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Appendix A

Recurrence Frequency

A.1 Historical Network Trends of PM₁₀ & PM_{2.5} Exceedances

The NMED AQB has documented blowing dust episodes caused by high winds for over twenty years. In March of 1988, the AQB established an air quality monitoring site in Anthony, NM in southern Doña Ana County. Due to the recorded exceedances, the EPA designated the Anthony area as nonattainment for the PM₁₀ NAAQS in 1991. During the 1990's and 2000's the monitoring network expanded throughout Doña Ana County and the AQB continued to record exceedances of the standard. Recognizing that uncontrollable windblown dust events caused these exceedances, EPA allowed the AQB to develop a Natural Event Action Plan (NEAP) to protect public health in lieu of expanding the nonattainment area under the Natural Events Policy (NEP).

Exceedances caused by high wind blowing dust storms can occur every year in Doña Ana and Luna Counties. From 2007-2011 the AQB recorded 260 high wind blowing dust PM₁₀ NAAQS exceedances on 85 days (Wedding and TEOM data). Averaged over 2007-2011, NMED monitored 52 exceedances on 17 days per year. The most active windblown dust year was 2008, when the AQB monitored 102 exceedances of the 24-hour average on 30 days during the year. 2012 was an average year for high wind and blowing dust as the AQB recorded 52 exceedances on 15 days (Figure A-1). This was the same number of exceedances on 2 less days as compared to the prior five year average.

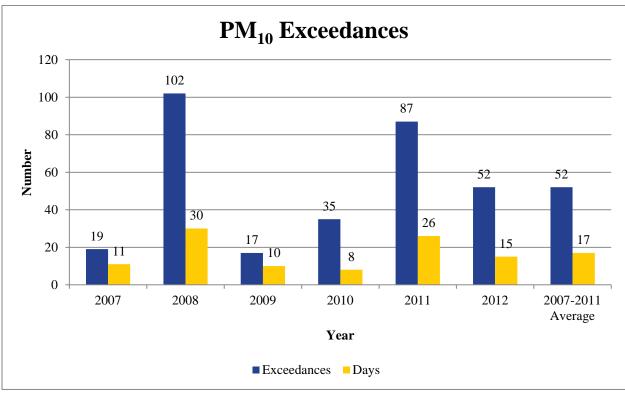


Figure A-1. PM₁₀ Exceedances and days with and exceedance by Year from 2007-2012.

The AQB operates two PM_{2.5} FRM Partisol monitors in Doña Ana County. One in Las Cruces on the roof of NMED's field office and one in Sunland Park at the SPCY site. The Las Cruces monitoring site has never recorded an exceedance of the 24-hour PM_{2.5} NAAQS while the SPCY

site recorded 37 exceedances of this standard from 2007-2011. Over this time period, the number of exceedances per year range from 3 in 2007 to a high of 14 in 2011, with an average of 8 exceedances per year. In 2012 the site recorded 13 exceedances, 5 more than the five year average (Figure A-2).

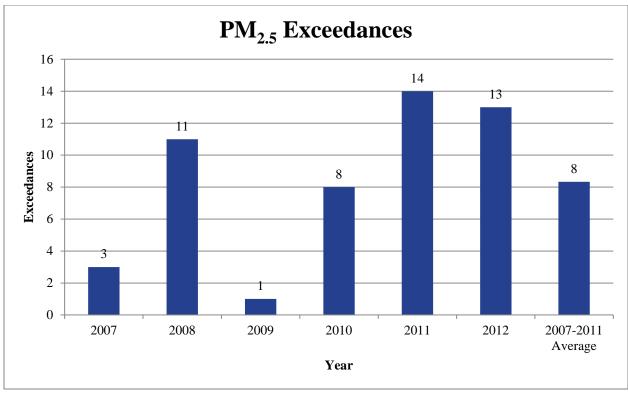


Figure A-2. $PM_{2.5}$ Exceedances and days with and exceedance by Year from 2007-2012.

A.2 Historical Monitoring Site Trends of PM Exceedances

As with the entire network, individual monitoring sites record varied numbers of exceedances from year to year (Figure A-3). From 2007 to 2011 the monitoring sites recorded an average of 2.6 to 11 exceedances per year. The southern monitoring sites of Anthony, Chaparral, and SPCY recorded the highest number of exceedances on average (9.8, 10.2, & 11, respectively), while the northern sites of West Mesa and Holman recorded the least amount of exceedances on average (2.6 and 5.8, respectively). The Deming Airport and Desert View monitors did not begin continuous monitoring until after the windy seasons in 2007 and 2008, respectively, so the five year averages for these monitors may be skewed downward.

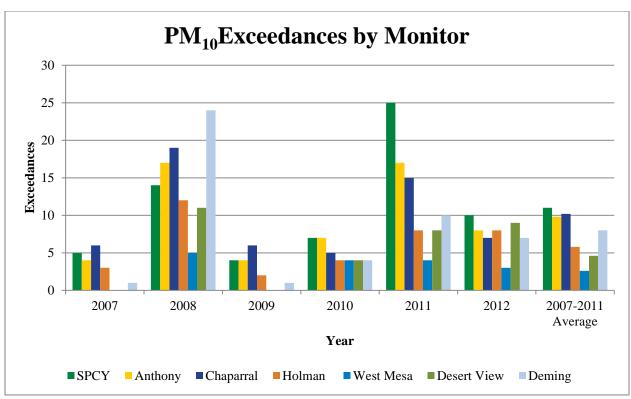


Figure A-3. PM_{10} Exceedances by year and monitor. Data includes FEM TEOM and FRM Wedding for SPCY, Anthony and Deming. The Deming monitors are not collocated. All other sites include FEM TEOM data only.

The Anthony monitoring site records exceedances of the PM₁₀ NAAQS every year. From 2007-2011 the FEM TEOM monitor recorded 48 exceedances and the FRM Wedding monitor has recorded 1 exceedance. This large disparity in the number of monitored exceedances is due to the FRM Wedding sampling schedule of 1-in-6 days. Over the same time period this monitoring site recorded an average of 9.8 exceedances per year.

The Chaparral monitoring site records exceedances of the PM₁₀ NAAQS every year. From 2007-2011 the FEM TEOM monitor has recorded 51 exceedances. Over the same time period this monitoring site records an average of 10.2 exceedances per year.

The Deming Airport monitoring site records exceedances of the PM_{10} NAAQS every year. From 2007-2010 the FEM TEOM monitor has recorded 40 exceedances. The Deming Post Office monitoring site (FRM Wedding) recorded 1 exceedance during this time period. These monitors are not collocated and operate on different schedules with the airport site operating continuously and the post office site sampling every 6 days. Over the same time period the Deming Airport monitoring site recorded an average of 8 exceedances per year.

The Desert View monitoring site recorded exceedances of the PM_{10} NAAQS three out of five years from 2007-2011. This monitor was deployed in the August of 2007 after the normal windy season. From 2007-2011 the FEM TEOM monitor has recorded 23 exceedances. Over the same time period this monitoring site records an average of 4.6 exceedances per year.

The Holman monitoring site records exceedances of the PM_{10} NAAQS every year. From 2007-2011 the FEM TEOM monitor has recorded 29 exceedances. Over the same time period this monitoring site recorded an average of 5.8 exceedances per year.

The SPCY monitoring site records exceedances of the PM₁₀ NAAQS every year. From 2007-2011 the FEM TEOM monitor recorded 51 exceedances and the FRM Wedding monitor has recorded 4 exceedances. This large disparity in the number of monitored exceedances is due to the FRM Wedding sampling schedule of 1-in-6 days. Over the same time period this monitoring site records an average of 11 exceedances per year.

The West Mesa monitoring site recorded exceedances of the PM_{10} NAAQS three out of five years from 2007-2011. From 2007-2011 the FEM TEOM monitor has recorded 13 exceedances. Over the same time period this monitoring site recorded an average of 2.6 exceedances per year.

The SPCY monitoring site recorded exceedances of the 24-hour PM_{2.5} NAAQS every year from 2007-2011. These exceedances occur during high wind and blowing dust conditions and also on calm and stagnant days. From 2007-2011 the SPCY monitor recorded 37 exceedances with 17 during high wind conditions and 20 during low wind conditions (Figure A-4). The AQB deployed a saturation network during the winter and early spring months of 2008 and 2009 to investigate where the pollution originated. The results of the study indicated that a source area located 2-4 km south of the SPCY monitor in Cd. Juárez contributed to elevated levels of pollution (DuBois, 2009). Earlier studies concluded that the dominate component of the particulate matter consisted of crustal material most likely from dirt roads and fuel combustion (Claiborn et al., 2000; DuBois et al., 2009; Li et al., 2005). The rapid growth and development of Colonia Anapra (northwest Cd. Juárez) along the border in Mexico continues to contribute to these observed elevated levels.

