

May 13, 2011

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

SUBJECT: Entergy Nuclear Operations, Inc. Pilgrim Nuclear Power Station Docket No. 50-293 License No. DPR-35

> Radioactive Effluent Release Report for January 1 through December 31, 2010

LETTER NUMBER: 2.11.036

Dear Sir or Madam:

In accordance with Pilgrim Technical Specifications 5.6.3, Entergy Nuclear Operations, Inc. submits the attached Annual Radiological Effluent Release Report for January 1 through December 31, 2010.

Should you have questions or require additional information, I can be contacted at (508) 830-8403.

This letter contains no commitments.

Sincerely,

Kyneh -

Joseph R. Lynch Manager, Licensing

JRL/wgl Attachment: Pilgrim Nuclear Power Station Radioactive Effluent Release Report January 1 through December 31, 2010

cc: U.S. Nuclear Regulatory Commission Region I 475 Allendale Road King of Prussia, PA 19406

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Entergy Letter No. 2.11.036, page 2/2

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Attachment to Entergy Letter No. 2.11.036

Pilgrim Nuclear Power Station Radioactive Effluent Release Report

January 1 through December 31, 2010

(78 pages)

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PILGRIM NUCLEAR POWER STATION

Facility Operating License DPR-35

Annual Radioactive Effluent Release Report

January 1 through December 31, 2010





PILGRIM NUCLEAR POWER STATION Facility Operating License DPR-35

ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT

JANUARY 01 THROUGH DECEMBER 31, 2010

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Pilgrim Nuclear Power Station Annual Radioactive Effluent Release Report January-December 2010

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EXECUTIVE SUMMARY

PILGRIM NUCLEAR POWER STATION ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT JANUARY 01 THROUGH DECEMBER 31, 2010

INTRODUCTION

This report quantifies the radioactive gaseous, liquid, and radwaste releases, and summarizes the local meteorological data for the period from January 01 through December 31, 2010. This document has been prepared in accordance with the requirements set forth in the Pilgrim Nuclear Power Station (PNPS) Technical Specifications and Revision 1 of Regulatory Guide 1.21, "Measuring, Evaluating, and Reporting Radioactivity in Solid Wastes and Releases of Radioactive Material in Liquid and Gaseous Effluents from Light Water Cooled Nuclear Power Plants".

The quantity of radioactive material released from PNPS was determined from sample analyses and continuous on-line monitoring of gaseous releases from the main stack, reactor building vent, turbine building, and various decontamination facilities, and liquid releases into the discharge canal.

The quantity and volume of radioactive waste shipped offsite from PNPS for processing and burial were determined from data contained on the radwaste shipping documentation. The meteorological data were obtained from monitoring instruments located on the 220-foot meteorological tower located at Pilgrim Station.

GASEOUS EFFLUENTS

Gaseous radioactive releases for the reporting period are quantified in Tables 2.2-A, 2.2-B, and 2.2-C. Radioactive noble gases released during the period totaled 27.7 Curies. Releases of radioactive iodines and particulates with half-life of greater than 8 days totaled 0.00963 Curies, tritium releases totaled 43.3 Curies, and carbon-14 totaled 8.54 Curies. No gross alpha radioactivity was detected in gaseous effluents.

Noble gases released in gaseous effluents resulted in a maximum total body dose of 0.0078 mrem, with a corresponding skin dose of 0.025 mrem. The release of radioactive particulates, iodines, tritium, and carbon-14 in gaseous effluents from PNPS during the reporting period resulted in a total body dose to the maximum-exposed hypothetical individual of about 0.031 mrem. The maximum hypothetical dose to any organ from radioactive particulates, iodines, tritium, and carbon-14 was about 0.11 mrem. The maximum, hypothetical total body dose from the combined release of all airborne radioactivity in gaseous effluents was 0.12 mrem.

The maximum individual doses from gaseous radioactive effluents were compared to the applicable ODCM dose limits. Noble gas doses were less than 1.1% of the corresponding 10CFR50 dose objectives. Maximum doses resulting from releases of particulates, iodines, tritium, and carbon-14 in gaseous effluents were less than 0.73% of corresponding 10CFR50 objectives.

LIQUID EFFLUENTS

Liquid radioactive releases for the reporting period are quantified in Tables 2.3-A and 2.3-B. Six discharges of liquid effluents containing radioactivity occurred during the reporting period. The resulting maximum total body dose was 0.00197 mrem, with a corresponding organ dose of 0.00997 mrem. All doses from liquid discharges were less than 0.2% of corresponding 10CFR50 objectives.

METEOROLOGICAL DATA

Meteorological joint frequency distributions are listed in Appendix A. Data recovery for the entire annual period was 86.3% for the 33-ft and 97.8% for the 220-ft levels of the tower. The predominant wind direction was from the south-southwest, which occurred approximately 13% of the time during the reporting period. The predominant stability class was Class D, which occurred about 39% of the time during the reporting period

OFFSITE AMBIENT RADIATION MEASUREMENTS

Ambient radiation exposure was evaluated to complete the assessment of radiological impact on humans. A small number of thermoluminescent dosimeters (TLDs) indicated an elevation in ambient radiation exposure on Entergy property in close proximity to the station, when compared to background levels in the region. This elevation is due to nitrogen-16 contained within the plant steam system, as opposed to radioactive effluent released from the plant. The dose to the maximum-exposed member of the public at the PNPS Health Club, even though they are within the owner-controlled area, was estimated as being about 1.8 mrem during 2010. There was no measurable increase during 2010 in ambient radiation measurements at the location of the nearest resident 0.8 km southeast of PNPS.

COMBINED DOSE IMPACT

The collective total body dose to a maximum-exposed hypothetical member of the public from airborne radioactivity, liquid-borne radioactivity, and ambient radiation exposure resulting from PNPS operation during 2010 was calculated as being about 0.83 mrem. This amount is about 0.2% of the typical dose of 300 to 400 mrem received each year by an average person from other sources of natural and man-made radiation. Although this calculated collective dose occurs to a maximum-exposed <u>hypothetical</u> individual, it is also well below the NRC dose limit of 100 mrem/yr specified in 10CFR20.1301, as well as the EPA dose limit of 25 mrem/yr specified in 40CFR190. Both of these limits are to be applied to <u>real</u> members of the general public, so the fact that the dose to the <u>hypothetical</u> maximum-exposed individual is within the limits ensures that any dose received by a real member of the public would be smaller and well within any applicable limit.

RADIOACTIVE SOLID WASTE DISPOSAL

Solid radioactive wastes shipped offsite for processing and disposal during the reporting period are described in Table 7.0. Approximately 375 cubic meters of solid waste, containing almost 958 Curies of radioactivity, were shipped during the reporting period.

ONSITE GROUNDWATER MONITORING PROGRAM

In response to the Nuclear Energy Institute Groundwater Protection Initiative, Pilgrim Station instituted a groundwater monitoring program during 2007. Four monitoring wells were installed onsite during the fourth quarter of 2007, and the first samples were collected in late November 2007. This sampling program was continued in 2010, and twelve additional sampling wells were added to the program in 2010. Low levels of tritium, a radioactive isotope of hydrogen, were detected in these onsite wells. No other plant-related radioactivity was detected in the samples. Concentrations of tritium ranged from non-detectable at less than 295 picoCuries per Liter up to 25,552 picoCuries per Liter. The average concentration of tritium detected in these onsite monitoring wells was well below the voluntary communications reporting level established by the EPA Drinking Water Standard of 20,000 pCi/L. Although the EPA Standard provides a standard for comparison, no drinking water sources are affected by this tritium. Results of the groundwater monitoring program are presented in Appendix B.

CONCLUSION

The PNPS Offsite Dose Calculation Manual contains effluent controls to limit doses resulting from releases of radioactivity to the environment. None of the effluent controls associated with liquid or gaseous effluents were exceeded during the reporting period, as confirmed by conservative dose assessments performed at weekly and monthly intervals. Conformance to the PNPS ODCM effluent control limits ensures that releases of radioactivity in liquid and gaseous effluents are kept as low as reasonably achievable in accordance with 10 CFR Part 50, Appendix I. Compliance with the ODCM also demonstrates that requirements of the Environmental Protection Agency's nuclear fuel cycle standard, 40CFR190.10, Subpart B, have been met. Based on the dose assessment results for 2010, there was no significant radiological impact on the general public from PNPS operation.

2.0 RADIOACTIVE EFFLUENT DATA

Radioactive gaseous and liquid releases for the reporting period are given in the standard format presented in Tables 1A, 1B, 1C, 2A, 2B, and Supplemental Information table from NRC Regulatory Guide 1.21 (Reference 1) format.

2.1 <u>Supplemental Effluent Release Data</u>

Supplemental information related to radioactive gaseous and liquid releases for the reporting period are given in the standard NRC Regulatory Guide 1.21 format in Table 2.1.

2.2 <u>Gaseous Effluent Data</u>

Gaseous radioactivity is released from Pilgrim Station to the atmosphere from the main stack, reactor building vent, turbine building, and various decontamination facilities. Combined gaseous effluent releases from all release points are summarized in Table 2.2-A. No alpha activity was detected on any of the particulate filters collected during the reporting period. The total gaseous releases for various categories of radionuclides, as well as the corresponding average release rates, can be summarized as follows:

٠	Noble gases:	27.7 Ci, 0.879 μCi/sec
٠	lodines and particulates with half-life greater than 8 days	0.00963 Ci, 0.000305 μCi/sec
٠	Tritium:	43.3 Ci, 1.37 μCi/sec
•	Carbon-14:	8.54 Ci, 0.271 uCi/sec

Effluent releases from the main stack are detailed in Table 2.2-B. The main stack is 335 feet tall, and represents an elevated release point with a total height of approximately 400 feet above sea level. The main stack is located about 700 feet west-northwest of the reactor building.

Ground-level effluent releases are detailed in Table 2.2-C. Data in this table include releases from the reactor building vent, turbine building, and assorted equipment decontamination facilities (e.g., hot machine shop, carbon dioxide pellet decon trailer, plastic media decon trailer, etc.) used during the period. Due to the close proximity of the reactor building, all of these release points are considered to be mixed-mode/ground level release points.

Following the revision of Regulatory Guide 1.21 in 2009, the nuclear industry re-assessed their gaseous effluent releases in accordance with the new definition of "principal radionuclide". Under this new definition, any radionuclide that contributed greater than 1% of the effluent dose calculated to demonstrate compliance with 10CFR50 Appendix I, or contributed more than 1% of the total activity for that type of effluent release, would be classified as a principal radionuclide. Although Carbon-14 (C-14) had been exempted from gaseous effluent calculations in the 1970s, industry assessments in 2009 revealed that Carbon-14 would qualify as a principal radionuclide. Based on this 2009 re-assessment, licensees were required to begin reporting C-14 gaseous effluents in the Annual Radioactive Effluent Release Report beginning with calendar-year 2010. Carbon-14 releases are summarized in Tables 2.2-A through 2.2-C, and the dose consequences from C-14 are incorporated into the dose assessments documented in Section 4.2 of this report.

2.3 Liquid Effluent Data

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ere andre regieren. Treff Liquid radioactivity is released from PNPS to Cape Cod Bay via the circulating water discharge canal. These effluents enter Cape Cod Bay at the outfall of the canal, which is located about 1100 feet north of the reactor building.

Liquid effluent releases are summarized in Table 2.3-A. Detailed breakdowns for individual radionuclides are listed in Table 2.3-B. There were six discharges of liquid effluents containing radioactivity during the reporting period. Total releases for the various categories of radionuclides, as well as their corresponding mean concentrations, can be summarized as follows:

Total Effluent Volume:	342,000 Liters
Total Dilution Volume:	615 billion Liters
Fission/Activation products:	0.0369 Ci, 0.0000000000000 μCi/mL
• Tritium:	2.48 Ci, 0.00000000404 μCi/mL

• Dissolved/entrained noble gases: 0 Ci, 0 μCi/mL

Table 2.1 Pilgrim Nuclear Power Station Annual Radioactive Effluent Release Report Supplemental Information January-December 2010

FACILITY: PILGRIM NUCLEAR POWER STATION

LICENSE: DPR-35

1. REGULATORY LIMITS							
a. Fission and activation gases:		500 mrem/yr total body and 3000 mrem/yr for skin at site boundary					
b,c. lodines, particulates with half-lif >8 days, tritium	e:	1500 mren	n/yr to any orga	an at site boun	dary		
d. Liquid effluents:	0.2 mrem/i	/month for who month for any o dwaste treatmo	organ				
2. EFFLUENT CONCENTRATION L	IMITS	•	مەرب	e enser correct	2 t		
a. Fission and activation gases:		10CFR20	Appendix B Ta	ble II			
b. lodines:			Appendix B Ta				
c. Particulates with half-life > 8 da	vs:		Appendix B Ta		•		
d. Liquid effluents:		mL for entraine Appendix B Ta les					
3. AVERAGE ENERGY		Not Applic	able				
4. MEASUREMENTS AND APPROX	(IMATIONS O	F TOTAL RAD	OACTIVITY				
a. Fission and activation gases:		High purity	High purity germanium gamma spectroscopy for all				
b. lodines:	· · ·		gamma emitters; radiochemistry analysis for H-3,				
c. Particulates:		Fe-55 (liqu	Fe-55 (liquid effluents), Sr-89, and Sr-90				
d. Liquid effluents:							
5. BATCH RELEASES	Jan-Mar 2010	Apr-Jun 2010	Jul-Sep 2010	Oct-Dec 2010	Jan-Dec 2010		
a. Liquid Effluents		.		I <u></u>	· · · · · · · · · · ·		
1. Total number of releases:	0	5	0	1	6		
2. Total time period (minutes):	0.00E+00	3.76E+02	0.00E+00	1.90E+02	5.66E+02		
3. Maximum time period (minutes):	0.00E+00	8.60E+01	0.00E+00	1.90E+02	1.90E+02		
Average time period (minutes):	0.00E+00	7.52E+01	0.00E+00	1.90E+02	9.43E+01		
5. Minimum time period (minutes):	0.00E+00	6.50E+01	0.00E+00	1.90E+02	6.50E+01		
 Average stream flow during periods of release of effluents into a flowing stream (Liters/min): 	N/A	1.15E+06	N/A	1.18E+06	1.16E+06		
b. Gaseous Effluents	None	None	None	None	None		
6. ABNORMAL RELEASES	L		4	L			
	None	None	None	None	None		
a. Liquid Effluents	NOLE		NOIE				

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Table 2.2-A Pilgrim Nuclear Power Station Annual Radioactive Effluent Release Report Gaseous Effluents - Summation of All Releases January-December 2010

						Est.
RELEASE PERIOD	Jan-Mar	Apr-Jun	Jul-Sep	Oct-Dec	Jan-Dec	Total
	2010	2010	2010	2010	2010	Error
A. FISSION AND ACTIVATION G	ASES					
Total Release: Ci	4.24E+00	6.81E+00	1.42E+01	2.43E+00	2.77E+01	
Average Release Rate: µCi/sec	5.38E-01	8.64E-01	1.81E+00	3.08E-01	8.79E-01	±22%
Percent of Effluent Control Limit*	*	*	*	*	*	
B. IODINE-131			-		• • • • • • • • • • • • • • • • • • • •	
Total lodine-131 Release: Ci	3.87E-04	5.20E-04	5.63E-04	4.71E-04	1.94E-03	
Average Release Rate: µCi/sec -	4:91E-05	- 6:59E-05	7.14E-05	5.97E-05	6.15E-05	±20%
Percent of Effluent Control Limit*	*	*	*	*	*	
		A	1			
C. PARTICULATES WITH HALF-			0.655.04	0.24E 04	2.465.02	
C. PARTICULATES WITH HALF- Total Release: Ci	8.03E-04	8.65E-04	9.65E-04	8.24E-04	3.46E-03	
C. PARTICULATES WITH HALF - Total Release: Ci Average Release Rate: μCi/sec			9.65E-04 1.22E-04	8.24E-04 1.05E-04	3.46E-03 1.10E-04	±21%
C. PARTICULATES WITH HALF - Total Release: Ci Average Release Rate: μCi/sec Percent of Effluent Control Limit*	8.03E-04 1.02E-04 *	8.65E-04 1.10E-04 *	1.22E-04 *	1.05E-04 *	1.10E-04 *	±21%
C. PARTICULATES WITH HALF - Total Release: Ci Average Release Rate: μCi/sec	8.03E-04	8.65E-04				±21%
C. PARTICULATES WITH HALF- Total Release: Ci Average Release Rate: μCi/sec Percent of Effluent Control Limit* Gross Alpha Radioactivity: Ci	8.03E-04 1.02E-04 *	8.65E-04 1.10E-04 *	1.22E-04 *	1.05E-04 *	1.10E-04 *	±21%
C. PARTICULATES WITH HALF- Total Release: Ci Average Release Rate: μCi/sec Percent of Effluent Control Limit* Gross Alpha Radioactivity: Ci	8.03E-04 1.02E-04 *	8.65E-04 1.10E-04 *	1.22E-04 *	1.05E-04 *	1.10E-04 *	±21%
C. PARTICULATES WITH HALF- Total Release: Ci Average Release Rate: μCi/sec Percent of Effluent Control Limit* Gross Alpha Radioactivity: Ci D. TRITIUM	8.03E-04 1.02E-04 * NDA	8.65E-04 1.10E-04 * NDA	1.22E-04 * NDA	1.05E-04 * NDA	1.10E-04 * NDA	±21% ±20%
 C. PARTICULATES WITH HALF-I Total Release: Ci Average Release Rate: μCi/sec Percent of Effluent Control Limit* Gross Alpha Radioactivity: Ci D. TRITIUM Total Release: Ci 	8.03E-04 1.02E-04 * NDA 6.56E+00	8.65E-04 1.10E-04 * NDA 6.61E+00	1.22E-04 * NDA 1.03E+01	1.05E-04 * NDA 1.99E+01	1.10E-04 * NDA 4.33E+01	
 C. PARTICULATES WITH HALF- Total Release: Ci Average Release Rate: μCi/sec Percent of Effluent Control Limit* Gross Alpha Radioactivity: Ci D. TRITIUM Total Release: Ci Average Release Rate: μCi/sec 	8.03E-04 1.02E-04 * NDA 6.56E+00 8.32E-01	8.65E-04 1.10E-04 * NDA 6.61E+00	1.22E-04 * NDA 1.03E+01 1.31E+00	1.05E-04 * NDA 1.99E+01 2.52E+00	1.10E-04 * NDA 4.33E+01	
C. PARTICULATES WITH HALF- Total Release: Ci Average Release Rate: μCi/sec Percent of Effluent Control Limit* Gross Alpha Radioactivity: Ci D. TRITIUM Total Release: Ci Average Release Rate: μCi/sec Percent of Effluent Control Limit*	8.03E-04 1.02E-04 * NDA 6.56E+00 8.32E-01	8.65E-04 1.10E-04 * NDA 6.61E+00	1.22E-04 * NDA 1.03E+01 1.31E+00	1.05E-04 * NDA 1.99E+01 2.52E+00	1.10E-04 * NDA 4.33E+01	
C. PARTICULATES WITH HALF- Total Release: Ci Average Release Rate: μCi/sec Percent of Effluent Control Limit* Gross Alpha Radioactivity: Ci D. TRITIUM Total Release: Ci Average Release Rate: μCi/sec Percent of Effluent Control Limit* E. CARBON-14	8.03E-04 1.02E-04 * NDA 6.56E+00 8.32E-01 *	8.65E-04 1.10E-04 * NDA 6.61E+00 8.39E-01 *	1.22E-04 * NDA 1.03E+01 1.31E+00 *	1.05E-04 * NDA 1.99E+01 2.52E+00 *	1.10E-04 * NDA 4.33E+01 1.37E+00 *	

Notes for Table 2.2-A:

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* Percent of Effluent Control Limit values based on dose assessments are provided in Section 7 of this report.

1. NDA stands for No Detectable Activity.

2. LLD for airborne gross alpha activity listed as NDA is 1E-11 μ Ci/cc. 3. N/A stands for not applicable.

Table 2.2-B Pilgrim Nuclear Power Station Annual Radioactive Effluent Release Report Gaseous Effluents - Elevated Release January-December 2010

Nuclide Released	Jan-Mar 2010	Apr-Jun 2010	Jul-Sep 2010	Oct-Dec 2010	Jan-Dec 2010
1. FISSION AND ACTIVAT	1	<u> </u>			· · · · · · · · · · · · · · · · · · ·
1. FISSION AND ACTIVAT	· · · · · · · · · · · · · · · · · · ·				
Ar-41	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Kr-85	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Kr-85m	0.00E+00	0.00E+00	9.33E-02	0.00E+00	9.33E-02
Kr-87	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Kr-88	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Xe-131m	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Xe-133	0.00E+00	0.00E+00	7.75E-01	1.39E-01	9.14E-01
<u>Xe-133m</u>	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Xe=135	2.62E-02	0.00E+00	0.00E+00	0.00E+00	2.62E-02
Xe-135m	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Xe-137	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Xe-138	0.00E+00	0.00E+00	4.03E-01	0.00E+00	4.03E-01
Total for Period	2.62E-02	0.00E+00	1.27E+00	1.39E-01	1.44E+00
2. IODINES: Ci					
I-131	1.73E-05	2.52E-05	4.15E-05	2.60E-05	1.10E-04
I-133	1.69E-05	3.93E-05	8.26E-05	3.94E-05	1.78E-04
	1			· · · · · · · · · · · · · · · · · · ·	
Total for Period	3.43E-05	6.44E-05	1.24E-04	6.54E-05	2.88E-04
3. PARTICULATES WITH	HALF-LIVES > 8 [DAYS: Ci			
Cr-51	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Mo E4	0.00E+00	0.00E+00	4.19E-07	0.00E+00	4.19E-07
Mn-54					
Fe-59	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	0.00E+00 0.00E+00	0.00E+00 0.00E+00	0.00E+00 0.00E+00	0.00E+00 0.00E+00	0.00E+00 0.00E+00
Fe-59		· · · · · · · · · · · · · · · · · · ·			
Fe-59 Co-58	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Fe-59 Co-58 Co-60	0.00E+00 0.00E+00	0.00E+00 0.00E+00	0.00E+00 0.00E+00	0.00E+00 0.00E+00	0.00E+00 0.00E+00
Fe-59 Co-58 Co-60 Zn-65	0.00E+00 0.00E+00 0.00E+00	0.00E+00 0.00E+00 0.00E+00	0.00E+00 0.00E+00 0.00E+00	0.00E+00 0.00E+00 0.00E+00	0.00E+00 0.00E+00 0.00E+00
Fe-59 Co-58 Co-60 Zn-65 Sr-89	0.00E+00 0.00E+00 0.00E+00 2.71E-06	0.00E+00 0.00E+00 0.00E+00 9.66E-08	0.00E+00 0.00E+00 0.00E+00 1.31E-06	0.00E+00 0.00E+00 0.00E+00 2.11E-06	0.00E+00 0.00E+00 0.00E+00 6.23E-06
Fe-59 Co-58 Co-60 Zn-65 Sr-89 Sr-90	0.00E+00 0.00E+00 0.00E+00 2.71E-06 0.00E+00	0.00E+00 0.00E+00 0.00E+00 9.66E-08 3.42E-06	0.00E+00 0.00E+00 0.00E+00 1.31E-06 0.00E+00	0.00E+00 0.00E+00 0.00E+00 2.11E-06 0.00E+00	0.00E+00 0.00E+00 0.00E+00 6.23E-06 3.42E-06
Fe-59 Co-58 Co-60 Zn-65 Sr-89 Sr-90 Ru-103	0.00E+00 0.00E+00 2.71E-06 0.00E+00 0.00E+00 0.00E+00	0.00E+00 0.00E+00 9.66E-08 3.42E-06 0.00E+00	0.00E+00 0.00E+00 1.31E-06 0.00E+00 0.00E+00	0.00E+00 0.00E+00 2.11E-06 0.00E+00 0.00E+00 0.00E+00	0.00E+00 0.00E+00 0.00E+00 6.23E-06 3.42E-06 0.00E+00
Fe-59 Co-58 Co-60 Zn-65 Sr-89 Sr-90 Ru-103 Cs-134	0.00E+00 0.00E+00 2.71E-06 0.00E+00 0.00E+00 0.00E+00 0.00E+00	0.00E+00 0.00E+00 9.66E-08 3.42E-06 0.00E+00 0.00E+00	0.00E+00 0.00E+00 1.31E-06 0.00E+00 0.00E+00 0.00E+00 0.00E+00	0.00E+00 0.00E+00 2.11E-06 0.00E+00 0.00E+00 0.00E+00 0.00E+00	0.00E+00 0.00E+00 6.23E-06 3.42E-06 0.00E+00 0.00E+00
Fe-59 Co-58 Co-60 Zn-65 Sr-89 Sr-90 Ru-103 Cs-134 Cs-137	0.00E+00 0.00E+00 2.71E-06 0.00E+00 0.00E+00 0.00E+00 0.00E+00	0.00E+00 0.00E+00 9.66E-08 3.42E-06 0.00E+00 0.00E+00	0.00E+00 0.00E+00 1.31E-06 0.00E+00 0.00E+00 0.00E+00 0.00E+00	0.00E+00 0.00E+00 2.11E-06 0.00E+00 0.00E+00 0.00E+00 0.00E+00	0.00E+00 0.00E+00 6.23E-06 3.42E-06 0.00E+00 0.00E+00
Fe-59 Co-58 Co-60 Zn-65 Sr-89 Sr-90 Ru-103 Cs-134 Cs-137 Ba/La-140	0.00E+00 0.00E+00 2.71E-06 0.00E+00 0.00E+00 0.00E+00 0.00E+00	0.00E+00 0.00E+00 9.66E-08 3.42E-06 0.00E+00 0.00E+00 0.00E+00	0.00E+00 0.00E+00 1.31E-06 0.00E+00 0.00E+00 0.00E+00 0.00E+00	0.00E+00 0.00E+00 2.11E-06 0.00E+00 0.00E+00 0.00E+00 0.00E+00	0.00E+00 0.00E+00 6.23E-06 3.42E-06 0.00E+00 0.00E+00 0.00E+00
Fe-59 Co-58 Co-60 Zn-65 Sr-89 Sr-90 Ru-103 Cs-134 Cs-137 Ba/La-140	0.00E+00 0.00E+00 2.71E-06 0.00E+00 0.00E+00 0.00E+00 0.00E+00	0.00E+00 0.00E+00 9.66E-08 3.42E-06 0.00E+00 0.00E+00 0.00E+00	0.00E+00 0.00E+00 1.31E-06 0.00E+00 0.00E+00 0.00E+00 0.00E+00	0.00E+00 0.00E+00 2.11E-06 0.00E+00 0.00E+00 0.00E+00 0.00E+00	0.00E+00 0.00E+00 6.23E-06 3.42E-06 0.00E+00 0.00E+00 0.00E+00
Fe-59 Co-58 Co-60 Zn-65 Sr-90 Ru-103 Cs-134 Cs-137 Ba/La-140 Total for Period 4. TRITIUM: Ci	0.00E+00 0.00E+00 2.71E-06 0.00E+00 0.00E+00 0.00E+00 0.00E+00 2.71E-06	0.00E+00 0.00E+00 9.66E-08 3.42E-06 0.00E+00 0.00E+00 0.00E+00 3.52E-06	0.00E+00 0.00E+00 1.31E-06 0.00E+00 0.00E+00 0.00E+00 0.00E+00 1.73E-06	0.00E+00 0.00E+00 2.11E-06 0.00E+00 0.00E+00 0.00E+00 0.00E+00 2.11E-06	0.00E+00 0.00E+00 6.23E-06 3.42E-06 0.00E+00 0.00E+00 0.00E+00 1.01E-05

Notes for Table 2.2-B:

Fission Gases:	1E-04 μCi/cc
lodines:	1E-12 μCi/cc
Particulates:	1E-11 μCi/cc

Table 2.2-B (continued) Pilgrim Nuclear Power Station Annual Radioactive Effluent Release Report Gaseous Effluents - Elevated Release January-December 2010

	BATCH MODE REL	EASES FROM EL	EVATED RELEAS		
Nuclide Released	Jan-Mar 2010	Apr-Jun 2010	Jul-Sep 2010	Oct-Dec 2010	Jan-Dec 2010
1. FISSION AND ACTIVA	TION GASES: Ci				
Ar-41	N/A	N/A	N/A	N/A	N/A
Kr-85	N/A	N/A	N/A	N/A	N/A
Kr-85m	N/A	N/A	N/A	N/A	N/A
Kr-87	N/A	N/A	N/A	N/A	N/A
Kr-88	N/A	N/A	N/A	N/A	N/A
Xe-131m	N/A	N/A	N/A	N/A	N/A
Xe-133	N/A	N/A	N/A	N/A	N/A
Xe-133m	. N/A.	N/A	N/A	N/A	N/A 1941
Xe-135	N/A	N/A	N/A	- N/A	N/A
Xe-135m	N/A	N/A	N/A	N/A	N/A
Xe-137	N/A	N/A	N/A	N/A	N/A
Xe-138	N/A	N/A	N/A	N/A	N/A
Total for period	N/A	N/A	N/A	N/A	N/A
2. IODINES: Ci	•	<u></u>	• · · · · · · · · · · · · · · · · · · ·		• • • • • • • • • • • • • • • • • • •
I-131	N/A	N/A	N/A	N/A	N/A
I-133	N/A	N/A	N/A	N/A	N/A
······································					
Total for period	N/A	N/A	N/A	N/A	N/A
3. PARTICULATES WITH	I HALF-LIVES > 8 D	DAYS: Ci			
Cr-51	N/A	N/A	N/A	N/A	N/A
Mn-54	N/A	N/A	N/A	N/A	N/A
Fe-59	N/A	N/A	N/A	N/A	N/A
Co-58	N/A	N/A	N/A	N/A	N/A
Co-60	N/A	N/A	N/A	N/A	N/A
Zn-65	N/A	N/A	N/A	N/A	N/A
Sr-89	N/A	N/A	N/A	N/A	N/A
Sr-90	N/A	N/A	N/A	N/A	N/A
Ru-103	N/A	N/A	N/A	N/A	N/A
Cs-134	N/A	N/A	N/A	N/A	N/A
Cs-137	N/A	N/A	N/A	N/A	N/A
Ba/La-140	N/A	N/A	N/A	N/A	N/A
Total for period	N/A	N/A	N/A	N/A	N/A
4. TRITIUM: Ci				•	
H-3	N/A	N/A	N/A	N/A	N/A
5. CARBON-14: Ci					

Notes for Table 2.2-B:

Fission Gases:	1E-04 μCi/cc
lodines:	1E-12 μCi/cc
Particulates:	1E-11 μCi/cc

Table 2.2-C Pilgrim Nuclear Power Station Annual Radioactive Effluent Release Report Gaseous Effluents – Ground-Level Release January-December 2010

			ROUND-LEVEL RE		
Nuclide Released	Jan-Mar 2010	Apr-Jun 2010	Jul-Sep 2010	Oct-Dec 2010	Jan-Dec 2010
1. FISSION AND ACTIV	ATION GASES: CI				
Ar-41	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Kr-85	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Kr-85m	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Kr-87	0.00E+00	0.00E+00	7.87E-01	0.00E+00	7.87E-01
Kr-88	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Xe-131m	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Xe-133	0.00E+00	0.00E+00	1.91E+00	0.00E+00	1.91E+00
Xe-133m	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Xe-135	0.00E+00	0.00E+00	9.20E-01	9.83E-01	1.90E+00
Xe-135m	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Xe-137	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Xe-138	4.21E+00	6.81E+00	9.35E+00	1.31E+00	2.17E+01
Total for period	4.21E+00	6.81E+00	1.30E+01	2.29E+00	2.63E+01
2. IODINES: Ci					
I-131	3.69E-04	4.94E-04	5.21E-04	4.45E-04	1.83E-03
I-133	8.62E-04	7.85E-04	1.23E-03	1.18E-03	4.05E-03
Total for period	1.23E-03	1.28E-03	1.75E-03	1.62E-03	5.88E-03
3. PARTICULATES WIT	H HALF-LIVES > 8 [DAYS: Ci	· · · · · · · · · · · · · · · · · · ·		
Cr-51	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Mn-54	4.31E-06	0.00E+00	0.00E+00	5.36E-07	4.85E-06
Fe-59	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Co-58	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Co-60	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Zn-65	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Sr-89	9.08E-05	6.45E-06	9.36E-05	8.41E-05	2.75E-04
Sr-90	0.00E+00	2.75E-05	5.00E-07	2.36E-06	3.04E-05
Ru-103	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Cs-134	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Cs-137	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Ba/La-140	7.05E-04	8.27E-04	8.70E-04	7.35E-04	3.14E-03
Total for period	8.00E-04	8.61E-04	9.64E-04	8.22E-04	3.45E-03
4. TRITIUM: Ci		_			
H-3	6.53E+00	6.58E+00	1.02E+01	1.98E+01	4.32E+01
5. CARBON-14: Ci					
C-14	6.35E-02	6.39E-02	6.45E-02	6.43E-02	2.56E-01

Notes for Table 2.2-C:

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Fission Gases:	1E-04 μCi/cc
lodines:	1E-12 μCi/cc
Particulates:	1E-11 μCi/cc

Table 2.2-C (continued) Pilgrim Nuclear Power Station Annual Radioactive Effluent Release Report Gaseous Effluents – Ground-Level Release January-December 2010

Nuclide Released	Jan-Mar 2010	Apr-Jun 2010	Jul-Sep 2010	Oct-Dec 2010	Jan-Dec 201
1. FISSION AND ACTIVA	•				
Ar-41	N/A	N/A	N/A	N/A	N/A
Kr-85	N/A	N/A	N/A	N/A	N/A
Kr-85m	N/A	N/A	N/A	N/A	N/A
Kr-87	N/A	N/A	N/A	N/A	N/A
Kr-88	N/A	N/A	N/A	N/A	N/A
Xe-131m	N/A	N/A	N/A	N/A	N/A
Xe-133	N/A	N/A	N/A	N/A	N/A
Xe-133m	. N/A	N/A	N/A	N/A	N/A
Xe-135	No. 1. 1 N/A		N/A	N/A	
Xe-135m	N/A	N/A	N/A	N/A	N/A
Xe-137	N/A	N/A	N/A	N/A	N/A
Xe-138	N/A	N/A	N/A	N/A	N/A
Total for pariod		N//A	N//A	NVA	N1/A
Total for period 2. IODINES: Ci	IN/A	N/A	N/A	N/A	N/A
I-131	N/A	N/A	N/A	N/A	N/A
I-133	N/A	N/A N/A	N/A N/A	N/A N/A	
1-133	N/A	IN/A	N/A	N/A	N/A
Total for period	N/A	N/A	N/A	N/A	N/A
3. PARTICULATES WITH	H HALF-LIVES > 8 [DAYS: Ci			
Cr-51	N/A	N/A	N/A	N/A	N/A
Mn-54	N/A	N/A	N/A	N/A	N/A
Fe-59	N/A	N/A	N/A	N/A	N/A
Co-58	N/A	N/A	N/A	N/A	N/A
Co-60	N/A	N/A	N/A	N/A	N/A
Zn-65	N/A	N/A	N/A	N/A	N/A
Sr-89	N/A	N/A	N/A	N/A	N/A
Sr-90	N/A	N/A	N/A	N/A	N/A
	N/A	N/A	N/A	/ N/A	N/A
Ru-103					
Ru-103 Cs-134	N/A	N/A	N/A	N/A	N/A
	N/A N/A		N/A N/A	the second s	N/A N/A
Cs-134		N/A		N/A	
Cs-134 Cs-137	N/A	N/A N/A	N/A	N/A N/A	N/A
Cs-134 Cs-137 Ba/La-140	N/A N/A	N/A N/A N/A	N/A N/A	N/A N/A N/A	N/A N/A
Cs-134 Cs-137 Ba/La-140 Total for period	N/A N/A	N/A N/A N/A	N/A N/A	N/A N/A N/A	N/A N/A
Cs-134 Cs-137 Ba/La-140 Total for period 4. TRITIUM: Ci	N/A N/A N/A	N/A N/A N/A N/A	N/A N/A N/A	N/A N/A N/A N/A	N/A N/A N/A

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Notes for Table 2.2-C:

Fission Gases:	1E-04 μCi/cc
lodines:	1E-12 μCi/cc
Particulates:	1E-11 μCi/cc

Table 2.3-A Pilgrim Nuclear Power Station Annual Radioactive Effluent Release Report Liquid Effluents - Summation of All Releases January-December 2010

			-			
RELEASE PERIOD	Jan-Mar 2010	Apr-Jun 2010	Jul-Sep 2010	Oct-Dec 2010	Jan-Dec 2010	Est. Total Error
A. FISSION AND ACTIVATION PI	RODUCTS					
Total Release (not including tritium, gases, alpha): Ci	N/A	3.69E-02	N/A	1.70E-05	3.69E-02	
Average Diluted Concentration During Period: µCi/mL	N/A	2.41E-10	N/A	1.09E-13	6.00E-11	±12%
Percent of Effluent Concentration Limit*	N/A	2.69E-03%	N/A	9.26E-06%	6.72E-04%	
B. TRITIUM						
Total Release: Ci	N/A	2.46E+00	N/A	1.83E-02	2.48E+00	
Average Diluted Concentration During Period: µCi/mL	N/A	1.61E-08	N/A	1.18E-10	4.40E-09	±9.4%
Percent of Effluent Concentration Limit*	N/A	1.61E-03%	N/A	1.18E-05%	4.04E-04%	
C. DISSOLVED AND ENTRAINED	D GASES					
Total Release: Ci	N/A	NDA	N/A	NDA	NDA	
Average Diluted Concentration During Period: µCi/mL	N/A	NDA	N/A	NDA	NDA	±16%
Percent of Effluent Concentration Limit*	N/A	0.00E+00	N/A	0.00E+00	0.00E+00	
D. GROSS ALPHA RADIOACTIV	ТҮ					
Total Release: Ci	N/A	NDA	N/A	NDA	NDA	±34%
E. VOLUME OF WASTE RELEAS	ED PRIOR		4			
Waste Volume: Liters	N/A	3.11E+05	N/A	3.04E+04	3.42E+05	±5.7%
F. VOLUME OF DILUTION WATE	R USED DU		D			
Dilution Volume: Liters	1.52E+11	1.53E+11	1.55E+11	1.55E+11	6.15E+11	±10%

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Notes for Table 2.3-A:

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* Additional percent of Effluent Control Limit values based on dose assessments are provided in Section 7 of this report.

