1	1	1	0	1	1	2	4	5	1	2	0	0	1	1	23
6.7	8.9	1	3	2	0	0	0	0	3	2	1	1	0	0	1	0	1	15
8.9	11.2	1	1	2	1	0	0	1	1	2	4	1	0	0	0	2	2	18
11.2	13.4	0	0	1	0	0	0	0	0	0	1	1	0	0	0	1	0	4
13.4	17.9	0	0	0	0	0	0	0	1	0	0	0	0	0	1	8	0	10
17.9	22.4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
22.4	29.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29.1	40.3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
40.3	90.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTALS		7	5	8	5	0	1	4	11	14	17	7	3	2	3	14	5	106

Stability Class: All

Wind Speed Min	Max	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	TOTAL
1.0	2.2	7	2	8	5	4	2	6	3	10	6	8	3	1	2	5	5	77
2.2	4.5	12	15	17	12	4	7	16	29	23	16	16	12	12	20	14	12	237
4.5	6.7	13	17	15	7	1	8	23	38	31	21	21	15	10	9	14	14	257
6.7	8.9	13	31	14	9	2	3	13	32	44	24	13	30	13	17	19	16	293
8.9	11.2	6	10	11	6	2	7	24	17	41	35	18	12	11	15	25	13	253
11.2	13.4	3	2	7	0	5	2	6	7	28	32	16	5	15	25	21	8	182
13.4	17.9	5	4	6	0	2	3	22	17	30	50	29	18	20	42	35	12	295
17.9	22.4	2	4	3	0	0	4	4	2	8	27	25	8	16	48	9	9	169
22.4	29.1	0	0	0	0	0	2	0	0	0	18	12	12	5	45	7	0	101
29.1	40.3	0	0	0	0	0	0	0	0	0	7	9	9	6	31	5	0	67
40.3	90.0	0	0	0	0	0	0	0	0	0	1	0	2	5	0	0	0	8
TOTALS		61	85	81	39	20	38	114	145	215	237	167	126	114	254	154	89	1939

Periods of Calm while in Stability Class:

A	B	C	D	E	F	G	Total
0	0	1	12	4	5	9	31

Table 5-5 3rd Quarter Average, 33 Ft AGL

Hours at each wind speed and direction during time period

Elevation: 33 | Start Date: 7/1/2010 | Total number of Periods: 2208
Period: 3rd Quarter | Stop Date: 9/30/2010 | Periods of No Data Recovery: 17
System Percent Data Recovery: 99.2%

Stability Class: A

Wind Speed Min	Max	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	TOTAL
1.0	2.2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2.2	4.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4.5	6.7	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
6.7	8.9	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	3	5
8.9	11.2	3	1	0	0	0	0	0	2	3	0	0	0	0	0	0	1	10
11.2	13.4	5	4	0	0	0	0	0	0	3	0	0	0	0	0	1	2	15
13.4	17.9	3	0	0	0	0	0	0	0	6	0	0	0	0	0	1	0	10
17.9	22.4	0	0	0	0	0	0	0	0	0	1	0	0	2	2	2	0	7
22.4	29.1	0	0	0	0	0	0	0	0	0	1	0	0	0	4	2	0	7
29.1	40.3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1
40.3	90.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTALS		12	7	0	0	0	0	0	2	12	2	0	0	2	6	7	6	56

Stability Class: B

Wind Speed Min	Max	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	TOTAL
1.0	2.2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2.2	4.5	3	1	0	0	0	0	0	0	0	0	0	1	2	0	0	3	10
4.5	6.7	2	0	0	0	0	0	0	0	1	0	0	0	1	1	0	5	10
6.7	8.9	3	6	0	0	0	0	0	0	0	1	0	0	0	0	1	7	18
8.9	11.2	4	2	1	0	0	0	0	4	8	0	0	0	1	1	0	3	24
11.2	13.4	2	1	0	0	0	0	0	2	4	1	0	0	0	3	3	0	16
13.4	17.9	2	0	0	0	0	0	0	2	3	0	0	2	1	2	0	0	12
17.9	22.4	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1
22.4	29.1	0	0	0	0	0	0	0	0	0	1	1	0	0	3	0	0	5
29.1	40.3	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1
40.3	90.0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1
TOTALS		16	10	1	0	0	0	0	8	16	3	2	3	5	12	4	18	98

Stability Class: C

Wind Speed Min	Max	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	TOTAL
1.0	2.2	3	1	1	1	1	0	0	0	0	1	3	1	0	0	1	1	14
2.2	4.5	13	8	11	0	0	1	0	4	7	2	3	2	2	2	5	9	69
4.5	6.7	9	8	5	2	1	2	5	16	19	2	4	2	1	2	3	10	91
6.7	8.9	5	4	1	1	0	0	3	10	9	2	0	0	3	1	2	10	51
8.9	11.2	7	2	1	2	1	0	0	8	12	1	3	2	2	1	0	3	45
11.2	13.4	2	0	0	2	2	2	1	2	5	2	0	1	1	2	0	3	25
13.4	17.9	0	1	0	1	1	0	2	7	5	2	0	1	1	2	2	0	25
17.9	22.4	0	0	0	0	0	0	0	0	0	3	0	0	0	1	1	1	6
22.4	29.1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	2
29.1	40.3	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1
40.3	90.0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
TOTALS		39	24	19	10	6	5	11	47	57	15	13	9	10	13	15	37	330

Stability Class: D

Wind Speed Min	Max	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	TOTAL
1.0	2.2	4	1	11	5	10	2	1	8	4	1	4	0	3	1	0	2	57
2.2	4.5	4	11	17	8	6	10	21	18	10	4	8	4	6	4	2	4	137
4.5	6.7	3	8	20	7	7	11	24	17	14	8	5	7	1	4	2	4	142
6.7	8.9	4	4	11	4	2	8	8	13	9	2	2	1	2	3	5	6	84
8.9	11.2	1	2	3	7	2	7	11	12	10	2	2	2	2	2	3	5	73
11.2	13.4	4	0	0	2	0	3	3	8	7	1	2	0	1	3	2	2	38
13.4	17.9	1	1	0	1	0	0	0	10	6	4	1	0	3	10	9	0	46
17.9	22.4	0	0	0	0	0	0	0	1	1	0	2	0	0	17	6	0	27
22.4	29.1	0	0	0	0	0	0	0	0	0	0	0	0	0	10	2	0	12
29.1	40.3	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	0	3
40.3	90.0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1
TOTALS		21	27	62	34	27	41	68	88	61	22	26	14	18	55	33	23	620

Table 5-5 3rd Quarter Average, 33 Ft AGL (Continued)

Stability Class: E

Wind Speed Min	Max	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	TOTAL
1.0	2.2	4	1	1	5	2	0	5	1	3	2	1	3	0	6	2	5	41
2.2	4.5	9	3	3	1	0	6	6	9	7	7	4	5	3	5	9	8	85
4.5	6.7	5	1	1	1	0	0	5	9	9	6	3	12	8	8	10	10	88
6.7	8.9	1	2	3	0	0	1	12	11	5	4	2	3	7	16	12	6	85
8.9	11.2	2	0	0	0	0	2	5	11	8	1	0	2	5	14	9	4	63
11.2	13.4	0	0	0	0	0	0	1	4	2	5	0	1	4	14	6	1	38
13.4	17.9	0	0	0	0	0	0	0	0	2	2	1	0	1	22	2	1	31
17.9	22.4	0	0	0	0	0	0	0	0	1	0	0	0	1	2	1	0	5
22.4	29.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29.1	40.3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
40.3	90.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTALS		21	7	8	7	2	9	34	45	37	27	11	26	29	87	51	35	436

Stability Class: F

Wind Speed Min	Max	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	TOTAL
1.0	2.2	6	6	4	2	1	3	2	4	9	3	0	2	5	1	4	2	54
2.2	4.5	7	8	10	0	0	4	6	20	8	5	1	2	2	9	7	17	106
4.5	6.7	4	7	10	0	0	1	8	22	9	3	3	2	2	5	8	4	88
6.7	8.9	2	2	4	0	0	2	6	21	9	3	0	0	2	6	6	2	65
8.9	11.2	0	1	4	0	0	0	2	9	6	1	0	1	5	3	1	0	33
11.2	13.4	0	0	1	0	0	0	0	1	2	0	0	0	1	2	1	0	8
13.4	17.9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17.9	22.4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
22.4	29.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29.1	40.3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
40.3	90.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTALS		19	24	33	2	1	10	24	77	43	15	4	7	17	26	27	25	354

Stability Class: G

Wind Speed Min	Max	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	TOTAL
1.0	2.2	2	6	6	2	0	3	0	3	2	2	1	1	0	1	3	4	36
2.2	4.5	12	27	11	0	1	0	9	8	2	2	0	0	2	1	10	4	89
4.5	6.7	8	2	1	0	0	0	4	17	5	1	2	0	0	0	5	16	61
6.7	8.9	0	1	2	0	0	0	5	19	4	0	0	0	0	2	6	2	41
8.9	11.2	0	0	3	0	0	0	0	3	0	0	0	0	0	0	0	0	6
11.2	13.4	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1
13.4	17.9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17.9	22.4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
22.4	29.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29.1	40.3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
40.3	90.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTALS		22	36	23	2	1	3	18	50	13	5	3	1	3	4	24	26	234