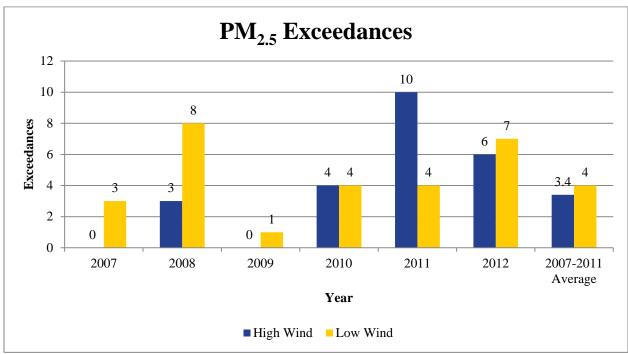


Figure A-4. PM_{2.5} exceedances due to high winds and international transport from 2007-2012.

Appendix B

Historical Fluctuations

B.1 Background Concentrations and Historical Fluctuations

To establish normal historical fluctuations and background concentrations, the AQB conducted statistical analyses of 24-hour average PM_{10} concentrations, hourly PM_{10} concentrations, average hourly wind gust and speeds, as well as hourly PM_{10} and $PM_{2.5}$ distributions (See appendices C-E) for suspected high wind blowing dust events for the five years preceding 2012 (2007-2011 when available). As used here normal historical fluctuations and background concentrations of PM_{10} and $PM_{2.5}$ means days that did not have suspected natural events from 2007-2011. Suspected natural events are those days for which NMED submitted documentation and analysis to EPA under the NEAP or EER.

Table B-1 shows that 99% percent of 24-hour average PM_{10} monitored concentrations in Doña Ana County fell below the corresponding NAAQS of 150 $\mu g/m^3$. Due to rounding conventions in the form of the standard an exceedance does not occur until a 24-hour average concentration reaches 155 $\mu g/m^3$. The one percent of data above the NAAQS of 150 $\mu g/m^3$ were likely on high wind blowing dust days with exceedances at other monitors but the data was not flagged or requested for exclusion since there would not have been a regulatory consequence. For most monitoring sites, the measured concentrations fall well below the level of the standard.

The only monitoring site that records 1% of days with concentrations approaching the $PM_{2.5}$ 24-hour standard is at SPCY. NMED suspects that unpaved roads and fuel combustion in Ciudad Juárez, Mexico cause these elevated levels (Claiborn et al., 2000; DuBois et al., 2009; Li et al., 2005). Table B-2 includes exceptional events caused by high wind and blowing dust and shows that 5% of days exceed the PM_{10} and $PM_{2.5}$ 24-hour standards.

Statistic/Site	Anthony	Chaparral	Deming	Desert View	Holman	SPCY	West Mesa	SPCY PM _{2.5}
Max	154	154	152	150	153	154	153	52
99th Percentile	124	116	100	121	118	134	81	36.4
95th Percentile	88	69	58	76	62	102	43	26.2
75th Percentile	57	36	30	43	33	59	22	14
50th Percentile	41	24	20	30	22	39	15	9.5
Mean	44	29	24	35	27	45	19	11.3
25th Percentile	27	15	13	20	14	25	10	6.3
5th Percentile	14	7	6	9	6	12	6	3.5

Table B-1. 24-hour average data distribution excluding high wind exceptional events for southern New Mexico monitors from 2007-2011.

Statistic/Site	Anthony	Chaparral	Deming	Desert View	Holman	SPCY	West Mesa	SPCY PM _{2.5}
Max	775	890	1033	420	542	877	422	74.5
99th Percentile	249	269	266	200	182	266	109	44.2
95th Percentile	103	98	72	86	70	120	46	28.1
75th Percentile	58	38	31	44	34	61	23	14.2
50th Percentile	42	25	20	31	22	40	16	9.5
Mean	50	36	31	38	30	51	20	11.7
25th Percentile	27	16	13	20	14	25	11	6.3
5th Percentile	14	7	6	9	6	12	6	3.6

Table B-2. 24-hour average data distribution for southern New Mexico monitors from 2007-2011.

Figure B-1 shows that the exceedances recorded in 2012 are well above background levels. NMED downloaded the data from EPA's AQS Data Mart. Data is from 2007-2011. The top whisker in Figure B-1 represents the 95th percentile of data.

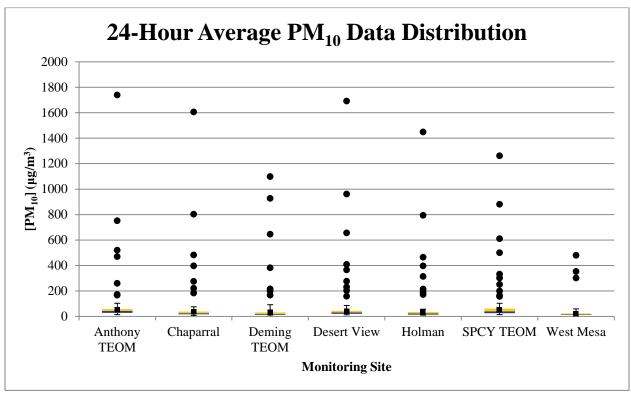


Figure B-1. PM₁₀ exceedances in 2012 plotted with historical data distributions for 2007-2011.

Although the overall seasonal trend shows spring as the predominant season in which exceedances occur, the amount of precipitation from year to year can influence this seasonal trend and overall number of exceedances. The overall trend shows that spring events are most prominent followed by winter and summer then fall. Fall through spring events occur due to frontal weather systems while summer time events occur when monsoonal thunderstorms produce strong outflow winds and localized blowing dust (Figure B-2). When the monsoon season (June-September) and winter (December-February) produce large amounts of precipitation, we can see a marked decrease in springtime and annual events as observed in 2007 and 2009 following the heavy rainfall during the 2006 and 2008 monsoon (Figure B-3).

 $PM_{2.5}$ seasonal trends vary much like PM_{10} with spring having the highest concentrations due to windblown dust (Figure B-4). Winter and fall also have elevated concentrations due to inversions and increased burning of wood for heating. When high wind blowing dust events are removed from the data set, the spring data distribution changes greatly as the 98^{th} percentile falls from $45.2 \, \mu g/m^3$ to $28.7 \, \mu g/m^3$ (Figure B-5). The extreme concentrations measured during the worst spring time events account for this drastic drop. Slight decreases in the data distribution are also seen in the winter and fall but wind events are generally not as intense and low wind exceedances are usually closer to the standard.

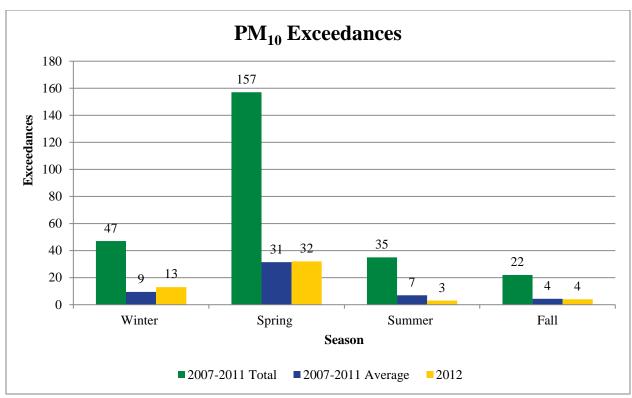


Figure B-2. 24-Hour PM₁₀ Exceedances in southern New Mexico from 2007-12.

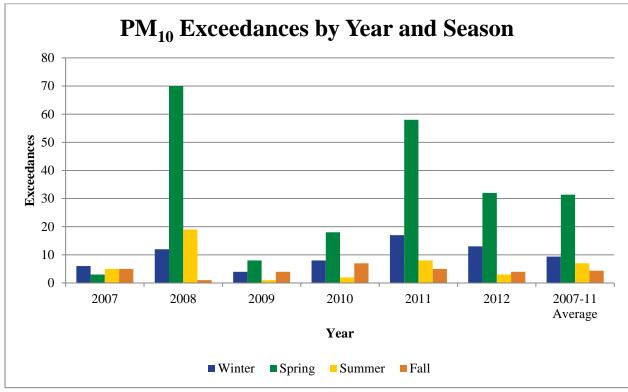


Figure B-3. PM_{10} by exceedances by season and year 2007-12.

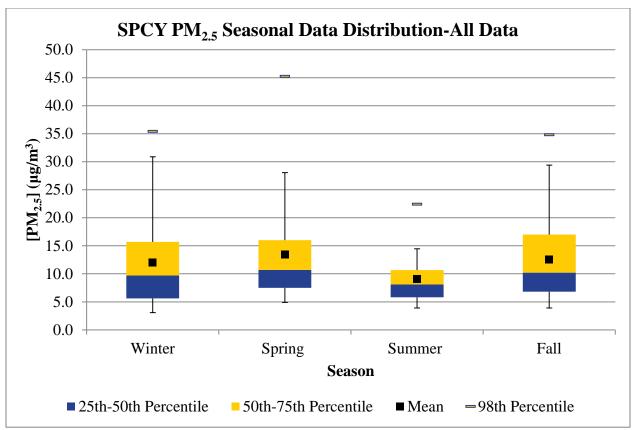


Figure B-4. Seasonal PM_{2.5} data distribution at SPCY from 2007-2011.