- 1. N/A stands for not applicable.
- 2. NDA stands for No Detectable Activity.
- 3. LLD for dissolved and entrained gases listed as NDA is 1E-05 $\mu Ci/mL.$
- 4. LLD for liquid gross alpha activity listed as NDA is 1E-07 μ Ci/mL.

Table 2.3-B Pilgrim Nuclear Power Station Annual Radioactive Effluent Release Report Liquid Effluents January-December 2010

Nuclide Delegend				0-+ D-+ 0010	
Nuclide Released	Jan-War 2010	Apr-Jun 2010	Jul-Sep 2010	Oct-Dec 2010	Jan-Dec 2010
1. FISSION AND AC	TIVATION PRODUC	TS: Ci			
Cr-51	N/A	N/A	N/A	N/A	N/A
Mn-54	N/A	N/A	N/A	N/A	N/A
Fe-55	N/A	N/A	N/A	N/A	N/A
Fe-59	N/A	N/A	N/A	N/A	N/A
Co-58	N/A	N/A	N/A	N/A	N/A
Co-60	N/A	N/A	N/A	N/A	N/A
Zn-65	N/A	N/A	N/A	N/A	N/A
Zn-69m	••••••••••••••••••••••••••••••••••••••	N/A	N/A 400.12		N/A
Sr-89	N/A	N/A	N/A	. N/A	N/A
Sr-90	N/A	N/A	N/A	N/A	N/A
Zr/Nb-95	N/A	N/A	N/A	N/A	N/A
Mo/Tc-99	N/A	N/A	N/A	N/A	N/A
Ag-110m	N/A	N/A	N/A	N/A	N/A
Sb-124	N/A	N/A	N/A	N/A	N/A
I-131	N/A	N/A	N/A	N/A	N/A
I-133	N/A	N/A	N/A	N/A	N/A
Cs-134	N/A	N/A	N/A	N/A	N/A
Cs-137	N/A	N/A	N/A	N/A	N/A
Ba/La-140	N/A	N/A	N/A	N/A	N/A
Ce-141	N/A	N/A	N/A	N/A	N/A
Total for period	N/A	N/A	N/A	N/A	N/A
2. DISSOLVED AND			L	I	
Xe-133	N/A	N/A	N/A	N/A	N/A
Xe-135	N/A	N/A	N/A	N/A	N/A
Total for period	N/A	N/A	N/A	N/A	N/A

Notes for Table 2.3-B:

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Strontium:	5E-08 µCi/mL
lodines:	1E-06 μCi/mL
Noble Gases:	1E-05 μCi/mL
All Others:	5E-07 μCi/mL

Table 2.3-B (continued) Pilgrim Nuclear Power Station Annual Radioactive Effluent Release Report Liquid Effluents January-December 2010

	B	ATCH MODE RE	LEASES		
Nuclide Released	Jan-Mar 2010	Apr-Jun 2010	Jul-Sep 2010	Oct-Dec 2010	Jan-Dec 2010
1. FISSION AND AC	TIVATION PRODUC	TS: Ci			
Cr-51	N/A	4.01E-04	N/A	NDA	4.01E-04
Mn-54	N/A	1.80E-02	N/A	1.78E-06	1.80E-02
Fe-55	N/A	5.93E-03	N/A	NDA	5.93E-03
Fe-59	N/A	1.43E-04	N/A	NDA	1.43E-04
Co-58	N/A	2.37E-04	N/A	NDA	2.37E-04
Co-60	N/A	8.06E-03	N/A	1.71E-06	8.06E-03
Zn-65	N/A	1.08E-03	N/A	NDA	1.08E-03
Zn-69m		NDA	N/A	NDA	NDA
Sr-89	N/A	1.43E-05	N/A	NDA	1.43E-05
Sr-90	N/A	NDA	N/A	7.65E-07	7.65E-07
Zr/Nb-95	N/A	NDA	N/A	NDA	NDA
Mo/Tc-99	N/A	NDA	N/A	NDA	NDA
Ag-110m	N/A	2.51E-03	N/A	NDA	2.51E-03
Sb-124	N/A	NDA	N/A	NDA	NDA
I-131	N/A	NDA	N/A	NDA	NDA
I-133	N/A	NDA	N/A	6.04E-07	6.04E-07
Cs-134	N/A	NDA	N/A	NDA	NDA
Cs-137	N/A	5.86E-05	N/A	1.21E-05	7.07E-05
Ba/La-140	N/A	4.18E-04	N/A	NDA	4.18E-04
Ce-141	N/A	4.54E-05	N/A	NDA	4.54E-05
Ce-144	N/A	NDA	N/A	NDA	NDA
Total for period	N/A	3.69E-02	N/A	1.70E-05	3.69E-02
2. DISSOLVED AND	ENTRAINED GASE	S: Ci			
Xe-133	N/A	NDA	N/A	NDA	NDA
Xe-135	N/A	NDA	N/A	NDA	NDA
Total for period	N/A	NDA	N/A	NDA	NDA

Notes for Table 2.3-B:

1. N/A stands for not applicable.

NDA stands for No Detectable Activity.
 LLDs for liquid radionuclides listed as NDA are as follows:

Strontium:	5E-08 μCi/mL
lodines:	1E-06 μCi/mL
Noble Gases:	1E-05 μCi/mL
All Others:	5E-07 μCi/mL

3.0 METEOROLOGICAL DATA

Meteorological data are summarized for the reporting period in Appendix A, in the standard joint frequency distribution format as given in NRC Regulatory Guide 1.21.

The predominant meteorological conditions observed during the annual reporting period can be summarized with their corresponding frequencies as follows:

- Stability Class: Class D, 39%
- 33-ft Wind Direction (from): South-southwest, 15%
- 33-ft Wind Speed: 3.5-7.5 mph, 56%
- 220-ft Wind Direction (from): West-northwest, 13%
- 220-ft Wind Speed: 12.5-18.5 mph, 35%

A problem was encountered during the first quarter of 2010 due to the failure of the datalogging channels for the lower level sensor that existed for several weeks until replacement electronics were procured. This resulted in a joint data recovery of 86.3% for the 33-ft level, which failed to meet the annual recovery goal of greater than 90%. However, data recovery for the upper level of the 220-ft tower was 97.8%, well in excess of the 90% annual data recovery goal specified by the NRC.

4.0 MAXIMUM INDIVIDUAL DOSES

Doses to the maximum exposed individual resulting from radionuclides in effluents released offsite were calculated using methods presented in the PNPS Offsite Dose Calculation Manual (ODCM, Reference 2), NRC Regulatory Guide 1.109 (Reference 3), NRC Regulatory Guide 1.111 (Reference 4), and the Pilgrim Station Unit 1 Appendix I Evaluation (Reference 5). Maximum individual doses are calculated separately for: (1) noble gases in gaseous effluents, (2) particulates, iodines, and tritium in gaseous effluents; and, (3) liquid effluents. Maximum consumption and use factors for various pathways from Table E-5 of the PNPS ODCM are used for calculating the doses to the maximum exposed individual.

Information related to liquid and gaseous effluent releases are summarized Section 2 of this report. These effluent release data were used as input to computer programs to calculate the resulting doses. PNPS ODCM methodologies were used to calculate the dose contributions to the various organs in each age class from major exposure pathways.

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Liver and a second **Doses From Noble Gas Releases** 4.1

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Gaseous effluent release data presented in Tables 2.2-A, 2.2-B, and 2.2-C from this effluent release report were used as input to a dose assessment computer program to calculate radiation doses. These data include gaseous releases from the PNPS main stack, reactor building vent, and turbine building roof exhausters. Meteorological data obtained from the PNPS 220-foot meteorological tower during the 10-year period from 1994 through 2003 were used as input to the "AEOLUS-3" computer program (Reference 6). This program was used to calculate the annual average atmospheric dispersion and deposition factors used in the dose assessment computer program to calculate maximum individual doses.

The maximum individual doses resulting from radioactive noble gases released in gaseous effluents are presented in Table 4.1 according to specific receptor locations. This table includes all noble gas doses for the individual calendar guarters and total calendar year.

Noble gases released in gaseous effluents from PNPS during 2010 resulted in a maximum total body dose of 0.0078 mrem. The maximum skin dose was 0.025 mrem. Both of these doses occurred to a hypothetical individual, assumed to be present 24 hours per day, 365 days per year, at the site boundary location yielding the highest dose (0.64 km ESE of the Reactor Building). For the more "realistic" individuals at offsite locations, the maximum total body dose was 0.0060 mrem (nearest residence, 0.80 kilometers ESE from the Reactor Building), while the maximum skin dose was 0.018 mrem (nearest residence, 0.80 kilometers ESE from the Reactor Building).

Table 4.1

Maximum Doses From Noble Gas Releases During 20)10 ^(a)

Release Period	Gamma Air Dose mrad/period (location)	Beta Air Dose mrad/period (location)	Total Body Dose mrem/period (location)	Skin Dose mrem/period (location)
Jan-Mar	2.15E-03	3.21E-03	1.45E-03	4.47E-03
	(0.64 km ESE)	(0.64 km ESE)	(0.64 km ESE)	(0.64 km ESE)
Apr-Jun	3.48E-03	5.19E-03	2.34E-03	7.22E-03
	(0.64 km ESE)	(0.64 km ESE)	(0.64 km ESE)	(0.64 km ESE)
Jul-Sep	5.20E-03	9.11E-03	3.48E-03	1.18E-02
	(0.64 km ESE)	(0.64 km ESE)	(0.64 km ESE)	(0.64 km ESE)
Oct-Dec	7.72E-04	1.38E-03	5.17E-04	1.76E-03
	(0.64 km ESE)	(0.64 km ESE)	(0.64 km ESE)	(0.64 km ESE)
Jan-Dec	1.16E-02	1.89E-02	7.78E-03	2.53E-02
	(0.64 km ESE)	(0.64 km ESE)	(0.64 km ESE)	(0.64 km ESE)

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^(a) All directions and distances are with respect to the reactor building vent.

4.2 Doses From Gaseous Effluent Releases

Gaseous effluent release data presented in Tables 2.2-A, 2.2-B, and 2.2-C from this effluent release report were used as input to a dose assessment computer program to calculate radiation doses. These data include gaseous releases from the PNPS main stack, reactor building vent, and turbine building roof exhausters. Meteorological data obtained from the PNPS 220-foot meteorological tower during the 10-year period from 1994 through 2003 were used as input to the "AEOLUS-3" computer program (Reference 6). This program was used to calculate the annual average atmospheric dispersion and deposition factors used in the dose assessment computer program to calculate maximum individual doses.

The maximum individual doses resulting from radioactive particulates, radioiodines, tritium and carbon-14 released in gaseous effluents are presented in Tables 4.2-A through 4.2-E. These tables cover the individual calendar quarters and the total calendar year, respectively. Doses resulting from releases of noble gases are addressed independently in the PNPS ODCM. Therefore, none of these tables for maximum individual doses include any dose contribution from noble gases. The presentation and analysis of doses resulting from noble gases are addressed include any dose contribution from noble gases. The presentation and analysis of doses resulting from noble gases are addressed include this report.

Tables 4.2-A through 4.2-E summarize the maximum total body and organ doses for the adult, teen, child, and infant age classes resulting from the major gaseous exposure pathways. These tables present the dose data according to specific receptor location and the exposure pathways assumed to occur at that location. For example, the second column of the tables presents the information for the <u>hypothetical</u> maximum-exposed at the most restrictive site boundary location, where only inhalation and ground deposition exposure pathways are assumed to occur. Since this is a shoreline location controlled by Entergy, the other pathways of garden vegetable production, milk production, and meat production are assumed not to occur. Doses for other offsite locations not under Entergy control, where other exposure pathways can and do occur, are presented in subsequent columns of the tables, and represent the potential maximum doses to individuals at these locations.

Radioactivity (particulates, radioiodines, tritium, and carbon-14) released in gaseous effluents from PNPS during 2010 resulted in a maximum total body dose (child age class) of 0.0313 mrem (child age class at nearest garden location, 0.87 kilometers SE from the Reactor Building), while the maximum organ dose was 0.109 mrem (child bone at nearest garden location, 0.87 kilometers SE from the Reactor Building). Carbon-14 contributed 0.0178 mrem (57%) of the 0.0313 mrem child total body dose, and 0.0892 mrem (82%) of the 0.109 mrem child bone dose at the location of the nearest garden.

Table 4.2-A

Maximum Individual Organ Dose at Receptor Location -- mrem From Gaseous Release Period: Jan-Mar 2010

Receptor:	Bound	Resident	Garden	Cow/Goat	Cow/Meat	Meat
Direction:	NNW	ESE	SE	WSW	w	S
Distance ¹ :	0.28 km	0.80 km	0.87 km	3.97 km	5.77 km	3.80 km
Pathway ² :	DI	DI	DIV ³	DIVCG ³	DIVCM ³	DIVM ³
Age Class: A	Adult					
Bone	1.99E-04	1.48E-04	5.98E-03	2.33E-03	2.04E-03	3.53E-03
GI-LLI	8.06E-04	5.46E-04	2.53E-03	5.77E-04	4.73E-04	7.87E-04
Kidney	7.72E-04	5.24E-04	2.45E-03	5.74E-04	4.72E-04	7.82E-04
Liver	7.69E-04	5.22E-04	2.44E-03	5.73E-04	4.71E-04	7.82E-04
Lung	8.56E-04	5.80E-04	2.48E-03	5.73E-04	4.71E-04	7.83E-04
Thyroid	1.67E-03	_1.12E-03	4.87E-03	-1.31E-03	8.66E-04	9.44E-04
T.Body	7.67E-04	5.21E-04	2.44E-03	5.72E-04	4.71E-04	7.82E-04
Age Class: T	een					
Bone	2.85E-04	2.12E-04	9.63E-03	3.92E-03	3.07E-03	4.99E-03
GI-LLI	8.30E-04	5.64E-04	3.37E-03	9.08E-04	6.86E-04	1.08E-03
Kidney	7.96E-04	5.41E-04	3.29E-03	9.08E-04	6.86E-04	1.08E-03
Liver	7.92E-04	5.39E-04	3.28E-03	9.06E-04	6.84E-04	1.08E-03
Lung	9.35E-04	6.33E-04	3.35E-03	9.06E-04	6.85E-04	1.08E-03
Thyroid	1.93E-03	, 1.30E-03	5.49E-03	1.99E-03	1.26E-03	1.22E-03
T.Body	7.90E-04	5.37E-04	3.29E-03	9.05E-04	6.84E-04	1.08E-03
Age Class: C	Child					
Bone	3.93E-04	2.93E-04	2.30E-02	9.45E-03	7.22E-03	1.15E-02
GI-LLI	7.40E-04	5.05E-04	6.45E-03	2.06E-03	1.54E-03	2.41E-03
Kidney	7.29E-04	4.97E-04	6.40E-03	2.06E-03	1.54E-03	2.41E-03
Liver	7.26E-04	4.95E-04	6.40E-03	2.06E-03	1.54E-03	2.41E-03
Lung	8.48E-04	5.76E-04	6.45E-03	2.06E-03	1.54E-03	2.41E-03
Thyroid	2.07E-03	1.39E-03	9.57E-03	4.14E-03	2.63E-03	2.61E-03
T.Body	7.24E-04	4.94E-04	6.42E-03	2.06E-03	1.54E-03	2.41E-03
Age Class: I	nfant	, <u>, , , , , , , , , , , , , , , , , , </u>				
Bone	2.89E-04	2.16E-04	1.80E-04	5.92E-03	4.11E-03	7.87E-05
GI-LLI	4.37E-04	2.99E-04	2.25E-04	1.35E-03	9.17E-04	2.62E-05
Kidney	4.35E-04	2.98E-04	2.24E-04	1.36E-03	9.25E-04	2.61E-05
Liver	4.34E-04	2.97E-04	2.24E-04	1.36E-03	9.24E-04	2.61E-05
Lung	5.47E-04	3.72E-04	2.79E-04	1.35E-03	9.18E-04	2.88E-05
Thyroid	1.67E-03	1.11E-03	8.26E-04	6.04E-03	3.35E-03	5.61E-05
T.Body	4.32E-04	2.95E-04	2.23E-04	1.35E-03	9.20E-04	2.60E-05

¹ Distances are measured with respect to the reactor building vent.

² Pathway designations are as follows:
 D = Deposition (Ground Plane)

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D = Deposition (Ground Plane)I = InhalationV = Vegetable GardenC = Cow MilkG = Goat MilkM = Meat

³ Doses are conservative since it is unlikely for vegetables to be grown outside or for animals to be fed on pasture during winter months.

Table 4.2-B

Maximum Individual Organ Dose at Receptor Location -- mrem From Gaseous Release Period: Apr-Jun 2010

Receptor:	Bound	Resident	Garden	Cow/Goat	Cow/Meat	Meat
Direction:	NNW	ESE	SE	WSW	W	S
Distance ¹ :	0.28 km	0.80 km	0.87 km	3.97 km	5.77 km	3.80 km
Pathway ² :	DI	DI	DIV	DIVCG	DIVCM	DIVM
Age Class: A	dult				1	
Bone	3.12E-04	2.23E-04	1.17E-02	2.67E-03	2.23E-03	3.92E-03
GI-LLI	8.16E-04	5.53E-04	2.66E-03	5.88E-04	4.81E-04	8.00E-04
Kidney	7.78E-04	5.28E-04	2.47E-03	5.80E-04	4.76E-04	7.88E-04
Liver	7.75E-04	5.26E-04	2.46E-03	5.78E-04	4.75E-04	7.88E-04
- Lung	8.95E-04	6.05E-04	2.51E-03	5.78E-04	4.75E-04	7.90E-04
Thyroid	1.87E-03	1.25E-03	- 5.63E-03	1.55E-03	1.00E-03	~ 1.00E-03
T.Body	7.75E-04	5.26E-04	2.58E-03	5.83E-04	4.78E-04	7.95E-04
Age Class: T	een					
Bone	4.14E-04	2.99E-04	1.72E-02	4.38E-03	3.33E-03	5.49E-03
GI-LLI	8.41E-04	5.71E-04	3.53E-03	9.24E-04	6.96E-04	1.10E-03
Kidney	8.03E-04	5.46E-04	3.32E-03	9.17E-04	6.92E-04	1.08E-03
Liver	7.99E-04	5.43E-04	3.31E-03	9.14E-04	6.90E-04	1.08E-03
Lung	9.95E-04	6.73E-04	3.40E-03	9.14E-04	6.91E-04	1.09E-03
Thyroid	2.17E-03	1.45E-03	6.17E-03	2.35E-03	1.45E-03	1.27E-03
T.Body	7.99E-04	5.43E-04	3.46E-03	9.20E-04	6.94E-04	1.09E-03
Age Class: C	hild					
Bone	5.43E-04	3.93E-04	3.82E-02	1.04E-02	7.75E-03	1.25E-02
GI-LLI	7.48E-04	5.10E-04	6.61E-03	2.08E-03	1.56E-03	2.43E-03
Kidney	7.36E-04	5.02E-04	6.46E-03	2.08E-03	1.56E-03	2.42E-03
Liver	7.32E-04	4.99E-04	6.45E-03	2.08E-03	1.55E-03	2.42E-03
Lung	9.02E-04	6.12E-04	6.52E-03	2.07E-03	1.55E-03	2.43E-03
Thyroid	2.32E-03	1.56E-03	1.06E-02	4.84E-03	3.01E-03	2.69E-03
T.Body	7.32E-04	5.00E-04	6.76E-03	2.09E-03	1.56E-03	2.44E-03
Age Class: Ir	nfant					
Bone	3.50E-04	2.56E-04	2.09E-04	6.07E-03	4.19E-03	8.08E-05
GI-LLI	4.41E-04	3.02E-04	2.27E-04	1.36E-03	9.25E-04	2.64E-05
Kidney	4.39E-04	3.00E-04	2.26E-04	1.38E-03	9.35E-04	2.63E-05
Liver	4.38E-04	3.00E-04	2.26E-04	1.37E-03	9.33E-04	2.63E-05
Lung	5.85E-04	3.97E-04	2.98E-04	1.36E-03	9.26E-04	2.99E-05
Thyroid	1.90E-03	1.27E-03	9.40E-04	7.61E-03	4.17E-03	6.20E-05
T.Body	4.36E-04	2.99E-04	2.25E-04	1.37E-03	9.29E-04	2.63E-05

¹ Distances are measured with respect to the reactor building vent. ² Pathway designations are as follows:

D =	Depo	osition	(Ground	Plane)	
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C = Cow Milk

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I = Inhalation G = Goat Milk

V = Vegetable Garden M = Meat

Table 4.2-C

Maximum Individual Organ Dose at Receptor Location -- mrem From Gaseous Release Period: Jul-Sep 2010

Receptor:	Bound	Resident	Garden	Cow/Goat	Cow/Meat	Meat
Direction:	NNW	ESE	SE	WSW	W	S
Distance ¹ :	0.28 [°] km	0.80 km	0.87 km	3.97 km	5.77 km	3.80 km
Pathway ² :	DI	DI	DIV	DIVCG	DIVCM	DIVM
				Dived		
Age Class: A	2.06E-04	1 525 04	6 105 02			2.005.00
Bone		1.53E-04	6.19E-03	2.38E-03	2.07E-03	3.60E-03
GI-LLI	1.23E-03	8.32E-04	3.30E-03	6.47E-04	5.18E-04	8.44E-04
Kidney	1.19E-03	8.05E-04	3.20E-03	6.46E-04	5.17E-04	8.39E-04
Liver	1.19E-03	8.03E-04	3.20E-03	6.43E-04	5.15E-04	8.38E-04
Lung	1.29E-03	~~.8.71E-04	3.24E-03	6.43E-04	5.15E-04	8.40E-04
Thyroid	2.46E-03	1.65E-03	6.63E-03	1.70E-03	1.09E-03	1.07E-03
T.Body	1.18E-03	7 8.01E-04	3.20E-03	6.42E-04	5.15E-04	8.38E-04
Age Class: T		<u></u>				
Bone	2.94E-04	2.19E-04	9.95E-03	3.99E-03	3.13E-03	5.08E-03
GI-LLI	1.26E-03	8.53E-04	4.22E-03	9.94E-04	7.38E-04	1.14E-03
Kidney	1.22E-03	8.26E-04	4.14E-03	9.95E-04	7.38E-04	1.14E-03
Liver	1.21E-03	8.23E-04	4.13E-03	9.91E-04	7.36E-04	1.14E-03
Lung	1.38E-03	9.34E-04	4.20E-03	9.91E-04	7.36E-04	1.14E-03
Thyroid	2.83E-03	1.89E-03	7.25E-03	2.54E-03	1.56E-03	1.34E-03
T.Body	1.21E-03	8.20E-04	4.14E-03	9.90E-04	7.35E-04	1.14E-03
Age Class: C	Child	·				
Bone	4.05E-04	3.02E-04	2.37E-02	9.62E-03	7.35E-03	1.17E-02
GI-LLI	1.11E-03	7.58E-04	7.65E-03	2.19E-03	1.62E-03	2.51E-03
Kidney	1.10E-03	7.50E-04	7.60E-03	2.20E-03	1.63E-03	2.51E-03
Liver	1.10E-03	7.47E-04	7.59E-03	2.20E-03	1.62E-03	2.51E-03
Lung	1.24E-03	8.42E-04	7.65E-03	2.19E-03	1.62E-03	2.51E-03
Thyroid	3.00E-03	2.01E-03	1.21E-02	5.18E-03	3.20E-03	2.81E-03
T.Body	1.09E-03	7.44E-04	7.62E-03	2.19E-03	1.62E-03	2.51E-03
Age Class: I	nfant		Ang	•		
Bone	2.98E-04	2.22E-04	1.84E-04	6.03E-03	4.18E-03	8.01E-05
GI-LLI	6.52E-04	4.44E-04	3.32E-04	1.42E-03	9.57E-04	3.23E-05
Kidney	6.51E-04	4.43E-04	3.32E-04	1.44E-03	9.69E-04	3.23E-05
Liver	6.50E-04	4.43E-04	3.31E-04	1.44E-03	9.67E-04	3.23E-05
Lung	7.82E-04	5.30E-04	3.96E-04	1.42E-03	9.58E-04	3.55E-05
Thyroid	2.40E-03	1.60E-03	1.19E-03	8.16E-03	4.48E-03	7.53E-05
T.Body	6.46E-04	4.40E-04	3.29E-04	1.43E-03	9.61E-04	3.22E-05

¹ Distances are measured with respect to the reactor building vent.
 ² Pathway designations are as follows: D = Deposition (Ground Plane)
 I = Inhalation

- C = Cow Milk

G = Goat Milk

V = Vegetable Garden M = Meat

Table 4.2-D

Maximum Individual Organ Dose at Receptor Location -- mrem From Gaseous Release Period: Oct-Dec 2010

Receptor:	Bound	Resident	Garden	Cow/Goat	Cow/Meat	Meat
Direction:	NNW	ESE	SE	WSW	W	S
Distance ¹ :	0.28 km	0.80 km	0.87 km	3.97 km	5.77 km	3.80 km
Pathway ² :	DI	DI	DIV^3	DIVCG ³		DIVM ³
Age Class: A						
Bone	2.12E-04	1.57E-04	6.54E-03	2.39E-03	2.08E-03	3.60E-03
GI-LLI	2.29E-03	1.55E-03	5.18E-03	8.04E-04	6.11E-04	9.56E-04
Kidney	2.29E-03	1.53E-03	5.09E-03	8.04E-04	6.09E-04	9.50E-04
Liver	2.25E-03	1.52E-03	5.08E-03	8.00E-04	6.08E-04	9.50E-04
Lung	2.35E-03	1.58E-03	5.12E-03	8.00E-04	6.08E-04	9.52E-04
Thyroid	3.38E-03	2.27E-03	8.04E-03	1.69E-03	1:09E-03	1.15E-03
T.Body	2.25E-03	1.52E-03	5.10E-03	8.00E-04	6.08E-04	9.51E-04
Age Class: T		1.522-05	10 <u>L-03</u>	0.000-04	0.000-04	9.512-04
Bone	3.00E-04	2.23E-04	1.04E-02	4.00E-03	3.13E-03	5.09E-03
GI-LLI	2.33E-03	1.58E-03	6.31E-03	1.17E-03	8.40E-04	1.26E-03
Kidney	2.30E-03	1.55E-03	6.22E-03	1.17E-03	8.40E-04	1.26E-03
Liver	2.29E-03	1.55E-03	6.21E-03	1.17E-03	8.38E-04	1.26E-03
Lung	2.29L-03	1.65E-03	6.28E-03	1.17E-03	8.38E-04	1.26E-03
Thyroid	3.72E-03	2.50E-03	8.91E-03	2.48E-03	1.53E-03	1.43E-03
T.Body	2.29E-03	1.55E-03	6.23E-03	1.17E-03	8.38E-04	1.43E-03
Age Class: C		1.556-03	0.232-03	1.17E-03	0.30E-04	1.202-03
Bone	4.12E-04	3.06E-04	2.46E-02	9.64E-03	7.35E-03	1.17E-02
GI-LLI	2.06E-03	1.40E-03	1.05E-02	2.45E-03	1.76E-03	2.67E-03
Kidney	2.00E-03	1.39E-03	1.05E-02	2.45E-03	1.77E-03	2.67E-03
Liver	2.05E-03	1.39E-03	1.05E-02	2.45E-03	1.77E-03	2.67E-03
Lung	2.03E-03	1.47E-03	1.05E-02	2.45E-03	1.76E-03	2.67E-03
Thyroid	3.74E-03	2.51E-03	1.43E-02	4.97E-03	3.10E-03	2.92E-03
T.Body	2.05E-03	1.39E-03	1.05E-02	2.45E-03	1.77E-03	2.67E-03
Age Class: Ir		1.392-03	1.05E-02	2.450-03	1.77E-03	2.072-03
Bone	2.99E-04	2.23E-04	1.85E-04	6.01E-03	4.17E-03	7.99E-05
GI-LLI	1.20E-04	8.13E-04	6.06E-04	1.54E-03	1.02E-03	4.73E-05
Kidney	1.20E-03	8.13E-04 8.13E-04	6.05E-04	1.54E-03	1.02E-03	4.73E-05 4.72E-05
Liver	1.20E-03	8.13E-04 8.12E-04	6.05E-04 6.05E-04	1.56E-03	1.03E-03	
	1.31E-03	8.89E-04	6.62E-04	1.55E-03	1.03E-03	4.72E-05
Lung						5.00E-05
Thyroid T Rody	2.75E-03	1.84E-03	1.36E-03	7.25E-03	3.98E-03	8.52E-05
T.Body	1.19E-03	8.10E-04	6.03E-04	1.55E-03	1.02E-03	4.71E-05

¹ Distances are measured with respect to the reactor building vent. ² Pathway designations are as follows: D = Deposition (Ground Plane) I = Inhalation

C = Cow Milk

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G = Goat Milk

V = Vegetable Garden M = Meat

³ Doses are conservative since it is unlikely for vegetables to be grown outside or for animals to be fed on pasture during winter months.

Table 4.2-E

Maximum Individual Organ Dose at Receptor Location -- mrem From Gaseous Release Period: Jan-Dec 2010

Receptor:	Bound	Resident	Garden	Cow/Goat	Cow/Meat	Meat
Direction:	NNW	ESE	SE	wsw	w	s
Distance ¹ :	0.28 km	0.80 km	0.87 km	3.97 km	5.77 km	3.80 km
Pathway ² :	DI	DI	DIV ³	DIVCG ³	DIVCM ³	DIVM ³
Age Class: A	dult		•	•		
Bone	9.28E-04	6.82E-04	3.04E-02	9.76E-03	8.41E-03	1.47E-02
GI-LLI	5.14E-03	3.48E-03	1.37E-02	2.62E-03	2.08E-03	3.39E-03
Kidney	5.00E-03	3.38E-03	1.32E-02	2.60E-03	2.07E-03	3.36E-03
Liver	4.98E-03	3.38E-03	1.32E-02	2.59E-03	2.07E-03	3.36E-03
Lung	5.38E-03	3.64E-03	1.33E-02	2.59E-03	2.07E-03	3.36E-03
Thyroid	9.38E-03	6.29E-03	2.52E-02	6.25E-03	4.04E-03	4.16E-03
T.Body	4.98E-03	3.37E-03	1.33E-02	2.60E-03	2.07E-03	3.37E-03
Age Class: T	een					
Bone	1.29E-03	9.53E-04	4.71E-02	1.63E-02	1.27E-02	2.06E-02
GI-LLI	5.26E-03	3.56E-03	1.74E-02	4.00E-03	2.96E-03	4.58E-03
Kidney	5.11E-03	3.47E-03	1.70E-02	3.99E-03	2.96E-03	4.56E-03
Liver	5.10E-03	3.46E-03	1.69E-02	3.98E-03	2.95E-03	4.55E-03
Lung	5.75E-03	3.89E-03	1.72E-02	3.98E-03	2.95E-03	4.57E-03
Thyroid	1.07E-02	7.14E-03	2.78E-02	9.36E-03	5.80E-03	5.26E-03
T.Body	5.09E-03	3.45E-03	1.71E-02	3.98E-03	2.95E-03	4.57E-03
Age Class: C	hild					
Bone	1.75E-03	1.29E-03	1.09E-01	3.91E-02	2.97E-02	4.75E-02
GI-LLI	4.67E-03	3.17E-03	3.12E-02	8.78E-03	6.48E-03	1.00E-02
Kidney	4.62E-03	3.14E-03	3.09E-02	8.80E-03	6.50E-03	1.00E-02
Liver	4.61E-03	3.13E-03	3.09E-02	8.78E-03	6.49E-03	1.00E-02
Lung	5.17E-03	3.50E-03	3.11E-02	8.77E-03	6.48E-03	1.00E-02
Thyroid	1.11E-02	7.46E-03	4.65E-02	1.91E-02	1.19E-02	1.10E-02
T.Body	4.60E-03	3.13E-03	3.13E-02	8.80E-03	6.49E-03	1.00E-02
Age Class: Ir	Age Class: Infant					
Bone	1.24E-03	9.16E-04	7.58E-04	2.40E-02	1.66E-02	3.19E-04
GI-LLI	2.73E-03	1.86E-03	1.39E-03	5.67E-03	3.82E-03	1.32E-04
Kidney	2.72E-03	1.85E-03	1.39E-03	5.74E-03	3.86E-03	1.32E-04
Liver	2.72E-03	1.85E-03	1.39E-03	5.73E-03	3.85E-03	1.32E-04
Lung	3.23E-03	2.19E-03	1.63E-03	5.67E-03	3.82E-03	1.44E-04
Thyroid	8.71E-03	5.82E-03	4.31E-03	2.91E-02	1.60E-02	2.79E-04
T.Body	2.71E-03	1.84E-03	1.38E-03	5.70E-03	3.83E-03	1.32E-04

¹ Distances are measured with respect to the reactor building vent. ² Pathway designations are as follows:

D = Deposition (Ground Plane)	I = Inhalation	V = Vegetable Garden
C = Cow Milk	G = Goat Milk	M = Meat

³ Doses are conservative since it is unlikely for vegetables to be grown outside or for animals to be fed on pasture during winter months.

4.3 Doses From Liquid Effluent Releases

Liquid effluent release data presented in Tables 2.3-A and 2.3-B were used as input to the dose assessment computer program to calculate radiation doses. The maximum individual doses resulting from radionuclides released in liquid effluents are presented in Tables 4.3-A through 4.3-E. These tables cover the individual calendar guarters and the total calendar year, respectively.

Tables 4.3-A through 4.3-E summarize the maximum total body and organ doses for the adult, teen, and child age classes resulting from the major liquid exposure pathways. NRC Regulatory Guide 1.109 does not recognize the infant age class as being exposed to the liquid effluent pathways. Therefore, doses for this age class are not included in any of the tables.

It should be noted that doses calculated for the entire year might not equal the sum of the doses for the individual quarters. Doses from liquid effluents are based on the concentration (activity divided by volume) of radionuclides released in the effluent, as prescribed by the NRC in Regulatory Guide 1.109. If a larger proportion of activity is released with a relatively smaller volume of dilution water during a given quarter, the resulting concentration for that quarter will be higher than concentrations from other quarters. This will result in a proportionally higher dose for that quarter. However, when that quarter's activity values are included in the annual sum, and divided by the total annual dilution flow, the resulting dose contribution will be smaller. In such a situation, the annual dose will actually be less than the sum of the individual quarterly doses.

