NMED

New Mexico Environment Department

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Exceptional Events Demonstration 2010

Particulate Matter Exceedances in Southern New Mexico due to Natural Events

Air Quality Bureau

March 2013

The New Mexico Environment Department's Air Quality Bureau prepared this document. It is available for review at the website located at www.nmenv.state.nm.us/aqb or in person at the addresses listed below. The Air Quality Bureau accepted public comment on this document from February 15, 2013 to March 19, 2013. For further information, please contact the department by phone, email or in writing at:

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1 INTRODUCTION

1.1 Purpose

The U.S Environmental Protection Agency (EPA) sets National Ambient Air Quality Standards (NAAQS) for Particulate Matter (PM) with an aerodynamic diameter of 10 microns or less (PM_{10}) and 2.5 microns or less ($PM_{2.5}$). The New Mexico Environment Department (NMED) Air Quality Bureau (AQB) recorded thirty-five exceedances on eight days (Table 1-1) of the PM_{10} NAAQS. The PM_{10} NAAQS, 150 µg/m^3, is a 24-hour average measured from midnight to midnight, not to be exceeded more than one day per year based on a three-year rolling average. The AQB recorded three exceedances of the 24-hour $PM_{2.5}$ NAAQS and five exceedances of the annual $PM_{2.5}$ NAAQS on the same days when PM_{10} exceedances were recorded. The 24-hour $PM_{2.5}$ NAAQS is 35 µg/m^3 measured from midnight to midnight while the annual standard is 15 µg/m^3. The evidence presented in this document substantiates the AQB's request to exclude exceedance data from the PM_{10} and $PM_{2.5}$ NAAQS attainment determinations for Doña Ana and Luna Counties in southern New Mexico. Exceedances of the PM_{10} standard were recorded at all seven monitoring sites operated in Doña Ana and Luna Counties using the Federal Equivalent Method (FEM) Tapered Element Oscillating Microbalance (TEOM) continuous instruments or the Federal Reference Method (FRM) Wedding instruments. Exceedances of the $PM_{2.5}$ standard were recorded at one of two monitoring sites in Doña Ana County using the Federal Reference Method (FRM) Partisol instrument. Table 1-1 lists the dates, monitoring sites and 24-hour averages of the exceedances requested for exclusion when the EPA makes the determination of whether or not Doña Ana and Luna Counties meet the PM NAAQS. The elevated levels of PM recorded on the dates highlighted in orange below were due to natural events: more specifically, this demonstration shows that high winds entrained dust in the air and transported it to the monitoring sites.

	6CM	6ZG	6ZK	6ZL	6WM	6ZM	7E	6ZG
DATE	Anthony PM_{10}	SPCY PM_{10}	Chaparral PM_{10}	Holman PM_{10}	West Mesa PM_{10}	Desert View PM_{10}	Deming PM_{10}	SPCY $PM_{2.5}$
20-Feb	199	145	119	66	62	113	52	8.4
26-Mar	414	486	589	542	416	396	519	ND
1-Apr	526	555	379	286	199	414	205	47.8
29-Apr	548	ND	604	393	333	ND	110	50.2
6-Jun	219	155	83	57	44	116	62	28.2
28-Nov	225	379 205 W	216	310	75	209	225	55.3
29-Dec	126	207	135	ND	15	65	90	ND
30-Dec	775	244	273	ND	217	262	524	32.1

Table 1-1. PM_{10} and $PM_{2.5}$ 24-hour average concentrations (µg/m^3) for suspected exceptional event days.
A value followed by a W indicates a value recorded using a FRM Wedding instrument. ND stands for no data.

2 BACKGROUND

2.1 Exceptional Events Rule

On March 22, 2007, the EPA adopted its final rule for state and local air quality management agencies regarding the review and handling of certain air quality monitoring data (72 FR 13560). The regulation, "Treatment of Data Influenced by Exceptional Events", or more commonly called the Exceptional Events Rule (EER), became effective on May 22, 2007 (40 CFR Part 50.14). The EER allows the EPA to exclude data affected by an exceptional event that caused an exceedance of a NAAQS when determining an area's ability to meet the standard for a given criteria pollutant. The rule does not include specific requirements concerning the type or level of evidence an agency must provide due to the wide range of events and circumstances covered under the rule. Hence, EPA determines data exclusion on a case-by-case basis after considering the weight of evidence provided in a demonstration. The procedural requirements of the EER consist of:

1. flagging data in EPA's Air Quality System (AQS) database by air quality management agencies;
2. submitting demonstrations proving an exceptional event caused an exceedance within three years of the calendar quarter in which it was recorded; and
3. EPA placing a concurrence flag in AQS for those dates that are exceptional events.

In order for EPA to concur on a demonstration and exclude data under the EER, an agency must meet six technical elements. These elements include:

1. whether the event in question was not reasonably controllable or preventable (nRCP);
2. whether there was a clear causal relationship (CCR);
3. whether there would have been no exceedance or violation but for the event in question (NEBF);
4. whether the event affects air quality (AAQ);
5. whether the event was caused by human activity unlikely to reoccur or it was a natural event (HAURL/Natural Event); and
6. whether the event was in excess of normal historical fluctuations (HF).

NMED concludes that the exceedances listed in Table 1-1 were natural events caused by high winds that entrained and transported dust from erodible areas to the monitoring sites. This report demonstrates that NMED met the procedural and technical requirements for excluding data due to exceptional events in Doña Ana and Luna Counties for calendar year 2010.

2.2 Geography, Topography, and Climate

The Rio Grande River runs through the 3,804 square miles comprising Doña Ana County, extending from the northwest corner to the south-central border where Sunland Park, New Mexico, El Paso, Texas and Ciudad Juárez, Mexico come together. The Rio Grande River forms the heavily agricultural Rincon (northern) and Mesilla (southern) Valleys in Doña Ana County continuing southeastward through the El Paso and Juarez Valleys along the entire length of the United States-Mexico border, eventually discharging into the Gulf of Mexico.

The area within and surrounding Doña Ana County is topographically diverse and includes mountain ranges, hills, valleys and deserts. The elevation range for the county is 3,730 feet at the valley floor in the south to 9,012 feet at the peak of the Organ Mountains. The Organ Mountains lay in a north-south direction along the eastern border of the county, separating the Mesilla Valley from White Sands Missile Range (WSMR) and White Sands National Monument. The western half of Doña Ana County is formed by an elevated desert plateau (West Mesa) that extends west through Luna, Grant, and Hidalgo Counties along the international border and into Arizona.

Where New Mexico, Texas and Mexico meet, Mount Cristo Rey lays south of Sunland Park between the Franklin Mountains on the east and the Sierra Juarez Mountains to the southwest. Previous air quality studies in the air shed indicate that this complex topography dictates wind flow patterns carrying air masses from El Paso and Ciudad Juarez into Sunland Park.

Luna County is 2,965 square miles in southwestern New Mexico sharing 54 miles of international border with Mexico. Luna County is within the northern most part of the Chihuahuan Desert, with desert landscape as its most predominant feature. Several mountain ranges are located within the county including: Cooke's Range, the Florida Mountains and the Tres Hermanas Mountains.

Doña Ana County has a mild, semiarid climate with light precipitation, abundant sunshine, low relative humidity, and a large daily and annual temperature range. Annual precipitation averages 9.35 inches with 3.7 inches of snowfall in Las Cruces to 8.71 inches and 5.9 inches of snowfall near El Paso (WRCC, 2011). Windstorms are common during the late winter and spring months. Due to these high velocity winds, Luna and Doña Ana Counties experience the majority of PM_{10} exceedances in the state. Synoptic scale weather activity and to a lesser extent, mesoscale weather systems drive most of the frequent high wind events in the region (Novlan et al., 2007). These periods of high wind may exceed average hourly wind speeds of 30 miles per hour (mph) for several hours and reach peak speeds of 60 mph or more (Aaboe et al., 1998-2007). Blowing dust and soil erosion originate from the numerous exposed and susceptible desert areas. Winds predominately blow from the southeast in summer, from the west in winter, and from the west-southwest in spring. However, local surface wind directions vary greatly because of local topography and mountain and valley breezes.

2.3 Monitoring Network and Data Collection

The AQB operates a State and Local Air Monitoring Stations (SLAMS) network to measure the concentration of criteria pollutants (Table 2-1). The Bureau maintains six PM_{10} monitoring sites in Doña Ana County and two in Luna County to track windblown dust in southern New Mexico. All monitoring sites in Doña Ana County and the Deming Airport site are equipped with continuous PM_{10} FEM TEOM instruments while the Deming Post Office, Anthony and Sunland Park City Yards (SPCY) sites have filter-based PM_{10} FRM Hi-Volume Wedding Monitors. The AQB also operates two $PM_{2.5}$ FRM Partisol and four $PM_{2.5}$ TEOM monitors in Doña Ana

County. The $PM_{2.5}$ TEOM instruments do not meet the specifications for FRM or FEM designation by EPA and are not part of the SLAMS network. The data from these machines are for informational purposes only and EPA does not use it to compare air quality to the NAAQS.

The monitoring network in Doña Ana County comprises the Las Cruces (northern) and Paso del Norte (southern) area. The Las Cruces, West Mesa and Holman monitoring sites are in the City of Las Cruces, with the rest of the monitoring sites situated along the borders with Texas and Mexico in the south (Figure 2-1). The PM_{10} FEM TEOM and FRM Wedding monitors are collocated at the Anthony and SPCY sites.

Site Name	AIRS Number	Latitude	Longitude	Begin Date
6ZL Holman	35-013-0019	32-25-29.69	106-40-26.62	April 2004
6ZK Chaparral	35-013-0020	32-02-27.48	106-24-33.09	July 2003
6CM Anthony	35-013-0016	32-00-11.54	106-35-57.67	July 2003/ March 1988 (W)
6ZG SPCY	35-013-0017	31-47-49.91	106-33-24.17	July 2003/February 1989 (W)
6ZM Desert View	35-013-0021	31-47-46.32	106-35-02.13	August 2007
6WM West Mesa	35-013-0024	32-16-39.90	106-51-49.68	July 2003
7E Deming	35-029-0003	32-15-20.99	107-43-21.58	July 2006
7D Deming	35-036-0001	32-16-07.86	107-45-29.32	August 1989 (W)
6ZG SPCY ($PM_{2.5}$)	35-013-0017	31-47-49.91	106-33-24.17	January 1999
6Q Las Cruces ($PM_{2.5}$)	35-013-0025	32-19-18.99	106-46-04.00	January 2001

Table 2-1. SLAMS designated PM monitoring sites in southern New Mexico. W stands for FRM Wedding Monitors.

Monitoring data is quality controlled and assured within the Department and submitted to AQS by the end of the following quarter in which it is collected. The AQB places flags on exceedances of the NAAQS and investigates the cause of the monitored concentration to determine if it qualifies as an exceptional event. If EPA concurs with a state's flag and subsequent demonstration of an exceptional event, it excludes that monitoring data when determining attainment of the NAAQS for a given pollutant.

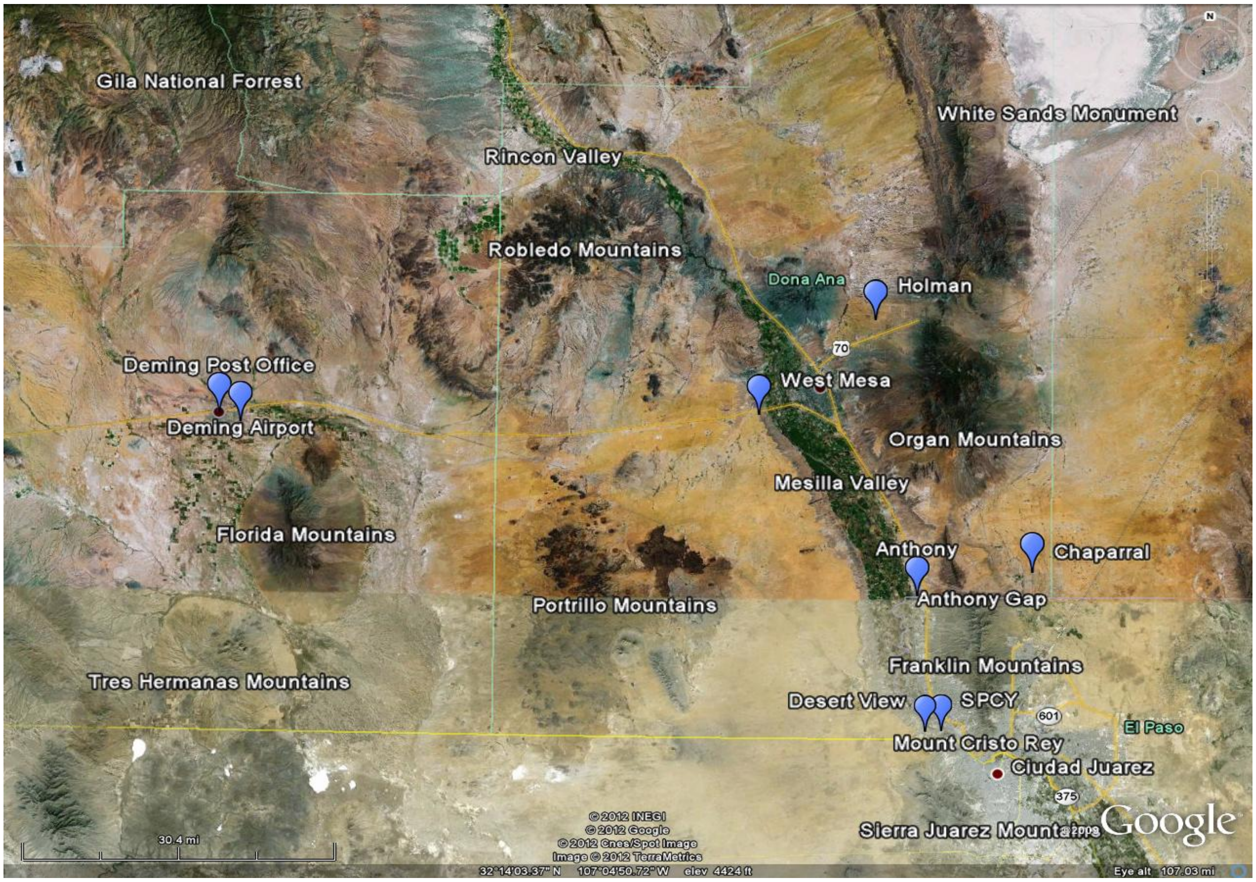

Figure 2-1. Map of New Mexico's PM monitoring sites with topographic and geographic features included.

2.4 Historical Trends of PM_{10} 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 PM_{10} 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.

Exceedances caused by high wind blowing dust storms can occur any time of year in Doña Ana and Luna Counties. The majority of these events occur from late winter through early summer in the months from March to June (Figure 2-2). From 2003-2009 the AQB recorded 272 high wind blowing dust PM_{10} exceedances on 116 days (Wedding and TEOM data). Averaged over 2003-2009, NMED monitored 39 exceedances on 15 days per year. In 2008, the AQB monitored 102 high wind blowing dust exceedances of the 24-hour average PM_{10} NAAQS on 30 days during the year (Figure 2-3). This was by far the most exceedances recorded by the AQB in a single year. In 2010, the AQB recorded 35 exceedances on 8 days.

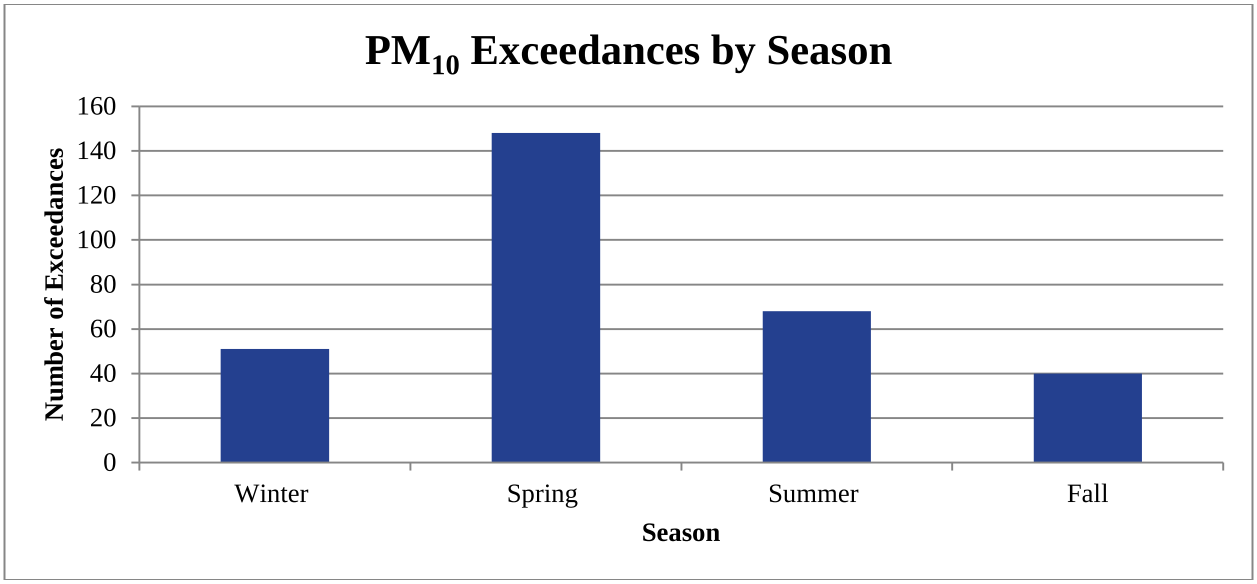

Figure 2-2. PM_{10} Exceedances by Season from 2003-2010.

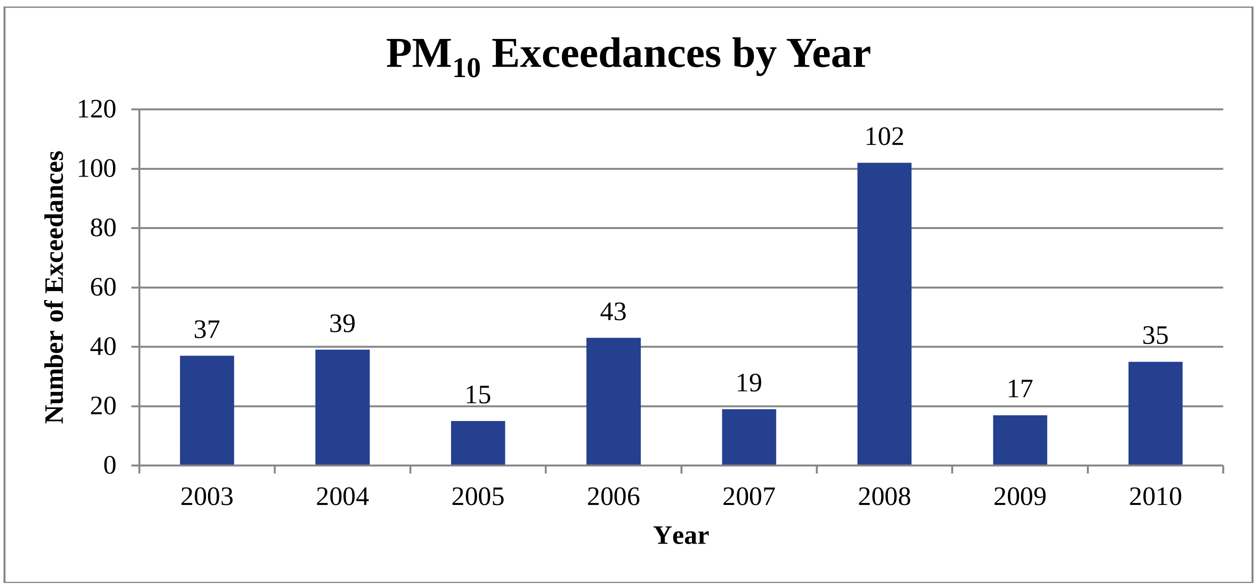

Figure 2-3. PM_{10} Exceedances by Year from 2003-2010.

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 trend. When the monsoon season (July-September) and winter (December-February) produce large amounts of precipitation, we can see a marked decrease in springtime events as observed following 2004, 2006 and 2008. Likewise, following the drier years of 2005, 2007 and 2009 a spike in springtime events occurred in 2006, 2008 and 2010 respectively (Figure 2-4).

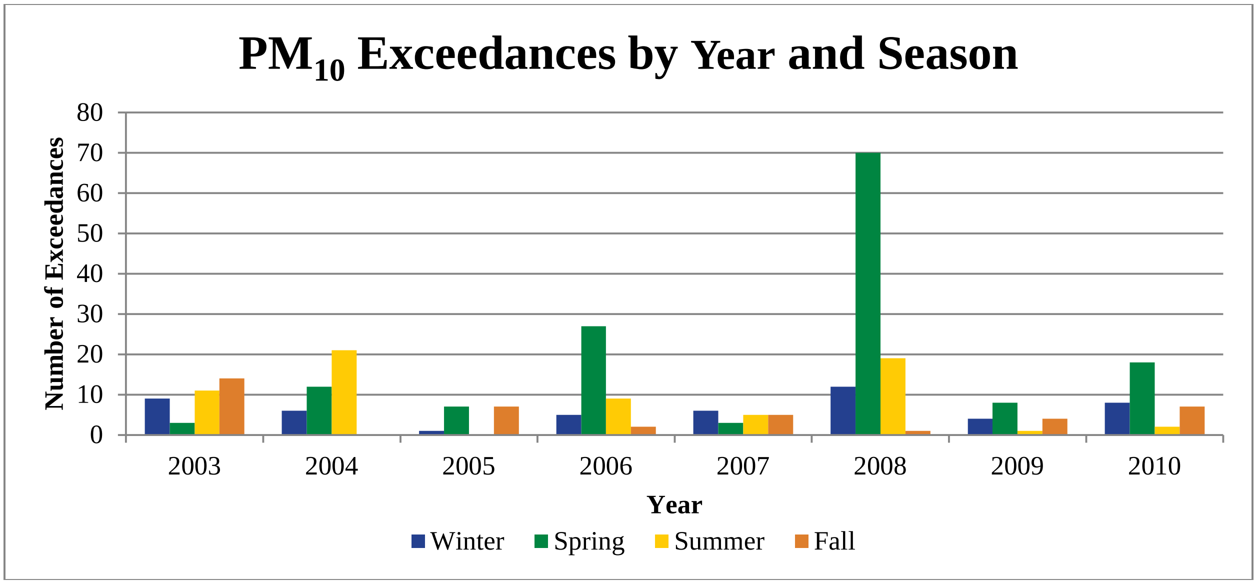

Figure 2-4. Seasonal and yearly variation of PM_{10} Exceedances in southern New Mexico from 2003-2010.

2.5 Background Concentrations and Historical Fluctuations

To establish normal historical fluctuations and background concentrations, the AQB conducted statistical analyses of 24-hour average PM_{10} and $PM_{2.5}$ concentrations, hourly PM_{10} concentrations, average hourly wind gust and speeds, as well as frequency distributions for suspected high wind blowing dust events for the seven years preceding 2010 (2003-2009 when available). As used here normal historical fluctuations and background concentrations refer to days that did not have suspected natural events from 2003-2009. Suspected natural events are those days for which NMED monitored an exceedance and submitted documentation and analysis to EPA under the NEAP or EER.

Table 2-2 shows that 99% percent of 24-hour average PM_{10} and $PM_{2.5}$ monitored concentrations in Doña Ana County fell below the corresponding NAAQS of 150 µg/m^3 and 35 µg/m^3, respectively. For most monitoring sites, the measured concentrations fall well below this level. The only monitoring site that records 1% of days with concentrations approaching the PM_{10} standard and above the $PM_{2.5}$ 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).

Statistic/Site	Anthony	Chaparral	Deming	Desert View	Holman	SPCY	West Mesa	SPCY ($PM_{2.5}$)	Las Cruces
Max	147	149	152	150	153	212	153	52	29
99th Percentile	121	116	91	122	117	143	87	36	16
95th Percentile	87	65	57	83	63	108	45	25	11
75th Percentile	55	35	29	47	35	59	22	13	7
50th Percentile	37	23	20	33	23	38	15	9	5
Mean	42	28	24	37	27	45	19	11	6
25th Percentile	24	13	13	21	14	23	10	6	4
5th Percentile	12	7	7	10	6	11	5	4	3

Table 2-2. 24-hour average data distribution for southern New Mexico monitors.

Figures 2-5 and 2-6 show that the PM_{10} and $PM_{2.5}$ exceedances recorded in 2010 are well above background levels (data courtesy of EPA's AQS Data Mart). Data represented in Figure 2-5 are from 2003-2009 except for Deming (2006-2009), Desert View (2007-2009) and Holman (2004-2009). Data represented in Figure 2-6 are from 2007-2009. The top whiskers in Figures 2-5 and 2-6 represent the 95th percentile of data.

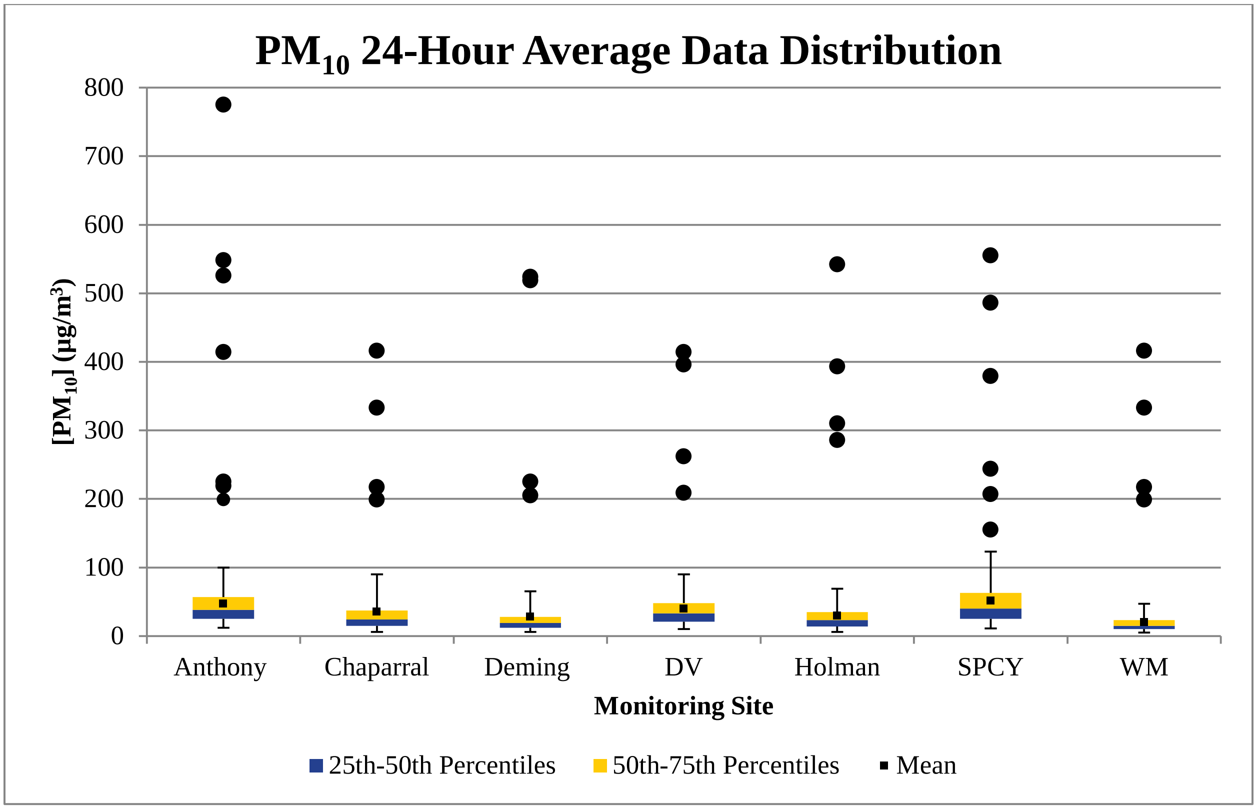

Figure 2-5. PM_{10} exceedances in 2010 plotted with historical data distributions for 2003-2009.

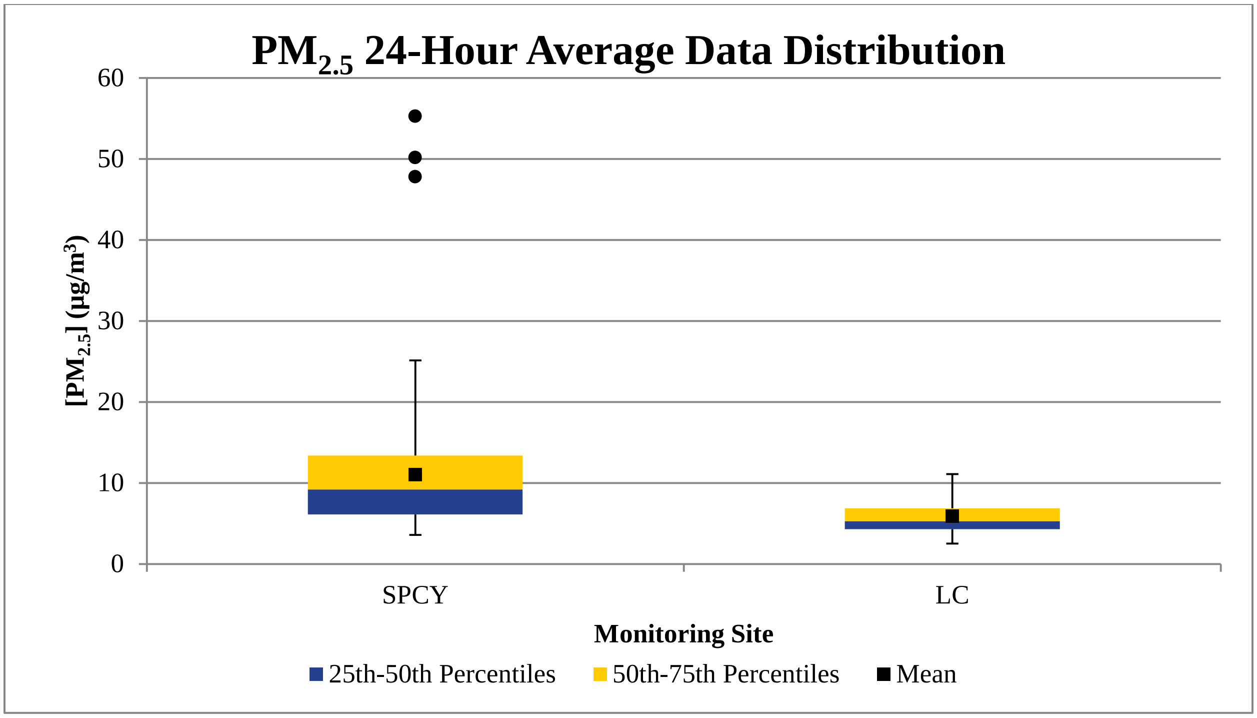

Figure 2-6. $PM_{2.5}$ exceedances in 2010 plotted with historical data distributions for 2007-2009.

2.6 Doña Ana and Luna Counties' NEAPs

Since 1977, EPA has recognized the need to review and handle air quality data for which the normal planning and regulatory processes are not appropriate (72 FR 13562). Prior to the implementation of the EER, EPA policy and guidance dictated the handling of data affected by an exceptional event. The policy most pertinent to New Mexico was outlined in the May 30, 1996 Natural Events Policy (NEP). This policy addressed exceedances of the PM_{10} NAAQS caused by natural events such as high winds and wildfires.

Similar to the EER, the NEP allowed the exclusion of ambient air quality monitoring data affected by natural events from attainment determinations, if certain requirements were met. The AQB managed its air quality monitoring data under this policy until the implementation of the EER (1996-2007). Many of the provisions of the NEP are included in the EER.

The NEP set procedures for the development of a NEAP to protect public health in areas where uncontrollable natural events caused a violation of the PM_{10} NAAQS. The AQB developed the Luna and Doña Ana County NEAPs based on the following five major elements:

1) protect public health;
2) public education and awareness;
3) documentation and analysis of exceedances;
4) use of Best Available Control Measures (BACM); and
5) five-year review and evaluation of plan.

EPA approved the NEAPs for Doña Ana and Luna Counties in 2000 and 2003 respectively. Under the NEAPs, the AQB provided documentation and analysis to EPA for exceedances of the PM_{10} NAAQS caused by high wind dust events from 1996-2007. In order for EPA to exclude these exceedances from consideration when determining nonattainment designations, the AQB's documentation had to demonstrate a clear causal relationship (CCR) between the measured exceedance and the natural event and that there would have been no exceedance but for the event (NEBF).

Another important element of the NEAPs required the identification of significant anthropogenic sources of dust and application of Best Available Control Measures (BACM) for these sources. BACM are control methods used to reduce or eliminate windblown dust in areas where natural soils have been disturbed and are prone to wind erosion. To determine what constitutes BACM for a particular community and source, a number of factors are considered. These factors include the sources of anthropogenic dust, when these sources are present, the available measures to control dust emissions, and the cost of these measures compared to their effectiveness to control dust. Due to the varied landscape and activities in the two counties, BACM for PM_{10} were determined on a case-by-case basis considering technological and economic feasibility of implementing each mitigation technique. The largest emission sources include the natural desert terrain, paved and unpaved roads, agriculture, and construction.

Under the Doña Ana County NEAP, the local governments developed wind erosion control ordinances based on BACM in 2000. Luna County and the City of Deming have had their ordinances in place since 2004. Through the efforts of developing the NEAPs, the state and large land managers (New Mexico State University, WSMR, Ft. Bliss, etc.) signed Memorandums of Agreement (MOAs) or Memorandums of Understanding (MOUs). The ordinances and MOUs adopted by each jurisdiction focused on the controllable anthropogenic sources identified in each BACM analysis. New Mexico did not adopt Luna and Doña Ana Counties' NEAPs under its State Implementation Plan; therefore, the AQB does not have the authority to require or enforce BACM in these counties.

For documentation and analysis under the NEAPs, NMED considered the occurrence of peak wind gusts greater than 18 meters per second (~40 miles per hour) to be sufficient evidence, by itself, that an exceedance was caused by high wind and was not reasonably controllable. The AQB's analysis of data for the 101 high wind exceedances that occurred during the years 1999 and 2000 determined this wind gust criterion (Aaboe et al., 1998-2007). For days when an exceedance occurred at a monitoring site that did not have 18 m/s wind gusts, NMED created time series plots of wind data and hourly PM_{10} concentrations to demonstrate that a natural event occurred and resulted in an exceedance. Along with these time series plots, NMED provided news reports, pictures, satellite images, and data from other jurisdictions (TCEQ-El Paso) that monitored exceedances on the same day that were used as supporting evidence of a natural event (Aaboe et al., 1998-2007).

For more information, copies of the Doña Ana and Luna County NEAPs as well as documentation and analysis for past natural events resulting in PM exceedances are available on our website at www.nmenv.state.nm.us/aqb. Alternatively, requests for hard copies may be made to the AQB in Santa Fe.

2.7 Sources of Windblown Dust

Many features of the Chihuahuan Desert contribute to the soil's susceptibility to erosion including: aridity, sparse vegetative cover, low soil moisture and large areas of exposed and fragile soil. The largest sources of blowing dust are playas (dry lakebeds) and disturbed desert located in southeastern Arizona, southern New Mexico, west Texas and northern Mexico. In Doña Ana County, windblown dust from desert land is by far the most prominent source of PM_{10} accounting for nearly 85% of emissions (Table 2-3). No emissions inventory exists for Luna County.

Area and Mobile Sources	PM_{10} Emissions (Tons/year)	$PM_{2.5}$ Emissions (Tons/year)
Wind Erosion	49,242.5	10,833.3
Unpaved Roads	6,166.9	922.5
Paved Roads	1,119.9	153.3
Agriculture	470.7	142.6
Construction	294.2	61.2
Quarrying and Mining	159.2	31.8
Total	58,141.7	12,759.4

Table 2-3. Emission data collected from the 2004 area and mobile emission inventory for Doña Ana County (EPA's ATLAS Project).

2.8 Meteorological Conditions for High Wind Blowing Dust Days

There are three weather systems, which create windstorms capable of producing windblown dust in New Mexico (Comet, 2010; Novlan et al., 2007). Large scale or synoptic weather systems account for two of these conditions. These weather systems often affect entire states and can be large enough to cover multiple states. The other meteorological condition, a small or mesoscale weather system, creates outflow boundaries from thunderstorms. The first and most common weather system creating windblown dust is synoptic scale Pacific cold fronts that frequently pass through New Mexico during the fall, winter and spring (Figure 2-7). Surface winds flow from a west to southwest direction during these conditions. The next most common cause of high wind blowing dust episodes is synoptic scale cold fronts from the north or east, also known as backdoor cold fronts. The last and least frequent cause of windblown dust events are mesoscale storms caused by thunderstorm outflow fronts and dry or wet microbursts. These storms, known as haboobs, occur during the monsoon season in the summer months when southern New Mexico receives the majority of its annual precipitation. June 6, 2010 is the only day when a thunderstorm caused a high wind and blowing dust event. No backdoor cold fronts caused high winds and blowing dust in 2010. The rest of the days had high winds caused by the passage of a Pacific cold front (Figure 2-7). The blue line with triangles depicts a cold front moving through New Mexico on April 9, 2008. Winds flow perpendicular to the isobars of constant pressure from high to low pressure on the map (red squiggly lines).

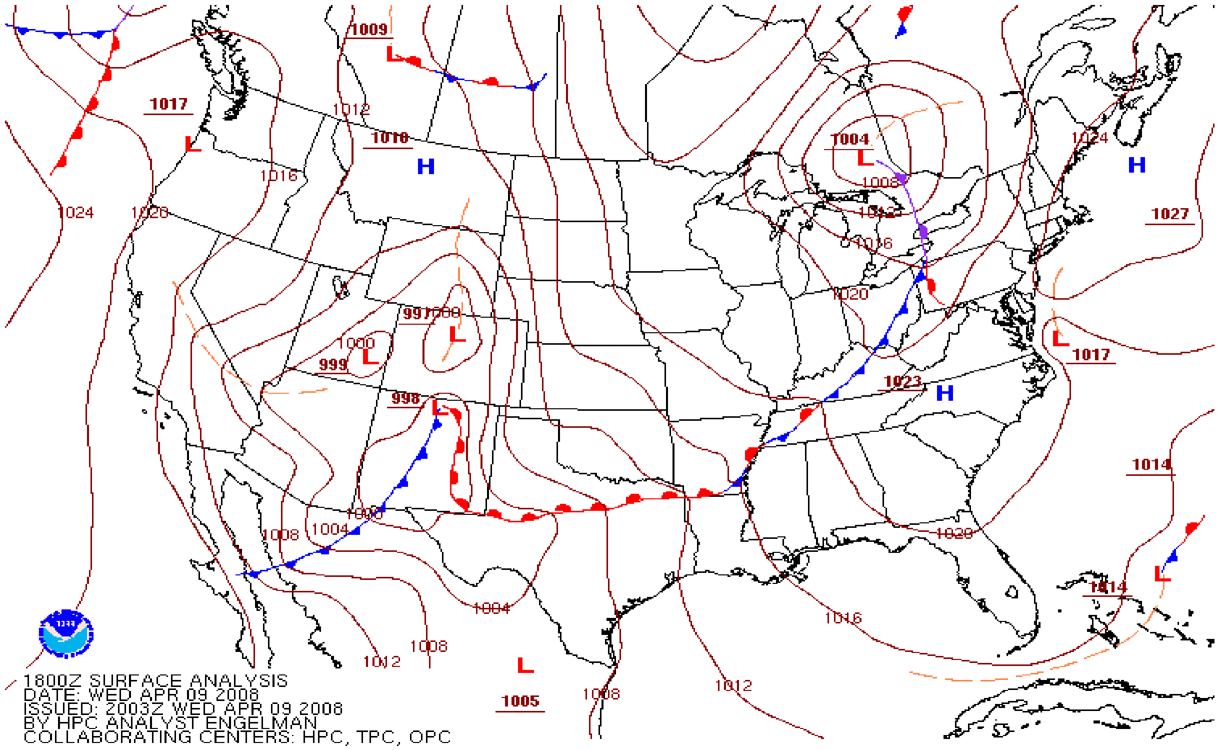

Figure 2-7. Surface weather map depicting a Pacific cold front.

The optimal meteorological conditions for high wind blowing dust days occur when an upper level trough of low pressure and a Pacific cold front pass through the region at the same time on days with high velocity winds aloft and at the surface, minimal cloud cover, low relative humidity, and maximum temperature (Novlan et al., 2007). As the surface pressure and density gradient begins to form due to the upper level trough and surface cold front passage, daytime heating of the surface creates a mixing layer that allows for entrainment of dust as well as downward mixing of strong winds aloft, which further enhances wind speeds at the surface. If the surface winds cross the vast sources of dust in the area with the correct angle and speed, a high potential for entraining and transporting dust occurs. There are many variations of this scenario and weather conditions that may cause high wind and blowing dust at different intensities.

Figure 2-7 depicts the upper air patterns associated with the Pacific cold front from Figure 2-6. This map is for the 500 hour on April 10, 2008 and shows that the cold front has passed toward north central Texas. Due to the lack of friction is the atmosphere, winds flow parallel to the isobars on an upper air map (brown lines).

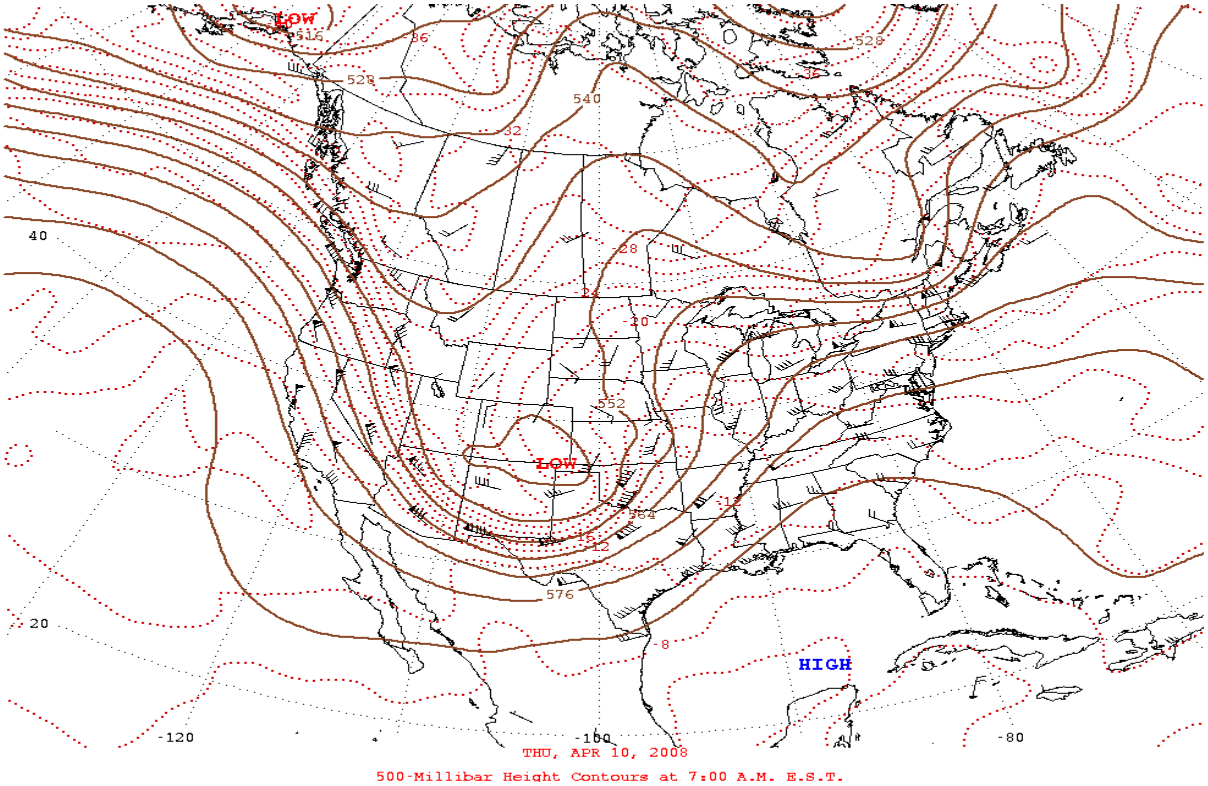

Figure 2-8. Upper air weather map for high winds aloft.

3 HIGH WIND EXCEPTIONAL EVENT: February 20, 2010

3.1 Summary of Event

The passing of a Pacific cold front caused high winds and blowing dust in southern Doña Ana County resulting in an exceedance of the PM_{10} NAAQS at the Anthony monitoring site on this date. The FEM TEOM continuous monitor at this site recorded a 24-hour average concentration of 199 µg/m^3. In accordance with the EER, the AQB flagged this data on EPA's AQS database as a high wind natural event on or before June 1, 2011. Although no other monitoring site recorded an exceedance on this date, elevated PM_{10} concentrations were measured at SPCY (145 µg/m^3), Chaparral (119 µg/m^3), and Desert View (113 µg/m^3) monitoring sites (Figure 3-1). The averages in this figure were calculated using FEM TEOM instrument data for the four days before and after the event.

As the event unfolded, the wind blew from the southwest throughout the border region. These high velocity winds passed over large areas of desert within New Mexico and Mexico. The co-occurrence of high winds and elevated levels of blowing dust, little to no point sources in the area, and the high hourly and daily PM_{10} concentrations support the assertion that this was an exceptional event, specifically a natural event caused by high wind and blowing dust.

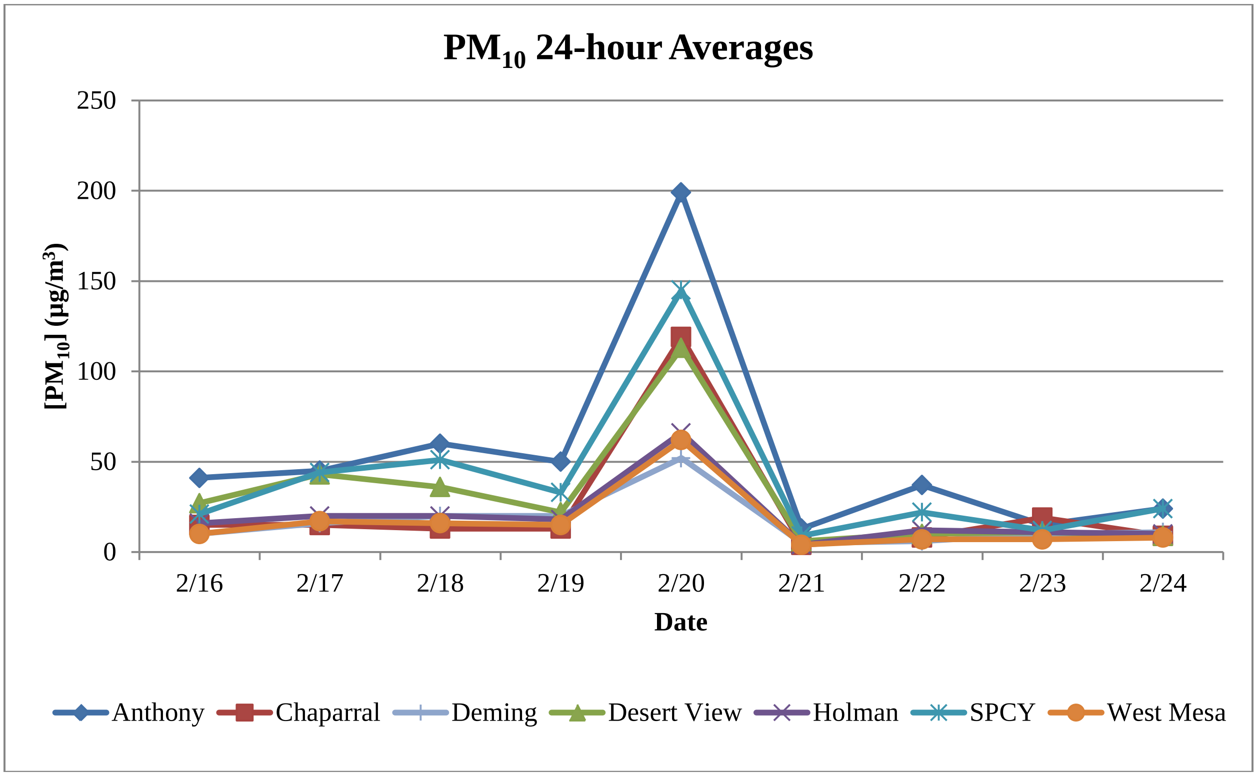

Figure 3-1. PM_{10} 24-hour averages four days before and after February 20, 2010.