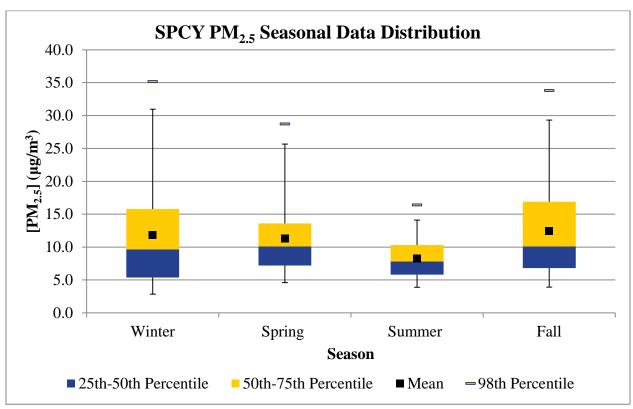


Figure B-5. Seasonal $PM_{2.5}$ data distribution at SPCY from 2007-2011 excluding high wind events.

Since being established, most monitoring sites in Doña Ana and Luna Counties record exceedances of the PM_{10} 24-hour standard every year. High winds cause these exceedances and they can occur at any time of year (Figure B-6 through B-13). Most exceedances occur from late winter through early summer (February-June) and are associated with the passage of Pacific cold fronts. The maximum 24-hour average PM_{10} concentration recorded by NMED was $1110\,\mu\text{g/m}^3$ recorded in 2004 at the Chaparral site. High winds caused all recorded exceedances at all sites except SPCY and NMED submitted natural events demonstrations to EPA under the NEAP or EER for these events. NMED has never recorded an exceedance at its monitors in the absence of high winds except for at SPCY.

The only monitoring site to record exceedances when winds are calm is the SPCY site ($PM_{2.5}$ Partisol Monitor). From 2007 to 2011, NMED recorded 20 low wind $PM_{2.5}$ 24-hour exceedances at SPCY. EPA lowered the $PM_{2.5}$ 24-hour NAAQS from 65 to 35 μ g/m³ in August 2006 and NMED did not record any exceedances prior to this date. In 2009, NMED set up a saturation network to investigate the cause of these exceedances. The results of this study indicate that the source of $PM_{2.5}$ came from international transport from Ciudad Juárez, Mexico (DuBois et al, 2009).

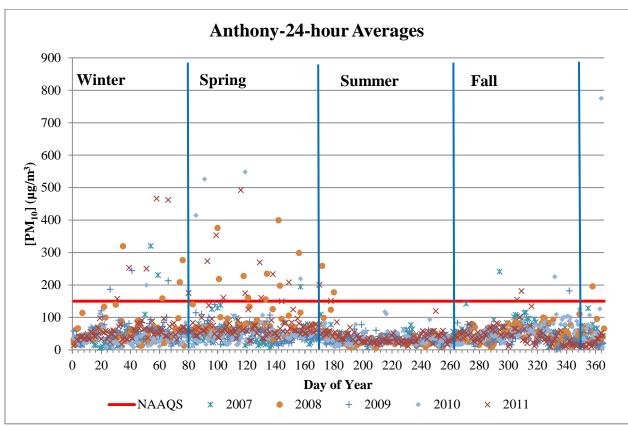


Figure B-6. 24-hour average PM₁₀ concentrations (FEM TEOM data) by day of year from 2007-2011

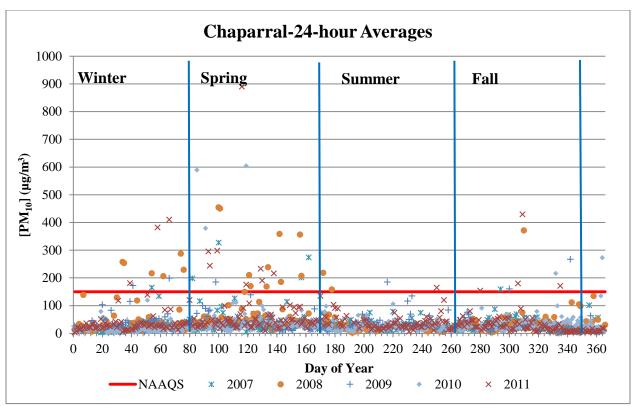


Figure B-7. 24-hour average PM_{10} concentrations (FEM TEOM data) by day of year from 2007-2011

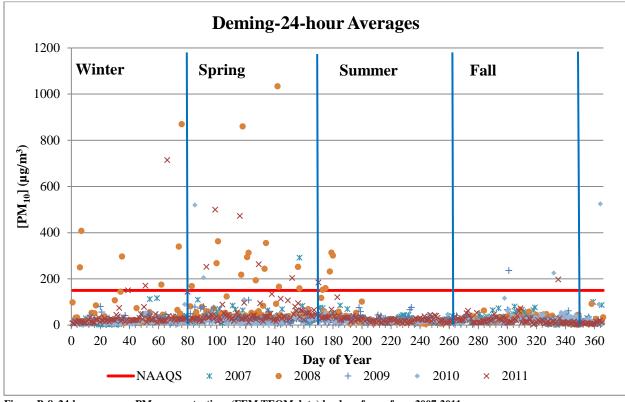


Figure B-8. 24-hour average PM_{10} concentrations (FEM TEOM data) by day of year from 2007-2011

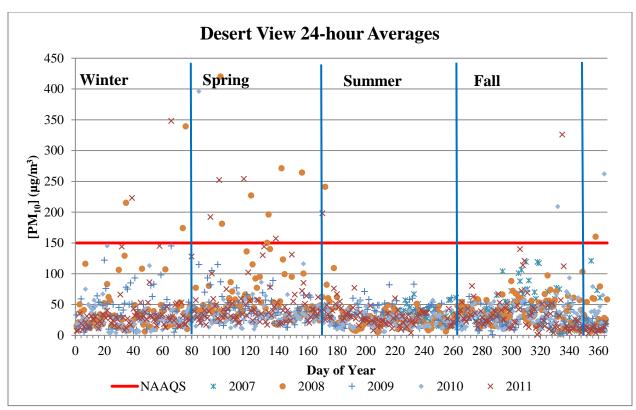


Figure B-9. 24-hour average PM_{10} concentrations (FEM TEOM data) by day of year from 2007-2011

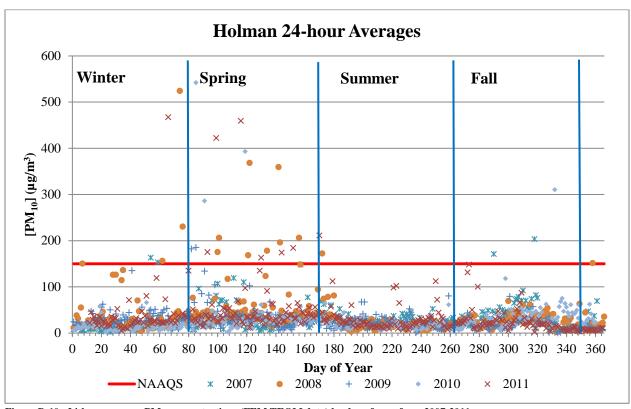


Figure B-10. 24-hour average $PM_{\rm 10}$ concentrations (FEM TEOM data) by day of year from 2007-2011

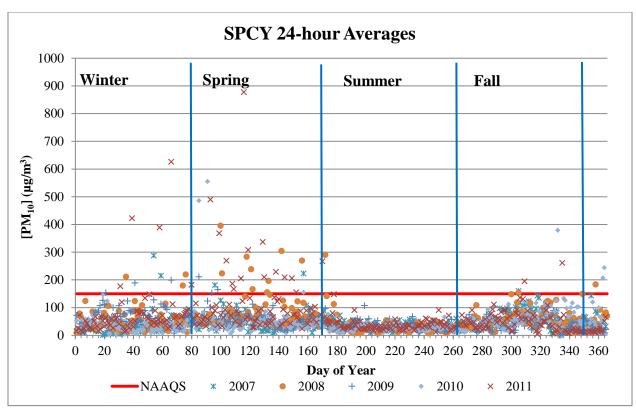


Figure B-11. 24-hour average PM_{10} concentrations (FEM TEOM data) by day of year from 2007-2011

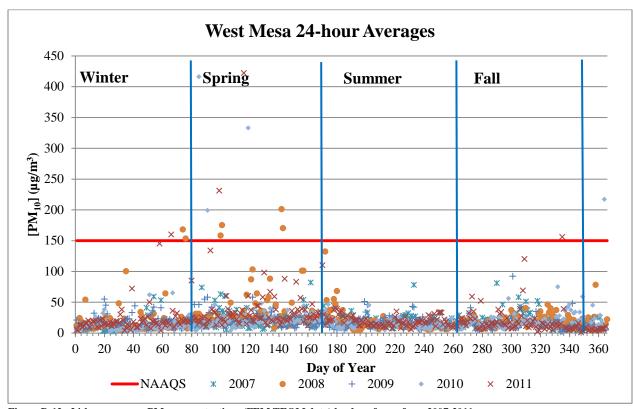


Figure B-12. 24-hour average $PM_{\rm 10}$ concentrations (FEM TEOM data) by day of year from 2007-2011