Radioactivity released in liquid effluents from PNPS during the reporting period resulted in a maximum total body dose (child age class) of 0.00197 mrem. The maximum organ dose (adult age class, GI-LLI) was 0.00997 mrem.

Table 4.3-A

Maximum Individual Organ Doses -- mrem From Liquid Release Period: Jan-Mar 2010

	Age Class Organ Dose – mrem *				
Organ	Adult	Teen	Child		
Bone	0.00E+00	0.00E+00	0.00E+00		
GI-LLI	0.00E+00	0.00E+00	0.00E+00		
Kidney	0.00E+00	0.00E+00	0.00E+00		
Liver	0.00E+00	0.00E+00	0.00E+00		
Lung	0.00E+00	0.00E+00	0.00E+00		
Thyroid	0.00E+00	0.00E+00	0.00E+00		
T.Body	0.00E+00	0.00E+00	0.00E+00		

* These doses are conservative since the same usage factor was applied for each quarter. In reality, it is unlikely that anyone would be swimming or boating during the entire year. However, the resulting dose is considerably lower than those from other pathways and does not contribute much to the total dose. Table 4.3-B

Maximum Individual Organ Doses -- mrem From Liquid Release Period: Apr-Jun 2010

	Age Cla	Age Class Organ Dose – mrem				
Organ	Adult	Teen	Child			
Bone	2.26E-03	2.34E-03	2.74E-03			
GI-LLI	1.00E-02	6.80E-03	2.45E-03			
Kidney	2.00E-03	2.01E-03	1.51E-03			
Liver	4.22E-03	4.14E-03	3.61E-03			
Lung	6.00E-04	9.62E-04	6.48E-04			
Thyroid	6.95E-05	3.75E-04	7.97E-05			
T.Body	1.75E-03	1.92E-03	1.98E-03			

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Table 4.3-C

Maximum Individual Organ Doses -- mrem From Liquid Release Period: Jul-Sep 2010

	Age Class Organ Dose – mrem			
Organ	Adult	Teen	Child	
Bone	0.00E+00	0.00E+00	0.00E+00	
GI-LLI	0.00E+00	0.00E+00	0.00E+00	
Kidney	0.00E+00	0.00E+00	0.00E+00	
Liver	0.00E+00	0.00E+00	0.00E+00	
Lung	0.00E+00.	0.00E+00	0.00E+00	
Thyroid	0.00E+00	0.00E+00	0.00E+00	
T.Body	0.00E+00	0.00E+00	0.00E+00	

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Table 4.3-D

Maximum Individual Organ Doses -- mrem From Liquid Release Period: Oct-Dec 2010

	Age Class Organ Dose – mrem *			
Organ	Adult	Teen	Child	
Bone	7.98E-07	9.46E-07	8.18E-07	
GI-LLI	4.57E-07	5.48E-07	1.63E-07	
Kidney	2.35E-07	4.70E-07	2.20E-07	
Liver	5.75E-07	8.11E-07	5.42E-07	
Lung	1.20E-07	3.62E-07	1.22E-07	
Thyroid	8.98E-08	3.21E-07	9.73E-08	
T.Body	5.04E-07	5.73E-07	2.53E-07	

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* These doses are conservative since the same usage factor was applied for each quarter. In reality, it is unlikely that anyone would be swimming or boating during these months. However, the resulting dose is considerably lower than those from other pathways and does not contribute much to the total dose.

Table 4.3-E

		Age Class Organ Dose – mrem *			
	Organ	Adult	Teen	Child	
	Bone	2.25E-03	2.33E-03	2.73E-03	
	GI-LLI	9.97E-03	6.77E-03	2.44E-03	
	Kidney	1.99E-03	2.00E-03	1.50E-03	
	Liver	4.20E-03	4.13E-03	3.59E-03	
	Lung	5.98E-04	9.58E-04	6.45E-04	
· · ·	Thyroid	6.92E-05	3.74E-04	7.94E-05	
	T.Body	1.74E-03	1.91E-03	1.97E-03	

Maximum Individual Organ Doses -- mrem From Liquid Release Period: Jan-Dec 2010

* These doses are conservative since the same usage factor was applied for each quarter. In reality, it is unlikely that anyone would be swimming or boating during the entire year. However, the resulting dose is considerably lower than those from other pathways and does not contribute much to the total dose.

5.0 OFFSITE AMBIENT RADIATION MEASUREMENTS

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The PNPS ODCM does not contain control limits related specifically to offsite ambient radiation exposure. However, Regulatory Guide 1.21 (Reference 1) recommends calculation of ambient radiation exposure as part of the overall assessment of radiological impact on man.

Thermoluminescent dosimeters (TLDs) are located at 83 sites beyond the boundary of the PNPS restricted/protected area. A number of these TLDs are located within the <u>site</u> boundary, on Entergy property in close proximity to the station proper. The TLDs are collected on a quarterly basis and used to calculate the ambient radiation exposure in milliRoentgen (mR) over the exposure period. These TLDs are grouped into four zones of increasing distance from the station. Average exposure values for each of these zones were calculated for each calendar quarter and the total year. The average exposure values (mR) for the four zones are presented in Table 5.0.

In addition to responding to ambient radiation exposure, TLDs will also record radiation resulting from noble gases (plume and immersion exposure), particulate materials deposited on the ground, cosmic rays from outer space, and from naturally-occurring radioactivity in the soil and air. Typically, the exposure from cosmic rays and other natural radioactivity components is about 40 to 70 mR/year. As calculated in Sections 4.1 and 4.2 of this report, the ambient radiation component of doses from PNPS effluent emissions are below 1 mrem/yr and would not be discernible above the natural radiation exposure levels.

The major source of ambient radiation exposure from PNPS results from high-energy gamma rays emitted from nitrogen-16 (N-16) contained in steam flowing through the turbine. Although the N-16 is enclosed in the process lines and turbine and is <u>not</u> released into the environment, the ambient radiation exposure and sky shine from this contained source accounts for the majority of the radiation dose, especially in close proximity to the station. Other sources of ambient radiation exposure include radiation emitted from contained radioactive materials and/or radwaste at the facility. Despite these sources of ambient radiation exposure at PNPS, increases in exposure from ambient radiation are typically not observable above background levels at locations beyond Entergy controlled property.

The average exposure values presented in Table 5.0 appear to indicate an elevation in ambient exposures in Zone 1, those TLDs within 2 miles of PNPS. Most of this elevation is due to increases in exposure levels measured at TLD locations on Entergy property in close proximity to the station proper. For example, the annual exposure at TLD location OA, located at the Overlook Area near the PNPS Health Club (I&S Building), was 215 mR for the entire year. This location is immediately adjacent to the station proper and overlooks the turbine building, therefore receiving the highest direct ambient and sky shine exposure. When the near-site TLDs (those located within 0.6 km of the Reactor Building) are removed from the calculation of averages, the mean annual exposure in Zone 1 falls from 74.2 \pm 28.8 mR/yr to 61.4 \pm 7.9 mR/yr. Such a corrected dose is not statistically different from the Zone 4 average of 59.8 \pm 6.9 mR/yr, and is indicative of natural background radiation.

Although the annual exposure at TLD location OA was 155 mR above the average Zone 4 exposure, members of the general public do not continuously occupy this area. When adjusted for such occupancy, a hypothetical member of the public who was at this location for 40 hours per year would only receive an incremental dose of 0.7 mrem over natural background radiation levels. At the nearest residence 0.8 kilometers (0.5 miles) southeast of the PNPS Reactor Building, the annual exposure was calculated as being 58.5 ± 8.0 mR (based on continuous occupancy at this location), which compares quite well to the Zone 4 annual average background radiation level of 59.8 ± 6.9 mR. Statistically, there is no difference between these two values.

It must be emphasized that the projected ambient exposures discussed on the previous page are calculated to occur to a maximum-exposed <u>hypothetical</u> individual. Even though conservative assumptions are made in the projection of these dose consequences, all of the projected doses are well below the NRC dose limit of 100 mrem/yr specified in 10CFR20.1301, as well as the EPA dose limit of 25 mrem/yr specified in 40CFR190. Both of these limits are to be applied to <u>real</u> members of the general public, so the fact that the dose to the <u>hypothetical</u> maximum-exposed individual is within the limits ensures that any dose received by a real member of the public would be smaller and well within any applicable limit.

In 1994, Pilgrim Station opened the old training facility (I&S Building) overlooking the plant as a health club for its employees. This site is immediately adjacent to the protected area boundary near monitoring location OA and receives appreciable amounts of direct ambient and sky shine exposure from the turbine building. Although personnel using this facility are employees of Entergy, they are considered to be members of the public. Due to their extended presence in the facility (500 hr/yr, assuming utilization of the facility for 2 hr/day, 5 days a week, for 50 weeks/yr), these personnel represent the most conservative case in regards to ambient radiation exposure to a member of the public within the PNPS owner controlled area. Their annual incremental radiation dose above background during 2010 is estimated as being about 1.8 mrem, based on the average exposure measured by the TLD in the building.

The exposures measured by the TLD located in the health club would also include any increase in ambient radiation resulting from noble gases and/or particulate activity deposited on the ground from gaseous releases. However, they would not indicate any internal dose received by personnel in this facility from inhalation of small amounts of PNPS-related radioactivity contained in the air. An environmental air sampler located immediately adjacent to the health club did not indicate any PNPS-related activity during 2010. Dose calculations performed in the same manner as those outlined in Section 4.2 for airborne effluent releases yielded a projected total body dose to the maximum-exposed individual (500 hr/yr exposure) of about 0.0011 mrem, resulting from inhalation.

Again, it must be emphasized that the above-described exposures were received by personnel who are employees or contractors of Entergy, accessing areas or facilities on property under the ownership and control of Entergy. Since this exposure was received within the owner-controlled area, it is not used for comparison to the annual dose limit of 25 mrem/yr specified in 40CFR190. This regulation expressly applies to areas at or beyond the owner-controlled property, and is not applicable in this situation. As stated earlier, TLDs at and beyond the site boundary do not indicate elevated ambient radiation levels resulting from the operation of Pilgrim Station.

Although some of the TLDs in close proximity to PNPS indicate increases in exposure levels from ambient radiation, such increases are localized to areas under Entergy control. For members of the general public who are not employed or contracted with Entergy and are accessing Entergy controlled areas (e.g., parking lots, etc.), such increases in dose from ambient radiation exposure are estimated as being less than 1.0 mrem/year.

Table 5.0

	Average Exposure ± Standard Deviation: mR/period			
Exposure	Zone 1*	Zone 2	Zone 3	Zone 4
Period	0-3 km	3-8 km	8-15 km	>15 km
Jan-Mar	17.7 ± 7.4	13.4 ± 1.7	13.4 ± 1.9	14.8 ± 2.2
Apr-Jun	19.2 ± 7.8	14.7 ± 1.7	14.0 ± 1.3	15.2 ± 1.8
Jul-Sep	18.8 ± 6.5	14.5 ± 1.8	14.2 ± 1.5	15.4 ± 1.5
Oct-Dec	18.4 ± 7.1	14.1 ± 1.6	13.5 ± 1.3	14.4 ± 1.5
Jan-Dec	74.2 ± 28.8**	56.6 ± 7.0	55.1 ± 5.9	59.8 ± 6.9

Average TLD Exposures By Distance Zone During 2010

* Zone 1 extends from the PNPS restricted/protected area boundary outward to 3 kilometers (2 miles), and includes several_TLDs located within the site boundary.

** When corrected for TLDs located within the site boundary, the Zone 1 annual average is calculated to be 61.4 ± 7.9 mR/yr.

6.0 PERCENT OF ODCM EFFLUENT CONTROL LIMITS

The PNPS ODCM contains dose and concentration limits for radioactive effluents. In addition, the effluent controls specified ensure that radioactive releases are maintained as low as reasonably achievable. The percentage of the PNPS ODCM Control limit values were determined from doses calculated in Section 4, the effluent releases summarized in Section 2, and the ODCM Control limits/objectives listed in Tables 6.1 and 6.2.

The percent of applicable control limit values are provided to supplement the information provided in the Section 2 of this report. The format for the percent of applicable limits is modified from that prescribed in Regulatory Guide 1.21 (Reference 1) to accommodate the Radioactive Effluents Technical Specifications (RETS) that became effective March 01, 1986. The percentages have been grouped according to whether the releases were via liquid or gaseous effluent pathways.

6.1 <u>Gaseous Effluent Releases</u>

Dose-based effluent controls related to exposures arising from gaseous effluent releases are presented in Table 6.1. The maximum quarterly air doses and annual whole body doses listed in Table 4.1 were used to calculate the percentage values shown in Table 6.1. All doses resulting from noble gas exposure were a small percentage of the applicable effluent control.

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Organ dose limits for the maximum-exposed individual from radioactive particulates, iodines, and tritium from the PNPS ODCM are also shown in Table 6.1. The maximum quarterly and annual organ doses from Tables 4.2-A through 4.2-E were used to calculate the percentages shown in Table 6.1. The resulting organ doses from Pilgrim Station's gaseous releases during 2010 were a small percentage of the corresponding effluent control.

Table 6.1

Percent of ODCM Effluent Control Limits for Gaseous Effluent Releases During 2010

A.	Instantaneous Dose Rate Limit - Noble Gases PNPS ODCM Control 3.3.1.a Limit: 500 mrem/yr Total Body Dose			
	<u>Period</u>	<u>Value - mrem/yr</u>	Fraction of Limit	
	Jan-Dec	7.78E-03	1.56E-03%	
В.	Instantaneous Dose Rate Lim PNPS ODCM Control Limit: 3000 mrem/yr S	3.3.1.a	ana kan Tana ang pangang pangang pangang Tang pangang	
	<u>Period</u>	Value - mrem/yr	Fraction of Limit	
	Jan-Dec	2.53E-02	8.42E-04%	
C.	Instantaneous Dose Rate Lim PNPS ODCM Control Limit: 1500 mrem/yr C			
	<u>Period</u>	<u>Value - mrem/yr</u>	Fraction of Limit	
	Jan-Dec	1.09E-01	7.30E-03%	
D.	Quarterly Dose Objective - No PNPS ODCM Control Objective: 5 mrad Ga	3.3.2.a		
	<u>Period</u>	<u>Value – mrad</u>	Fraction of Limit	
	Jan-Mar	2.15E-03	4.31E-02%	
	Apr-Jun	3.48E-03	6.96E-02%	
	Jul-Sep	5.20E-03	1.04E-01%	
	Oct-Dec	7.72E-04	1.54E-02%	
E.	. Annual Dose Objective - Noble Gas Gamma Air Dose PNPS ODCM Control 3.3.2.b Objective: 10 mrad Gamma Air Dose			
	<u>Period</u>	<u>Value - mrad/yr</u>	Fraction of Limit	
	Jan-Dec	1.16E-02	1.16E-01%	

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Percent of ODCM Effluent Control Limits for Gaseous Effluent Releases During 2010

	PNPS ODCM Con Objective: 10 mr		
	Period	Value - mrad	Fraction of Limit
	Jan-Mar	3.21E-03	3.21E-02%
	Apr-Jun	5.19E-03	5.19E-02%
	Jul-Sep	9.11E-03	9.11E-02%
	Oct-Dec	1.38E-03	1.38E-02%
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Э.	Annual Dose Objective - PNPS ODCM Col Objective: 20 mr		
	Period	Value - mrad/yr	Fraction of Limit
	Jan-Dec	1.89E-02	9.45E-02%
⊣.		e - Particulates, Iodines, Tritium, an ntrol 3.3.3.a	
┥.	Quarterly Dose Objective PNPS ODCM Co Objective: 7.5 m <u>Period</u>	e - Particulates, Iodines, Tritium, an ntrol 3.3.3.a rem Organ Dose <u>Value - mrem</u>	nd Carbon-14 <u>Fraction of Limit</u>
4.	Quarterly Dose Objective PNPS ODCM Co Objective: 7.5 m <u>Period</u> Jan-Mar	e - Particulates, Iodines, Tritium, an ntrol 3.3.3.a rem Organ Dose <u>Value - mrem</u> 2.30E-02	nd Carbon-14 <u>Fraction of Limit</u> 3.07E-01%
- 1 .	Quarterly Dose Objective PNPS ODCM Co Objective: 7.5 m <u>Period</u> Jan-Mar Apr-Jun	e - Particulates, Iodines, Tritium, an ntrol 3.3.3.a rem Organ Dose <u>Value - mrem</u> 2.30E-02 3.82E-02	nd Carbon-14 <u>Fraction of Limit</u> 3.07E-01% 5.09E-01%
I.	Quarterly Dose Objective PNPS ODCM Co Objective: 7.5 m <u>Period</u> Jan-Mar Apr-Jun Jul-Sep	e - Particulates, Iodines, Tritium, an ntrol 3.3.3.a rem Organ Dose <u>Value - mrem</u> 2.30E-02 3.82E-02 2.37E-02	nd Carbon-14 <u>Fraction of Limit</u> 3.07E-01% 5.09E-01% 3.16E-01%
1.	Quarterly Dose Objective PNPS ODCM Co Objective: 7.5 m <u>Period</u> Jan-Mar Apr-Jun	e - Particulates, Iodines, Tritium, an ntrol 3.3.3.a rem Organ Dose <u>Value - mrem</u> 2.30E-02 3.82E-02	nd Carbon-14 <u>Fraction of Limit</u> 3.07E-01% 5.09E-01%
	Quarterly Dose Objective PNPS ODCM Co Objective: 7.5 m <u>Period</u> Jan-Mar Apr-Jun Jul-Sep Oct-Dec	e - Particulates, Iodines, Tritium, an ntrol 3.3.3.a rem Organ Dose <u>Value - mrem</u> 2.30E-02 3.82E-02 2.37E-02 2.46E-02 Particulates, Iodines, Tritium, and ntrol 3.3.3.b	nd Carbon-14 <u>Fraction of Limit</u> 3.07E-01% 5.09E-01% 3.16E-01% 3.28E-01%

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6.2 Liquid Effluent Releases

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Liquid effluent concentration limits and dose objectives from the PNPS ODCM are shown in Table 6.2. The quarterly average concentrations from Table 2.3-A were used to calculate the percent concentration limits. The maximum quarterly and annual whole body and organ doses from Tables 4.3-A through 4.3-E were used to calculate the percentages shown in Table 6.2. The resulting concentrations, as well as organ and total body doses from Pilgrim Station's liquid releases during the reporting period were a small percentage of the corresponding effluent controls.

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Table 6.2

Percent of ODCM Effluent Control Limits for Liquid Effluent Releases During 2010

A. Fission and Activation Product Effluent Concentration Limit PNPS ODCM Control 3.2.1 Limit: 10CFR20 Appendix B, Table 2, Column 2 Value

<u>Period</u>	Value - µCi/mL	Fraction of Limit
Jan-Mar	0.00E+00	0.00E+00%
Apr-Jun	2.41E-10	2.69E-03%
Jul-Sep	0.00E+00	0.00E+00%
Oct-Dec	. 1.09E-13	9.26E-06%
Jan-Dec	6.00E-11	6.72E-04%

an and

B. Tritium Average Concentration Limit PNPS ODCM Control 3.2.1 Limit: 1.0E-03 μCi/mL

Period	<u>Value - µCi/mL</u>	Fraction of Limit
Jan-Mar	0.00E+00	0.00E+00%
Apr-Jun	1.61E-08	1.61E-03%
Jul-Sep	0.00E+00	0.00E+00%
Oct-Dec	1.18E-10	1.18E-05%
Jan-Dec	4.04E-09	4.04E-04%

C. Dissolved and Entrained Noble Gases Concentration Limit PNPS ODCM Control 3.2.1 Limit: 2.0E-04 μCi/mL

		4
Period	<u>Value - μCi/mL</u>	Fraction of Limit
Jan-Mar	0.00E+00	0.00E+00%
Apr-Jun	0.00E+00	0.00E+00%
Jul-Sep	0.00E+00	0.00E+00%
Oct-Dec	0.00E+00	0.00E+00%
Jan-Dec	0.00E+00	0.00E+00%

Percent of ODCM Effluent Control Limits for Liquid Effluent Releases During 2010

		em Total Body Dose	
	Period	Value - mrem	Fraction of Limit
	Jan-Mar Apr-Jun	0.00E+00 1.98E-03	0.00E+00% 1.32E-01%
	Jul-Sep	0.00E+00	0.00E+00%
	Oct-Dec	5.73E-07	3.82E-05%
Ξ.	Annual Total Body Dose PNPS ODCM Cor Objective: 3 mrer		
	<u>Period</u> Jan-Dec	Value - mrem	Fraction of Limit
	Jan-Dec	1.97E-03	6.56E-02%
₹.	Quarterly Organ Dose Ol PNPS ODCM Cor Objective: 5 mrer	ntrol 3.2.2.a	
	PNPS ODCM Cor Objective: 5 mrer <u>Period</u>	ntrol 3.2.2.a n Organ Dose <u>Value - mrem</u>	Fraction of Limit
. .	PNPS ODCM Cor Objective: 5 mrer <u>Period</u> Jan-Mar	ntrol 3.2.2.a n Organ Dose <u>Value - mrem</u> 0.00E+00	0.00E+00%
	PNPS ODCM Cor Objective: 5 mrer Jan-Mar Apr-Jun	ntrol 3.2.2.a n Organ Dose <u>Value - mrem</u> 0.00E+00 1.00E-02	0.00E+00% 2.00E-01%
	PNPS ODCM Cor Objective: 5 mrer <u>Period</u> Jan-Mar	ntrol 3.2.2.a n Organ Dose <u>Value - mrem</u> 0.00E+00	0.00E+00%
à.	PNPS ODCM Cor Objective: 5 mrer Jan-Mar Apr-Jun Jul-Sep Oct-Dec Annual Organ Dose Obje	ntrol 3.2.2.a n Organ Dose <u>Value - mrem</u> 0.00E+00 1.00E-02 0.00E+00 9.46E-07	0.00E+00% 2.00E-01% 0.00E+00%
-	PNPS ODCM Cor Objective: 5 mrer Jan-Mar Apr-Jun Jul-Sep Oct-Dec	ntrol 3.2.2.a n Organ Dose <u>Value - mrem</u> 0.00E+00 1.00E-02 0.00E+00 9.46E-07 ctive ntrol 3.2.2.b	0.00E+00% 2.00E-01% 0.00E+00%
_	PNPS ODCM Cor Objective: 5 mrer <u>Period</u> Jan-Mar Apr-Jun Jul-Sep Oct-Dec Annual Organ Dose Obje PNPS ODCM Cor	ntrol 3.2.2.a n Organ Dose <u>Value - mrem</u> 0.00E+00 1.00E-02 0.00E+00 9.46E-07 ctive ntrol 3.2.2.b	0.00E+00% 2.00E-01% 0.00E+00%

7.0 RADIOACTIVE WASTE DISPOSAL DATA

Radioactive wastes that were shipped offsite for processing and disposal during the reporting period are described in Table 7.0, in the standard NRC Regulatory Guide 1.21 format.

The total quantity of radioactivity in Curies and the total volume in cubic meters are summarized in Table 7.0 for the following waste categories:

- Spent resins, filter sludges, and evaporator bottoms;
- Dry activated wastes, contaminated equipment, etc.;
- Irradiated components, control rods, etc.; and,
- Other.

During the reporting period approximately 5.89E+01 cubic meters of spent resins, filter sludges, etc., containing a total activity of about 9.54E+02 Curies were shipped from PNPS for processing and disposal. Dry activated wastes and contaminated equipment shipped during the period totaled 2.98E+02 cubic meters and contained 1.81E+00 Curies of radioactivity. No shipment of irradiated components was shipped during the reporting period containing 0 cubic meters and 0 curies. The "Other" category, made up from "Hi Rad Trash" consisted of 1.79E+01 cubic meters and 1.93E+00 curies. No shipments of irradiated fuel were made during the reporting period.

Estimates of major radionuclides, those comprising greater than 1% of the total activity in each waste category shipped, are listed in Table 7.0. There were 9 shipments to Energy Solutions' Bear Creek Facility; 3 shipments to Energy Solutions' Gallaher Road Facility; 8 shipments to Studsvik in Erwin, TN and 1 shipment to Studsvik/Race in Oak Ridge, TN.

Table 7.0 Pilgrim Nuclear Power Station Annual Radioactive Effluent Release Report Solid Waste and Irradiated Fuel Shipments January-December 2010

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

1. Estimate of volume and activity content by type of waste

		Jan-Dec 2010	
Type of waste	Volume - m ³	Curies	Total Error
 Spent resins, filters, filter sludges, evaporator bottoms, etc. 	5.89E+01	9.54E+02	± 25%
 b. Dry activated waste, contaminated equipment, etc. 	2.98E+02	1.81E+00	± 25%
c. Irradiated components, control rods, etc.	Not Applicable	Not Applicable	N/A
d. Other (describe): Hi-Rad Trash/Metals	1.79E+01	1.93E+00	±25%

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2. Estimate of major nuclide composition by type of waste¹

Type of waste	Radionuclide	Abundance	Total Error
a. Spent resins, filters, filter sludges,	Mn-54	13.97%	± 25%
evaporator bottoms, etc.	Fe-55	45.45%	± 25%
	Co-58	1.33%	± 25%
	Co-60	29.17%	± 25%
	Zn-65	4.88%	± 25%
	Cs-137	1.77%	± 25%
b. Dry activated waste, contaminated	Mn-54	4.73%	± 25%
equipment, etc.	Fe-55	78.61%	± 25%
	Co-60	13.32%	± 25%
	Cs-137	1.95%	± 25%
c. Irradiated components, control rods, etc.	Not Applicable	Not Applicable	±25%
d. Other (describe): Hi-Rad Trash/Metals	Cr-51	3.47%	± 25%
	Mn-54	21.51%	± 25%
	Fe-55	21.71%	± 25%
	Co-60	11.78%	± 25%
	Ni-63	40.04%	± 25%

¹ "Major" is defined as any radionuclide comprising >1% of the total activity in the waste category.

3. Solid Waste Disposition

Number of Shipments	Mode of Transportation	Destination
9	Tractor-trailer (Hittman Transport)	Energy Solutions Bear Creek Facility ² Oak Ridge, TN
3	Tractor-trailer (Hittman Transport)	Energy Solutions Gallaher Road Facility ² Kingston, TN
8	Tractor-trailer (Hittman Transport)	Studsvik Processing Facility, ² Erwin, TN
1	Tractor-trailer (Hittman Transport)	Studsvik/RACE, LLC ² Memphis, TN

² This processor provides volume reduction services for dry compressible waste, contaminated equipment, etc. Remaining radioactive wastes will be shipped to Chem Nuclear Systems, Inc. in Barnwell, SC, or Envirocare, Inc. in Clive, UT for final disposal.

B. IRRADIATED FUEL SHIPMENTS & DISPOSITION

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

8.0 OFFSITE DOSE CALCULATION MANUAL REVISIONS

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The PNPS Offsite Dose Calculation Manual (ODCM) was not revised during the calendar year of 2010. Information regarding revisions to the ODCM can be found attached as Appendix D of this report.

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9.0 PROCESS CONTROL PROGRAM REVISIONS

The following site-specific procedures related to the Process Control Program have been retired and replaced by the Entergy fleet procedures.

Retired PNPS Procedures

Process Control Program: PNPS 1.15.6, PNPS 1.15.4, and PNPS 1.15.3 Shipment of Radioactive Waste: PNPS 6.9-160 10CFR Part 61 Sampling: PNPS 6.9-211

Replacement Entergy Fleet Procedures

Process Control Program: EN-RW-105 Radioactive Shipping Procedure: EN-RW-102 Radioactive Waste Tracking Procedure: EN-RW-103 Scaling Factors: EN-RW-104 Integrated Transportation Security Plan: EN-RW-106

These procedures cover the methods used to accomplish the processing and packaging of radioactive waste at Pilgrim Nuclear Power Station.

10.0 <u>REFERENCES</u>

- 1. U.S. Nuclear Regulatory Commission, "Measuring, Evaluating, and Reporting Radioactivity in Solid Wastes and Releases of Radioactive Materials in Liquid and Gaseous Effluents from Light-Water Cooled Nuclear Power Plants", Regulatory Guide 1.21, Revision 1, June 1974.
- 2. "Pilgrim Nuclear Power Station Offsite Dose Calculation Manual", Revision 9, June 2003.
- 3. U.S. Nuclear Regulatory Commission, "Calculation of Annual Doses to Man from Routine Releases of Reactor Effluents for the Purpose of Evaluating Compliance with 10CFR50 Appendix I", Regulatory Guide 1.109, Revision 1, October 1977.
- 4. U.S. Nuclear Regulatory Commission, "Methods for Estimating Atmospheric Transport and Dispersion of Gaseous Effluents in Routine Releases from Light-Water-Cooled Reactors", Regulatory Guide 1.111, July 1977.
- 5. Boston Edison Company, "Pilgrim Station Unit 1 Appendix I Evaluation", April 1977.
- Entech Engineering Inc., P100-R19, "AEOLUS-3 A Computer Code for the Determination of Atmospheric Dispersion and Deposition of Nuclear Power Plant Effluents During Continuous, Intermittent and Accident Conditions in Open-Terrain Sites, Coastal Sites and Deep-River Valleys"

APPENDIX A

Meteorological Joint Frequency Distributions

TABLE	TABLE TITLE	PAGE
A-1	Joint Frequency Distribution of Wind Directions and Speeds for the 33-ft Level of the 220-ft Tower	48
A-2	Joint Frequency Distribution of Wind Directions and Speeds for the 220-ft Level of the 220-ft Tower	58

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Table A-1 Joint Frequency Distribution of Wind Directions and Speeds For the 33-ft level of the 220-ft Tower

Jan-Mar 2010

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Class A	Freq:	0.111															
mph	Ν	NNE	NE	ENE	Е	ESE	SE	SSE	s	ssw	sw	wsw	w	WNW	NW	NNW	TOTAL
Calm-0.95	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0.95-3.5	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	3
3.5-7.5	0	7	10	6	1	1	3	1	3	0	0	2	7	18	15	0	74
7.5-12.5	0	15	0	0	0	0	0	0	1	3	1	0	1	7	2	0	30
12.5-18.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	_ 0	0	0
18.5-24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
>24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	1	22	10	6	2	1	3	1	4	3	1	2	8	25	17	1	107
									·· · ·		••						
Class B	Freq:	0.024	· · · · · ·														
mph	N	NNE	NE	ENE	E	ESE	SE	SSE	S	ssw	sw	wsw	w	WNW	NW	NNW	TOTAL
Calm-0.95	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0.95-3.5	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	2
3.5-7.5	1	0	0	1	1	0	0	0	0	0	1	3	1	2	2	0	12
7.5-12.5	0	3	0	0	0	0	0	0	1	2	0	0	0	2	0	0	8
12.5-18.5	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1
18.5-24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
>24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	1	3	1	1	1	0	0	0	1	2	1	3	1	5	3	0	23
Class C	Freq:	0.046															
mph	N	NNE	NE	ENE	E	ESE	SE.	SSE	s	ssw	sw	wsw	w	WNW	NW	NNW	TOTAL
Calm-0.95	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0.95-3.5	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	0	3
3.5-7.5	0	1	0	2	0	0	2	0	4	1	0	3	9	7	1	2	32
7.5-12.5	0	5	0	0	0	0	0	0	0	1	0	0	1	0	1	1	9
12.5-18.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18.5-24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
>24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		1				1		1		1	T			1		T	

Class D	Freq:	0.531
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TOTAL

mph	N	NNE	NE	ENE	Е	ESE	SE	SSE	s	ssw	sw	wsw	W	WNW	NW	NNW	TOTAL
Calm-0.95	0	0	0	0	0	0	0	0	0	0	0	1	0	0	2	0	3
0.95-3.5	9	5	3	4	7	3	0	3	2	2	4	2	8	14	5	3	74
3.5-7.5	8	2	3	14	6	7	8	11	3	6	6	31	60	52	31	4	252
7.5-12.5	4	30	14	10	10	1	0	13	6	8	2	0	33	10	13	6	160
12.5-18.5	0	6	2	12	1	0	0	0	0	0	0	0	0	0	0	0	21
18.5-24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
>24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	21	43	22	40	24	11	8	27	11	16	12	34	101	76	51	13	510