Stability Class: All

Wind Speed Min	Max	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	TOTAL
1.0	2.2	19	15	23	15	14	8	8	16	18	9	9	7	8	9	10	14	202
2.2	4.5	48	58	52	9	7	21	42	59	34	20	16	14	17	21	33	45	496
4.5	6.7	31	27	37	10	8	14	46	81	57	20	17	23	13	20	28	49	481
6.7	8.9	16	20	21	5	2	11	34	74	36	12	4	4	14	28	32	36	349
8.9	11.2	17	8	12	9	3	9	18	49	47	5	5	7	15	21	13	16	254
11.2	13.4	13	5	1	4	2	5	5	17	23	9	2	2	8	24	13	8	141
13.4	17.9	6	2	0	2	1	0	2	19	22	8	2	3	6	36	14	1	124
17.9	22.4	0	0	0	0	0	0	0	1	2	4	2	0	3	23	10	1	46
22.4	29.1	0	0	0	0	0	0	0	0	0	2	1	0	0	18	5	0	26
29.1	40.3	0	0	0	0	0	0	0	0	0	0	0	0	0	3	3	0	6
40.3	90.0	0	0	0	1	0	0	0	1	0	0	1	0	0	0	0	0	3
TOTALS		150	135	146	55	37	68	155	317	239	89	59	60	84	203	161	170	2128

Periods of Calm while in Stability Class:							
A	B	C	D	E	F	G	Total
0	0	3	12	13	15	20	63

Table 5-6 3rd Quarter Average, 245 Ft AGL

Hours at each wind speed and direction during time period

Elevation: 245 | Start Date: 7/1/2010 | Total number of Periods: 2208
Period: 3rd Quarter | Stop Date: 9/30/2010 | Periods of No Data Recovery: 17
System Percent Data Recovery: 99.2%

Stability Class: A

Wind Speed Min	Max	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	TOTAL
1.0	2.2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2.2	4.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4.5	6.7	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
6.7	8.9	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
8.9	11.2	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	3	5
11.2	13.4	7	2	0	0	0	0	0	0	3	0	0	0	0	0	0	2	14
13.4	17.9	0	3	2	0	0	0	0	0	6	2	0	0	0	0	1	1	15
17.9	22.4	0	2	0	0	0	0	0	0	1	1	0	0	0	0	2	0	6
22.4	29.1	0	0	0	0	0	0	0	0	0	1	0	0	2	2	1	0	6
29.1	40.3	0	0	0	0	0	0	0	0	0	0	1	0	0	4	3	0	8
40.3	90.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTALS		9	7	2	1	0	0	0	1	10	4	1	0	2	6	7	6	56

Stability Class: B

Wind Speed Min	Max	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	TOTAL
1.0	2.2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2.2	4.5	2	0	0	0	1	0	0	0	1	0	0	1	0	0	0	0	5
4.5	6.7	1	1	0	0	0	0	0	0	0	0	0	1	0	1	0	5	9
6.7	8.9	4	3	1	0	0	0	0	0	0	2	0	0	0	0	0	3	13
8.9	11.2	3	3	0	0	0	0	0	2	4	0	0	0	2	0	1	7	22
11.2	13.4	3	3	1	0	0	0	0	0	4	3	0	0	1	1	0	0	16
13.4	17.9	1	2	1	0	0	0	0	1	6	1	1	1	1	2	5	0	22
17.9	22.4	0	0	0	0	0	0	0	0	1	1	0	1	0	0	1	0	4
22.4	29.1	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	2
29.1	40.3	0	0	0	0	0	0	0	0	0	0	1	0	0	1	2	0	4
40.3	90.0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1
TOTALS		14	12	3	0	1	0	0	3	16	8	2	4	4	7	9	15	98

Stability Class: C

Wind Speed Min	Max	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	TOTAL
1.0	2.2	3	1	0	0	0	0	0	1	0	2	1	1	0	0	2	0	11
2.2	4.5	9	8	7	3	0	0	0	1	4	2	3	2	0	2	4	8	53
4.5	6.7	1	4	6	5	0	2	1	5	12	8	1	1	3	2	3	5	59
6.7	8.9	7	9	3	2	1	1	4	14	13	6	0	4	3	2	4	11	84
8.9	11.2	5	5	2	2	1	0	0	3	9	2	0	0	1	0	0	3	33
11.2	13.4	3	2	0	0	1	0	0	0	15	4	3	1	2	1	0	4	36
13.4	17.9	0	1	1	2	5	1	3	4	9	7	0	2	1	2	0	0	38
17.9	22.4	0	0	0	0	0	0	0	0	1	1	1	1	1	2	2	0	9
22.4	29.1	0	0	0	0	0	0	0	0	0	2	0	0	0	0	2	1	5
29.1	40.3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	2
40.3	90.0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1
TOTALS		28	30	19	14	8	4	8	28	63	34	9	12	11	12	19	32	331

Stability Class: D

Wind Speed Min	Max	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	TOTAL
1.0	2.2	0	2	4	5	5	7	4	2	3	2	1	2	2	1	1	2	43
2.2	4.5	1	6	14	10	5	6	16	19	7	7	7	4	4	2	3	1	112
4.5	6.7	4	4	14	15	7	9	17	17	12	7	7	5	5	4	1	6	134
6.7	8.9	4	4	8	8	6	6	8	13	15	5	3	6	0	1	2	2	91
8.9	11.2	3	2	1	9	2	3	10	4	6	4	1	2	1	5	2	1	56
11.2	13.4	4	2	1	4	2	5	5	3	11	2	0	2	0	3	2	4	50
13.4	17.9	3	1	1	0	1	2	5	5	17	4	2	1	2	2	5	3	54
17.9	22.4	0	0	1	0	0	0	0	2	5	6	0	0	1	6	7	0	28
22.4	29.1	0	0	0	0	0	0	0	1	1	3	3	1	0	15	12	0	36
29.1	40.3	0	0	0	0	0	0	0	0	0	0	0	0	0	15	6	0	21
40.3	90.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTALS		19	21	44	51	28	38	65	66	77	40	24	23	15	54	41	19	625

Table 5-6 3rd Quarter Average, 245 Ft AGL (Continued)

Stability Class: E

Wind Speed Min	Max	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	TOTAL
1.0	2.2	3	2	1	2	1	0	0	2	0	0	1	1	0	1	2	1	17
2.2	4.5	2	1	3	0	1	4	5	1	1	1	5	6	2	3	1	1	37
4.5	6.7	4	1	2	0	0	2	4	2	2	2	1	3	3	5	7	2	40
6.7	8.9	4	3	0	1	0	2	2	6	7	4	2	2	5	10	3	11	62
8.9	11.2	3	1	2	2	0	1	4	1	10	8	1	3	10	9	7	3	65
11.2	13.4	2	2	0	1	0	0	2	2	9	3	1	3	7	6	5	2	45
13.4	17.9	3	3	1	0	0	0	0	10	8	11	1	2	5	27	17	6	94
17.9	22.4	0	0	0	0	0	0	0	0	1	6	2	1	3	26	13	1	53
22.4	29.1	0	0	0	0	0	0	0	0	0	3	1	0	1	26	0	0	31
29.1	40.3	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1
40.3	90.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTALS		21	13	9	6	2	9	17	24	38	38	15	21	36	114	55	27	445

Stability Class: F

Wind Speed Min	Max	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	TOTAL
1.0	2.2	1	0	1	2	1	2	0	2	1	3	1	1	1	2	1	4	23
2.2	4.5	4	3	4	3	3	2	1	1	9	5	6	3	1	2	6	8	61
4.5	6.7	1	1	1	0	3	1	6	8	8	2	1	1	2	6	2	5	48
6.7	8.9	3	2	3	1	0	0	6	12	8	4	3	3	1	2	4	7	59
8.9	11.2	1	2	1	1	0	1	1	12	4	7	4	2	1	5	6	2	50
11.2	13.4	0	2	1	1	0	1	2	6	5	5	2	1	7	5	12	2	52
13.4	17.9	1	0	1	2	0	0	2	3	5	7	1	0	2	4	8	3	39
17.9	22.4	0	0	3	5	0	0	0	0	2	3	0	0	0	8	3	2	26
22.4	29.1	0	0	2	0	0	0	0	0	0	0	0	0	0	5	0	0	7
29.1	40.3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
40.3	90.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTALS		11	10	17	15	7	7	18	44	42	36	18	11	15	39	42	33	365

Stability Class: G

Wind Speed Min	Max	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	TOTAL
1.0	2.2	2	2	1	1	3	0	3	1	2	1	0	1	0	2	0	2	21
2.2	4.5	5	3	4	1	0	2	3	5	5	6	2	3	2	0	1	6	48
4.5	6.7	6	2	0	1	1	3	3	9	11	4	2	2	1	0	3	3	51
6.7	8.9	2	0	0	2	0	0	5	10	8	5	3	0	0	0	2	10	47
8.9	11.2	3	1	1	0	0	0	1	4	2	7	0	0	0	0	3	4	26
11.2	13.4	1	0	0	0	0	0	0	2	1	2	1	0	0	0	4	6	17
13.4	17.9	1	0	0	0	0	0	0	1	1	3	1	0	1	4	11	5	28
17.9	22.4	0	0	1	1	0	0	0	0	0	0	0	0	0	1	1	0	4
22.4	29.1	0	0	2	0	0	0	0	0	0	0	0	0	0	3	0	0	5
29.1	40.3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
40.3	90.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTALS		20	8	9	6	4	5	15	32	30	28	9	6	4	10	25	36	247

Stability Class: All

Wind Speed Min	Max	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	TOTAL
1.0	2.2	9	7	7	10	10	9	7	8	6	8	4	6	3	6	6	9	115
2.2	4.5	23	21	32	17	10	14	25	27	27	21	23	19	9	9	15	24	316
4.5	6.7	17	13	23	22	11	17	31	41	45	23	12	13	14	18	16	26	342
6.7	8.9	25	21	15	14	7	9	25	55	51	26	11	15	9	15	15	44	357
8.9	11.2	19	14	7	14	3	5	16	27	35	28	6	7	15	19	19	23	257
11.2	13.4	20	13	3	6	3	6	9	13	48	19	7	7	17	16	23	20	230
13.4	17.9	9	10	7	4	6	3	10	24	52	35	6	6	12	41	47	18	290
17.9	22.4	0	2	5	6	0	0	0	2	11	18	3	3	5	43	29	3	130
22.4	29.1	0	0	4	0	0	0	0	1	1	10	4	1	3	52	15	1	92
29.1	40.3	0	0	0	0	0	0	0	0	0	0	2	0	0	21	13	0	36
40.3	90.0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	2
TOTALS		122	101	103	93	50	63	123	198	276	188	78	77	87	242	198	168	2167