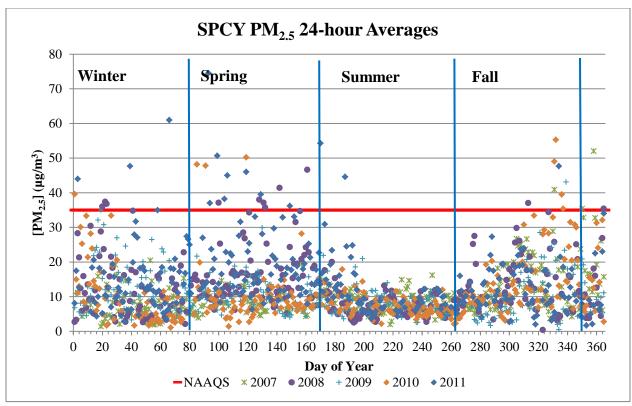


Figure B-13. 24-hour average PM_{2.5} concentrations (FRM Partisol data) by day of year from 2007-2011

Appendix C Hourly Particulate Matter Fluctuations

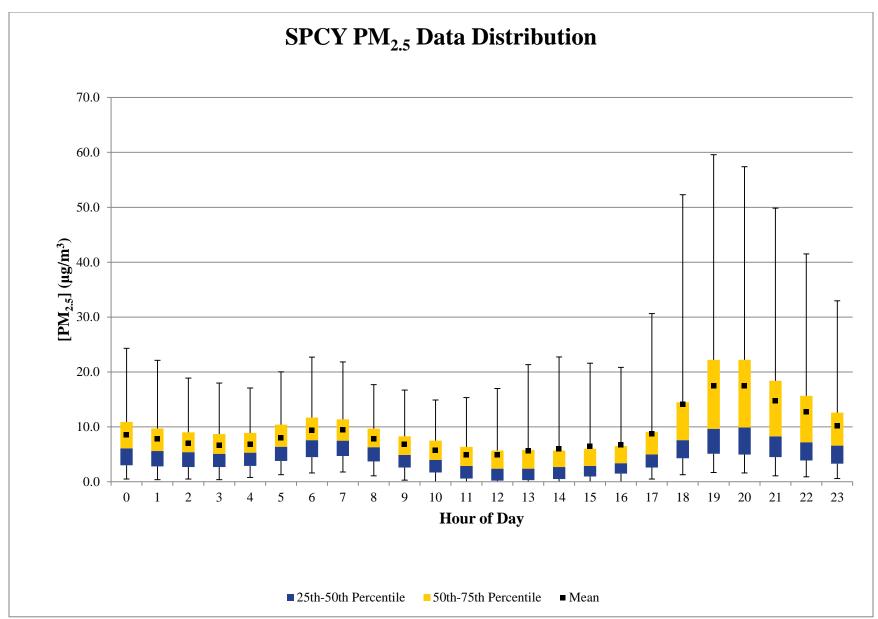


Figure C-1. $PM_{2.5}$ data distribution from 2007-2011 for all data.