Jan-Mar 2010

Class E	Freq:	0.219											-	,			
mph	N	NNE	NE	ENE	Е	ESE	SE	SSE	S	SSW	sw	wsw	W	WNW	NW	NNW	TOTAL
Calm-0.95	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1
0.95-3.5	1	1	1	5	5	3	1	2	10	4	1	8	9	2	5	3	61
3.5-7.5	1	0	0	2	5	4	3	1	7	9	6	55	17	3	2	0	115
7.5-12.5	0	0	1	1	14	2	0	0	0	7	0	4	0	0	0	0	29
12.5-18.5	0	0	0	1	3	0	0	0	0	0	0	0	0	0	0	0	4
18.5-24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
>24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	2	1	2	9	27	9	4	3	17	20	8	67	26	5	7	3	210
Class F	Freq:	 0.044													រាំពិត	•	·
	N	NNE	NE	ENE	Е	ESE	SE	SSE	s	ssw	sw	wsw	w	WNW	NW	NNW	TOTAL
mph Colm 0.05	î	1						<u> </u>									
Calm-0.95 0.95-3.5	0	0	0	0	0	0	0	0	0	0	0	0 5	0 3	0	0	0	0 16
3.5-7.5	0	0	0	2	0	1	0	0	0	1	10	5 6	0	0	0	0	20
7.5-12.5	0	0	0	0	0	0	0	0	0	4	2	0	0	0	0	0	6
12.5-18.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18.5-24	0	0	Ō	0	0	0	0	Ō	0	0	0	0	0	0	0	0 0	0
>24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	0	0	0	4	0	1	0	0	0	6	14	11	3	1	1	1	42
Class C	Free	0.006															
Class G		0.026															
mph		NINE			E	EQE	0E	005	6	86W	CIM/		14/		NIM		TOTAL
0-1 0.05	N	NNE	NE	ENE	E	ESE	SE		S	ssw	sw	wsw	W	WNW	NW	NNW	TOTAL
Calm-0.95	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0.95-3.5	0	0	0	0 0	0 0	0 0	0	0	0 1	0 0	0	0 2	0	0	0	0	0 3
0.95-3.5 3.5-7.5	0 0 0	0 0 0	0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 1 0	0 0 0	0 0 9	0 2 2	0 0 0	0 0 0	0 0 0	0 0 0	0 3 11
0.95-3.5 3.5-7.5 7.5-12.5	0 0 0	0 0 0	0 0 0	0 0 0 0	0 0 0	0 0 0	0 0 0	0 0 0 0	0 1 0 0	0 0 0 2	0 0 9 9	0 2 2 0	0 0 0	0 0 0	0 0 0	0 0 0 0	0 3 11 11
0.95-3.5 3.5-7.5 7.5-12.5 12.5-18.5	0 0 0 0	0 0 0 0	0 0	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0	0 0 0	0 1 0 0	0 0 0 2 0	0 0 9 9 0	0 2 2 0 0	0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0 3 11 11 0
0.95-3.5 3.5-7.5 7.5-12.5	0 0 0	0 0 0	0 0 0 0	0 0 0 0	0 0 0	0 0 0	0 0 0 0	0 0 0 0	0 1 0 0	0 0 0 2	0 0 9 9	0 2 2 0	0 0 0 0	0 0 0	0 0 0	0 0 0 0	0 3 11 11
0.95-3.5 3.5-7.5 7.5-12.5 12.5-18.5 18.5-24	0 0 0 0 0	0 0 0 0 0	0 0 0 0 0	0 0 0 0 0	0 0 0 0 0	0 0 0 0 0	0 0 0 0 0	0 0 0 0 0	0 1 0 0 0	0 0 2 0 0	0 9 9 0 0	0 2 2 0 0 0	0 0 0 0 0	0 0 0 0 0	0 0 0 0 0	0 0 0 0 0	0 3 11 11 0 0
0.95-3.5 3.5-7.5 7.5-12.5 12.5-18.5 18.5-24 >24 TOTAL	0 0 0 0 0 0 0 0	0 0 0 0 0 0 0	0 0 0 0 0 0	0 0 0 0 0 0	0 0 0 0 0 0	0 0 0 0 0 0	0 0 0 0 0 0	0 0 0 0 0 0	0 1 0 0 0 0 0	0 0 2 0 0 0	0 9 9 0 0 0	0 2 2 0 0 0 0	0 0 0 0 0 0	0 0 0 0 0 0 0	0 0 0 0 0 0 0	0 0 0 0 0 0	0 3 11 11 0 0 0
0.95-3.5 3.5-7.5 7.5-12.5 12.5-18.5 18.5-24 >24 TOTAL Class All	0 0 0 0 0 0 0 0 5 7 req:	0 0 0 0 0 0 0 0 0 0 1.000	0 0 0 0 0 0	0 0 0 0 0 0 0	0 0 0 0 0 0	0 0 0 0 0 0 0	0 0 0 0 0 0 0	0 0 0 0 0 0 0 0	0 1 0 0 0 0 0	0 0 2 0 0 0 2 2	0 9 9 0 0 0 0 18	0 2 2 0 0 0 0 4	0 0 0 0 0 0 0	0 0 0 0 0 0 0	0 0 0 0 0 0 0	0 0 0 0 0 0 0	0 3 11 11 0 0 0 25
0.95-3.5 3.5-7.5 7.5-12.5 12.5-18.5 18.5-24 >24 TOTAL Class All mph	0 0 0 0 0 0 0 5 7 req: N	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 5 5 5 5	0 0 0 0 0 0 0 5 5 5	0 0 0 0 0 0 0 0 0 5SE	0 1 0 0 0 0 1 5	0 0 2 0 0 0 2 2 SSW	0 0 9 9 0 0 0 18 SW	0 2 2 0 0 0 0 4 4 WSW	0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0	0 3 11 1 0 0 0 25 TOTAL
0.95-3.5 3.5-7.5 7.5-12.5 12.5-18.5 18.5-24 >24 TOTAL Class All mph Calm-0.95	0 0 0 0 0 0 0 0 0 5 7 req: N 0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 5 5 5 0	0 0 0 0 0 0 0 0 0 5 5 5 5 5 5 5 5 5 5 5	0 1 0 0 0 0 0 1 5 0	0 0 2 0 0 0 0 2 2 SSW 0	0 0 9 9 0 0 0 18 SW 1	0 2 2 0 0 0 0 4 4 WSW 1	0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0	0 3 11 0 0 0 25 TOTAL 4
0.95-3.5 3.5-7.5 7.5-12.5 12.5-18.5 18.5-24 >24 TOTAL Class All mph Calm-0.95 0.95-3.5	0 0 0 0 0 0 0 0 0 5 7 req: N 0 11	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 11	0 0 0 0 0 0 0 0 0 0 0 0 13	0 0 0 0 0 0 0 0 0 0 0 5 5 5 5 6	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1	0 0 0 0 0 0 0 0 0 0 5 5	0 1 0 0 0 0 0 1 5 0 13	0 0 2 0 0 0 0 2 2 5 5 8 8 8 9 7	0 9 9 0 0 0 18 SW 1 7	0 2 2 0 0 0 0 4 4 WSW 1 17	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 14	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 3 11 0 0 0 25 TOTAL 4 162
0.95-3.5 3.5-7.5 7.5-12.5 12.5-18.5 18.5-24 >24 TOTAL Class All mph Calm-0.95 0.95-3.5 3.5-7.5	0 0 0 0 0 0 0 0 0 Freq: N 0 11 10	0 0 0 0 0 0 0 0 1.000 NNE 0 6 10	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 1 27	0 0 0 0 0 0 0 0 0 0 0 0 0 1 3 13	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 1 16	0 0 0 0 0 0 0 0 0 0 5 5 13	0 1 0 0 0 0 0 0 1 1 3 17	0 0 2 0 0 0 2 2 SSW 0 7 17	0 0 9 9 0 0 18 SW 1 7 32	0 2 2 0 0 0 0 4 4 WSW 1 17 102	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 14 51	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 3 11 0 0 25 TOTAL 4 162 516
0.95-3.5 3.5-7.5 7.5-12.5 12.5-18.5 18.5-24 >24 TOTAL Class All mph Calm-0.95 0.95-3.5 3.5-7.5 7.5-12.5	0 0 0 0 0 0 0 0 0 5 7 7 7 0 0 11 10 4	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 3 15	0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 1 27 11	0 0 0 0 0 0 0 0 0 0 0 0 0 0 13 13 24	0 0 0 0 0 0 0 0 0 0 0 5 5 5 5 6 13 3	0 0 0 0 0 0 0 0 0 0 0 0 0 1 1 16 0	0 0 0 0 0 0 0 0 0 0 5 5 13 13	0 1 0 0 0 0 0 1 1 5 0 13 17 8	0 0 2 0 0 0 2 2 SSW 0 7 17 27	0 0 9 9 0 0 18 SW 1 7 32 14	0 2 2 0 0 0 0 4 4 WSW 1 17 102 4	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 8 6 7	0 3 11 11 0 0 0 25 TOTAL 4 162 516 253
0.95-3.5 3.5-7.5 7.5-12.5 12.5-18.5 18.5-24 >24 TOTAL Class All mph Calm-0.95 0.95-3.5 3.5-7.5 7.5-12.5 12.5-18.5	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 11 10 4 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0 1 3 15 3	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 11 27 11 13	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 13 13 13 24 4	0 0 0 0 0 0 0 0 0 0 0 0 5 5 5 6 13 3 0	0 0 0 0 0 0 0 0 0 0 0 0 1 1 6 0 0	0 0 0 0 0 0 0 0 0 0 5 13 13 0	0 1 0 0 0 0 0 0 0 1 1 1 5 0 13 17 8 8 0	0 0 2 0 0 0 2 2 SSW 0 7 17 27 0	0 0 9 9 0 0 0 18 SW 1 7 32 14 0	0 2 2 0 0 0 0 4 4 WSW 1 177 102 4 0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 8 6 7 0	0 3 11 1 0 0 0 25 TOTAL 4 162 516 253 26
0.95-3.5 3.5-7.5 7.5-12.5 12.5-18.5 18.5-24 >24 TOTAL Class All mph Calm-0.95 0.95-3.5 3.5-7.5 7.5-12.5 12.5-18.5 18.5-24	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 11 10 4 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 11 27 11 13 0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 5 5 5 6 13 3 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 1 1 16 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 5 13 13 0 0 0	0 1 0 0 0 0 0 1 1 S 0 13 17 8 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 2 0 0 0 2 2 SSW 0 7 17 27 0 0 0	0 0 9 9 0 0 0 0 18 SW 1 7 32 14 0 0	0 2 2 0 0 0 0 4 4 WSW 1 17 102 4 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 20 94 35 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 19 82 19 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0 14 51 16 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 8 6 7 0 0 0	0 3 11 0 0 0 25 TOTAL 4 162 516 253 26 0
0.95-3.5 3.5-7.5 7.5-12.5 12.5-18.5 18.5-24 >24 TOTAL Class All mph Calm-0.95 0.95-3.5 3.5-7.5 7.5-12.5 12.5-18.5	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 11 10 4 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0 1 3 15 3	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 11 27 11 13	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 13 13 13 24 4	0 0 0 0 0 0 0 0 0 0 0 0 5 5 5 6 13 3 0	0 0 0 0 0 0 0 0 0 0 0 0 1 1 6 0 0	0 0 0 0 0 0 0 0 0 0 5 13 13 0	0 1 0 0 0 0 0 0 0 1 1 1 5 0 13 17 8 8 0	0 0 2 0 0 0 2 2 SSW 0 7 17 27 0	0 0 9 9 0 0 0 18 SW 1 7 32 14 0	0 2 2 0 0 0 0 4 4 WSW 1 177 102 4 0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 8 6 7 0	0 3 11 1 0 0 0 25 TOTAL 4 162 516 253 26

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	Class	Α	Freq:	0.154
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	Freq:										_					_	
mph	N	NNE	NE	ENE	Е	ESE	SE	SSE	S	SSW	SW	wsw	W	WNW	NW	NNW	TOTAL
Calm-0.95	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0.95-3.5	5	5	3	3	2	0	0	0	0	0	0	0	0	0	2	1	21
3.5-7.5	16	26	25	24	20	15	6	3	3	10	12	14	22	19	13	14	242
7.5-12.5	0	0	1	1	2	0	0	0	6	35	5	1	16	5	0	2	74
12.5-18.5	0	0	0	0	0	0	0	0	0	0	_0	0	0	0	0	0	0
18.5-24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
>24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	21	31	29	28	24	15	6	3	9	45	17	15	38	24	15	17	337
Class B	Freq:	0.051															
mph	N N	NNE	NE	ENE	Ē	ESE	SE	SSE	S	ssw	SW	wsw	Ŵ	WNW	NW	NNW	TOTAL
Calm-0.95	0		0	0	0	0	0	002	0	0	0	0	0	0	0	0	0
0.95-3.5	3	1	1	3	1	2	4	0	0	0	0	0	1	1	4	2	23
3.5-7.5	0	5	3	6	12	10	4	2	1	10	11	6	5		2	<u> </u>	23 79
7.5-12.5	ō	0	0	0	0	0	0	0	1	4	3	1	1	0	0	0	10
12.5-18.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18.5-24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
>24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	3	6	4	9	13	12	8	2	2	14	14	7	7	2	6	3	112
Class C mph	Freq:	0.065 NNE	NE	ENE	E	ESE	SE	SSE	S	ssw	sw	wsw	w	WNW	NW	NNW	TOTAL
Calm-0.95	0	0	0	0	0	0	0	0	0	T	0	0	<u>^</u>	†			
0.95-3.5	1	6		-					0	0			0	0	0	0	0
3.5-7.5	4		6	2	3	0	4	1	0	0	0	0	0 1	0 3	0	0	0 30
7.5-12.5		2	6 5	2	3 8	0		1 2	-								
	0	2					4		0	0	0	0	1	3	0	3	30
12.5-18.5	0	1 1	5	7	8	6	4 0	2	0 9	0 16	0 13	0 10	1 4	3 4	0	3 0	30 91
12.5-18.5 18.5-24		0	5 0	7 0	8 0	6 0	4 0 0	2 0	0 9 1	0 16 12	0 13 6	0 10 0	1 4 0	3 4 1	0 1 0	3 0 0	30 91 20
	ō	0	5 0 0	7 0 0	8 0 0	6 0 0	4 0 0	2 0 0	0 9 1 0	0 16 12 0	0 13 6 0	0 10 0 0	1 4 0 0	3 4 1 0	0 1 0 0	3 0 0 0	30 91 20 0
18.5-24	0	0 0 0	5 0 0 0	7 0 0 0	8 0 0 0	6 0 0 0	4 0 0 0	2 0 0 0	0 9 1 0 0	0 16 12 0 0	0 13 6 0 0	0 10 0 0	1 4 0 0 0	3 4 1 0 0	0 1 0 0	3 0 0 0	30 91 20 0 0
18.5-24 >24	0 0 0 5	0 0 0	5 0 0 0	7 0 0 0	8 0 0 0	6 0 0 0	4 0 0 0 0	2 0 0 0	0 9 1 0 0 0	0 16 12 0 0 0	0 13 6 0 0 0	0 10 0 0 0	1 4 0 0 0 0	3 4 1 0 0 0	0 1 0 0 0	3 0 0 0 0 0	30 91 20 0 0 0
18.5-24 >24 TOTAL	0 0 0 5	0 0 0 0 8	5 0 0 0	7 0 0 0	8 0 0 0	6 0 0 0	4 0 0 0 0	2 0 0 0	0 9 1 0 0 0	0 16 12 0 0 0	0 13 6 0 0 0	0 10 0 0 0	1 4 0 0 0 0	3 4 1 0 0 0	0 1 0 0 0	3 0 0 0 0 0	30 91 20 0 0 0
18.5-24 >24 TOTAL Class D	0 0 5 Freq: N	0 0 0 8 0.339	5 0 0 0 0	7 0 0 0 9	8 0 0 0 0	6 0 0 0 6	4 0 0 0 0 0 4	2 0 0 0 3	0 9 1 0 0 0 10	0 16 12 0 0 0 28	0 13 6 0 0 0 19	0 10 0 0 0 0 10	1 4 0 0 0 0 5	3 4 1 0 0 0 0 8	0 1 0 0 0 0 1	3 0 0 0 0 0 0 3	30 91 20 0 0 0 141
18.5-24 >24 TOTAL Class D mph	0 0 5 Freq: N	0 0 0 8 0.339 NNE	5 0 0 0 11 NE	7 0 0 0 9 9 ENE	8 0 0 0 11 E	6 0 0 0 6 ESE	4 0 0 0 0 0 4 SE	2 0 0 0 3 SSE	0 9 1 0 0 0 10 5	0 16 12 0 0 0 28 SSW	0 13 6 0 0 0 19 SW	0 10 0 0 0 10 wsw	1 4 0 0 0 5 5	3 4 1 0 0 0 8 8	0 1 0 0 0 1 1	3 0 0 0 0 3	30 91 20 0 0 0 141 TOTAL
18.5-24 >24 TOTAL Class D mph Calm-0.95	0 0 5 Freq: N 0	0 0 0 8 0.339 NNE 0	5 0 0 0 11 NE 0	7 0 0 0 9 9 ENE 0	8 0 0 0 11 E 0	6 0 0 0 6 ESE 0	4 0 0 0 0 4 5 5 5 0	2 0 0 3 3 SSE 0	0 9 1 0 0 0 10 5 0	0 16 12 0 0 28 SSW 0	0 13 6 0 0 0 19 SW 0	0 10 0 0 10 10 wsw	1 4 0 0 0 5 5 W	3 4 1 0 0 0 8 8 WNW 0	0 1 0 0 0 1 1 NW	3 0 0 0 0 0 3 8 NNW	30 91 20 0 0 141 TOTAL 0
18.5-24 >24 TOTAL Class D mph Calm-0.95 0.95-3.5 3.5-7.5 7.5-12.5	0 0 5 Freq: N 0 21	0 0 0 8 0.339 NNE 0 23	5 0 0 0 11 NE 0 21	7 0 0 9 9 ENE 0 17	8 0 0 0 11 E 0 17	6 0 0 0 6 ESE 0 17	4 0 0 0 0 4 5 5 5 5 0 18	2 0 0 3 3 SSE 0 20	0 9 1 0 0 0 10 5 0 14	0 16 12 0 0 28 SSW 0 10	0 13 6 0 0 0 19 SW 0 6	0 10 0 0 10 10 wsw 0 8	1 4 0 0 0 5 W 0 4	3 4 1 0 0 0 8 8 WNW 0 7	0 1 0 0 0 0 1 1 NW 0 13	3 0 0 0 0 0 3 3 NNW 0 13	30 91 20 0 0 141 TOTAL 0 229
18.5-24 >24 TOTAL Class D mph Calm-0.95 0.95-3.5 3.5-7.5	0 0 5 Freq: N 0 21 15	0 0 0 8 0.339 NNE 0 23 6	5 0 0 0 11 11 NE 0 21 17	7 0 0 9 9 ENE 0 17 9	8 0 0 0 11 E 0 17 23	6 0 0 0 6 ESE 0 17 28	4 0 0 0 0 4 5 5 5 5 6 0 18 8	2 0 0 3 3 SSE 0 20 7	0 9 1 0 0 0 10 10 5 0 14 46	0 16 12 0 0 28 SSW 0 10 109	0 13 6 0 0 0 19 19 \$\$W 0 6 55	0 10 0 0 10 10 8 8 30	1 4 0 0 0 5 W 0 4 47	3 4 1 0 0 0 8 8 WNW 0 7 15	0 1 0 0 0 1 1 NW 0 13 3	3 0 0 0 0 3 3 NNW 0 13 5	30 91 20 0 0 141 TOTAL 0 229 423
18.5-24 >24 TOTAL Class D mph Calm-0.95 0.95-3.5 3.5-7.5 7.5-12.5	0 0 5 Freq: N 0 21 15 0	0 0 0 8 0.339 NNE 0 23 6 0	5 0 0 0 11 11 NE 0 21 17 0	7 0 0 9 9 ENE 0 17 9 2	8 0 0 0 11 E 0 17 23 1	6 0 0 6 ESE 0 17 28 1	4 0 0 0 0 4 5 5 5 5 0 18 8 0	2 0 0 3 3 SSE 0 20 7 0	0 9 1 0 0 0 10 10 5 0 14 46 0	0 16 12 0 0 28 SSW 0 10 109 56 0 0	0 13 6 0 0 0 19 19 55 55 18	0 10 0 0 10 10 8 8 30 0	1 4 0 0 0 5 W 0 4 47 4	3 4 1 0 0 0 8 8 WNW 0 7 15 1	0 1 0 0 0 0 1 1 3 3 4	3 0 0 0 0 3 8 NNW 0 13 5 0	30 91 20 0 0 141 TOTAL 0 229 423 87
18.5-24 >24 TOTAL Class D mph Calm-0.95 0.95-3.5 3.5-7.5 7.5-12.5 12.5-18.5	0 0 5 5 7 7 8 7 9 0 21 15 0 0	0 0 0 8 0.339 NNE 0 23 6 0 0 0	5 0 0 0 11 11 NE 0 21 17 0 0	7 0 0 9 9 ENE 0 17 9 2 0	8 0 0 0 11 E 0 17 23 1 0	6 0 0 6 ESE 0 17 28 1 0	4 0 0 0 0 4 5 E 0 18 8 0 0 0	2 0 0 3 SSE 0 20 7 0 0	0 9 1 0 0 0 10 10 5 0 14 46 0 0	0 16 12 0 0 28 SSW 0 10 109 56 0	0 13 6 0 0 0 19 5 \$ W 0 6 55 18 2	0 10 0 0 10 10 8 8 30 0 0	1 4 0 0 0 5 W 0 4 47 4 0	3 4 1 0 0 8 8 WNW 0 7 15 1 0	0 1 0 0 0 1 1 NW 0 13 3 4 0	3 0 0 0 0 3 NNW 0 13 5 0 0	30 91 20 0 0 0 141 TOTAL 0 229 423 87 2

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Class	E	Freq:	0.271

Class E	Freq:	0.271																_
mph	N	NNE	NE	ENE	Е	ESE	SE	SSE	S	SSW	SW	wsw	W	WNW	NW	NNW	TOTAL	
Calm-0.95	0	0	0	0	0	0	0	0	0	0	1	0	1	0	1	0	3	
0.95-3.5	12	5	9	16	11	10	20	22	18	9	13	30	28	16	22	6	247	
3.5-7.5	2	1	0	2	5	1	2	0	15	78	63	49	43	11	7	4	283	
7.5-12.5	0	0	0	0	0	0	0	0	0	22	33	0	0	1	0	0	56	
12.5-18.5	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	2	
18.5-24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
>24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
TOTAL	14	6	9	18	16	11	22	22	33	111	110	79	72	28	30	10	591	
			-															-
Class F	Freq:	0.099																_
mph	N	NNE	NE	ENE	[:] •E · '`	ESE	SE	SSE	S	SSW	sw	wsw	W	WNW	NW	NNW	TOTAL	and the second sec
Calm-0.95	0	0	0	0	0	0	1	0	0	0	0	1	0	1	0	0	3	·
0.95-3.5	1	1	0	9	2	2	2	0	3	4	18	46	15	11	4	4	122	
3.5-7.5	0	0	1	1	0	0	0	0	2	8	37	26	3	0	0	0	78	
7.5-12.5	0	0	0	0	0	0	0	0	0	2	11	0	0	0	0	0	13	
12.5-18.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
18.5-24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
>24	0	0	0	0	0	0	0	0	0	0	. 0	0	0	0	0	0	0	
TOTAL	1	1	1	10	2	2	3	0	5	14	66	73	18	12	4	4	216	
Class G	Freq:	0.021																-
mph	N	NNE	NE	ENE	É	ESE	SE	SSE	S	SSW	sw	wsw	w	WNW	NW	NNW	TOTAL	
Calm-0.95	0	0	0	0	1	0	0	0	1	0	1	0	0	0	0	0	3	
0.95-3.5	0	0	0	0	0	0	0	0	0	0	4	9	2	3	1	0	19	
3.5-7.5	0	0	0	0	0	0	0	0	0	0	15	6	1	0	0	0	22	
7.5-12.5	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	2	
12.5-18.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
18.5-24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
>24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
TOTAL	0	0	0	0	1	0	0	0	1	1	21	15	3	3	1	0	46	
																		-
Class All	Freq:	1.000																•
mph	N	NNE	NE	ENE	E	ESE	SE	SSE	S	ssw	sw	wsw	w	WNW	NW	NNW	TOTAL	
Calm-0.95	0	0	0	0	1	0	1	0	1	0	2	1	1	1	1	0	9	I
0.95-3.5	43	41	40	50	36	31	48	43	35	23	41	93	51	41	46	29	691]
3.5-7.5	37	40	51	49	68	60	20	14	76	231	206	141	125	50	26	24	1218	
7.5-12.5	0	0	1	3	3	1	0	0	8	132	77	2	21	8	4	2	262	
12.5-18.5	0	0	0	0	0	0	0	0	0	2	2	0	0	0	0	0	4]
18.5-24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	ļ
>24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
TOTAL	80	81	92	102	108	92	69	57	120	388	328	237	198	100	77	55	2184	

Jul-Sep 2010

TOTAL

16 21

43

56

21

20

24

23

Class A Freq: 0.068

	Class A	Freq:	0.068															
	mph	N	NNE	NE	ENE	Е	ESE	SE	SSE	S	SSW	SW	wsw	W	WNW	NW	NNW	TOTAL
	Calm-0.95	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0.95-3.5	8	4	13	6	4	0	1	0	0	0	0	0	3	4	3	2	48
	3.5-7.5	10	15	17	8	4	6	5	1	3	6	3	1	0	7	4	2	92
	7.5-12.5	0	0	0	0	0	0	0	0	1	6	3	0	0	0	0	0	10
	12.5-18.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	18.5-24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	>24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	TOTAL	18	19	30	14	8	6	6	1	4	12	6	1	3	11	7	4	150
	Class B	Frea:	0.043															
یہ داری ہے۔ ہوتے اس	```mph	N	NNE	NE	ENE	Е	ESE	SE	SSE	S	ssw	SW	wsw	w	WNW	NW	NNW	TOTAL
* * e. 2.3¥	Calm-0.95	0	0	0	0	0	0	0	0	0	0	Ó	0	0	0	0	0	0
	0.95-3.5	1	3	3	3	0	0	1	0	0	0	0	3	6	0	3	1	24
	3.5-7.5	1	1	1	7	1	5	1	1	2	16	5	10	3	1	1	1	57
	7.5-12.5	0	0	0	0	0	0	0	0	0	10	3	0	0	0	0	0	13
	12.5-18.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	18.5-24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	>24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
						1	5	2	1	2	26	· · 8	13	~		4	2	
	TOTAL	2	4	4	10	-	5	2		2	20	0	13	9	1	4	2	94
	TOTAL	2	4	4	10	ł	5	2		2	_ 20_]	0	13	9		4	2	94
		2 Freq:	0.061				,						· · · · ·		1			
			<u> </u>	4 NE	ENE	E	5 ESE	SE	SSE	S	SSW	sw	wsw	y W	WNW	4 NW	2 NNW	94 TOTAL
	Class C	Freq:	0.061				,						· · · · ·		1			
	Class C mph Calm-0.95 0.95-3.5	Freq: N 0 3	0.061 NNE 0 4	NE 0 0	ENE 0 3	E 0 4	ESE 0 2	SE 0 1	SSE 0 3	S 0 0	SSW 0 0	SW 0 1	WSW 0 3	W 0 2	WNW 0 2	NW 0 8	NNW 0 6	TOTAL 0 42
	Class C mph Calm-0.95 0.95-3.5 3.5-7.5	Freq: N 0 3 0	0.061 NNE 0 4 2	NE 0 0 2	ENE 0 3 9	E 0 4 3	ESE 0 2 1	SE 0 1 2	SSE 0 3 1	S 0 0 9	SSW 0 19	SW 0 1 11	WSW 0 3 7	W 0 2 3	WNW 0 2 3	NW 0 8 2	NNW 0 6 0	TOTAL 0 42 74
	Class C mph Calm-0.95 0.95-3.5 3.5-7.5 7.5-12.5	Freq: N 0 3 0	0.061 NNE 0 4 2 0	NE 0 0 2 0	ENE 0 3 9 0	E 0 4 3 0	ESE 0 2 1 0	SE 0 1 2 0	SSE 0 3 1 0	S 0 0 9 1	SSW 0 0 19 13	SW 0 1 11 4	WSW 0 3 7 0	W 0 2 3 0	WNW 0 2 3 0	NW 0 8 2 0	NNW 0 6 0 0	TOTAL 0 42 74 18
	Class C mph Calm-0.95 0.95-3.5 3.5-7.5 7.5-12.5 12.5-18.5	Freq: N 0 3 0 0 0	0.061 NNE 0 4 2 0 0	NE 0 0 2 0 0	ENE 0 3 9 0 0	E 0 4 3 0 0	ESE 0 2 1 0 0	SE 0 1 2 0 0	SSE 0 3 1 0 0	S 0 0 9 1 0	SSW 0 19 13 0	SW 0 1 11 4 0	WSW 0 3 7 0 0	W 0 2 3 0 0	WNW 0 2 3 0 0	NW 0 8 2 0 0	NNW 0 6 0 0	TOTAL 0 42 74 18 0
	Class C mph Calm-0.95 0.95-3.5 3.5-7.5 7.5-12.5 12.5-18.5 18.5-24	Freq: N 0 3 0 0 0 0 0	0.061 NNE 0 4 2 0 0 0 0	NE 0 0 2 0 0 0 0	ENE 0 3 9 0 0 0	E 0 4 3 0 0 0	ESE 0 2 1 0 0 0 0	SE 0 1 2 0 0 0	SSE 0 3 1 0 0 0	S 0 9 1 0 0	SSW 0 19 13 0	SW 0 1 11 4 0 0	WSW 0 3 7 0 0 0	W 0 2 3 0 0 0 0	WNW 0 2 3 0 0 0 0	NW 0 8 2 0 0 0 0	NNW 0 6 0 0 0 0 0	TOTAL 0 42 74 18 0 0
	Class C mph Calm-0.95 0.95-3.5 3.5-7.5 7.5-12.5 12.5-18.5 18.5-24 >24	Freq: N 0 3 0 0 0 0 0 0 0	0.061 NNE 0 4 2 0 0 0 0 0 0	NE 0 2 0 0 0 0 0 0	ENE 0 3 9 0 0 0 0 0 0	E 0 4 3 0 0 0 0 0	ESE 0 2 1 0 0 0 0 0	SE 0 1 2 0 0 0 0 0	SSE 0 3 1 0 0 0 0 0	S 0 9 1 0 0 0	SSW 0 19 13 0 0 0	SW 0 1 11 4 0 0 0 0	WSW 0 3 7 0 0 0 0 0	W 0 2 3 0 0 0 0 0	WNW 0 2 3 0 0 0 0 0 0	NW 0 8 2 0 0 0 0 0 0	NNW 0 6 0 0 0 0 0 0	TOTAL 0 42 74 18 0 0 0
	Class C mph Calm-0.95 0.95-3.5 3.5-7.5 7.5-12.5 12.5-18.5 18.5-24	Freq: N 0 3 0 0 0 0 0	0.061 NNE 0 4 2 0 0 0 0	NE 0 0 2 0 0 0 0	ENE 0 3 9 0 0 0	E 0 4 3 0 0 0	ESE 0 2 1 0 0 0 0	SE 0 1 2 0 0 0	SSE 0 3 1 0 0 0	S 0 9 1 0 0	SSW 0 19 13 0	SW 0 1 11 4 0 0	WSW 0 3 7 0 0 0	W 0 2 3 0 0 0 0	WNW 0 2 3 0 0 0 0	NW 0 8 2 0 0 0 0	NNW 0 6 0 0 0 0 0	TOTAL 0 42 74 18 0 0
	Class C mph Calm-0.95 0.95-3.5 3.5-7.5 7.5-12.5 12.5-18.5 18.5-24 >24 TOTAL	Freq: N 0 3 0 0 0 0 0 0 0	0.061 NNE 0 4 2 0 0 0 0 0 0 0 6	NE 0 2 0 0 0 0 0 0	ENE 0 3 9 0 0 0 0 0 0	E 0 4 3 0 0 0 0 0	ESE 0 2 1 0 0 0 0 0	SE 0 1 2 0 0 0 0 0	SSE 0 3 1 0 0 0 0 0	S 0 9 1 0 0 0	SSW 0 19 13 0 0 0	SW 0 1 11 4 0 0 0 0	WSW 0 3 7 0 0 0 0 0	W 0 2 3 0 0 0 0 0	WNW 0 2 3 0 0 0 0 0 0	NW 0 8 2 0 0 0 0 0 0	NNW 0 6 0 0 0 0 0 0	TOTAL 0 42 74 18 0 0 0
	Class C mph Calm-0.95 0.95-3.5 3.5-7.5 7.5-12.5 12.5-18.5 18.5-24 >24 TOTAL	Freq: N 0 3 0 0 0 0 0 3	0.061 NNE 0 4 2 0 0 0 0 0 0 0 6	NE 0 2 0 0 0 0 0 0	ENE 0 3 9 0 0 0 0 0 0	E 0 4 3 0 0 0 0 0	ESE 0 2 1 0 0 0 0 0	SE 0 1 2 0 0 0 0 0	SSE 0 3 1 0 0 0 0 0	S 0 9 1 0 0 0	SSW 0 19 13 0 0 0	SW 0 1 11 4 0 0 0 0 16	WSW 0 3 7 0 0 0 0 0	W 0 2 3 0 0 0 0 0	WNW 0 2 3 0 0 0 0 0 0	NW 0 8 2 0 0 0 0 0 0	NNW 0 6 0 0 0 0 0 0	TOTAL 0 42 74 18 0 0 0
	Class C mph Calm-0.95 0.95-3.5 3.5-7.5 7.5-12.5 12.5-18.5 18.5-24 >24 TOTAL Class D	Freq: N 0 3 0 0 0 0 0 0 3 Freq:	0.061 NNE 0 4 2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	NE 0 2 0 0 0 0 0 2 2	ENE 0 3 9 0 0 0 0 0 0 12	E 0 4 3 0 0 0 0 0 7	ESE 0 2 1 0 0 0 0 3	SE 0 1 2 0 0 0 0 0 3	SSE 0 3 1 0 0 0 0 0 4	S 0 9 1 0 0 0 10	SSW 0 0 19 13 0 0 0 0 32	SW 0 1 11 4 0 0 0 0 16	WSW 0 3 7 0 0 0 0 0 0 10	W 0 2 3 0 0 0 0 5	WNW 0 2 3 0 0 0 0 0 5	NW 0 8 2 0 0 0 0 0 0 0 10	NNW 0 6 0 0 0 0 0 0 6	TOTAL 0 42 74 18 0 0 0 134
	Class C mph Calm-0.95 0.95-3.5 3.5-7.5 7.5-12.5 12.5-18.5 18.5-24 >24 TOTAL Class D mph	Freq: N 0 3 0 0 0 0 0 0 0 3 Freq: N	0.061 NNE 0 4 2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	NE 0 0 2 0 0 0 0 0 0 2 2 NE	ENE 0 3 9 0 0 0 0 0 0 12 ENE	E 0 4 3 0 0 0 0 0 7 7	ESE 0 2 1 0 0 0 0 3 8 ESE	SE 0 1 2 0 0 0 0 0 3 3	SSE 0 3 1 0 0 0 0 0 4 SSE	S 0 9 1 0 0 0 10 5	SSW 0 19 13 0 0 0 32 SSW	SW 0 1 11 4 0 0 0 0 16 SW	WSW 0 3 7 0 0 0 0 0 10 10	W 0 2 3 0 0 0 0 5 5	WNW 0 2 3 0 0 0 0 0 5	NW 0 8 2 0 0 0 0 0 0 0 10	NNW 0 6 0 0 0 0 0 6 8	TOTAL 0 42 74 18 0 0 0 134 TOTAL
	Class C mph Calm-0.95 0.95-3.5 3.5-7.5 7.5-12.5 12.5-18.5 18.5-24 >24 TOTAL Class D mph Calm-0.95 0.95-3.5 3.5-7.5	Freq: N 0 3 0 0 0 0 0 0 0 3 Freq: N 0	0.061 NNE 0 4 2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	NE 0 0 0 0 0 0 0 2 8 8 28 25	ENE 0 3 9 0 0 0 0 0 0 0 12 ENE 0	E 0 4 3 0 0 0 0 0 7 7 E 0 15 6	ESE 0 2 1 0 0 0 0 0 3 3 ESE 0 12 8	SE 0 1 2 0 0 0 0 0 3 3 SE 0 19 5	SSE 0 3 1 0 0 0 0 0 4 SSE 0	S 0 9 1 0 0 0 10 10 5 0 28 35	SSW 0 19 13 0 0 0 0 32 SSW 0 11 145	SW 0 1 11 4 0 0 0 0 16 5 W 0	WSW 0 3 7 0 0 0 0 0 0 10 10 10 14 32	W 0 2 3 0 0 0 0 0 5 5 W 0 8 8 12	WNW 0 2 3 0 0 0 0 0 0 5 5	NW 0 8 2 0 0 0 0 0 0 0 0 0 0 10 10 8 3	NNW 0 6 0 0 0 0 0 0 0 6 8 8 8 8 9 8 9 9 9 9 9 9 9 9 9 9 9 9 9	TOTAL 0 42 74 18 0 0 0 134
·	Class C mph Calm-0.95 0.95-3.5 3.5-7.5 7.5-12.5 12.5-18.5 18.5-24 >24 TOTAL Class D mph Calm-0.95 0.95-3.5 3.5-7.5 7.5-12.5	Freq: N 0 3 0 0 0 0 0 0 0 3 Freq: N 0 14 2 0	0.061 NNE 0 4 2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	NE 0 2 0 0 0 0 0 2 2 NE 0 28 25 3	ENE 0 3 9 0 0 0 0 0 0 0 12 ENE 0 22 21 0	E 0 4 3 0 0 0 0 0 7 7 5 6 0 15 6 0	ESE 0 2 1 0 0 0 0 0 3 3 ESE 0 12 8 0	SE 0 1 2 0 0 0 0 0 0 3 3 5 0 19 5 0	SSE 0 3 1 0 0 0 0 0 0 4 3 5 SE 0 20 3 0 0	S 0 9 1 0 0 0 10 10 5 28 35 23	SSW 0 19 13 0 0 0 32 SSW 0 11 145 37	SW 0 1 11 4 0 0 0 0 16 5 1 51 11	WSW 0 3 7 0 0 0 0 0 0 0 10 10 10 14 32 0	W 0 2 3 0 0 0 0 0 5 5 8 8 12 0	WNW 0 2 3 0 0 0 0 0 5 5 WNW 0 4 14 0	NW 0 8 2 0 0 0 0 0 0 0 10 10 8 8 3 0	NNW 0 6 0 0 0 0 0 0 6 8 8 8 9 0 10 2 0	TOTAL 0 42 74 18 0 0 0 134
·	Class C mph Calm-0.95 0.95-3.5 3.5-7.5 7.5-12.5 12.5-18.5 18.5-24 >24 TOTAL Class D mph Calm-0.95 0.95-3.5 3.5-7.5 7.5-12.5 12.5-18.5	Freq: N 0 3 0 0 0 0 0 0 0 3 Freq: N 0 14 2 0 0 0 0 14	0.061 NNE 0 4 2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	NE 0 2 0 0 0 0 0 2 2 NE 0 28 25 3 0	ENE 0 3 9 0 0 0 0 0 0 0 12 ENE 0 22 21 0 0 0	E 0 4 3 0 0 0 0 0 7 7 5 6 0 15 6 0 0	ESE 0 2 1 0 0 0 0 0 3 3 ESE 0 12 8 0 0	SE 0 1 2 0 0 0 0 0 0 3 3 SE 0 19 5 0 0 0	SSE 0 3 1 0 0 0 0 0 4 3 5SE 0 20 3 0 0 0	S 0 9 1 0 0 0 10 10 5 28 35 23 0	SSW 0 19 13 0 0 0 32 SSW 0 11 145 37 0	SW 0 1 11 4 0 0 0 0 16 5 8 W 0 2 51 11 0	WSW 0 3 7 0 0 0 0 0 0 10 10 10 14 32 0 0 0	W 0 2 3 0 0 0 0 0 0 5 5 8 W 0 8 8 12 0 0	WNW 0 2 3 0 0 0 0 0 5 5 WNW 0 4 14 0 0	NW 0 8 2 0 0 0 0 0 0 10 10 10 8 8 3 0 0 0	NNW 0 6 0 0 0 0 0 0 6 8 8 8 9 0 10 2 0 0 0	TOTAL 0 42 74 18 0 0 0 134
·	Class C mph Calm-0.95 0.95-3.5 3.5-7.5 7.5-12.5 12.5-18.5 18.5-24 >24 TOTAL Class D mph Calm-0.95 0.95-3.5 3.5-7.5 7.5-12.5	Freq: N 0 3 0 0 0 0 0 0 0 3 Freq: N 0 14 2 0	0.061 NNE 0 4 2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	NE 0 2 0 0 0 0 0 2 2 NE 0 28 25 3	ENE 0 3 9 0 0 0 0 0 0 0 12 ENE 0 22 21 0	E 0 4 3 0 0 0 0 0 7 7 5 6 0 15 6 0	ESE 0 2 1 0 0 0 0 0 3 3 ESE 0 12 8 0	SE 0 1 2 0 0 0 0 0 0 3 3 5 0 19 5 0	SSE 0 3 1 0 0 0 0 0 0 4 3 5 SE 0 20 3 0 0	S 0 9 1 0 0 0 10 10 5 28 35 23	SSW 0 19 13 0 0 0 32 SSW 0 11 145 37	SW 0 1 11 4 0 0 0 0 16 5 1 51 11	WSW 0 3 7 0 0 0 0 0 0 0 10 10 10 14 32 0	W 0 2 3 0 0 0 0 0 5 5 8 8 12 0	WNW 0 2 3 0 0 0 0 0 0 5 5 WNW 0 4 14 0	NW 0 8 2 0 0 0 0 0 0 0 10 10 8 8 3 0	NNW 0 6 0 0 0 0 0 0 6 8 8 8 9 0 10 2 0	TOTAL 0 42 74 18 0 0 0 134