Periods of Calm while in Stability Class:

A	B	C	D	E	F	G	Total
0	0	2	7	4	4	7	24

Table 5-7 4th Quarter Average, 33 Ft AGL

Hours at each wind speed and direction during time period

Elevation: 33	Start Date: 10/1/2010	Total number of Periods: 2208
Period: 4th Quarter	Stop Date: 12/31/2010	Periods of No Data Recovery: 8
		System Percent Data Recovery: 99.6%

Stability Class: A

Wind Speed Min	Max	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	TOTAL
1.0	2.2	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1
2.2	4.5	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	3
4.5	6.7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6.7	8.9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8.9	11.2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11.2	13.4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
13.4	17.9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17.9	22.4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
22.4	29.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29.1	40.3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
40.3	90.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTALS		1	0	1	0	0	0	0	1	0	0	0	0	0	0	0	1	4

Stability Class: B

Wind Speed Min	Max	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	TOTAL
1.0	2.2	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1
2.2	4.5	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	1	3
4.5	6.7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6.7	8.9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8.9	11.2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11.2	13.4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
13.4	17.9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
17.9	22.4	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1
22.4	29.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29.1	40.3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
40.3	90.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTALS		0	1	0	0	0	0	1	0	0	2	0	0	0	0	0	2	6

Stability Class: C

Wind Speed Min	Max	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	TOTAL
1.0	2.2	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	2
2.2	4.5	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	6	8
4.5	6.7	3	0	0	0	0	0	1	0	0	0	0	0	0	0	0	2	6
6.7	8.9	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	3	6
8.9	11.2	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	2
11.2	13.4	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	3
13.4	17.9	0	0	0	0	0	0	0	0	0	4	1	0	0	0	0	5	10
17.9	22.4	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1
22.4	29.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29.1	40.3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
40.3	90.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTALS		5	2	0	0	0	0	1	4	0	5	1	1	1	0	0	18	38

Stability Class: D

Wind Speed Min	Max	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	TOTAL
1.0	2.2	3	1	4	3	0	3	4	6	5	6	3	2	4	5	13	8	70
2.2	4.5	11	9	10	3	3	0	5	10	12	7	2	6	5	20	22	19	144
4.5	6.7	11	7	14	2	1	1	6	6	8	4	3	2	4	8	21	10	108
6.7	8.9	3	5	8	0	0	1	8	10	9	4	4	0	4	7	20	7	90
8.9	11.2	5	5	1	0	0	0	3	10	12	2	2	5	0	5	18	26	94
11.2	13.4	7	0	0	0	0	0	2	2	6	5	0	0	1	14	6	5	48
13.4	17.9	0	0	0	0	0	0	1	3	12	24	3	1	0	3	6	13	66
17.9	22.4	0	0	0	0	0	0	1	1	7	6	0	0	4	0	6	2	27
22.4	29.1	0	0	0	0	0	0	0	0	1	10	2	0	0	0	0	0	13
29.1	40.3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
40.3	90.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTALS		40	27	37	8	4	5	30	48	72	68	19	16	22	62	112	90	660

Table 5-7 4th Quarter Average, 33 Ft AGL (Continued)

Stability Class: E

Wind Speed Min	Max	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	TOTAL
1.0	2.2	4	5	4	1	2	3	6	5	6	6	8	4	9	11	8	6	88
2.2	4.5	16	7	8	0	1	1	9	10	15	10	7	7	10	16	34	19	170
4.5	6.7	6	5	4	2	0	2	10	22	18	7	5	2	6	17	34	9	149
6.7	8.9	2	2	1	0	0	3	21	24	13	8	1	1	2	5	33	7	123
8.9	11.2	0	1	1	0	0	1	8	21	14	14	2	2	2	5	7	3	81
11.2	13.4	0	0	0	0	0	0	6	17	13	13	1	0	3	3	5	3	64
13.4	17.9	0	0	0	0	0	0	1	5	10	9	2	0	6	7	0	0	40
17.9	22.4	0	0	0	0	0	0	1	2	4	14	1	0	1	1	0	0	24
22.4	29.1	0	0	0	0	0	0	0	0	1	4	0	0	1	0	0	0	6
29.1	40.3	0	0	0	0	0	0	0	0	0	0	1	1	1	0	0	0	3
40.3	90.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTALS		28	20	18	3	3	10	62	106	94	85	28	17	41	65	121	47	748

Stability Class: F

Wind Speed Min	Max	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	TOTAL
1.0	2.2	5	7	3	2	3	0	3	5	6	5	3	5	2	6	3	3	61
2.2	4.5	14	7	1	1	0	0	1	13	6	9	3	2	5	6	19	6	93
4.5	6.7	2	2	3	1	1	0	7	15	18	8	1	1	4	6	25	11	105
6.7	8.9	2	1	1	0	0	0	7	22	10	5	1	1	2	2	13	3	70
8.9	11.2	0	1	0	0	0	0	2	12	3	3	0	0	1	0	2	0	24
11.2	13.4	0	0	0	0	0	0	1	7	2	1	0	0	1	0	0	0	12
13.4	17.9	0	0	0	0	0	0	0	1	1	2	0	0	0	1	0	0	5
17.9	22.4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
22.4	29.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29.1	40.3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
40.3	90.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTALS		23	18	8	4	4	0	21	75	46	33	8	9	15	21	62	23	370

Stability Class: G

Wind Speed Min	Max	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	TOTAL
1.0	2.2	10	12	1	1	1	0	1	2	6	4	4	0	1	4	3	6	56
2.2	4.5	10	14	9	2	0	0	2	12	13	3	2	4	4	5	10	26	116
4.5	6.7	3	1	1	0	0	0	2	11	5	4	0	1	0	1	4	5	38
6.7	8.9	0	0	1	0	0	0	0	5	3	0	0	0	1	1	5	0	16
8.9	11.2	0	0	0	0	0	0	0	4	0	0	0	0	0	0	3	0	7
11.2	13.4	0	0	2	0	0	0	0	1	0	0	0	0	1	0	0	0	4
13.4	17.9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17.9	22.4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
22.4	29.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29.1	40.3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
40.3	90.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTALS		23	27	14	3	1	0	5	35	27	11	6	5	7	11	25	37	237

Stability Class: All

Wind Speed Min	Max	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	TOTAL
1.0	2.2	22	26	13	7	6	6	14	18	23	22	18	11	17	26	27	23	279
2.2	4.5	53	39	28	6	4	1	18	46	46	29	14	19	24	47	85	78	537
4.5	6.7	25	15	22	5	2	3	26	54	49	23	9	6	14	32	84	37	406
6.7	8.9	7	8	11	0	0	4	36	64	35	17	6	2	9	15	71	20	305
8.9	11.2	5	7	2	0	0	1	13	48	29	19	4	8	3	10	30	29	208
11.2	13.4	8	0	2	0	0	0	9	27	21	19	1	0	6	17	11	10	131
13.4	17.9	0	0	0	0	0	0	2	9	23	39	6	1	6	11	6	19	122
17.9	22.4	0	0	0	0	0	0	2	3	11	22	1	0	5	1	6	2	53
22.4	29.1	0	0	0	0	0	0	0	0	2	14	2	0	1	0	0	0	19
29.1	40.3	0	0	0	0	0	0	0	0	0	0	1	1	1	0	0	0	3
40.3	90.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTALS		120	95	78	18	12	15	120	269	239	204	62	48	86	159	320	218	2063

Periods of Calm while in Stability Class:

A	B	C	D	E	F	G	Total
0	1	0	31	38	35	32	137

Table 5-8 4th Quarter Average, 245 Ft AGL

Hours at each wind speed and direction during time period

Elevation: 245 | Start Date: 10/1/2010 | Total number of Periods: 2208
Period: 4th Quarter | Stop Date: 12/31/2010 | Periods of No Data Recovery: 32
System Percent Data Recovery: 98.6%

Stability Class: A

Wind Speed Min	Wind Speed Max	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	TOTAL
1.0	2.2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2.2	4.5	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	3
4.5	6.7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6.7	8.9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8.9	11.2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11.2	13.4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
13.4	17.9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17.9	22.4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
22.4	29.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29.1	40.3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
40.3	90.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTALS		1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	3

Stability Class: B

Wind Speed Min	Wind Speed Max	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	TOTAL
1.0	2.2	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	2
2.2	4.5	1	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	3
4.5	6.7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6.7	8.9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8.9	11.2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11.2	13.4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
13.4	17.9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
17.9	22.4	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1
22.4	29.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29.1	40.3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
40.3	90.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTALS		1	1	0	0	0	0	1	0	0	2	1	0	0	0	0	1	7

Stability Class: C

Wind Speed Min	Wind Speed Max	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	TOTAL
1.0	2.2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2.2	4.5	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	3	6
4.5	6.7	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	4
6.7	8.9	1	1	0	0	0	0	1	0	0	0	0	0	0	0	0	3	6
8.9	11.2	0	0	0	0	0	0	0	3	1	0	0	0	0	0	0	2	6
11.2	13.4	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	2
13.4	17.9	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	2	4
17.9	22.4	1	0	0	0	0	0	0	0	0	3	2	0	0	0	0	3	9
22.4	29.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29.1	40.3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
40.3	90.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTALS		7	3	0	0	0	0	1	3	1	3	3	1	0	0	0	15	37