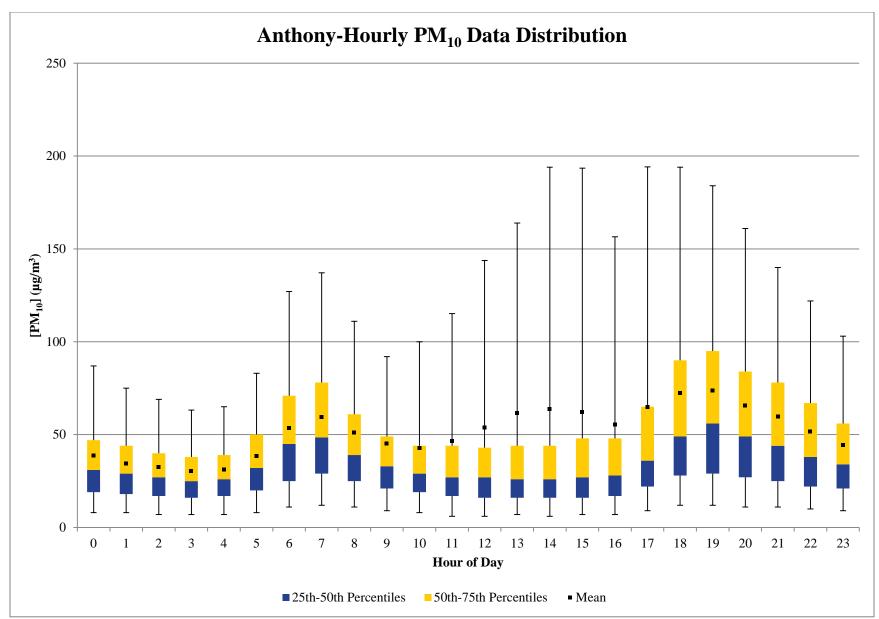


Figure C-2. PM₁₀ data distribution from 2007-2011 for all data

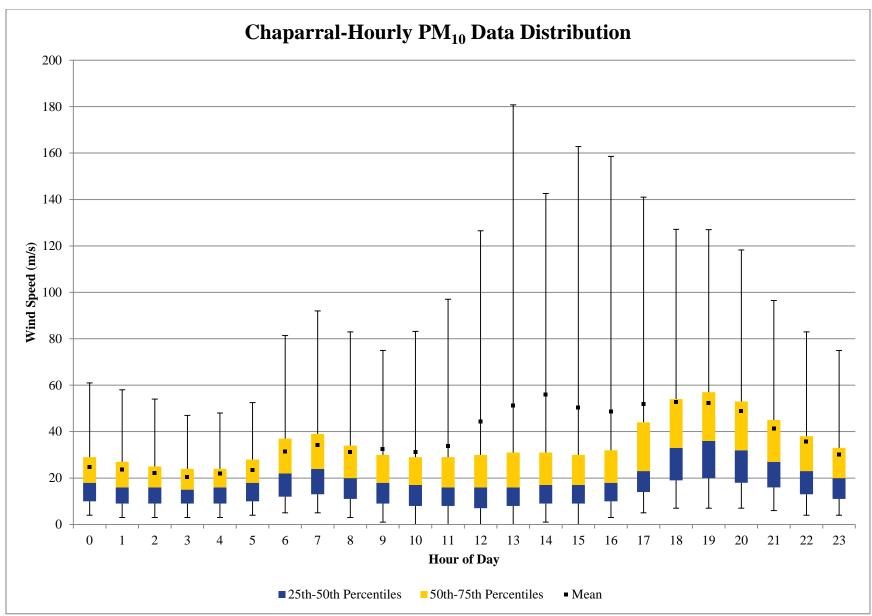


Figure C-3. PM₁₀ data distribution from 2007-2011 for all data

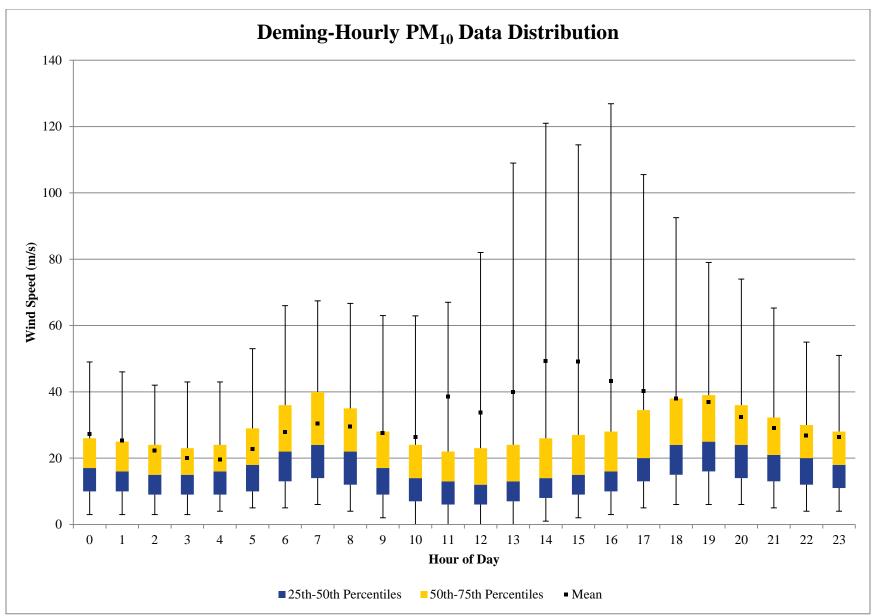


Figure C-4. PM₁₀ data distribution from 2007-2011 for all data

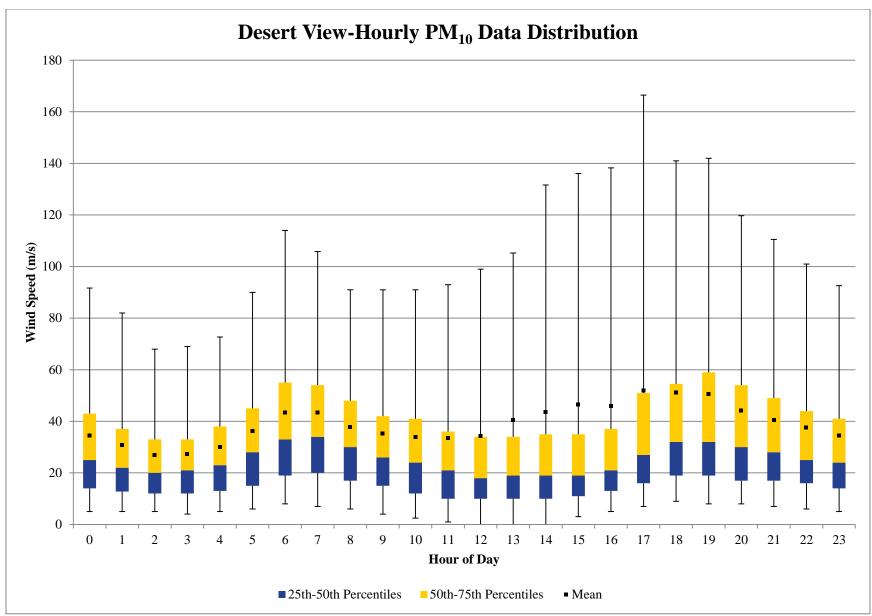


Figure C-5. PM₁₀ data distribution from 2007-2010 for all data

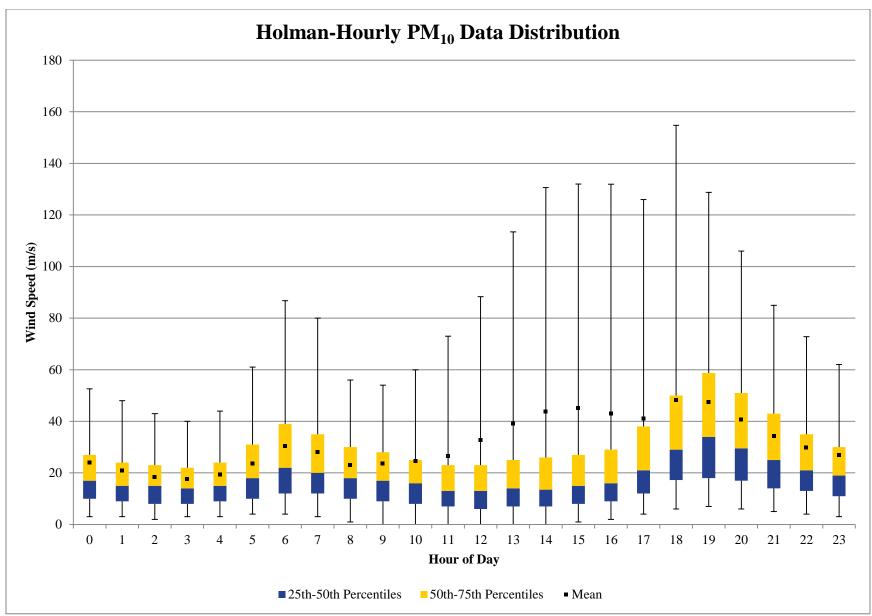


Figure C-6. PM₁₀ data distribution from 2007-2011 for all data

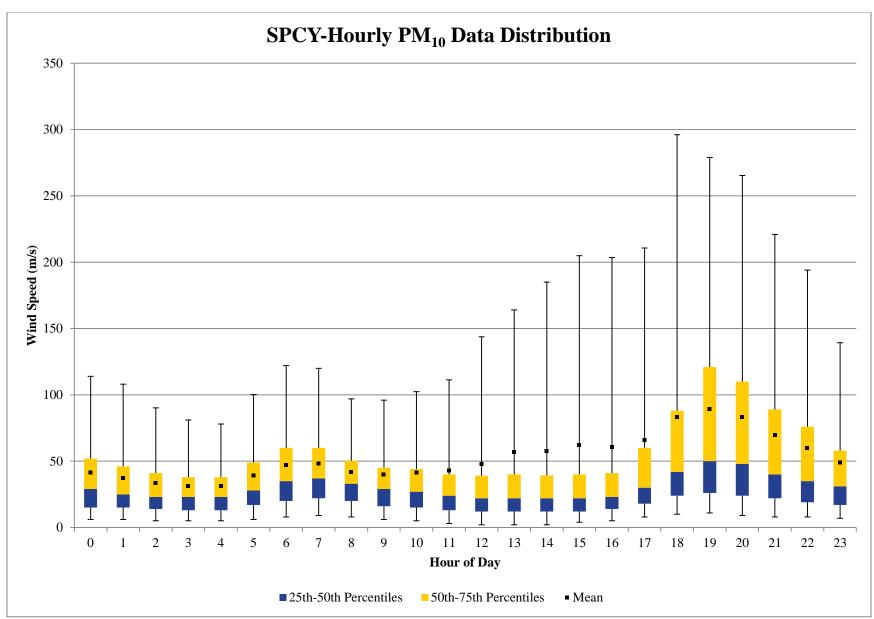


Figure C-7. PM₁₀ data distribution from 2007-2011 for all data

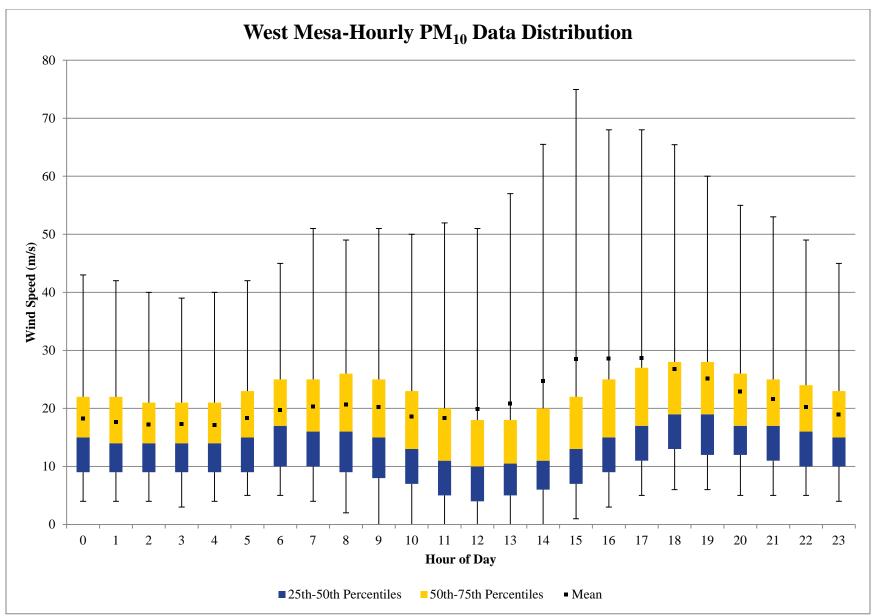


Figure C-8. PM₁₀ data distribution from 2007-2011 for all data

Appendix D

Hourly Wind Speed Fluctuations

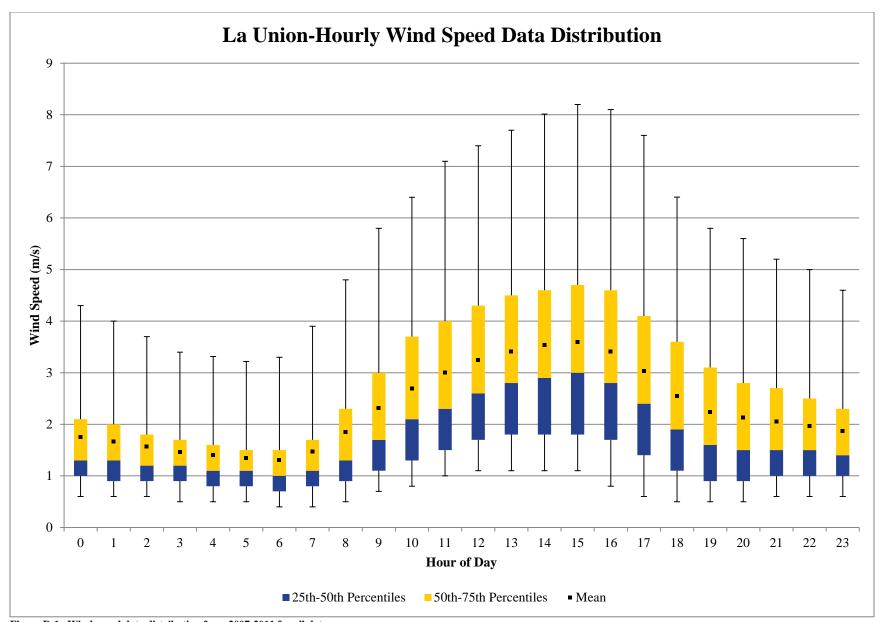


Figure D-1. Wind speed data distribution from 2007-2011 for all data

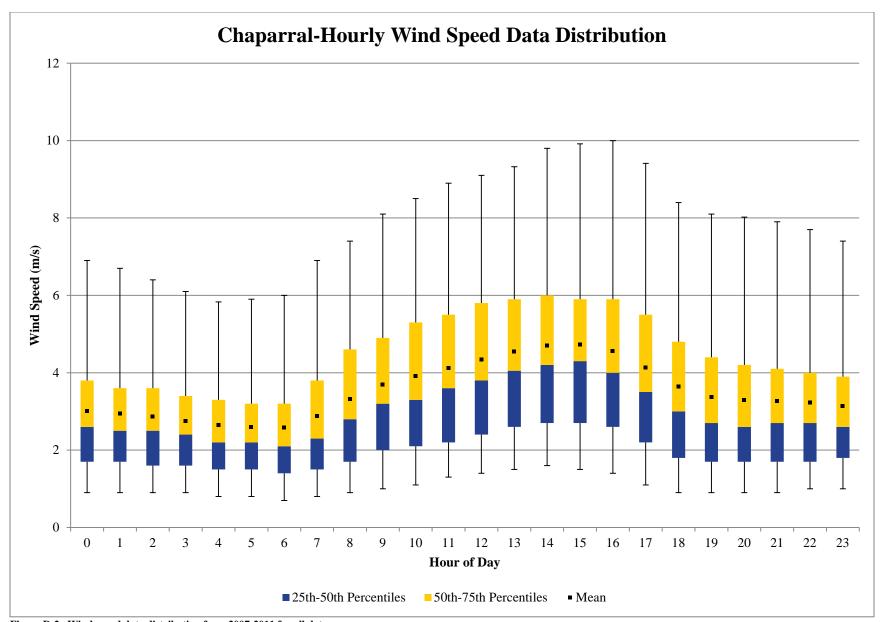


Figure D-2. Wind speed data distribution from 2007-2011 for all data

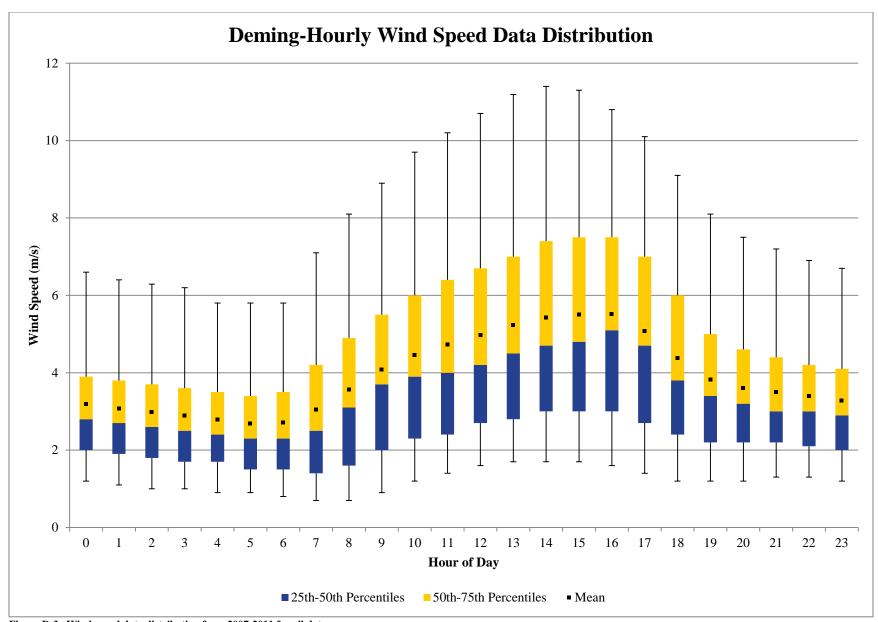


Figure D-3. Wind speed data distribution from 2007-2011 for all data

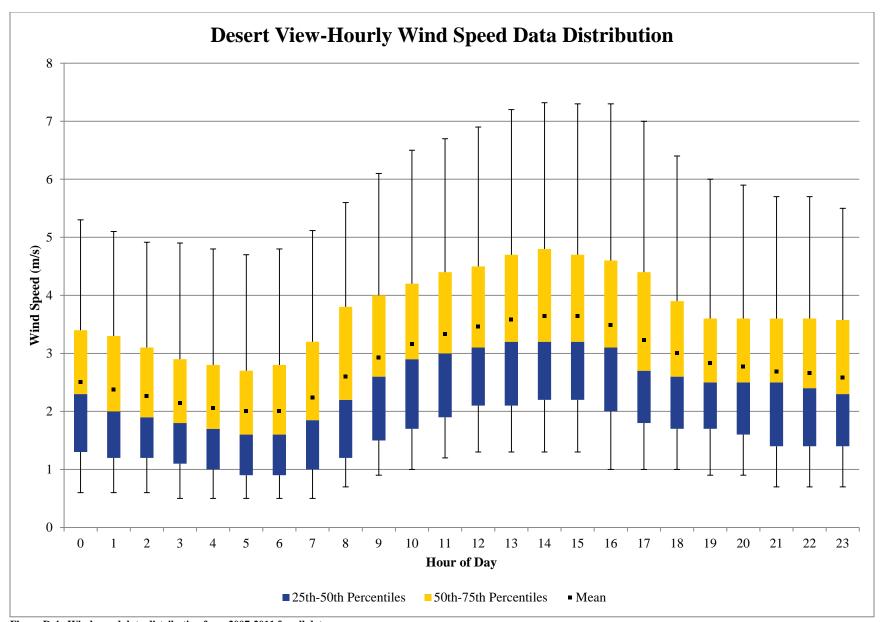


Figure D-4. Wind speed data distribution from 2007-2011 for all data

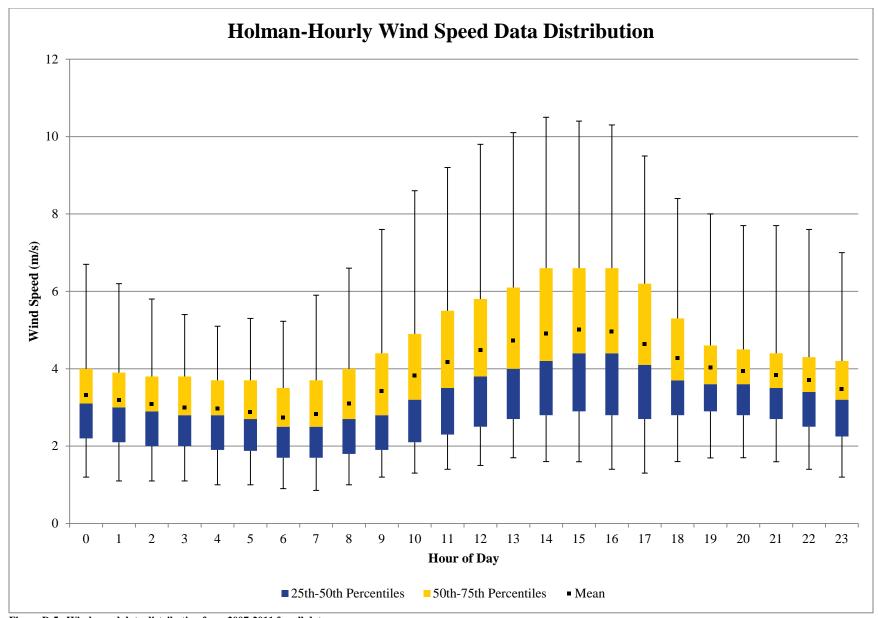


Figure D-5. Wind speed data distribution from 2007-2011 for all data

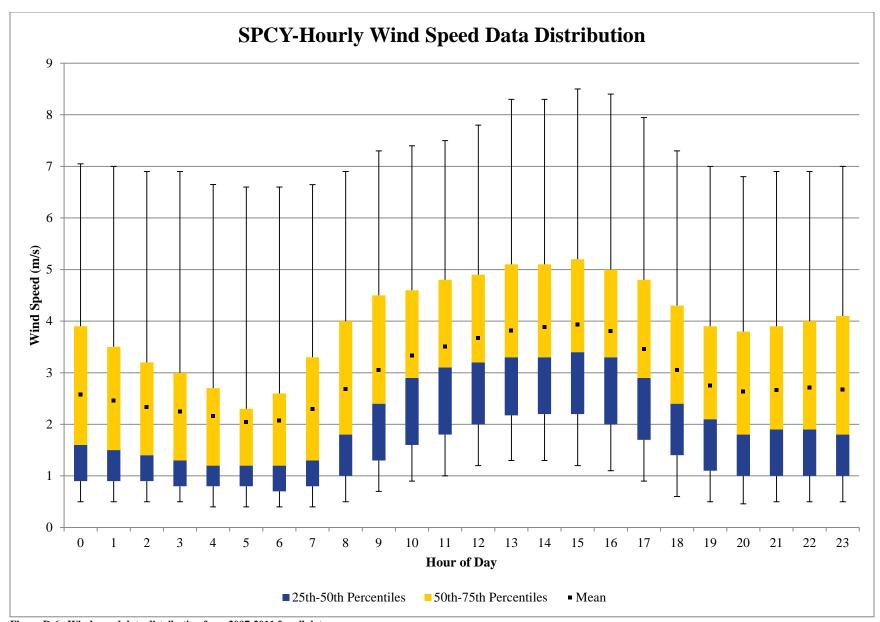


Figure D-6. Wind speed data distribution from 2007-2011 for all data

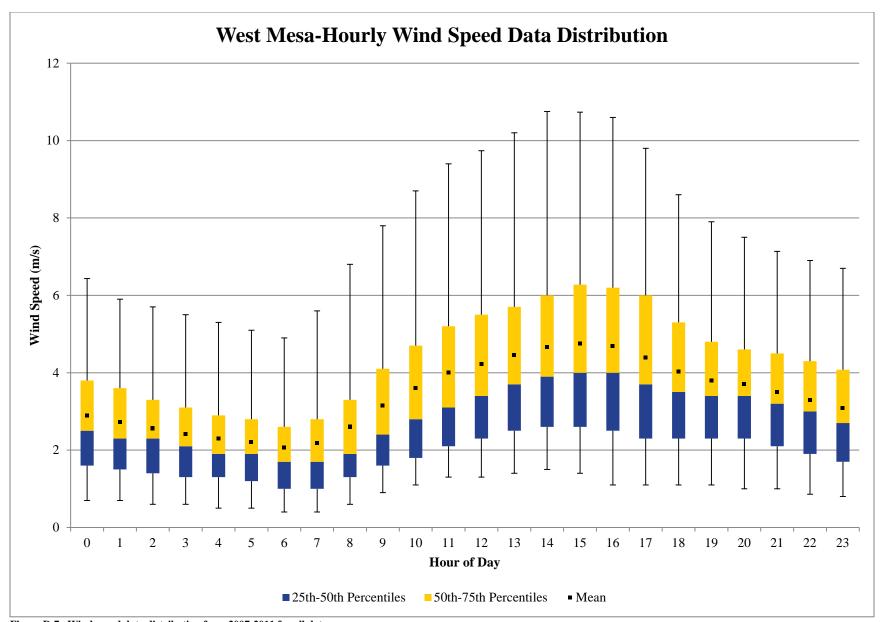


Figure D-7. Wind speed data distribution from 2007-2011 for all data

Appendix E

Hourly Wind Gust Fluctuations