3.2 Is Not Reasonably Controllable or Preventable

3.2.1 Suspected Source Areas and Categories Contributing to the Event

Sources of windblown dust contributing to this exceedance include the natural desert, residential properties, agricultural land and unpaved roads in Mexico and New Mexico. Agricultural tilling and crop planting may have contributed to this event. Doña Ana County Ordinance requires BACM for any dust producing activities. The largest and most likely sources of windblown dust are the playas of northern Mexico (see Section 3.2.4 below).

3.2.2 Sustained and Instantaneous Wind Speeds

EPA has indicated that sustained wind speeds of at least11.2 m/s (25 mph) would be used as the default entrainment threshold for natural and well controlled anthropogenic sources contributing to natural events caused by high wind and blowing dust (EPA, 2011). Under the Doña Ana and Luna County NEAPs, EPA and NMED agreed that wind gusts exceeding 18 m/s would overwhelm any natural and well-controlled anthropogenic sources and cause windblown dust. On February 20, sustained wind speeds exceeded EPA's default threshold at five of the seven monitoring sites in southern New Mexico and wind gusts exceeded the NEAPs agreed upon threshold at six of the seven monitoring sites (Figures 3-2 and 3-3). Winds exceeded these thresholds at one or more monitoring site beginning at the 1000 hour and ending at the 1900 hour. The meteorological tower at the Anthony site measures wind speed at two meters instead of the customary 10 meters. Due to this fact, this demonstration uses data from La Union (the closet site measuring wind speed at 10 m).

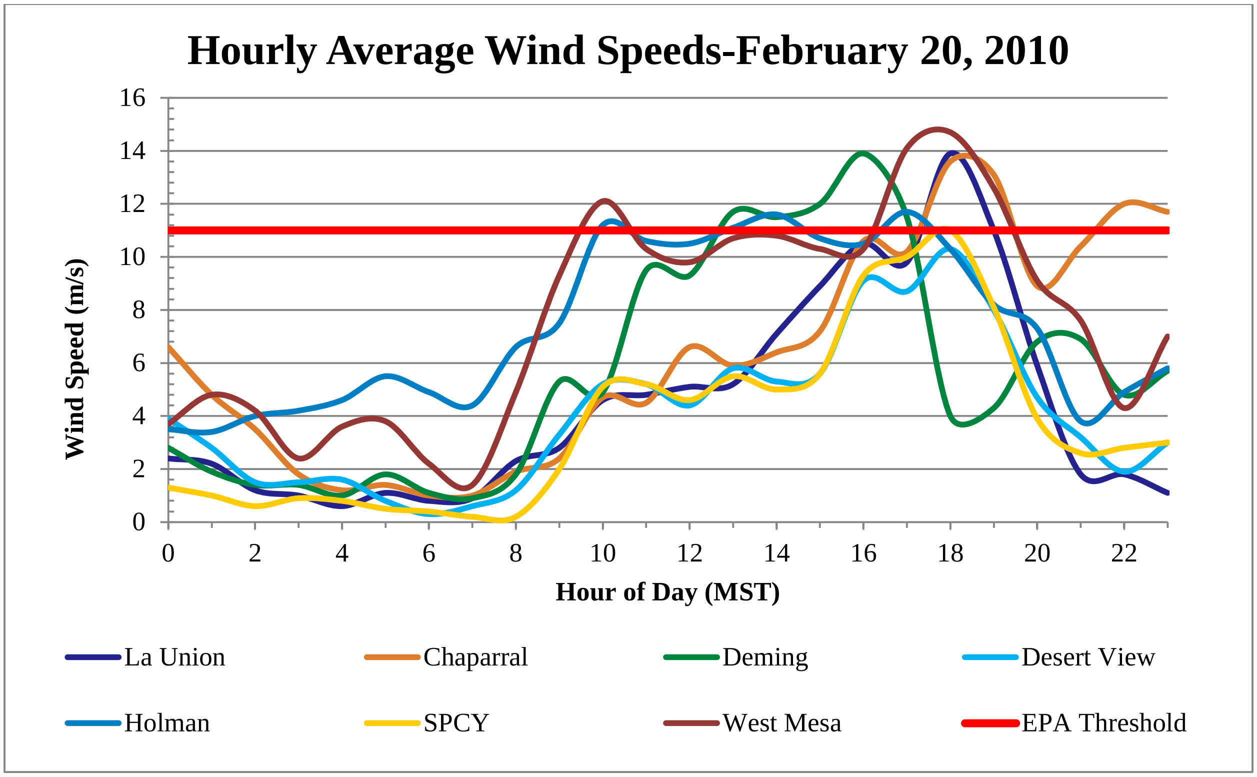

Figure 3-2. Sustained wind speeds at monitoring sites in Doña Ana and Luna Counties.

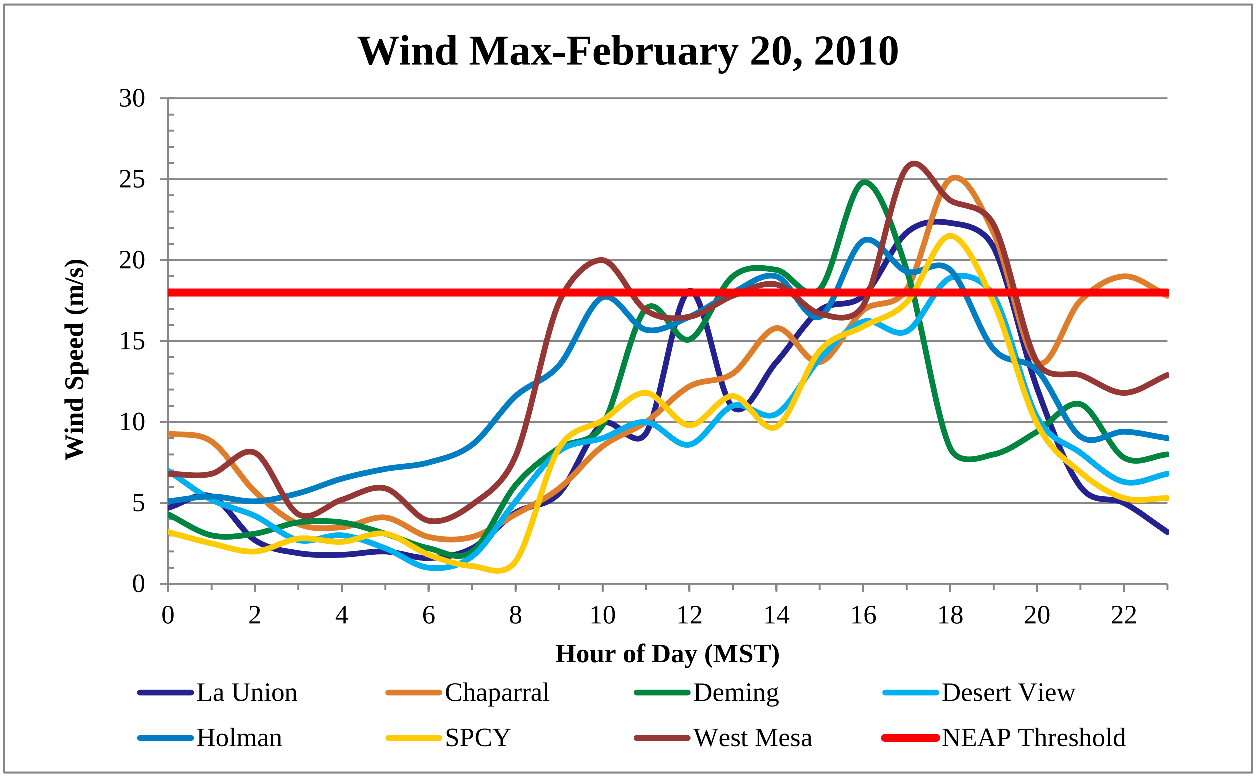

Figure 3-3. Maximum wind gusts at monitoring sites in Doña Ana and Luna Counties.

3.2.3 Recurrence Frequency

The Anthony monitoring site records exceedances of the PM_{10} NAAQS throughout the year. From 2003-2009 the FEM TEOM monitor has recorded 61 exceedances and the FRM Wedding monitor has recorded five exceedances (Figure 3-4). This large disparity in the number of monitored exceedances is due to the FRM Wedding sampling schedule of 1-in-6 days.

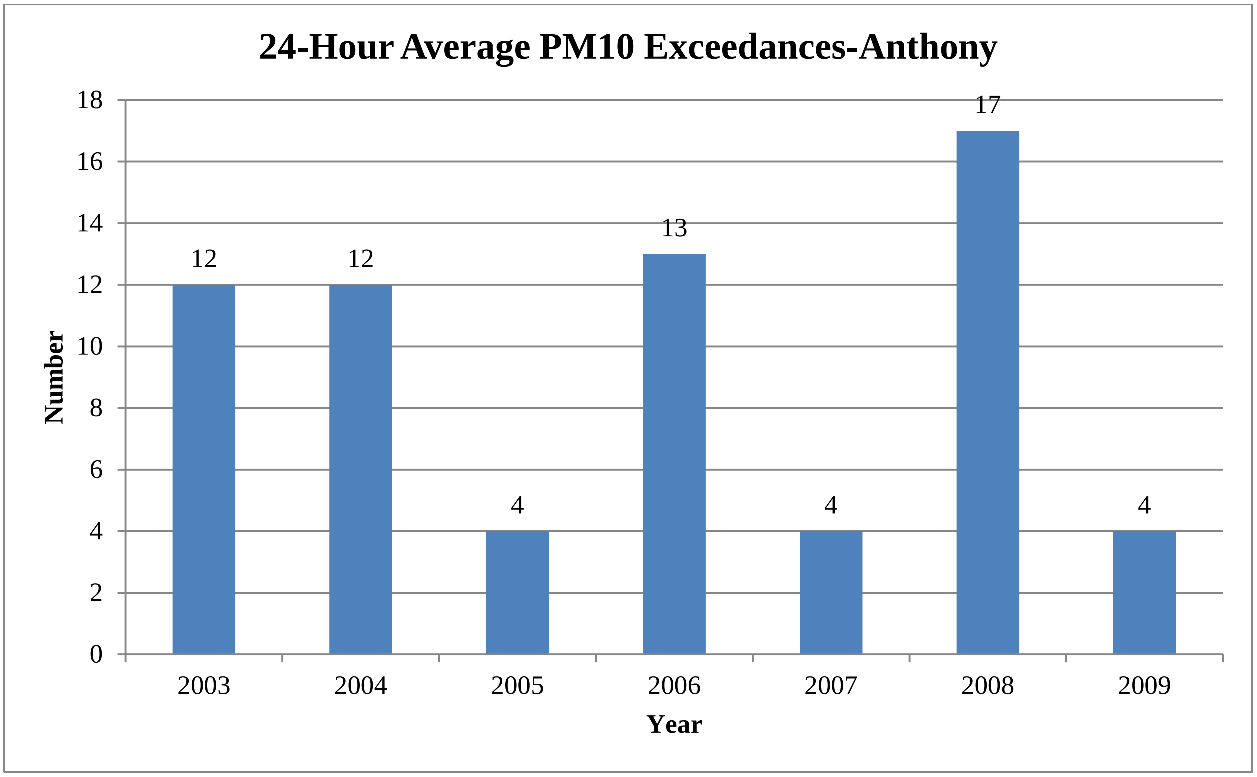

Figure 3-4. Exceedances recorded by the FEM TEOM and FRM Wedding monitors at Anthony.

3.2.4 Controls Analysis

The local ordinances and MOUs adopted under the NEAP direct the implementation of BACM for sources of dust in Doña Ana County. The ordinances regulate disturbed lands, construction and demolition, vacant parking lots and materials handling and transportation. Our investigation did not identify any unusual PM_{10} producing activities on this day, and anthropogenic emissions remained constant before, during and after the event. The most likely source contributing to the event is the playas of northern Mexico. The southern sites recorded the highest 24-hour averages in the monitoring network. A back-trajectory analysis using the HYSPLIT (Draxler et al., 2011; Rolph, 2011) model shows that the air masses traveled from Mexico to the monitors in southern Doña Ana County. The model starts four hours before the start of elevated PM_{10} concentrations measured during the event (Figure 3-5). Costs prohibit controlling dust from the natural desert terrain and falls outside NMED's jurisdiction when it originates in Mexico. NMED concludes that the sources contributing to the event are not reasonably controllable.

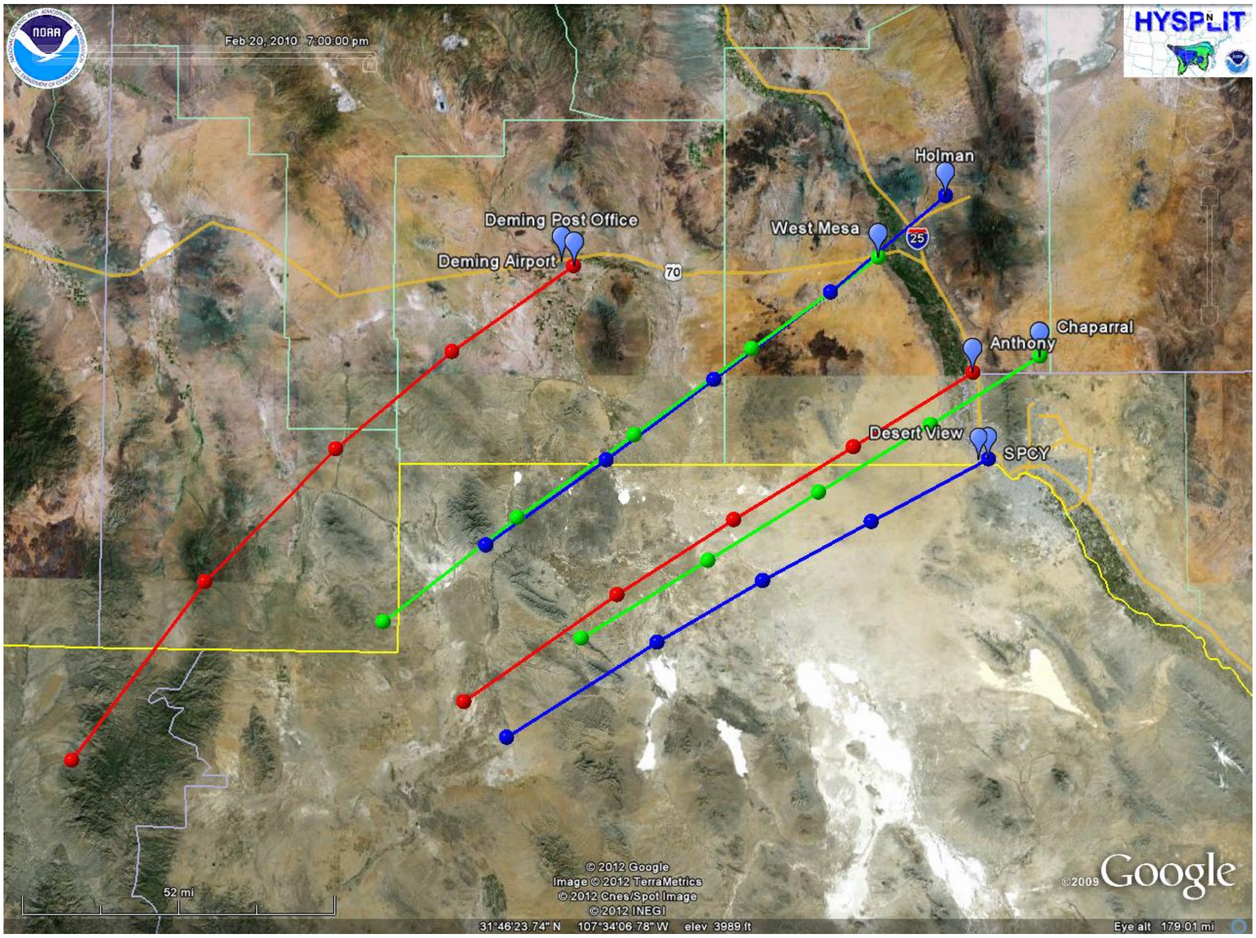

Figure 3-5. HYSPLIT back-trajectory model analysis for February 20, 2010.

3.3 Historical Fluctuations Analysis

3.3.1 Annual and Seasonal 24-hour Average Fluctuations

Established in 1988, the Anthony site has recorded PM_{10} exceedances every year since. High winds cause these exceedances and they can occur at any time of year (Figure 3-6). 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 at Anthony was 403 $\mu g/m^3$, recorded in 2005. High winds caused all recorded exceedances and NMED submitted natural events demonstrations to EPA under the NEAP or EER. NMED has never recorded an exceedance at Anthony in the absence of high winds.

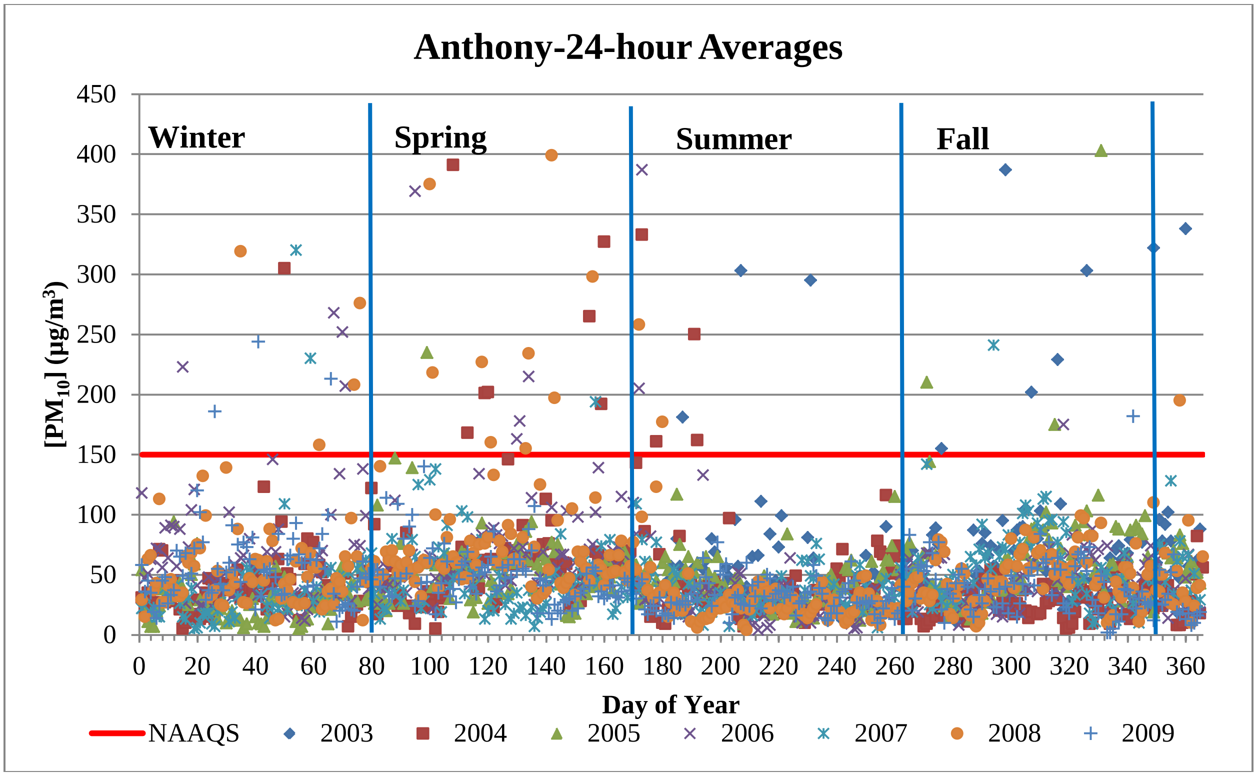

Figure 3-6. 24-hour average PM_{10} concentrations (FEM TEOM data) by day of year from 2003-2009

Table 3-1 shows normal historical fluctuations with and without high wind natural events that caused exceedances from 2003-2009. The analysis excludes only those high wind events that resulted in an exceedance. Data in this table include FRM Wedding and FEM TEOM data from 2003-2009. The recorded value for this day (199 µg/m^3 on 02/10/10) is above the maximum value recorded when no high wind exceedances are included and is above the 95th percentile of all 24-hour averages recorded.

Anthony	Max	99th	95th	75th	50th	Mean	25th	5th	Minimum
No Events	147	120	88	56	38	42	25	12	2
Events	403	234	100	57	38	47	25	12	2

Table 3-1. 24-hour average PM_{10} data distribution with and without high wind events included.

An hourly data distribution analysis was performed for hourly PM_{10} concentrations, wind speeds and wind gusts (Appendices A, B and C). All data used for the PM_{10} distribution charts come from the FEM TEOM monitor. Overlaying the hourly data for February 20 on the hourly data distribution plots shows that the values recorded during the high wind event exceed the 95th percentile for PM_{10}, wind speed and wind gusts (Figures 3-7 through 3-9). The top whisker of the of the box and whisker plots represent the 95th percentile of data. As stated previously, wind data used here comes from the La Union site. The hourly PM_{10} values during the high wind blowing dust storm far exceed the historical 95th percentile of data.

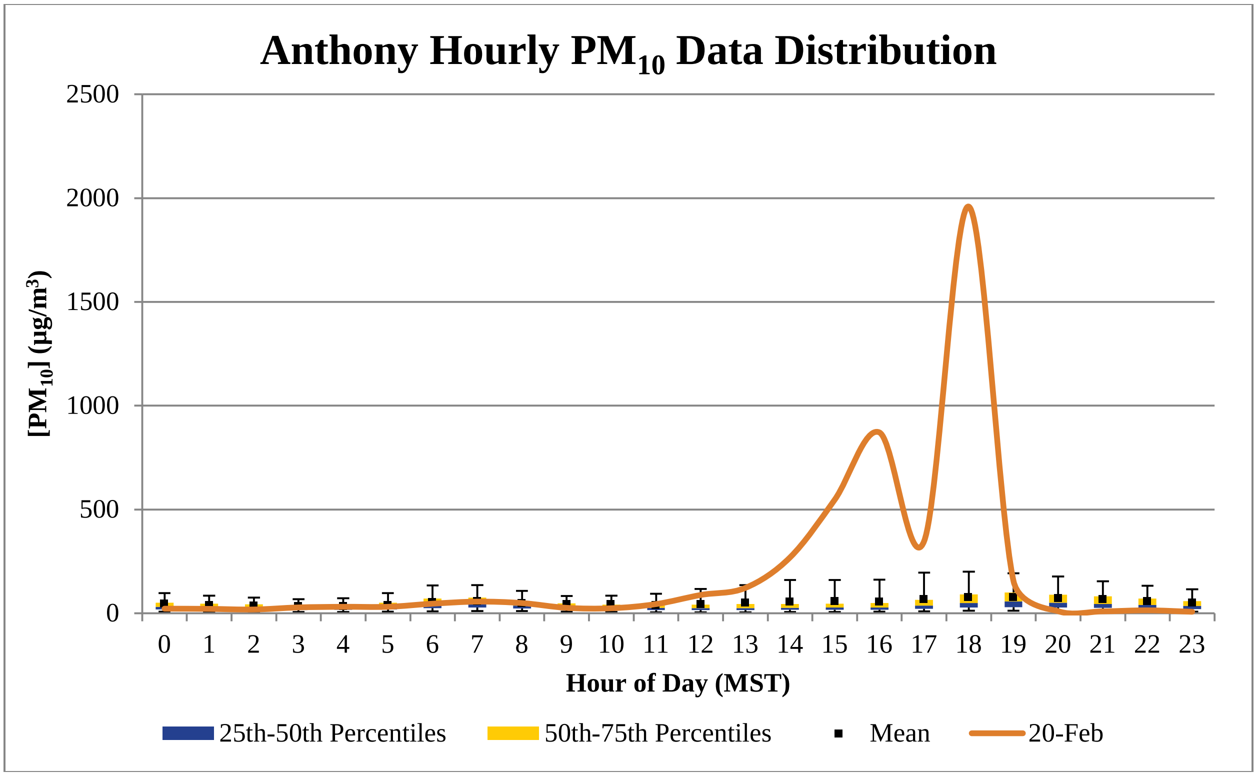

Figure 3-7. PM_{10} hourly data distribution from 2003-2009 overlaid by hourly values for February 20, 2010.

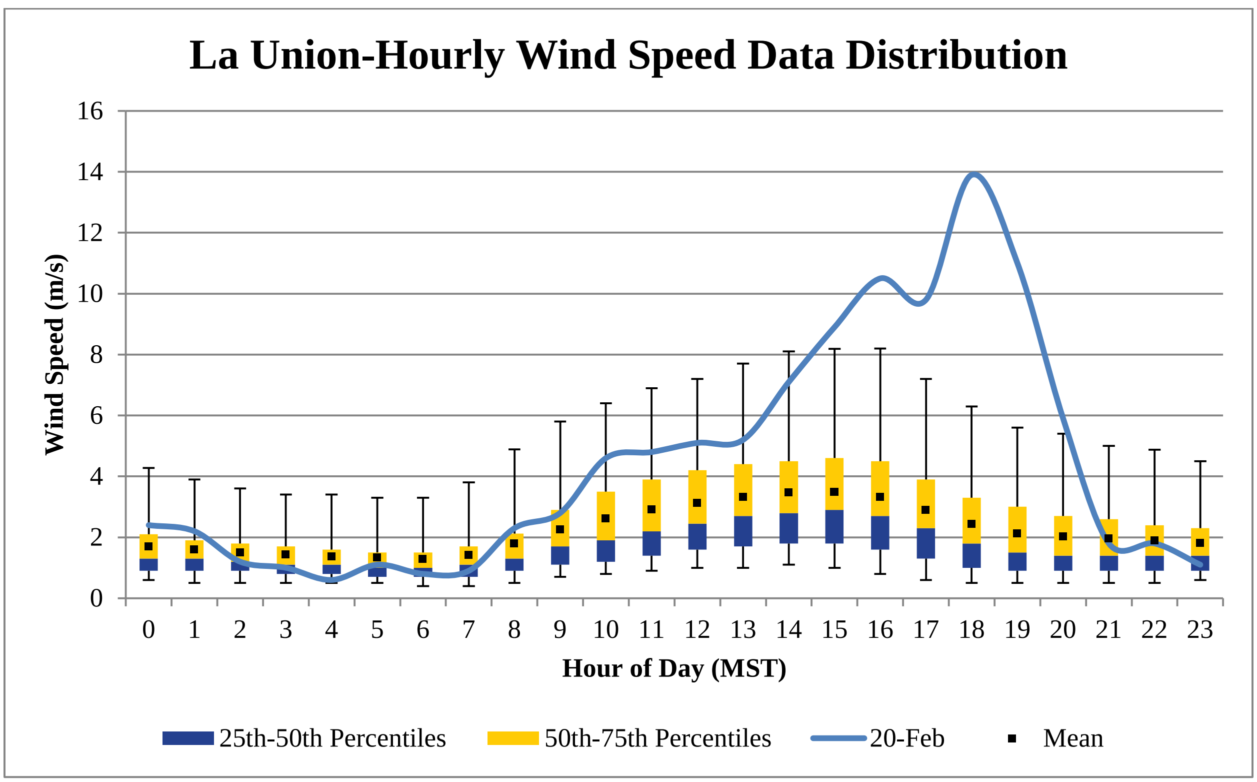

Figure 3-8. Hourly wind speed data distribution from 2003-2009 overlaid by hourly values for February 20, 2010.

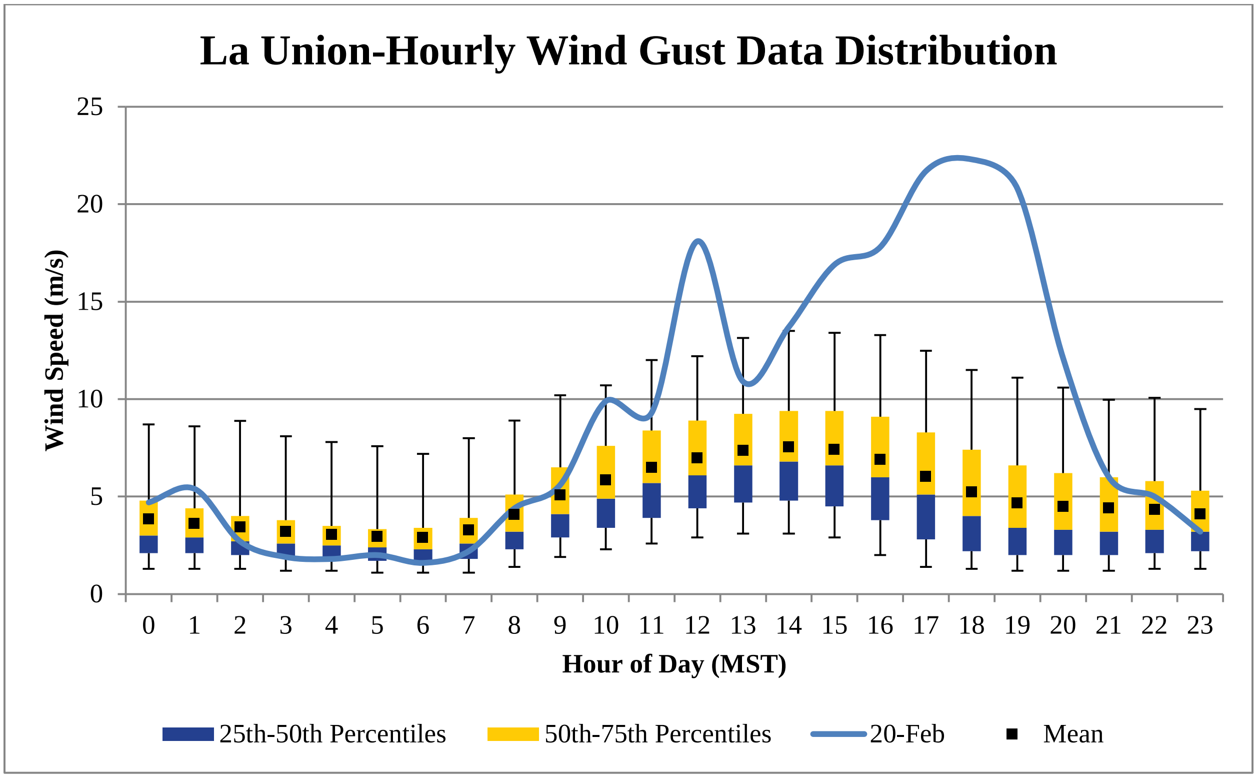

Figure 3-9. Hourly wind gust data distribution from 2003-2009 overlaid by hourly values for February 20, 2010.

3.4 Clear Causal Relationship

A Pacific cold front passed through New Mexico on February 20, 2010. Prior to the arrival of the Pacific cold front, a stationary front in northern New Mexico created a low pressure center in eastern New Mexico creating a pressure gradient over southeastern Arizona, southwestern New Mexico and northern Mexico. As the Pacific cold front moved through New Mexico, the pressure gradient tightened and winds became even stronger at the surface (Figure 3-10). Surface winds flow perpendicular to the isobars from high to low pressure. The wind direction in the upper atmosphere aligned with the surface wind direction (Figure 3-11). Diurnal heating of the surface allowed winds aloft to mix downward, increasing the surface wind velocities and provided the turbulence required for vertical mixing and horizontal transport.

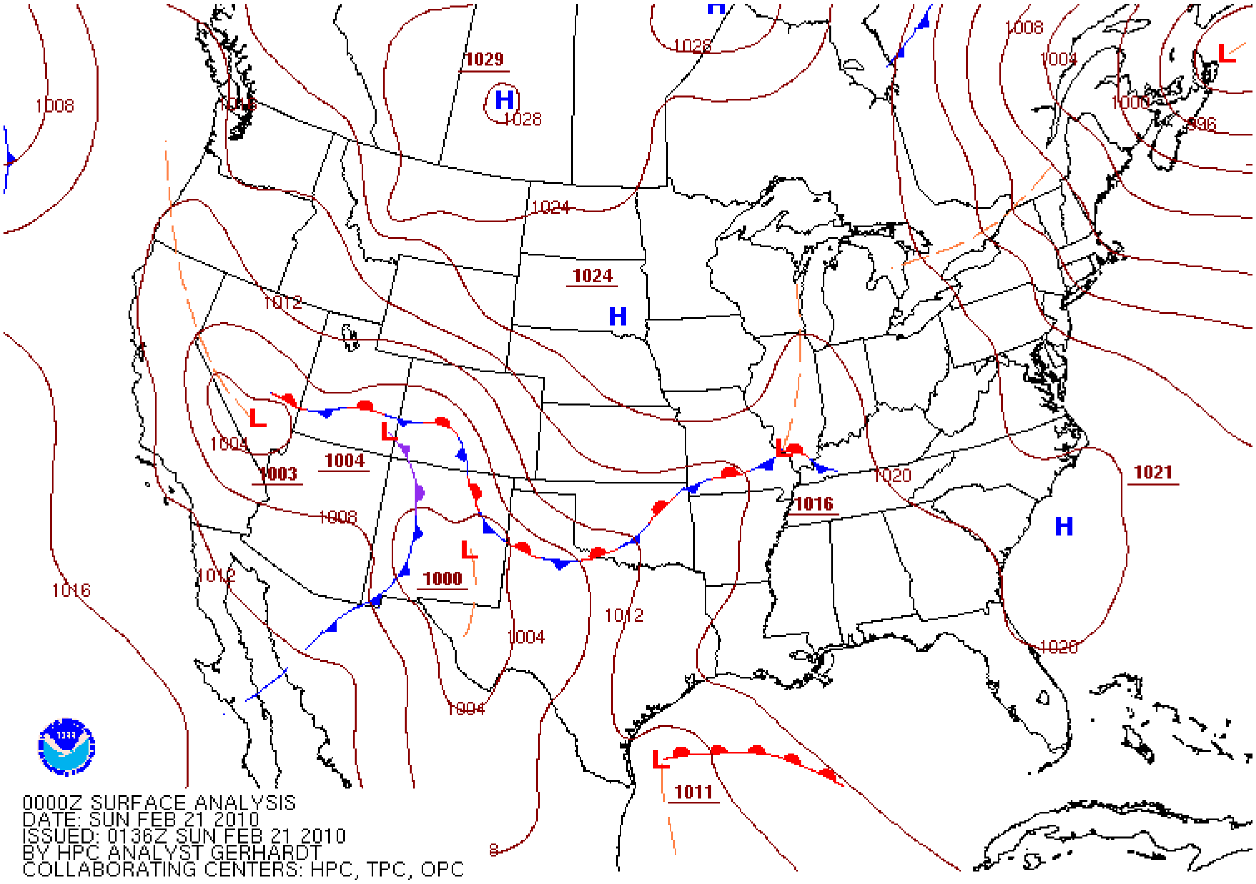

Figure 3-10. Surface weather map showing frontal activity and isobars of constant pressure (red lines) for February 20, 2010 at the 1700 hour MST.

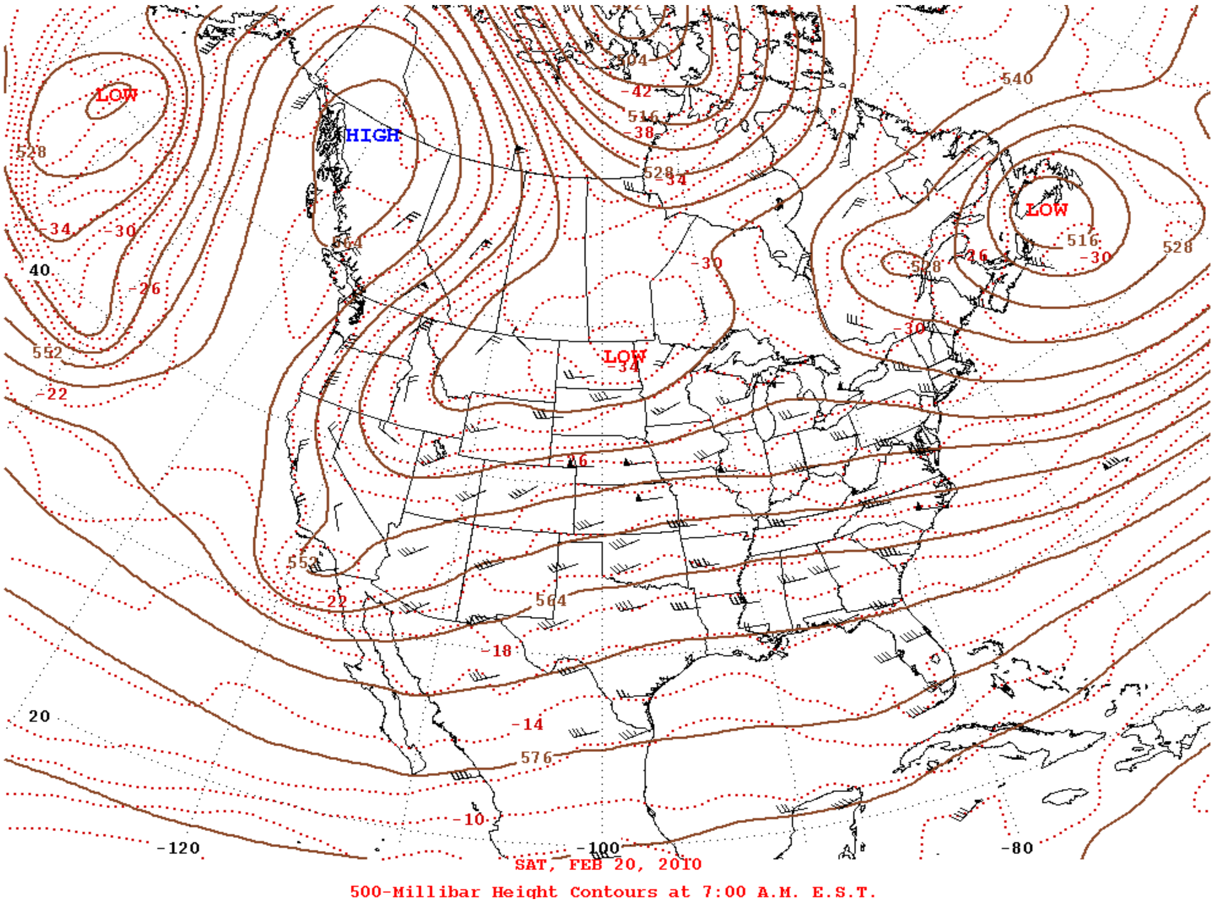

Figure 3-11. Upper air weather map showing geopotential heights (brown lines) at the 500 hour on February 20, 2010.

The weather pattern described above generated strong southwesterly winds beginning at the 1000 hour and lasting through the 1900 hour. Beginning at the 1500 hour, wind gusts exceeded the historical 95th percentile of data at La Union as shown in Figure 3-8. Peak wind gusts ranged from 19 m/s at SPCY to 26 m/s at West Mesa (Figure 3-3). Peak wind speeds ranged from 11 m/s at SPCY to 14 m/s at Anthony (Figure 3-2). Blowing dust caused elevated levels of PM_{10} during the same period as high winds as demonstrated by the time series plot in Figure 3-12. As wind speed and wind gusts exceed the 95th percentile of historical data so do hourly PM_{10} concentrations on this date (1500-1800 hours). During these hours, hourly PM_{10} concentrations spiked at all monitoring sites in the network (Figure 3-13). NASA's Calypso satellite also captured dust in the atmosphere in the western half of state including Doña Ana and Luna Counties (Figures 3-14 and 3-15).

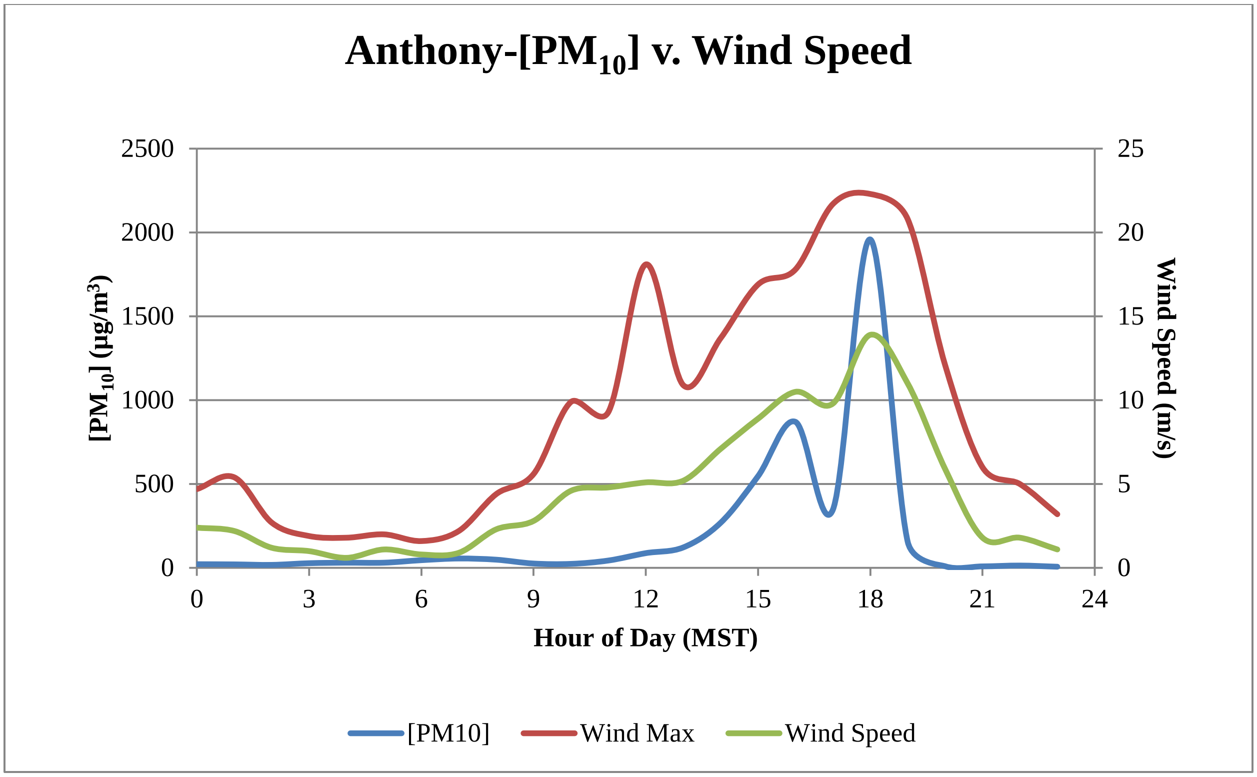

Figure 3-12. Time series plot of hourly observations showing increased PM_{10} concentrations as wind speeds and gusts increase.

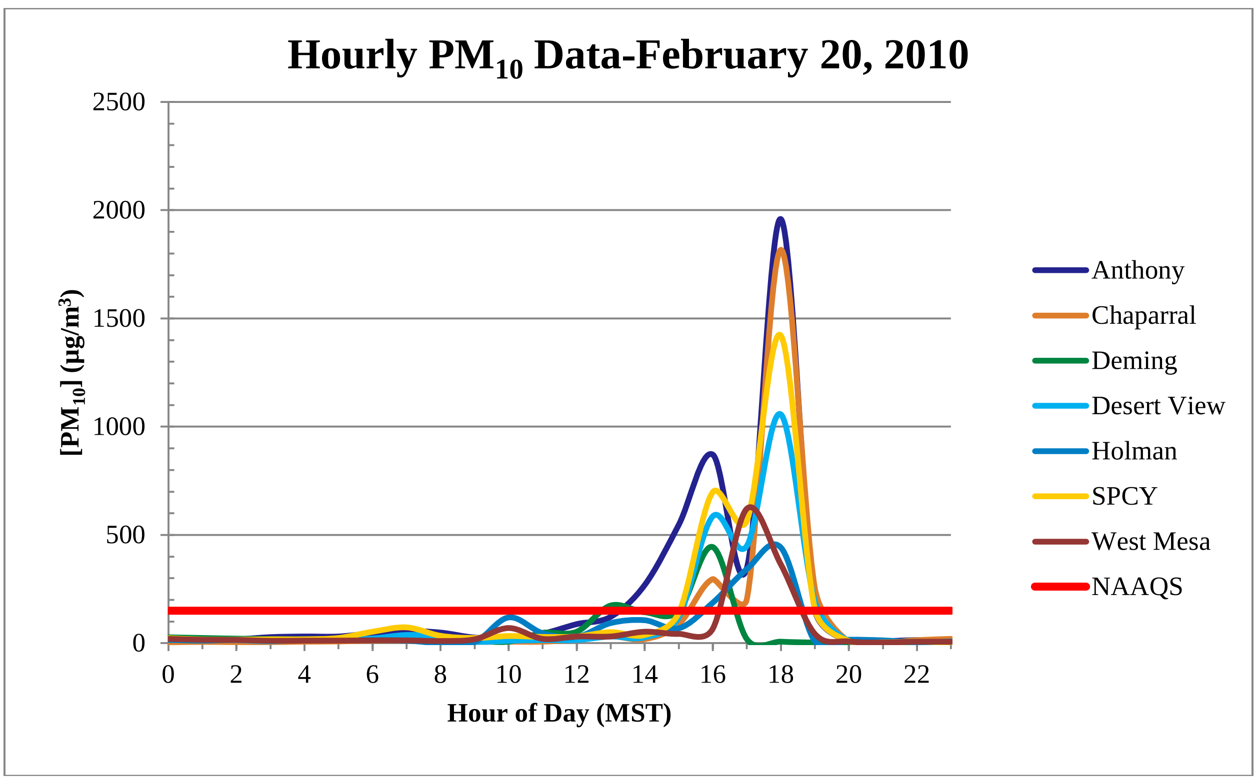

Figure 3-13. Hourly PM_{10} concentrations for Doña Ana and Luna Counties monitors.