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Jul-Sep 2010

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Class E Freq: 0.347

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Class E	Freq:	0.347															
mph	N	NNE	NE	ENE	Е	ESE	SE	SSE	S	SSW	SW	wsw	W	WNW	NW	NNW	TOTAL
Calm-0.95	5	1	2	0	0	0	0	1	1	1	0	0	0	0	0	0	11
0.95-3.5	8	21	22	22	14	13	13	18	52	22	13	35	19	19	18	18	327
3.5-7.5	4	3	11	3	10	13	0	. 4	31	134	57	82	19	14	7	3	395
7.5-12.5	0	0	9	0	0	1	0	0	0	13	10	0	0	0	0	0	33
12.5-18.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18.5-24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
>24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	17	25	44	25	24	27	13	23	84	170	80	117	38	33	25	21	766
Class F	Freq:	0.143												•			
mph	N	NNĖ	NE	ENE	E	ESE	SE	SSE	S	ssw	SW	wsw	w	WNW	Ň₩ [™]	NNW	TOTAL
Calm-0.95	0	0	0	Ö	0	0	1	0	3	1	1	0	0	0	0	0	6
0.95-3.5	5	1	3	3	0	3	3	4	13	21	30	44	16	13	4	5	168
3.5-7.5	1	1	0	1	3	0	0	0	0	24	77	23	4	3	0	1	138
7.5-12.5	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	3
12.5-18.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18.5-24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
>24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	6	2	3	4	3	3	4	4	16	46	111	67	20	16	4	6	315
Class G	Freq:	0.034															
mph	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	wsw	w	WNW	NW	NNW	TOTAL
Calm-0.95	0	0	0	0	0	0	0	1	0	2	0	1	0	0	0	0	4
0.95-3.5	0	0	0	0	0	0	1	0	2	3	11	15	13	2	0	0	47
3.5-7.5	0	0	0	0	0	0	0	0	0	0	20	3	0	0	0	0	23
7.5-12.5	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	.0	1
12.5-18.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18.5-24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
>24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	0	0	0	0	0	0	1	1	2	5	32	19	13	2	0	0	75
Class All	Freq:	1.000															
mph	Ν	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	wsw	w	WNW	NW	NNW	TOTAL
Calm-0.95	5	1	2	0	0	0	1	2	4	4	1	1	0	0	0	0	21
0.95-3.5	39	44	69	59	37	30	39	45	95	57	57	114	67	44	44	42	882
3.5-7.5	18	31	56	49	27	33	13	10	80	344	224	158	41	42	17	9	1152
7.5-12.5	0	1	12	0	0	1	0	0	25	79	35	0	0	0	0	0	153
12.5-18.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1 40 5 04		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18.5-24	0	<u> </u>	<u> </u>	<u> </u>	⊢ ~	-		1						1			
18.5-24 >24	0	0	0	0	Ō	0	0	0	0	0	0	0	0	0	0	0	0

Oct-Dec 2010

Class A	Freq:	0.043
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TOTAL 33

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Class A	Freq:	0.043															
mph	N	NNE	NE	ENE	Е	ESE	SE	SSE	S	SSW	SW	wsw	W	WNW	NW	NNW	TOTAL
Calm-0.95	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0.95-3.5	5	2	2	2	0	0	0	0	0	0	0	0	0	0	2	4	17
3.5-7.5	5	9	5	0	3	0	0	0	0	0	0	0	11	22	8	7	70
7.5-12.5	0	0	2	0	0	0	0	0	0	0	0	0	1	1	5	0	9
12.5-18.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18.5-24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
>24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	10	11	9	2	3	0	0	0	0	0	0	0	12	23	15	11	96
Class B	Freq:	0.033															
mph	• N	NNE	NE	ENE	Ē	ESE	SE	SSE"	÷ •S• .⊺	⁻ SSW	sw	wsw	Ŵ	WNW	NW	NNW	TOTAL
Calm-0.95	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0.95-3.5	0	0	0	0	1	0	0	0	0	0	0	0	1	1	0	1	4
3.5-7.5	2	4	3	0	1	1	1	0	0	3	2	6	13	14	8	2	60
7.5-12.5	0	3	1	0	0	0	0	0	0	0	0	1	4	0	0	0	9
12.5-18.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18.5-24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
>24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	2	7	4	0	2	1	1	0	0	3	2	7	18	15	8	3	73
Class C	Freq:																
mph	N	0.048 NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	wsw	W	WNW	NW	NNW	TOTAL
mph Calm-0.95			NE 0	ENE 0	Е 0	ESE 0	SE 0	SSE 0	S 0	SSW 0	SW 0	wsw o	W	WNW 0			
	N	NNE				1		<u> </u>				1	····	Î	NW 0 2	NNW 0	TOTAL 0 7
Calm-0.95	N 0	NNE 0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Calm-0.95 0.95-3.5	N 0 0	NNE 0 1	0 1	0	0 0	0 2	0	0	0	00	0	0	0	0	0 2	0 0	0 7
Calm-0.95 0.95-3.5 3.5-7.5	N 0 0 1	NNE 0 1 3	0 1 12	0 0 0	0 0 0	0 2 1	0 0 1	0 0 0	0 0 2	0 _0 _1	0 0 7	0 0 17	0 0 18	0 1 3	0 2 4	0 0 4	0 7 74
Calm-0.95 0.95-3.5 3.5-7.5 7.5-12.5	N 0 1 1	NNE 0 1 3 3	0 1 12 2	0 0 0 1	0 0 0 0	0 2 1 0	0 0 1 0	0 0 0	0 0 2 0	0 0 1 0	0 0 7 0	0 0 17 4	0 0 18 4	0 1 3 7	0 2 4 1	0 0 4 1	0 7 74 24
Calm-0.95 0.95-3.5 3.5-7.5 7.5-12.5 12.5-18.5	N 0 1 1 0	NNE 0 1 3 0	0 1 12 2 0	0 0 0 1 0	0 0 0 0 0	0 2 1 0 0	0 0 1 0 0	0 0 0 0	0 0 2 0 0	0 0 1 0	0 0 7 0	0 0 17 4 0	0 0 18 4 0	0 1 3 7 0	0 2 4 1 0	0 0 4 1 0	0 7 74 24 0
Calm-0.95 0.95-3.5 3.5-7.5 7.5-12.5 12.5-18.5 18.5-24	N 0 1 1 0 0	NNE 0 1 3 3 0 0	0 1 12 2 0 0	0 0 1 0	0 0 0 0 0	0 2 1 0 0 0	0 0 1 0 0 0	0 0 0 0 0	0 0 2 0 0 0	0 0 1 0 0	0 0 7 0 0 0	0 0 17 4 0 0	0 0 18 4 0 0	0 1 3 7 0 0	0 2 4 1 0 0	0 0 4 1 0 0	0 7 74 24 0 0
Calm-0.95 0.95-3.5 3.5-7.5 7.5-12.5 12.5-18.5 18.5-24 >24	N 0 1 1 0 0 0	NNE 0 1 3 3 0 0 0 0 7	0 1 12 2 0 0 0	0 0 1 0 0 0	0 0 0 0 0 0 0	0 2 1 0 0 0 0	0 0 1 0 0 0 0	0 0 0 0 0 0	0 0 2 0 0 0 0	0 0 1 0 0 0	0 0 7 0 0 0 0	0 0 17 4 0 0 0	0 0 18 4 0 0 0	0 1 3 7 0 0 0	0 2 4 1 0 0	0 0 4 1 0 0 0	0 7 74 24 0 0 0
Calm-0.95 0.95-3.5 3.5-7.5 7.5-12.5 12.5-18.5 18.5-24 >24 TOTAL	N 0 1 1 0 0 0 2	NNE 0 1 3 3 0 0 0 0 7	0 1 12 2 0 0 0	0 0 1 0 0 0	0 0 0 0 0 0 0	0 2 1 0 0 0 0	0 0 1 0 0 0 0	0 0 0 0 0 0	0 0 2 0 0 0 0	0 0 1 0 0 0	0 0 7 0 0 0 0	0 0 17 4 0 0 0	0 0 18 4 0 0 0	0 1 3 7 0 0 0	0 2 4 1 0 0	0 0 4 1 0 0 0	0 7 74 24 0 0 0
Calm-0.95 0.95-3.5 3.5-7.5 7.5-12.5 12.5-18.5 18.5-24 >24 TOTAL Class D	N 0 1 1 0 0 0 2 Freq:	NNE 0 1 3 3 0 0 0 0 7 0.462	0 1 12 2 0 0 0 0 15	0 0 0 1 0 0 0 1	0 0 0 0 0 0 0	0 2 1 0 0 0 0 3	0 0 1 0 0 0 0 1	0 0 0 0 0 0 0	0 0 2 0 0 0 0 0 2	0 0 1 0 0 0 0 1	0 0 7 0 0 0 0 0 7	0 0 17 4 0 0 0 21	0 0 18 4 0 0 0 22	0 1 3 7 0 0 0 0 11	0 2 4 1 0 0 0 7	0 0 4 1 0 0 0 5	0 7 74 24 0 0 0 0 105
Calm-0.95 0.95-3.5 3.5-7.5 7.5-12.5 12.5-18.5 18.5-24 >24 TOTAL Class D mph	N 0 1 1 0 0 0 2 Freq: N	NNE 0 1 3 3 0 0 0 0 7 0.462 NNE	0 1 12 2 0 0 0 0 15 NE	0 0 1 0 0 0 1 1 ENE	0 0 0 0 0 0 0 0 0	0 2 1 0 0 0 3 ESE	0 0 1 0 0 0 0 1 5 E	0 0 0 0 0 0 0 0 0 5SE	0 0 2 0 0 0 0 2 2 5	0 0 1 0 0 0 1 1 SSW	0 0 7 0 0 0 0 7 7 SW	0 0 17 4 0 0 0 21	0 0 18 4 0 0 0 22 W	0 1 3 7 0 0 0 0 11	0 2 4 1 0 0 0 7 7 NW	0 0 4 1 0 0 0 5	0 7 74 24 0 0 0 0 105 TOTAL
Calm-0.95 0.95-3.5 3.5-7.5 12.5-18.5 18.5-24 >24 TOTAL Class D mph Calm-0.95	N 0 1 1 0 0 0 2 Freq: N 0	NNE 0 1 3 0 0 0 0 0 7 0.462 NNE 0	0 1 12 2 0 0 0 0 0 15 NE 0	0 0 1 0 0 1 0 1 0 0 1 0	0 0 0 0 0 0 0 0 0 0 0 0	0 2 1 0 0 0 3 ESE 0	0 0 1 0 0 0 1 5 5 5 0	0 0 0 0 0 0 0 0 0 5SE 0	0 0 2 0 0 0 0 2 2 5 0	0 0 1 0 0 0 1 5 SW 0	0 0 7 0 0 0 0 7 7 8 W	0 0 17 4 0 0 0 21 WSW 0	0 0 18 4 0 0 0 22 22 W	0 1 3 7 0 0 0 0 11 1 WNW 0	0 2 4 1 0 0 0 7 7 8 8 8 8 8 9 8 9 8 9 8 9 8 9 8 9 8 9	0 0 4 1 0 0 5 5 NNW 0	0 7 74 24 0 0 0 105 TOTAL 0
Calm-0.95 0.95-3.5 3.5-7.5 12.5-18.5 18.5-24 >24 TOTAL Class D mph Calm-0.95 0.95-3.5	N 0 1 1 0 0 0 2 Freq: N 0 6	NNE 0 1 3 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 8	0 1 12 2 0 0 0 0 15 NE 0 6	0 0 1 0 0 1 0 1 0 1 0 10	0 0 0 0 0 0 0 0 0 0 0 0 0 11	0 2 1 0 0 0 3 ESE 0 0	0 0 1 0 0 0 0 1 5 5 5 5 3	0 0 0 0 0 0 0 0 0 0 5 5 5 5 6	0 0 2 0 0 0 0 2 2 5 0 2	0 0 1 0 0 0 1 5 SW 0 2	0 0 7 0 0 0 0 7 7 5 W 0 3	0 0 17 4 0 0 0 21 WSW 0 3	0 0 18 4 0 0 0 0 22 W 0 10	0 1 3 7 0 0 0 0 11 1 WNW 0 7	0 2 4 1 0 0 0 7 7 NW 0 12	0 0 4 1 0 0 5 5 NNW 0 5	0 7 74 24 0 0 0 0 105 TOTAL 0 94
Calm-0.95 0.95-3.5 3.5-7.5 12.5-18.5 18.5-24 >24 TOTAL Class D mph Calm-0.95 0.95-3.5 3.5-7.5	N 0 1 1 0 0 0 2 Freq: N 6 10	NNE 0 1 3 3 0 0 0 0 0 7 0.462 NNE 0 8 8 26	0 1 12 2 0 0 0 0 15 NE 0 6 44	0 0 1 0 0 0 1 0 1 0 10 12	0 0 0 0 0 0 0 0 0 0 0 0 0 11 17	0 2 1 0 0 0 3 ESE 0 0 27	0 0 1 0 0 0 0 1 1 SE 0 3 20	0 0 0 0 0 0 0 0 0 0 5 5 5 5 5 6 10	0 0 2 0 0 0 0 2 2 5 0 2 38	0 0 1 0 0 0 0 1 1 SSW 0 2 50	0 0 7 0 0 0 0 7 7 5 W 0 3 45	0 0 17 4 0 0 0 21 WSW 0 3 76	0 0 18 4 0 0 0 22 22 W 0 10 96	0 1 3 7 0 0 0 0 11 1 1 WNW 0 7 72	0 2 4 1 0 0 0 7 7 8 8 8 8 9 8 9 8 9 8 9 8 9 8 9 8 9 8	0 0 4 1 0 0 0 5 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8	0 7 74 24 0 0 0 105 TOTAL 0 94 612
Calm-0.95 0.95-3.5 3.5-7.5 12.5-18.5 18.5-24 >24 TOTAL Class D mph Calm-0.95 0.95-3.5 3.5-7.5 7.5-12.5	N 0 1 1 0 0 0 2 Freq: N 0 6 10 16	NNE 0 1 3 3 0 0 0 0 0 0 7 0.462 NNE 0 8 26 64	0 1 12 2 0 0 0 15 NE 0 6 44 20	0 0 1 0 0 0 0 1 0 1 0 10 12 1	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 1 17 3	0 2 1 0 0 0 3 ESE 0 0 27 1	0 0 1 0 0 0 0 1 1 SE 0 3 20 20	0 0 0 0 0 0 0 0 0 0 5SE 0 6 10 1	0 0 2 0 0 0 0 2 2 5 0 2 38 16	0 0 1 0 0 0 0 1 1 SSW 0 2 50 19	0 0 7 0 0 0 0 7 7 5 W 0 3 3 45 3	0 0 17 4 0 0 21 WSW 0 3 76 14	0 0 18 4 0 0 22 22 W 0 10 96 27	0 1 3 7 0 0 0 0 11 11 WNW 0 7 72 32	0 2 4 1 0 0 0 7 7 NW 0 12 62 49	0 0 4 1 0 0 0 5 NNW 0 5 7 17	0 7 74 24 0 0 0 105 TOTAL 0 94 612 303
Calm-0.95 0.95-3.5 3.5-7.5 12.5-18.5 18.5-24 >24 TOTAL Class D mph Calm-0.95 0.95-3.5 3.5-7.5 7.5-12.5 12.5-18.5	N 0 1 1 0 0 0 2 Freq: N 0 6 10 16 1	NNE 0 1 3 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 8 26 64 0	0 1 12 2 0 0 0 0 15 NE 0 6 44 20 4	0 0 0 1 0 0 0 1 0 1 0 10 12 1 0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 1 17 3 0	0 2 1 0 0 0 3 ESE 0 0 0 27 1 0	0 0 1 0 0 0 0 1 1 SE 0 3 20 20 0	0 0 0 0 0 0 0 0 0 0 0 5SE 0 6 10 1 0	0 0 2 0 0 0 0 2 2 5 5 0 2 38 16 2	0 0 1 0 0 0 1 1 SSW 0 2 50 19 0	0 0 7 0 0 0 0 7 7 5 W 0 3 3 45 3 0	0 0 17 4 0 0 21 WSW 0 3 76 14 0	0 0 18 4 0 0 22 22 W 0 10 96 27 0	0 1 3 7 0 0 0 11 WNW 0 7 72 32 3	0 2 4 1 0 0 0 7 7 NW 0 12 62 49 0	0 0 4 1 0 0 5 5 7 17 2	0 7 74 24 0 0 0 105 TOTAL 0 94 612 303 12

58 71 51

93 133 114 123 31

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Class E Freq: 0.329

0.95-3.5 4 8 1 3 1 5 11 13 23 26 13 37 33 21 11 4 214 3.5-7.5 4 6 3 0 1 13 14 20 14 39 55 12 72 35 28 2 4<25 7.5-12.5 1 9 0	Class E	Freq:	0.329															
0.95-35 4 8 1 3 1 5 11 13 22 26 13 37 33 21 11 4 214 3.5-7.5 4 6 3 0 1 13 14 20 14 39 55 121 72 35 26 2 425 75-12.5 1 4 2 0	mph	N	NNE	NE	ENE	Е	ESE	SE	SSE	S	SSW	SW	wsw	W	WNW	NW	NNW	TOTAL
3.5.7.5 4 6 3 0 1 13 14 20 14 39 55 121 72 35 26 2 425 7.5-12.5 1 4 2 0 <t< td=""><td>Calm-0.95</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>1</td><td>0</td><td>0</td><td>0</td><td>1</td><td>1</td><td>0</td><td>1</td><td>0</td><td>0</td><td>0</td><td>4</td></t<>	Calm-0.95	0	0	0	0	0	1	0	0	0	1	1	0	1	0	0	0	4
7.5-12.5 1 9 0 0 0 3 5 2 3 12 9 6 15 5 6 0 76 12.5-18.5 1 4 2 0	0.95-3.5	4	8	1	3	1	5	11	13	23	26	13	37	33	21	11	4	214
12.5-18.5 1 4 2 0	3.5-7.5	4	6	3	0	1	13	14	20	14	39	55	121	72	35	26	2	425
18.5-24 0 </td <td>7.5-12.5</td> <td>1</td> <td>9</td> <td>0</td> <td>0</td> <td>0</td> <td>3</td> <td>5</td> <td>2</td> <td>3</td> <td>12</td> <td>9</td> <td>6</td> <td>15</td> <td>5</td> <td>6</td> <td>0</td> <td>76</td>	7.5-12.5	1	9	0	0	0	3	5	2	3	12	9	6	15	5	6	0	76
>24 0	12.5-18.5	1	4	2	0	0	0	0	0	0	0	0	0	0	0	0	0	7
TOTAL 10 27 6 3 2 22 30 35 40 78 78 164 121 61 43 6 726 Class F Free: 0.075 mph N NNE NNE ENE E ESE SE SSW SW WSW W.T WNW NNW NNW TOTAL Calm-0.96 0	18.5-24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Class F Freq: 0.075 mph C.M NNE NE ENE E ESE SE SSW SW WWW NWW NNW TOTAL Calm-0.95 0	>24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Class F Freq: 0.075 mph N NNE NNE ENE E ESE SE SSW SW WSW WY NNW NNW NNW TOTAL Calm-0.95 0 <t< td=""><td>TOTAL</td><td>10</td><td>27</td><td>6</td><td>3</td><td>2</td><td>22</td><td>30</td><td>35</td><td>40</td><td>78</td><td>78</td><td>164</td><td>121</td><td>61</td><td>43</td><td>6</td><td>726</td></t<>	TOTAL	10	27	6	3	2	22	30	35	40	78	78	164	121	61	43	6	726
Calm-0.95 0 0 0 0 0 2 0	Class _. F	Freq:	0.075						١									
0.95-3.5 0 0 0 0 0 0 2 23 17 14 14 6 7 1 0 84 3.57.5 0	mph	N.	^t NNE ^{//}	NE	ENE	Ē	ESE	SE	SSE	S	SSW	SW	wsw	W *	WNW	NW	NNW	TOTAL
3.5-7.5 0 </td <td>Calm-0.95</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>2</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>2</td>	Calm-0.95	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	2
7.5-12.5 0 0 0 0 0 0 12 0 0 0 0 12 12.5-18.5 0	0.95-3.5	0	0	0	0	0	0	0	2	23	17	14	14	6	7	1	0	84
12.5-18.5 0	3.5-7.5	0	0	0	0	0	0	0	0	2	7	41	18	0	0	0	0	68
18.5:24 0 </td <td>7.5-12.5</td> <td>0</td> <td>12</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>12</td>	7.5-12.5	0	0	0	0	0	0	0	0	0	0	12	0	0	0	0	0	12
>24 0	12.5-18.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL 0 0 0 0 0 2 25 26 67 32 6 7 1 0 166 Class G Freq: 0.010 0 0 0 2 25 26 67 32 6 7 1 0 166 Class G Freq: 0.010 0 </td <td>18.5-24</td> <td>0</td>	18.5-24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Class G Freq: 0.010 mph N NNE NE ENE E ESE SE SSW SW WSW W NNW NNW NNW TOTAL Calm-0.95 0	>24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
mph N NNE NE ENE E ESE SE SS SW WSW W NNW NNW NNW TOTAL Calm-0.95 0	TOTAL	0	0	0	0	0	0	0	2	25	26	67	32	6	7	1	0	166
mph N NNE NE ENE E ESE SE SS SW WSW W NNW NNW NNW TOTAL Calm-0.95 0	Class G	Frea:	0.010															
0.95-3.5 0 0 0 0 0 0 0 4 8 1 1 0 0 14 3.5-7.5 0	mph			NE	ENE	Е	ESE	SE	SSE	S	SSW	SW	wsw	W	WNW	NW	NNW	TOTAL
3.5-7.5 0 0 0 0 0 0 0 5 1 0 0 0 0 6 7.5-12.5 0	Calm-0.95	0	0	0	0	Ö	0	0	0	0	0	0	0	0	0	0	0	0
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	0.95-3.5	0	0	0	0	0	0	0	0	0	0	4	8	1	1	0	0	14
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	3.5-7.5	0	0	0	0	0	0	0	0	0	0	5	1	0	0	0	0	6
18.5-24 0 </td <td>7.5-12.5</td> <td>0</td> <td>1</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>1</td>	7.5-12.5	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1
>24 0	12.5-18.5	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1
TOTAL 0 0 0 0 0 0 0 0 11 9 1 1 0 0 22 Class All Freq: 1.000 0 0 0 0 0 0 11 9 1 1 0 0 22 Class All Freq: 1.000 0 0 1 0 0 0 22 mph N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NOW TOTAL Calm-0.95 0 0 0 1 0 0 0 3 1 0 1 0 0 66 0.95-3.5 15 19 10 15 13 7 14 21 48 45 34 62 51 38 28 14 434 3.5-7.5 22 48 67 12 22 42 36 30 56 100 155 <	18.5-24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Class All Freq: 1.000 mph N NNE NE ENE E ESE SE SSE S SW WSW W NNW NW NNW TOTAL Calm-0.95 0 0 0 0 1 0 0 0 3 1 0 1 0 0 6 0.95-3.5 15 19 10 15 13 7 14 21 48 45 34 62 51 38 28 14 434 3.5-7.5 22 48 67 12 22 42 36 30 56 100 155 239 210 146 108 22 1315 7.5-12.5 18 79 25 2 3 4 25 3 19 31 25 25 51 45 61 18 434 12.5-18.5 2 4 6 0 0 0 0 0 0 0 0 0 0 0 <td< td=""><td>>24</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td></td<>	>24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
mph N NNE NE ENE E ESE SE SSE S SSW SW WSW W NW NW NNW TOTAL Calm-0.95 0 0 0 0 1 0 0 3 1 0 1 0 0 6 0.95-3.5 15 19 10 15 13 7 14 21 48 45 34 62 51 38 28 14 434 3.5-7.5 22 48 67 12 22 42 36 30 56 100 155 239 210 146 108 22 1315 7.5-12.5 18 79 25 2 3 4 25 3 19 31 25 51 45 61 18 434 12.5-18.5 2 4 6 0 0 0 0 0 0	TOTAL	0	0	0	0	0	0	0	0	0	0	11	9	1	1	0	0	22
Calm-0.95 0 0 0 0 1 0 0 0 3 1 0 1 0 0 6 0.95-3.5 15 19 10 15 13 7 14 21 48 45 34 62 51 38 28 14 434 3.5-7.5 22 48 67 12 22 42 36 30 56 100 155 239 210 146 108 22 1315 7.5-12.5 18 79 25 2 3 4 25 3 19 31 25 25 51 45 61 18 434 12.5-18.5 2 4 6 0 0 0 0 2 0 1 0 0 3 0 2 20 18.5-24 0<	Class All	Freq:	1.000															
Calm-0.95 0 0 0 0 1 0 0 0 3 1 0 1 0 0 6 0.95-3.5 15 19 10 15 13 7 14 21 48 45 34 62 51 38 28 14 434 3.5-7.5 22 48 67 12 22 42 36 30 56 100 155 239 210 146 108 22 1315 7.5-12.5 18 79 25 2 3 4 25 3 19 31 25 25 51 45 61 18 434 12.5-18.5 2 4 6 0 0 0 0 2 0 1 0 0 3 0 2 20 18.5-24 0<	mph	N	NNE	NE	ENE	Е	ESE	SE	SSE	S	ssw	SW	wsw	W	WNW	NW	NNW	TOTAL
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	Calm-0.95	0	0	0	0	0	1	0	0	0	3	1	0	1		0		
3.5-7.5 22 48 67 12 22 42 36 30 56 100 155 239 210 146 108 22 1315 7.5-12.5 18 79 25 2 3 4 25 3 19 31 25 25 51 45 61 18 434 12.5-18.5 2 4 6 0 0 0 0 2 0 1 0 0 3 0 2 20 18.5-24 0 <td></td> <td>1</td> <td>19</td> <td>10</td> <td>15</td> <td>13</td> <td>7</td> <td>14</td> <td>21</td> <td>48</td> <td></td> <td>34</td> <td>62</td> <td>51</td> <td>·····</td> <td></td> <td></td> <td></td>		1	19	10	15	13	7	14	21	48		34	62	51	·····			
12.5-18.5 2 4 6 0 0 0 0 2 0 1 0 0 3 0 2 20 18.5-24 0	3.5-7.5	22	48	67	12	22	42	36	30	56	100	155	-					
18.5-24 0 </td <td>7.5-12.5</td> <td>18</td> <td>79</td> <td>25</td> <td>2</td> <td>3</td> <td>4</td> <td>25</td> <td>3</td> <td>19</td> <td>31</td> <td>25</td> <td>25</td> <td>51</td> <td>45</td> <td>61</td> <td>18</td> <td>434</td>	7.5-12.5	18	79	25	2	3	4	25	3	19	31	25	25	51	45	61	18	434
>24 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	12.5-18.5	2	4	6	0	0	0	0	0	2	0	1	0	0	3	0	2	20
	18.5-24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL 57 150 108 29 38 54 75 54 125 179 216 326 313 232 197 56 2209	>24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	TOTAL	57	150	108	29	38	54	75	54	125	179	216	326	313	232	197	56	2209

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	^	From	0.001
Class	A	Frea:	0.091

Class A	Freq:	0.091															
mph	Ν	NNE	NE	ENE	Е	ESE	SE	SSE	S	SSW	SW	wsw	W	WNW	NW	NNW	TOTAL
Calm-0.95	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0.95-3.5	19	11	18	11	7	0	1	0	0	0	0	0	3	4	7	8	89
3.5-7.5	31	57	57	38	28	22	14	5	9	16	15	17	40	66	40	23	478
7.5-12.5	0	15	3	1	2	0	0	0	8	44	9	1	18	13	7	2	123
12.5-18.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18.5-24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
>24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	50	83	78	50	37	22	15	5	17	60	24	18	61	83	54	33	690
 Class B	Freq:	0.040	. · ·		۰.		a namena ar	ر و چر ور مرج چر و	• •		·····					•	a 1944-1
mph	N	NNE	NE	ENE	Е	ESE	SE	SSE	S	ssw	SW	wsw	W	WNW	NW	NNW	TOTAL
Calm-0.95	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0.95-3.5	4	4	4	6	2	2	5	0	0	0	0	3	8	3	8	4	53
3.5-7.5	4	10	7	14	15	16	6	3	3	29	19	25	22	18	13	4	208
7.5-12.5	0	6	1	0	0	0	0	0	2	16	6	2	5	2	0	0	40
12.5-18.5	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1
18.5-24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
>24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	8	20	13	20	17	18	11	3	5	45	25	30	35	23	21	8	302
Class C mph	Freq:	0.056 NNE	NE	ENE	E	ESE	SE	SSE	S	ssw	sw	wsw	w	WNW	NW	NNW	TOTAL
						1								<u> </u>			
Calm-0.95 0.95-3.5	0	0	 7	0 5	0 7	0	0	0	0	0	0	0	0	0	0	0	0 82
3.5-7.5	 5	11 8		5 18		4 8	5 5	4	0 24	0 37	1 31	3 37	3 34	7	12 8	9 6	271
7.5-12.5	1	8	2	10	0	0	0	0	24	26	10	4	5	8	2	2	71
12.5-18.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18.5-24	0	0	0	0	0	0	0	0	0	0.	0	0	0	0	0	0	0
>24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	10	27	28	24	18	12	10	7	26	63	42	44	42	32	22	17	424
		1				=											
Class D	Freq:	0.390															
mph	· · · ·	NNE	NE	ENE	Е	ESF	SE	SSE	S	ssw	sw	wsw	w	WNW	NW	NNW	TOTAL
Calm-0.95	The sub-	0	0	0	0	0	0	0	0	0	0	1	0	0	2	0	3
0.95-3.5	50	47	58	53	50	32	40	49	46	25	15	27	30	32	38	31	623
3.5-7.5	35	43	89	56	52	70	41	31	122	310	157	169	215	153	99	18	1660
7.5-12.5	20	95	37	13	14	3	20	14	45	120	34	14	64	43	66	23	625
12.5-18.5	1	6	6	12	1	0	0	0	2	0	2	0	0	3	0	2	35
18.5-24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
>24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	106	191	190	134	117	105	101	94	215	455	208	211	309	231	205	74	2946
						L		<u> </u>		1					200	L	