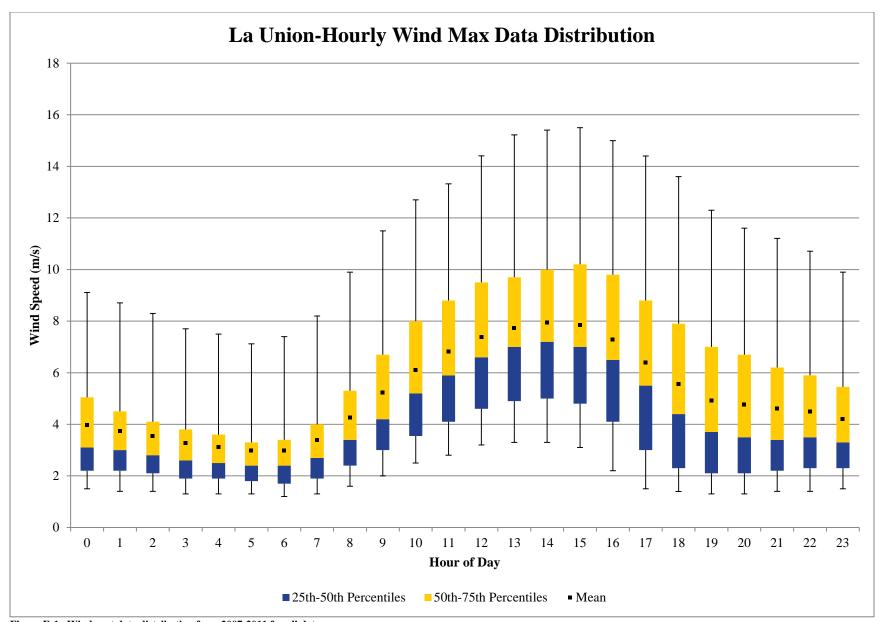


Figure E-1. Wind gust data distribution from 2007-2011 for all data

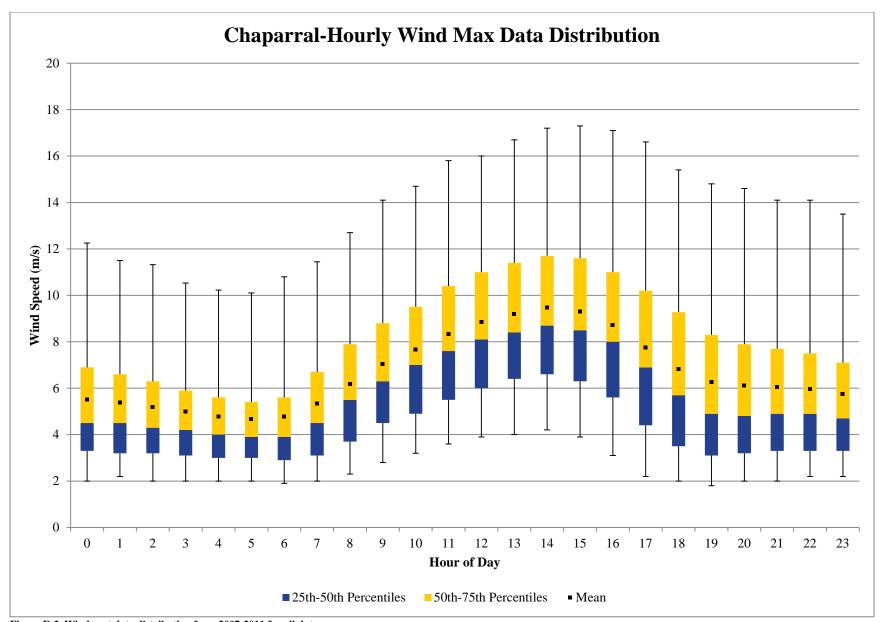


Figure E-2. Wind gust data distribution from 2007-2011 for all data

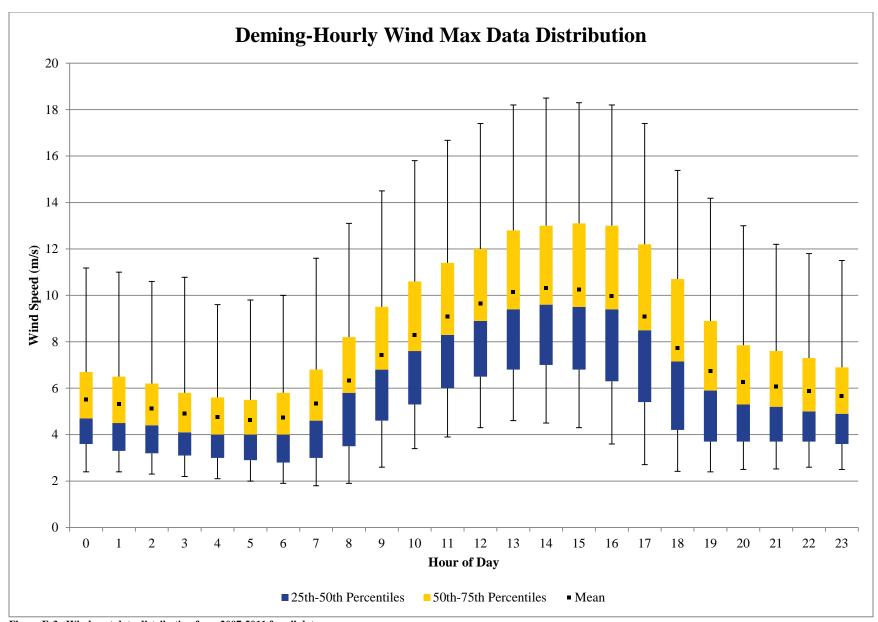


Figure E-3. Wind gust data distribution from 2007-2011 for all data

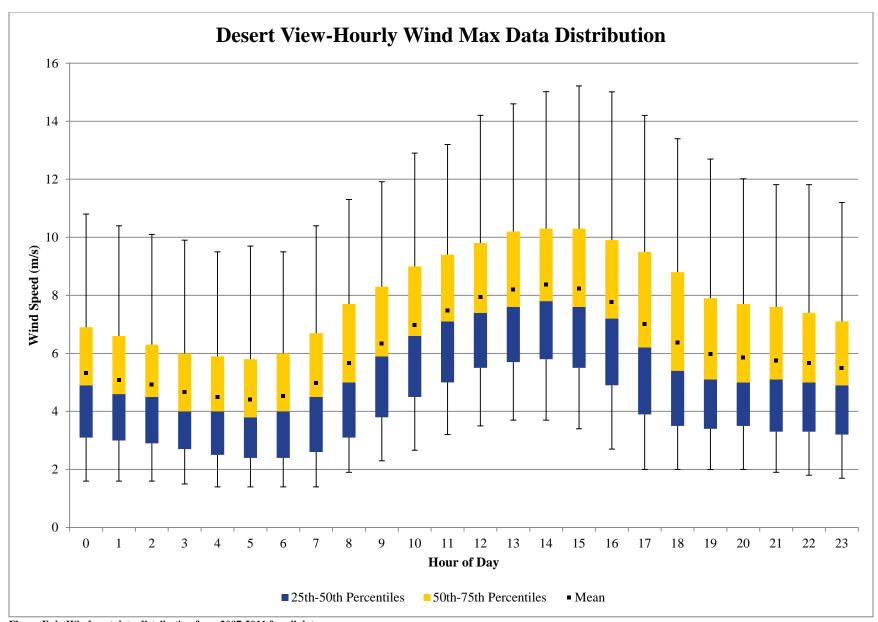


Figure E-4. Wind gust data distribution from 2007-2011 for all data

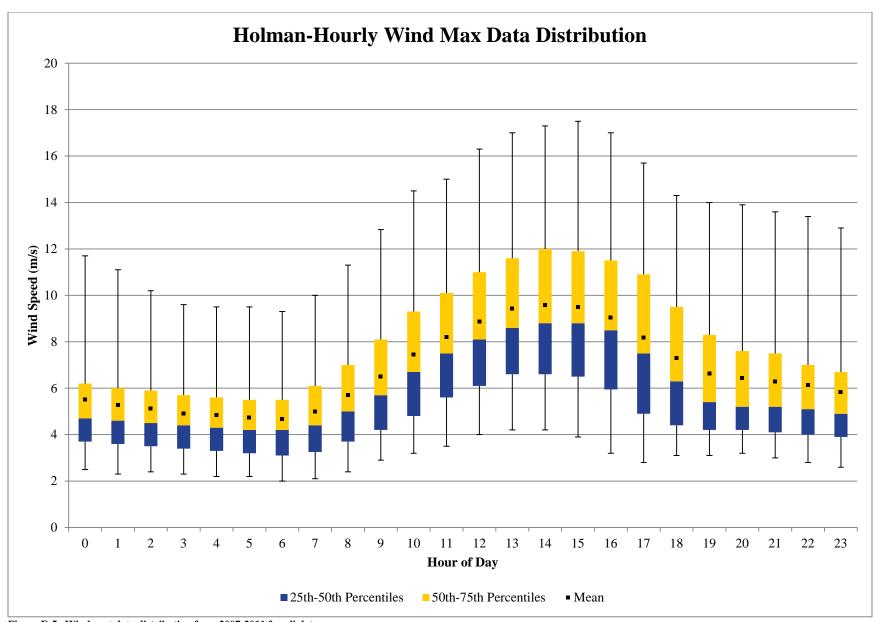


Figure E-5. Wind gust data distribution from 2007-2011 for all data

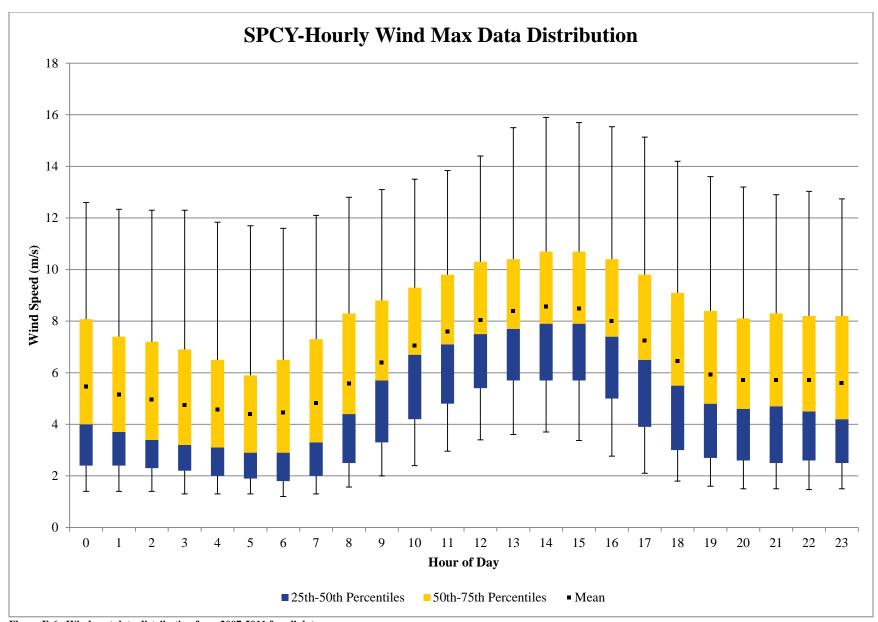


Figure E-6. Wind gust data distribution from 2007-2011 for all data

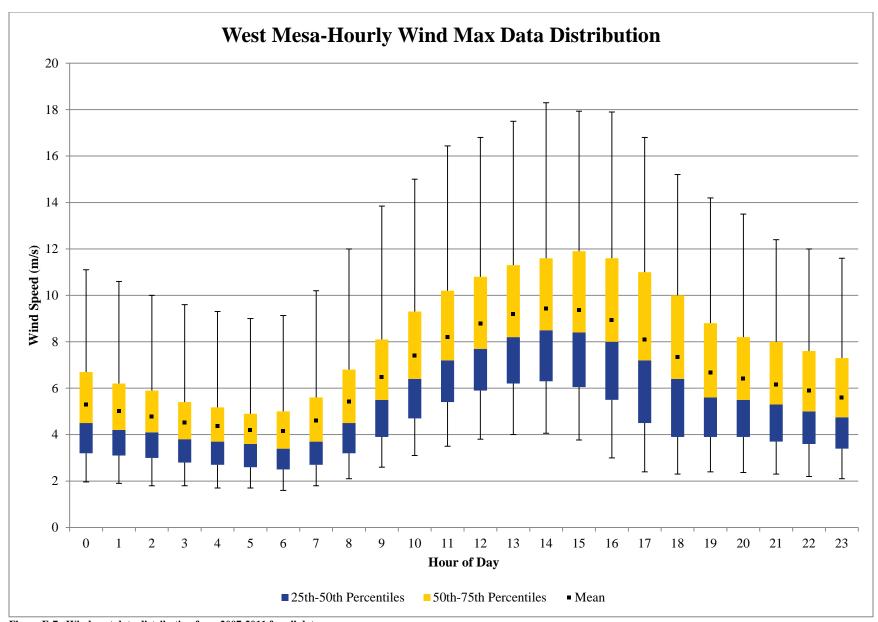


Figure E-7. Wind gust data distribution from 2007-2011 for all data

Appendix F

Public Notice and Comments

The NMED printed Public Notices in the Albuquerque Journal and Las Cruces Sun-News on November 8, 2013. The document was available in hard copy at the AQB in Santa Fe and the 23 field offices around the state. The public comment period ended on December 9, 2013 and no responses were submitted to the department. Affidavits of publishing can be found below.						

LAS CRUCES SUN-NEWS



PROOF OF PUBLICATION

I, being duly sworn, Frank Leto deposes and says that he is the Publisher of the Las Cruces Sun-News, a newspaper published daily in the county of Dona Ana, State of New Mexico; that the notice 53245 is an exact duplicate of the notice that was published once a week/day in regular and entire issue of said newspaper and not in any supplement thereof for 1 consecutive week(s)/day(s), the first publication was in the issue November 8, 2013 and the last publication was November 8, 2013