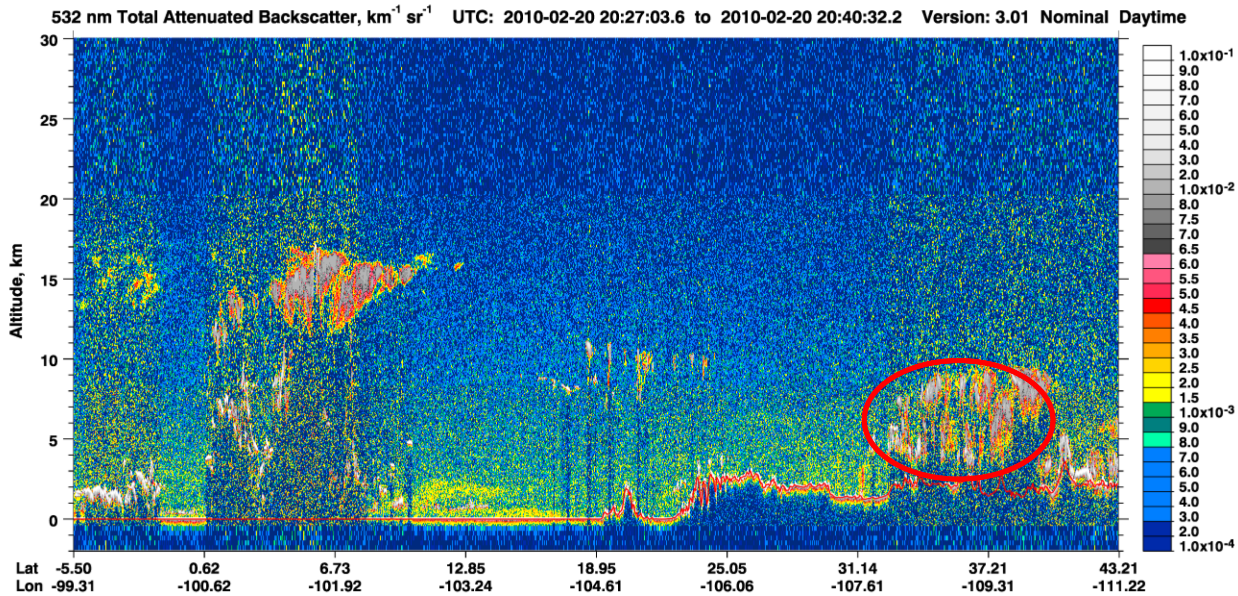

Figure 3-14. Total Attenuated Backscatter plot for February 20, 2010.

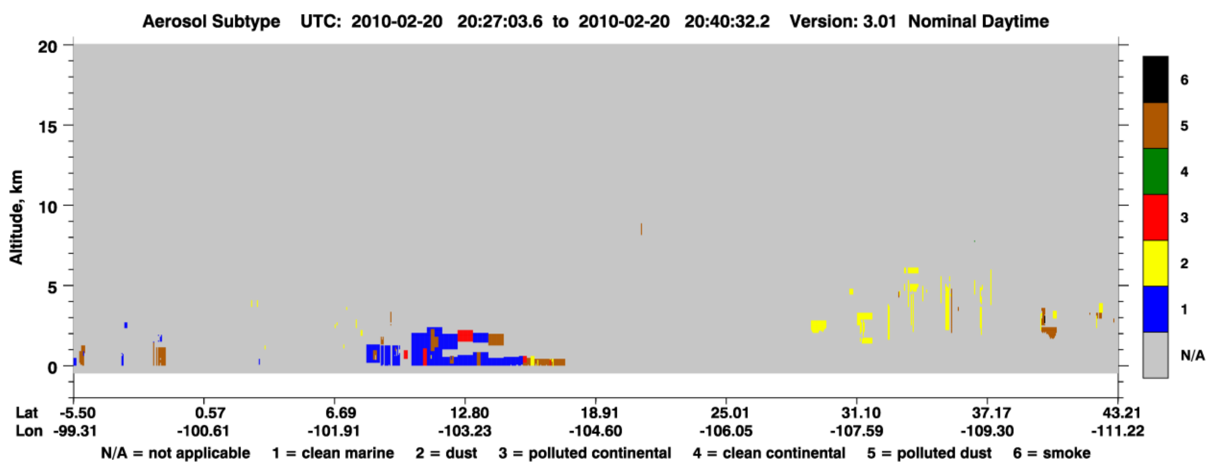

Figure 3-15. Aerosol Subtype Plot of the CALIPSO Total Attenuated Backscatter.

3.5 Affects Air Quality

The historical fluctuations and clear causal relationship analyses prove that the event in question affected air quality on February 20, 2010.

3.6 Natural Event

The CCR and nRCP analyses show that this was a natural event caused by high wind and blowing dust.

3.7 No Exceedance but for the Event

The Anthony monitor detected blowing dust around the 1400 hour with hourly concentrations heavily impacted until the 1800 hour. The five hourly PM_{10} values from 1400-1800 hours alone, exceed the 24-hour average standard at Anthony [(269 + 547 + 871 + 347 + 1959) µg/m^3 = 3993 µg/m^3; (3993 µg/m^3)/24 = 166 µg/m^3]. By replacing these five hourly values with the 95th percentile of hourly data at the Anthony site, the resulting 24-hour average (70 µg/m^3) does not exceed the NAAQS (Table 3-2). The values in red represent the 95th percentile of all hourly data collected at Anthony, including data affected by high wind blowing dust events in the table below. NMED concludes that without the high wind and blowing dust an exceedance would not have occurred.

Hour of Day (MST)	Recorded Hourly Data	Substituted Hourly Data
0	22	22
1	21	21
2	18	18
3	28	28
4	31	31
5	31	31
6	46	46
7	56	56
8	49	49
9	26	26
10	24	24
11	44	44
12	88	88
13	122	122
14	269	**160**
15	547	**161**
16	871	**163**
17	347	**195**
18	1959	**201**
19	156	156
20	10	10
21	9	9
22	14	14
23	7	7
24-Hour Average	199	**70**

Table 3-2. 95th percentile of data substituted for those hours when windblown dust was the most intense does not result in an exceedance at Anthony.

4 HIGH WIND EXCEPTIONAL EVENT: March 26, 2010

4.1 Summary of the Event

On March 26, 2010, a strong Pacific cold front moved through New Mexico causing high winds and widespread blowing dust in the border region. All of NMED's PM_{10} FEM TEOM monitors recorded exceedances of the 24-hour average NAAQS. The 24-hour averages ranged from 396 $\mu g/m^3$ at Desert View to 589 $\mu g/m^3$ at Chaparral. Table 1-1 lists all of the 24-hour average concentrations for each site. In accordance with the EER, the AQB flagged this data on EPA's AQS database as high wind natural events on or before June 1, 2011. On this date, PM_{10} 24-hour averages spiked greatly compared to the days immediately before and after the event (Figure 4-1). The averages in this figure were calculated using FEM TEOM instrument data for the four days before and after the event.

As the event unfolded, the wind blew from the southwest throughout the border region. These high velocity winds passed over large areas of desert within New Mexico and Mexico. The co-occurrence of high winds and elevated levels of blowing dust, little to no point sources in the area, and the high hourly and daily PM_{10} concentrations support the assertion that this was an exceptional event, specifically a natural event caused by high wind and blowing dust.

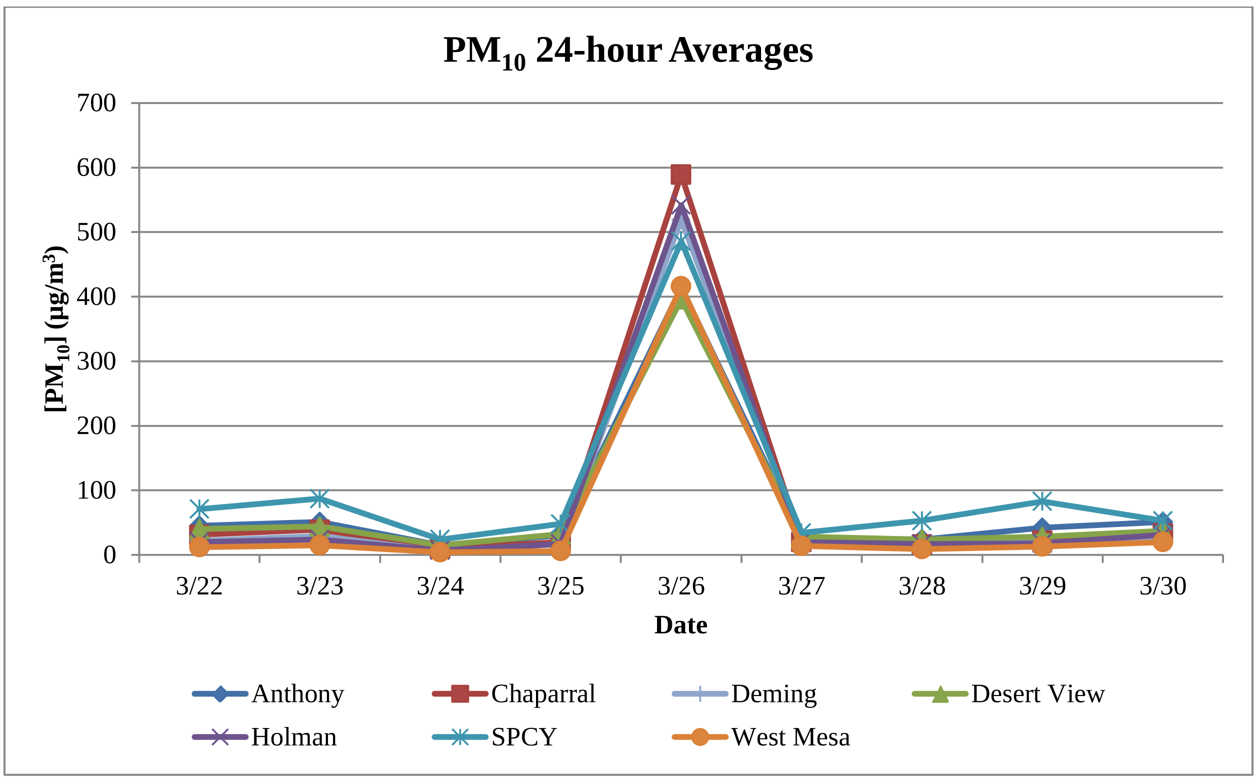

Figure 4-1. PM_{10} 24-hour averages four days before and after March 26, 2010.

4.2 Is Not Reasonably Controllable or Preventable

4.2.1 Suspected Source Areas and Categories Contributing to the Event

Sources of windblown dust contributing to this exceedance include the natural desert, residential properties, agricultural land and unpaved roads in Mexico and New Mexico. Agricultural tilling and crop planting may have contributed to this event. Doña Ana County Ordinance requires BACM for any dust producing activities. The largest sources of windblown dust are the playas of northern Mexico and desert land in New Mexico.

4.2.2 Sustained and Instantaneous Wind Speeds

EPA has indicated that sustained wind speeds of at least 11.2 m/s (25 mph) would be used as the default entrainment threshold for natural and well controlled anthropogenic sources contributing to natural events caused by high wind and blowing dust (EPA, 2011). Under the Doña Ana and Luna County NEAPs, EPA and NMED agreed that wind gusts exceeding 18 m/s would overwhelm any natural and well-controlled anthropogenic sources and cause windblown dust. On March 26, sustained wind speeds exceeded EPA's default threshold at all of the monitoring sites in southern New Mexico and wind gusts exceeded the NEAP's agreed upon threshold at all monitoring sites as well (Figures 4-2 and 4-3). Winds exceeded these thresholds at one or more monitoring site beginning at the 1100 hour and ending at the 1800 hour. The meteorological tower at the Anthony site measures wind speed at two meters instead of the customary 10 meters. Due to this fact, this demonstration uses data from La Union (the closet site).

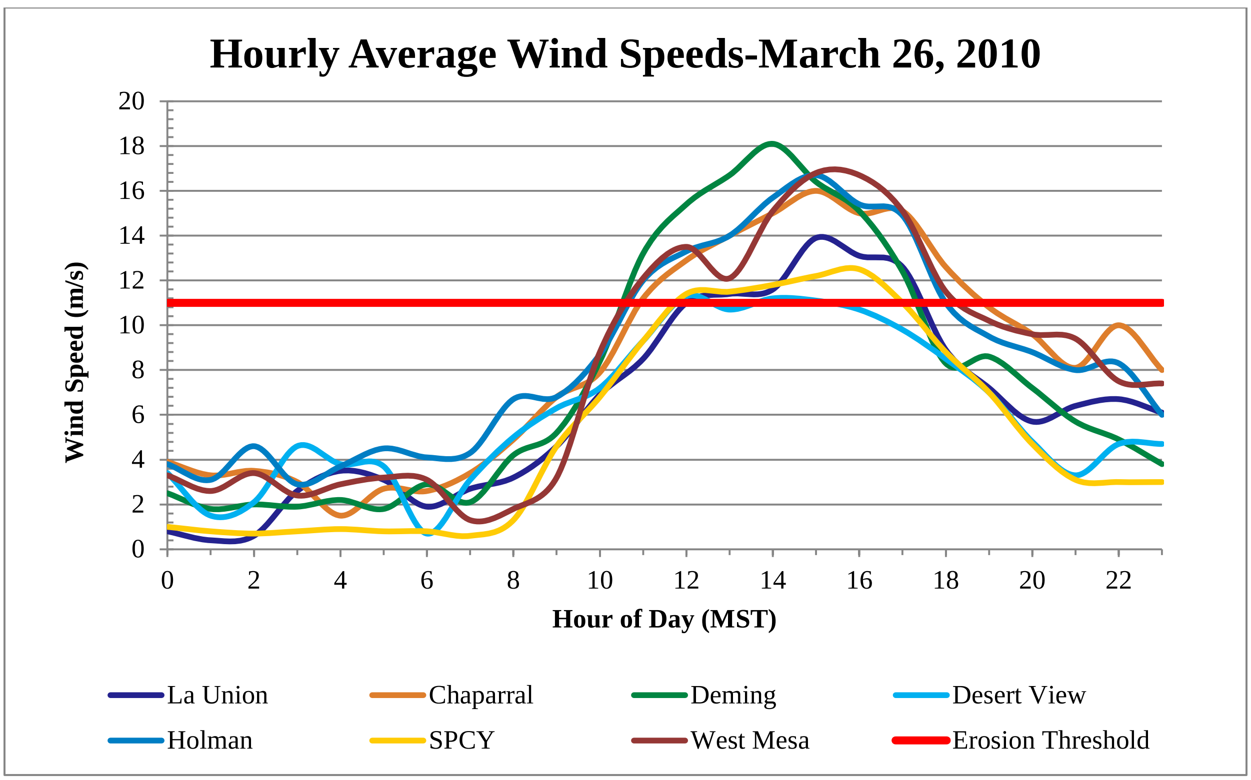

Figure 4-2. Sustained wind speeds at monitoring sites in Doña Ana and Luna Counties.

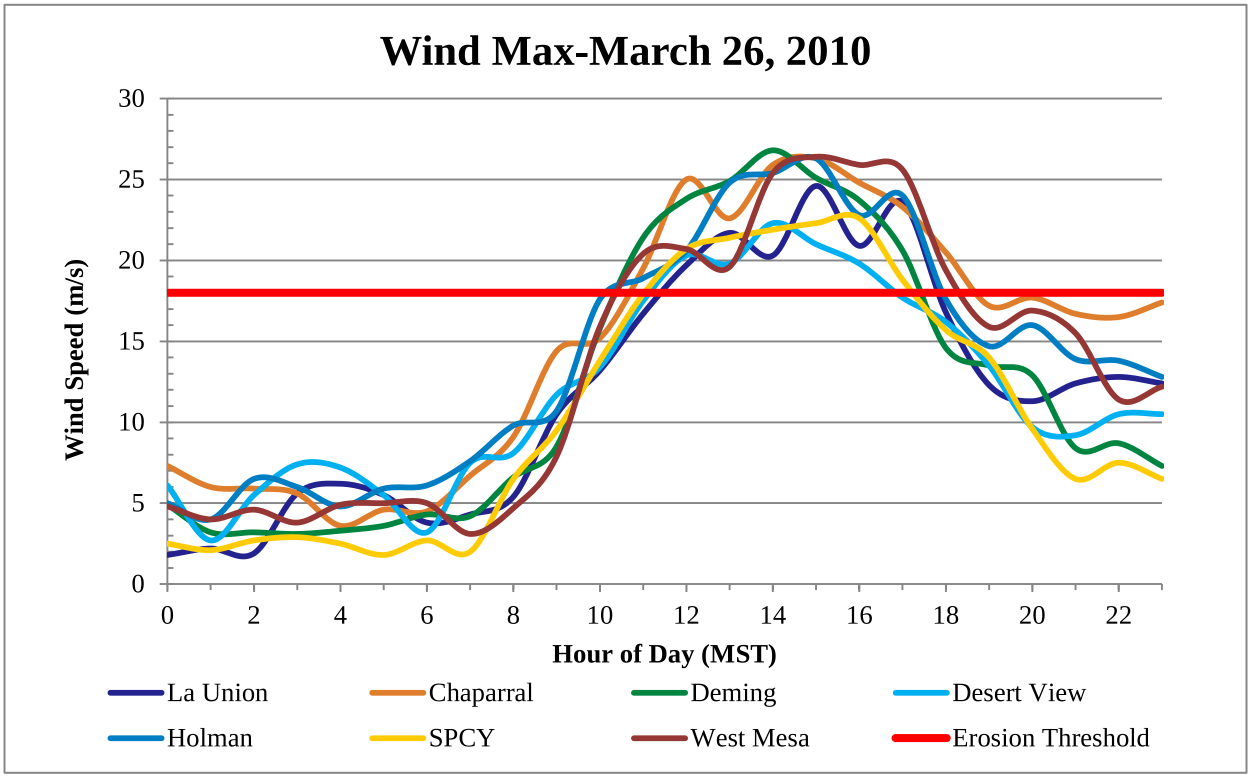

Figure 4-3. Maximum wind gusts at monitoring sites in Doña Ana and Luna Counties.

4.2.3 Recurrence Frequency

The monitoring sites in Doña Ana and Luna Counties can record exceedances of the PM_{10} NAAQS throughout the year. From 2003-2009 the FEM TEOM monitors have recorded 262 exceedances and the FRM Wedding monitors have recorded 10 exceedances (Figure 4-4). This large disparity in the number of monitored exceedances is due to the FRM Wedding sampling schedules of 1-in-6 days. There is additional evidence that under high loading conditions, the FEM TEOM monitors record 1.5 to 4 times higher concentrations as do the FRM Weddings. The Deming Airport and Desert View monitoring sites (FEM TEOMs) were established in 2006 and 2007 respectively and do not show exceedances until the year following startup (Table 2-1). Also, note that the FEM TEOM monitors at Holman, West Mesa and Chaparral were not part of the SLAMS network until 2006.

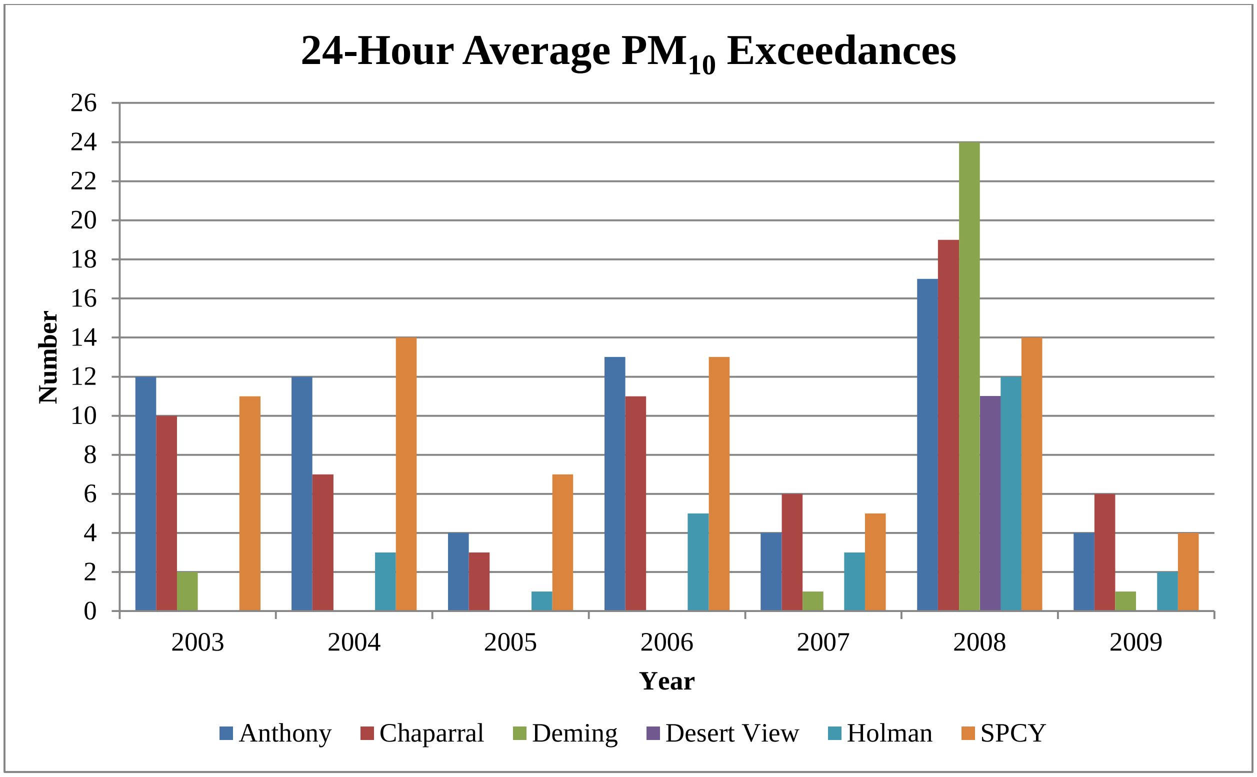

Figure 4-4. Exceedances recorded by the FEM TEOM and FRM Wedding monitors at Anthony, SPCY and Deming. All other monitors are FEM TEOM monitors.

4.2.4 Controls Analysis

The local ordinances and MOUs adopted under the NEAP direct the implementation of BACM for sources of dust in Doña Ana County. The ordinances regulate disturbed lands, construction and demolition, vacant parking lots and materials handling and transportation. Our investigation did not identify any unusual PM_{10} producing activities on this day, and anthropogenic emissions remained constant before, during and after the event. The most likely source contributing to the event is the playas of northern Mexico. The southern sites recorded the highest 24-hour averages in the monitoring network. A back-trajectory analysis using the HYSPLIT (Draxler et al., 2011; Rolph, 2011) model shows that the air masses traveled from Mexico to the monitors in southern Doña Ana County. The model starts four hours before the start of elevated PM_{10} concentrations during the event (Figure 4-5). Costs prohibit controlling dust from the natural desert terrain and falls outside NMED's jurisdiction when it originates in Mexico. NMED concludes that the sources that caused the event are not reasonably controllable.

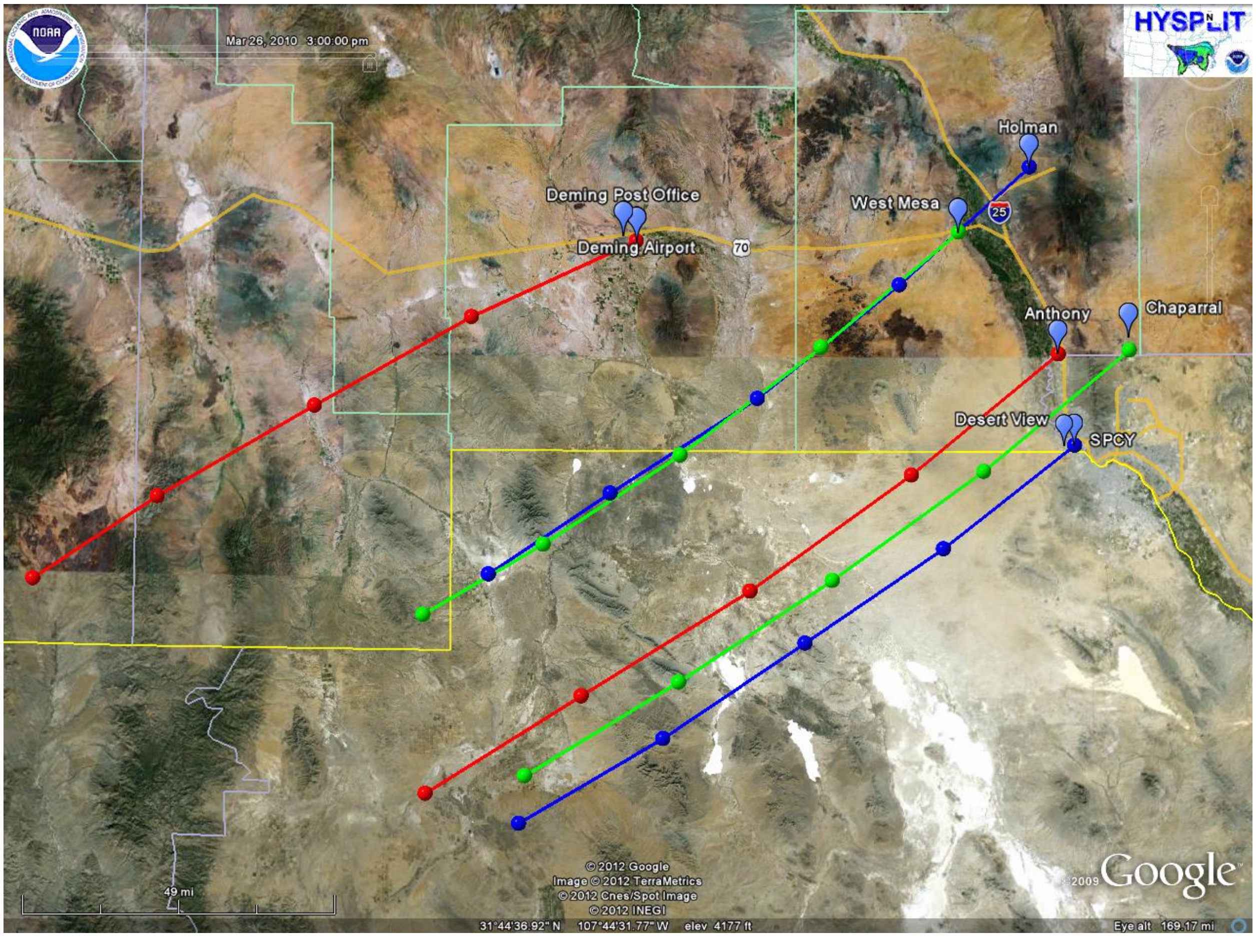

Figure 4-5. HYSPLIT back-trajectory model analysis for March 26, 2010.

4.3 Historical Fluctuations Analysis

4.3.1 Annual and Seasonal 24-hour Average Fluctuations

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 4-6 through 4-12). Most exceedances occur from late winter through early summer (February-June) and are associated with the passage of Pacific cold fronts. The only monitoring site to record exceedances when winds are calm is the SPCY site. From 2003 to 2005, NMED recorded fourteen low wind exceedances at this site. Since 2005, NMED has not recorded a low wind exceedance of the PM_{10} 24-hour standard at this site. 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_{10} came from international transport from Ciudad Juárez, Mexico (DuBois et al, 2009). The maximum 24-hour average PM_{10} concentration recorded by NMED was 1110 $\mu g/m^3$ 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.

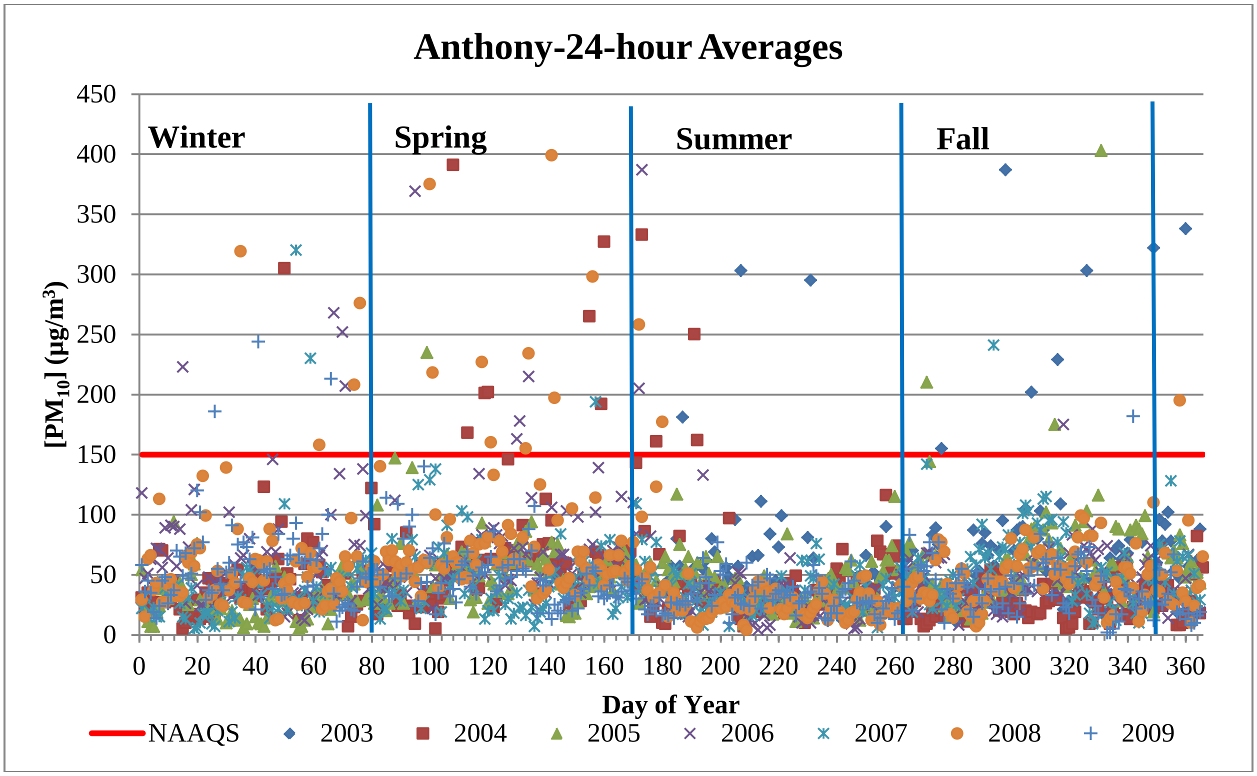

Figure 4-6. 24-hour average PM_{10} concentrations (FEM TEOM data) by day of year from 2003-2009

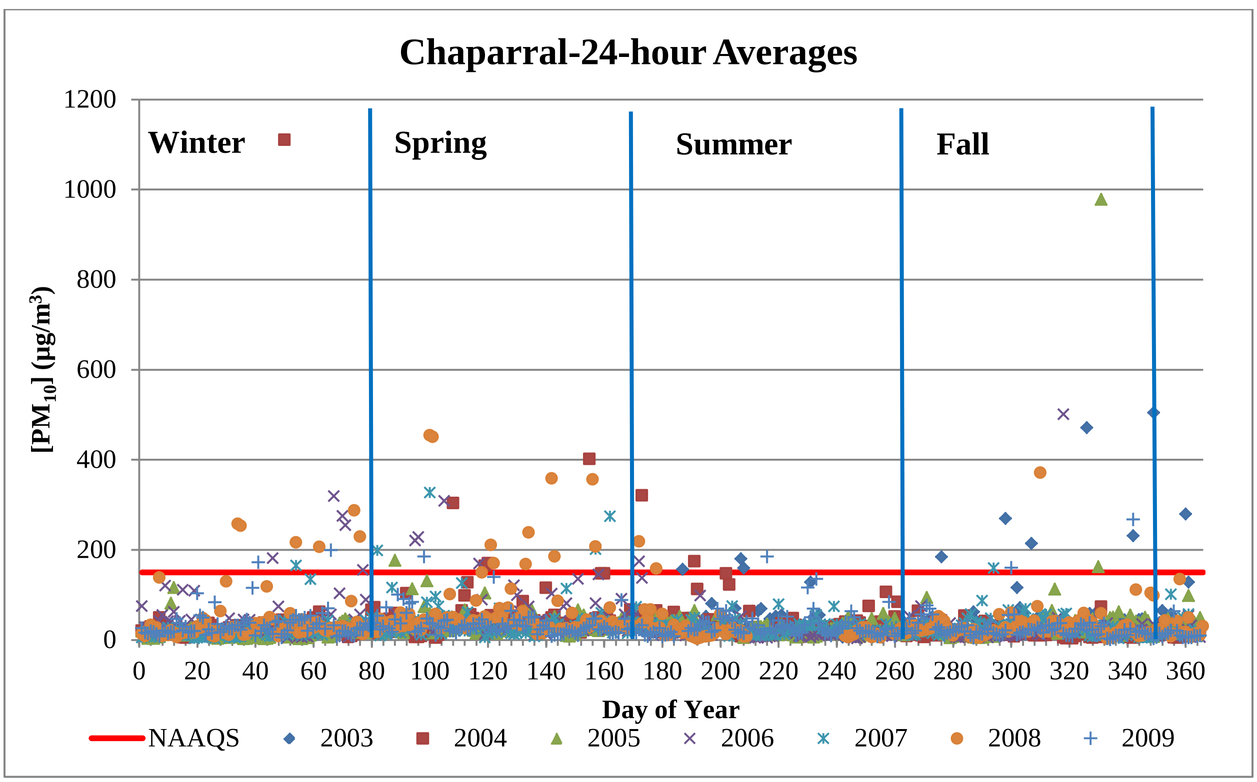

Figure 4-7. 24-hour average PM_{10} concentrations (FEM TEOM data) by day of year from 2003-2009

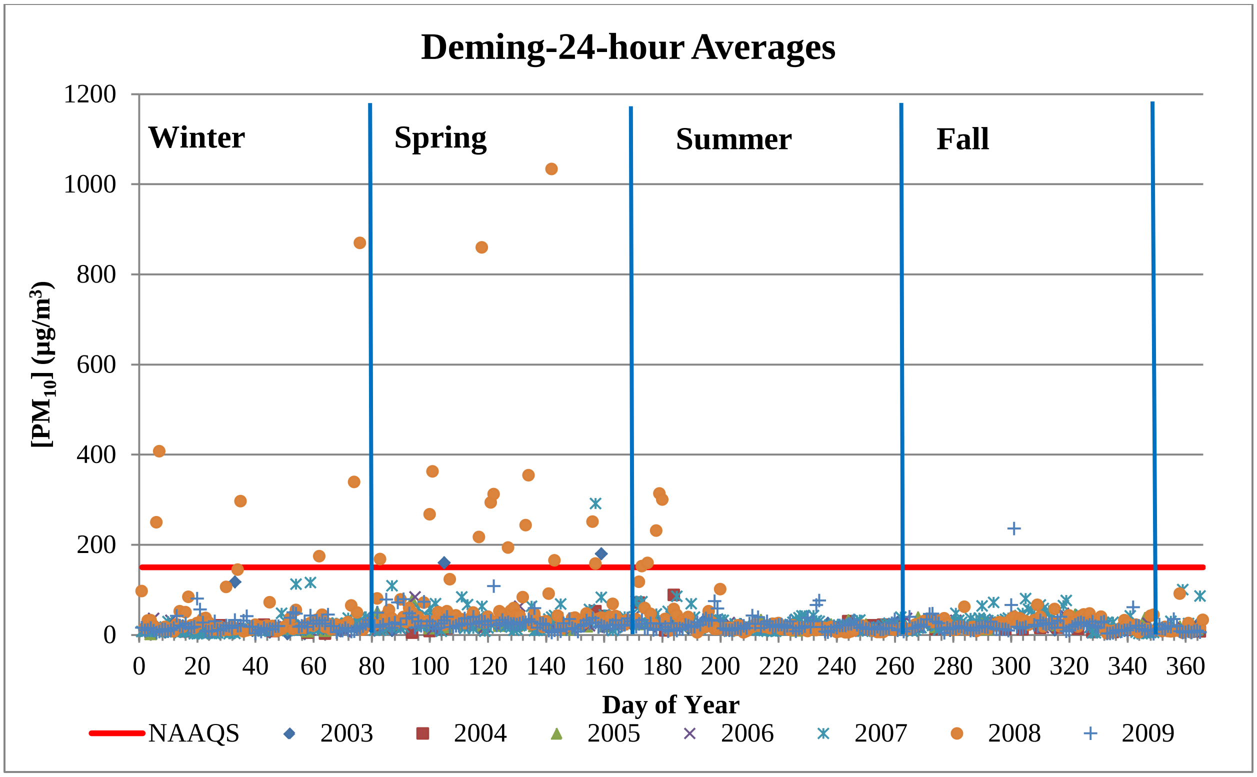

Figure 4-8. 24-hour average PM_{10} concentrations by day of year from 2003-2009. FRM Wedding data from 2003-2006. FEM TEOM data from 2007-2009.

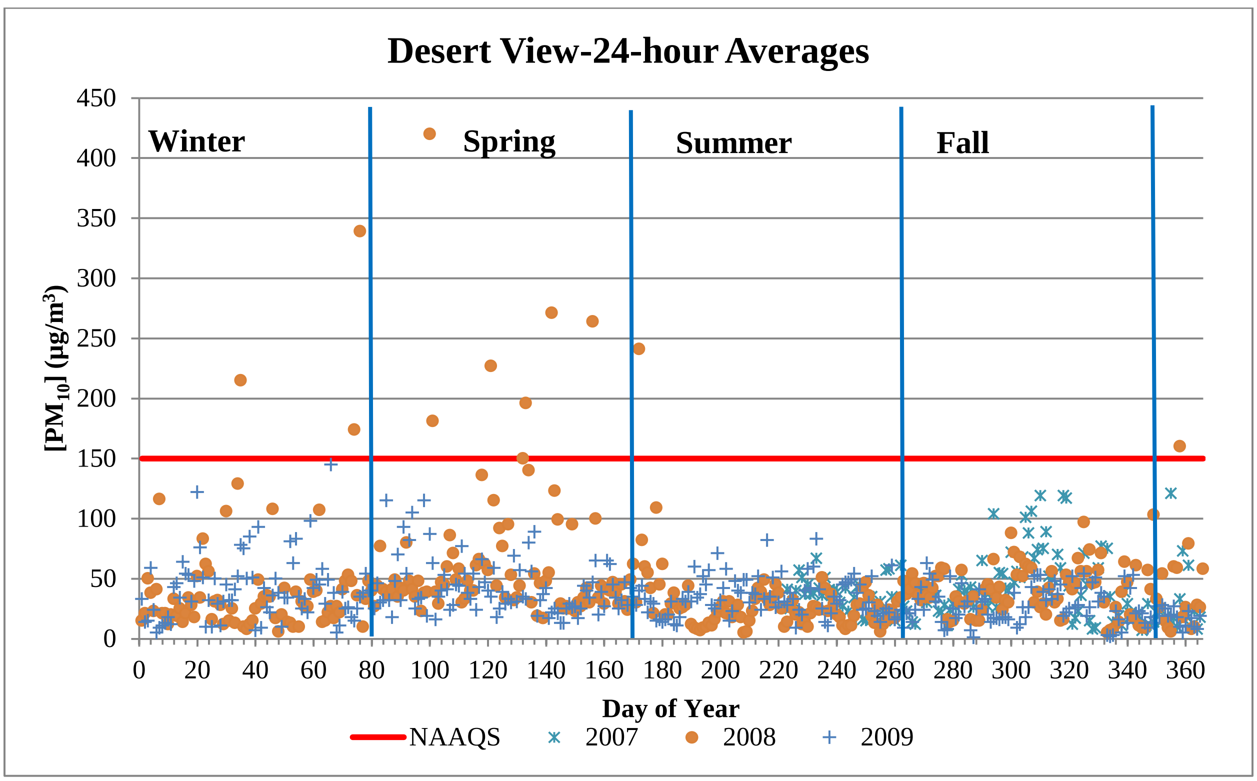

Figure 4-9. 24-hour average PM_{10} concentrations (FEM TEOM data) by day of year from 2007-2009

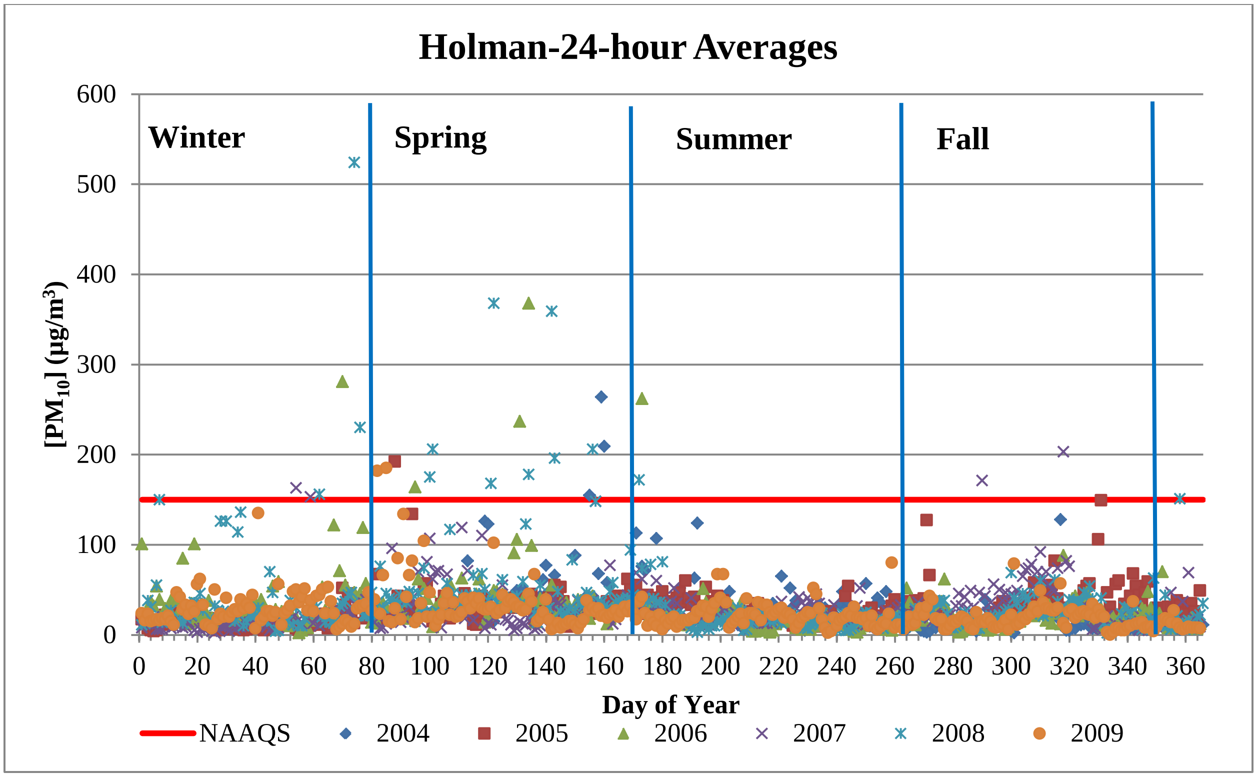

Figure 4-10. 24-hour average PM_{10} concentrations (FEM TEOM data) by day of year from 2004-2009

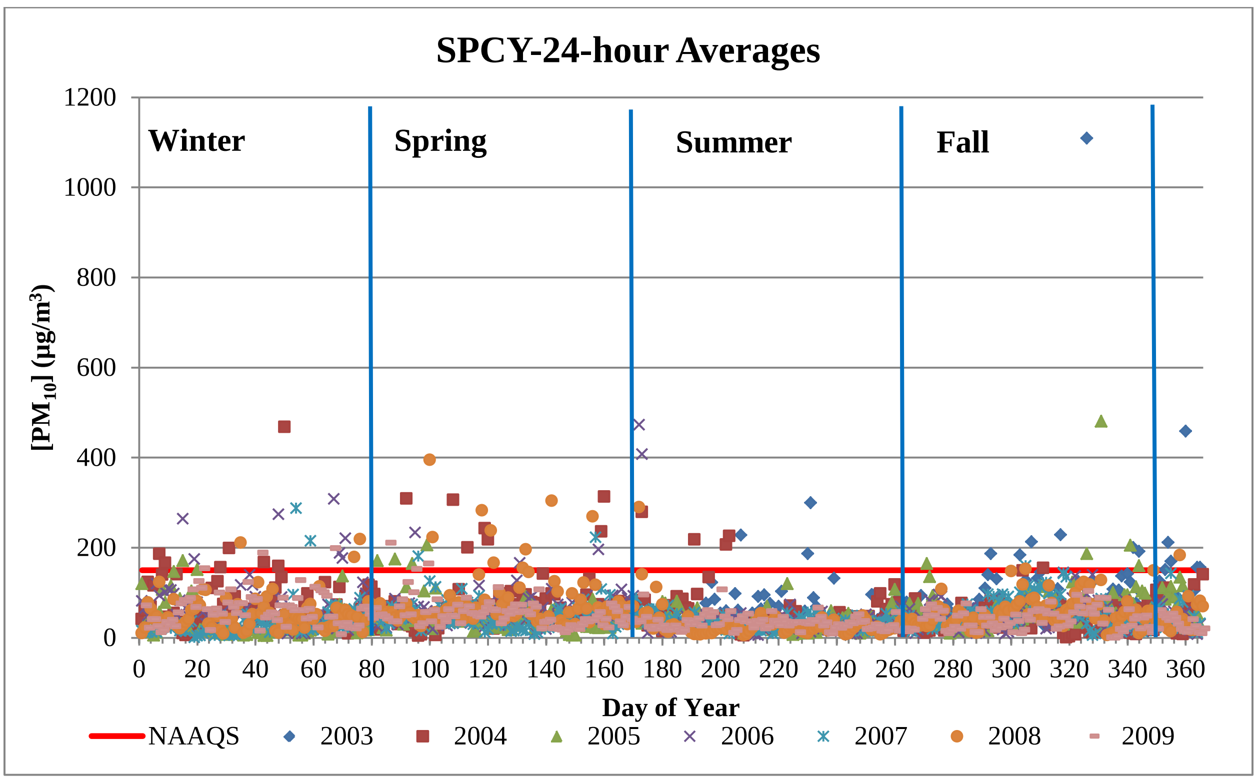

Figure 4-11. 24-hour average PM_{10} concentrations (FEM TEOM data) by day of year from 2003-2009.