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	Freq:	0.303													1		
mph	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	тот/
Calm-0.95	5	1	2	0	0	1	0	1	1	2	3	0	2	0	1	0	19
0.95-3.5	25	35	33	46	31	31	45	55	103	61	40	110	89	58	56	31	849
3.5-7.5	11	10	14	7	21	31	19	25	67	260	181	307	151	63	42	9	121
7.5-12.5	1	9	10	1	14	6	5	2	3	54	52	10	15	6	6	0	19
12.5-18.5	1	4	2	1	3	0	0	0	0	2	0	0	0	0	0	0	13
18.5-24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
>24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	43	59	61	55	69	69	69	83	174	379	276	427	257	127	105	40	229
Class F	Frea:	0:098		· · · ·				•			· · .	105.1	<u></u>				• •
mph	N	NNE	NE	ENE	Е	ESE	SE	SSE	S	ssw	SW	wsw	W	WNW	NW	NNW	тот
Calm-0.95	0	0	0	0	0	0	2	0	3	3	1	1	0	1	0	0	11
0.95-3.5	6	2	3	14	2	5	5	6	39	43	64	109	40	32	10	10	39
3.5-7.5	1	1	1	4	3	1	0	0	4	40	165	73	7	3	0	1	30
7.5-12.5	0	0	0	0	0	0	0	0	0	6	28	0	0	0	0	0	. 34
12.5-18.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18.5-24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
>24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		1					_								10	4.4	
Class G	7 Freq:	<u>3</u> 0.022	4	18	5	6	7	6	46	92	258	183	47	36	10	11	/3
	1		4 NE		5 E	6 ESE	7 SE	6 SSE	46 S	92 SSW	258 SW	183 WSW	47 W	36 WNW	NW	NNW	
Class G	Freq:	0.022									Г			1	1		тот
Class G mph	Freq:	0.022 NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	sw	wsw	w	WNW	NW	NNW	TOT
Class G mph Calm-0.95	Freq: N 0	0.022 NNE 0	NE 0	ENE 0	E 1	ESE 0	SE 0	SSE 1	S 1	SSW 2	SW 1	WSW	W 0	WNW 0	NW 0	NNW 0	TOT 7 8(
Class G mph Calm-0.95 0.95-3.5	Freq: N 0 0	0.022 NNE 0 0	NE 0 0	ENE 0 0	E 1 0	ESE 0 0	SE 0 1	SSE 1 0	S 1 3	SSW 2 3	SW 1 19	WSW 1 34	W 0 16	WNW 0 6	NW 0 1	NNW 0 0	TOT 7 8: 62
Class G mph Calm-0.95 0.95-3.5 3.5-7.5	Freq: N 0 0	0.022 NNE 0 0 0	NE 0 0	ENE 0 0	E 1 0 0	ESE 0 0	SE 0 1 0	SSE 1 0 0	S 1 3 0	SSW 2 3 0	SW 1 19 49	WSW 1 34 12	W 0 16 1	WNW 0 6 0	NW 0 1 0	NNW 0 0	TOT 7 83 62 15
Class G mph Calm-0.95 0.95-3.5 3.5-7.5 7.5-12.5	Freq: N 0 0 0 0	0.022 NNE 0 0 0 0	NE 0 0 0	ENE 0 0 0	E 1 0 0	ESE 0 0 0	SE 0 1 0 0	SSE 1 0 0	S 1 3 0 0	SSW 2 3 0 3	SW 1 19 49 12	WSW 1 34 12 0	W 0 16 1 0	WNW 0 6 0 0	NW 0 1 0 0	NNW 0 0 0	TOT 7 83 62 11
Class G mph Calm-0.95 0.95-3.5 3.5-7.5 7.5-12.5 12.5-18.5	Freq: N 0 0 0 0 0	0.022 NNE 0 0 0 0 0	NE 0 0 0 0	ENE 0 0 0 0 0	E 1 0 0 0	ESE 0 0 0 0 0	SE 0 1 0 0 0	SSE 1 0 0 0	S 1 3 0 0 0	SSW 2 3 0 3 0	SW 1 19 49 12 1	WSW 1 34 12 0 0	W 0 16 1 0 0	WNW 0 6 0 0	NW 0 1 0 0 0	NNW 0 0 0 0	TOT 7 83 62 11 1
Class G mph Calm-0.95 0.95-3.5 3.5-7.5 7.5-12.5 12.5-18.5 18.5-24	Freq: N 0 0 0 0 0 0 0 0	0.022 NNE 0 0 0 0 0 0 0 0 0 0 0 0 0	NE 0 0 0 0 0 0	ENE 0 0 0 0 0 0 0	E 1 0 0 0 0 0	ESE 0 0 0 0 0 0 0	SE 0 1 0 0 0 0	SSE 1 0 0 0 0 0	S 1 3 0 0 0 0 0	SSW 2 3 0 3 0 0 0	SW 1 19 49 12 1 0	WSW 1 34 12 0 0 0 0	W 0 16 1 0 0 0	WNW 0 6 0 0 0 0	NW 0 1 0 0 0 0	NNW 0 0 0 0 0 0 0	TOT 7 83 62 11 1 1 0 0 0
Class G mph Calm-0.95 0.95-3.5 3.5-7.5 7.5-12.5 12.5-18.5 18.5-24 >24	Freq: N 0 0 0 0 0 0 0 0 0	0.022 NNE 0 0 0 0 0 0 0 0 0 0 0 0 0	NE 0 0 0 0 0 0 0	ENE 0 0 0 0 0 0 0 0 0	E 1 0 0 0 0 0 0	ESE 0 0 0 0 0 0 0 0	SE 0 1 0 0 0 0 0	SSE 1 0 0 0 0 0 0 0	S 1 3 0 0 0 0 0	SSW 2 3 0 3 0 0 0 0 0	SW 1 19 49 12 1 0 0	WSW 1 34 12 0 0 0 0 0 0	W 0 16 1 0 0 0	WNW 0 6 0 0 0 0 0 0 0	NW 0 1 0 0 0 0 0	NNW 0 0 0 0 0 0 0 0 0	TOT 7 83 62 11 1 1 0 0 0
Class G mph Calm-0.95 0.95-3.5 3.5-7.5 7.5-12.5 12.5-18.5 18.5-24 >24 TOTAL	Freq: N 0 0 0 0 0 0 0 0 0 0 0	0.022 NNE 0 0 0 0 0 0 0 0 0 0 0 0 0	NE 0 0 0 0 0 0 0	ENE 0 0 0 0 0 0 0 0 0	E 1 0 0 0 0 0 0 1	ESE 0 0 0 0 0 0 0 0	SE 0 1 0 0 0 0 0	SSE 1 0 0 0 0 0 0 0	S 1 3 0 0 0 0 0	SSW 2 3 0 3 0 0 0 0 0	SW 1 19 49 12 1 0 0	WSW 1 34 12 0 0 0 0 0 47	W 0 16 1 0 0 0	WNW 0 6 0 0 0 0 0 0 0	NW 0 1 0 0 0 0 0	NNW 0 0 0 0 0 0 0 0 0	TOT 7 83 62 14 1 1 0 0 0 0 0 0 16
Class G mph Calm-0.95 0.95-3.5 3.5-7.5 7.5-12.5 12.5-18.5 18.5-24 >24 TOTAL Class All	Freq: N 0 0 0 0 0 0 0 Freq:	0.022 NNE 0 0 0 0 0 0 0 0 0 1.000	NE 0 0 0 0 0 0 0 0	ENE 0 0 0 0 0 0 0 0	E 1 0 0 0 0 0 0 1	ESE 0 0 0 0 0 0 0 0	SE 0 1 0 0 0 0 0 1	SSE 1 0 0 0 0 0 0 1	S 1 3 0 0 0 0 0 4	SSW 2 3 0 3 0 0 0 0 8	SW 1 19 49 12 1 0 0 82	WSW 1 34 12 0 0 0 0 0 47	W 0 16 1 0 0 0 0 17	WNW 0 6 0 0 0 0 0 6	NW 0 1 0 0 0 0 0 1	NNW 0 0 0 0 0 0 0 0 0	TOT 7 83 62 19 1 1 0 0 0 0 0 16
Class G mph Calm-0.95 0.95-3.5 3.5-7.5 7.5-12.5 12.5-18.5 18.5-24 >24 TOTAL Class All mph	Freq: N 0 0 0 0 0 0 0 Freq: N	0.022 NNE 0 0 0 0 0 0 0 0 0 0 1.000 NNE	NE 0 0 0 0 0 0 0 0 0 0 0 0	ENE 0 0 0 0 0 0 0 0 0 0 0 0	E 1 0 0 0 0 0 0 1 1 E	ESE 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	SE 0 1 0 0 0 0 0 1 1 SE	SSE 1 0 0 0 0 0 1 5SE	S 1 3 0 0 0 0 0 0 4 5	SSW 2 3 0 3 0 0 0 0 8 8 SSW	SW 1 19 49 12 1 0 0 82 SW	WSW 1 34 12 0 0 0 0 0 47 WSW	W 0 16 1 0 0 0 0 17	WNW 0 6 0 0 0 0 0 6 8	NW 0 1 0 0 0 0 0 1	NNW 0 0 0 0 0 0 0 0 0 0 0 0 0	TOT 7 83 62 11 1 1 0 0 0 0 16 7 01
Class G mph Calm-0.95 0.95-3.5 3.5-7.5 7.5-12.5 12.5-18.5 18.5-24 >24 TOTAL Class All mph Calm-0.95	Freq: N 0 0 0 0 0 0 0 0 0 Freq: N 5	0.022 NNE 0 0 0 0 0 0 0 0 0 0 0 0 0	NE 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	ENE 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	E 1 0 0 0 0 0 0 1 1 E 1	ESE 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	SE 0 1 0 0 0 0 0 1 1 SE 2	SSE 1 0 0 0 0 0 1 5 SE 2	S 1 3 0 0 0 0 0 0 4 4 5 5	SSW 2 3 0 3 0 0 0 0 0 8 8 8 5 SW 7	SW 1 19 49 12 1 0 0 82 SW 5	WSW 1 34 12 0 0 0 0 0 47 WSW 3	W 0 16 1 0 0 0 0 17 17 W 2	WNW 0 6 0 0 0 0 0 6 WNW 1	NW 0 1 0 0 0 0 0 1 1 NW 3	NNW 0 0 0 0 0 0 0 0 0 0 0 0 0 0	TOT 7 83 62 11 1 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
Class G mph Calm-0.95 0.95-3.5 3.5-7.5 7.5-12.5 12.5-18.5 18.5-24 >24 TOTAL Class All mph Calm-0.95 0.95-3.5	Freq: N 0 0 0 0 0 0 0 0 0 0 Freq: N 5 108	0.022 NNE 0 0 0 0 0 0 0 0 0 0 0 0 0	NE 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 123	ENE 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 135	E 1 0 0 0 0 0 0 1 1 5 5 6 1 99	ESE 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	SE 0 1 0 0 0 0 0 1 1 5 5 2 102	SSE 1 0 0 0 0 0 0 1 1 SSE 2 114	S 1 3 0 0 0 0 0 0 0 4 4 5 5 191	SSW 2 3 0 3 0 0 0 0 0 8 8 8 8 7 132	SW 1 19 49 12 1 0 0 82 82 SW 5 139	WSW 1 34 12 0 0 0 0 0 0 47 47 8 8 8 8 8	W 0 16 1 0 0 0 0 17 17 89	WNW 0 6 0 0 0 0 0 6 8 WNW 1 142	NW 0 1 0 0 0 0 0 1 1 NW 3 132	NNW 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	TO1 7 83 65 11 1 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
Class G mph Calm-0.95 0.95-3.5 3.5-7.5 7.5-12.5 12.5-18.5 18.5-24 >24 TOTAL Class All Mph Calm-0.95 0.95-3.5 3.5-7.5	Freq: N 0 0 0 0 0 0 0 0 0 0 0 0 0	0.022 NNE 0 0 0 0 0 0 0 0 0 0 1.000 NNE 1 110 129	NE 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	ENE 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 35 137	E 1 0 0 0 0 0 0 1 1 5 99 130	ESE 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	SE 0 1 0 0 0 0 0 1 1 5 5 85	SSE 1 0 0 0 0 0 1 1 SSE 2 114 67	S 1 3 0 0 0 0 0 0 0 4 4 5 5 5 191 229	SSW 2 3 0 3 0 0 0 0 0 8 8 8 8 8 7 132 692	SW 1 19 49 12 1 0 0 0 82 SW 5 139 617	WSW 1 34 12 0 0 0 0 0 0 47 47 47 8 8 8 8 6 40	W 0 16 1 0 0 0 0 17 17 17 89 470	WNW 0 6 0 0 0 0 0 6 8 WNW 1 142 320	NW 0 1 0 0 0 0 0 1 1 1 8 3 132 202	NNW 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	TOT 7 83 62 11 1 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
Class G mph Calm-0.95 0.95-3.5 3.5-7.5 7.5-12.5 12.5-18.5 18.5-24 >24 TOTAL Class All Class All Mph Calm-0.95 0.95-3.5 3.5-7.5 7.5-12.5	Freq: N 0 0 0 0 0 0 0 0 0 0 0 0 0	0.022 NNE 0 0 0 0 0 0 0 0 0 1.000 NNE 1 110 129 133	NE 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	ENE 0 0 0 0 0 0 0 0 0 0 0 0 0 0 135 137 16	E 1 0 0 0 0 0 0 1 1 5 9 9 9 9 9 130 30	ESE 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	SE 0 1 0 0 0 0 0 1 1 5 5 25	SSE 1 0 0 0 0 0 0 1 5 SSE 2 114 67 16	S 1 3 0 0 0 0 0 0 0 4 4 5 5 191 229 60	SSW 2 3 0 3 0 0 0 0 0 0 8 8 8 8 8 7 132 692 269	SW 1 19 49 12 1 0 0 82 82 SW 5 139 617 151	WSW 1 34 12 0 0 0 0 0 0 0 47 47 WSW 3 286 640 31	W 0 16 1 0 0 0 0 17 17 17 89 470 107	WNW 0 6 0 0 0 0 0 6 8 WNW 1 142 320 72	NW 0 1 0 0 0 0 0 1 1 1 1 3 132 202 81	NNW 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	TOT 7 83 62 15 1 1 0 0 0 0 0 16 7 0 1 16 216 420 110 50
Class G mph Calm-0.95 0.95-3.5 3.5-7.5 7.5-12.5 12.5-18.5 18.5-24 >24 TOTAL Class All mph Calm-0.95 0.95-3.5 3.5-7.5 7.5-12.5 12.5-18.5	Freq: N 0 0 0 0 0 0 0 0 0 0 0 5 108 87 22 2	0.022 NNE 0 0 0 0 0 0 0 0 0 0 0 0 0	NE 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	ENE 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 135 137 16 13	E 1 0 0 0 0 0 0 0 1 1 99 130 30 4	ESE 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	SE 0 1 0 0 0 0 0 1 1 5 5 2 5 0	SSE 1 0 0 0 0 0 0 1 5 5 5 5 2 114 67 16 0	S 1 3 0 0 0 0 0 0 0 0 0 0 4 4 5 5 191 229 60 2	SSW 2 3 0 3 0 0 0 0 0 0 8 8 8 5 SW 7 132 692 269 2	SW 1 19 49 12 1 0 0 82 SW 5 139 617 151 3	WSW 1 34 12 0 0 0 0 0 47 WSW 3 286 640 31 0	W 0 16 1 0 0 0 0 0 0 17 7 89 470 107 0	WNW 0 6 0 0 0 0 0 0 6 8 8 8 8 9 8 9 9 72 3	NW 0 1 0 0 0 0 0 0 1 1 8 1 32 202 81 0	NNW 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	73 TOT 7 83 62 15 1 0 0 0 16 7 40 216 420 110 50 0 0 0 0

Table A-2 Joint Frequency Distribution of Wind Directions and Speeds For the 220-ft level of the 220-ft Tower

Jan-Mar 2010

7.5-12.5

12.5-18.5

18.5-24

>24

TOTAL

Class A	Freq:	0.137								1							
mph	Ν	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	wsw	W	WNW	NW	NNW	TOTAL
Calm-0.95	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0.95-3.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3.5-7.5	1	2	3	1	2	1	0	0	0	0	0	0	1	1	3	1	16
7.5-12.5	5	5	4	3	0	0	0	0	0	0	0	3	6	13	5	4	48
12.5-18.5	7	11	3	4	1	1	3	3	2	2	1	3	17	29	18	4	109
18.5-24	5	8	2	0	0	1	0	0	0	1	0	0	6	28	3	7	61
>24	6	8	0	0	0	0	0	0	0	0	0	0	4	10	5	2	35
TO'ſAL	24	34	12	. 8	• 3 -	. 3	3	3	2	3	<u>1</u>	6	34 ⁻	81	34	1 8 :	269
Class B	Freq:	0.034			··*			1		1	-						· · ·
mph	N	NNE	NE	ENE	Е	ESE	SE	SSE	s	SSW	SW	wsw	W	WNW	NW	NNW	TOTAL
Calm-0.95	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0.95-3.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3.5-7.5	2	1	0	2	2	0	0	0	0	0	0	0	0	2	1	1	11
7.5-12.5	1	0	0	0	1	0	0	0	0	0	0	2	2	2	0	2	10
12.5-18.5	1	0	0	1	3	0	0	0	2	1	0	2	4	4	2	1	21
18.5-24	0	1	0	0	1	3	0	0	0	0	0	0	3	4	0	1	13
>24	1	5	1	0	0	0	0	0	0	0	0	0	1	3	0	1	12
TOTAL	5	7	1	3	7	3	0	0	2	1	0	4	10	15	3	6	67
Class C	Freq:	0.057			r			1		1					·····		
mph	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	wsw	W	WNW	NW	NNW	TOTAL
Calm-0.95	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0.95-3.5	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	1	3
3.5-7.5	1	0	0	0	0	1	0	0	0	0	0	0	1	4	1	1	9
7.5-12.5	3	1	1	1	0	1	1	0	4	1	0	2	5	5	0	0	25
12.5-18.5	0	1	1	3	1	1	1	0	4	4	1	2	12	2	0	1	34
18.5-24	1	2	1	0	0	1	0	0	0	0	0	0	3	5	1	2	16
>24	10	5	0	0	0	0	0	0	0	0	0	.0	1	1	4	4	25
TOTAL	15	9	4	5	1	4	2	0	8	5	1	4	22	17	6	9	112
Class D	Freq:	0.502		-		-			-								
mph	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	sw	wsw	w	WNW	NW	NNW	TOTAL
Calm-0.95	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0.95-3.5	1	0	1	0	0	0	1	0	0	1	0	0	1	0	2	2	9
3.5-7.5	3	3	3	3	8	7	3	4	7	0	0	1	5	6	5	3	61
			1			1				1				1			

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Class E	Freq:	0.208	-														
mph	N	NNE	NE	ENE	Е	ESE	SE	SSE	s	SSW	sw	wsw	w	WNW	NW	NNW	TOTAL
Calm-0.95	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0.95-3.5	1	1	0	2	2	1	0	1	0	1	1	1	3	0	0	3	17
3.5-7.5	2	4	2	3	2	2	3	0	2	5	2	0	3	2	1	0	33
7.5-12.5	0	0	1	1	8	7	5	18	4	4	6	10	18	12	3	4	101
12.5-18.5	5	2	0	1	2	4	4	7	0	1	11	16	59	18	4	2	136
18.5-24	1	2	0	1	2	1	3	1	0	3	0	10	26	10	7	7	74
>24	2	0	0	9	22	1	0	0	0	2	0	0	0	.7	4	1	48
TOTAL	11	9	3	17	38	16	15	27	6	16	20	37	109	49	19	17	409
Class F	E ròci	0.050						,			· .		·				
	Fréq: N	0.050 NNE	NE	ENE	Е	ESE	SE	SSE	s	SSW	sw	wsw	w	WNW	NW	NNW	ΤΟΤΑΙ
Colm 0.05	t	0			0	0	0		0								
Calm-0.95 0.95-3.5		0	3	0	0		1	0	0	0	0	0	0	0	0	0	0
3.5-7.5	0	0	0	0	2	1	0	1 0	1	0	0	0 4	0 3	 1	3	0 2	9
7.5-12.5	1	0	0	0	0	0	0	2	0	1	0	6	9	5	3		15
12.5-18.5	0	0	0	0	0	0	2	5	3	1	4	6	3	5		0	27
18.5-24	0	0	0	0	0	0	0	0	0	2		5	0	0	0	0	29
>24	0	0	0	0	0	0	0	0	0	2	8	0	0	0	0	0	<u>15</u> 4
TOTAL	1	0	3	0	2	2	3	8	4	6	15	21	15	11	6	2	99
Class G mph	Freq:	0.013 NNE	NE	ENE	E	ESE	SE	SSE	s	SSW	sw	wsw	w	WNW	NW	NNW	ΤΟΤΑ
Calm-0.95	0	0	0	0	0	0	0	002	0	0	0	0	0	0	0	0	0
0.95-3.5	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	2
3.5-7.5	0	0	0	0	0	0	0	0	1	1	0	0	0	0	1	0	3
7.5-12.5	0	0	0	Ō	0	0	0	0	0	0	1	1	5	0	0	0	7
12.5-18.5	0	0	0	0	0	0	0	0	Ō	0	2	1	0	0	0	0	3
18.5-24	0	0	0	0	0	0	0	0	0	0	3	4	0	0	0	0	7
>24	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	4
TOTAL	0	0	0	0	0	0	1	0	1	1	10	6	5	0	2	0	26
	F	1 000															
Class All	Freq:	1.000 NNE	NE	ENE	F	ESE	ee.	SSE	5	ssw	sw	wsw	14/	14/5/14/	NIM	NINNAC	TOTA
mph	T	1	I						S		T T	<u> </u>	W	WNW	NW	NNW	ΤΟΤΑ
Calm-0.95	0	0	0	0	0	0	0 3	0	0	0	0	0	0	0	0	0	0
0.95-3.5	2	1	5	3	2	2		2	0	2	1		4	0	6	6	40
3.5-7.5	9	10	8	9	16	12	6	4	11	6	3	5	13	16	12	8	148
7.5-12.5	20	7	9	13	16	16	12	29	18	14	13	38 [,]	57	55	20	14	351
<u>12.5-18.5</u> 18.5-24	19	17	6	24	14	9	19	21	14	15	26	58	201	110	41	15	609
10.0-24	9	25	10	15	9	7	6	26	4	13	14	23	73	100	48	29	411
	60	57	10	20	35	2	4	15	0		1	0	30	74	11	33	414
>24 TOTAL	60 119	57 117	10 48	38 102	35 92	2 48	1	15 97	0 47	6 56	6 63	0 125	30 378	74 355	44	33 105	411 1970

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Class A Freq: 0.154

Class A	Freq:	0.154	_					_		_			_				
mph	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	wsw	W	WNW	NW	NNW	TOTAL
Calm-0.95	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0.95-3.5	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	2
3.5-7.5	6	14	11	5	3	1	0	0	0	0	0	0	1	1	0	4	46
7.5-12.5	10	8	7	7	13	14	9	2	5	1	3	9	7	6	5	5	111
12.5-18.5	7	4	2	0	0	1	7	2	7	23	10	8	9	7	5	2	94
18.5-24	5	0	2	2	2	1	0	0	4	15	1	0	16	8	2	9	67
>24	0	0	0	0		0	0	0	0	0	0	0	6	6	1	3	17
TOTAL	28	26	22	15	20	17	16	4	16	39	14	17	39	28	13	23	337
Class B	Freq:	0.051	· - •••		• •						·			 			·
mph	N	NNE	NE	ENE	Е	ESE	SE	SSE	S	ssw	sw	wsw	w	WNW	NW	NNW	TOTAL
Calm-0.95	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0.95-3.5	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1
3.5-7.5	4	3	0	2	3	0	0	0	0	0	0	0	1	4	0	0	17
7.5-12.5	1	3	2	2	1	17	6	2	1	5	6	5	4	1	4	1	61
12.5-18.5	0	0	0	0	1	4	2	2	,1	5	7	2	1	1	1	0	27
18.5-24	0	0	0	0	0	0	0	0	0	4	1	0	1	0	0	0	6
>24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	1											7	7	6	5	4	112
	5	6	3	4	5	21	8	4	2	14	14	7			5	1	
TOTAL Class C mph	5 Freq: N		3 NE	4 ENE	5 E	21 ESE	8 SE	4 SSE	2 S	ssw	14 SW	wsw	 	WNW	5 NW		TOTAL
Class C	Freq:	0.065		1	<u>г</u>	1		· · · · · · · · · · · · · · · · · · ·		1		·		,,		, 	
Class C mph	Freq: N	0.065 NNE	NE	ENE	E	ESE	SE	SSE	S	ssw	SW	wsw	w	WNW	NW	NNW	TOTAL
Class C mph Calm-0.95	Freq: N	0.065 NNE 0	NE 0	ENE 0	<u>Е</u>	ESE 0	SE 0	SSE 0	S 0	SSW 0	SW 0	wsw 0	<u>w</u>	WNW 0	NW 0	NNW 0	TOTAL 0
Class C mph Calm-0.95 0.95-3.5	Freq: N 0 0	0.065 NNE 0 0	NE 0 0	ENE 0 0	E 0 0	ESE 0 0	SE 0 0	SSE 0 0	S 0 0	SSW 0 0	SW 0 0	wsw 0 0	W 0 0	WNW 0 0	NW 0 0	NNW 0 1	<u>TOTAL</u> 0 1
Class C mph Calm-0.95 0.95-3.5 3.5-7.5	Freq: N 0 0	0.065 NNE 0 0 6	NE 0 0 3	ENE 0 0 2	E 0 0 2	ESE 0 0 4	SE 0 0	SSE 0 0 0	S 0 0 2	SSW 0 1	SW 0 1	WSW 0 0	W 0 0	WNW 0 0	NW 0 0	NNW 0 1 2	TOTAL 0 1 25
Class C mph Calm-0.95 0.95-3.5 3.5-7.5 7.5-12.5	Freq: N 0 1 0	0.065 NNE 0 0 6 5 1 0	NE 0 0 3 4	ENE 0 2 2	E 0 0 2 0	ESE 0 0 4 5 3 0	SE 0 0 7 1 0	SSE 0 0 0 5	S 0 0 2 1	SSW 0 0 1 5	SW 0 0 1 6	WSW 0 0 0 3	W 0 0 0 2	WNW 0 0 1 1	NW 0 0 0	NNW 0 1 2 2	TOTAL 0 1 25 49
Class C mph Calm-0.95 0.95-3.5 3.5-7.5 7.5-12.5 12.5-18.5	Freq: N 0 0 1 0 2	0.065 NNE 0 0 6 5 1	NE 0 0 3 4 0	ENE 0 0 2 2 2 2	E 0 0 2 0 1	ESE 0 0 4 5 3	SE 0 0 7 1	SSE 0 0 0 5 0	S 0 0 2 1 5	SSW 0 0 1 5 13	SW 0 0 1 6 5	WSW 0 0 3 5	W 0 0 2 4	WNW 0 1 1 0	NW 0 0 1 1	NNW 0 1 2 2 0	TOTAL 0 1 25 49 43
Class C mph Calm-0.95 0.95-3.5 3.5-7.5 7.5-12.5 12.5-18.5 18.5-24	Freq: N 0 1 0 2 1	0.065 NNE 0 0 6 5 1 0	NE 0 0 3 4 0 0	ENE 0 2 2 2 0	E 0 0 2 0 1 1	ESE 0 0 4 5 3 0	SE 0 0 7 1 0	SSE 0 0 5 0 0	S 0 0 2 1 5 0	SSW 0 1 5 13 8	SW 0 0 1 6 5 7	WSW 0 0 3 5 0	W 0 0 2 4 1	WNW 0 0 1 1 0 2	NW 0 0 0 1 1 0	NNW 0 1 2 2 0 1	TOTAL 0 1 25 49 43 21
Class C mph Calm-0.95 0.95-3.5 3.5-7.5 7.5-12.5 12.5-18.5 18.5-24 >24	Freq: N 0 0 1 0 2 1 0 4	0.065 NNE 0 0 6 5 1 0 0	NE 0 3 4 0 0 0	ENE 0 2 2 2 2 0 0	E 0 2 0 1 1 0	ESE 0 4 5 3 0 0	SE 0 0 7 1 0 0	SSE 0 0 0 5 0 0 0 0	S 0 2 1 5 0 0	SSW 0 1 5 13 8 0	SW 0 1 6 5 7 0	WSW 0 0 3 5 0 0	W 0 0 2 4 1 0	WNW 0 0 1 1 0 2 1	NW 0 0 1 1 0 1	NNW 0 1 2 2 0 1 0	TOTAL 0 1 25 49 43 21 2
Class C mph Calm-0.95 0.95-3.5 3.5-7.5 7.5-12.5 12.5-18.5 18.5-24 >24 TOTAL	Freq: N 0 1 0 2 1 0 4 Freq:	0.065 NNE 0 0 0 6 5 1 0 0 12	NE 0 3 4 0 0 0 7	ENE 0 2 2 2 2 0 0	E 0 2 0 1 1 0 4	ESE 0 4 5 3 0 0	SE 0 0 7 1 0 0 8	SSE 0 0 0 5 0 0 0 0	S 0 2 1 5 0 0 8	SSW 0 1 5 13 8 0	SW 0 1 6 5 7 0 19	WSW 0 0 0 3 5 0 0 0 8	W 0 0 2 4 1 0 7	WNW 0 0 1 1 0 2 1	NW 0 0 1 1 1 0 1 3	NNW 0 1 2 2 0 1 0 6	TOTAL 0 1 25 49 43 21 2
Class C mph Calm-0.95 0.95-3.5 3.5-7.5 7.5-12.5 12.5-18.5 18.5-24 >24 TOTAL Class D	Freq: N 0 1 0 2 1 0 4 Freq: N	0.065 NNE 0 0 6 5 1 0 0 0 12 0.339	NE 0 3 4 0 0 0 7	ENE 0 2 2 2 0 0 0 6	E 0 2 0 1 1 0 4	ESE 0 4 5 3 0 0 0 12	SE 0 0 7 1 0 0 8	SSE 0 0 0 5 0 0 0 0 5 5	S 0 2 1 5 0 0 8	SSW 0 1 5 13 8 0 27	SW 0 1 6 5 7 0 19	WSW 0 0 0 3 5 0 0 0 8	W 0 0 2 4 1 0 7	WNW 0 0 1 1 1 0 2 1 5	NW 0 0 1 1 1 0 1 3	NNW 0 1 2 2 0 1 0 6	TOTAL 0 1 25 49 43 21 2 141
Class C mph Calm-0.95 0.95-3.5 3.5-7.5 7.5-12.5 12.5-18.5 18.5-24 >24 TOTAL Class D mph	Freq: N 0 1 0 2 1 0 4 Freq: N	0.065 NNE 0 0 6 5 1 0 0 12 0.339 NNE	NE 0 0 3 4 0 0 0 7 7 NE	ENE 0 2 2 2 0 0 6 8	E 0 2 0 1 1 0 4 E	ESE 0 4 5 3 0 0 12 ESE	SE 0 0 7 1 0 0 8 8 SE	SSE 0 0 5 0 0 0 5 5 5 SSE	S 0 2 1 5 0 0 8 8 S	SSW 0 1 5 13 8 0 27 SSW	SW 0 1 6 5 7 0 19 SW	WSW 0 0 0 3 5 0 0 0 8 8	W 0 0 2 4 1 0 7 W	WNW 0 0 1 1 0 2 1 5 5	NW 0 0 1 1 1 3 8	NNW 0 1 2 2 0 1 0 6 8	TOTAL 0 1 25 49 43 21 2 141 141
Class C mph Calm-0.95 0.95-3.5 3.5-7.5 7.5-12.5 12.5-18.5 18.5-24 >24 TOTAL Class D mph Calm-0.95	Freq: N 0 1 0 2 1 0 2 1 0 4 Freq: N 0	0.065 NNE 0 0 0 6 5 1 0 0 12 0.339 NNE 0 0	NE 0 3 4 0 0 0 7 7 NE 0	ENE 0 2 2 2 2 0 0 0 6 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8	E 0 2 0 1 1 1 0 4 E 0	ESE 0 4 5 3 0 0 0 12 ESE 0	SE 0 0 7 1 0 0 8 8 SE 0	SSE 0 0 5 0 0 0 5 5 5 SSE 0	S 0 2 1 5 0 0 0 8 8 S 0	SSW 0 1 5 13 8 0 27 SSW 0	SW 0 1 6 5 7 0 19 9 SW 0	WSW 0 0 0 3 5 0 0 0 8 8 WSW 0	W 0 0 2 4 1 0 7 7 W	WNW 0 0 1 1 0 2 1 5 5 WNW 0	NW 0 0 1 1 1 0 1 3 3 NW	NNW 0 1 2 2 0 1 0 6 8 NNW	TOTAL 0 1 25 49 43 21 2 141 TOTAL 0
Class C mph Calm-0.95 0.95-3.5 3.5-7.5 7.5-12.5 12.5-18.5 18.5-24 >24 TOTAL Class D mph Calm-0.95 0.95-3.5	Freq: N 0 1 0 2 1 0 2 1 0 4 Freq: N 0 2	0.065 NNE 0 0 0 6 5 1 0 0 12 0.339 NNE 0 8	NE 0 3 4 0 0 0 7 7	ENE 0 2 2 2 2 0 0 0 6 6 8 8 8 9 0 1	E 0 2 0 1 1 0 4 E 0 0	ESE 0 4 5 3 0 0 0 12 ESE 0 0	SE 0 0 7 1 0 0 8 8 SE 0 0	SSE 0 0 5 0 0 0 5 5 5 5 5 5 5 5 5 5 0 0 0 0	S 0 2 1 5 0 0 8 8 8 5 0 0 0	SSW 0 1 5 13 8 0 27 SSW 0 0	SW 0 1 6 5 7 0 19 19 SW 0 0	WSW 0 0 3 5 0 0 0 8 8 WSW 0 0 0	W 0 0 2 4 1 0 7 7 W 0 0	WNW 0 0 1 1 2 1 5 5 WNW 0 0 0	NW 0 0 1 1 1 0 1 3 3 NW 0 0	NNW 0 1 2 2 0 1 0 6 8 NNW 0 1	TOTAL 0 1 25 49 43 21 2 141 TOTAL 0 19
Class C mph Calm-0.95 0.95-3.5 3.5-7.5 7.5-12.5 12.5-18.5 18.5-24 >24 TOTAL Class D mph Calm-0.95 0.95-3.5 3.5-7.5	Freq: N 0 1 0 2 1 0 4 Freq: N 0 2 10	0.065 NNE 0 0 6 5 1 0 0 0 12 0.339 NNE 0 8 5	NE 0 3 4 0 0 0 7 8	ENE 0 2 2 2 0 0 0 6 6 8 8	E 0 2 0 1 1 0 4 E 0 0 0 7	ESE 0 4 5 3 0 0 0 12 ESE 0 0 10	SE 0 0 7 1 0 0 8 8 SE 0 0 11	SSE 0 0 5 0 0 0 5 5 5 5 5 5 5 5 5 9 9	S 0 2 1 5 0 0 8 8 S 0 0 0 3	SSW 0 1 5 13 8 0 27 SSW 0 0 5	SW 0 1 6 5 7 0 19 19 SW 0 0 2	WSW 0 0 3 5 0 0 0 8 8 WSW 0 0 3	W 0 0 2 4 1 0 7 7 W 0 0 1	WNW 0 1 1 2 1 5 5 WNW 0 0 4	NW 0 0 1 1 0 1 3 3 NW 0 0 4	NNW 0 1 2 2 0 1 0 6 8 NNW 0 1 10	TOTAL 0 1 25 49 43 21 2 141 TOTAL 0 19 100
Class C mph Calm-0.95 0.95-3.5 3.5-7.5 7.5-12.5 12.5-18.5 18.5-24 >24 TOTAL Class D mph Calm-0.95 0.95-3.5 3.5-7.5 7.5-12.5	Freq: N 0 1 0 2 1 0 4 Freq: N 0 2 10 6	0.065 NNE 0 0 6 5 1 0 0 12 0.339 NNE 0 8 5 13	NE 0 3 4 0 0 0 7 7 8 10	ENE 0 2 2 2 0 0 0 6 8 5 8 3	E 0 2 0 1 1 0 4 4 E 0 0 7 10	ESE 0 4 5 3 0 0 12 ESE 0 0 0 10 24	SE 0 0 7 1 0 0 8 8 SE 0 0 11 17	SSE 0 0 5 0 0 0 5 5 SSE 0 0 9 9 9	S 0 2 1 5 0 0 8 8 8 5 0 0 0 3 26	SSW 0 1 5 13 8 0 27 SSW 0 0 0 5 35	SW 0 1 6 5 7 0 19 19 SW 0 0 0 2 19	WSW 0 0 3 5 0 0 0 8 8 WSW 0 0 3 11	W 0 0 2 4 1 0 7 7 W 0 0 1 5	WNW 0 0 1 1 1 0 2 1 5 5 WNW 0 0 0 4 4	NW 0 0 1 1 1 0 1 3 3 NW 0 0 0 4 6	NNW 0 1 2 2 0 1 0 6 8 NNW 0 1 10 12	TOTAL 0 1 25 49 43 21 2 141 TOTAL 0 19 100 210
Class C mph Calm-0.95 0.95-3.5 3.5-7.5 7.5-12.5 12.5-18.5 18.5-24 >24 TOTAL Class D mph Calm-0.95 0.95-3.5 3.5-7.5 7.5-12.5 12.5-18.5	Freq: N 0 1 0 2 1 0 4 Freq: N 0 2 10 6 4	0.065 NNE 0 0 6 5 1 0 0 12 0.339 NNE 0 8 5 13 6	NE 0 3 4 0 0 0 7 7 8 10 2	ENE 0 2 2 0 0 6 6 ENE 0 1 8 3 3 3	E 0 2 0 1 1 1 0 4 E 0 0 7 10 8	ESE 0 4 5 3 0 0 0 12 ESE 0 0 0 10 24 13	SE 0 0 7 1 0 0 8 8 SE 0 0 0 111 17 4	SSE 0 0 5 0 0 0 5 5 SSE 0 0 0 9 9 4	S 0 2 1 5 0 0 8 8 S 0 0 0 3 26 20	SSW 0 1 5 13 8 0 27 27 SSW 0 0 0 5 35 83	SW 0 1 6 5 7 0 19 19 SW 0 0 2 19 41	WSW 0 0 3 5 0 0 0 8 8 WSW 0 0 0 3 111 13	W 0 0 2 4 1 0 7 7 W 0 0 1 5 16	WNW 0 0 1 1 0 2 1 5 5 WNW 0 0 0 4 4 4 2 1	NW 0 0 1 1 1 0 1 3 8 NW 0 0 0 4 6 3	NNW 0 1 2 2 0 1 0 6 8 NNW 0 1 10 12 5	TOTAL 0 1 25 49 43 21 2 141 TOTAL 0 19 100 210 246