Despondent further states this newspaper is duly qualified to publish legal notice or advertisements within the meaning of Sec. Chapter 167, Laws of 1937.

Signed

Publisher Official Position

STATE OF NEW MEXICO

88

County of Dona Ana

Subscribed and sworn before me this

Notary Public in and for

Dona Ana County, New Mexico

My Term Expires

OFFICIAL SEAL
ANGEL ANN SOLIS
Notary Public
State of New Mexico
My Comm. Expires

STATE ENVIRONMENT DEPARTMENT SEEKS PUBLIC COMMENT ON EXCEPTIONAL EVENTS DEMONSTRATION

(Santa Fe, NM) -The New Mexico **Environment Department Air Quality** Bureau has completed a draft exceptional events demonstration for periods exceeding federal air quality standards for particulate matter in southern New Mexico during calendar year 2012. This document demonstrates to the U.S. Environmental Protection Agency that smoke impacts from wildfires and dust storms generated by high winds, rather than man-made sources, caused exceedances of the national standard for particulate matter in the air. Without this demonstration, certain areas of the state would be in violation of federal standards and subject to stricter air quality rules and requirements designed to meet and maintain the standard in the future. The level of the federal air standards for particulate matter is protective of public health.

The New Mexico Environment Department is seeking public comment on the draft document through December 9, 2013. The document is available for review at the Environment Department's field offices and website at www.nmenv.state.nm.us/aqb or by contacting the Department at 1-800-224-7009