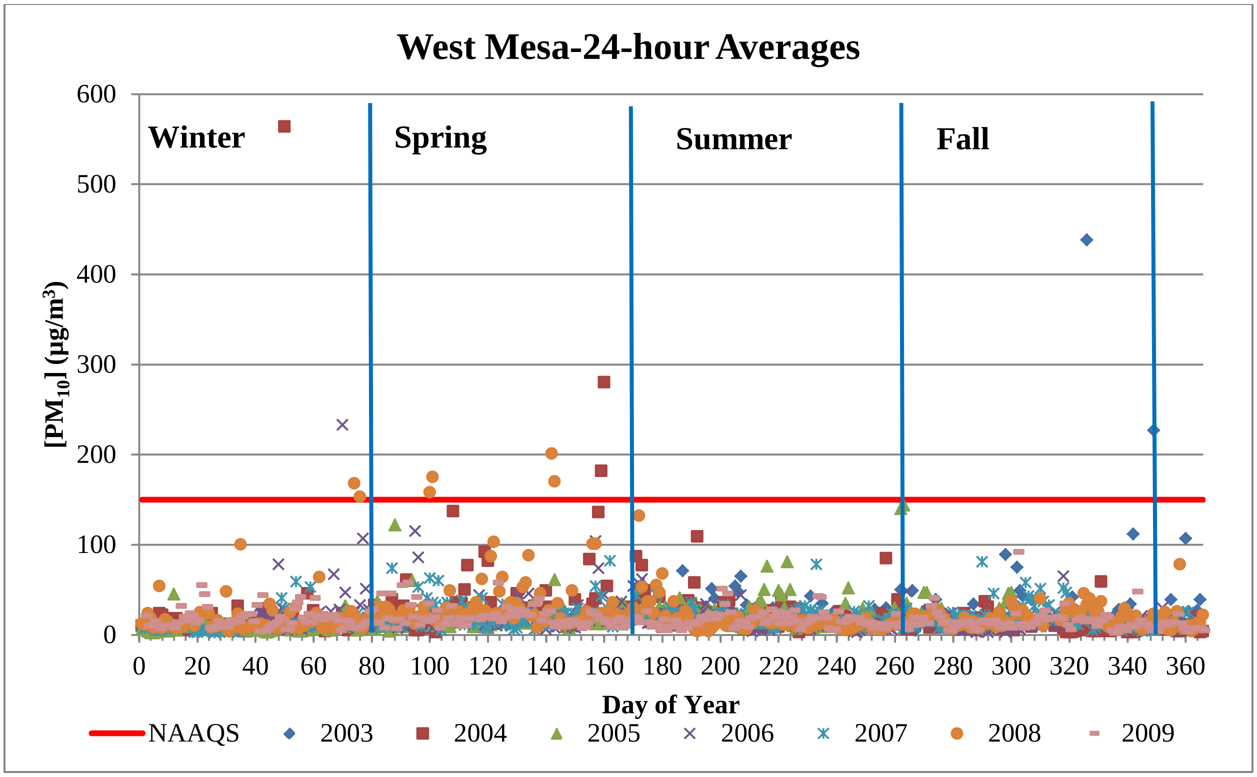

Figure 4-12. 24-hour average PM_{10} concentrations (FEM TEOM data) by day of year from 2003-2009

Table 4-1 shows normal historical fluctuations with and without high wind natural events that caused exceedances from 2003-2009. The analysis excludes only those high wind events that resulted in an exceedance. The low wind exceedances recorded at SPCY from 2003 to 2005 are included in the analysis when high wind events are excluded. Data in this table includes FRM Wedding and FEM TEOM data from 2003-2009 when available. The recorded values for this day are above the maximum value recorded when no high wind exceedances are included and is above the 99th percentile of all 24-hour averages recorded.

Anthony	Max	99th	95th	75th	50th	Mean	25th	5th	Minimum
No Events	147	120	88	56	38	42	25	12	2
Events	403	234	100	57	38	47	25	12	2
Chaparral	**Max**	**99th**	**95th**	**75th**	**50th**	**Mean**	**25th**	**5th**	**Minimum**
No Events	149	116	65	35	24	28	15	6	1
Events	1110	254	90	37	24	35	15	6	1
Deming	**Max**	**99th**	**95th**	**75th**	**50th**	**Mean**	**25th**	**5th**	**Minimum**
No Events	152	88	53	28	19	23	12	6	2
Events	1033	239	65	28	19	28	12	6	2
Desert View	**Max**	**99th**	**95th**	**75th**	**50th**	**Mean**	**25th**	**5th**	**Minimum**
No Events	150	119	82	47	33	37	21	10	1
Events	420	176	90	48	33	40	21	10	1
Holman	**Max**	**99th**	**95th**	**75th**	**50th**	**Mean**	**25th**	**5th**	**Minimum**
No Events	153	119	62	34	23	27	14	6	0
Events	524	170	69	35	23	29	14	6	0
SPCY	**Max**	**99th**	**95th**	**75th**	**50th**	**Mean**	**25th**	**5th**	**Minimum**
No Events	212	143	108	60	39	46	24	11	0
Events	1109	227	123	63	40	51	25	11	0
West Mesa	**Max**	**99th**	**95th**	**75th**	**50th**	**Mean**	**25th**	**5th**	**Minimum**
No Events	153	87	46	23	15	19	10	5	0
Events	564	106	47	23	15	20	10	5	0

Table 4-4-1. 24-hour average PM_{10} data distribution with and without high wind events included.

An hourly data distribution analysis was performed for hourly PM_{10} concentrations, wind speeds and wind gusts (Appendices A, B and C). All data for this analysis use the FEM TEOM monitors. Overlaying the hourly data for March 26 on the hourly data distribution plots shows that the values recorded during the high wind event exceed the 95th percentile for PM_{10}, wind speed and wind gusts (Figures 4-13 through 4-33). The top whisker of the of the box and whisker plots represent the 95th percentile of data. As stated previously, wind data used for the Anthony site come from the La Union site. The hourly PM_{10} values during the high wind blowing dust storm far exceed the historical 95th percentile of data.

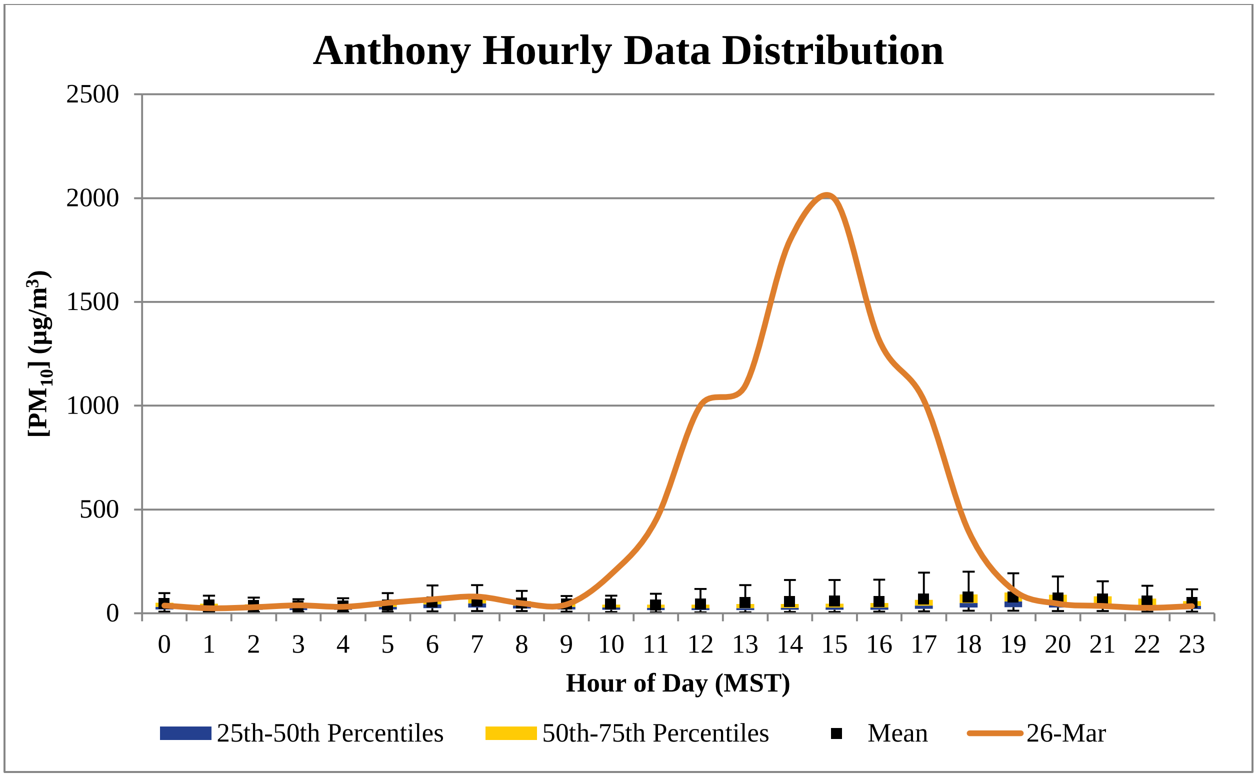

Figure 4-13. PM_{10} hourly data distribution from 2003-2009 overlaid by hourly values for March 26, 2010.

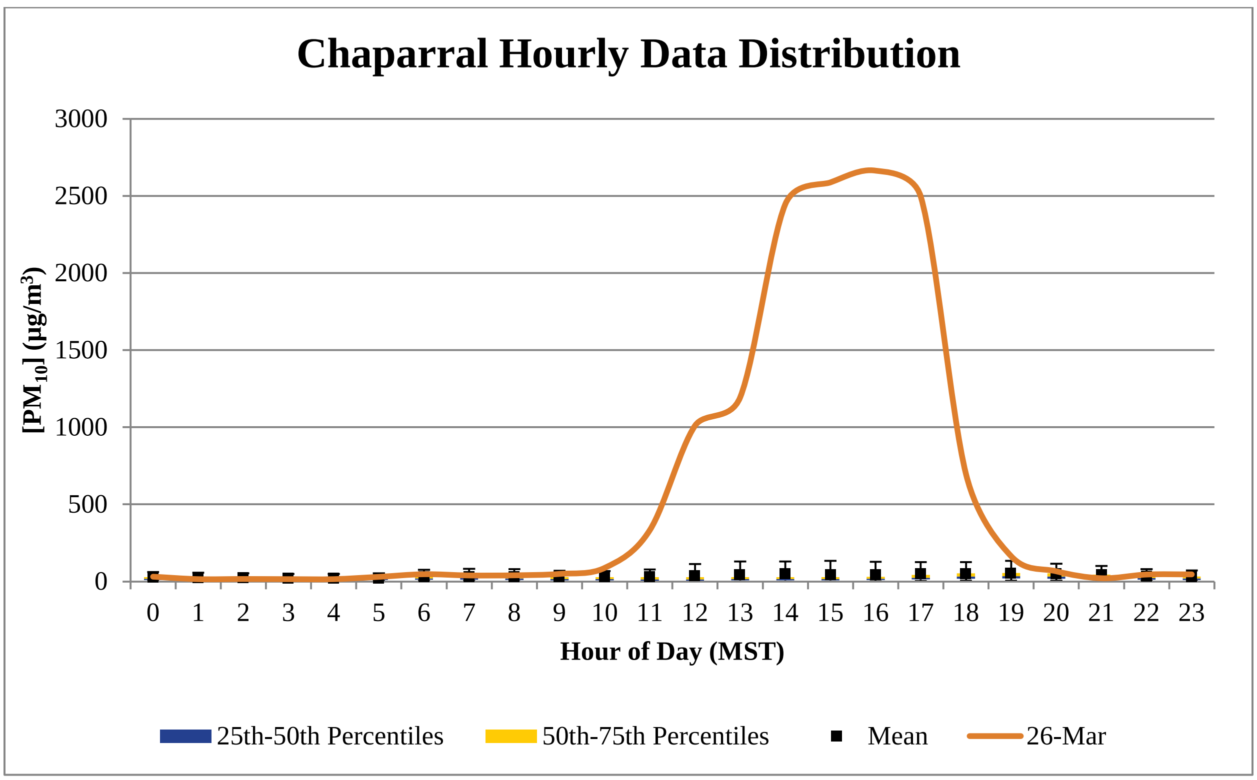

Figure 4-14. PM_{10} hourly data distribution from 2003-2009 overlaid by hourly values for March 26, 2010.

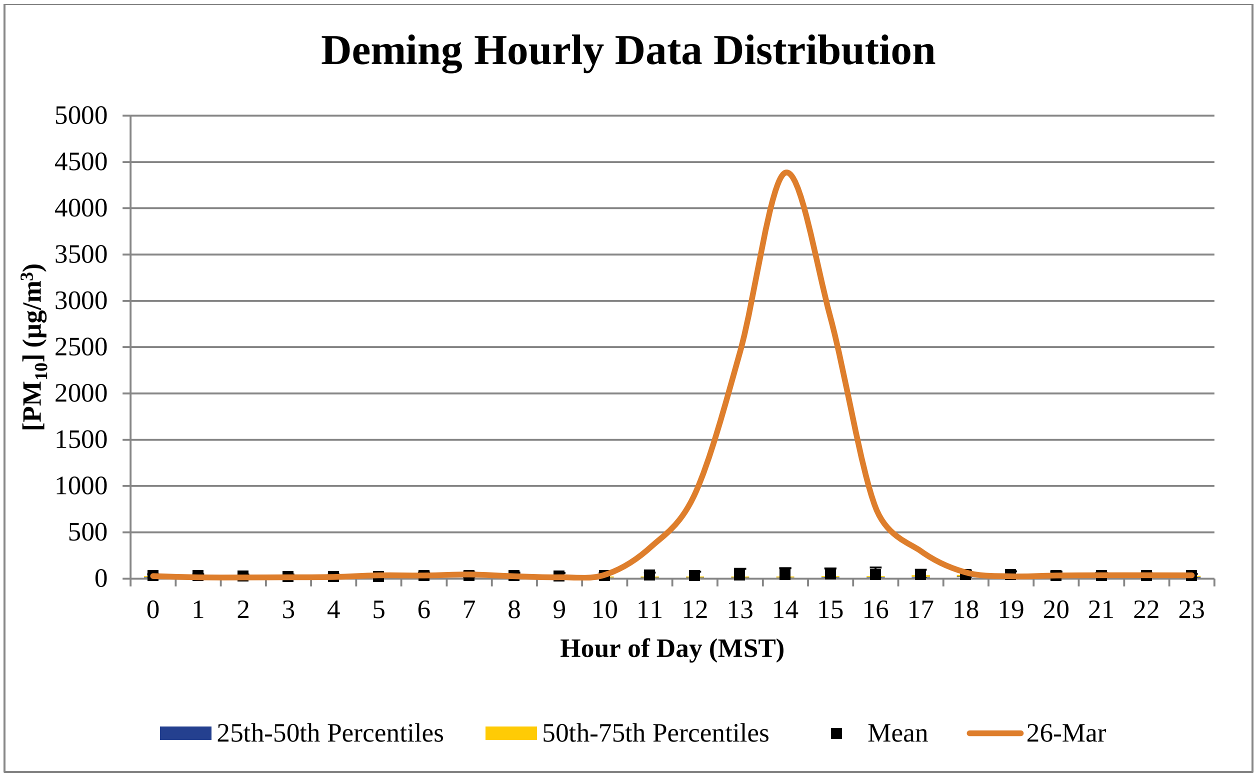

Figure 4-15. PM_{10} hourly data distribution from 2006-2009 overlaid by hourly values for March 26, 2010.

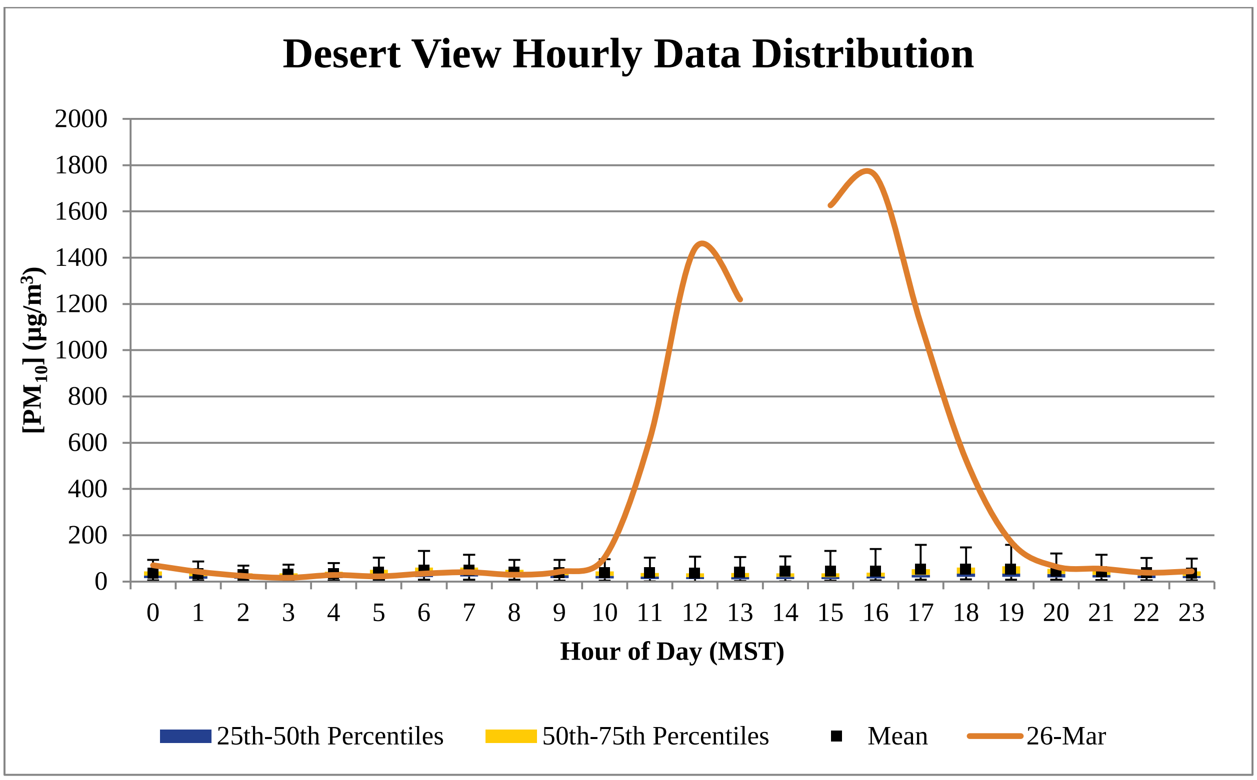

Figure 4-16. PM_{10} hourly data distribution from 2007-2009 overlaid by hourly values for March 26, 2010. Data for the 1400 hour was incomplete and not included for this day.

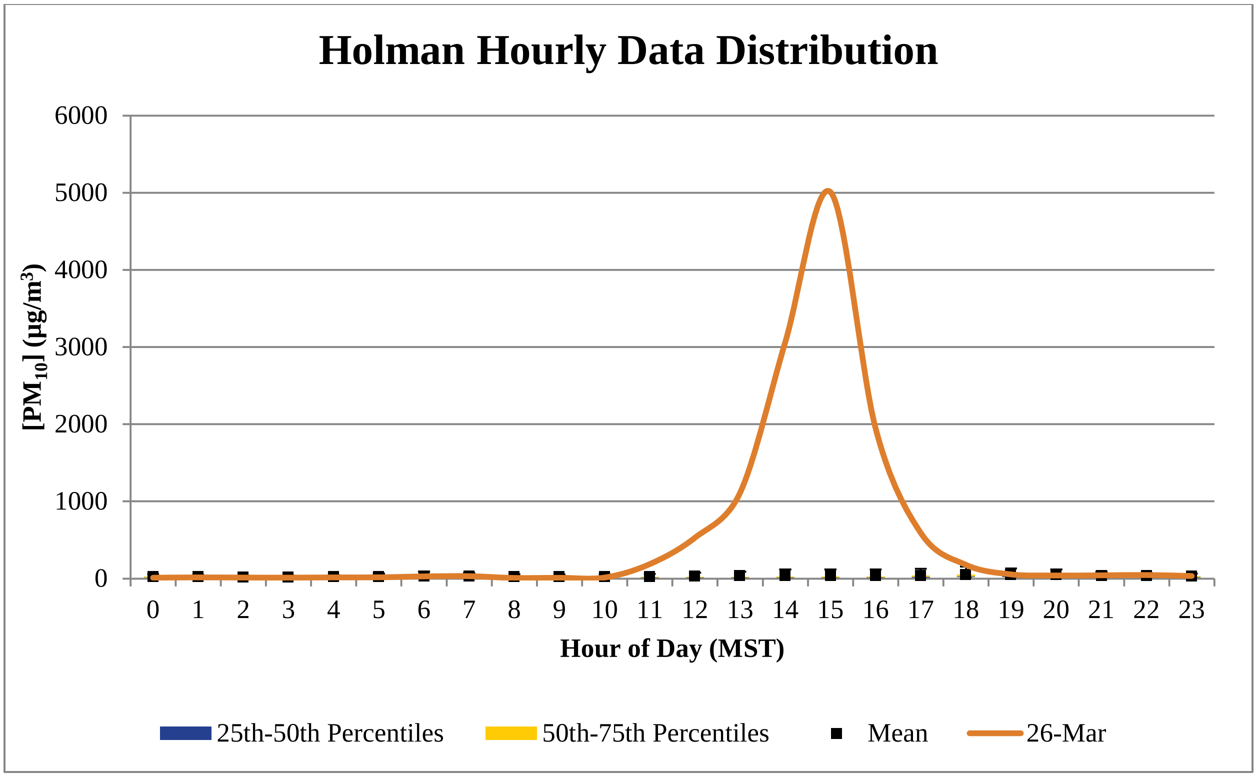

Figure 4-17. PM_{10} hourly data distribution from 2004-2009 overlaid by hourly values for March 26, 2010.

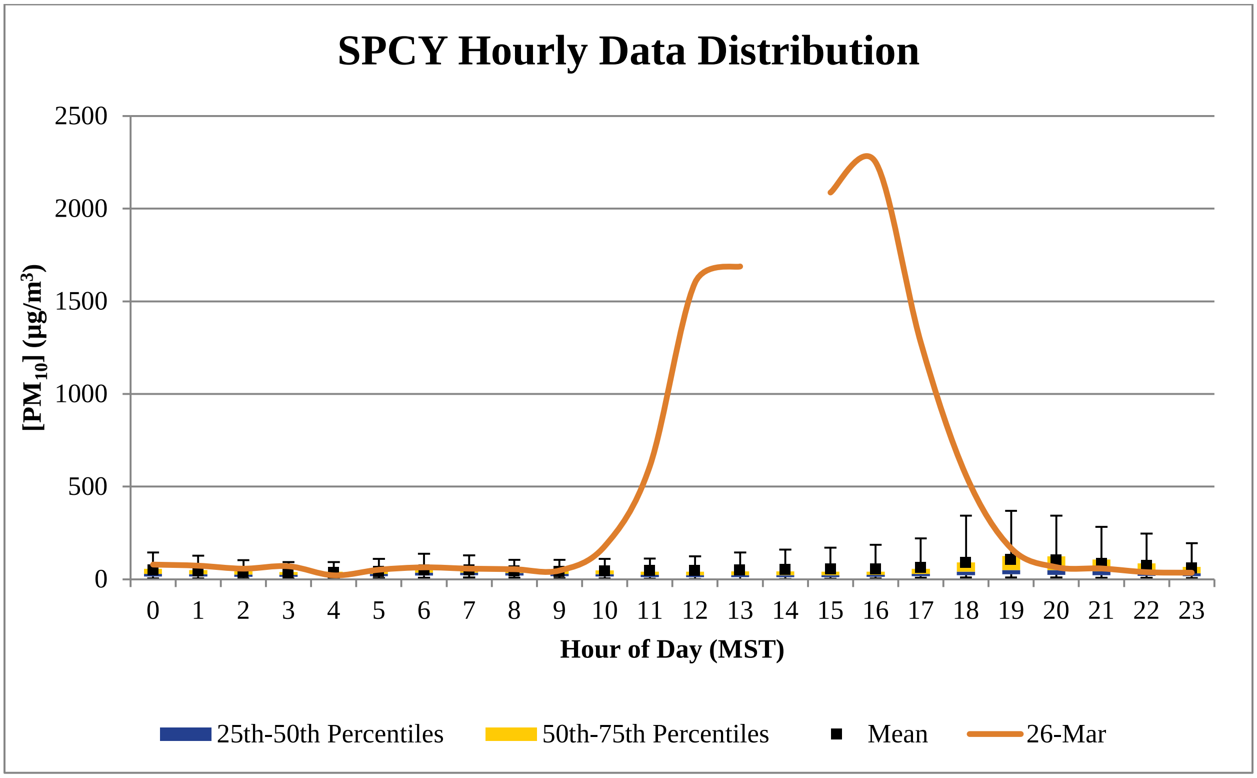

Figure 4-18. PM_{10} hourly data distribution from 2003-2009 overlaid by hourly values for March 26, 2010. Data for the 1400 hour was incomplete and not included for this day.

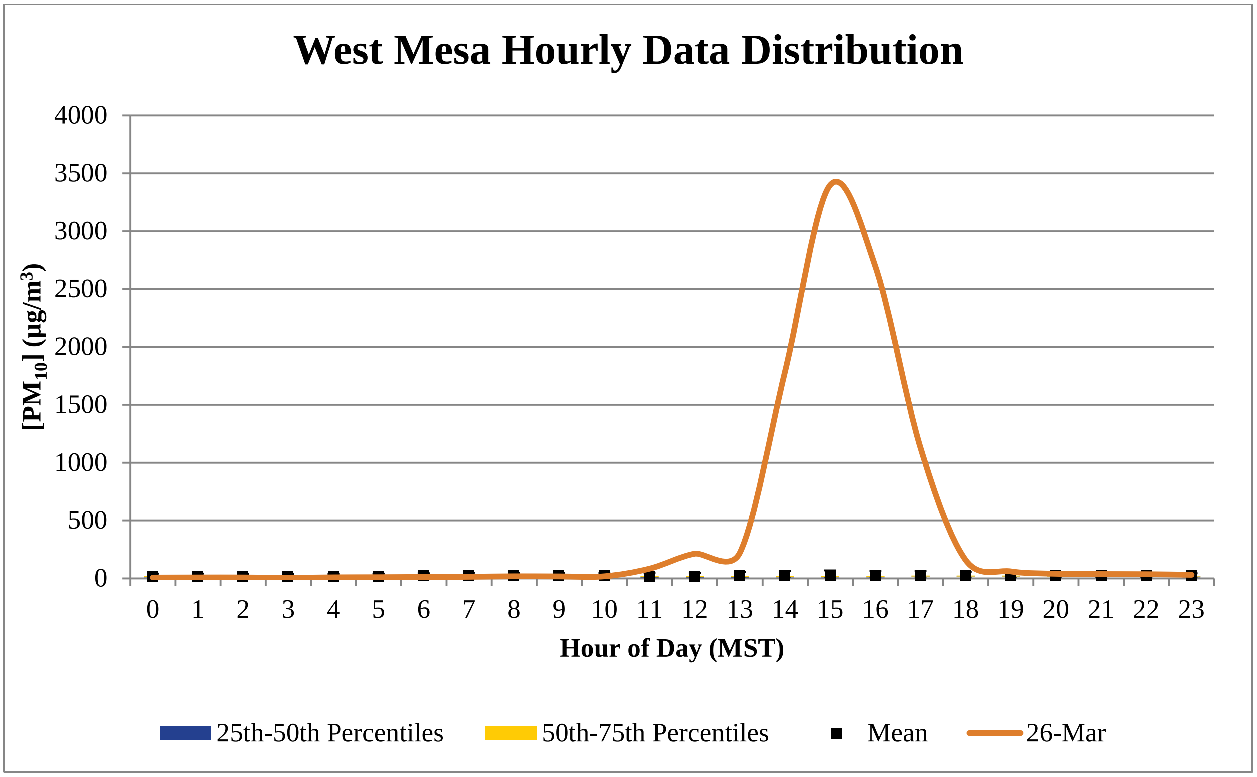

Figure 4-19. PM_{10} hourly data distribution from 2003-2009 overlaid by hourly values for March 26, 2010.

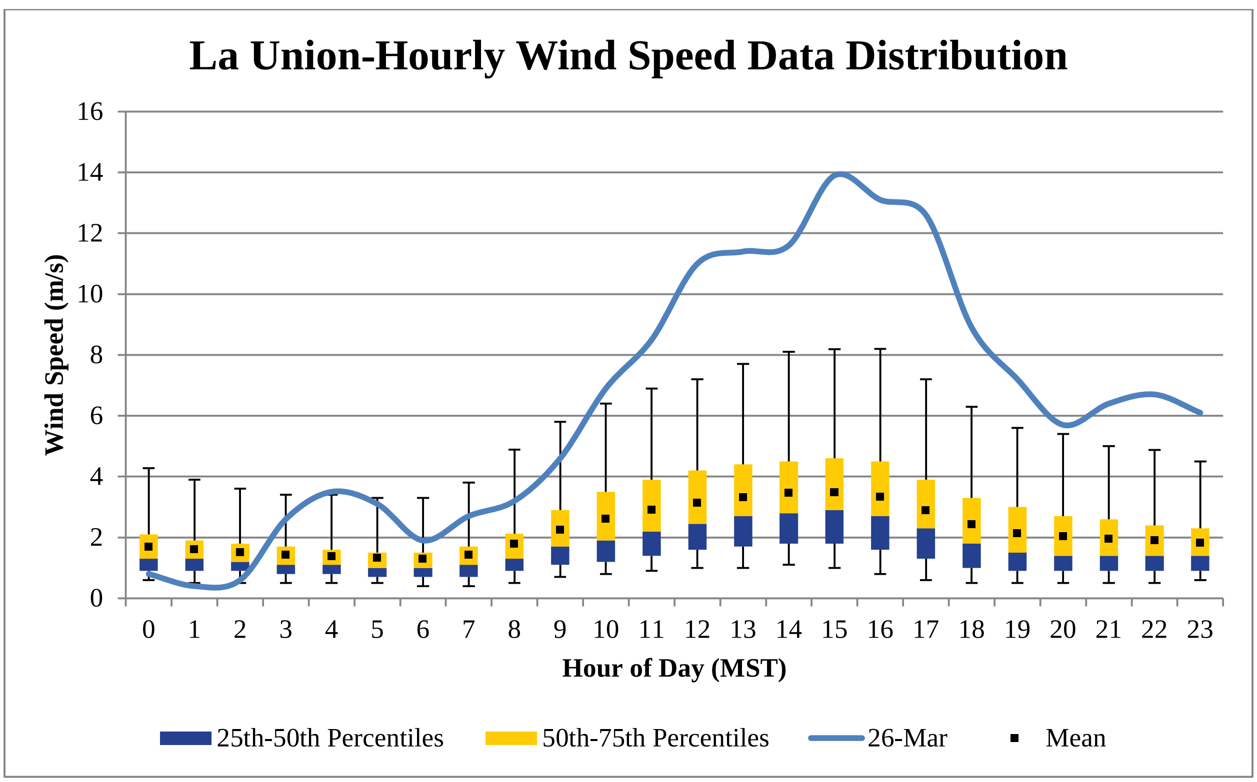

Figure 4-20. Hourly wind speed data distribution from 2003-2009 overlaid by hourly values for March 26, 2010.

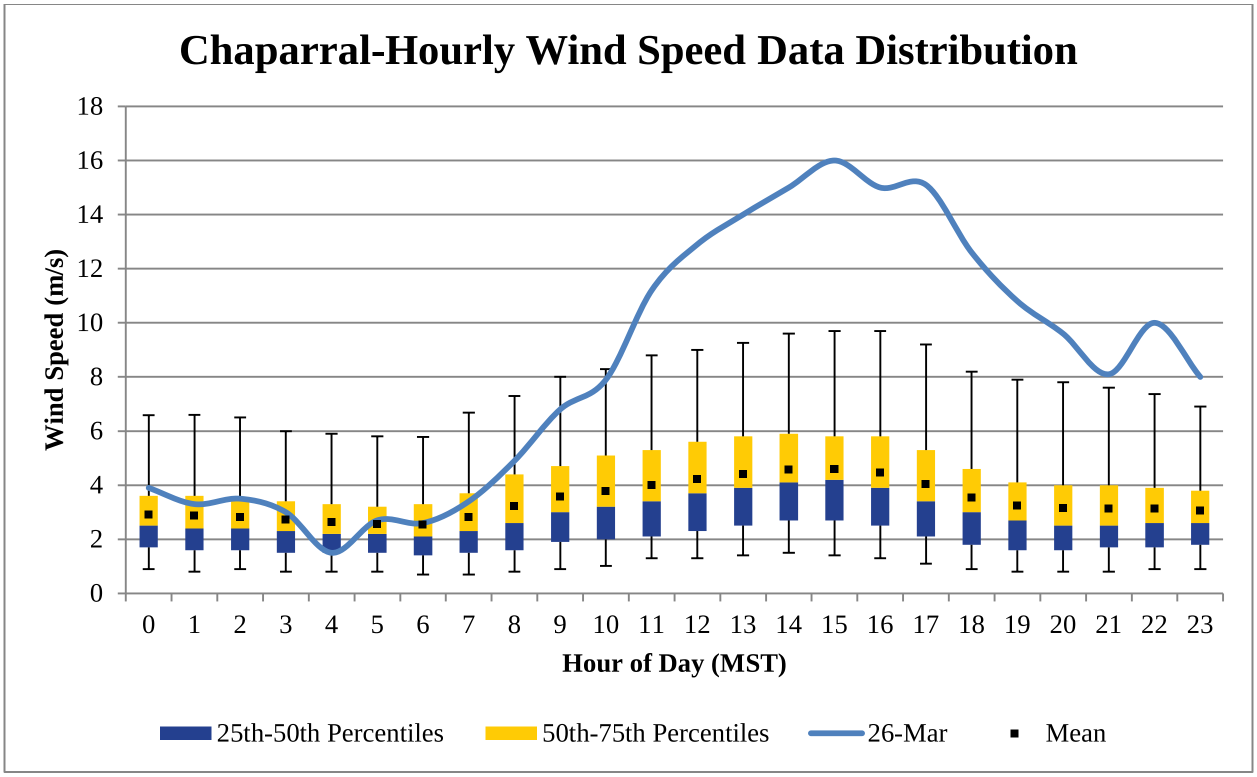

Figure 4-21. Hourly wind speed data distribution from 2003-2009 overlaid by hourly values for March 26, 2010.

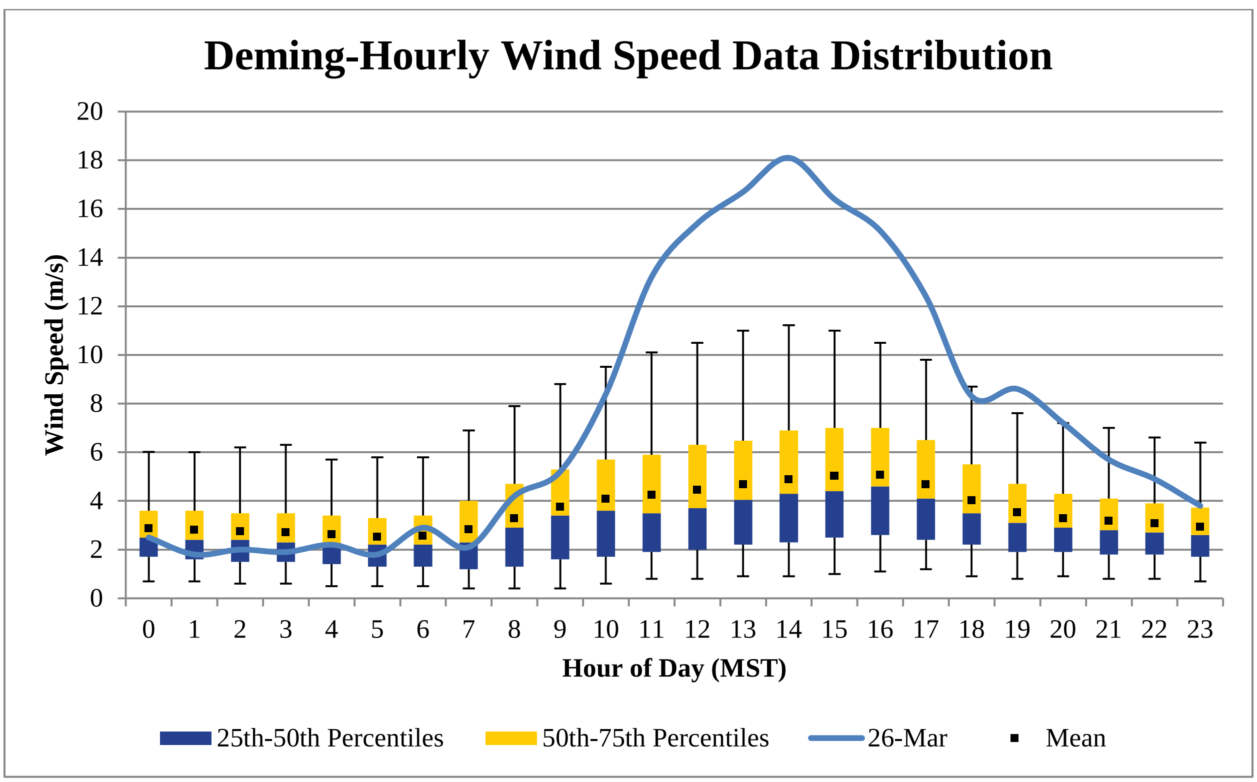

Figure 4-22. Hourly wind speed data distribution from 2003-2009 overlaid by hourly values for March 26, 2010.

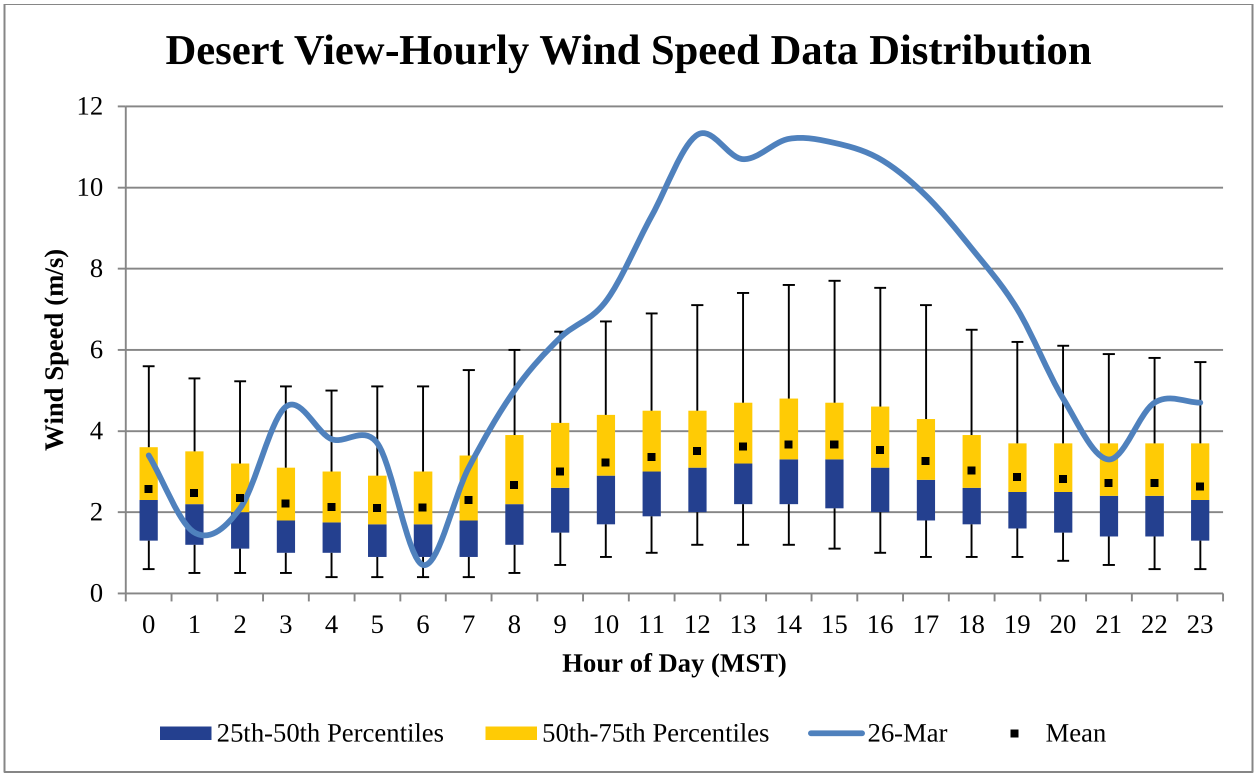

Figure 4-23. Hourly wind speed data distribution from 2003-2009 overlaid by hourly values for March 26, 2010.

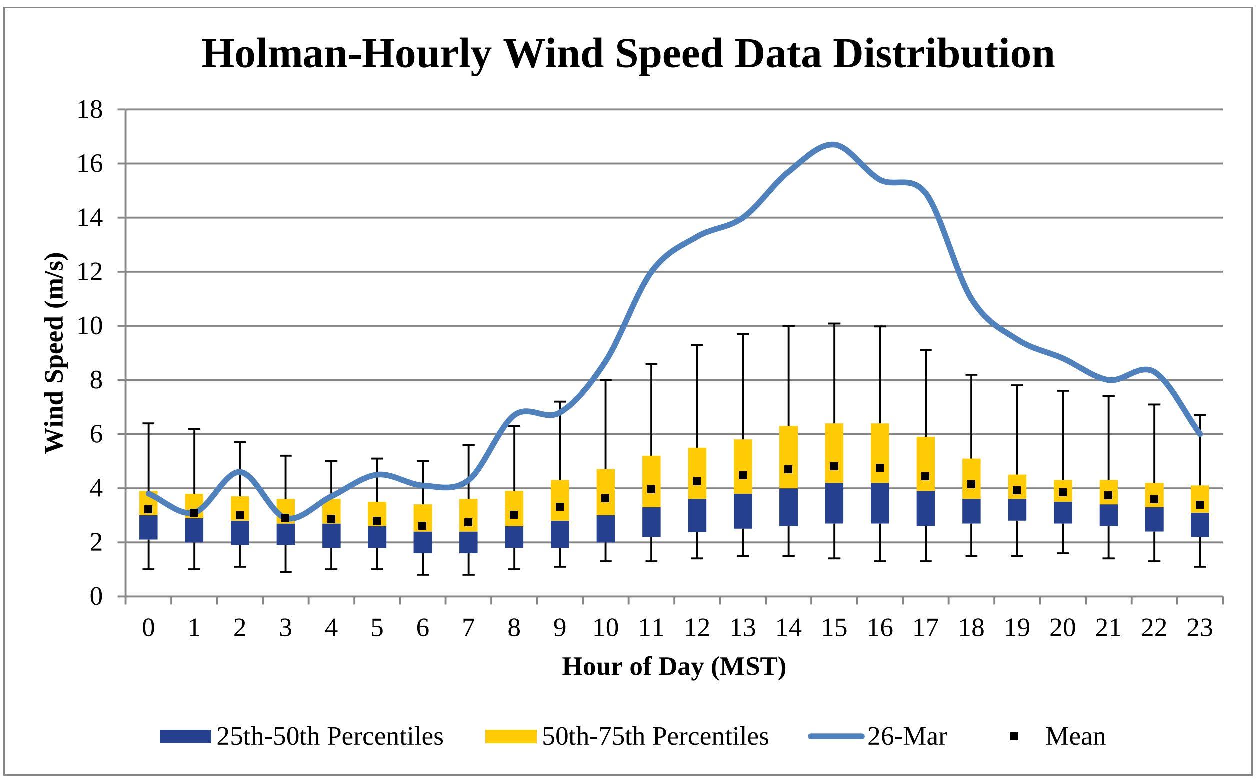

Figure 4-24. Hourly wind speed data distribution from 2004-2009 overlaid by hourly values for March 26, 2010.

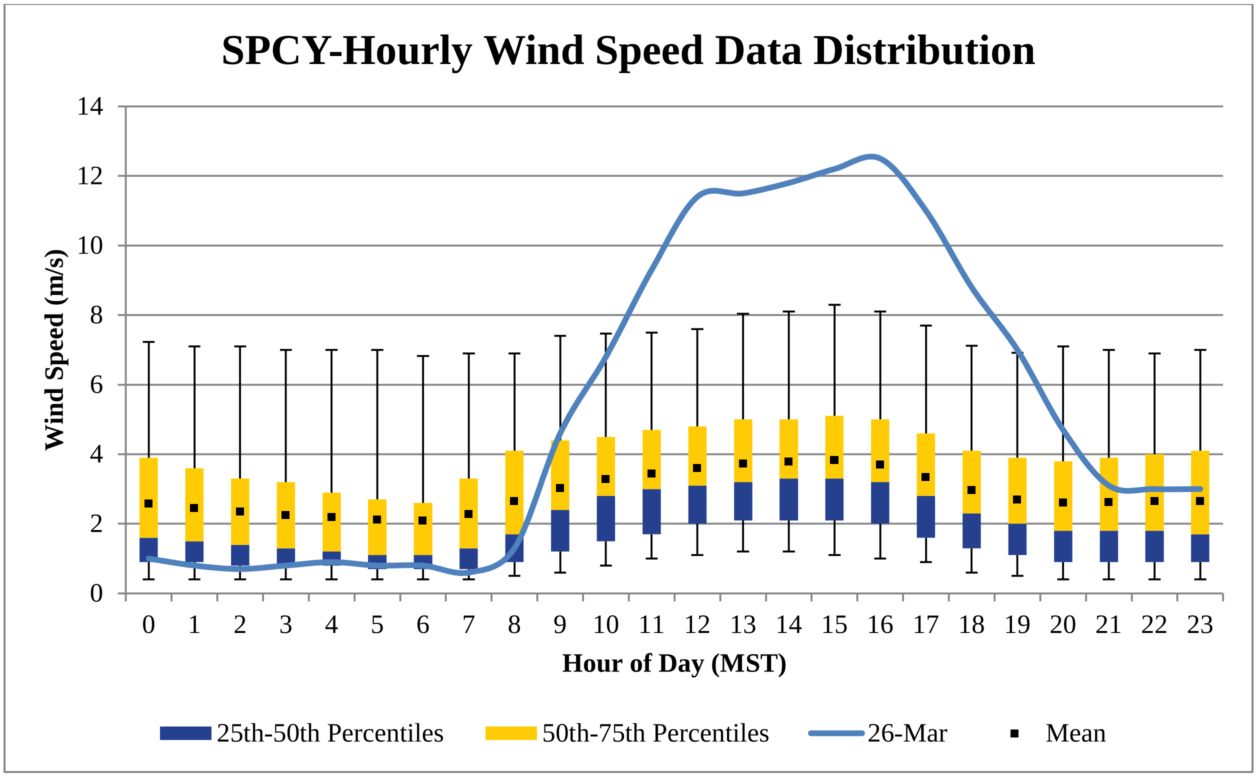

Figure 4-25. Hourly wind speed data distribution from 2003-2009 overlaid by hourly values for March 26, 2010.

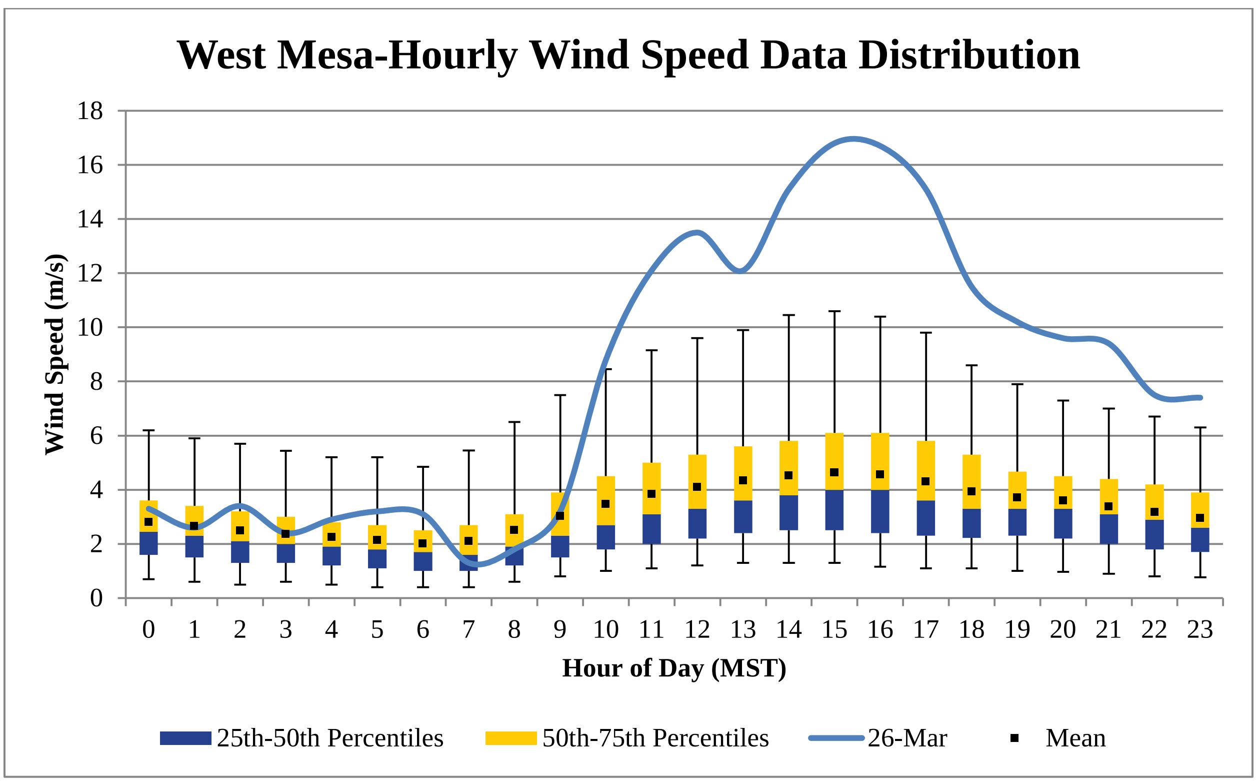

Figure 4-26. Hourly wind speed data distribution from 2003-2009 overlaid by hourly values for March 26, 2010.