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Class E	Freq:	0.271															_
mph	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	sw	wsw	W	WNW	NW	NNW	TOTAL
Calm-0.95	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0.95-3.5	0	2	5	4	1	4	0	0	0	1	1	0	1	3	0	1	23
3.5-7.5	4	2	2	1	9	10	3	3	7	5	0	1	2	1	5	3	58
7.5-12.5	12	2	3	1	3	10	9	9	10	16	5	4	3	14	5	5	111
12.5-18.5	5	1	0	0	2	0	6	10	14	41	30	10	27	40	13	13	212
18.5-24	2	0	0	0	0	0	0	1	0	39	50	8	21	18	5	9	153
>24	0	0	0	0	0	0	0	0	0	12	10	0	1	10	1	0	34
TOTAL	23	7	10	6	15	24	18	23	31	114	96	23	55	86	29	31	591
	F	0.000					÷									· .	
lass F	Freq: N	0.099 NNE	NE	ENE	E	ESE	SE	SSE	s	SSW	sw	wsw	w	WNW	NW	NNW	TOTAL
mph		1	<u> </u>		1		1										
Calm-0.95	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0.95-3.5	$\frac{1}{2}$		1	0	0	1	2	3	0	0		1	0	0		2	12
3.5-7.5	3 2	1 0	2	1 0	1	<u>3</u> 1	4	0	3	0	1	2 7	3	2 14	4 8	1	<u>29</u> 53
7.5-12.5	$\frac{2}{1}$	0	2	1	0	0		2	5	4	6	10	4	14	16	5 5	53 85
12.5-18.5	0	0	0	0	0	0		0	0	1	23	7	2	1	0	2	36
<u>18.5-24</u>	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1
TOTAL	7	2	3	2	2	5	9	7	9	7	33	27	25	35	28	15	216
mph	Freq: N	0.021 NNE	NE	ENE	Е	ESE	SE	SSE	S	ssw	sw	wsw	w	WNW	NW	NNW	TOTAL
Calm-0.95	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0.95-3.5	0	0	1	0	0	1	1	0	0	1	0	0	0	0	0	0	4
3.5-7.5	2	0	0	0	0	0	0	0	1	1	0	0.	2	0	0	0	6
7.5-12.5	0	0	0	0	0	0	0	0	4	0	0	1	3	4	2	1	15
12.5-18.5	0	0	0	0	0	0	0	0	1	0	4	3	5	3	1	0	17
18.5-24	0	0	0	0	0	0	0	0	· 0	0	1	0	2	0	0	0	3
>24	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1
TOTAL	2	0	1	0	0	1	1	0	6	2	6	4	12	7	3	1	46
	Freq:	1 000															
Class All mph	N	NNE	NE	ENE	E	ESE	SE	SSE	s	ssw	sw	wsw	w	WNW	NW	NNW	TOTAL
Calm-0.95	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0.95-3.5	3	11	15	6	2	6	3	3	0	2	1	1	1	3	0	5	62
3.5-7.5	30	31	24	19	25	28	18	12	16	12	4	6	10	13	13	20	281
7.5-12.5	31	31	28	15	28	71	50	29	48	63	42	40	28	44	31	31	610
12.5-18.5	19	12	4	6	12	21	21	20	53	169	103	51	78	90	40	25	724
18.5-24	15	0	4	6	7	5	3	2	5	125	100	16	63	40	8	30	429
>24	0	0	1	3	1	0	0	0	0	17	14	0	8	23	8	3	78
TOTAL	98	85	76	55	75	131	95	66	122	388	264	114	188	213	100	114	2184
		1					1 2 2	1 2 2		1			1				

in the

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Class A Freq: 0.068

Class A	Freq:	0.068															
mph	N	NNE	NE	ENE	Е	ESE	SE	SSE	S	ssw	SW	wsw	W	WNW	NW	NNW	TOTAL
Calm-0.95	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0.95-3.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3.5-7.5	1	5	9	3	3	0	0	0	0	0	0	1	3	2	0	0	27
7.5-12.5	16	3	12	4	5	4	3	0	1	0	3	0	1	5	1	1	59
12.5-18.5	7	0	3	2	1	3	5	1	6	7	2	0	0	8	1	4	50
18.5-24	4	0	0	1	0	0	0	0	0	1	1	0	0	0	0	1	8
>24	5	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	6
TOTAL	33	8	24	10	9	7	8	1	7	9	6	1	4	15	2	6	150
Class B	Freq:	0.043			•		-		•	1	:	<u>ಇ. ೧ ಭ</u>	1.207	1		••.	
mph	[™] N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	wsw	Ŵ	WNW	NW	NNW	TOTAL
Calm-0.95	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0.95-3.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3.5-7.5	1	2	3	2	2	0	0	0	0	0	0	1	3	2	0	2	18
7.5-12.5	2	0	1	1	1	2	3	0	0	6	1	5	4	3	1	0	30
12.5-18.5	0	0	0	3	0	1	2	1	6	13	5	4	0	2	1	1	39
18.5-24	0	0	0	1	0	0	0	0	0	1	3	0	0	0	0	0	5
>24	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	2
TOTAL	3	2	4	7	3	3	5	1	6	22	9	10	7	7	2	3	94
Class C	Freq:	0.061												,		,	
mph	N	NNE	NE	ENE	Ę	ESE	SE	SSE	S	SSW	SW	wsw	W	WNW	NW	NNW	TOTAL
Calm-0.95	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0.95-3.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3.5-7.5	2	3	0	3	1	2	0	0	0	1	3	1	1	3	4	3	27
7.5-12.5	0	0	2	2	1	7	7	2	7	7	6	5	3	6	2	0	57
12.5-18.5	0	0	0	2	0	0	2	0	5	10	6	2	3	2	0	1	33
18.5-24	0	0	0	1	0	0	0	0	2	6	3	0	1	2	0	0	15
>24	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
TOTAL	4	3	2	8	2	9	9	2	14	24	18	8	8	13	6	4	134
Class D	Freq:	0.305															
	1		N/5		-	FOF	05	005		0.011	0.11	wsw	144				TOT::
mph	N	NNE		T		ESE		SSE	S	ssw		<u> </u>		WNW			TOTAL
Calm-0.95		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0.95-3.5	2	5	7	1	1	0	1	0	0	0	0	0	0	0	0	1	18
3.5-7.5	9	5	10	6	12	7	8	6	7	6	4	1	1	4	2	1	89
7.5-12.5	5	5	4	8	6	11	11	28	21	33	17	9	12	4	4	3	181
12.5-18.5		2	3	8	5	5	5	5	20	83	45	12	18	13	3	6	235
18.5-24	5	7	6	10	0	1	0	3	21	38	22	2	4	7	2	1	129
>24	3	4	4	2	0	0	0	0	3	1	5	0	0	0	0	0	22
TOTAL	26	28	34	35	24	24	25	42	72	161	93	24	35	28	11	12	674

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Class E	Freq:	0.347															
mph	N	NNE	NE	ENE	Е	ESE	SE	SSE	s	ssw	sw	wsw	w	WNW	NW	NNW	TOTAL
Calm-0.95	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0.95-3.5	0	4	3	4	2	2	2	1	3	0	1	0	0	0	0	2	24
3.5-7.5	4	6	6	4	9	9	14	6	10	4	1	3	3	1	4	3	87
7.5-12.5	4	11	16	1	6	6	11	13	15	21	6	4	11	9	14	9	157
12.5-18.5	5	2	1	5	1	3	2	23	29	67	41	35	65	27	9	12	327
18.5-24	3	0	6	4	0	5	0	1	4	55	21	1	9	12	7	3	131
>24	2	1	11	8	3	0	0	0	0	3	2	0	0	3	5	2	40
TOTAL	18	24	43	26	21	25	29	44	61	150	72	43	88	52	39	31	766
Class F	Freq:	0.143		200 J. J.	-	· .											1
mph	N	NNE	NE	ENE	E	ESE	SE	SSE	s	SSW	sw	wsw	w	WNW	NW	NNW	TOTAL
Calm-0.95	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0.95-3.5	1	0	2	1	1	1	0	0	1	0	0	0	0	0	0	0	7
3.5-7.5	1	1	3	0	5	4	4	0	5	4	1	1	1	0	1	2	33
7.5-12.5	3	1	1	2	0	7	6	5	5	7	6	11	6	17	10	9	96
12.5-18.5	5	1	0	0	0	2	3	9	5	12	15	13	30	24	7	4	130
18.5-24	1	0	0	0	0	0	0	0	0	4	16	4	6	11	2	2	46
>24	0	1	0	2	0	0	0	0	0	0	0	0	0	0	0	0	3
TOTAL	11	4	6	5	6	14	13	14	16	27	38	29	43	52	20	17	315
Class G	Freq:	1	I							1		<u>.</u>	1	1	1		
mph	N	NNE	NE	ENE	Е	ESE	SE	SSE	S	SSW	SW	wsw	W	WNW	NW	NNW	TOTAL
Calm-0.95	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
0.95-3.5	1	2	1	1	2	0	0	0	1	0	0	0	2	1	Ó	1	12
3.5-7.5	1	0	1	0	1	0	2	0	2	3	1	1	0	0	3	2	17
7.5-12.5	0	0	0	0	0	0	0	1	2	4	3	6	2	3	1	1	23
12.5-18.5	0	0	0	0	0	0	0	0	0	0	1	3	7	6	0	1	18
18.5-24	0	0	0	0	0	0	0	0	0	0	3	1	0	0	0	0	4
>24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	2	2	2	2	3	0	2	1	5	7	8	11	11	10	4	5	75
Class All	Freq:	1.000									_	-	-				
mph	N	NNE	NE	ENE	E	ESE	SE	SSE	S	ssw	sw	wsw	w	WNW	NW	NNW	TOTAL
Calm-0.95	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
0.95-3.5	4	11	13	7	6	3	3	1	5	0	1	0	2	1	0	4	61
3.5-7.5	19	22	32	18	33	22	28	12	24	18	10	9	12	12	14	13	298
7.5-12.5	30	20	36	18	19	37	41	49	51	78	42	40	39	47	33	23	603
12.5-18.5	19	5	7	20	7	14	19	39	71	192	115	69	123	82	21	29	832
18.5-24	13	7	12	17	0	6	0	4	27	105	69	8	20	32	11	7	338
>24	12	6	15	12	3	0	0	0	3	7	7	0	0	3	5	2	75
TOTAL	97	71	115	93	68	82	91	105	181	400	244	126	196	177	84	78	2208
TUTAL	31		115	33	100	201	91	105	101	1 400	244	120	190	1. 1//	04	10	2200

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18.5-24

>24

TOTAL

00 A Eroa: 0.042 ~.

	Class A	Freq:	0.043															
	mph	N	NNE	NE	ENE	Е	ESE	SE	SSE	S	SSW	SW	wsw	W	WNW	NW	NNW	TOTAL
	Calm-0.95	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0.95-3.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	3.5-7.5	3	1	1	2	0	0	0	0	0	0	0	0	0	0	2	0	9
	7.5-12.5	2	4	2	0	0	2	0	0	0	0	0	0	2	7	1	7	27
	12.5-18.5	2	1	1	0	0	1	0	0	0	0	0	0	3	14	5	3	30
	18.5-24	5	0	0	0	0	0	0	0	0	0	0	0	2	8	2	2	19
	>24	0	0	3	0	0	0	0	0	0	0	0	0	1	1	6	0	11
	TOTAL	12	6	7	2	0	3	0	0	0	0	0	0	8	30	16	12	96
		-																
	Class B	T	0.033 NNE		ENE	Е	ESE	SE	SSE	S	ssw	SW	wsw	W	WNW	NIXA/	NIN IN AZ	TOTAL
and the second	mph	N	1 I	NE									i i		i	NW	NNW	TOTAL
	Calm-0.95	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0.95-3.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	3.5-7.5	0	0	0	0	0	0	0	0	0	0	0 2	1 2	2 4	1	1	1	6 17
	7.5-12.5	0	3	1	0	0	1	1	0	2	0	2	4	- <u>4</u> 7	5	0 3	0 3	28
	18.5-24	0	1	2	0	0	0	0	0	0	0	0	0	6	4	5	0	18
	>24	3	0	0	0	0	0	0	0	0	0	0	0	0	0		0	4
		3	4	4	0	1	2	1	0	2	1	2	7		r			
	TOTAL		4	4	0		2		0		L	2	/	19	13	10	4	73
	Class C	Frea:	0.048								•							
	mph	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	wsw	w	WNW	NW	NNW	TOTAL
	Calm-0.95	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0.95-3.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
•	3.5-7.5	1	0	1	0	0	0	0	0	0	0	2	1	0	1	1	0	7
	7.5-12.5	0	0	1	0	0	3	0	0	0	1	3	8	5	2	1	0	24
	12.5-18.5	0	1	5	0	0	0	1	0	2	0	3	12	6	2	1	3	36
	18.5-24	0	2	8	0	0	0	0	0	0	0	0	0	9	2	2	0	23
	>24	2	1	0	1	0	0	0	0	0	0	0	0	0	5	4	2	15
	TOTAL	3	4	15	1	0	3	1	0	2	1	8	21	20	12	9	5	105
		_																
	Class D	1	0.462			_				-								
	mph	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	wsw	W	WNW	NW	NNW	TOTAL
	Calm-0.95		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1	0.95-3.5	3	0	2	1	0	0	0	0	0	0	0	0	0	1	0	4	11
	3.5-7.5	1		5	6	5	7	3	2	0	2	3		1	6	3	1	47
	7.5-12.5	3	5	9	5	6	5	5	3	5	7	21	9	6	14	10	2	115
	12.5-18.5	7	5	20	6	11	12	17	7	26	48	34	41	58	49	10	5	356

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Class	Е	Freq:	0.329

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	Freq:	0.329					_										
mph	N	NNE	NE	ENE	Е	ESE	SE	SSE	S	SSW	SW	wsw	W	WNW	NW	NNW	TOTAL
Calm-0.95	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0.95-3.5	0	0	0	0	2	1	1	2	0	1	2	0	1	1	0	1	12
3.5-7.5	1	1	0	2	4	3	5	4	1	0	3	1	3	2	12	1	43
7.5-12.5	3	3	3	1	1	9	12	6	8	12	15	7	16	20	13	9	138
12.5-18.5	4	6	0	0	2	1	13	22	10	23	32	47	60	58	27	3	308
18.5-24	2	2	0	0	3	. 9	6	3	1	15	13	20	_40	29	17	3	163
>24	5	10	2	1	1	0	6	0	0	0	4	0	3	15	12	3	62
TOTAL	15	22	5	4	13	23	43	37	20	51	69	75	123	125	81	20	726
Class F	Freq:	0.075														,	
mph	N	NNE-	'NE	ENE	Е	ESE	SE	SSE	S	SSW	sw	wsw	W -	WNW	NW	NNW	"TOTAL
Calm-0.95	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0.95-3.5	0	0	0	0	1	0	0	0	0	1	0	0	1	1	0	0	4
3.5-7.5	0	3	0	1	1	1	2	0	2	2	0	0	2	0	1	2	17
7.5-12.5	3	1	0	0	1	1	15	10	6	6	8	5	8	6	2	0	72
12.5-18.5	0	0	0	0	0	0	1	5	1	4	9	4	16	13	0	4	57
18.5-24	0	0	0	0	0	0	0	0	0	0	6	8	1	0	0	0	15
>24	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1
TOTAL	3	4	0	1	3	2	18	15	9	13	24	17	28	20	3	6	166
Class G	Class G Freq: 0.010																
mph	N	NNE	NE	ENE	E	ESE	SE	SSE	S	ssw	sw	wsw	W	WNW	NW	NNW	TOTAL
Calm-0.95	0	0	0												L	L	
0.95-3.5	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0575		0	0	0	0	0	0	0 0	0	0	0	0 0	0 0	0	0	0	0 3
3.5-7.5	1	0								-				t			
<u>3.5-7.5</u> 7.5-12.5	1 0		0	1	0	0	2	0	0	0	0	0	0	0	0	0	3
7.5-12.5 12.5-18.5	0	2 0 0	0 3 0 0	1 0 0	0 0 0 0	0 1 0 0	2 0 0	0 0 0	0 1 0 0	0 0 2 0	0 0 1 1	0 0 4 0	0 0 0 0	0 0 0 1	0 0 0 0	0 0 0 0	3 8 7 2
7.5-12.5 12.5-18.5 18.5-24	0 0 0	2 0 0	0 3 0 0 0	1 0 0 0	0 0 0 0	0 1 0 0	2 0 0 0	0 0 0 0	0 1 0 0	0 0 2 0 0	0 0 1 1 0	0 0 4 0 1	0 0 0 0	0 0 0 1 0	0 0 0 0	0 0 0 0	3 8 7 2 1
7.5-12.5 12.5-18.5	0	2 0 0	0 3 0 0	1 0 0	0 0 0 0	0 1 0 0	2 0 0	0 0 0	0 1 0 0	0 0 2 0	0 0 1 1	0 0 4 0	0 0 0 0	0 0 0 1	0 0 0 0	0 0 0 0	3 8 7 2
7.5-12.5 12.5-18.5 18.5-24	0 0 0	2 0 0	0 3 0 0 0	1 0 0 0	0 0 0 0	0 1 0 0	2 0 0 0	0 0 0 0	0 1 0 0	0 0 2 0 0	0 0 1 1 0	0 0 4 0 1	0 0 0 0	0 0 0 1 0	0 0 0 0	0 0 0 0	3 8 7 2 1
7.5-12.5 12.5-18.5 18.5-24 >24	0 0 0	2 0 0 0 2	0 3 0 0 0	1 0 0 0 0	0 0 0 0 0	0 1 0 0 0	2 0 0 0 0	0 0 0 0 0	0 1 0 0 0	0 0 2 0 0 1	0 0 1 1 0 0	0 0 4 0 1 0	0 0 0 0 0 0	0 0 1 0	0 0 0 0 0	0 0 0 0 0	3 8 7 2 1 1
7.5-12.5 12.5-18.5 18.5-24 >24 TOTAL	0 0 0 0	2 0 0 0 2	0 3 0 0 0	1 0 0 0 0	0 0 0 0 0	0 1 0 0 0	2 0 0 0 0	0 0 0 0 0	0 1 0 0 0	0 0 2 0 0 1	0 0 1 1 0 0	0 0 4 0 1 0	0 0 0 0 0 0	0 0 1 0	0 0 0 0 0	0 0 0 0 0	3 8 7 2 1 1
7.5-12.5 12.5-18.5 18.5-24 >24 TOTAL Class All	0 0 0 1 Freq:	2 0 0 0 2 1.000	0 3 0 0 0 0 3	1 0 0 0 0 1	0 0 0 0 0	0 1 0 0 0 0	2 0 0 0 0 0 2	0 0 0 0 0 0	0 1 0 0 0 0	0 0 2 0 0 1 3	0 0 1 1 0 0 2	0 0 4 0 1 0 5	0 0 0 0 0 0	0 0 1 0 0 1	0 0 0 0 0 0	0 0 0 0 0 0	3 8 7 2 1 1 22
7.5-12.5 12.5-18.5 18.5-24 >24 TOTAL Class All mph	0 0 0 1 Freq: N	2 0 0 2 1.000 NNE	0 3 0 0 0 0 3 3	1 0 0 0 0 1 ENE	0 0 0 0 0 0 0 0 0	0 1 0 0 0 1 ESE	2 0 0 0 0 2 SE	0 0 0 0 0 0 0 5SE	0 1 0 0 0 0 1 5	0 0 2 0 1 3 SSW	0 0 1 1 0 0 2 SW	0 0 4 0 1 5 5	0 0 0 0 0 0 0 0 0	0 0 1 0 0 1 1 WNW	0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0	3 8 7 2 1 1 22 70TAL
7.5-12.5 12.5-18.5 18.5-24 >24 TOTAL Class All mph Calm-0.95	0 0 0 1 Freq: N 0	2 0 0 2 1.000 NNE 0	0 3 0 0 0 3 3 NE 0	1 0 0 0 0 1 ENE 0	0 0 0 0 0 0 0 0 0 0 0 0	0 1 0 0 0 1 1 ESE 0	2 0 0 0 2 2 SE 0	0 0 0 0 0 0 0 0 5 5 5 5 5 5 5 5 5 5 5 5	0 1 0 0 0 1 1 \$ 0	0 0 2 0 1 3 SSW 0	0 0 1 1 0 0 2 2 SW	0 0 4 0 1 0 5 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 1 0 0 1 0 0 1 0 0	0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0	3 8 7 2 1 1 22 7 7 7 7 7 7 7 7 7 8 7 7 9 7 7 9 7 9 7 7 9 7 7 9 7 7 9 7 7 9 7 7 9 7 7 7 7 9 7 7 7 9 7 7 7 9 7 7 9 7 7 9 7 9 7 9 7 9 7 9 7 9 9 7 9 7 9
7.5-12.5 12.5-18.5 18.5-24 >24 TOTAL Class All mph Calm-0.95 0.95-3.5	0 0 0 1 Freq: N 0 3	2 0 0 2 1.000 NNE 0 0	0 3 0 0 0 3 3 NE 0 2	1 0 0 0 0 1 1 ENE 0 2	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 3	0 1 0 0 0 1 ESE 0 1	2 0 0 0 2 2 SE 0 3	0 0 0 0 0 0 0 0 0 5SE 0 2	0 1 0 0 0 1 1 S 0 0	0 0 2 0 1 3 SSW 0 2	0 0 1 1 0 0 2 SW 0 2	0 0 4 0 1 0 5 WSW 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 2	0 0 1 0 0 1 1 0 0 1 0 3	0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 5	3 8 7 2 1 1 22 TOTAL 0 30
7.5-12.5 12.5-18.5 18.5-24 >24 TOTAL Class All mph Calm-0.95 0.95-3.5 3.5-7.5	0 0 0 1 Freq: N 0 3 7	2 0 0 2 1.000 NNE 0 0 8	0 3 0 0 0 3 3 NE 0 2 10	1 0 0 0 1 1 ENE 0 2 11	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 1 0 0 0 1 5 5 5 6 0 1 12	2 0 0 0 2 2 SE 0 3 10	0 0 0 0 0 0 0 0 0 0 5SE 0 2 6	0 1 0 0 0 0 1 1 5 0 0 4	0 0 2 0 1 3 3 SSW 0 2 4	0 0 1 0 0 2 SW 0 2 8	0 0 4 0 1 5 5 WSW 0 0 0 4	0 0 0 0 0 0 0 0 0 0 0 0 0 2 8	0 0 1 0 0 1 1 0 0 1 0 3 10	0 0 0 0 0 0 0 0 0 0 0 20	0 0 0 0 0 0 0 0 0 0 0 5 5 5	3 8 7 2 1 1 22 TOTAL 0 30 137
7.5-12.5 12.5-18.5 18.5-24 >24 TOTAL Class All mph Calm-0.95 0.95-3.5 3.5-7.5 7.5-12.5	0 0 0 1 Freq: N 0 3 7 11	2 0 0 2 1.000 NNE 0 0 8 13	0 3 0 0 0 3 3 NE 0 2 10 16	1 0 0 0 1 1 ENE 0 2 11 6	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 1 0 0 0 1 5 5 5 6 0 1 12 21	2 0 0 0 2 2 SE 0 3 10 32	0 0 0 0 0 0 0 0 0 0 0 5SE 0 2 6 19	0 1 0 0 0 0 1 1 S 0 0 0 4 19	0 0 0 1 3 SSW 0 2 4 29	0 0 1 0 2 8 8 50	0 0 4 0 1 5 5 WSW 0 0 0 4 35	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 1 0 0 1 0 1 1 0 3 10 54	0 0 0 0 0 0 0 0 0 0 0 20 27	0 0 0 0 0 0 0 0 0 0 0 5 5 5 18	3 8 7 2 1 1 22 TOTAL 0 30 137 400
7.5-12.5 12.5-18.5 18.5-24 >24 TOTAL Class All mph Calm-0.95 0.95-3.5 3.5-7.5 7.5-12.5 12.5-18.5	0 0 0 1 Freq: N 0 3 7 11 13	2 0 0 2 1.000 NNE 0 0 8 8 13 16	0 3 0 0 3 3 NE 0 2 10 16 27	1 0 0 0 1 5 ENE 0 2 11 6 6 6	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 1 0 0 0 1 1 ESE 0 1 12 21 15	2 0 0 0 2 2 SE 0 3 10 32 33	0 0 0 0 0 0 0 0 0 0 5SE 0 2 6 6 19 34	0 1 0 0 0 1 1 S 0 0 4 19 41	0 0 0 1 3 SSW 0 2 4 29 75	0 0 1 0 2 SW 0 2 8 8 50 79	0 0 4 0 5 5 WSW 0 0 0 4 35 108	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 2 8 8 41 150	0 0 1 0 0 1 1 0 0 1 0 3 10 54 140	0 0 0 0 0 0 0 0 0 0 20 27 46	0 0 0 0 0 0 0 0 0 0 0 0 0 5 5 18 21	3 8 7 2 1 1 22 TOTAL 0 30 137 400 817

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Class A Freq: 0.099

Class A	Freq:	0.099															
mph	N	NNE	NE	ENE	Ë	ESE	SE	SSE	S	ssw	SW	wsw	W	WNW	NW	NNW	TOTAL
Calm-0.95	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0.95-3.5	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	2
3.5-7.5	11	22	24	11	8	2	0	0	0	0	0	1	5	4	5	5	98
7.5-12.5	33	20	25	14	18	20	12	2	6	1	6	12	16	31	12	17	245
12.5-18.5	23	16	9	6	2	6	15	6	15	32	13	11	29	58	29	13	283
18.5-24	19	8	4	3	2	2	0	0	4	17	2	0	24	44	7	19	155
>24	11	8	3	0	1	0	0	0	0	1	0	0	11	17	12	5	69
TOTAL	97	74	65	35	32	30	27	8	25	51	21	24	85	154	65	59	852
		- * '			سر .												
Class B	Freq:	0.040		- 				-	y a sua p Sanga			<u> </u>	· · · · ·	T			,
mph	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	wsw	W	WNW	NW	NNW	TOTAL
Calm-0.95	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0.95-3.5	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1
3.5-7.5	7	6	3	6	7	0	0	0	0	0	0	2	6	9	_2	4	52
7.5-12.5	4	3	4	3	4	20	9	2	1	12	9	14	14	11	5	3	118
12.5-18.5	1	3	1	4	4	6	5	3		19	12	12	12	10	7	5	115
18.5-24	0	2	2	1	1	3	0	0	0	5	4	0	10	8	5	1	42
>24	4	5	1	0	0	0	0	. 0	0	2	0	0	1	3	1	1	18
TOTAL	16	19	12	14	16	29	14	5	12	38	25	28	43	41	20	14	346
TOTAL	16	19	12	14	16	29	14	5	12	38	25	28	43	41	20	14	346
		0.057	12	14	16	29	14	5	12	38	25	28	43	41	20	14	346
		1	12 NE	ENE	16 E	ESE	14 SE	5 SSE	12 S	38 SSW	25 SW	28 WSW	43 W	41	20 NW	14 NNW	346 TOTAL
Class C mph Calm-0.95	Freq: N 0	0.057 NNE 0	NE 0	ENE 0	<u>Е</u> 0	ESE 0	SE 0	SSE 0	S 0	SSW 0	SW 0	wsw 0	W 0	1	NW 0	NNW 0	
Class C mph Calm-0.95 0.95-3.5	Freq: N 0	0.057 NNE 0	NE 0 1	ENE 0 1	E 0 0	ESE 0 0	SE 0 0	SSE 0 0	S 0 0	SSW 0 0	SW 0 0	WSW 0 0	W 0 0	WNW 0 0	NW 0 0	NNW 0 2	TOTAL 0 4
Class C mph Calm-0.95 0.95-3.5 3.5-7.5	Freq: N O 5	0.057 NNE 0 9	NE 0 1 4	ENE 0 1 5	E 0 0 3	ESE 0 0 7	SE 0 0	SSE 0 0	S 0 0 2	SSW 0 2	SW 0 0 6	WSW 0 0 2	W 0 0 2	WNW 0 0 9	NW 0 0 6	NNW 0 2 6	TOTAL 0 4 68
Class C mph Calm-0.95 0.95-3.5 3.5-7.5 7.5-12.5	Freq: N 0 5 3	0.057 NNE 0 9 6	NE 0 1 4 8	ENE 0 1 5 5	E 0 0 3 1	ESE 0 0 7 16	SE 0 0 0 15	SSE 0 0 0 7	S 0 0 2 12	SSW 0 2 14	SW 0 0 6 15	WSW 0 0 2 18	W 0 0 2 15	WNW 0 0 9 14	NW 0 0 6 4	NNW 0 2 6 2	TOTAL 0 4 68 155
Class C mph Calm-0.95 0.95-3.5 3.5-7.5 7.5-12.5 12.5-18.5	Freq: N 0 5 3 2	0.057 NNE 0 9 6 3	NE 0 1 4 8 6	ENE 0 1 5 5 7	E 0 0 3 1 2	ESE 0 0 7 16 4	SE 0 0 0 15 5	SSE 0 0 0 7 0	S 0 0 2 12 16	SSW 0 0 2 14 27	SW 0 0 6 15 15	WSW 0 2 18 21	W 0 2 15 25	WNW 0 9 14 6	NW 0 0 6 4 2	NNW 0 2 6 2 5	TOTAL 0 4 68 155 146
Class C mph Calm-0.95 0.95-3.5 3.5-7.5 7.5-12.5 12.5-18.5 18.5-24	Freq: N 0 0 5 3 2 2	0.057 NNE 0 0 9 6 3 4	NE 0 1 4 8 6 9	ENE 0 1 5 5 7 1	E 0 3 1 2 1	ESE 0 7 16 4 1	SE 0 0 0 15 5 0	SSE 0 0 0 7 0 0	S 0 2 12 16 2	SSW 0 2 14 27 14	SW 0 0 6 15 15 10	WSW 0 0 2 18 21 0	W 0 2 15 25 14	WNW 0 0 9 14 6 11	NW 0 0 6 4 2 3	NNW 0 2 6 2 5 3	TOTAL 0 4 68 155 146 75
Class C mph Calm-0.95 0.95-3.5 3.5-7.5 7.5-12.5 12.5-18.5 18.5-24 >24	Freq: N 0 5 3 2 2 14	0.057 NNE 0 0 9 6 3 4 6	NE 0 1 4 8 6 9 0	ENE 0 1 5 5 7 1 1	E 0 3 1 2 1 0	ESE 0 7 16 4 1 0	SE 0 0 15 5 0 0	SSE 0 0 7 0 0 0 0	S 0 2 12 16 2 0	SSW 0 2 14 27 14 0	SW 0 6 15 15 10 0	WSW 0 2 18 21 0 0	W 0 2 15 25 14 1	WNW 0 0 9 14 6 11 7	NW 0 6 4 2 3 9	NNW 0 2 6 2 5 3 6	TOTAL 0 4 68 155 146 75 44
Class C mph Calm-0.95 0.95-3.5 3.5-7.5 7.5-12.5 12.5-18.5 18.5-24	Freq: N 0 0 5 3 2 2	0.057 NNE 0 0 9 6 3 4	NE 0 1 4 8 6 9	ENE 0 1 5 5 7 1	E 0 3 1 2 1	ESE 0 7 16 4 1	SE 0 0 0 15 5 0	SSE 0 0 0 7 0 0	S 0 2 12 16 2	SSW 0 2 14 27 14	SW 0 0 6 15 15 10	WSW 0 0 2 18 21 0	W 0 2 15 25 14	WNW 0 0 9 14 6 11	NW 0 0 6 4 2 3	NNW 0 2 6 2 5 3	TOTAL 0 4 68 155 146 75
Class C mph Calm-0.95 0.95-3.5 3.5-7.5 7.5-12.5 12.5-18.5 18.5-24 >24 TOTAL	Freq: N 0 5 3 2 2 14 26	0.057 NNE 0 0 9 6 3 4 6 28	NE 0 1 4 8 6 9 0	ENE 0 1 5 5 7 1 1	E 0 3 1 2 1 0	ESE 0 7 16 4 1 0	SE 0 0 15 5 0 0	SSE 0 0 7 0 0 0 0	S 0 2 12 16 2 0	SSW 0 2 14 27 14 0	SW 0 6 15 15 10 0	WSW 0 2 18 21 0 0	W 0 2 15 25 14 1	WNW 0 0 9 14 6 11 7	NW 0 6 4 2 3 9	NNW 0 2 6 2 5 3 6	TOTAL 0 4 68 155 146 75 44
Class C mph Calm-0.95 0.95-3.5 3.5-7.5 7.5-12.5 12.5-18.5 18.5-24 >24 TOTAL Class D	Freq: N 0 5 3 2 2 14 26 Freq:	0.057 NNE 0 0 9 6 3 4 6 28 0.399	NE 0 1 4 8 6 9 0 28	ENE 0 1 5 5 7 1 1 20	E 0 3 1 2 1 0 7	ESE 0 0 7 16 4 1 0 28	SE 0 0 15 5 0 0 20	SSE 0 0 7 0 0 0 0 7 7	S 0 2 12 16 2 0 32	SSW 0 2 14 27 14 0 57	SW 0 6 15 15 10 0 46	WSW 0 2 18 21 0 0 41	W 0 2 15 25 14 1 57	WNW 0 9 14 6 11 7 47	NW 0 6 4 2 3 9 24	NNW 0 2 6 2 5 3 6 2 4	TOTAL 0 4 68 155 146 75 44 492
Class C mph Calm-0.95 0.95-3.5 3.5-7.5 7.5-12.5 12.5-18.5 18.5-24 >24 TOTAL Class D mph	Freq: N 0 5 3 2 14 26 Freq: N	0.057 NNE 0 9 6 3 4 6 28 0.399 NNE	NE 0 1 4 8 6 9 0 28 NE	ENE 0 1 5 5 7 1 1 20 ENE	E 0 3 1 2 1 0 7 5	ESE 0 7 16 4 1 0 28 ESE	SE 0 0 15 5 0 0 20 SE	SSE 0 0 7 0 0 0 0 7 7 SSE	S 0 2 12 16 2 0 32 S	SSW 0 2 14 27 14 0 57 SSW	SW 0 6 15 15 10 0 46 SW	WSW 0 2 18 21 0 0 41	W 0 2 15 25 14 1 57 W	WNW 0 0 9 14 6 11 7 47 WNW	NW 0 6 4 2 3 9 24 NW	NNW 0 2 6 2 5 3 6 24 NNW	TOTAL 0 4 68 155 146 75 44 492 TOTAL
Class C mph Calm-0.95 0.95-3.5 3.5-7.5 7.5-12.5 12.5-18.5 18.5-24 >24 TOTAL Class D mph Calm-0.95	Freq: N 0 5 3 2 2 14 26 Freq: N 0	0.057 NNE 0 9 6 3 4 6 28 0.399 NNE 0	NE 0 1 4 8 6 9 0 28 NE 0	ENE 0 1 5 5 7 1 1 20 ENE 0	E 0 3 1 2 1 0 7 7 E 0	ESE 0 7 16 4 1 0 28 ESE 0	SE 0 0 15 5 0 0 20 20 SE 0	SSE 0 0 7 0 0 0 0 7 7 5 SE 0	S 0 2 12 16 2 0 32 S 0	SSW 0 2 14 27 14 0 57 57 SSW 0	SW 0 6 15 15 10 0 46 SW	WSW 0 2 18 21 0 0 41 WSW 0	W 0 2 15 25 14 1 57 W	WNW 0 9 14 6 11 7 47 47	NW 0 6 4 2 3 9 24 NW 0	NNW 0 2 6 2 5 3 6 24 24 NNW 0	TOTAL 0 4 68 155 146 75 44 492 TOTAL 0
Class C mph Calm-0.95 0.95-3.5 3.5-7.5 7.5-12.5 12.5-18.5 18.5-24 >24 TOTAL Class D mph Calm-0.95 0.95-3.5	Freq: N 0 5 3 2 14 26 Freq: N 0 8	0.057 NNE 0 9 6 3 4 6 28 0.399 NNE 0 13	NE 0 1 4 8 6 9 0 28 28 NE 0 17	ENE 0 1 5 5 7 1 1 1 20 ENE 0 3	E 0 3 1 2 1 0 7 7 E 0 1	ESE 0 7 16 4 1 0 28 ESE 0 0	SE 0 0 15 5 0 0 20 SE 0 2	SSE 0 0 7 0 0 0 0 7 7 5 SSE 0 0 0	S 0 2 12 16 2 0 32 32 S 0 0	SSW 0 2 14 27 14 0 57 57 SSW 0 1	SW 0 6 15 15 10 0 46 SW 0 0	WSW 0 2 18 21 0 0 0 41 41 WSW 0 0	W 0 2 15 25 14 1 57 W 0 1	WNW 0 9 14 6 11 7 47 47 WNW 0 1	NW 0 6 4 2 3 9 24 NW 0 2	NNW 0 2 6 2 5 3 6 24 24 NNW 0 8	TOTAL 0 4 68 155 146 75 44 492 TOTAL 0 57
Class C mph Calm-0.95 0.95-3.5 3.5-7.5 7.5-12.5 12.5-18.5 18.5-24 >24 TOTAL Class D mph Calm-0.95 0.95-3.5 3.5-7.5	Freq: N 0 0 5 3 2 2 14 26 Freq: N 0 8 23	0.057 NNE 0 9 6 3 4 6 28 0.399 NNE 0 13 14	NE 0 1 4 8 6 9 0 28 28 NE 0 17 26	ENE 0 1 5 5 7 1 1 1 20 ENE 0 3 23	E 0 3 1 2 1 0 7 7 E 0 1 32	ESE 0 7 16 4 1 0 28 ESE 0 0 31	SE 0 0 15 5 0 0 20 SE 0 2 2 5	SSE 0 0 7 0 0 0 0 7 7 SSE 0 0 21	S 0 2 12 16 2 0 32 32 S 0 0 0 17	SSW 0 2 14 27 14 0 57 57 SSW 0 1 13	SW 0 6 15 15 10 0 46 SW 0 0 9	WSW 0 2 18 21 0 0 41 41 WSW 0 0 6	W 0 2 15 25 14 1 57 W 0 1 8	WNW 0 9 14 6 11 7 47 47 WNW 0 1 20	NW 0 6 4 2 3 9 24 24 NW 0 2 14	NNW 0 2 6 2 5 3 6 24 24 NNW 0 8 15	TOTAL 0 4 68 155 146 75 44 492 TOTAL 0 57 297
Class C mph Calm-0.95 0.95-3.5 3.5-7.5 7.5-12.5 12.5-18.5 18.5-24 >24 TOTAL Class D mph Calm-0.95 0.95-3.5 3.5-7.5 7.5-12.5	Freq: N 0 0 5 3 2 2 14 26 Freq: N 0 8 23 24	0.057 NNE 0 9 6 3 4 6 28 0.399 NNE 0 13 14 24	NE 0 1 4 8 6 9 0 28 28 NE 0 17 26 26	ENE 0 1 5 5 7 1 1 1 20 ENE 0 3 23 24	E 0 3 1 2 1 0 7 7 E 0 1 32 29	ESE 0 7 16 4 1 0 28 ESE 0 0 31 48	SE 0 0 15 5 0 0 20 20 SE 0 2 25 39	SSE 0 0 7 0 0 0 0 7 7 SSE 0 0 0 21 49	S 0 2 12 16 2 0 32 32 S 0 0 17 62	SSW 0 2 14 27 14 0 57 57 SSW 0 1 13 83	SW 0 6 15 15 10 0 46 SW 0 0 9 63	WSW 0 2 18 21 0 0 0 41 0 0 6 43	W 0 2 15 25 14 1 1 57 W 0 1 8 35	WNW 0 9 14 6 11 7 47 47 WNW 0 1 1 20 40	NW 0 6 4 2 3 9 24 24 NW 0 2 14 29	NNW 0 2 6 2 5 3 6 2 4 24 NNW 0 8 15 21	TOTAL 0 4 68 155 146 75 44 492 TOTAL 0 57 297 639
Class C mph Calm-0.95 0.95-3.5 3.5-7.5 7.5-12.5 12.5-18.5 18.5-24 >24 TOTAL Class D mph Calm-0.95 0.95-3.5 3.5-7.5 7.5-12.5 12.5-18.5	Freq: N 0 5 3 2 2 14 26 Freq: N 0 8 23 24 19	0.057 NNE 0 9 6 3 4 6 28 0.399 NNE 0 13 14 24 16	NE 0 1 4 8 6 9 0 28 28 NE 0 17 26 26 27	ENE 0 1 5 5 7 1 1 1 20 ENE 0 3 23 24 32	E 0 3 1 2 1 0 7 7 5 6 0 1 32 29 31	ESE 0 7 16 4 1 0 28 ESE 0 0 31 48 33	SE 0 0 15 5 0 0 20 20 SE 0 2 25 39 35	SSE 0 0 0 7 0 0 0 7 0 0 0 7 0 0 0 21 49 22 2	S 0 2 12 16 2 0 32 32 S 0 0 17 62 69	SSW 0 2 14 27 14 0 57 57 SSW 0 1 13 83 220	SW 0 6 15 15 10 0 46 SW 0 0 9 63 127	WSW 0 2 18 21 0 0 41 41 0 0 0 41 0 0 6 43 94	W 0 2 15 25 14 1 57 W 0 1 8 35 198	WNW 0 9 14 6 11 7 47 47 WNW 0 1 1 20 40 135	NW 0 6 4 2 3 9 24 24 NW 0 2 14 29 33	NNW 0 2 6 2 5 3 6 2 4 24 NNW 0 8 15 21 23	TOTAL 0 4 68 155 146 75 44 492 TOTAL 0 57 297 639 1114
Class C mph Calm-0.95 0.95-3.5 3.5-7.5 7.5-12.5 12.5-18.5 18.5-24 >24 TOTAL Class D mph Calm-0.95 0.95-3.5 3.5-7.5 7.5-12.5	Freq: N 0 0 5 3 2 2 14 26 Freq: N 0 8 23 24	0.057 NNE 0 9 6 3 4 6 28 0.399 NNE 0 13 14 24	NE 0 1 4 8 6 9 0 28 28 NE 0 17 26 26	ENE 0 1 5 5 7 1 1 1 20 ENE 0 3 23 24	E 0 3 1 2 1 0 7 7 E 0 1 32 29	ESE 0 7 16 4 1 0 28 ESE 0 0 31 48	SE 0 0 15 5 0 0 20 20 SE 0 2 25 39	SSE 0 0 7 0 0 0 0 7 7 SSE 0 0 0 21 49	S 0 2 12 16 2 0 32 32 S 0 0 17 62	SSW 0 2 14 27 14 0 57 57 SSW 0 1 13 83	SW 0 6 15 15 10 0 46 SW 0 0 9 63	WSW 0 2 18 21 0 0 0 41 0 0 6 43	W 0 2 15 25 14 1 1 57 W 0 1 8 35	WNW 0 9 14 6 11 7 47 47 WNW 0 1 1 20 40	NW 0 6 4 2 3 9 24 24 NW 0 2 14 29	NNW 0 2 6 2 5 3 6 2 4 24 NNW 0 8 15 21	TOTAL 0 4 68 155 146 75 44 492 TOTAL 0 57 297 639