Stability Class: D

Wind Speed Min	Wind Speed Max	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	TOTAL
1.0	2.2	8	3	12	6	0	1	3	3	1	3	2	2	1	3	5	5	58
2.2	4.5	17	5	7	3	3	1	3	14	6	6	6	3	4	7	9	17	111
4.5	6.7	6	6	9	1	1	0	3	6	11	2	1	2	3	7	8	11	77
6.7	8.9	1	3	3	5	0	0	2	6	6	2	4	2	2	3	10	7	56
8.9	11.2	3	4	5	1	0	0	6	9	13	5	0	5	0	4	11	8	74
11.2	13.4	7	3	1	0	0	0	1	2	7	9	3	1	0	5	17	18	74
13.4	17.9	16	0	0	0	0	0	1	5	6	6	3	2	2	8	19	13	81
17.9	22.4	0	0	0	0	0	0	1	0	2	25	4	0	0	9	6	10	57
22.4	29.1	0	0	0	0	0	0	0	1	3	13	6	0	4	1	7	3	38
29.1	40.3	0	0	0	0	0	0	0	0	0	5	8	0	0	0	0	0	13
40.3	90.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTALS		58	24	37	16	4	2	20	46	55	76	37	17	16	47	92	92	639

Table 5-8 4th Quarter Average, 245 Ft AGL (Continued)

Stability Class: E

Wind Speed Min	Max	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	TOTAL
1.0	2.2	6	1	3	2	2	2	5	2	2	2	4	3	4	2	5	2	47
2.2	4.5	7	8	7	4	2	9	14	15	4	3	5	5	2	6	11	9	111
4.5	6.7	7	7	5	4	0	1	2	7	12	4	2	0	0	5	11	10	77
6.7	8.9	2	4	2	0	0	2	7	9	9	4	2	1	0	6	15	5	68
8.9	11.2	3	4	3	1	0	3	8	11	13	7	4	1	1	6	17	7	89
11.2	13.4	0	1	2	0	0	0	10	10	11	11	2	0	0	9	25	4	85
13.4	17.9	5	0	2	0	0	0	6	19	21	21	13	1	2	12	29	16	147
17.9	22.4	1	0	0	0	0	0	1	5	13	22	13	1	2	8	5	0	71
22.4	29.1	0	0	0	0	0	0	0	2	4	13	3	0	3	10	0	0	35
29.1	40.3	0	0	0	0	0	0	0	0	0	13	2	0	2	1	0	0	18
40.3	90.0	0	0	0	0	0	0	0	0	0	0	0	1	2	0	0	0	3
TOTALS		31	25	24	11	4	17	53	80	89	100	50	13	18	65	118	53	751

Stability Class: F

Wind Speed Min	Max	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	TOTAL
1.0	2.2	1	2	1	1	0	1	4	2	2	1	2	1	1	1	1	2	23
2.2	4.5	6	4	3	2	1	3	5	4	7	5	4	4	3	6	3	9	69
4.5	6.7	9	4	5	1	1	1	3	11	8	7	5	0	0	1	4	13	73
6.7	8.9	6	4	2	3	0	0	2	3	13	6	2	3	0	3	5	18	70
8.9	11.2	1	0	2	1	0	0	4	2	9	2	0	0	1	7	6	3	38
11.2	13.4	0	0	1	0	0	0	4	13	8	5	2	0	1	1	3	5	43
13.4	17.9	0	0	2	0	0	0	1	7	10	8	2	0	1	4	12	9	56
17.9	22.4	0	0	0	0	0	0	0	1	5	5	0	0	3	2	1	2	19
22.4	29.1	0	0	0	0	0	0	0	0	0	4	0	0	0	1	0	0	5
29.1	40.3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
40.3	90.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTALS		23	14	16	8	2	5	23	43	62	43	17	8	10	26	35	61	396

Stability Class: G

Wind Speed Min	Max	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	TOTAL
1.0	2.2	1	1	0	1	1	3	1	2	2	2	3	3	2	1	0	1	24
2.2	4.5	3	2	5	2	1	1	2	6	7	2	2	2	4	2	1	3	45
4.5	6.7	4	9	9	0	2	0	1	8	7	7	4	0	2	0	3	5	61
6.7	8.9	7	0	4	4	1	0	5	13	3	5	1	1	3	3	3	10	63
8.9	11.2	2	0	4	0	0	0	3	3	5	2	0	0	0	1	3	10	33
11.2	13.4	0	0	0	0	0	0	0	2	3	2	0	0	0	0	3	2	12
13.4	17.9	1	0	0	0	0	0	0	2	3	1	0	0	0	1	5	3	16
17.9	22.4	0	0	0	0	0	0	0	1	0	0	0	0	0	2	0	1	4
22.4	29.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29.1	40.3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
40.3	90.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTALS		18	12	22	7	5	4	12	37	30	21	10	6	11	10	18	35	258

Stability Class: All

Wind Speed Min	Max	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	TOTAL
1.0	2.2	16	7	16	10	3	7	13	9	7	9	12	9	8	7	11	10	154
2.2	4.5	36	22	22	11	7	14	25	40	24	16	17	14	13	21	24	42	348
4.5	6.7	28	26	28	6	4	2	9	32	38	20	12	2	5	13	26	41	292
6.7	8.9	17	12	11	12	1	2	17	31	31	17	9	7	5	15	33	43	263
8.9	11.2	9	8	14	3	0	3	21	28	41	16	4	6	2	18	37	30	240
11.2	13.4	8	4	4	0	0	0	15	27	29	27	7	2	1	15	48	29	216
13.4	17.9	23	0	4	0	0	0	8	33	40	36	19	3	5	25	65	44	305
17.9	22.4	2	0	0	0	0	0	2	7	20	56	19	1	5	21	12	16	161
22.4	29.1	0	0	0	0	0	0	0	3	7	30	9	0	7	12	7	3	78
29.1	40.3	0	0	0	0	0	0	0	0	0	18	10	0	2	1	0	0	31
40.3	90.0	0	0	0	0	0	0	0	0	0	0	0	1	2	0	0	0	3
TOTALS		139	79	99	42	15	28	110	210	237	245	118	45	55	148	263	258	2091

Periods of Calm while in Stability Class:

A	B	C	D	E	F	G	Total
1	0	0	40	24	9	11	85

Table 5-9 Year 2010, 33 Ft AGL

Hours at each wind speed and direction during time period

Elevation: 33 **Start Date: 1/1/2010** **Total number of Periods: 8759**
Period: Annual **Stop Date: 12/31/2010** **Periods of No Data Recovery: 375**
System Percent Data Recovery: 95.7%

Stability Class: A

Wind Speed Min	Max	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	TOTAL
1.0	2.2	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1
2.2	4.5	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	3
4.5	6.7	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
6.7	8.9	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	5	7
8.9	11.2	3	1	0	0	0	0	0	2	3	0	0	0	0	0	0	1	10
11.2	13.4	5	4	0	0	0	0	0	0	5	0	0	0	0	0	2	2	18
13.4	17.9	3	0	0	0	0	0	0	0	8	0	3	0	0	0	1	1	16
17.9	22.4	0	0	0	0	0	0	0	0	0	1	0	0	2	2	2	0	7
22.4	29.1	0	0	0	0	0	0	0	0	0	1	0	0	0	8	2	0	11
29.1	40.3	0	0	0	0	0	0	0	0	0	0	0	3	2	0	1	0	6
40.3	90.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTALS		13	7	1	0	0	0	0	3	16	2	3	3	4	10	8	10	80

Stability Class: B

Wind Speed Min	Max	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	TOTAL
1.0	2.2	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	2
2.2	4.5	4	3	0	0	0	0	1	0	0	0	0	1	2	0	0	5	16
4.5	6.7	3	1	0	0	0	0	0	0	2	0	0	0	1	1	0	7	15
6.7	8.9	10	7	0	0	0	0	0	0	2	1	1	0	0	0	2	11	34
8.9	11.2	5	3	2	0	0	0	0	4	10	1	0	0	1	1	0	4	31
11.2	13.4	2	1	0	0	0	0	0	2	10	3	0	0	0	3	3	0	24
13.4	17.9	4	2	0	0	0	0	1	2	3	5	4	2	1	4	0	3	31
17.9	22.4	0	0	0	0	0	0	0	0	0	2	0	1	0	1	0	0	4
22.4	29.1	0	0	0	0	0	0	0	0	0	2	1	2	0	3	0	0	8
29.1	40.3	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	2
40.3	90.0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1
TOTALS		28	18	2	0	0	0	2	8	27	15	7	7	5	14	5	30	168

Stability Class: C

Wind Speed Min	Max	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	TOTAL
1.0	2.2	7	5	3	1	1	2	0	0	0	1	3	1	1	0	3	4	32
2.2	4.5	23	11	14	0	0	1	1	7	9	2	4	2	2	3	8	32	119
4.5	6.7	25	17	8	3	2	2	8	23	24	2	7	7	4	2	8	25	167
6.7	8.9	18	11	1	1	1	2	6	21	15	6	1	3	6	2	5	24	123
8.9	11.2	12	7	4	3	2	0	0	12	27	10	7	6	6	5	1	5	107
11.2	13.4	6	0	1	2	2	2	1	3	18	10	5	4	4	6	2	7	73
13.4	17.9	3	2	0	1	1	0	3	7	11	12	10	3	3	5	4	6	71
17.9	22.4	0	0	0	0	0	0	0	0	0	5	4	3	0	2	2	1	17
22.4	29.1	0	0	0	0	0	0	0	0	0	0	1	0	1	3	1	0	6
29.1	40.3	0	0	0	0	0	0	0	0	0	1	0	0	1	2	0	0	4
40.3	90.0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
TOTALS		94	53	31	12	9	9	19	73	104	49	42	29	28	30	34	104	720