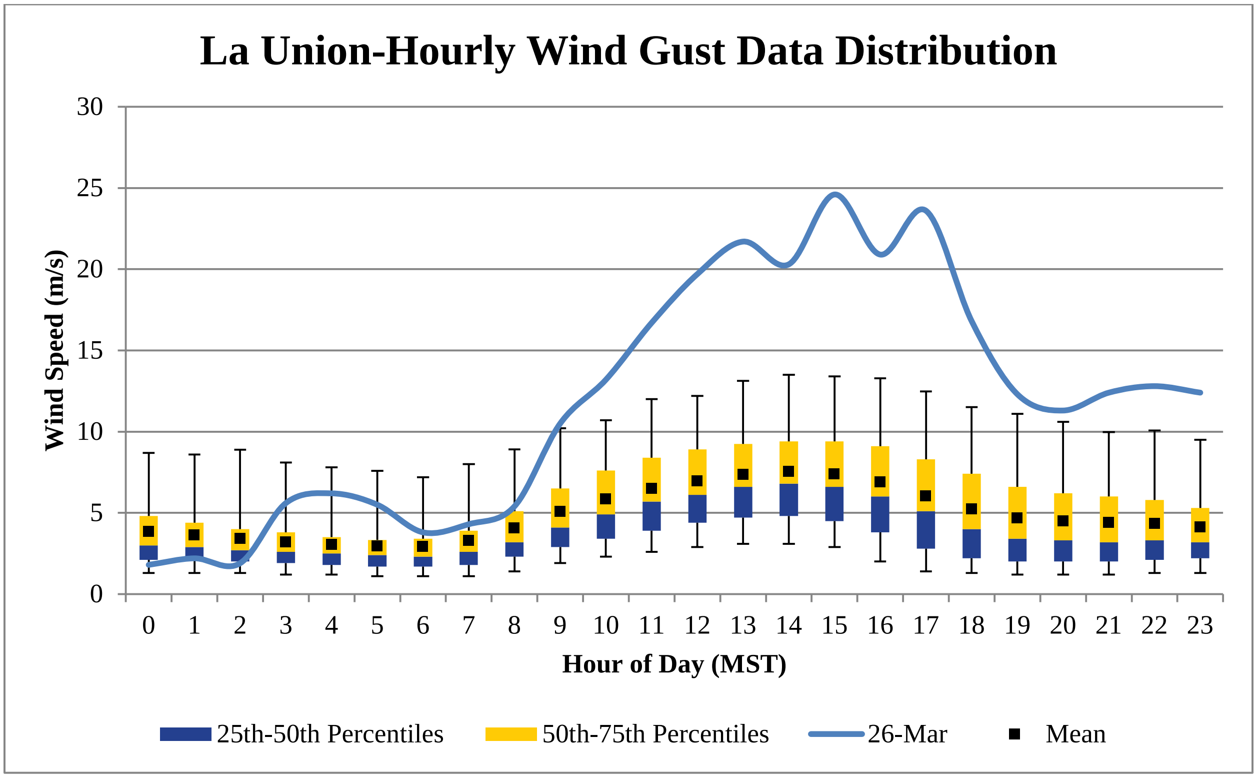

Figure 4-27. Hourly wind gust data distribution from 2003-2009 overlaid by hourly values for March 26, 2010.

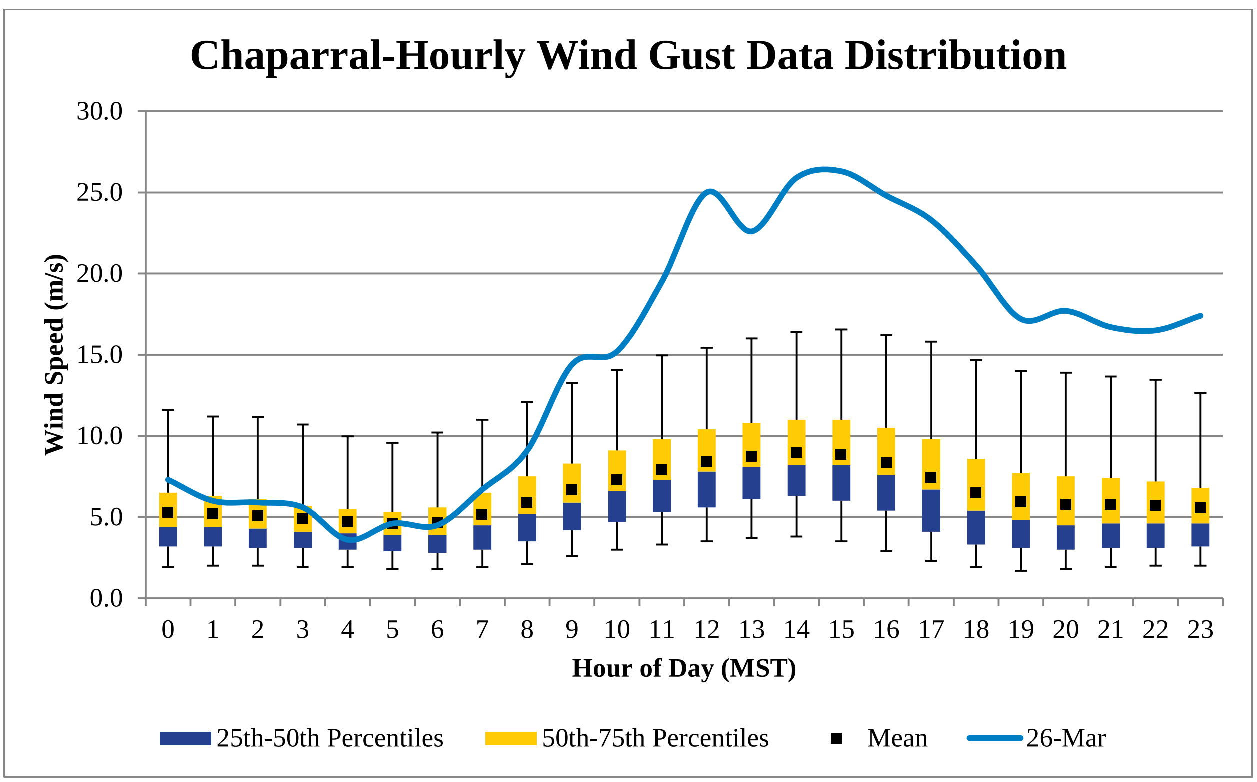

Figure 4-28. Hourly wind gust data distribution from 2003-2009 overlaid by hourly values for March 26, 2010.

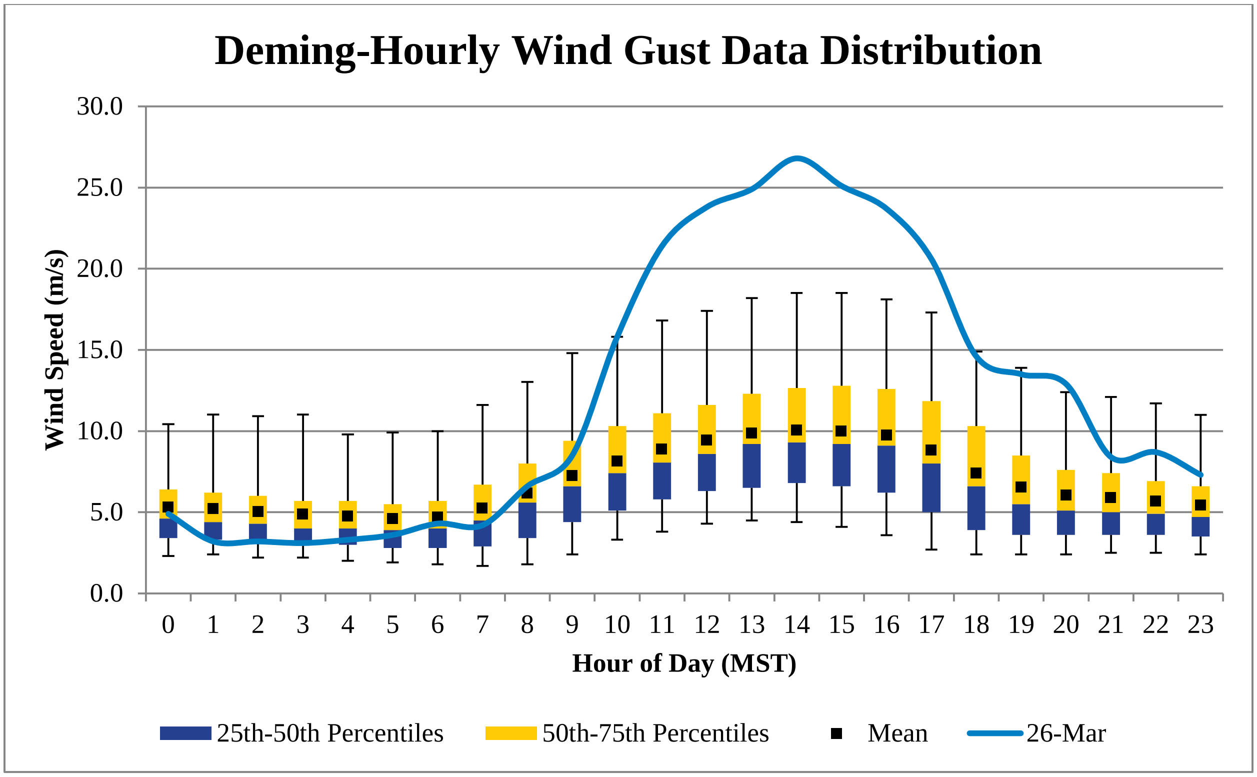

Figure 4-29. Hourly wind gust data distribution from 2003-2009 overlaid by hourly values for March 26, 2010.

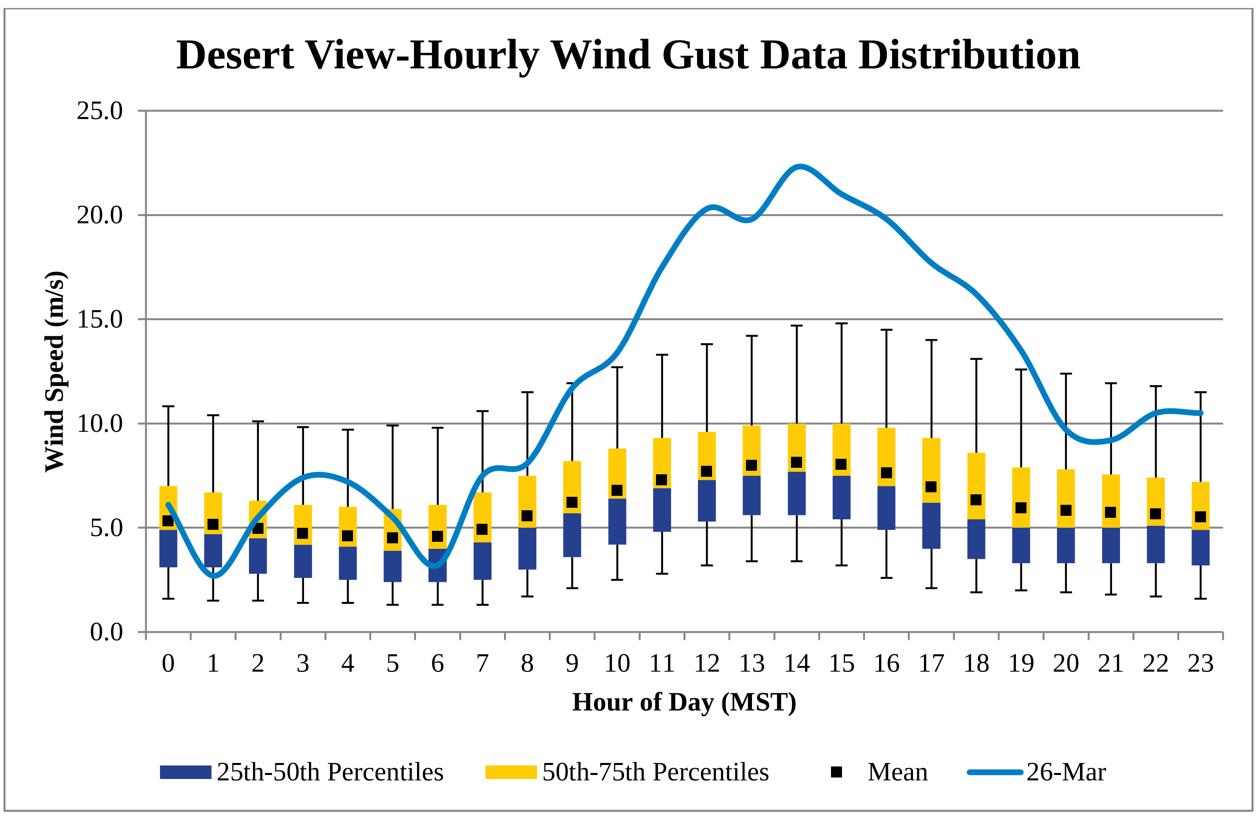

Figure 4-30. Hourly wind gust data distribution from 2003-2009 overlaid by hourly values for March 26, 2010.

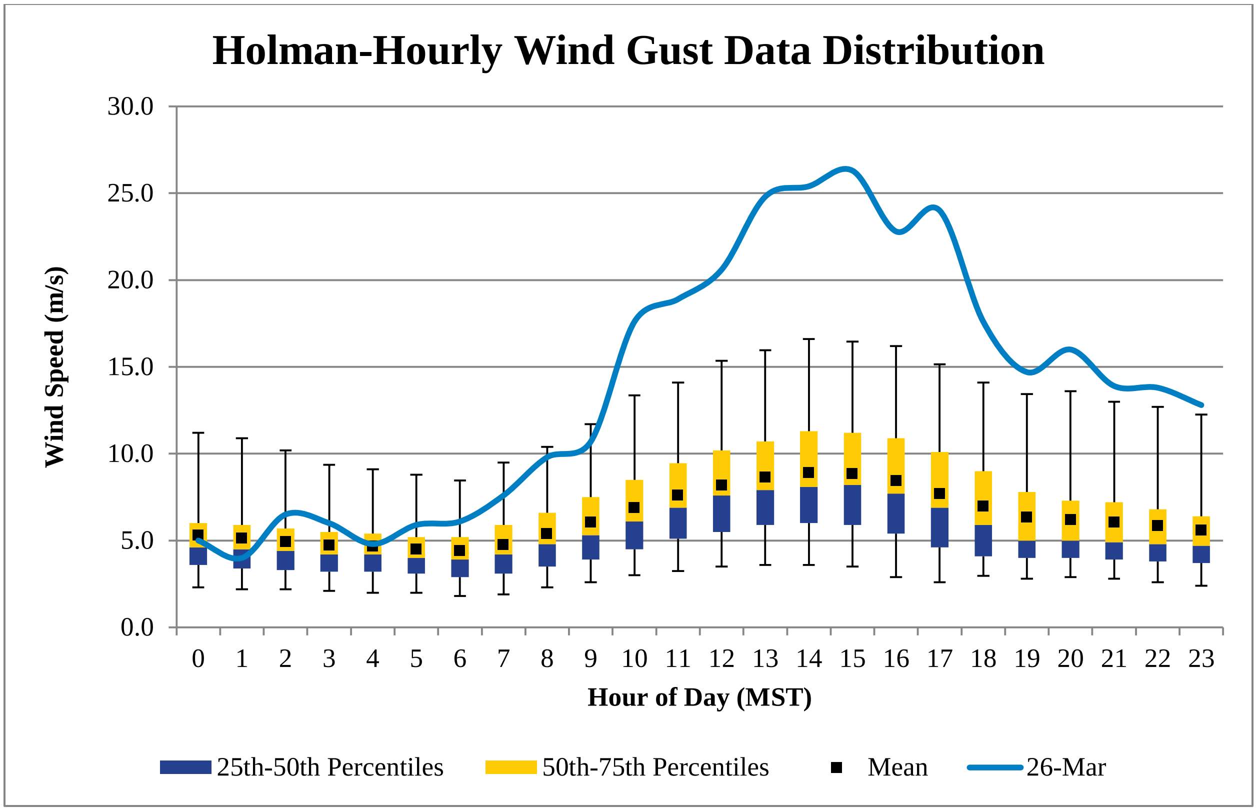

Figure 4-31. Hourly wind gust data distribution from 2004-2009 overlaid by hourly values for March 26, 2010.

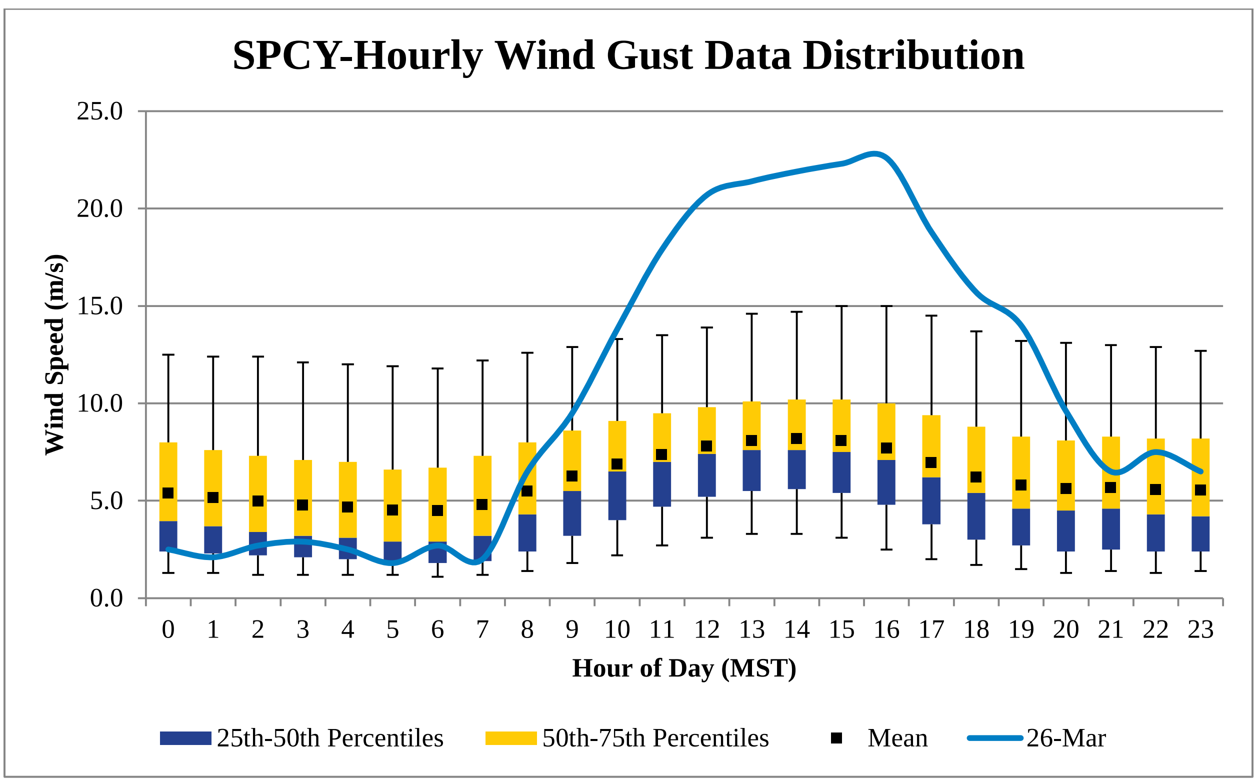

Figure 4-32. Hourly wind gust data distribution from 2003-2009 overlaid by hourly values for March 26, 2010.

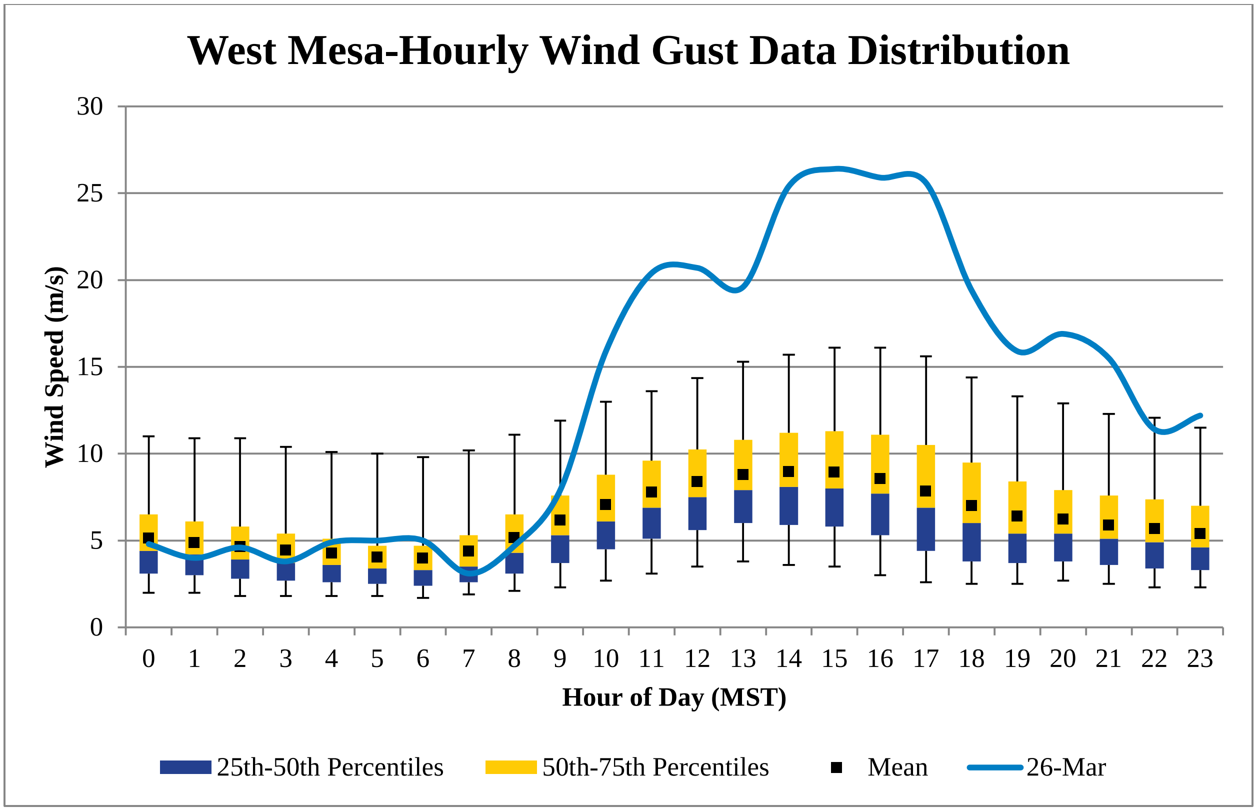

Figure 4-33. Hourly wind gust data distribution from 2003-2009 overlaid by hourly values for March 26, 2010.

4.4 Clear Causal Relationship

A strong Pacific cold front passed through New Mexico on March 26, 2010. As the Pacific cold front moved through New Mexico, a strong pressure gradient formed causing high winds at the surface (Figure 4-34). Surface winds flow perpendicular to the isobars from high to low pressure. As the day progressed, the wind direction in the upper atmosphere aligned with the surface wind direction (Figure 4-35). Diurnal heating of the surface allowed winds aloft to mix downward, increasing the surface wind velocities and provided the turbulence required for vertical mixing and horizontal transport.

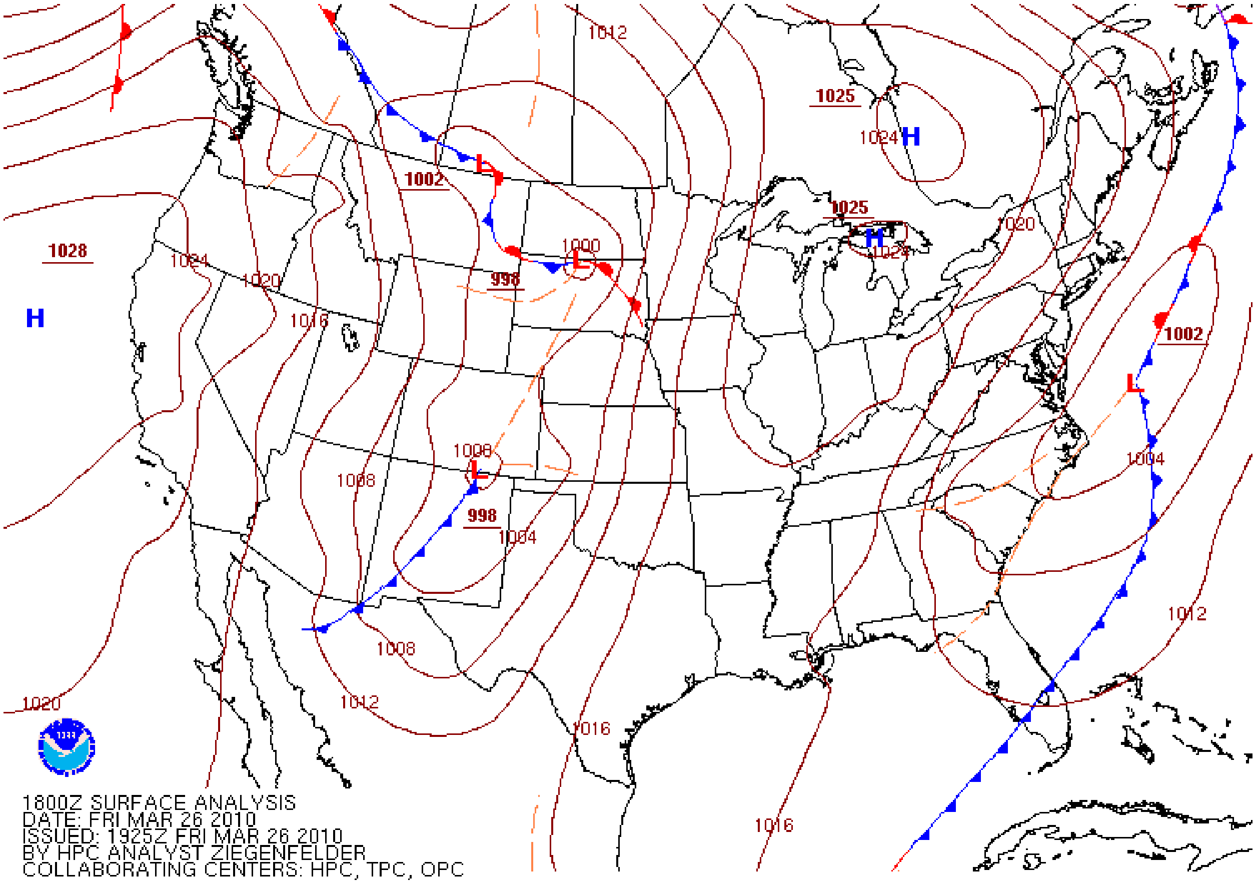

Figure 4-34. Surface weather map showing frontal activity and isobars of constant pressure (red lines) for March 26, 2010 at the 1200 hour MST.

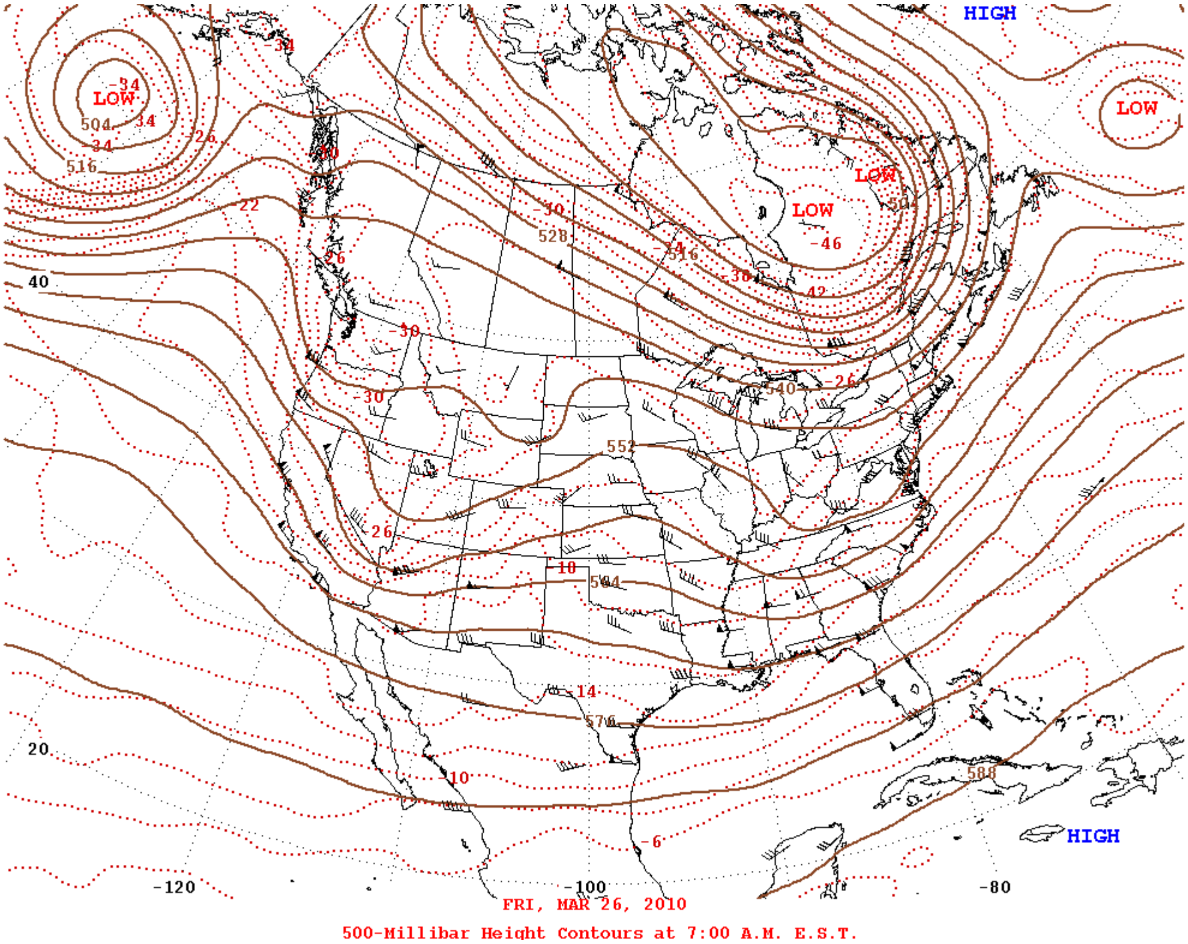

Figure 4-35. Upper air weather map showing geopotential heights (brown lines) at the 500 hour on March 26, 2010.

The weather pattern described above generated strong southwesterly winds beginning at the 1100 hour and lasting through the 1800 hour. Beginning at the 1100 hour, wind gusts exceeded the historical 95th percentile of data at all sites as shown in Figures 4-20 through 4-26. In addition, sustained wind speeds reached then exceeded EPA's default threshold for blowing dust (Figure 4-2). Peak wind gusts ranged from 22 m/s at Desert View to 27 m/s at Deming (Figure 4-3). Peak wind speeds ranged from 12 m/s at SPCY to 18 m/s at Chaparral (Figure 4-2). Blowing dust caused elevated levels of PM_{10} during the same period of high winds as demonstrated by the time series plots in Figures 4-36 through 4-42. As wind speed and wind gusts exceed the 95th percentile of historical data, so do hourly PM_{10} concentrations on this date (1100-1800 hours). During these hours, hourly PM_{10} concentrations spiked at all monitoring sites in the network (Figure 4-43). Satellite imagery captured the blowing dust throughout the southern New Mexico, northern Mexico and west Texas (Figure 4-44). The Texas Commission on Environmental Quality (TCEQ) also recorded exceedances of the PM_{10} standard in El Paso on this day and posted a brief description of the event with satellite imagery and visibility data on their website (Appendix E). The National Weather Service also reported in their weather bulletin that strong winds persisted throughout the region on this day (Appendix E).

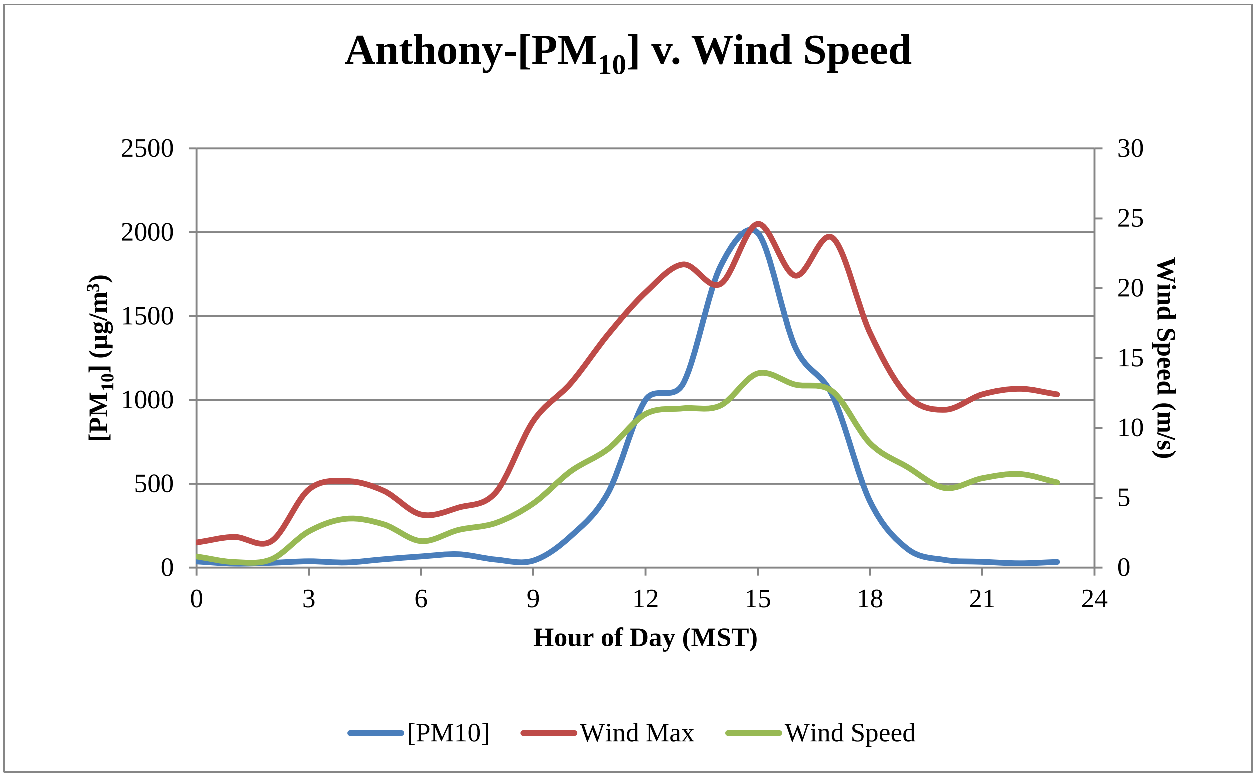

Figure 4-36. Time series plot of hourly observations showing increased PM_{10} concentrations as wind speeds and gusts increase.

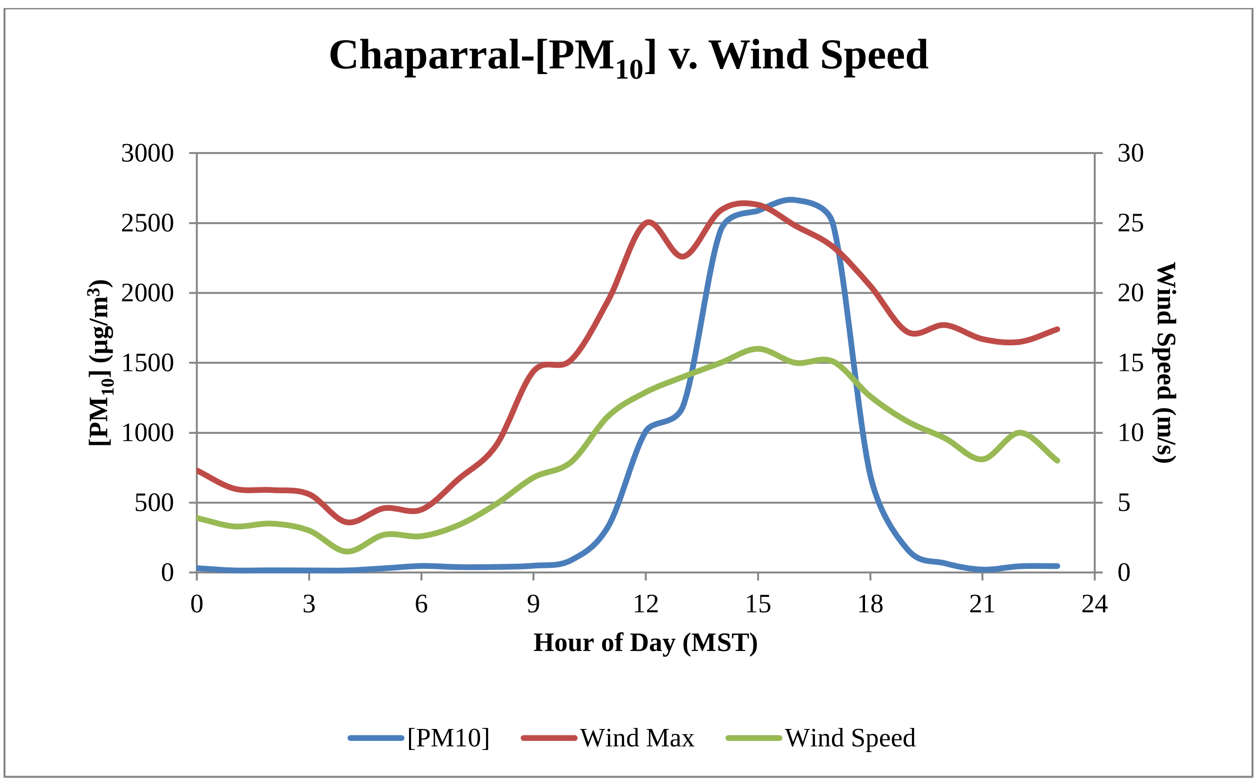

Figure 4-37. Time series plot of hourly observations showing increased PM_{10} concentrations as wind speeds and gusts increase.

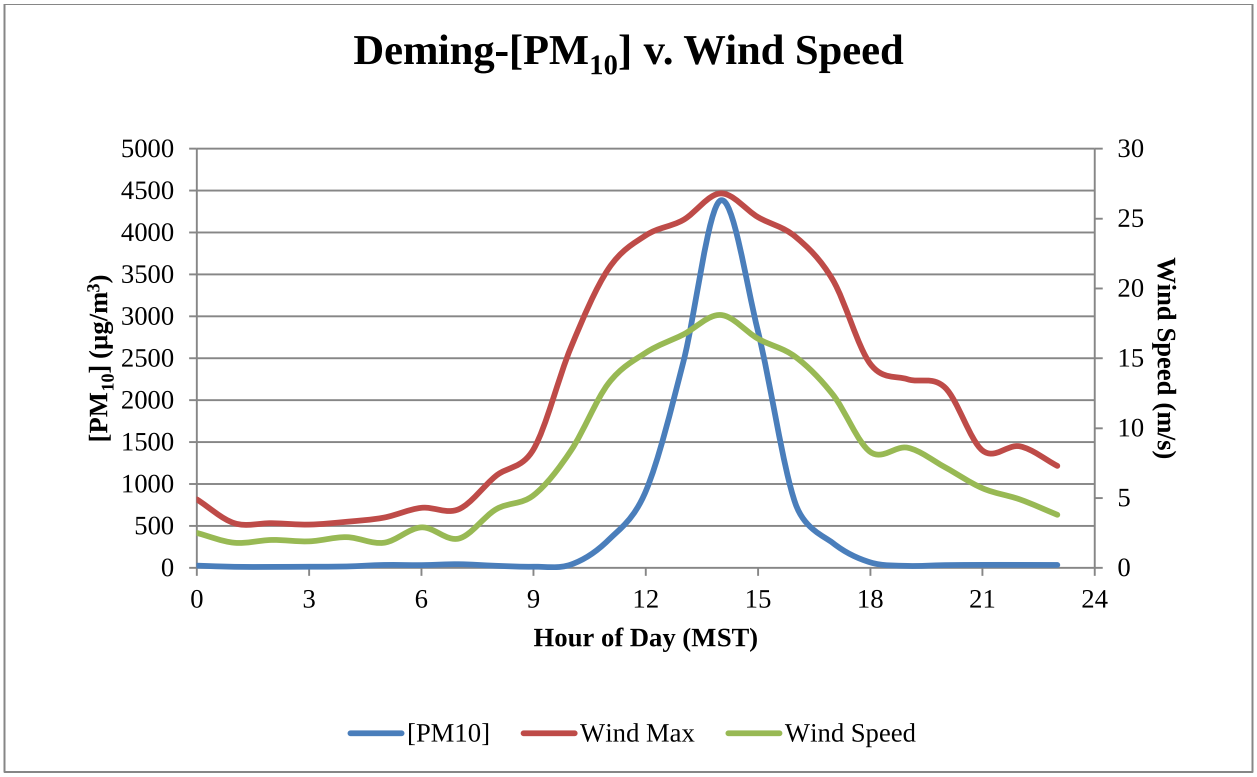

Figure 4-38. Time series plot of hourly observations showing increased PM_{10} concentrations as wind speeds and gusts increase.

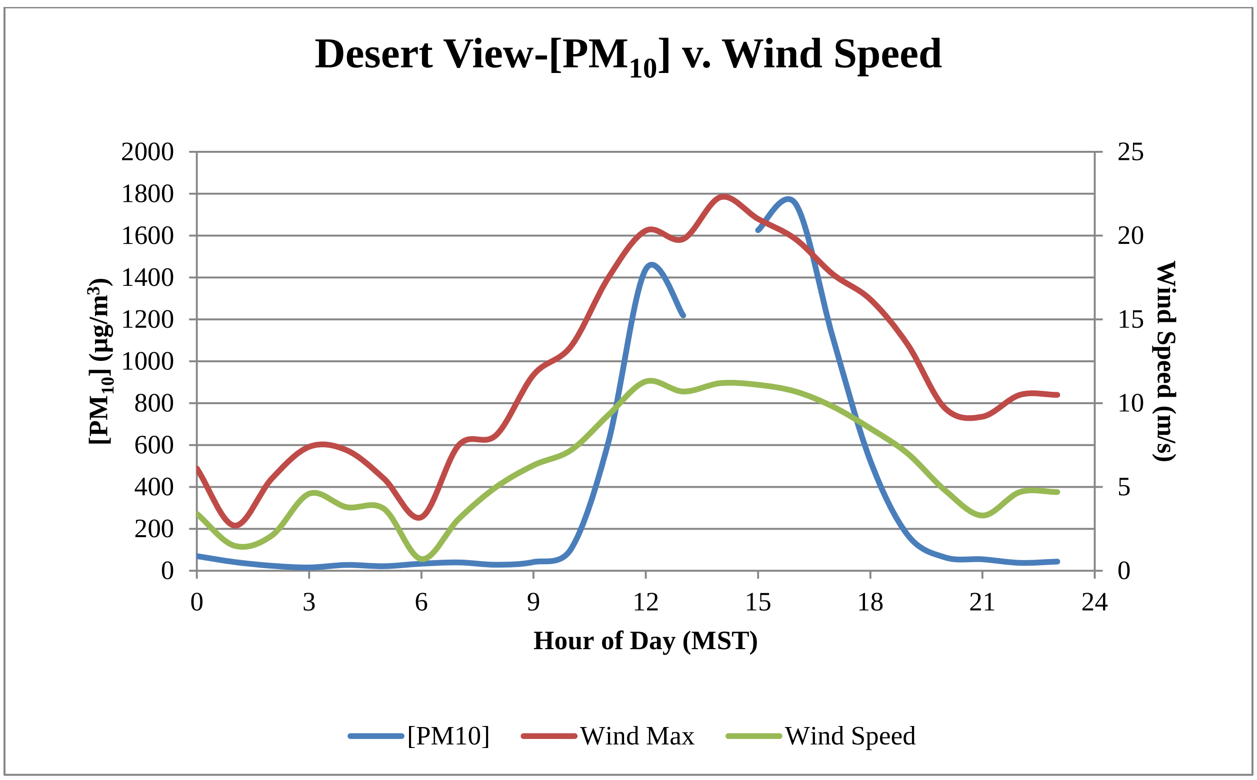

Figure 4-39. Time series plot of hourly observations showing increased PM_{10} concentrations as wind speeds and gusts increase.

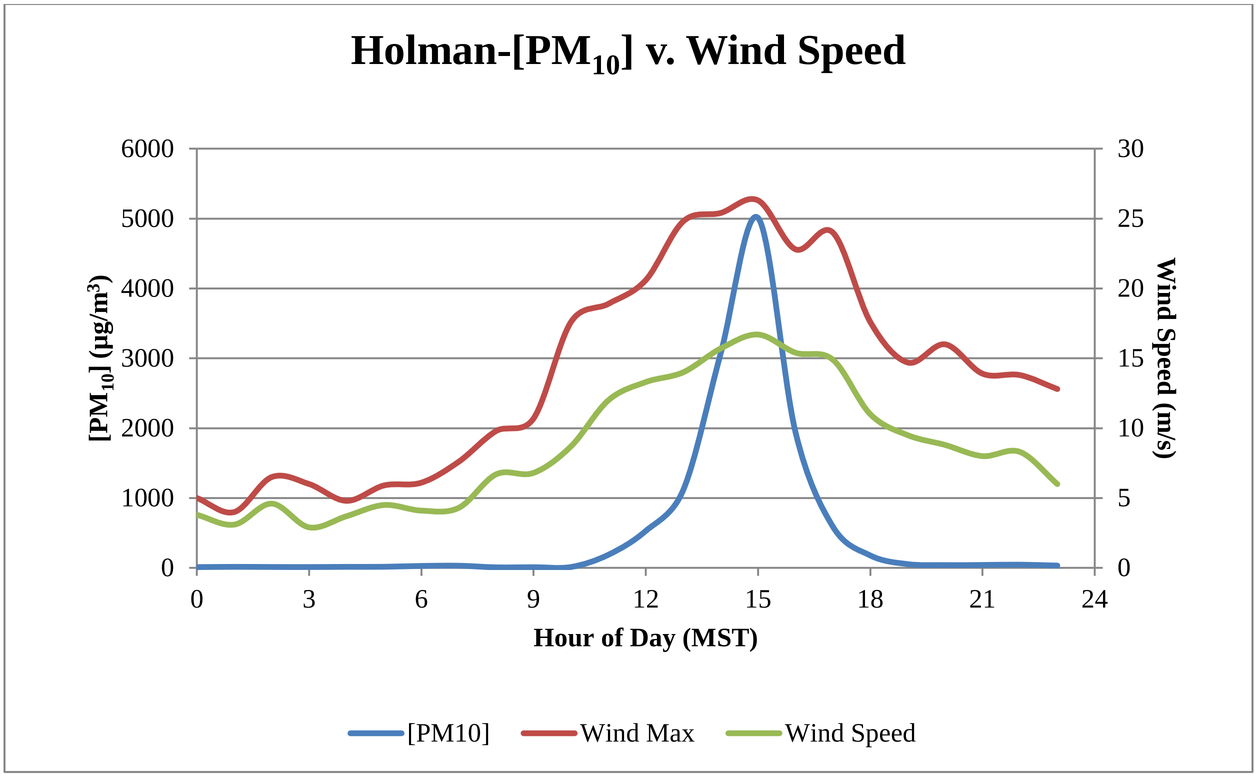

Figure 4-40. Time series plot of hourly observations showing increased PM_{10} concentrations as wind speeds and gusts increase.