For more information and to submit comments, please contact Michael Baca, Environmental Analyst, NMED Air Quality Bureau at (575) 524-6300 or at michael.baca1@state.nm.us.

Publication# 53245 Run Date: Nov 8, 2013

OFFICIAL SEAL David M. Noel

NOTARY PUBLIC STATE OF NEW MEXICO

_, 20/3, and the subsequent consecutive publications on

AFFIDAVIT OF PUBLICATION



The New Mexico Environment De-partment is seeking public com-ment on the draft document through December 9, 2013: The document is available for review at the Fourimement Department's

For more information and to sub-mit comments, please contact Mi-chael. Bece, Environmental Ana-lyst, NMED Ar Qualify Bureau at (575). \$24-6300 o at michael bada? #8 state muss.

STATE OF NEW MEXICO County of Bernalillo

Linda MacEachen, being duly sworn, declares and says that she is Classified Advertising Manager of The Albuquerque Journal, and that this newspaper is duly qualified to publish legal notices or advertisements within the meaning of Section 3, Chapter 167, Session Laws of 1937, and that payment therefore has been made of assessed as court cost; that the notice, copy of which is hereto attached, was published in said paper in the regular daily edition, for ____ times, the first publication being on the 8 day of November

Sworn and subscribed before me, a Notary Public, in and for the County of Bernalillo and State of New Mexico this

| day of November of 20 | 5.

Statement to come at end of month.

ACCOUNT NUMBER (OC)