Stability Class: D

Wind Speed Min	Max	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	TOTAL
1.0	2.2	12	14	25	13	17	7	10	24	16	23	11	10	12	9	20	22	245
2.2	4.5	42	45	51	17	11	16	64	57	49	24	22	24	24	31	40	58	575
4.5	6.7	30	43	51	13	10	19	47	67	41	25	21	22	14	20	35	51	509
6.7	8.9	12	17	25	7	4	13	37	48	38	22	15	9	10	20	61	39	377
8.9	11.2	6	13	6	7	5	8	25	34	44	17	9	12	9	25	49	44	313
11.2	13.4	13	3	2	3	0	4	11	19	23	15	9	7	7	27	11	9	163
13.4	17.9	5	4	2	1	0	1	7	19	28	40	15	12	8	27	19	20	208
17.9	22.4	0	0	0	0	0	0	3	4	10	17	13	4	7	35	19	2	114
22.4	29.1	0	0	0	0	0	0	0	0	2	15	3	3	4	23	4	0	54
29.1	40.3	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	0	3
40.3	90.0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1
TOTALS		120	139	162	61	47	68	204	273	251	198	118	103	95	218	260	245	2562

Table 5-9 Year 2010, 33 Ft AGL (Continued)

Stability Class: E

Wind Speed Min	Max	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	TOTAL
1.0	2.2	12	12	7	7	7	3	18	10	16	24	14	12	17	23	18	27	227
2.2	4.5	48	28	18	5	2	14	28	33	51	41	18	30	22	36	77	57	508
4.5	6.7	30	17	16	9	0	5	21	54	44	22	19	24	24	39	76	51	451
6.7	8.9	5	6	7	0	0	5	44	80	41	23	12	7	21	38	81	26	396
8.9	11.2	2	2	1	0	0	3	23	41	29	27	12	10	18	42	33	17	260
11.2	13.4	0	2	0	0	1	0	11	27	24	38	3	2	10	34	19	9	180
13.4	17.9	0	0	0	0	0	0	2	9	16	25	11	2	8	52	5	2	132
17.9	22.4	0	0	0	0	0	0	1	2	8	21	6	5	4	8	1	0	56
22.4	29.1	0	0	0	0	0	0	0	0	2	6	1	1	2	2	0	0	14
29.1	40.3	0	0	0	0	0	0	0	0	0	0	1	1	1	0	0	0	3
40.3	90.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTALS		97	67	49	21	10	30	148	256	231	227	97	94	127	274	310	189	2227

Stability Class: F

Wind Speed Min	Max	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	TOTAL
1.0	2.2	23	23	12	11	5	6	11	23	23	14	13	12	15	12	16	17	236
2.2	4.5	52	34	25	6	1	7	18	58	48	26	11	8	14	32	56	57	453
4.5	6.7	17	14	19	2	1	1	22	65	48	21	10	4	12	25	55	53	369
6.7	8.9	7	4	5	0	0	2	16	68	35	14	3	3	6	14	46	9	232
8.9	11.2	0	2	4	0	0	0	9	37	12	7	0	1	8	7	8	0	95
11.2	13.4	0	0	1	0	0	0	2	10	6	2	0	0	2	3	2	0	28
13.4	17.9	0	0	0	0	0	0	0	3	2	2	0	0	0	1	0	0	8
17.9	22.4	0	0	0	0	0	0	0	0	1	2	0	0	0	0	0	0	3
22.4	29.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29.1	40.3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
40.3	90.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTALS		99	77	66	19	7	16	78	264	175	88	37	28	57	94	183	136	1424

Stability Class: G

Wind Speed Min	Max	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	TOTAL
1.0	2.2	18	22	12	3	2	4	2	8	12	9	6	4	3	9	17	23	154
2.2	4.5	50	59	24	2	1	0	17	36	25	11	7	5	7	12	33	65	354
4.5	6.7	18	8	9	1	0	0	11	45	13	8	2	1	0	3	28	39	186
6.7	8.9	0	1	3	0	0	0	5	33	17	2	0	0	2	5	18	8	94
8.9	11.2	0	0	3	0	0	0	0	15	2	0	0	0	0	1	6	0	27
11.2	13.4	0	0	2	0	0	0	0	1	1	0	0	0	2	0	0	0	6
13.4	17.9	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1
17.9	22.4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
22.4	29.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29.1	40.3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
40.3	90.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTALS		86	90	53	6	3	4	35	138	71	30	15	10	14	30	102	135	822

Stability Class: All

Wind Speed Min	Max	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	TOTAL
1.0	2.2	72	77	60	35	32	22	41	65	67	72	47	39	48	53	74	93	897
2.2	4.5	220	180	132	30	15	38	129	192	182	104	62	70	71	114	214	275	2028
4.5	6.7	123	101	103	28	13	27	109	254	172	78	59	58	55	90	202	226	1698
6.7	8.9	53	47	41	8	5	22	108	250	148	68	32	22	45	79	213	122	1263
8.9	11.2	28	28	20	10	7	11	57	145	127	62	28	29	42	81	97	71	843
11.2	13.4	26	10	6	5	3	6	25	62	87	68	17	13	25	73	39	27	492
13.4	17.9	15	8	2	2	1	1	13	40	69	84	43	19	20	89	29	32	467
17.9	22.4	0	0	0	0	0	0	4	6	19	48	23	13	13	48	24	3	201
22.4	29.1	0	0	0	0	0	0	0	0	4	24	6	6	7	39	7	0	93
29.1	40.3	0	0	0	0	0	0	0	0	0	1	1	5	4	4	3	0	18
40.3	90.0	0	0	0	1	0	0	0	1	0	0	1	0	0	0	0	0	3
TOTALS		537	451	364	119	76	127	486	1015	875	609	319	274	330	670	902	849	8003

Periods of Calm while in Stability Class:

A	B	C	D	E	F	G	Total
0	1	4	87	115	97	77	381

Table 5-10 Year 2010, 245 Ft AGL

Hours at each wind speed and direction during time period

Elevation: 245
Period: Annual

Start Date: 1/1/2010
Stop Date: 12/31/2010

Total number of Periods: 8759
Periods of No Data Recovery: 272
System Percent Data Recovery: 96.9%

Stability Class: A

Wind Speed Min	Max	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	TOTAL
1.0	2.2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2.2	4.5	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	3
4.5	6.7	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
6.7	8.9	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
8.9	11.2	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	4	6
11.2	13.4	7	2	0	0	0	0	0	0	4	0	0	0	0	0	0	2	15
13.4	17.9	0	3	2	0	0	0	0	0	7	3	0	0	0	0	2	2	19
17.9	22.4	0	2	0	0	0	0	0	0	1	3	2	0	0	0	2	0	10
22.4	29.1	0	0	0	0	0	0	0	0	0	1	0	0	2	2	1	0	6
29.1	40.3	0	0	0	0	0	0	0	0	0	0	1	0	0	8	3	0	12
40.3	90.0	0	0	0	0	0	0	0	0	0	0	0	1	4	0	0	0	5
TOTALS		11	7	2	1	0	0	0	2	12	7	3	1	6	10	8	9	79

Stability Class: B

Wind Speed Min	Max	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	TOTAL
1.0	2.2	0	0	1	0	0	0	0	0	0	1	1	0	0	0	0	0	3
2.2	4.5	4	1	0	0	1	0	1	0	1	0	0	1	0	0	0	1	10
4.5	6.7	3	1	0	0	0	0	0	0	0	0	0	1	0	1	0	6	12
6.7	8.9	6	8	1	0	0	0	0	0	1	2	0	0	0	0	2	3	23
8.9	11.2	5	4	1	0	0	0	0	2	5	1	1	0	2	0	1	11	33
11.2	13.4	3	4	2	0	0	0	0	0	5	6	0	0	1	1	0	0	22
13.4	17.9	2	3	1	0	0	0	0	1	9	4	3	1	1	2	6	2	35
17.9	22.4	1	1	0	0	0	0	1	0	1	6	3	3	0	2	1	0	19
22.4	29.1	0	0	0	0	0	0	0	0	0	1	1	0	0	1	0	0	3
29.1	40.3	0	0	0	0	0	0	0	0	0	1	1	2	0	1	2	0	7
40.3	90.0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	2
TOTALS		24	22	6	0	1	0	2	3	22	22	10	9	4	9	12	23	169

Stability Class: C

Wind Speed Min	Max	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	TOTAL
1.0	2.2	5	1	1	0	0	1	0	1	0	2	1	1	0	0	5	2	20
2.2	4.5	20	15	9	3	0	0	2	1	6	2	4	2	0	3	5	21	93
4.5	6.7	11	11	9	7	1	2	1	9	14	9	2	1	3	2	8	21	111
6.7	8.9	21	17	3	2	1	1	6	21	18	7	2	10	7	4	6	25	151
8.9	11.2	12	11	4	3	1	2	2	10	23	7	2	3	3	1	3	10	97
11.2	13.4	8	4	1	0	3	0	0	0	21	16	9	2	8	2	0	6	80
13.4	17.9	6	2	2	2	5	1	3	4	18	26	9	5	8	8	2	6	107
17.9	22.4	1	0	0	0	0	0	1	0	1	10	14	2	3	6	3	3	44
22.4	29.1	0	0	0	0	0	0	0	0	0	3	4	3	0	1	2	1	14
29.1	40.3	0	0	0	0	0	0	0	0	0	0	1	0	1	2	2	0	6
40.3	90.0	0	0	0	0	0	0	0	0	0	1	0	0	1	1	0	0	3
TOTALS		84	61	29	17	11	7	15	46	101	83	48	29	34	30	36	95	726

Stability Class: D

Wind Speed Min	Max	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	TOTAL
1.0	2.2	12	12	24	17	13	10	13	8	17	13	6	10	3	9	10	13	190
2.2	4.5	36	28	41	22	12	10	32	63	35	25	29	18	20	19	28	43	461
4.5	6.7	22	23	39	20	8	16	46	62	45	21	19	16	14	16	21	48	436
6.7	8.9	15	27	24	21	8	8	21	41	48	18	16	20	7	10	33	34	351
8.9	11.2	8	12	9	14	4	7	29	24	40	25	13	14	7	17	37	25	285
11.2	13.4	12	9	4	4	4	6	10	12	35	21	10	6	5	24	46	32	240
13.4	17.9	24	3	4	0	3	4	18	24	38	32	21	13	12	31	37	21	285
17.9	22.4	1	3	3	0	0	2	5	4	10	41	12	5	7	26	16	16	151
22.4	29.1	0	0	0	0	0	2	0	4	6	29	22	8	10	32	25	3	141
29.1	40.3	0	0	0	0	0	0	0	0	0	12	15	3	6	34	11	0	81
40.3	90.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTALS		130	117	148	98	52	65	174	242	274	237	163	113	91	218	264	235	2621