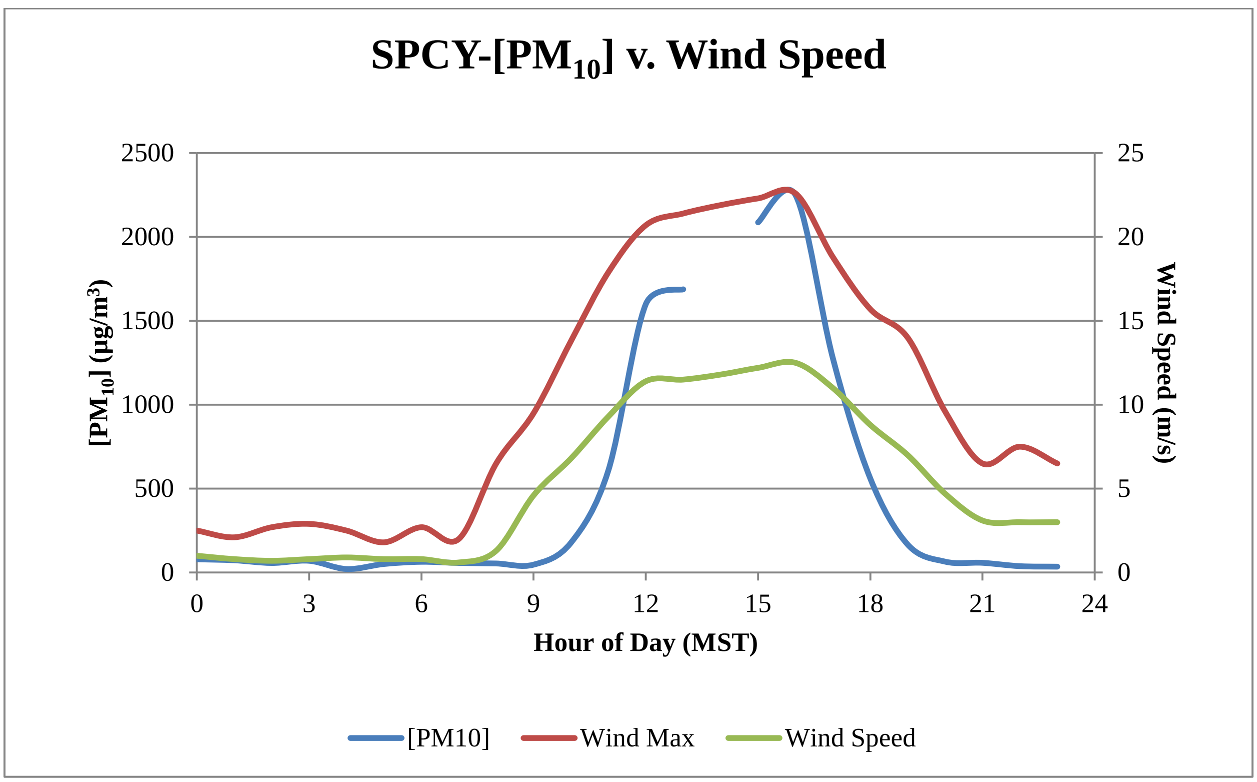

Figure 4-41. Time series plot of hourly observations showing increased PM_{10} concentrations as wind speeds and gusts increase.

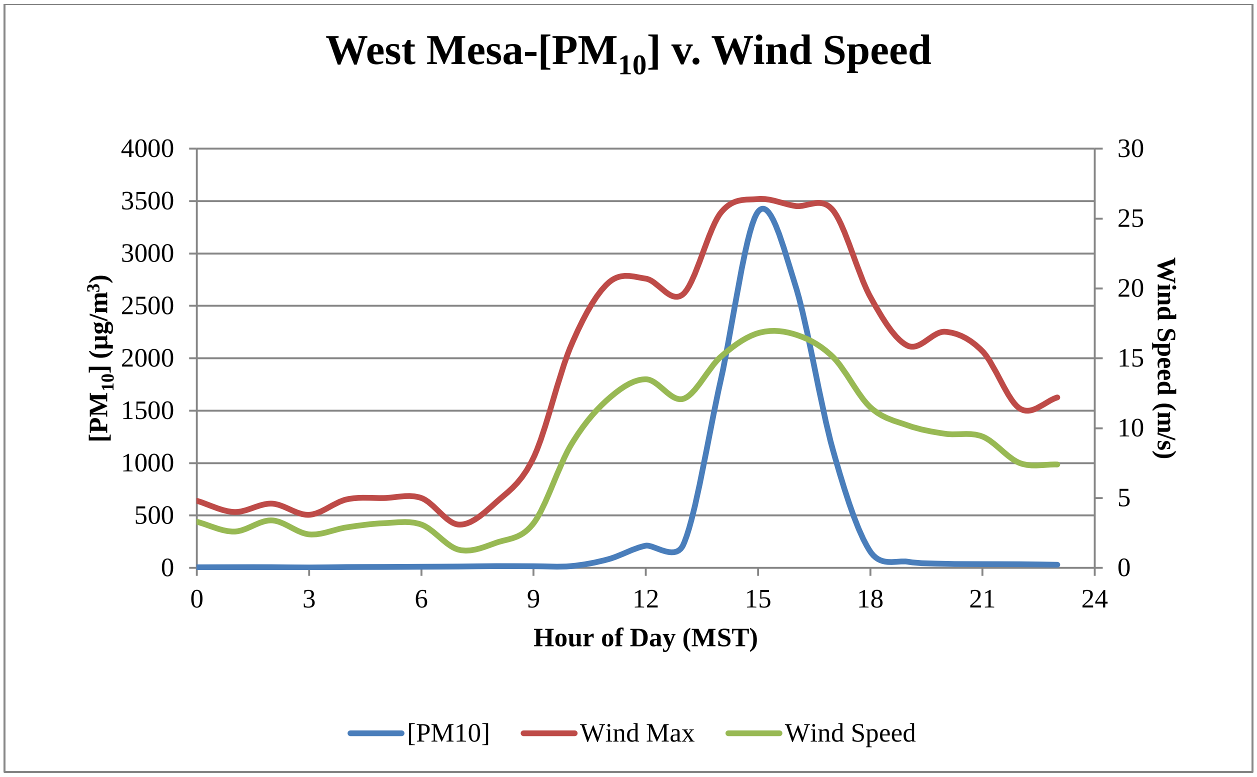

Figure 4-42. Time series plot of hourly observations showing increased PM_{10} concentrations as wind speeds and gusts increase.

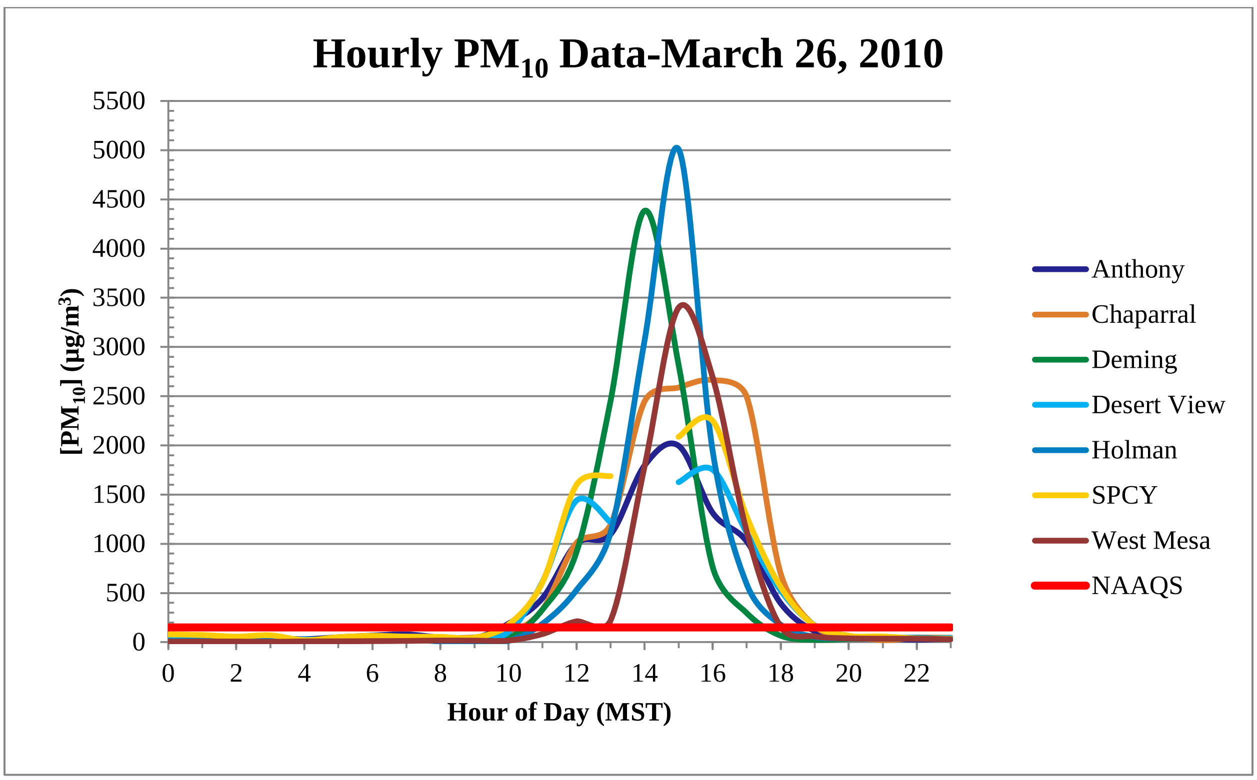

Figure 4-43. Hourly PM_{10} concentrations for Doña Ana and Luna Counties monitors on March 26, 2010.

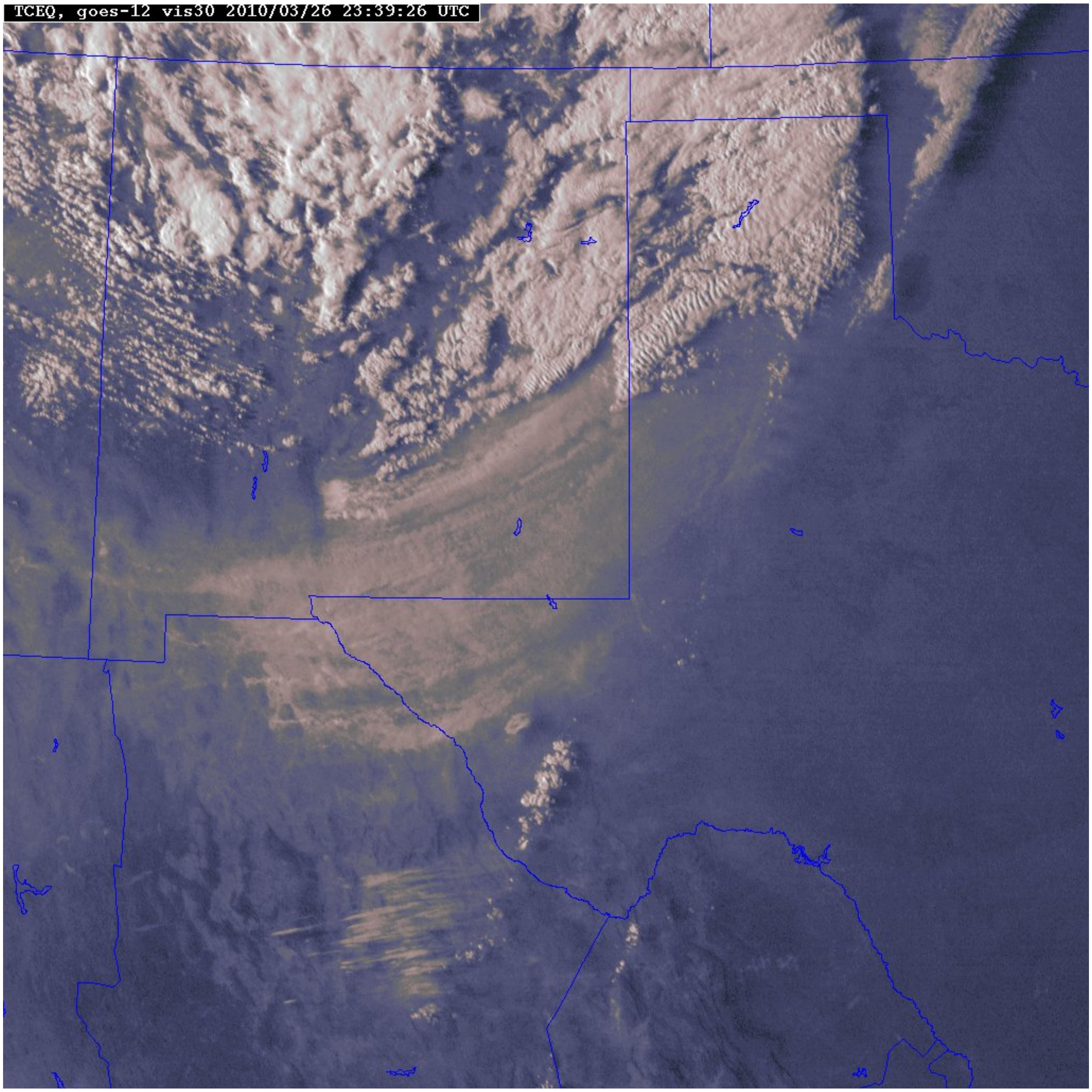

Figure 4-44. Satellite imagery of blowing dust on March 26, 2010. Image courtesy of NASA and TCEQ.

4.5 Affects Air Quality

The historical fluctuations and clear causal relationship analyses prove that the event in question affected air quality on March 26, 2010.

4.6 Natural Event

The CCR and nRCP analyses show that this was a natural event caused by high wind and blowing dust.

4.7 No Exceedance but for the Event

The Anthony monitor detected blowing dust around the 1100 hour with hourly concentrations heavily impacted until the 1800 hour. The eight hourly PM_{10} values from 1100-1800 hours alone, exceed the 24-hour average standard at Anthony [(448 + 1001 + 1096 + 1796 + 1996 + 1315 + 1025 + 395) µg/m^3 = 9,072 µg/m^3; (9,072 µg/m^3)/24 = 378 µg/m^3]. By replacing these eight hourly values with the 95th percentile of hourly data at the Anthony site, the resulting 24-hour average (88 µg/m^3) does not exceed the NAAQS (Table 4-2). The values in red represent the 95th percentile of all hourly data collected at Anthony in the table below. NMED concludes that without the high wind and blowing dust at the Anthony site an exceedance would not have occurred.

Hour of Day (MST)	Recorded Hourly Data	Substituted Hourly Data
0	37	37
1	24	24
2	29	29
3	38	38
4	31	31
5	50	50
6	67	67
7	80	80
8	48	48
9	42	42
10	188	188
11	448	**94**
12	1001	**118**
13	1096	**136**
14	1796	**160**
15	1996	**161**
16	1315	**163**
17	1025	**195**
18	395	**201**
19	112	112
20	46	46
21	35	35
22	26	26
23	34	34
24-Hour Average	414	**88**

Table 4-2. Anthony: 95th percentile of data substituted for those hours when windblown dust was the most intense does not result in an exceedance at Anthony.

The Chaparral monitor detected blowing dust at the 1100 hour with hourly concentrations heavily impacted until the 1800 hour. The eight hourly PM_{10} values from 1100-1800 hours alone, exceed the 24-hour average standard at Chaparral [(333 + 1010 + 1194 + 2447 + 2588 + 2664 + 2495 + 697) µg/m^3 = 13,428 µg/m^3; (13,428 µg/m^3)/24 = 560 µg/m^3]. By replacing these eight hourly values with the 95th percentile of hourly data for the Chaparral site, the resulting 24-hour average (76 µg/m^3) does not exceed the NAAQS (Table 4-3). The values in red represent the 95th percentile of all hourly data collected at Chaparral in the table below. NMED concludes that without the high wind and blowing dust at the Chaparral site an exceedance would not have occurred.

Hour of Day (MST)	Recorded Hourly Data	Substituted Hourly Data
0	31	31
1	15	15
2	16	16
3	15	15
4	15	15
5	30	30
6	47	47
7	39	39
8	40	40
9	49	49
10	88	88
11	333	**92**
12	1010	**116**
13	1194	**134**
14	2447	**159**
15	2588	**154**
16	2664	**157**
17	2495	**187**
18	697	**195**
19	112	112
20	46	46
21	35	35
22	26	26
23	34	34
24-Hour Average	589	**76**

Table 4-3. Chaparral: 95th percentile of data substituted for those hours when windblown dust was the most intense does not result in an exceedance at Chaparral.

The Deming monitor detected blowing dust at the 1100 hour with hourly concentrations heavily impacted until the 1600 hour. The six hourly PM_{10} values from 1100-1600 hours alone, exceed the 24-hour average standard at Deming [(332 + 916 + 2452 + 4384 + 2818 + 766) $\mu g/m^3$ = 11,668 $\mu g/m^3$; (11,668 $\mu g/m^3$)/24 = 486 $\mu g/m^3$]. By replacing these six hourly values with the 95th percentile of hourly data for the Deming site, the resulting 24-hour average (70 $\mu g/m^3$) does not exceed the NAAQS (Table 4-4). The values in red represent the 95th percentile of all hourly data collected at Deming in the table below. NMED concludes that without the high wind and blowing dust at the Deming site an exceedance would not have occurred.

Hour of Day (MST)	Recorded Hourly Data	Substituted Hourly Data
0	27	27
1	13	13
2	12	12
3	14	14
4	17	17
5	35	35
6	33	33
7	44	44
8	25	25
9	14	14
10	40	40
11	332	**103**
12	916	**130**
13	2452	**141**
14	4384	**177**
15	2818	**175**
16	766	**152**
17	297	297
18	66	66
19	24	24
20	33	33
21	36	36
22	36	36
23	35	35
24-Hour Average	519	**70**

Table 4-4. Deming: 95th percentile of data substituted for those hours when windblown dust was the most intense does not result in an exceedance at Deming.

The Desert View monitor detected blowing dust at the 1100 hour with hourly concentrations heavily impacted until the 1800 hour. The eight hourly PM_{10} values from 1100-1800 hours alone, exceed the 24-hour average standard at Desert View [(615 + 1440 + 1219 + 0 + 1626 + 1753 + 1113 + 526) $\mu g/m^3$ = 8,292 $\mu g/m^3$; (8,292 $\mu g/m^3$)/24 = 346 $\mu g/m^3$]. By replacing these eight hourly values with the 95th percentile of hourly data for the Desert View site, the resulting 24-hour average (91 $\mu g/m^3$) does not exceed the NAAQS (Table 4-5). The values in red represent the 95th percentile of all hourly data collected at Desert View in the table below. NMED concludes that without the high wind and blowing dust at the Desert View site an exceedance would not have occurred.

Hour of Day (MST)	Recorded Hourly Data	Substituted Hourly Data
0	70	70
1	42	42
2	24	24
3	16	16
4	28	28
5	22	22
6	34	34
7	40	40
8	29	29
9	42	42
10	104	104
11	615	**111**
12	1440	**135**
13	1219	**154**
14	No Data	**193**
15	1626	**216**
16	1753	**155**
17	1113	**195**
18	526	**211**
19	171	171
20	64	64
21	55	55
22	38	38
23	44	44
24-Hour Average	396	**91**

Table 4-5. Desert View: 95th percentile of data substituted for those hours when windblown dust was the most intense does not result in an exceedance at Desert View.

The Holman monitor detected blowing dust at the 1200 hour with hourly concentrations heavily impacted until the 1700 hour. The six hourly PM_{10} values from 1200-1700 hours alone, exceed the 24-hour average standard at Holman [(530 + 1114 + 3067 + 5009 + 1945 + 591) µg/m^3 = 12,256 µg/m^3; (12,256 µg/m^3)/24 = 510 µg/m^3]. By replacing these six hourly values with the 95th percentile of hourly data for the Holman site, the resulting 24-hour average (69 µg/m^3) does not exceed the NAAQS (Table 4-6). The values in red represent the 95th percentile of all hourly data collected at Holman in the table below. NMED concludes that without the high wind and blowing dust at the Holman site an exceedance would not have occurred.

Hour of Day (MST)	Recorded Hourly Data	Substituted Hourly Data
0	11	11
1	15	15
2	13	13
3	12	12
4	15	15
5	16	16
6	28	28
7	31	31
8	8	8
9	10	10
10	13	13
11	188	188
12	530	**114**
13	1114	**131**
14	3067	**160**
15	5009	**154**
16	1945	**152**
17	591	**187**
18	178	178
19	54	54
20	40	40
21	42	42
22	46	46
23	33	33
24-Hour Average	542	**69**

Table 4-6. Holman: 95th percentile of data substituted for those hours when windblown dust was the most intense does not result in an exceedance at Holman.

The SPCY monitor detected blowing dust at the 1100 hour with hourly concentrations heavily impacted until the 1800 hour. The eight hourly PM_{10} values from 1100-1800 hours alone, exceed the 24-hour average standard at SPCY [(610 + 1600 + 1688 + 0 + 2087 + 2250 + 1277 + 561) µg/m^3 = 10,073 µg/m^3; (10,073 µg/m^3)/24 = 419 µg/m^3]. By replacing these eight hourly values with the 95th percentile of hourly data for the SPCY site, the resulting 24-hour average (97 µg/m^3) does not exceed the NAAQS (Table 4-7). The values in red represent the 95th percentile of all hourly data collected at SPCY in the table below. NMED concludes that without the high wind and blowing dust at the SPCY site an exceedance would not have occurred.

Hour of Day (MST)	Recorded Hourly Data	Substituted Hourly Data
0	79	79
1	73	73
2	57	57
3	70	70
4	21	21
5	51	51
6	64	64
7	57	57
8	54	54
9	47	47
10	178	178
11	610	**94**
12	1600	**116**
13	1688	**135**
14	No Data	**160**
15	2087	**160**
16	2250	**161**
17	1277	**195**
18	561	**201**
19	167	167
20	65	65
21	58	58
22	38	38
23	35	35
24-Hour Average	396	**97**

Table 4-7. SPCY: 95th percentile of data substituted for those hours when windblown dust was the most intense does not result in an exceedance at SPCY.

The West Mesa monitor detected blowing dust at the 1200 hour with hourly concentrations heavily impacted until the 1700 hour. The six hourly PM_{10} values from 1200-1700 hours alone, exceed the 24-hour average standard at West Mesa [(212 + 220 + 1787 + 3399 + 2693 + 1127) µg/m^3 = 9,438 µg/m^3; (9,438 µg/m^3)/24 = 393 µg/m^3]. By replacing these six hourly values with the 95th percentile of hourly data for the West Mesa site, the resulting 24-hour average (61 µg/m^3) does not exceed the NAAQS (Table 4-8). The values in red represent the 95th percentile of all hourly data collected at West Mesa in the table below. NMED concludes that without the high wind and blowing dust at the West Mesa site an exceedance would not have occurred.

Hour of Day (MST)	Recorded Hourly Data	Substituted Hourly Data
0	6	6
1	7	7
2	7	7
3	4	4
4	8	8
5	9	9
6	11	11
7	13	13
8	17	17
9	16	16
10	17	17
11	83	83
12	212	**117**
13	220	**135**
14	1787	**161**
15	3399	**160**
16	2693	**157**
17	1127	**189**
18	156	156
19	59	59
20	39	39
21	36	36
22	35	35
23	30	30
24-Hour Average	416	**61**

Table 4-8. West Mesa: 95th percentile of data substituted for those hours when windblown dust was the most intense does not result in an exceedance at West Mesa.

5 HIGH WIND EXCEPTIONAL EVENT: April 1, 2010

5.1 Summary of the Event

On April 1, 2010, a strong Pacific cold front moved through New Mexico causing high winds and widespread blowing dust in the border region. The $PM_{2.5}$ FRM Partisol at SPCY and all of NMED's PM_{10} FEM TEOM monitors recorded exceedances of the 24-hour average NAAQS. The SPCY $PM_{2.5}$ 24-hour average reached 47.8 $\mu g/m^3$ and the PM_{10} 24-hour averages ranged from 199 $\mu g/m^3$ at West Mesa to 555 $\mu g/m^3$ at SPCY. Table 1-1 lists all of the 24-hour average concentrations for each site. In accordance with the EER, the AQB flagged this data on EPA's AQS database as high wind natural events on or before June 1, 2011. On this date, PM_{10} and $PM_{2.5}$ 24-hour averages spiked greatly compared to the days immediately before and after the event (Figure 5-1). The PM_{10} and $PM_{2.5}$ averages in this figure were calculated using FEM TEOM and FRM Partisol instrument data for the four days before and after the event, respectively. There was no data available for the $PM_{2.5}$ FRM Partisol from March 29 to March 31, 2010.

As the event unfolded, the wind blew from the southwest throughout the border region. These high velocity winds passed over large areas of desert within New Mexico and Mexico. The co-occurrence of high winds and elevated levels of blowing dust, little to no point sources in the area, and the high hourly and daily PM_{10} concentrations support the assertion that this was an exceptional event, specifically a natural event caused by high wind and blowing dust.

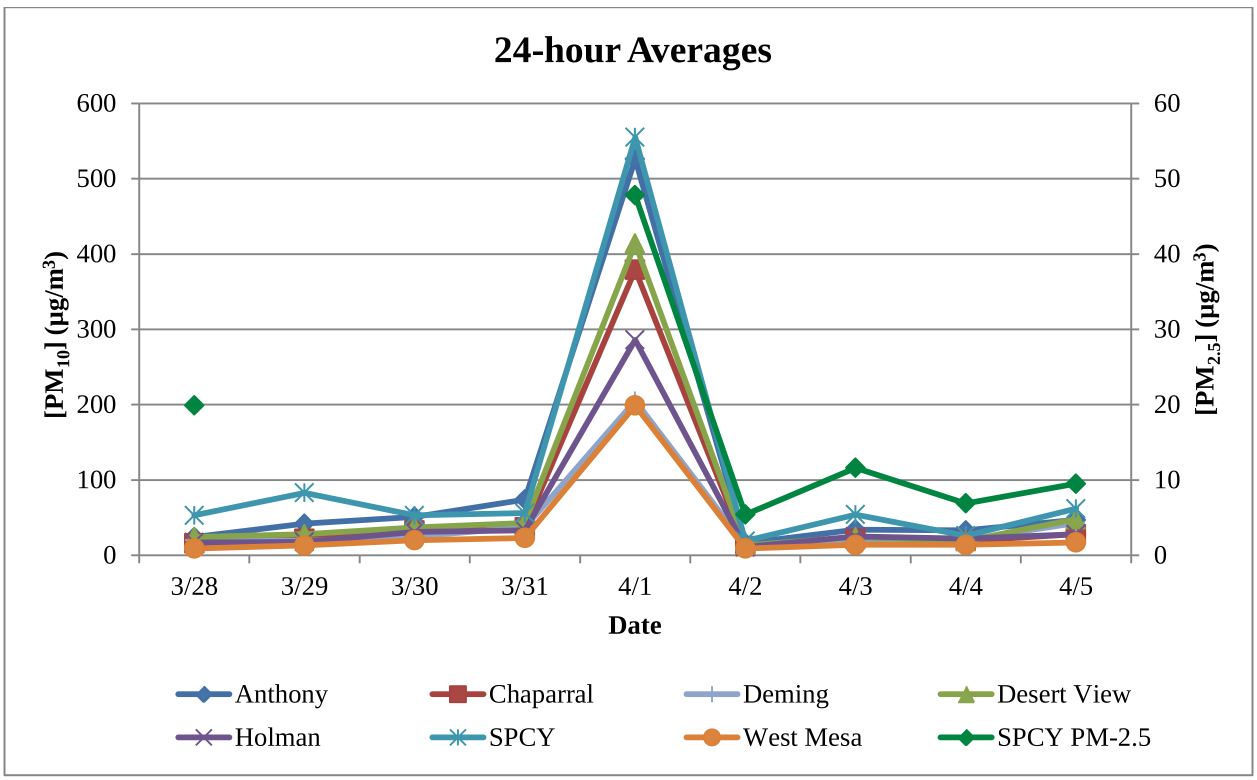

Figure 5-1. PM_{10} and $PM_{2.5}$ 24-hour averages four days before and after April 1, 2010.

5.2 Is Not Reasonably Controllable or Preventable

5.2.1 Suspected Source Areas and Categories Contributing to the Event

Sources of windblown dust contributing to this exceedance include the natural desert, residential properties, agricultural land and unpaved roads in Mexico and New Mexico. Doña Ana County Ordinance requires BACM for any dust producing activities. The largest sources of windblown dust are the playas of northern Mexico and desert land in New Mexico.

5.2.2 Sustained and Instantaneous Wind Speeds

EPA has indicated that sustained wind speeds of at least 11.2 m/s (25 mph) would be used as the default entrainment threshold for natural and well controlled anthropogenic sources contributing to natural events caused by high wind and blowing dust (EPA, 2011). Under the Doña Ana and Luna County NEAPs, EPA and NMED agreed that wind gusts exceeding 18 m/s would overwhelm any natural and well-controlled anthropogenic sources and cause windblown dust. On April 1, sustained wind speeds exceeded EPA's default threshold at all of the monitoring sites in southern New Mexico and wind gusts exceeded the NEAP's agreed upon threshold at all monitoring sites as well (Figures 5-2 and 5-3). Winds exceeded these thresholds at one or more monitoring sites beginning at the 900 hour and ending at the 1700 hour. The meteorological tower at the Anthony site measures wind speed at two meters instead of the customary 10 meters. Due to this fact, this demonstration uses data from La Union (the closet site).

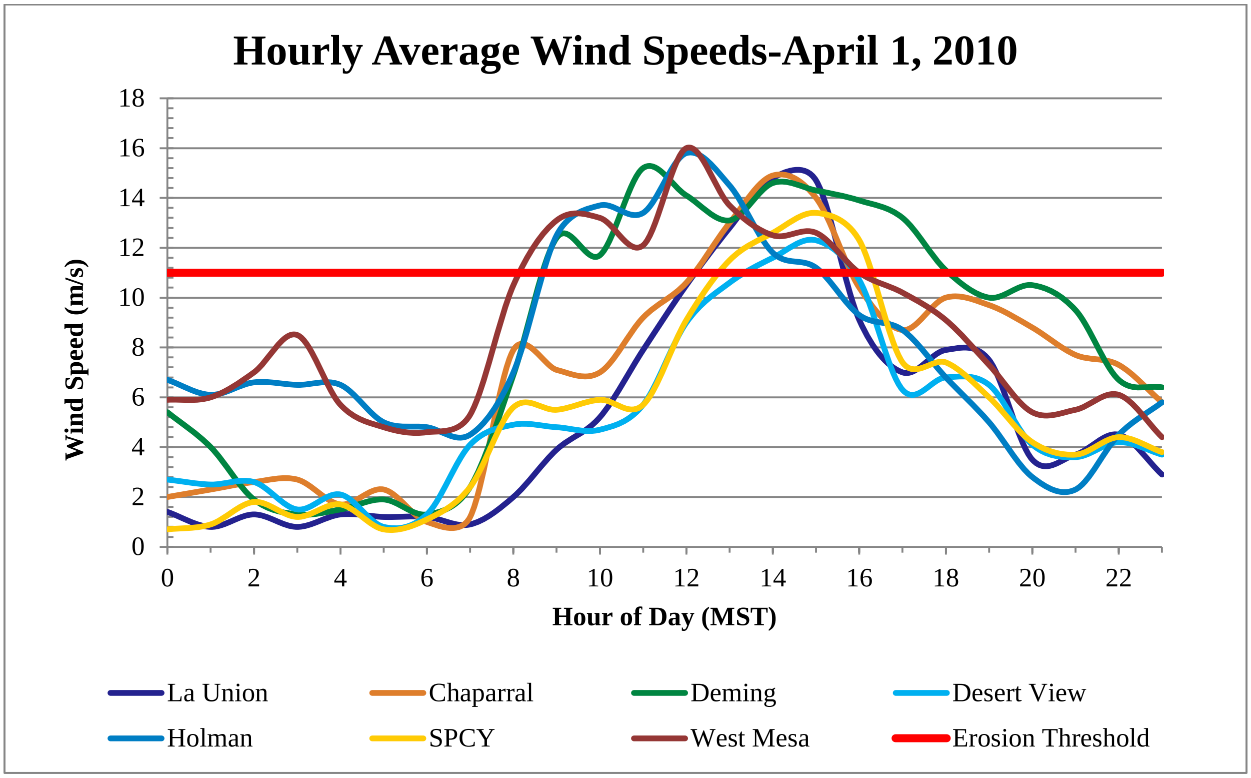

Figure 5-2. Sustained wind speeds at monitoring sites in Doña Ana and Luna Counties.

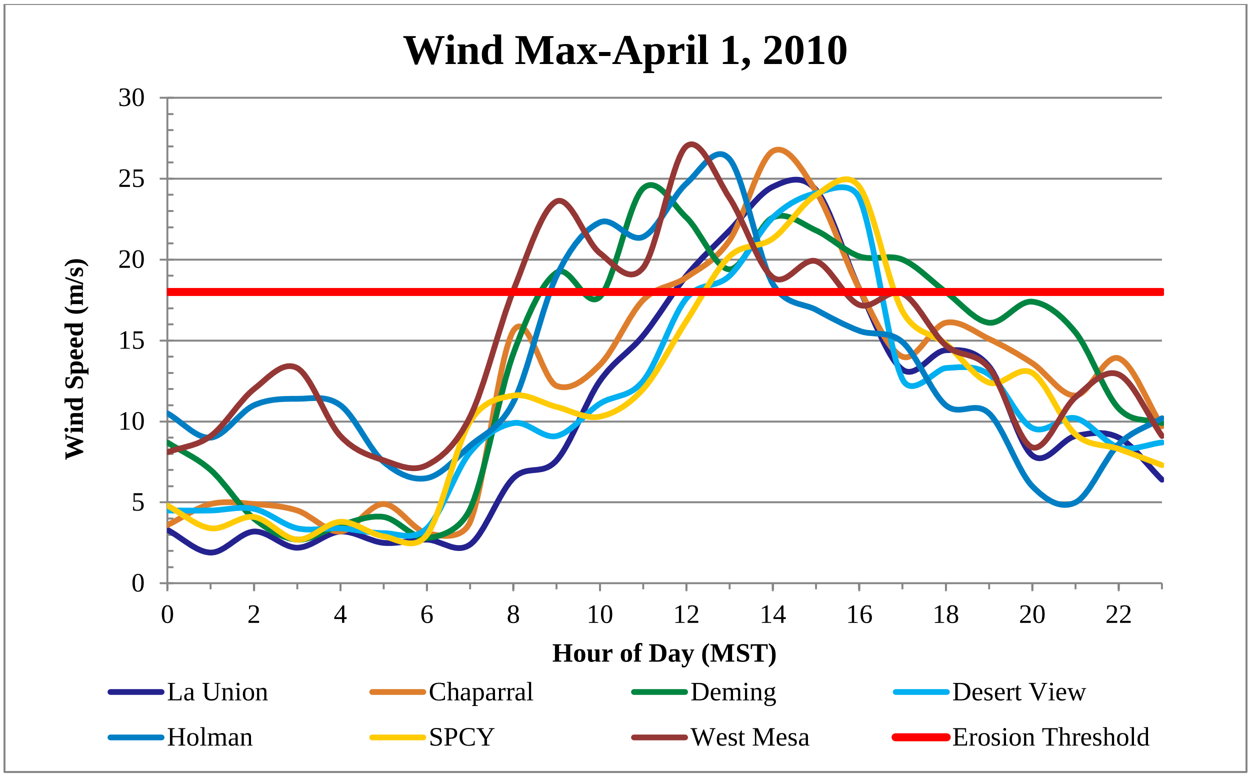

Figure 5-3. Maximum wind gusts at monitoring sites in Doña Ana and Luna Counties.

5.2.3 Recurrence Frequency

The monitoring sites in Doña Ana and Luna Counties can record exceedances of the PM_{10} NAAQS throughout the year. From 2003-2009 the FEM TEOM monitors have recorded 262 exceedances and the FRM Wedding monitors have recorded 10 exceedances (Figure 5-4). This large disparity in the number of monitored exceedances is due to the FRM Wedding sampling schedules of 1-in-6 days. There is additional evidence that under high loading conditions, the FEM TEOM monitors record 1.5 to 4 times higher concentrations as do the FRM Weddings. The Deming Airport and Desert View monitoring sites (FEM TEOMs) were established in 2006 and 2007 respectively and do not show exceedances until the year following startup (Table 2-1). Also, note that the FEM TEOM monitors at Holman, West Mesa and Chaparral were not part of the SLAMS network until 2006.

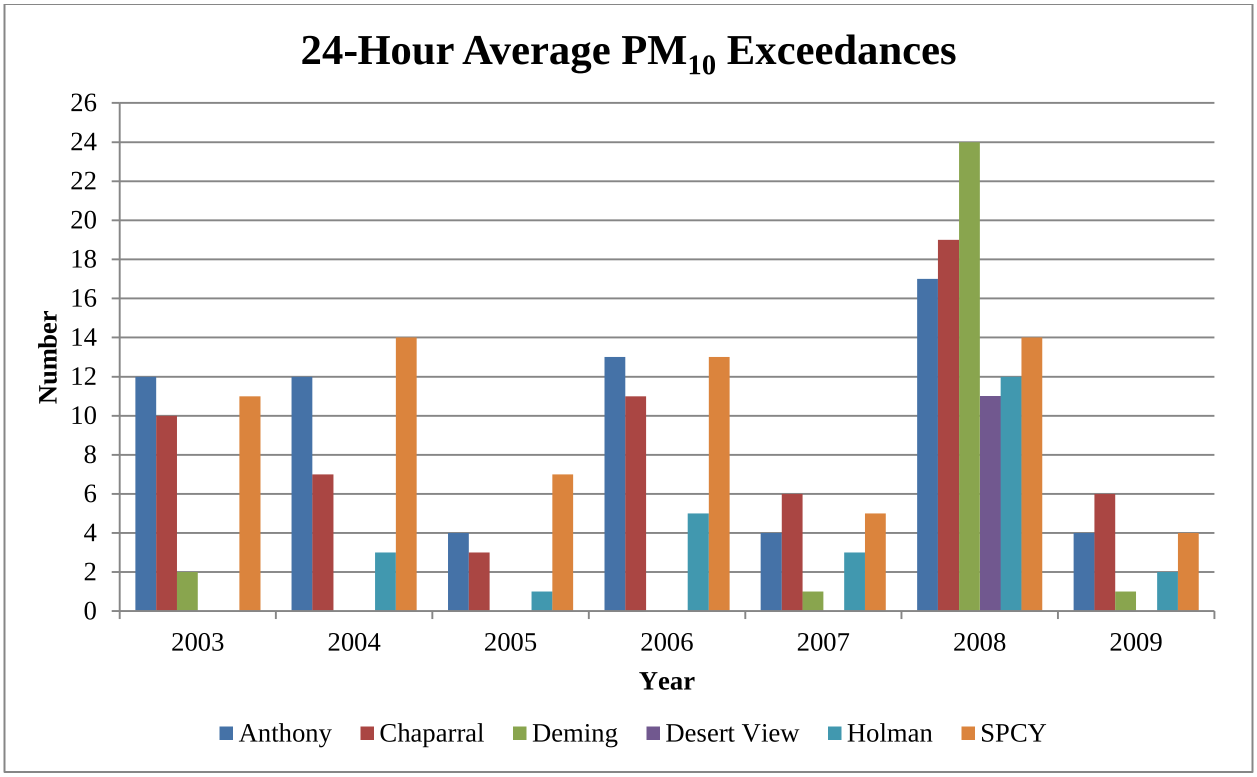

Figure 5-4. Exceedances recorded by the FEM TEOM and FRM Wedding monitors at Anthony, SPCY and Deming. All other monitors are FEM TEOM monitors.

5.2.4 Controls Analysis

The local ordinances and MOUs adopted under the NEAP direct the implementation of BACM for sources of dust in Doña Ana County. The ordinances regulate disturbed lands, construction and demolition, vacant parking lots and materials handling and transportation. Our investigation did not identify any unusual PM_{10} producing activities on this day, and anthropogenic emissions remained constant before, during and after the event. The most likely source contributing to the event is the playas of northern Mexico. The southern sites recorded the highest 24-hour averages in the monitoring network. A back-trajectory analysis using the HYSPLIT (Draxler et al., 2011; Rolph, 2011) model shows that the air masses traveled from Mexico to the monitors in southern Doña Ana County. The model starts four hours before the start of elevated PM_{10} concentrations during the event (Figure 5-5). Costs prohibit controlling dust from the natural desert terrain and falls outside NMED's jurisdiction when it originates in Mexico. NMED concludes that the sources that caused the event are not reasonably controllable.

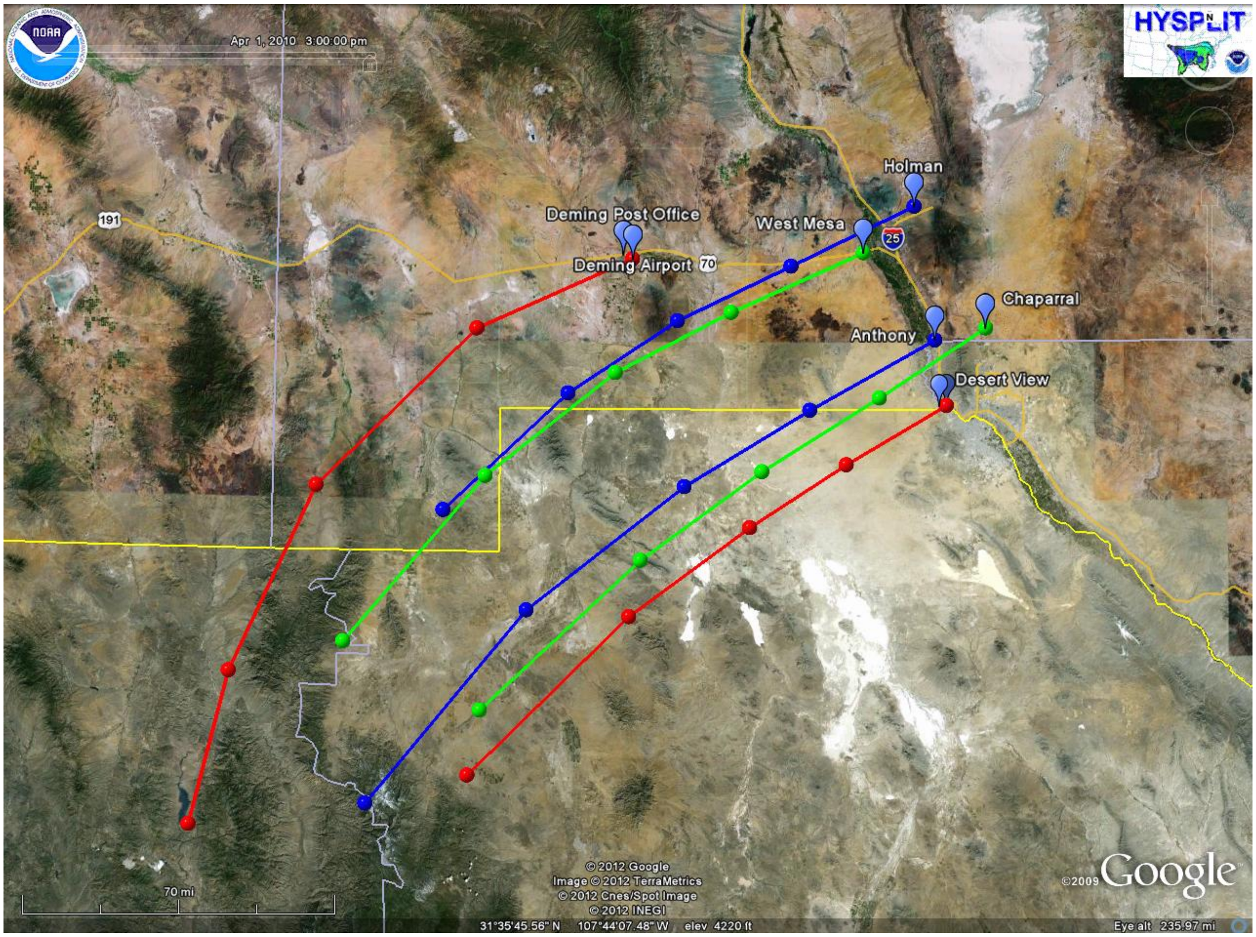

Figure 5-5. HYSPLIT back-trajectory model analysis for April 1, 2010.

5.3 Historical Fluctuations Analysis

5.3.1 Annual and Seasonal 24-hour Average Fluctuations

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 5-6 through 5-13). Most exceedances occur from late winter through early summer (February-June) and are associated with the passage of Pacific cold fronts. The only monitoring site to record exceedances when winds are calm is the SPCY site. From 2003 to 2005, NMED recorded fourteen low wind exceedances at this site. Since 2005, NMED has not recorded a low wind exceedance of the PM_{10} 24-hour standard at this site. 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_{10} came from international transport from Ciudad Juárez, Mexico (DuBois et al, 2009). The maximum 24-hour average PM_{10} concentration recorded by NMED was 1110 $\mu g/m^3$ 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.