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TOTAL

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Jan-Dec 2010

Class E	Freq:	0.291															
mph	N	NNE	NE	ENE	Е	ESE	SE	SSE	S	ssw	sw	wsw	W	WNW	NW	NNW	TOTAL
Calm-0.95	0	0	0	0	0	0	0	0	_0	0	0	0	0	0	0	0	0
0.95-3.5	1	7	8	10	7	8	3	4	3	3	5	1	5	4	0	7	76
3.5-7.5	11	13	10	10	24	24	25	13	20	14	6	5	11	6	22	7	221
7.5-12.5	19	16	23	4	18	32	37	46	37	53	32	25	48	55	35	27	507
12.5-18.5	19	11	1	6	7	8	25	62	53	132	114	108	211	143	53	30	983
18.5-24	8	4	6	5	5	15	9	6	5	112	84	39	96	69	36	22	521
>24	9	11	13	18	26	1	6	0	0	17	16	0	4	35	22	6	184
TOTAL	67	62	61	53	87	88	105	131	118	331	257	178	375	312	168	99	2492
	F		.														
Class F													÷	- ***			
mph	Ń	NNE	NE	ENE	E	ESE	SE	SSE	S	ssw	sw	wsw	W		NW	NNW	
Calm-0.95	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0.95-3.5	2	1 5	6	1	2	3	3 10	4	1	1	0	1	1	1	3	2	32
<u>3.5-7.5</u> 7.5-12.5	4 9	5 2	3	2	9 2	9 9	23	0 19	11 12	<u>6</u> 15	3 17	7 29	9 27	3 42	6 23	7 14	94 248
12.5-18.5	6	1	0	1	0	2	7	21	14	21	34	33	65	60	23	13	301
18.5-24	1	0	0	0	0	0	, 0	0	0	7	53	24	9	12	2	4	112
>24	0	1	0	2	0	0	0	0	0	3	3	0	0	0	0	0	9
TOTAL	22	10	12	8	13	23	43	44	38	53	110	94	111	118	57	40	796
Class G mph	Freq:	0.020 NNE	NE	ENE	Е	ESE	SE	SSE	S	ssw	sw	wsw	w	WNW	NW	NNW	TOTAL
Calm-0.95	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
0.95-3.5	1	2	2	2	2	1	4	0	1	1	0	0	2	1		1	21
3.5-7.5	4	2	4	0		1	2	0	5	5	1	1	2	0	4	2	34
7.5-12.5	0	0	0	0	0	0	0	1	6	6	5	12	10	7	3	2	52
12.5-18.5	0	0	0	0	0	0	0	0	1	0	8	7	12	10	1	1	40
18.5-24	0	0	0	0	0	0	0	0	0	0	7	6	2	0	0	0	15
>24	0	0	0	0	0	0	0	0	0	1	5	0	0	0	0	0	6
TOTAL	5	4	6	3	3	2	6	1	13	13	26	26	28	18	9	6	169
	-	4 000															
Class All	Freq:	I	N		_	F05	07	005			0.44	14014					
mph	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	TOTAL
Calm-0.95	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
0.95-3.5	12	23	35	18	13	12	12	8	5	6	5	2	9	7	6	20	193
3.5-7.5	65	71	74	57	84	74	62	34	55	40	25	24	43	51	59	46	864
7.5-12.5	92	<u>71</u>	89	52	72	145	135	126	136	184	147	153	165	200	111	86	1964
12.5-18.5	70 55	50 47	44 57	56	46	59	92	114	179	451	323	286	552	422	148	90 72	2982
18.5-24 >24	55 134	99	43	43 56	23 47	32 2	21 25	36 15	48 8	268 31	205 32	95 0	242 47	252 163	1 <u>36</u> 161	73 71	1633 934
	1	[····	1	Í T				Î			1				<u> </u>		
TOTAL	428	361	342	283	285	324	347	333	431	980	737	560	1058	1095	621	386	8571

APPENDIX B

Results of Onsite Groundwater Monitoring Program

In response to the Nuclear Energy Institute (NEI) Groundwater Protection Initiative, Pilgrim Station instituted a groundwater monitoring program during 2007. Four monitoring wells were installed during the fourth quarter of 2007, and the first samples were collected in late November 2007. All four wells were installed onsite, within the protected area fence. Since these are onsite wells, they are not considered part of the Radiological Environmental Monitoring Program (REMP), and data from these wells are being reported in the annual Radiological Effluent Release Report. Also, there were no leaks or spills of radioactive material at Pilgrim Station during 2010 that could have affected onsite or offsite groundwater

Two pre-existing wells were incorporated into the groundwater monitoring program in early 2008. Monitoring well MW3 is located in the owner-controlled area near Rocky Hill Road, and was added to the program during the first quarter of 2008. Since monitoring well MW3 is located slightly uphill of Pilgrim Station approximately 0.2 mile southwest of the power block, it is upgradient of the PNPS power block and outside of natural groundwater flow direction. As such, it is considered to be a control well indicative of baseline levels in the vicinity of Pilgrim Station. Monitoring well MW4 is located within the protected area near the main transformer, and was added to the program during the 2nd quarter of 2008 as an additional onsite monitoring well.

In response to recommendations from assessments performed in 2009 by Entergy and NEI, six new monitoring wells were installed within the Pilgrim Station protected area in April 2010 to better characterize groundwater flow characteristics and perform monitoring closer to selected systems, structures and components (SSCs) the contain radioactive material and could lead to groundwater contamination if leaks were to develop. One of the wells MW202-I was an intermediate-level (45-feet deep) well installed adjacent to MW202 that had been installed in 2007. Monitoring well MW205 was a 25-ft well installed slightly down-gradient from the Condensate Storage Tanks (CSTs), and MW206 was a 25-ft well installed near the radwaste truck lock. MW207 was a 25-ft well installed on the southwest corner of the power block. Two additional wells were installed upgradient, approximately 300 yards southeast of the power block; MW208-S was a 25-ft shallow-level well, and was installed adjacent to MW208-I, a 45-ft intermediate level well.

The first samples were collected from these new wells in May-2010, and the radioactivity content was assessed. Analyses of samples from wells MW202-I, MW207, MW208-S, and MW208-I were consistent with the other wells installed in 2007. Tritium levels in MW205 and MW206 were higher than those observed from the wells installed in 2007, and the sampling frequency was changed from the normal quarterly sampling interval to once per week to obtain more information.

Both wells MW205 and MW206 continued to show wide fluctuations during the summer of 2010, and six additional sampling wells were installed in August 2010. All six of the wells installed in August were shallow wells, approximately 25-ft in depth. Monitoring well MW209 was installed on the north side of the reactor building truck lock. Monitoring well MW210 was installed immediately adjacent to the condensate storage tank to provide indication of any CST leakage that would be anticipated to move toward MW205, one of the wells indicating higher concentrations. Monitoring well MW211 was installed on the south side of the reactor building truck lock, in an area that could potentially be affected by storm drain leakage and the underground liquid radwaste discharge line. MW212 was installed between the underground radwaste discharge line and the intake screenhouse, and was intended to monitor for lateral flow of groundwater at the site. MW213 was installed on the north side of the PNPS Warehouse, and was intended to characterize groundwater on the east side of the plant site. Finally, MW214 was installed on the north side of the trash compaction facility to characterize groundwater flows along the northeast boundary of the site.

Additional efforts were undertaken to try to identify potential sources of the elevated tritium detected in the monitoring wells. A technical team was assembled to review various systems and processes

that might influence introduction of tritium into groundwater, and Pilgrim Station has contracted the services of a professional hydrogeological firm to assist in the effort. Samples of roof runoff, storm drain runoff, and accumulated water in manholes were collected and analyzed for tritium, but provided inconclusive results. Soil samples were collected from borings performed in the vicinity of wells MW205 and MW206 to determine the possibility of "pockets" of tritium that might be suspended above the water table that could lead to "spikes" of tritium as precipitation percolated through the soil. These results also proved inconclusive, as no detectable tritium was detected in the soil samples. A dye tracer study was conducted in January 2011 on four underground systems to detect any potential for leakage in these systems that might carry tritium to the monitoring wells. However, due to slow rate of water movement through the soil (approximately 6-inches/day), it may take several months for dye to migrate from the underground systems to the monitoring wells. Despite the extensive efforts to date, no likely candidates for the sources of tritium in the groundwater have been identified.

All samples collected were analyzed for tritium, a radioactive isotope of hydrogen, and well as for gamma emitting radionuclides and hard-to-detect beta emitting nuclides. In accordance with industry practice established under the NEI initiative, lower limits of detection (LLDs) used for analysis of REMP samples were used when assessing these samples for the presence of radioactivity. Tritium was the only radionuclide detected in the samples that is attributed to operations of Pilgrim Station. No plant-related gamma emitting radionuclides or hard-to-detect beta emitting radioactivity was detected in any of the samples. Naturally-occurring radioactivity was detected in the samples. Such levels of natural radioactivity are expected as these radionuclides are dissolved into the groundwater from the rocks and soil. The fact that these low levels of naturally-occurring radioactivity can be detected demonstrated the ability of the gamma spectroscopy analyses to detect radioactivity in groundwater. If any plant-related gamma activity was contained in the groundwater, the analytical techniques used would be able to detect them.

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Results of the tritium analyses are presented in the following tables. In these tables, a value of "NDA < xx" in the columns indicates that no activity was detected in the sample when analyzed to the minimum-detectable level following the "<" sign. For example, the sample collected from MW202-I on 11-Jun-2010 contained no detectable tritium, and a minimum detectable concentration of 404 pCi/L was achieved on that sample. The achieved sensitivity of 404 pCi/L is well below the required REMP LLD of 3000 pCi/L, and no tritium was detected even when counted to this more sensitive level of detection.

Analyses for hard-to-detect nuclides, such as iron-55 (Fe-55), nickel-63 (Ni-63), strontium-89 (Sr-89), strontium-90 (Sr-90), and gross alpha were performed on the samples collected during the fourth quarter of 2007 and the first quarter of 2008. Analyses for these hard-to-detect radionuclides were also performed on initial samples collected from all of the new wells installed during 2010. Since no plant-related gamma activity and no Fe-55, Ni-63, Sr-89, or Sr-90 was detected in any of these samples, further analyses for these hard-to-detect nuclides will not be performed unless there is a significant increase in tritium levels, or if plant-related gamma activity is detected.

Low levels of tritium, a radioactive isotope of hydrogen, were detected in the onsite wells. Although gamma spectroscopy and gross alpha analyses indicated the presence of naturally-occurring radioactivity, such as potassium-40 and radon daughters from the uranium/thorium decay chains, there was no indication of any plant-related radioactivity in the samples, other than tritium.

Concentrations of tritium detected in the onsite wells ranged from non-detectable at less than 295 pCi/L, up to a maximum concentration of 25,552 pCi/L. The average concentrations from these onsite wells are well below the voluntary communication reporting level of 20,000 pCi/L as established by the EPA Drinking Water Standard. Although the EPA Standard provides a baseline for comparison, no drinking water sources are affected by this tritium. All of the affected wells are onsite, and the general groundwater flow pathway is under Pilgrim Station and out into the salt water of Cape Cod Bay. As such, there is no potential to influence any off-site drinking water wells. Even if worst-case assumptions were made and the water from monitoring well MW-205 (average

concentration = 9550 pCi/L) was consumed as drinking water, the maximum dose consequence would be less than 0.87 mrem/yr. In actuality, any dose consequence would be much less than this, as any tritium-laden water potentially leaving the site would be diluted into the seawater of Cape Cod Bay before being incorporated into any ingestion pathways. No drinking water ingestion pathway exists.

The following tables list the tritium concentrations observed in the samples collected from the monitoring wells during 2010.

Sample	Tritium C	oncentration by	/ Monitoring W	ell - pCi/Liter V	alue ± 1-sigma (uncertainty
Date	MW201	MW202	MW202-I	MW203	MW204	MW205
02-Mar-2010	1180 ± 110	1040 ± 110		900 ± 110	930 ± 110	
17-May-2010	910 ± 130	900 ± 130	930 ± 130	1060 ± 130	1230 ± 130	5810 ± 160
11-Jun-2010		589 ± 127	NDA<404			8632 ± 191
21-Jun-2010	- 8.,	660 ± 128	529 ± 126			11072 ± 207
30-Jun-2010		499 ± 126	520 ± 127			8477 ± 190
07-Jul-2010	718 ±127	553 ± 126	471 ± 125	447 ± 124	759 ± 128	25552 ± 282
15-Jul-2010		589 ± 68.5	425 ± 64.5			6870 ± 79.0
22-Jul-2010	731 ± 222	390 ± 209	473 ± 212			12600 ± 495
26-Jul-2010	932 ± 156	580 ± 133	408 ± 121			10800 ± 449
02-Aug-2010	576 ± 163	579 ± 164	NDA<460	NDA<465	794 ± 170	17800 ± 493
09-Aug-2010	961 ± 125	349 ± 107	390 ± 109	480 ± 111	578 ± 114	12700 ± 304
17-Aug-2010	1090 ± 126	371 ± 108	NDA<322	712 ± 137	805 ± 141	7840 ± 233
26-Aug-2010	873 ± 123	364 ± 113	485 ± 116	423 ± 114	383 ± 114	7960 ± 264
30-Aug-2010	974 ± 137	NDA<364	NDA<364	NDA<360	403 ± 125	1390 ± 148
07-Sep-2010	1200 ± 137	352 ± 112	417 ± 101	375 ± 101	455 ± 116	3010 ± 180
13-Sep-2010	1510 ± 167	461 ± 126	652 ± 134	NDA<380	415 ± 129	1840 ± 177
20-Sep-2010	1340 ± 134	NDA<314	341 ± 107	NDA<394	NDA<394	22000 ± 398
27-Sep-2010	958 ± 143	400 ± 126	522 ± 130	NDA<364	596 ± 113	25000 ± 484
04-Oct-2010	1140 ± 124					17300 ± 332
12-Oct-2010	1040 ± 143	NDA<373	NDA<388	NDA<347	646 ± 124	1760 ± 157
18-Oct-2010	966 ± 129					5890 ± 228
25-Oct-2010	1340 ± 160	NDA<390	NDA<390	NDA<322	532 ± 112	2840 ± 194
01-Nov-2010	1020 ± 121					16700 ± 356
15-Nov-2010	909 ± 144	NDA<383	NDA<353	NDA<320	529 ± 113	5730 ± 259
22-Nov-2010	1290 ± 129					1810 ± 141
29-Nov-2010	1060 ± 153	NDA<382	NDA<385	NDA<397	526 ± 114	1960 ± 177
09-Dec-2010	1150 ± 182					2300 ± 225
14-Dec-2010	781 ± 148	579 ± 139	486 ± 144	NDA<372	503 ± 141	17800 ± 532
29-Dec-2010	1190 ± 171	579 ± 147	556 ± 146	NDA<356	372 ± 118	3930 ± 199

Sample	Tritium Concentration by Monitoring Well - pCi/Liter Value ± 1-sigma uncertainty									
Date	MW206	MW207	MW208-S	MW208-I	MW209	MW210				
02-Mar-2010										
17-May-2010	1470 ± 130	1090 ± 130	630 ± 130	380 ± 120						
11-Jun-2010										
21-Jun-2010										
30-Jun-2010										
07-Jul-2010	3352 ± 151	488 ± 125	NDA<402	NDA<402						
15-Jul-2010										
22-Jul-2010	1520 ± 251			-						
26-Jul-2010	2030 ± 213									
02-Aug-2010	1380 ± 190	512 ± 160	NDA<477	NDA<457						
09-Aug-2010	4550 ± 198	394 ± 108	381 ± 108	NDA<315						
17-Aug-2010	5370 ± 201	701 ± 137	NDA<410	NDA<412						
26-Aug-2010	10500 ± 243	453 ± 116	NDA<303	NDA<348	2940 ± 159	1280 ± 131				
30-Aug-2010	2790 ± 177	421 ± 112	NDA<322	NDA<357	1780 ± 158	NDA<362				
07-Sep-2010	3190 ± 183	329 ± 112	NDA<295	NDA<304	1560 ± 145	589 ± 105				
13-Sep-2010	6830 ± 295	NDA<379	NDA<376	NDA<378	1590 ± 168	641 ± 134				
20-Sep-2010	8290 ± 242	NDA<394	NDA<390	NDA<394	1390 ± 131	1020 ± 123				
27-Sep-2010	5040 ± 238	519 ± 130	NDA<312	413 ± 126	1760 ± 168	816 ± 140				
04-Oct-2010	8210 ± 239									
12-Oct-2010	10100 ± 273	NDA<346	NDA<347	NDA<345	1440 ± 151	610 ± 134				
18-Oct-2010	5950 ± 229									
25-Oct-2010	12200 ± 343	NDA<321	NDA<320	NDA<321	1710 ± 169	837 ± 145				
01-Nov-2010	13600 ± 324									
15-Nov-2010	9250 ± 306	NDA<318	NDA<328	NDA<320	1830 ± 171	1230 ± 155				
22-Nov-2010	4720 ± 190									
29-Nov-2010	5290 ± 246	NDA<398	NDA<317	NDA<399	1550 ± 166	NDA<385				
09-Dec-2010	5270 ± 225									
14-Dec-2010	10300 ± 413	NDA<360	NDA<365	NDA<370	1940 ± 208	1090 ± 168				
29-Dec-2010	8950 ± 353	NDA<350	NDA<365	NDA<340	1870 ± 194	930 ± 161				

Sample	Tritium Concentration by Monitoring Well - pCi/Liter Value ± 1-sigma uncertainty									
Date	MW211	MW212	MW213	MW214	MW3	MW4				
02-Mar-2010					360 ± 100	590 ± 100				
17-May-2010					500 ± 130	830 ± 120				
11-Jun-2010										
21-Jun-2010										
30-Jun-2010										
07-Jul-2010					NDA<402	568 ± 126				
15-Jul-2010										
22-Jul-2010										
26-Jul-2010										
02-Aug-2010					NDA<460	504 ± 162				
09-Aug-2010					NDA<313	491 ± 111				
17-Aug-2010					NDA<397	759 ± 134				
26-Aug-2010	1540 ± 136	514 ± 117	NDA<346	NDA<345	NDA<345	557 ± 116				
30-Aug-2010	1340 ± 148	385 ± 122	NDA<361	NDA<364	NDA<320	573 ± 116				
07-Sep-2010	1570 ± 146	655 ± 122	341 ± 99	NDA<297	NDA<331	662 ± 122				
13-Sep-2010	1730 ± 173	618 ± 133	NDA<378	NDA<380	NDA<377	398 ± 129				
20-Sep-2010	1200 ± 127	462 ± 110	NDA<420	NDA<396	NDA<395	493 ± 128				
27-Sep-2010	1090 ± 148	513 ± 111	438 ± 122	NDA<313	400 ± 133	645 ± 114				
04-Oct-2010										
12-Oct-2010	1180 ± 146	455 ± 129	415 ± 118	NDA<344	NDA<345	466 ± 118				
18-Oct-2010										
25-Oct-2010	870 ± 146	568 ± 137	NDA<321	NDA<318	NDA<321	556 ± 113				
01-Nov-2010										
15-Nov-2010	1050 ± 150	745 ± 118	NDA<312	NDA<302	NDA<305	491 ± 107				
22-Nov-2010						1				
29-Nov-2010	717 ± 142	533 ± 136	NDA<398	NDA<318	NDA<317	607 ± 117				
09-Dec-2010										
14-Dec-2010	1250 ± 181	620 ± 146	NDA<353	NDA<368	534 ± 143	740 ± 156				
29-Dec-2010	1110 ± 136	830 ± 157	NDA<334	NDA<282	NDA<358	NDA<347				

Although there are no indications that the groundwater containing low concentrations of tritium is actually migrating offsite, a bounding calculation was performed to assess the potential dose impact of such a scenario. Based on the tritium concentrations detected during 2010, the annual average concentrations of tritium in groundwater in the four monitoring wells most closely adjacent to the shoreline (MW204, MW205, MW202, and MW201) were used to estimate tritium migration into the intake bay. Hydrological characteristics of the compacted backfill in the vicinity of these wells were measured in 2010 and indicate the hydraulic conductivity to 0.002 cm/sec to about 0.0006 cm/sec. When coupled with the hydraulic slope of 0.014 and average porosity of 0.3, the flow velocity was calculated as being between 0.08 and 0.23 meters per day. Using an assumed horizontal shoreline interface area 236 meters long by 3 meters deep that could potentially transmit groundwater into the intake bay, the annual discharge of groundwater would be about 12.5 million Liters of water per year. Assuming this volume of 12.5 million liters contained the average concentration of 2380 pCi/L, the annual discharge of tritium into the intake bay under this hypothetical scenario would be 0.0297 Curies. This activity represents less than 0.07% of the annual airborne effluent of tritium released from the reactor building vent (see Table 2.2-C). Such airborne effluents can be washed down to the ground surface during precipitation events and infiltrate into the ground, thereby introducing tritium into the groundwater.

In the hypothetical scenario described above, the 0.0297 Curies of tritium entering the intake bay would be further diluted into the circulating water flow of the plant. As documented in Table 2.3-A, the total volume of circulating water flow during 2010 was 615 billion Liters, yielding an effective concentration of tritium in the intake bay of about 0.048 pCi/L. Such a concentration would be well

below the detection sensitivity of about 450 pCi/L used to analyze water collected from the discharge canal as part of the radiological environmental monitoring program (REMP). The calculated dose to the maximum-exposed member of the public from such a hypothetical release would be 0.000000027 millirem, resulting from tritium incorporated into fish and shellfish. Since the tritium would be incorporated into seawater, there is no drinking water ingestion pathway in the described scenario.

The following table lists the hydrological characteristics in the vicinity of each of the monitoring wells used to estimate tritium migration. Predicted flow velocities, annual discharge volumes, average tritium concentrations, and hypothetical tritium discharges are listed for each shoreline segment represented by each monitoring well.

Shoreline Segment Number	1	2	3	4			
Monitoring Well Number	MW204	MW205	MW202	MW201			
Hydraulic Conductivity - cm/sec	1.99E-03	4.27E-03	3.13E-03	5.64E-03			
Hydraulic Slope	0.014	···· 0.014	0.014	0.014			
Porosity	0.300	0.300	0.300	0.300			
Flow Velocity - m/day	8.02E-02	1.72E-01	1.26E-01	2.27E-01			
Flow Velocity - ft/yr	9.61E+01	2.06E+02	1.51E+02	2.72E+02			
Length of Shoreline Segment – m	61.0	38.1	45.7	91.4			
Thickness of Water Layer – m	3.0	3.0	3.0	3.0			
Volumetric Discharge - m ³ /day	4.40E+00	5.90E+00	5.19E+00	1.87E+01			
Volumetric Discharge - Liter/yr	1.61E+06	2.16E+06	1.90E+06	6.84E+06			
Annual Average H-3 Concentration - pCi/L	6.30E+02	9.55E+03	5.46E+02	1.03E+03			
Annual Segment Tritium Discharge - Ci/yr	1.01E-03	2.06E-02	1.04E-03	7.06E-03			
Total Volumetric Discharge - L/yr	1.25E+07						
Total H-3 Discharge - Ci/yr	2.97E-02						
Annual Circulating Water Flow - Liter/yr		6.15	E+11				
Discharge Canal H-3 Concentration - Ci/L		4.83	E-14				
Discharge Canal H-3 Concentration - pCi/L		4.83	E-02				
Max. Indiv. Dose Factor - mrem/yr per Ci/L	5.73E+05						
Maximum Individual Dose - mrem/yr		2.77	E-08				

In conclusion, there were no known leaks or spills of radioactive material at Pilgrim Station during 2010 that could have affected onsite or offsite groundwater. The only radionuclide detected in groundwater during the 2010 monitoring effort that is attributable to Pilgrim Station operations is tritium, and all concentrations were well below any reporting criteria established in the Pilgrim Station Offsite Dose Calculation Manual and through EPA safe drinking water standards.

APPENDIX C

CORRECTIONS TO PREVIOUS EFFLUENT REPORTS

Some minor discrepancies were identified in Effluent Release Reports issued in 2008 and 2009. These discrepancies are addressed below.

D.1 Correction to Table 4.3-A from 2009 Effluent Report

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The first discrepancy involved confusing wording preceding Table 4.3-A depicting the doses from liquid effluent discharges during the first calendar quarter of 2009. A statement preceding the table of values indicated that "No Liquid Discharges Occurred During This Period". The table correctly reflected the dose consequence from a single discharge which was performed during that quarter, and the doses were correctly characterized in Section 6.2 of the 2009 Report where comparisons were made to ODCM limits. The corrected table is presented below:

Table 4.3-A

Maximum Individual Organ Doses -- mrem From Liquid Release Period: Jan-Mar 2009

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_	Age Clas	Age Class Organ Dose – mrem *							
Organ	Adult	Teen	Child						
Bone	1.70E-06	2.15E-06	1.74E-06						
GI-LLI	1.67E-06	1.74E-06	5.36E-07						
Kidney	5.28E-07	1.17E-06	5.02E-07						
Liver	1.32E-06	1.96E-06	1.24E-06						
Lung	2.72E-07	9.28E-07	2.85E-07						
Thyroid	1.60E-07	7.95E-07	1.76E-07						
T.Body	1.20E-06	1.47E-06	6.54E-07						

* These doses are conservative since the same usage factor was applied for each quarter. In reality, it is unlikely that anyone would be swimming or boating during the entire year. However, the resulting dose is considerably lower than those from other pathways and does not contribute much to the total dose.

D.2 Correction to Appendix C of 2008 Report Regarding Groundwater Tritium

Calculations were performed regarding the hypothetical release of groundwater containing tritium into the PNPS intake bay due to normal groundwater flow gradient. In the calculations performed in 2008, the estimation of groundwater discharge into the bay did not properly account for the groundwater hydraulic slope and the soil porosity. In the 2008 report, the estimation erroneously assumed the groundwater flow velocity when calculating the total discharge was equal to the hydraulic conductivity of 0.019 cm/sec, resulting in a flow velocity of 16.4 meters/day. When additional wells were installed in 2010 and additional soil and groundwater physical parameters were collected, the error was identified in the groundwater discharge calculation.

The correct calculation for groundwater discharge incorporates hydraulic conductivity, soil porosity, and groundwater hydraulic slope. The correct calculation of groundwater flow velocity is the product of the hydraulic conductivity multiplied by the hydraulic slope and divided by the soil porosity.

Testing of new monitoring wells installed in 2010 indicated an average soil hydraulic conductivity value of 0.00376 cm/sec, a hydraulic slope of 0.014, and a porosity value of 0.3. Therefore, the correct groundwater flow velocity is estimated as:

$0.00376 \text{ cm/sec} * 0.014 \div 0.3 = 0.000176 \text{ cm/sec}, \text{ or } 0.152 \text{ meters/day}$

This value is considerably lower than the value of 16.4 meters/day assumed in the 2008 calculations. When corrected for the proper groundwater flow velocity, the total hypothetical volume of groundwater discharged into the intake bay would be 55 million liters of water, as opposed to the original estimate of 6 billion liters. When the corrected volume of 55 million liters/year is multiplied by the average tritium concentration of 947 pCi/L, the hypothetical discharge of tritium into the intake bay would be 0.052 Curies, as opposed to the original estimate of 5.7 Curies. The resulting dose impact from discharging 0.052 Curies would be 4.84E-8 millirem.

The corrected wording for the 2008 report is shown below, with applicable changes denoted in **bold** text:

Although there are no indications that the groundwater containing low concentrations of tritium is actually migrating offsite, a bounding calculation was performed to assess the potential dose impact of such a scenario. Based on the tritium concentrations detected during 2008, the annual average concentration of tritium in groundwater in the vicinity of the onsite shorefront of the protected area would be 947 pCi/L. Hydrological characteristics of the compacted backfill onsite indicate the hydraulic conductivity to be about 0.00376 cm/sec, resulting in a groundwater flow velocity of about 0.152 meters per day. When coupled with an assumed horizontal interface area 200 meters long by 5 meters deep that could potentially transmit groundwater into the intake bay, the annual discharge of groundwater would be about 55 million Liters of water per year. Assuming this volume of 55 million liters contained the average concentration of 947 pCi/L, the annual discharge of tritium into the intake bay under this hypothetical scenario would be 0.052 Curies. This activity represents less than 0.1% of the annual airborne effluent of tritium released from the reactor building vent (see Table 2.2-C). Such airborne effluents can be washed down to the ground surface during precipitation events and infiltrate into the ground, thereby introducing tritium into the groundwater.

In the hypothetical scenario described above, the **0.052** Curies of tritium entering the intake bay would be further diluted into the circulating water flow of the plant. As documented in Table 2.3-A, the total volume of circulating water flow during 2008 was 615 billion Liters, yielding an effective concentration of tritium in the intake bay of about **0.085** pCi/L. Such a concentration would be well below the detection sensitivity of about 450 pCi/L used to analyze water collected from the discharge canal as part of the radiological environmental monitoring program (REMP). The calculated dose to the maximum-exposed member of the public from such a hypothetical release would be **4.84E-8** millirem, resulting from tritium incorporated into fish and shellfish. Since the tritium would be incorporated into seawater, there is no drinking water ingestion pathway in the described scenario.

D.3 Correction to Appendix B of 2009 Report Regarding Groundwater Tritium

The same issues identified in the previous section also applied to the 2009 estimation of groundwater discharge into the intake bay. The correct flow velocity of 0.052 meters/day is considerably lower than the value of 16.4 meters/day assumed in the 2009 calculations. When corrected for the proper groundwater flow velocity, the total hypothetical volume of groundwater discharged into the intake bay would be 55 million liters of water, as opposed to the original estimate of 6 billion liters. When the corrected volume of 55 million liters/year is multiplied by the average tritium concentration of 890 pCi/L, the hypothetical discharge of tritium into the intake bay would be 0.049 Curies, as opposed to the original estimate of 5.3 Curies. The resulting dose impact from discharging 0.049 Curies would be 4.90E-8 millirem.

The corrected wording for the 2009 report is shown below, with applicable changes denoted in **bold** text:

Although there are no indications that the groundwater containing low concentrations of tritium is actually migrating offsite, a bounding calculation was performed to assess the potential dose impact of such a scenario. Based on the tritium concentrations detected during 2009, the annual average concentration of tritium in groundwater in the vicinity of the onsite shorefront of the protected area would be 890 pCi/L. Hydrological characteristics of the compacted backfill onsite indicate the hydraulic conductivity to be about 0.00376 cm/sec, resulting in a groundwater flow velocity of about 0.152 meters per day. When coupled with an assumed horizontal interface area 200 meters long by 5 meters deep that could potentially transmit groundwater into the intake bay, the annual discharge of groundwater would be about 55 million Liters of water per year. Assuming this volume of 55 million liters contained the average concentration of 890 pCi/L, the annual discharge of tritium into the intake bay under this hypothetical scenario would be 0.049 Curies. This activity represents less than 0.1% of the annual airborne effluent of tritium released from the reactor building vent (see Table 2.2-C). Such airborne effluents can be washed down to the ground surface during precipitation events and infiltrate into the ground, thereby introducing tritium into the groundwater.

In the hypothetical scenario described above, the **0.049** Curies of tritium entering the intake bay would be further diluted into the circulating water flow of the plant. As documented in Table 2.3-A, the total volume of circulating water flow during 2009 was 571 billion Liters, yielding an effective concentration of tritium in the intake bay of about **0.085** pCi/L. Such a concentration would be well below the detection sensitivity of about 450 pCi/L used to analyze water collected from the discharge canal as part of the radiological environmental monitoring program (REMP). The calculated dose to the maximum-exposed member of the public from such a hypothetical release would be **0.000000049** millirem, resulting from tritium incorporated into fish and shellfish. Since the tritium would be incorporated into seawater, there is no drinking water ingestion pathway in the described scenario.

APPENDIX D

CHANGES TO PNPS OFFSITE DOSE CALCULATION MANUAL

No revisions were made to the PNPS Offsite Dose Calculation Manual (ODCM) during calendar year 2010. - -

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