Table 5-10 Year 2010, 245 Ft AGL (Continued)

Stability Class: E

Wind Speed Min	Max	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	TOTAL
1.0	2.2	14	6	9	7	4	4	8	10	4	9	9	6	6	5	11	6	118
2.2	4.5	20	15	17	9	8	20	27	25	21	13	15	17	12	19	22	25	285
4.5	6.7	19	14	17	8	4	6	14	23	25	14	9	8	10	18	36	33	258
6.7	8.9	14	15	5	4	0	6	10	30	24	17	10	10	11	29	40	35	260
8.9	11.2	11	10	10	5	0	5	20	21	40	29	9	9	19	27	52	27	294
11.2	13.4	5	3	6	1	1	1	16	24	40	23	14	6	15	33	67	18	273
13.4	17.9	12	4	7	0	0	2	18	42	38	52	29	10	12	69	75	34	404
17.9	22.4	1	0	1	0	1	2	3	8	21	41	32	6	13	75	31	8	243
22.4	29.1	0	0	0	0	0	0	0	5	4	33	12	6	4	69	1	0	134
29.1	40.3	0	0	0	0	0	0	0	0	0	19	6	6	3	8	0	0	42
40.3	90.0	0	0	0	0	0	0	0	0	0	0	0	1	2	0	0	0	3
TOTALS		96	67	72	34	18	46	116	188	217	250	145	85	107	352	335	186	2314

Stability Class: F

Wind Speed Min	Max	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	TOTAL
1.0	2.2	5	6	6	4	2	5	6	5	7	4	6	3	5	4	5	6	79
2.2	4.5	20	16	16	18	10	11	13	22	28	17	22	13	5	15	17	27	270
4.5	6.7	20	19	12	5	4	3	18	31	32	19	16	5	6	16	14	37	257
6.7	8.9	15	14	17	10	0	0	12	30	35	23	10	14	6	9	30	45	270
8.9	11.2	9	5	8	2	0	1	13	22	23	18	8	5	3	19	33	19	188
11.2	13.4	0	5	3	1	0	1	11	25	25	16	5	2	11	12	28	13	158
13.4	17.9	2	0	3	2	0	0	5	22	20	23	5	0	8	34	47	24	195
17.9	22.4	0	0	3	5	0	0	0	3	11	8	1	0	4	25	8	5	73
22.4	29.1	0	0	2	0	0	0	0	1	0	5	0	0	0	9	0	0	17
29.1	40.3	0	0	0	0	0	0	0	0	0	2	1	0	0	0	0	0	3
40.3	90.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTALS		71	65	70	47	16	21	78	161	181	135	74	42	48	143	182	176	1510

Stability Class: G

Wind Speed Min	Max	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	TOTAL
1.0	2.2	7	4	1	5	5	5	5	5	8	7	10	4	5	4	2	6	83
2.2	4.5	14	11	15	8	1	7	10	16	23	13	5	8	10	5	7	15	168
4.5	6.7	27	21	13	3	3	4	6	21	24	17	8	4	4	1	8	15	179
6.7	8.9	16	7	9	6	1	0	10	34	17	15	6	1	3	4	9	35	173
8.9	11.2	10	2	9	1	0	0	6	10	12	14	1	0	0	1	19	26	111
11.2	13.4	3	0	1	0	0	0	1	9	7	5	2	0	0	1	15	13	57
13.4	17.9	2	0	0	0	0	0	2	8	5	7	1	0	1	9	34	14	83
17.9	22.4	0	0	1	1	0	0	0	3	0	1	0	0	0	3	1	3	13
22.4	29.1	0	0	2	0	0	0	0	0	0	0	0	0	0	3	0	0	5
29.1	40.3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
40.3	90.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTALS		79	45	51	24	10	16	40	106	96	79	33	17	23	31	95	127	872

Stability Class: All

Wind Speed Min	Max	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	TOTAL
1.0	2.2	43	29	42	33	24	25	32	29	36	36	33	24	19	22	33	33	493
2.2	4.5	115	86	98	60	32	48	85	128	114	70	75	59	47	61	79	133	1290
4.5	6.7	102	89	90	44	20	31	85	146	140	80	54	35	37	54	87	160	1254
6.7	8.9	89	88	59	43	10	15	59	156	143	82	44	55	34	56	120	177	1230
8.9	11.2	56	44	41	25	5	15	70	90	143	94	34	31	34	65	145	122	1014
11.2	13.4	38	27	17	6	8	8	38	70	137	87	40	16	40	73	156	84	845
13.4	17.9	48	15	19	4	8	7	46	101	135	147	68	29	42	153	203	103	1128
17.9	22.4	4	6	8	6	1	4	10	18	45	110	64	16	27	137	62	35	553
22.4	29.1	0	0	4	0	0	2	0	10	10	72	39	17	16	117	29	4	320
29.1	40.3	0	0	0	0	0	0	0	0	0	34	25	11	10	53	18	0	151
40.3	90.0	0	0	0	0	0	0	0	0	0	1	0	3	7	2	0	0	13
TOTALS		495	384	378	221	108	155	425	748	903	813	476	296	313	793	932	851	8291

Periods of Calm while in Stability Class:

A	B	C	D	E	F	G	Total
1	0	5	80	51	28	31	196

Table 5-11 Year 2010 Growing Season with Solar Irradiance > 5 watts/m^2 33 Ft AGL

Hours at each wind speed and direction during time period

Elevation: 33 | Start Date: 4/15/2010 | Total number of Periods: 2360
Period: Growing Season | Stop Date: 10/15/2010 | Periods of No Data Recovery: 211
System Percent Data Recovery: 91.8%

Stability Class: A

Wind Speed Min	Max	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	TOTAL
1.0	2.2	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	2
2.2	4.5	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	4
4.5	6.7	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
6.7	8.9	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	4	10
8.9	11.2	3	1	0	0	0	0	0	2	3	0	0	0	0	0	0	1	15
11.2	13.4	5	4	0	0	0	0	0	0	5	0	0	0	0	0	2	2	24
13.4	17.9	3	0	0	0	0	0	0	0	8	0	3	0	0	0	1	1	23
17.9	22.4	0	0	0	0	0	0	0	0	0	1	0	0	2	2	2	0	15
22.4	29.1	0	0	0	0	0	0	0	0	0	1	0	0	0	8	2	0	20
29.1	40.3	0	0	0	0	0	0	0	0	0	0	0	3	2	0	1	0	16
40.3	90.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	11
TOTALS		13	7	1	0	0	0	0	2	16	2	3	3	4	10	8	9	144

Stability Class: B

Wind Speed Min	Max	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	TOTAL
1.0	2.2	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	2
2.2	4.5	3	2	0	0	0	0	1	0	0	0	0	1	2	0	0	4	15
4.5	6.7	3	1	0	0	0	0	0	0	2	0	0	0	1	1	0	5	16
6.7	8.9	7	7	0	0	0	0	0	0	2	1	1	0	0	0	1	10	33
8.9	11.2	5	3	2	0	0	0	0	4	10	1	0	0	1	1	0	4	36
11.2	13.4	2	1	0	0	0	0	0	2	10	2	0	0	0	3	3	0	29
13.4	17.9	2	0	0	0	0	0	0	2	3	2	4	2	1	3	0	1	27
17.9	22.4	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	9
22.4	29.1	0	0	0	0	0	0	0	0	0	1	1	1	0	3	0	0	15
29.1	40.3	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	12
40.3	90.0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	12
TOTALS		22	14	2	0	0	0	1	8	27	8	7	5	5	13	4	24	206

Stability Class: C

Wind Speed Min	Max	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	TOTAL
1.0	2.2	4	4	1	1	1	2	0	0	0	1	3	1	0	0	1	3	23
2.2	4.5	14	9	12	0	0	1	1	7	9	2	4	2	2	3	8	14	90
4.5	6.7	17	13	7	3	2	2	8	23	23	2	7	5	3	2	6	14	140
6.7	8.9	7	9	1	1	1	2	6	17	13	6	1	2	5	2	4	14	95
8.9	11.2	8	3	4	3	2	0	0	11	23	8	5	5	3	2	1	4	87
11.2	13.4	3	0	0	2	1	1	1	3	16	7	2	4	3	3	1	3	56
13.4	17.9	0	1	0	1	0	0	2	7	11	5	2	2	3	3	4	0	48
17.9	22.4	0	0	0	0	0	0	0	0	0	3	0	2	0	2	2	1	18
22.4	29.1	0	0	0	0	0	0	0	0	0	0	1	0	0	3	1	0	14
29.1	40.3	0	0	0	0	0	0	0	0	0	1	0	0	1	2	0	0	14
40.3	90.0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	12
TOTALS		53	39	25	12	7	8	18	68	95	35	25	23	20	22	28	53	597

Stability Class: D

Wind Speed Min	Max	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	TOTAL
1.0	2.2	4	4	15	8	13	2	3	11	5	7	7	2	4	1	1	5	93
2.2	4.5	7	19	29	12	8	14	48	32	20	10	13	11	12	10	6	9	262
4.5	6.7	10	15	26	10	10	17	40	41	23	16	13	16	5	6	7	9	267
6.7	8.9	6	10	16	7	4	12	26	28	20	8	6	6	5	8	9	5	180
8.9	11.2	4	5	5	7	5	8	19	21	28	9	4	5	5	14	5	7	156
11.2	13.4	4	1	0	3	0	4	8	16	18	5	5	5	3	5	2	1	86
13.4	17.9	1	1	2	1	0	1	2	18	16	7	5	4	4	12	8	1	90
17.9	22.4	0	0	0	0	0	0	0	1	1	2	4	1	1	17	6	0	41
22.4	29.1	0	0	0	0	0	0	0	0	0	0	0	1	2	18	4	0	34
29.1	40.3	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	0	13
40.3	90.0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	12
TOTALS		36	55	93	48	40	58	146	169	131	64	57	51	41	92	50	37	1234