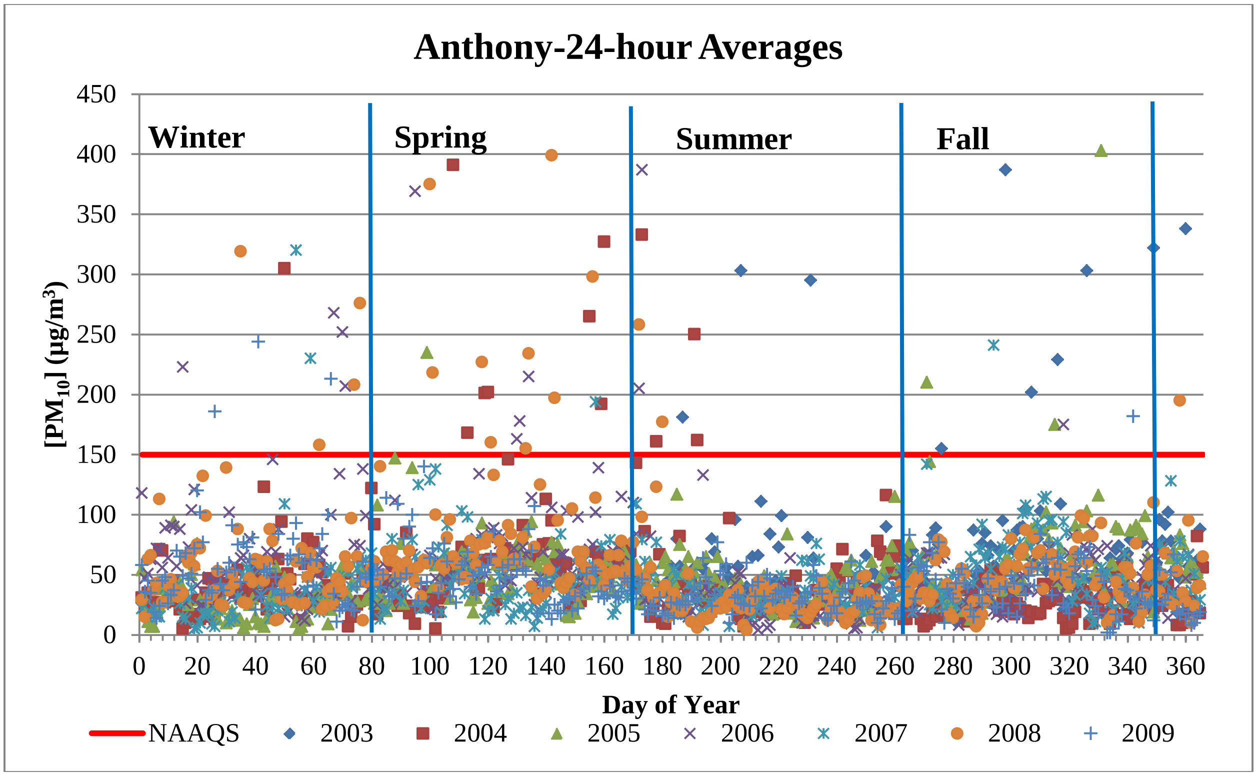

Figure 5-6. 24-hour average PM_{10} concentrations (FEM TEOM data) by day of year from 2003-2009

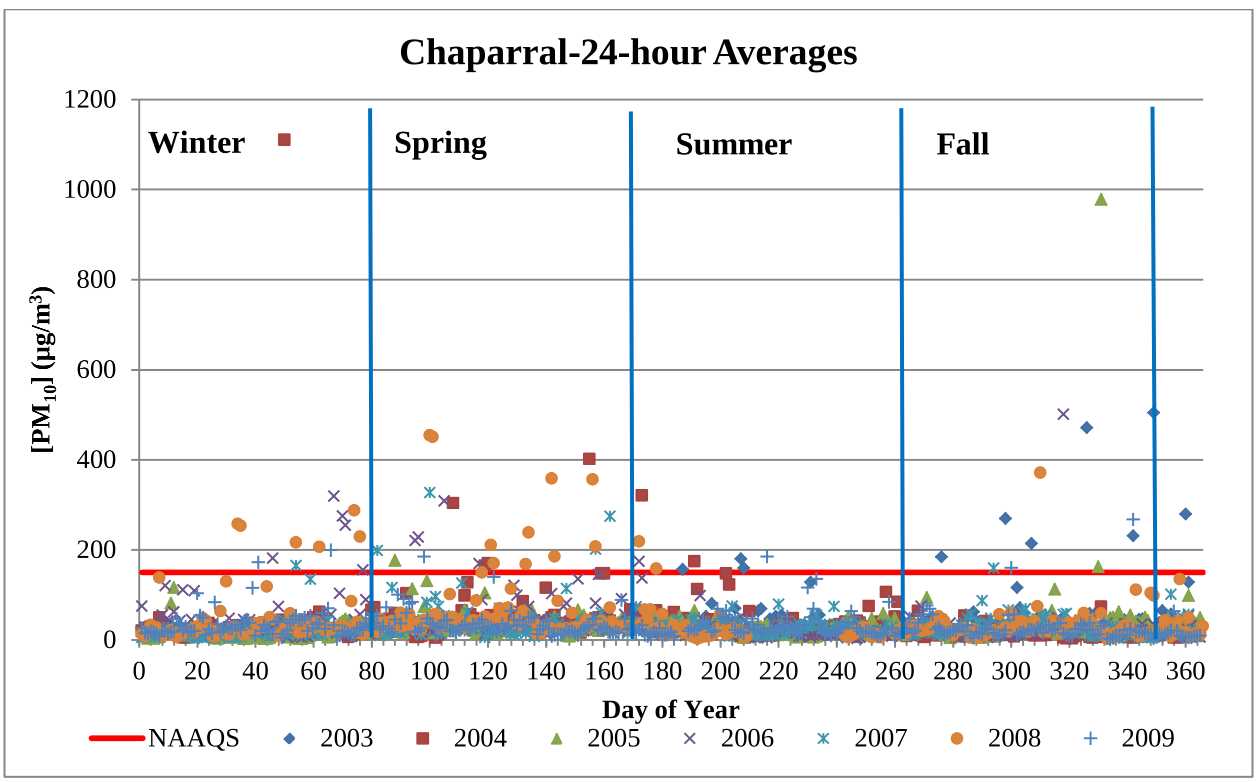

Figure 5-7. 24-hour average PM_{10} concentrations (FEM TEOM data) by day of year from 2003-2009

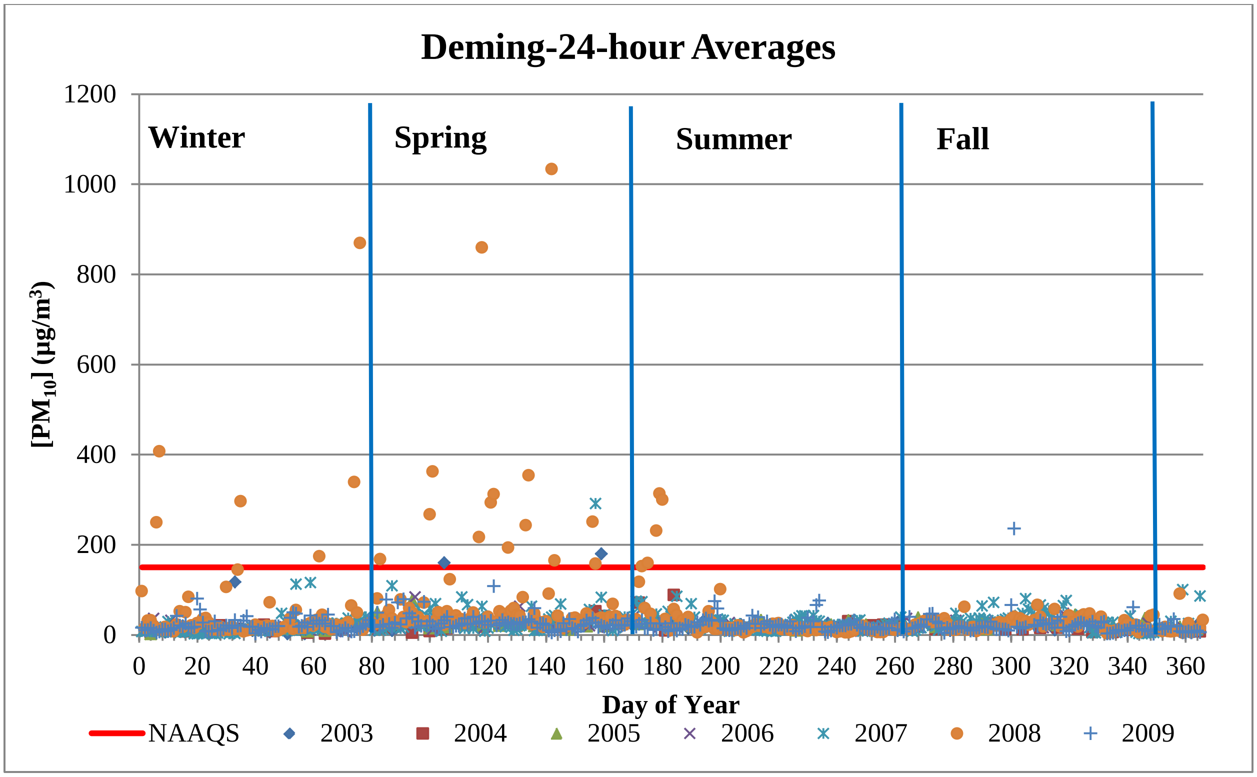

Figure 5-8. 24-hour average PM_{10} concentrations by day of year from 2003-2009. FRM Wedding data from 2003-2006. FEM TEOM data from 2007-2009.

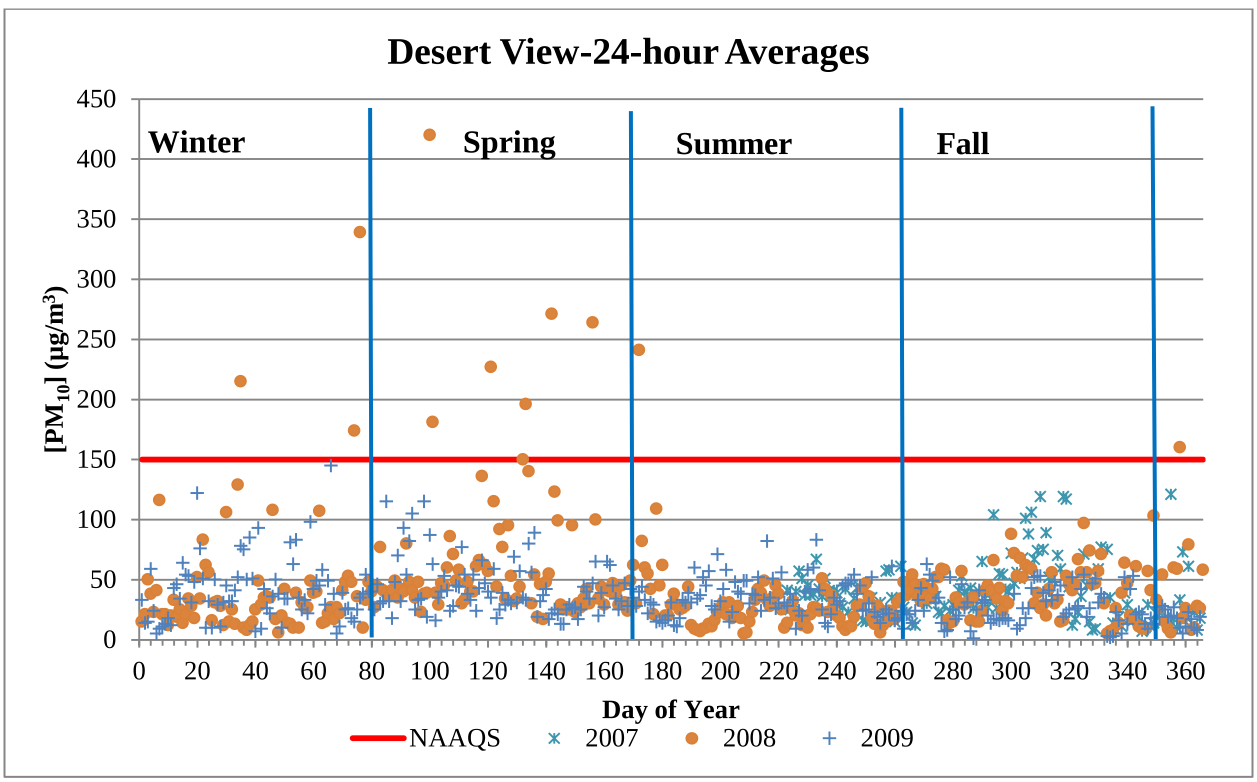

Figure 5-9. 24-hour average PM_{10} concentrations (FEM TEOM data) by day of year from 2007-2009

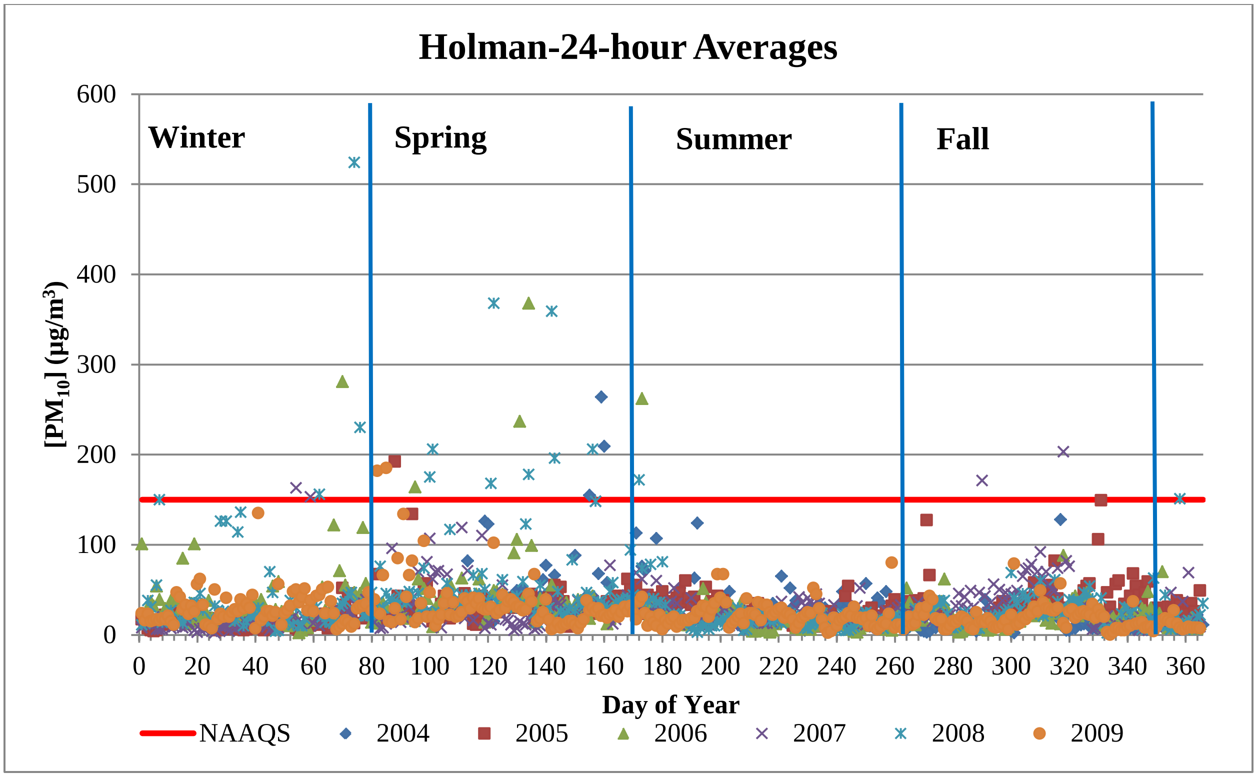

Figure 5-10. 24-hour average PM_{10} concentrations (FEM TEOM data) by day of year from 2004-2009

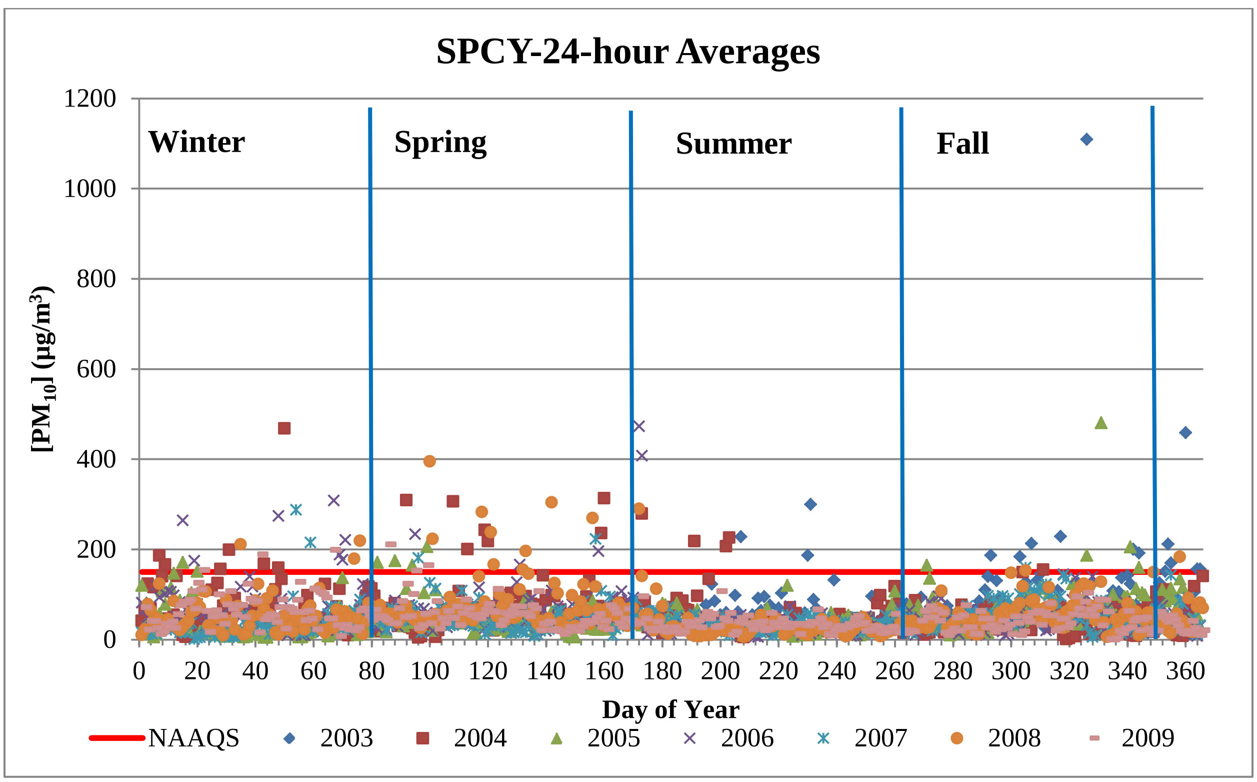

Figure 5-11. 24-hour average PM_{10} concentrations (FEM TEOM data) by day of year from 2003-2009.

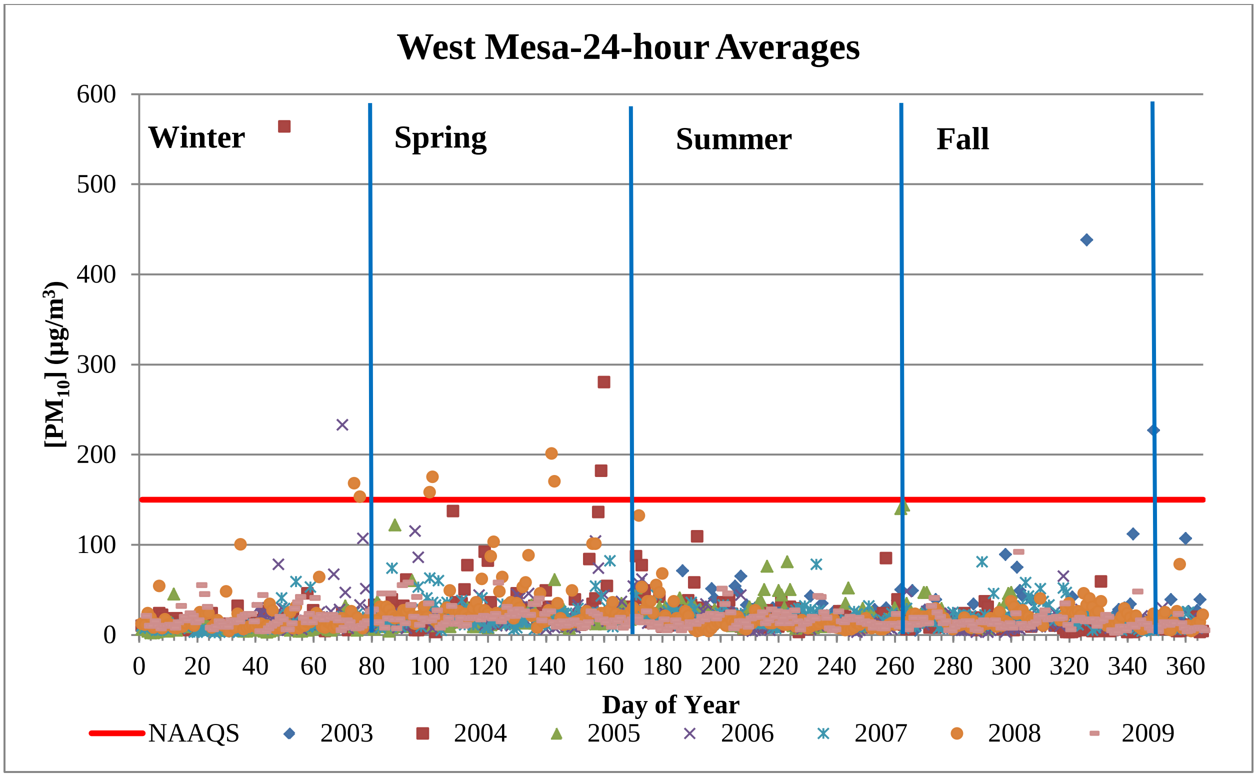

Figure 5-12. 24-hour average PM_{10} concentrations (FEM TEOM data) by day of year from 2003-2009

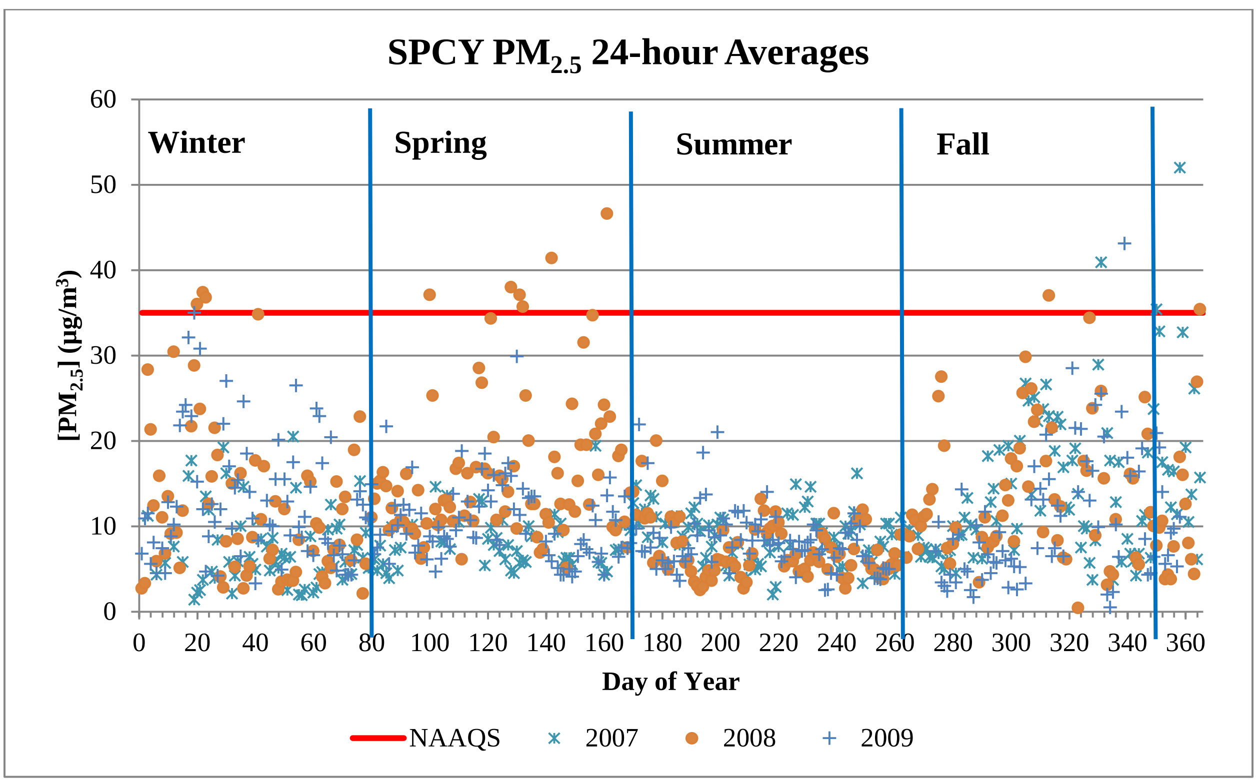

Figure 5-13. 24-hour average $PM_{2.5}$ concentrations (FRM Partisol data) by day of year from 2007-2009

Table 5-1 shows normal historical fluctuations with and without high wind natural events that caused exceedances from 2003-2009. The analysis excludes only those high wind events that resulted in an exceedance. The low wind exceedances recorded at SPCY for PM_{10} from 2003 to 2005 and for $PM_{2.5}$ from 2007-2009 are included in the analysis when high wind events are excluded. PM_{10} Data in this table includes FRM Wedding and FEM TEOM data from 2003-2009 when available and $PM_{2.5}$ data includes FRM Partisol data from 2007-2009. The recorded PM_{10} values for this day are above the maximum value recorded when no high wind exceedances are included and is above the 99th percentile of all PM_{10} and $PM_{2.5}$ 24-hour averages recorded.

Anthony	**Max**	**99th**	**95th**	**75th**	**50th**	**Mean**	**25th**	**5th**	**Minimum**
No Events	147	120	88	56	38	42	25	12	2
Events	403	234	100	57	38	47	25	12	2
Chaparral	**Max**	**99th**	**95th**	**75th**	**50th**	**Mean**	**25th**	**5th**	**Minimum**
No Events	149	116	65	35	24	28	15	6	1
Events	1110	254	90	37	24	35	15	6	1
Deming	**Max**	**99th**	**95th**	**75th**	**50th**	**Mean**	**25th**	**5th**	**Minimum**
No Events	152	88	53	28	19	23	12	6	2
Events	1033	239	65	28	19	28	12	6	2
Desert View	**Max**	**99th**	**95th**	**75th**	**50th**	**Mean**	**25th**	**5th**	**Minimum**
No Events	150	119	82	47	33	37	21	10	1
Events	420	176	90	48	33	40	21	10	1
Holman	**Max**	**99th**	**95th**	**75th**	**50th**	**Mean**	**25th**	**5th**	**Minimum**
No Events	153	119	62	34	23	27	14	6	0
Events	524	170	69	35	23	29	14	6	0
SPCY	**Max**	**99th**	**95th**	**75th**	**50th**	**Mean**	**25th**	**5th**	**Minimum**
No Events	212	143	108	60	39	46	24	11	0
Events	1109	227	123	63	40	51	25	11	0
West Mesa	**Max**	**99th**	**95th**	**75th**	**50th**	**Mean**	**25th**	**5th**	**Minimum**
No Events	153	87	46	23	15	19	10	5	0
Events	564	106	47	23	15	20	10	5	0
SPCY $PM_{2.5}$	**Max**	**99th**	**95th**	**75th**	**50th**	**Mean**	**25th**	**5th**	**Minimum**
No Events	52	36	25	13	9	11	6	4	0
Events	52	37	25	13	9	11	6	4	0

Table 5-1. 24-hour average PM_{10} and $PM_{2.5}$ data distribution with and without high wind events included.

An hourly data distribution analysis was performed for hourly PM_{10} concentrations, wind speeds and wind gusts (Appendices A, B and C). All data for this analysis use the FEM TEOM monitors. NMED does not have a continuous FRM or FEM approved $PM_{2.5}$ monitor and an hourly data distribution is not available for the SPCY $PM_{2.5}$ site. Overlaying the hourly data for April 1 on the hourly data distribution plots shows that the values recorded during the high wind event exceed the 95th percentile for PM_{10}, wind speed and wind gusts (Figures 5-14 through 5-34). The top whisker of the of the box and whisker plots represent the 95th percentile of data. As stated previously, wind data used for the Anthony site come from the La Union site. The hourly

PM_{10} values during the high wind blowing dust storm far exceed the historical 95th percentile of data.

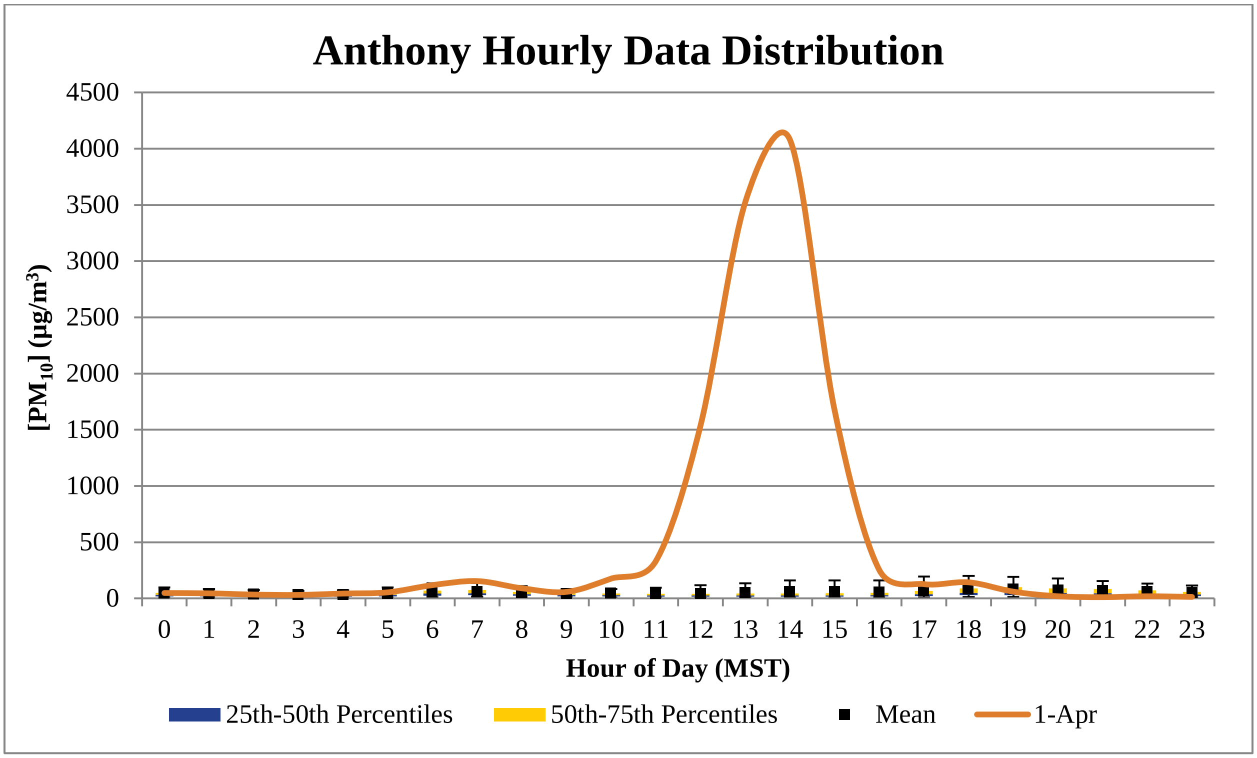

Figure 5-14. PM_{10} hourly data distribution from 2003-2009 overlaid by hourly values for April 1, 2010.

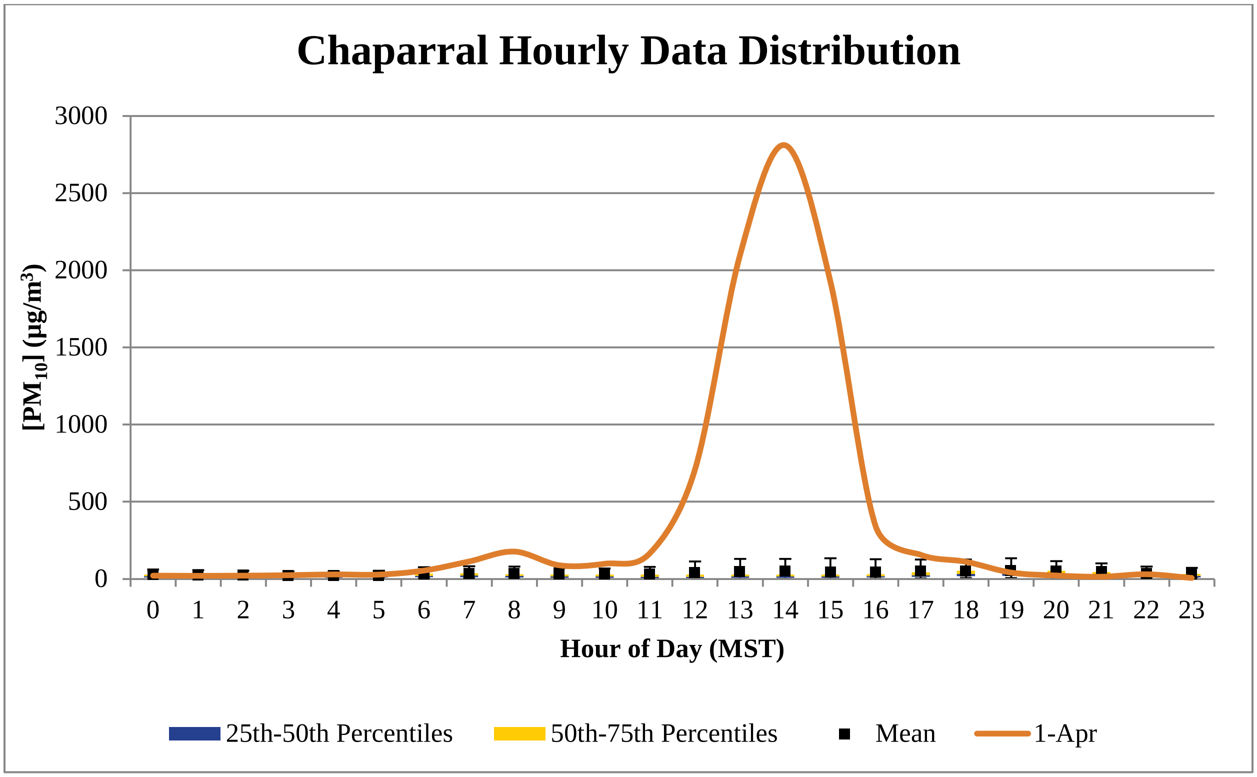

Figure 5-15. PM_{10} hourly data distribution from 2003-2009 overlaid by hourly values for April 1, 2010.

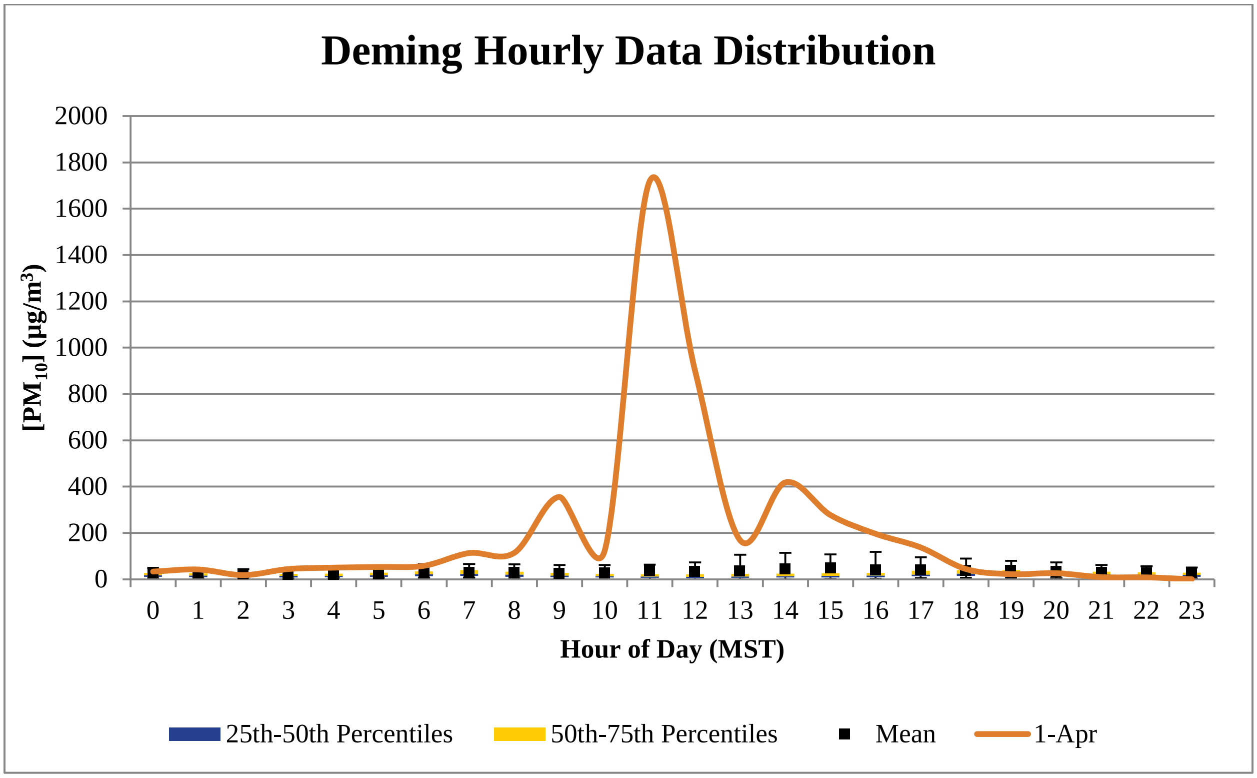

Figure 5-16. PM_{10} hourly data distribution from 2006-2009 overlaid by hourly values for April 1, 2010.

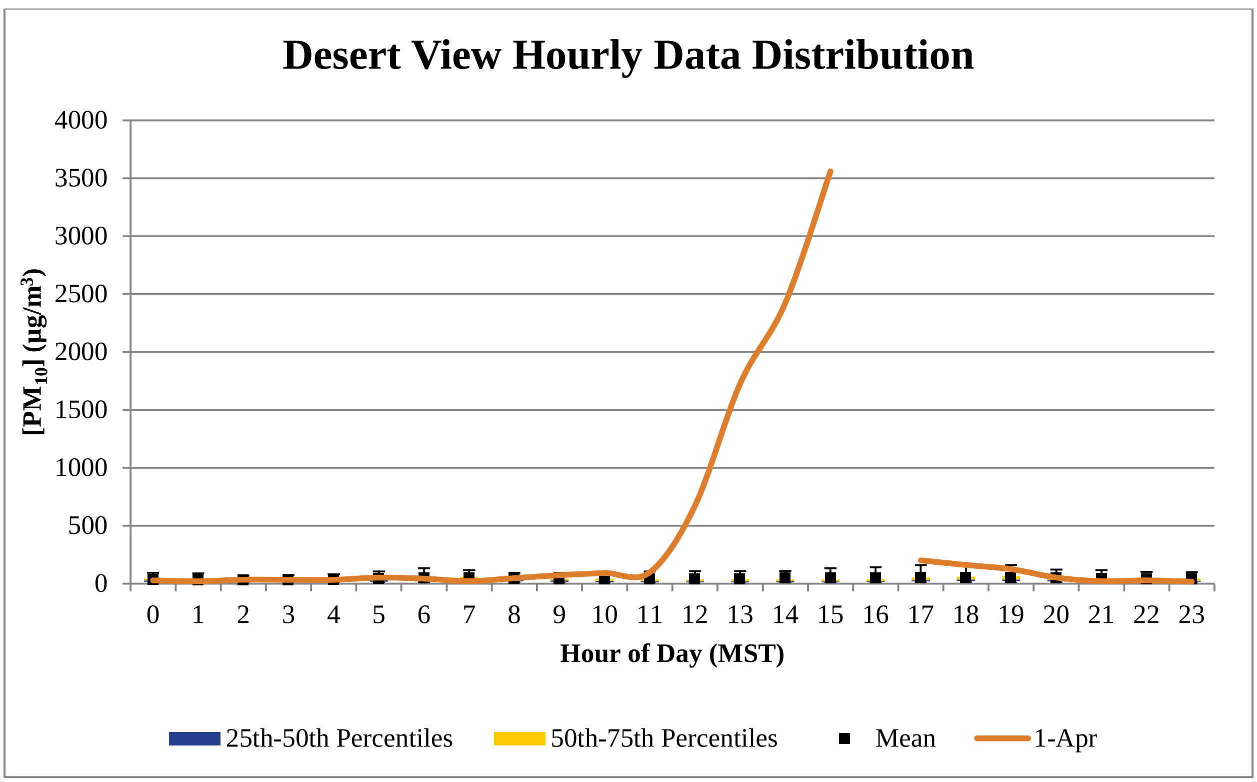

Figure 5-17. PM_{10} hourly data distribution from 2007-2009 overlaid by hourly values for April 1, 2010. Data for the 1600 hour was incomplete and not included for this day.

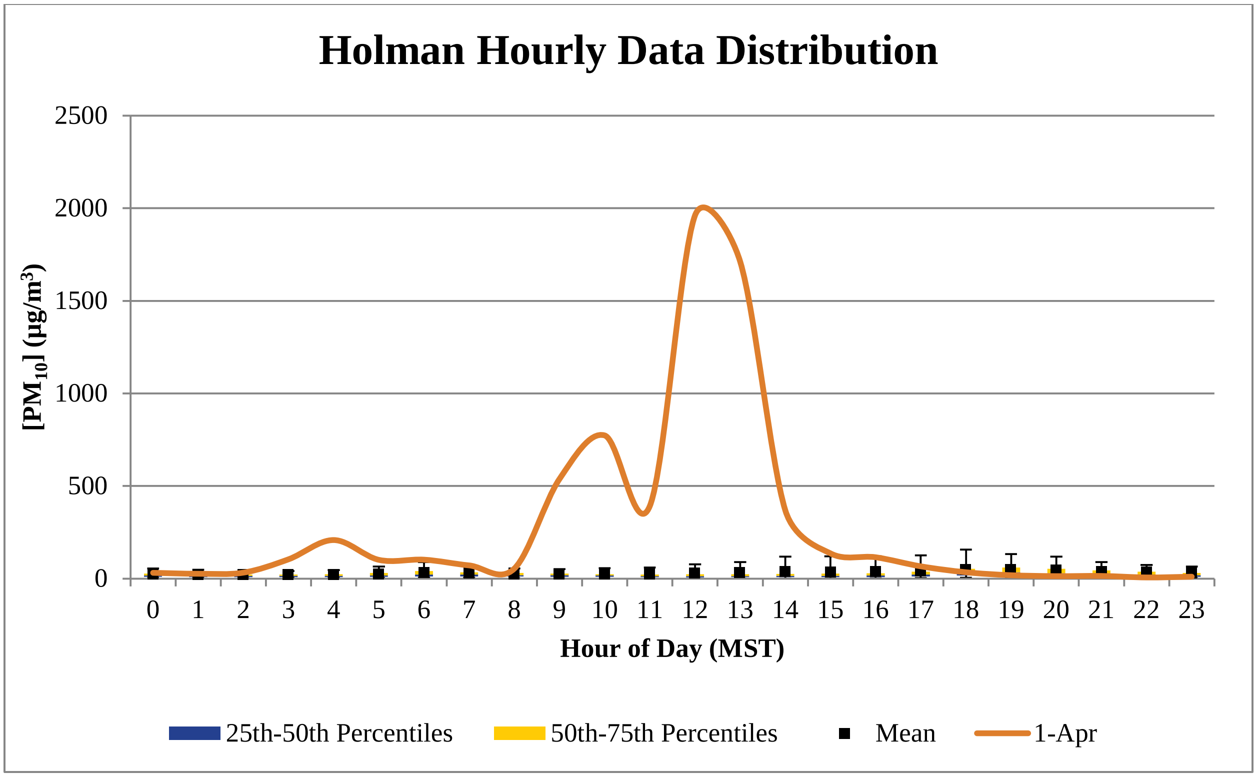

Figure 5-18. PM_{10} hourly data distribution from 2004-2009 overlaid by hourly values for April 1, 2010.

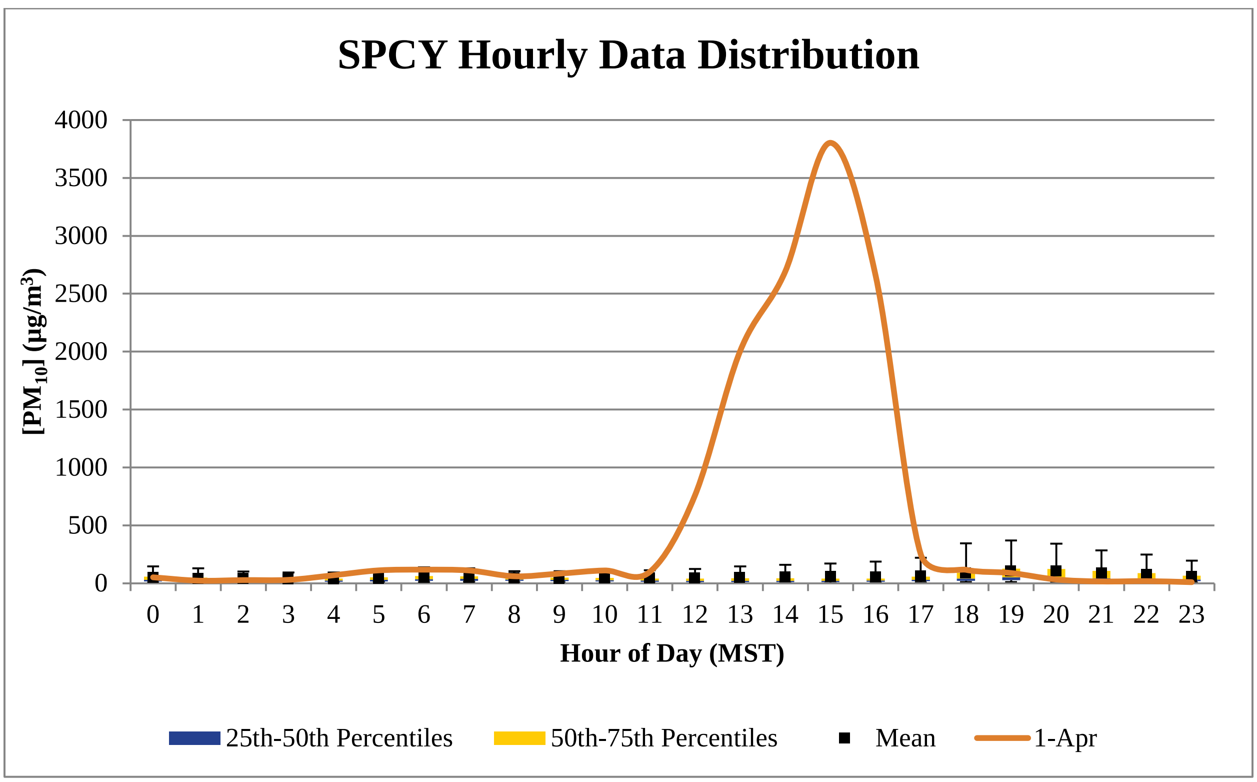

Figure 5-19. PM_{10} hourly data distribution from 2003-2009 overlaid by hourly values for April 1, 2010.