Table 5-11 Year 2010 Growing Season with Solar Irradiance > 5 watts/m^2, 33 Ft AGL (Continued)

Stability Class: E

Wind Speed Min	Max	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	TOTAL
1.0	2.2	2	3	1	2	3	0	4	0	1	1	0	1	0	2	2	3	26
2.2	4.5	8	3	3	1	0	3	9	11	6	5	3	2	2	2	3	4	67
4.5	6.7	4	4	3	2	0	0	5	14	3	4	1	2	2	5	3	2	57
6.7	8.9	0	1	2	0	0	2	14	5	6	7	3	0	1	1	2	3	51
8.9	11.2	0	1	0	0	0	1	6	6	7	1	0	0	1	4	2	3	37
11.2	13.4	0	1	0	0	0	0	4	4	1	2	0	1	0	2	2	1	24
13.4	17.9	0	0	0	0	0	0	0	0	1	0	1	0	0	6	0	1	16
17.9	22.4	0	0	0	0	0	0	0	0	3	0	0	1	0	0	0	0	12
22.4	29.1	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	11
29.1	40.3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10
40.3	90.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	11
TOTALS		14	13	9	5	3	6	42	40	29	20	8	7	7	22	14	17	322

Stability Class: F

Wind Speed Min	Max	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	TOTAL
1.0	2.2	1	5	3	2	1	1	2	5	2	0	0	2	2	0	0	2	29
2.2	4.5	5	5	1	0	0	1	5	9	5	2	1	0	0	2	1	2	41
4.5	6.7	1	6	9	0	0	0	1	14	7	2	0	0	0	0	1	1	45
6.7	8.9	0	0	0	0	0	0	1	5	1	0	0	0	0	0	1	0	12
8.9	11.2	0	0	0	0	0	0	1	3	2	0	0	0	0	0	0	0	11
11.2	13.4	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	7
13.4	17.9	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	8
17.9	22.4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8
22.4	29.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9
29.1	40.3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10
40.3	90.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	11
TOTALS		7	16	13	2	1	2	10	36	18	5	1	2	2	2	3	5	191

Stability Class: G

Wind Speed Min	Max	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	TOTAL
1.0	2.2	3	1	2	0	0	0	0	1	0	0	0	0	0	0	2	2	12
2.2	4.5	5	9	4	0	0	0	5	5	1	0	0	0	0	0	2	1	34
4.5	6.7	0	1	1	0	0	0	2	4	2	1	0	0	0	0	1	1	16
6.7	8.9	0	0	0	0	0	0	1	4	0	0	0	0	0	0	0	0	9
8.9	11.2	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	6
11.2	13.4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6
13.4	17.9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7
17.9	22.4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8
22.4	29.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9
29.1	40.3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10
40.3	90.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	11
TOTALS		8	11	7	0	0	0	8	15	3	1	0	0	0	0	5	4	128

Stability Class: All

Wind Speed Min	Max	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	TOTAL
1.0	2.2	14	17	23	13	18	5	9	17	8	10	10	6	6	3	6	15	180
2.2	4.5	43	47	49	13	8	19	69	64	41	19	21	16	18	17	20	35	499
4.5	6.7	35	41	46	15	12	19	56	96	60	25	21	23	11	14	18	32	524
6.7	8.9	21	28	19	8	5	16	48	59	42	22	11	8	11	11	17	36	362
8.9	11.2	20	13	11	10	7	9	26	48	73	19	9	10	10	21	8	19	313
11.2	13.4	14	7	0	5	1	5	13	25	50	17	7	10	6	13	10	7	190
13.4	17.9	6	2	2	2	0	1	4	27	40	14	15	8	8	24	13	4	170
17.9	22.4	0	0	0	0	0	0	0	1	4	6	4	4	3	22	10	1	55
22.4	29.1	0	0	0	0	0	0	0	0	1	2	2	2	3	32	7	0	49
29.1	40.3	0	0	0	0	0	0	0	0	0	1	0	4	3	4	3	0	15
40.3	90.0	0	0	0	1	0	0	0	1	0	0	1	0	0	0	0	0	3
TOTALS		153	155	150	67	51	74	225	338	319	135	101	91	79	161	112	149	2360

Periods of Calm while in Stability Class:

A	B	C	D	E	F	G	Total
1	3	22	15	13	4	0	58

6.0 DOSE ASSESSMENT -- IMPACT ON MAN

Liquid Effluents - There were no liquid discharges from the radwaste processing system to the Columbia River during calendar year 2010.

Gaseous Effluents - The NRC GASPAR II computer code was used to calculate doses at and beyond the site boundary using quarterly and annual meteorological data and site-specific variables as required and defined in the ODCM. Table 6-1 shows the highest calculated doses at the site boundary and beyond the site boundary. Table 6-1 also shows the quarterly and annual dose for the nearest and highest exposed resident identified in the land use census. Table 6-2 lists the annual 50-mile dose using values obtained from the ALARA annual integrated population dose summary (person-rem). Table 6-2 also provides the annual individual doses associated with each pathway. These values were obtained by dividing the ALARA integrated dose (person-rem) by the estimated year 2000 50-mile population (356,993) and converting to mrem.

During the growing season, Columbia Generating Station conducts a five-mile land use census to determine the locations of nearest residents, gardens, and milk animals or other livestock out to five miles in each sector. The 2010 Land Use Census did not identify broad leaf vegetable gardens or milk animals within the 5-mile radius. Cattle, goats, and horses were observed within 5-miles. Although it was not determined if the nearest residents were actually consuming meat from these animals, the beef and goat meat pathways were assumed in the sectors where these animals were observed. The NRC computer code GASPAR was used for dose estimates. Because the GASPAR code only calculates a beef meat pathway, IAEA Technical Series Report 472[1] was used to derive nuclide-specific ratios to convert the GASPAR meat dose output to dose from goat meat. As substantial commercial fruit orchards and corn crops were observed in all eastern sectors with residents, it was assumed that these crops were being consumed by the residents. The GASPAR code assumes that if there is a vegetable pathway, the pathway includes broad-leaf vegetables even though they were not observed. As such, the vegetation calculations are conservative.

Based on Electric Power Research Institute (EPRI) Technical Report 1021106[2], the total activity of Carbon-14 (C-14) released to the environment as $^{14}CO_2$ was estimated to be 17.8 +/- 2.1 Curies. As C-14 in the form of $^{14}CO_2$ is a non-depositing, gaseous effluent, it enters the food chain through plant photosynthesis. Since Columbia Generating Station is a continuous release plant, normally, offsite dose is based on meteorological data throughout the year. For C-14 dose analysis, however, a Joint Frequency Distribution (JFD) table of atmospheric data was developed based on daylight hours (solar irradiance > 5 watts per square meter) during the growing season of both vegetables and pasture grass for beef (April 15th through October 15th). The JFD table was used as input into the NRC XOQDOQ computer code from which dispersion estimates were obtained. This method

[1] *Handbook Of Parameter Values For The Prediction Of Radionuclide Transfer In Terrestrial And Freshwater Environments*, IAEA Technical Series Report 472, 2010

[2] *Estimation of Carbon-14 in Nuclear Power Plant Gaseous Effluents.* EPRI, Palo Alto, CA: 2010 1021106

provides a more accurate method of determining the average air concentration of C-14 during times of photosynthesis.

Both inhalation and ingestion pathways contribute to dose from C-14. The highest dose calculated was for the resident at 4.24 miles in the ESE sector due to higher dispersion and deposition in that sector. The annual dose to the potential maximally exposed individual (child living at resident location 4.24 miles ESE) from gaseous releases of C-14 is 7.12E-02 mrem to the critical organ (bone) and 1.42E-02 mrem to the total body. The available dose pathways at this location were inhalation and the ingestion of fruits and non-leafy vegetables. This dose is only included in Table 6.0-C of this section because of the significant difference in the JFD tables used for the above dose analysis as compared to the JFD tables with all atmospheric data for 2010.

For all other gaseous releases, the highest calculated dose to a child living at locations identified in the most recent land use census was 2.83E-03 mrem to the total body, 3.14E-03 mrem to the thyroid, and 4.30E-03 mrem to the skin. This location was at 4.24 miles in the East South East sector.

Periodically, Columbia Generating Station offers public tours of selected locations within the site boundary. Calculations assumed an eight (8) hour per year exposure to the plume, ground shine, and inhalation pathways. The organ with the highest dose was the skin at 6.05E-04 mrem.

During 2010, Members of the Public worked at the Industrial Development area in the E and ESE sectors of the owner controlled area. The maximum dose to these individuals was also calculated assuming adult exposure to the plume, inhalation, and ground deposition pathways.

The following table (6.0-A) shows estimated dose to Members of the Public from gaseous effluents and direct radiation exposure within the site boundary of Columbia Generating Station for the total indicated hours spent at each location.

Table 6.0-A; Estimated Dose to Members of the Public within the Site Boundary

Location	Hours Spent	Total Body Dose (mrem)	Thyroid Dose (mrem)	Highest Other Organ Dose (mrem)	Beta Air Dose (mrad)	Gamma Air Dose (mrad)	Direct Radiation (mrem)
Tour Visitors	8.00E+00	3.81E-04	3.82E-04	6.05E-04	1.96E-04	5.55E-04	2.11E-02
Firing Range	8.00E+00	4.58E-06	4.59E-06	7.27E-06	2.35E-06	6.66E-06	6.39E-04
WNP-4 Whse.2-4	2.60E+03	2.16E-02	2.17E-02	3.44E-02	4.98E-03	1.41E-02	0.00E+00
WNP-1 Bldg 121	2.60E+03	9.65E-03	9.66E-03	1.54E-02	1.12E-02	3.17E-02	0.00E+00

Table 6.0-B provides the results of annual dose calculations for the highest dose age group for each identified land use census location from gaseous effluents. The highest 'Other Organ' in all cases was the skin.

Table 6.0-B; Estimated Dose to Residents identified in the 2010 Land Use Census

Location	Total Body Dose (mrem)	Thyroid Dose (mrem)	Highest Other Organ Dose (mrem)	Beta Air Dose (mrad)	Gamma Air Dose (mrad)	Age Group
Resident (4.47 miles NE)	1.02E-03	1.08E-03	1.56E-03	4.88E-04	1.38E-03	Child
Resident (4.01 miles ENE)	5.33E-04	6.01E-04	7.85E-04	2.23E-04	6.31E-04	Child
Resident (4.59 miles E)	1.95E-03	2.09E-03	2.95E-03	8.86E-04	2.51E-03	Child
Resident (4.65 miles E)	1.96E-03	2.10E-03	2.97E-03	8.88E-04	2.52E-03	Child
Resident (4.24 miles ESE)	2.83E-03	3.14E-03	4.30E-03	1.31E-03	3.71E-03	Child

Based on the available exposure pathways and the highest dispersion and deposition values, the critical receptor is the resident at 4.24 miles ESE. Table 6.0-C adds the potential dose from Carbon-14 to the above dose estimate.

Table 6.0-C; Total Potential Dose to Critical Receptor (4.24 miles ESE)

	Total Body	Bone	Thyroid	Skin
Dose from Carbon-14	1.42E-02	7.12E-02	1.42E-02	1.42E-02
Dose from Other Nuclides	2.83E-03	2.60E-03	3.14E-03	4.30E-03
Total Dose	1.70E-02	7.38E-02	1.73E-02	1.85E-02

For environmental thermoluminescent dosimeter (TLD) stations at or beyond the site boundary where preoperational (background) data was acquired, no increase in the average ambient exposure was observed in 2010 from the preoperational values.

Dose Tables

Dose from Carbon-14 is not included in these tables for reasons discussed earlier in this report.

Table 6-1 Summary of Doses from Gaseous Effluents

The first six tables in this section show maximum estimated exposure and dose at and beyond the site boundary although no real person is resident at the site boundary. The maximum exposure and dose beyond the site boundary is estimated for locations with actual residents.

1. Maximum Air Dose at the Site Boundary (1.2 miles)

	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter	Annual Cumulative*
Beta air dose (mrad)	4.52E-03	4.09E-03	5.82E-03	4.04E-03	1.82E-02
Gamma air dose (mrad)	1.28E-02	1.16E-02	1.65E-02	1.15E-02	5.15E-02

2. Maximum Air Dose Beyond the Site Boundary

	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter	Annual Cumulative*
Beta air dose (mrad)	2.30E-04	3.60E-04	3.48E-04	4.45E-04	1.31E-03
Gamma air dose (mrad)	6.52E-04	1.02E-03	9.88E-04	1.26E-03	3.71E-03

3. Maximum Annual Dose at the Site Boundary

	Annual Dose
Annual total body dose (mrem)	3.50E-02
Annual skin dose (mrem)	5.57E-02

4. Maximum Annual Dose Beyond the Site Boundary

	Annual Dose
Annual total body dose (mrem)	2.83E-03
Annual skin dose (mrem)	4.30E-03

Table 6-1 Summary of Doses from Gaseous Effluents (Continued)

5. Maximum Organ Dose at the Site Boundary (1.2 miles)

	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter	Annual Cumulative*
Maximum Organ dose (mrem)	1.40E-02	1.25E-02	1.77E-02	1.25E-02	5.57E-02

6. Maximum Organ Dose Beyond the Site Boundary

	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter	Annual Cumulative*
Maximum Organ dose (mrem)	1.46E-03	1.18E-03	1.12E-03	1.49E-03	4.30E-03

7. Dose to Nearest Residents within 5-Miles in each Sector with Residents

4.47 Miles NE

	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter	Annual Cumulative*
Beta Air Dose (mrad)	5.00E-05	1.86E-04	1.06E-04	1.01E-04	4.88E-04
Gamma Air Dose (mrad)	1.42E-04	5.28E-04	3.00E-04	2.87E-04	1.38E-03
Maximum Organ dose (mrem)	1.80E-04	5.94E-04	3.36E-04	3.32E-04	1.56E-03

4.01 Miles ENE

	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter	Annual Cumulative*
Beta Air Dose (mrad)	4.63E-05	2.38E-04	1.42E-04	3.30E-05	2.23E-04
Gamma Air Dose (mrad)	1.31E-04	6.74E-04	4.02E-04	9.35E-05	6.31E-04
Maximum Organ dose (mrem)	1.67E-04	7.62E-04	4.52E-04	1.27E-04	7.85E-04

4.59 Miles E

	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter	Annual Cumulative*
Beta Air Dose (mrad)	1.71E-04	2.03E-04	1.77E-04	1.70E-04	8.86E-04
Gamma Air Dose (mrad)	4.86E-04	5.75E-04	5.01E-04	4.82E-04	2.51E-03
Maximum Organ dose (mrem)	6.06E-04	6.74E-04	5.85E-04	6.17E-04	2.95E-03

Table 6-1 Summary of Doses from Gaseous Effluents (Continued)

7. Dose to Nearest Residents within 5-Miles in each Sector with Residents (Continued)

4.65 Miles E

	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter	Annual Cumulative*
Beta Air Dose (mrad)	1.75E-04	1.99E-04	1.73E-04	1.70E-04	8.88E-04
Gamma Air Dose (mrad)	4.97E-04	5.62E-04	4.90E-04	4.82E-04	2.52E-03
Maximum Organ dose (mrem)	6.25E-04	6.61E-04	5.75E-04	6.22E-04	2.97E-03

4.24 Miles ESE

	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter	Annual Cumulative*
Beta Air Dose (mrad)	2.30E-04	3.60E-04	3.48E-04	4.45E-04	1.31E-03
Gamma Air Dose (mrad)	6.52E-04	1.02E-03	9.88E-04	1.26E-03	3.71E-03
Maximum Organ dose (mrem)	7.75E-04	1.18E-03	1.12E-03	1.49E-03	4.30E-03

* Rather than the sum of the quarters, the Annual Cumulative values are based on annual meteorological data and total annual effluents. For each time period, the dose estimate uses the radionuclide mix and release rate for that period along with an estimate of the dispersion in air and deposition on ground and vegetation calculated by the NRC computer code XOQDOQ using actual meteorological conditions during the respective quarters. The dose estimate of the NRC computer code GASPAR uses, as base methodology, NRC Regulatory Guide 1.109 (1974) which includes the prospective dose component arising from retention in the body beyond the period of environmental exposure.

Table 6-2 50-Mile Population Dose from Gaseous Effluents

A. 50-mile population collective dose

Exposure Pathway	Total Body (person-rem)	Max. Organ (person-rem)
Plume	1.35E-02	2.39E-02
Ground	4.88E-04	5.73E-04
Inhalation	3.58E-03	3.58E-03
Vegetables	2.93E-03	2.90E-03
Milk	1.06E-03	1.01E-03
Meat	5.33E-04	5.18E-04
Total	2.21E-02	3.25E-02

B. Average Individual*

Exposure Pathway	Total Body (mrem)	Max. Organ (mrem)
Plume	3.78E-05	6.69E-05
Ground	1.37E-06	1.61E-06
Inhalation	1.00E-05	1.00E-05
Vegetables	8.21E-06	8.12E-06
Milk	2.97E-06	2.83E-06
Meat	1.49E-06	1.45E-06
Total	6.19E-05	9.10E-05

* These values are derived by dividing the 50-mile population collective doses by the population within 50 miles of Columbia Generating Station (356,993). The population estimate is based on the 2000 census conducted by the United States Census Bureau and documented in the Columbia Generating Station Final Safety Analysis Report. The Maximum Organ was the thyroid.

7.0 REVISIONS TO THE ODCM

No revisions were made to the ODCM in 2010.

8.0 REVISIONS TO THE PROCESS CONTROL PROGRAM (PCP)

There were no revisions to the Process Control Program in 2010.

9.0 NEW OR DELETED LOCATIONS FOR DOSE ASSESSMENTS AND/OR ENVIRONMENTAL MONITORING LOCATIONS

9.1 The 2010 Five-Mile Land Use Census showed some changes which resulted in an additional dose assessment location and additional ingestion pathways. At 4.65 miles from the plant in the E sector, 5-6 goats were observed. All but one were juvenile and none were milking goats. To be conservative, although no evidence exists to support the assumption, CGS assumes that they may be raised for meat consumption by a nearby resident. Although horses were observed 4.4 miles from CGS in the ESE sector, CGS is assuming they are not being raised for meat consumption. As substantial commercial fruit orchards and corn crops were observed in all eastern sectors with residents, it is assumed that these crops are being consumed by the residents of those sectors. The following table summarizes the assumed dose pathways:

				Ingestion		
Location	Plume	Ground Shine	Inhalation	Fruit or Vegetation	Beef Meat	Goat Meat
Resident (4.47 miles NE)	X	X	X	X		
Resident (4.01 miles ENE)	X	X	X	X	X	
Resident (4.59 miles E)	X	X	X	X		
Resident (4.65 miles E)	X	X	X	X		X
Resident (4.24 miles ESE)	X	X	X	X		

9.2 There were no new locations for environmental monitoring formally adopted into the program based on the 2010 Land Use Census.

9.3 No dose assessment or environmental monitoring locations were deleted.

10.0 MAJOR CHANGES TO RADIOACTIVE LIQUID, GASEOUS, AND SOLID WASTE TREATMENT SYSTEMS

No major changes (as defined by ODCM Section 6.4.3) were made to the radioactive waste systems (liquid, gaseous, or solid) during this reporting period.