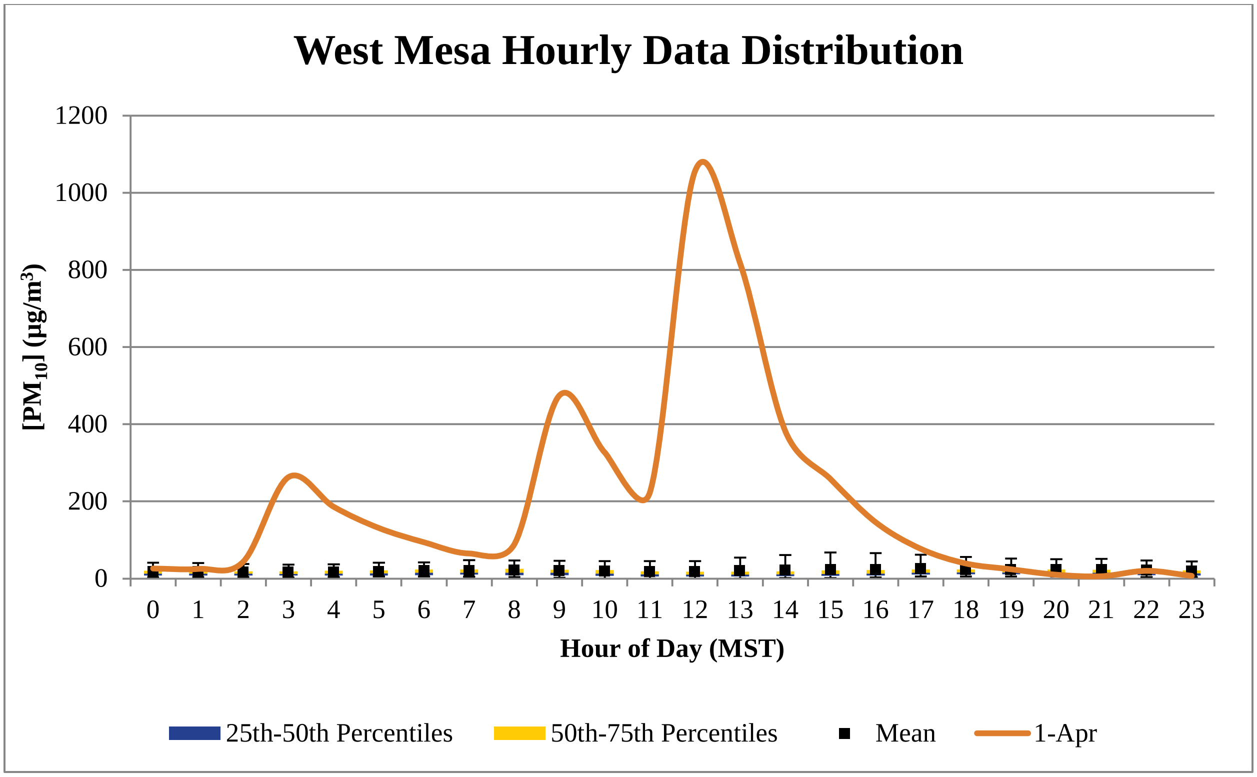

Figure 5-20. PM_{10} hourly data distribution from 2003-2009 overlaid by hourly values for April 1, 2010.

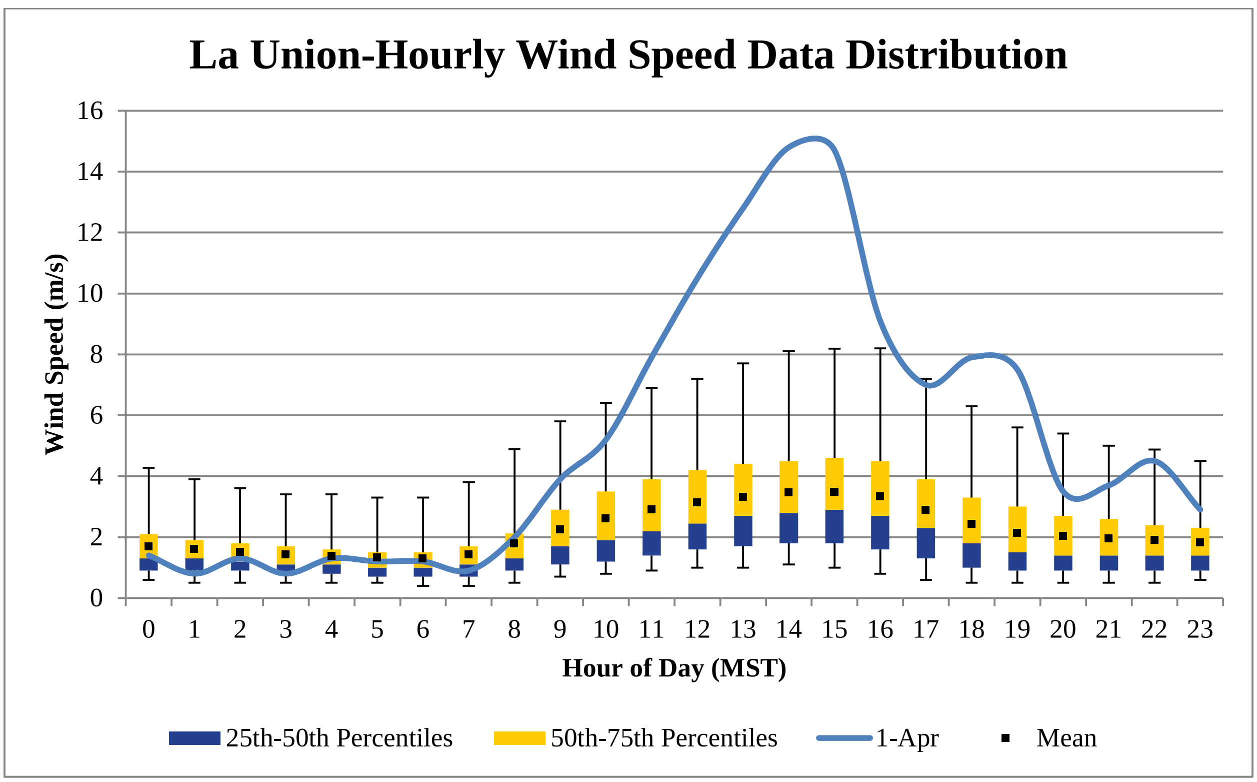

Figure 5-21. Hourly wind speed data distribution from 2003-2009 overlaid by hourly values for April 1, 2010.

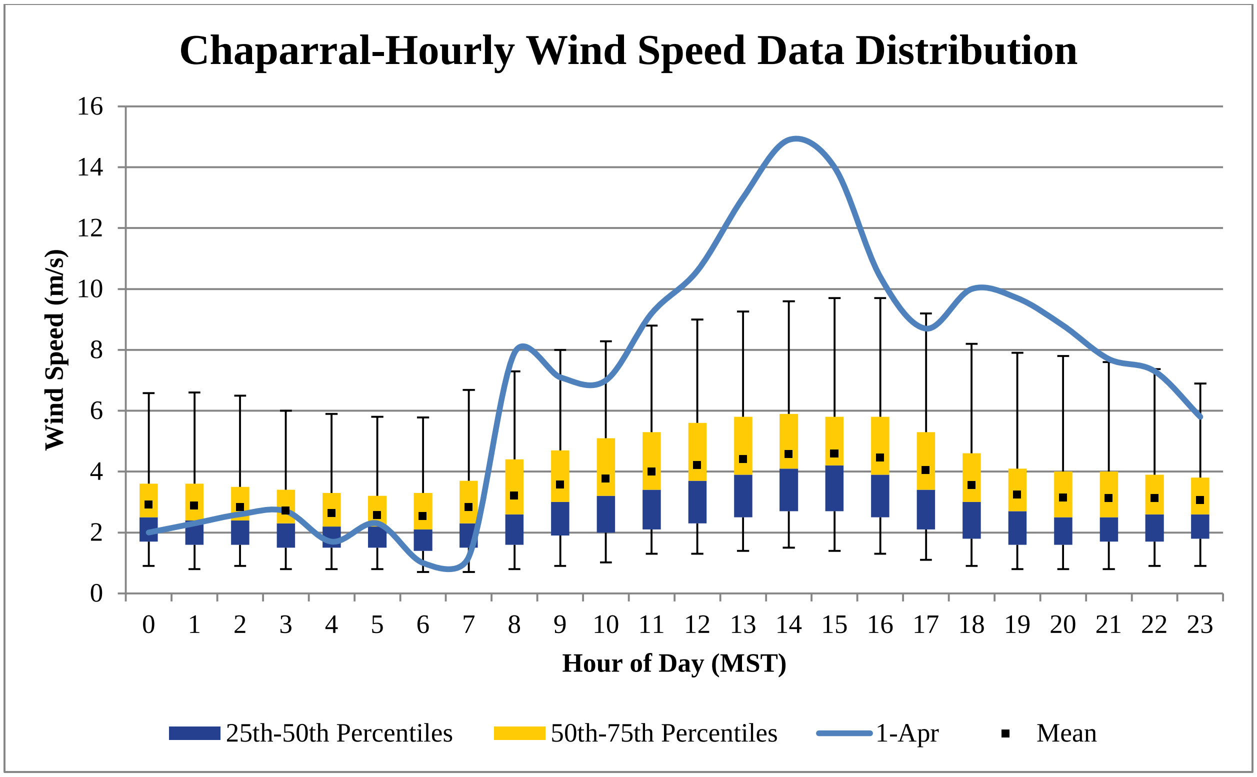

Figure 5-22. Hourly wind speed data distribution from 2003-2009 overlaid by hourly values for April 1, 2010.

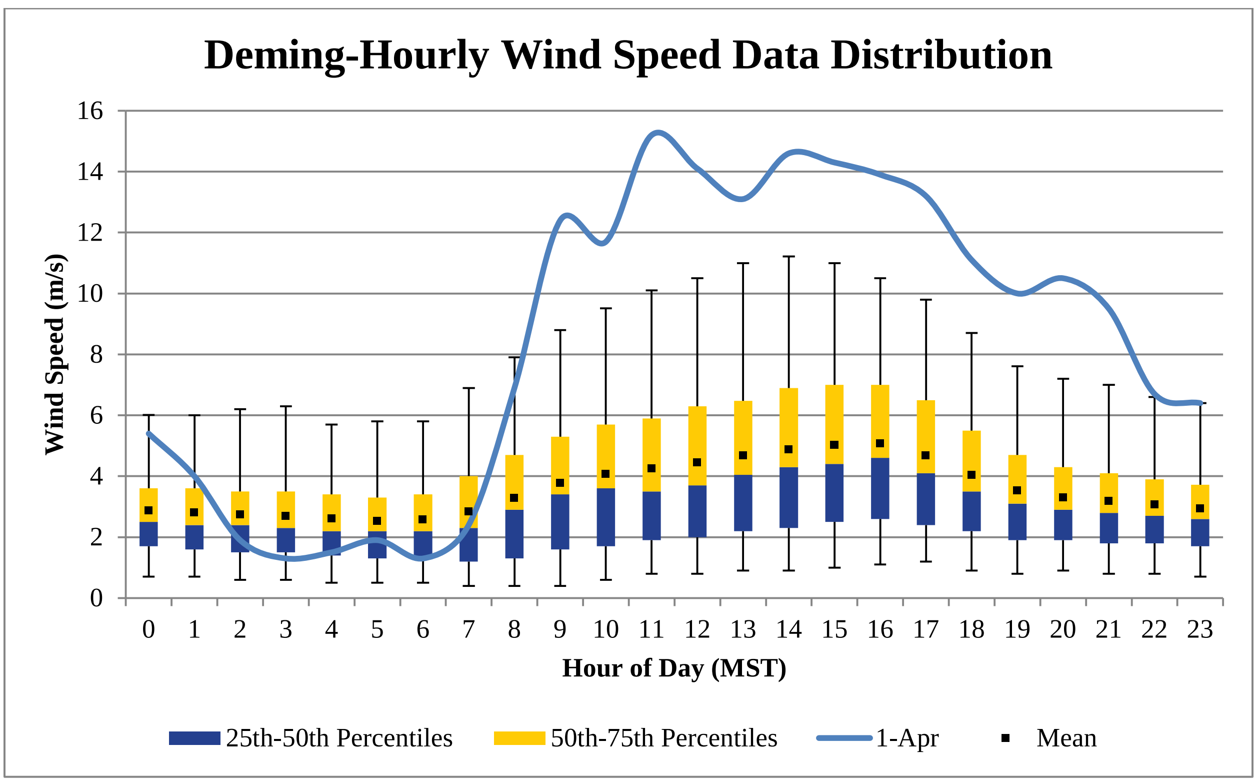

Figure 5-23. Hourly wind speed data distribution from 2003-2009 overlaid by hourly values for April 1, 2010.

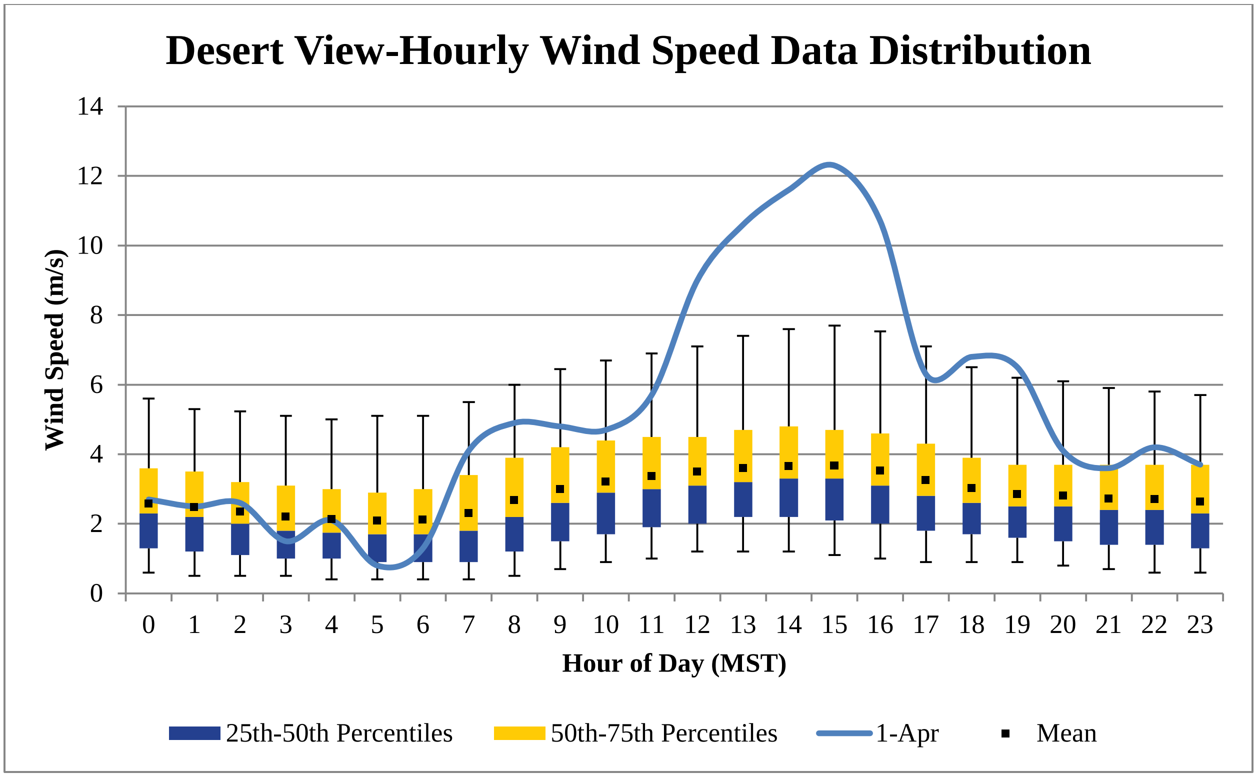

Figure 5-24. Hourly wind speed data distribution from 2003-2009 overlaid by hourly values for April 1, 2010.

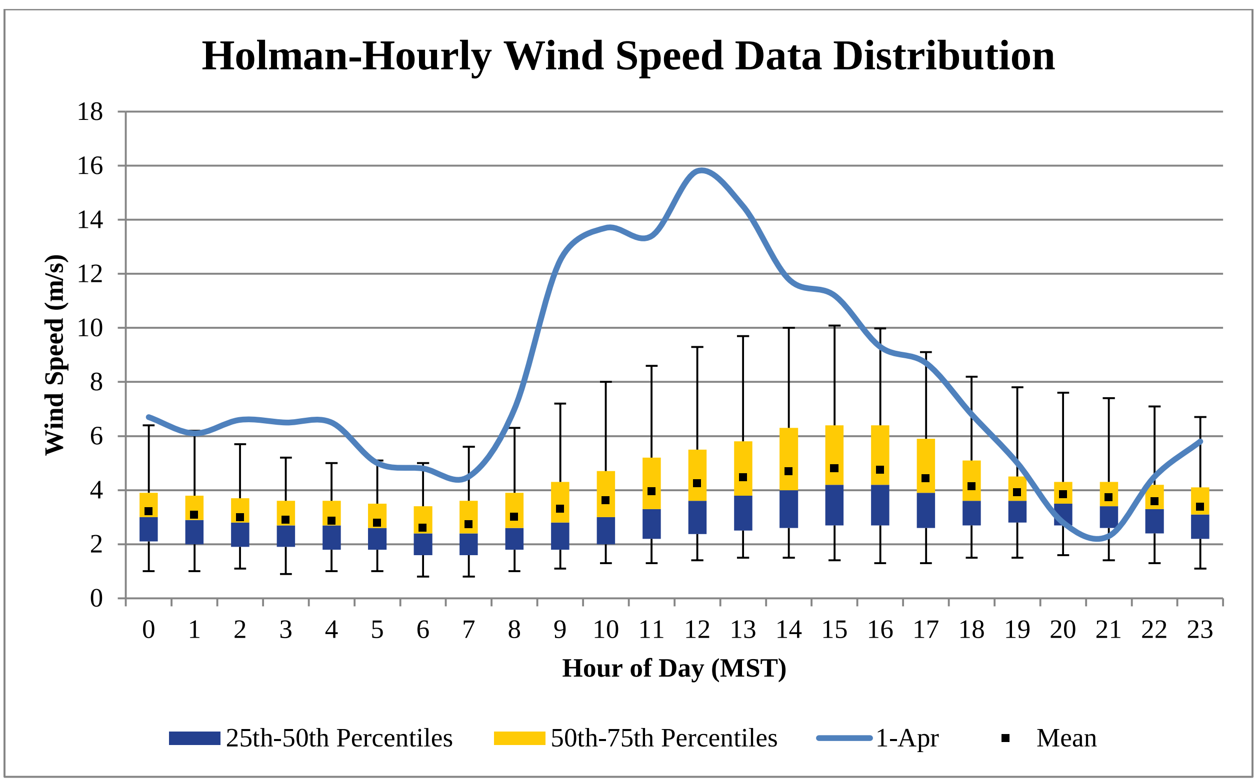

Figure 5-25. Hourly wind speed data distribution from 2004-2009 overlaid by hourly values for April 1, 2010.

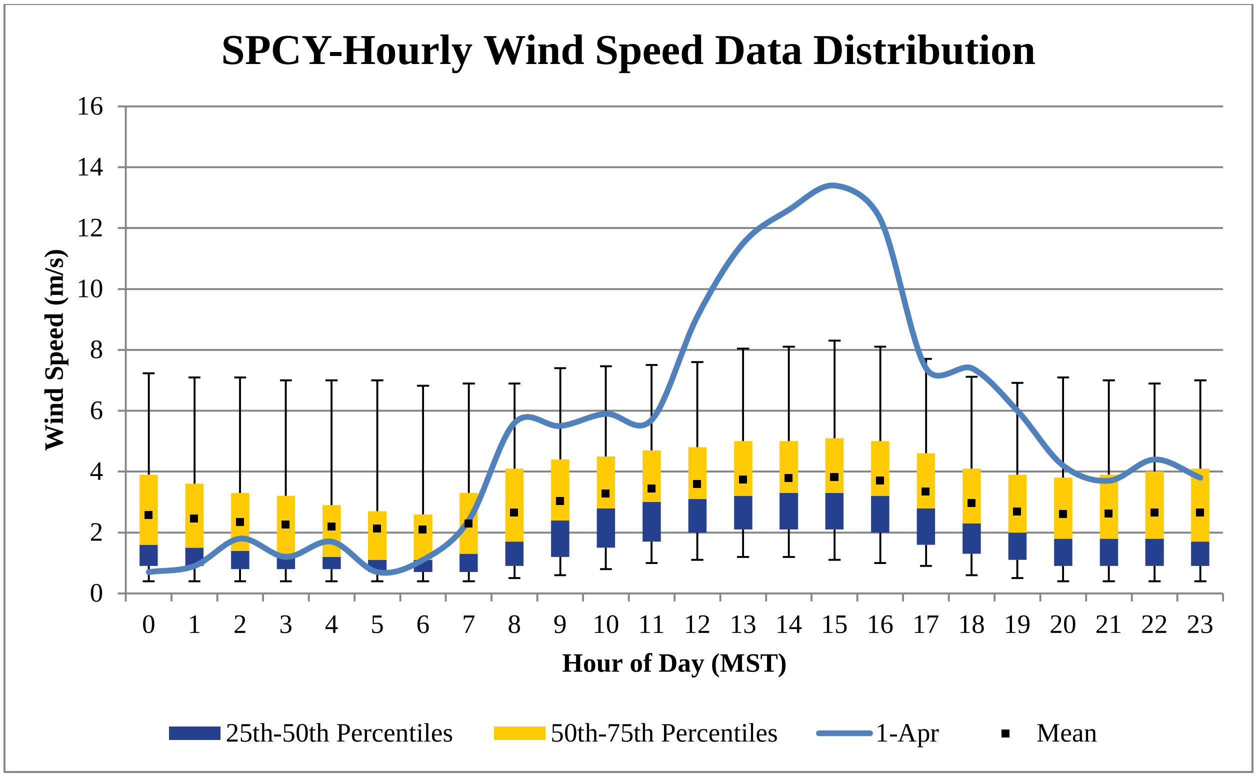

Figure 5-26. Hourly wind speed data distribution from 2003-2009 overlaid by hourly values for April 1, 2010.

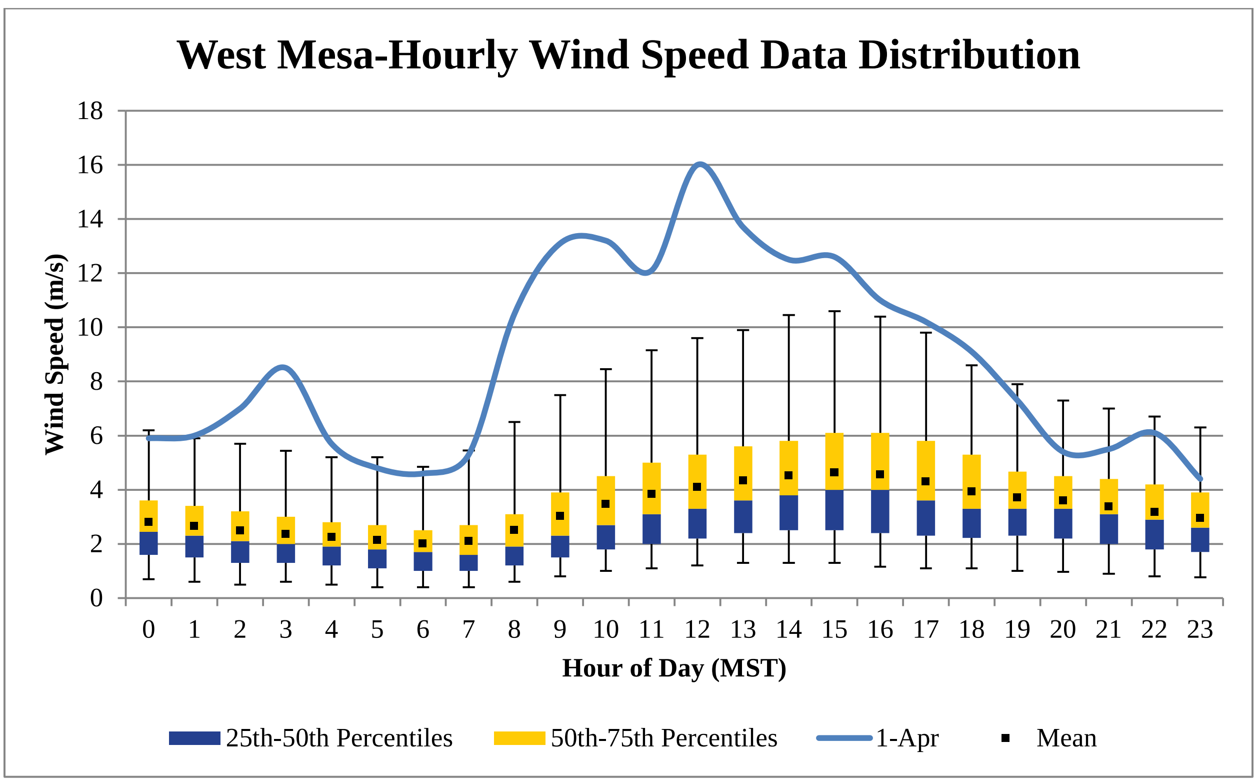

Figure 5-27. Hourly wind speed data distribution from 2003-2009 overlaid by hourly values for April 1, 2010.

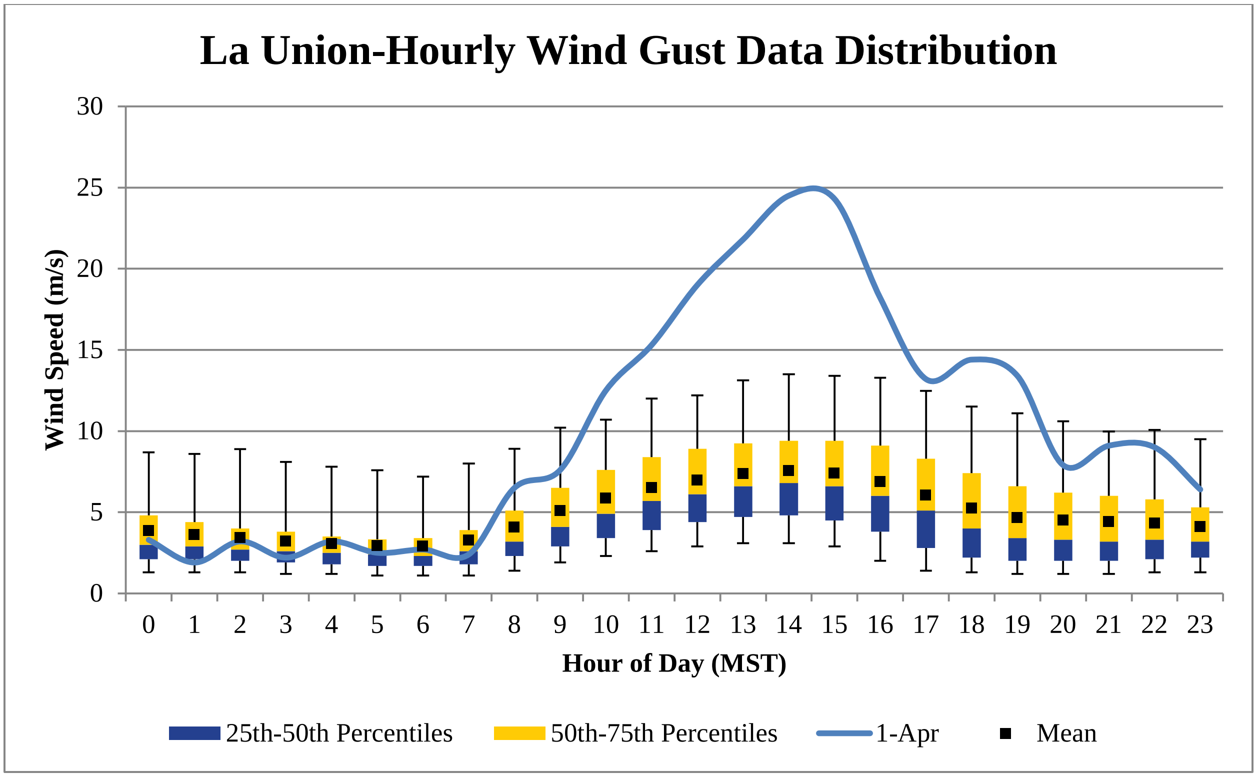

Figure 5-28. Hourly wind gust data distribution from 2003-2009 overlaid by hourly values for April 1, 2010.

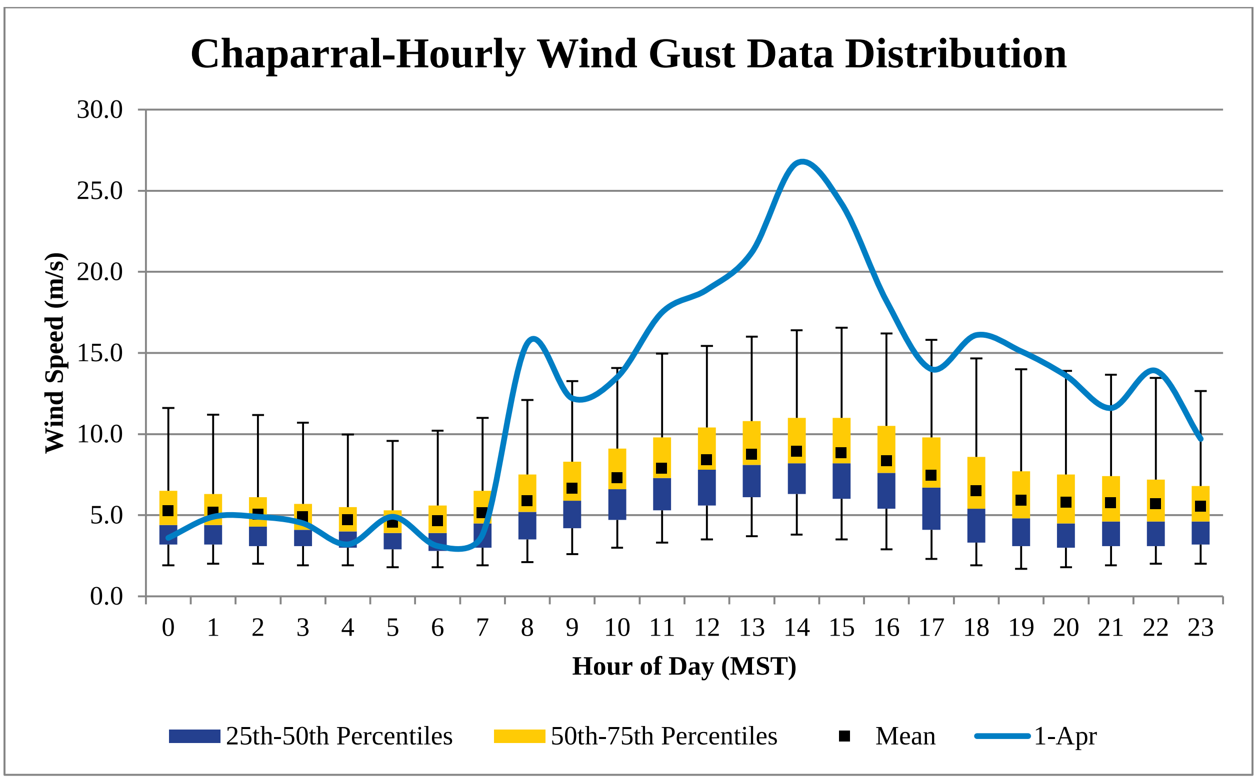

Figure 5-29. Hourly wind gust data distribution from 2003-2009 overlaid by hourly values for April 1, 2010.

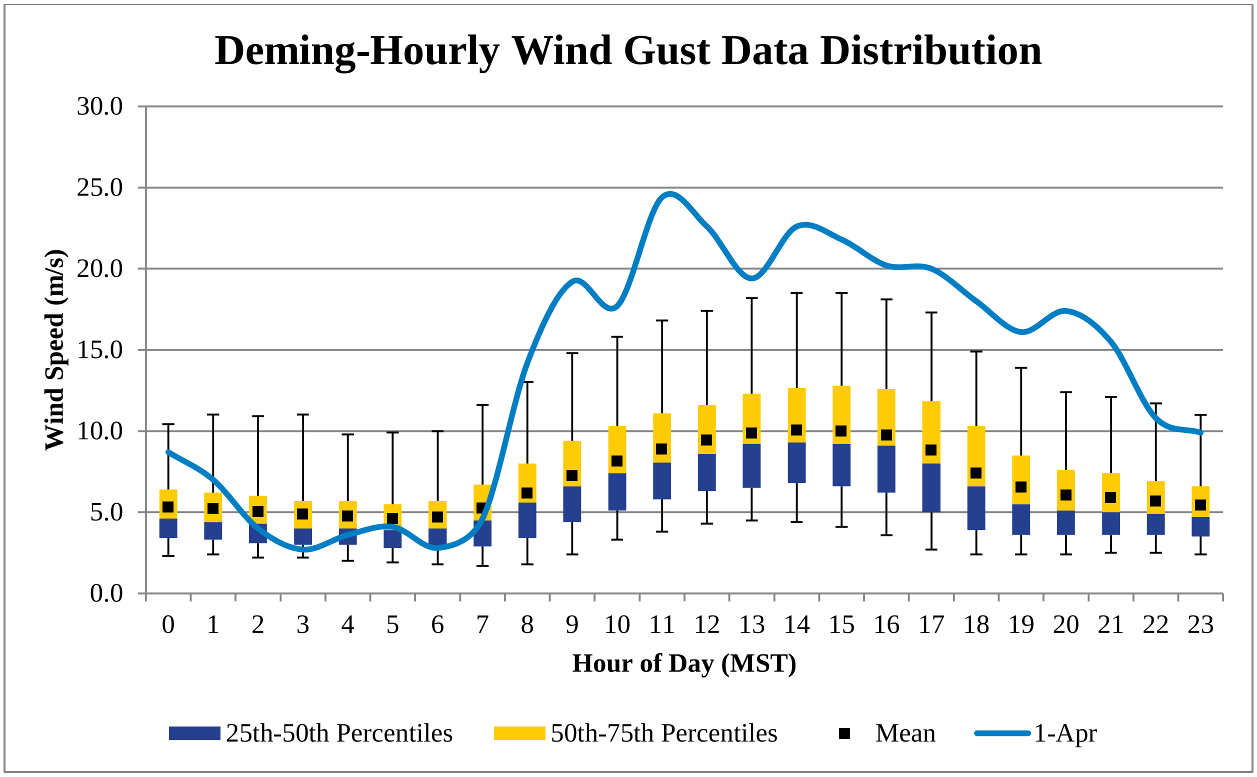

Figure 5-30. Hourly wind gust data distribution from 2003-2009 overlaid by hourly values for April 1, 2010.

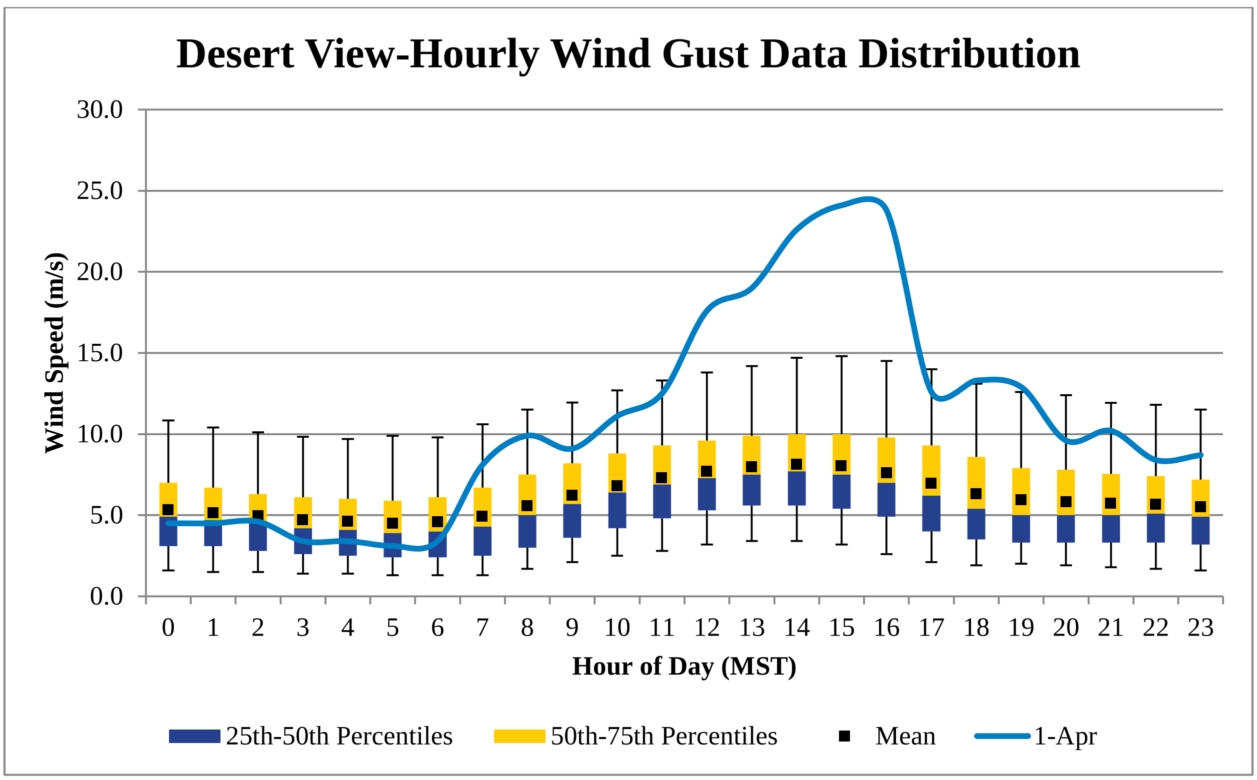

Figure 5-31. Hourly wind gust data distribution from 2003-2009 overlaid by hourly values for April 1, 2010.

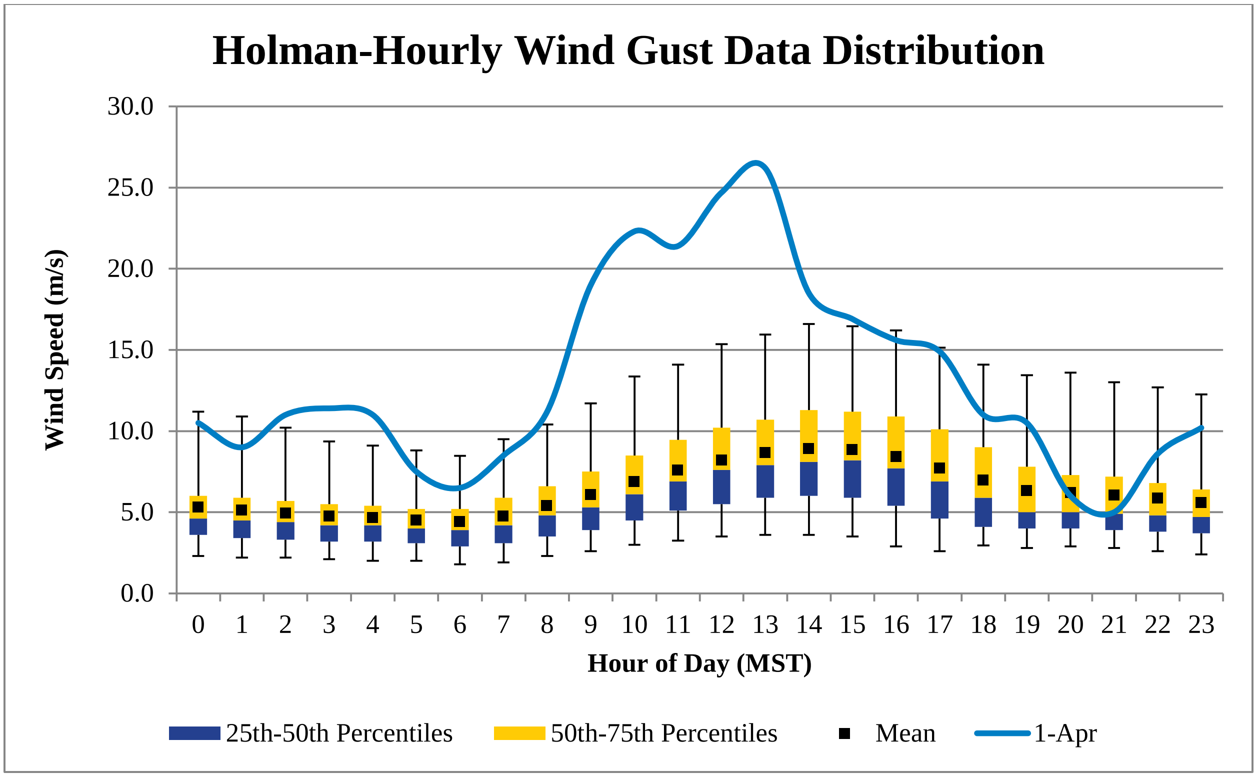

Figure 5-32. Hourly wind gust data distribution from 2004-2009 overlaid by hourly values for April 1, 2010.

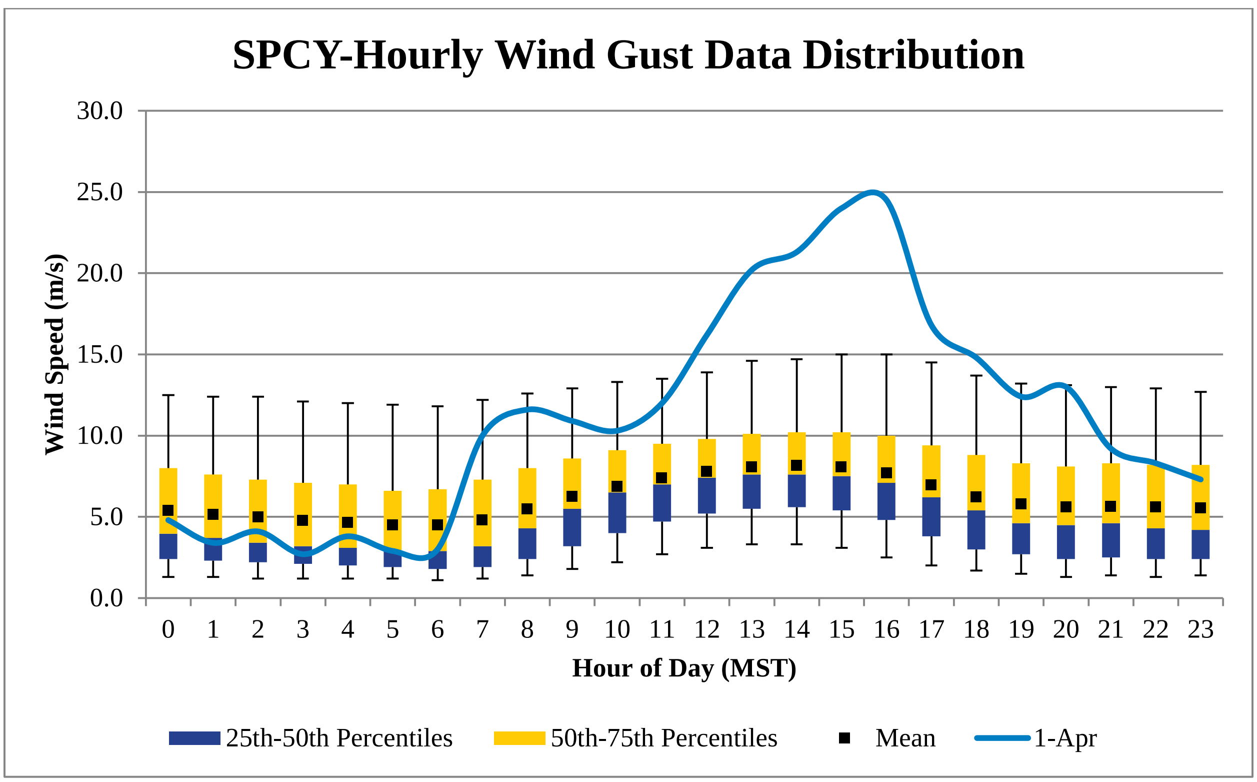

Figure 5-33. Hourly wind gust data distribution from 2003-2009 overlaid by hourly values for April 1, 2010.

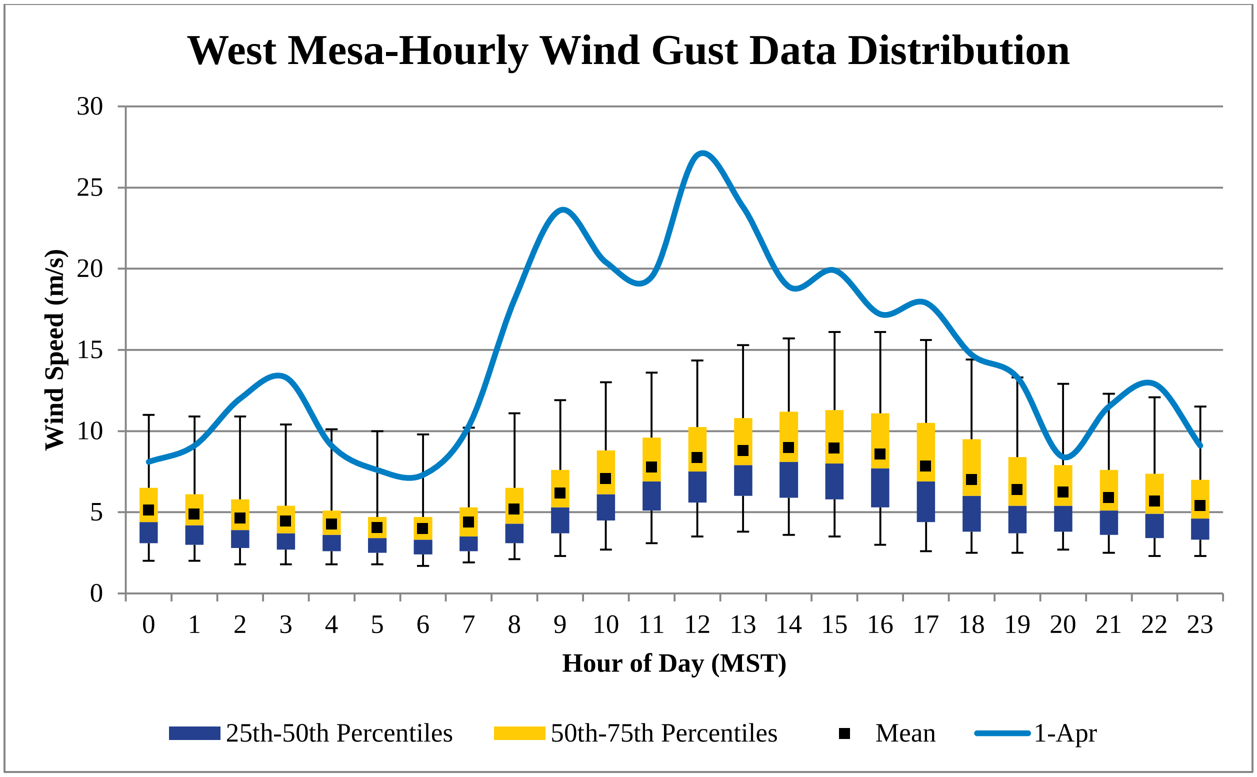

Figure 5-34. Hourly wind gust data distribution from 2003-2009 overlaid by hourly values for April 1, 2010.

5.4 Clear Causal Relationship

A strong Pacific cold front passed through New Mexico on April 1, 2010. As the Pacific cold front moved through New Mexico, a strong pressure gradient formed over southeastern Arizona, southwestern New Mexico and northwestern Chihuahua causing high winds at the surface (Figure 5-35). Surface winds flow perpendicular to the isobars from high to low pressure. As the day progressed, the wind direction in the upper atmosphere aligned with the surface wind direction (Figure 5-36). Diurnal heating of the surface allowed winds aloft to mix downward, increasing the surface wind velocities and provided the turbulence required for vertical mixing and horizontal transport.

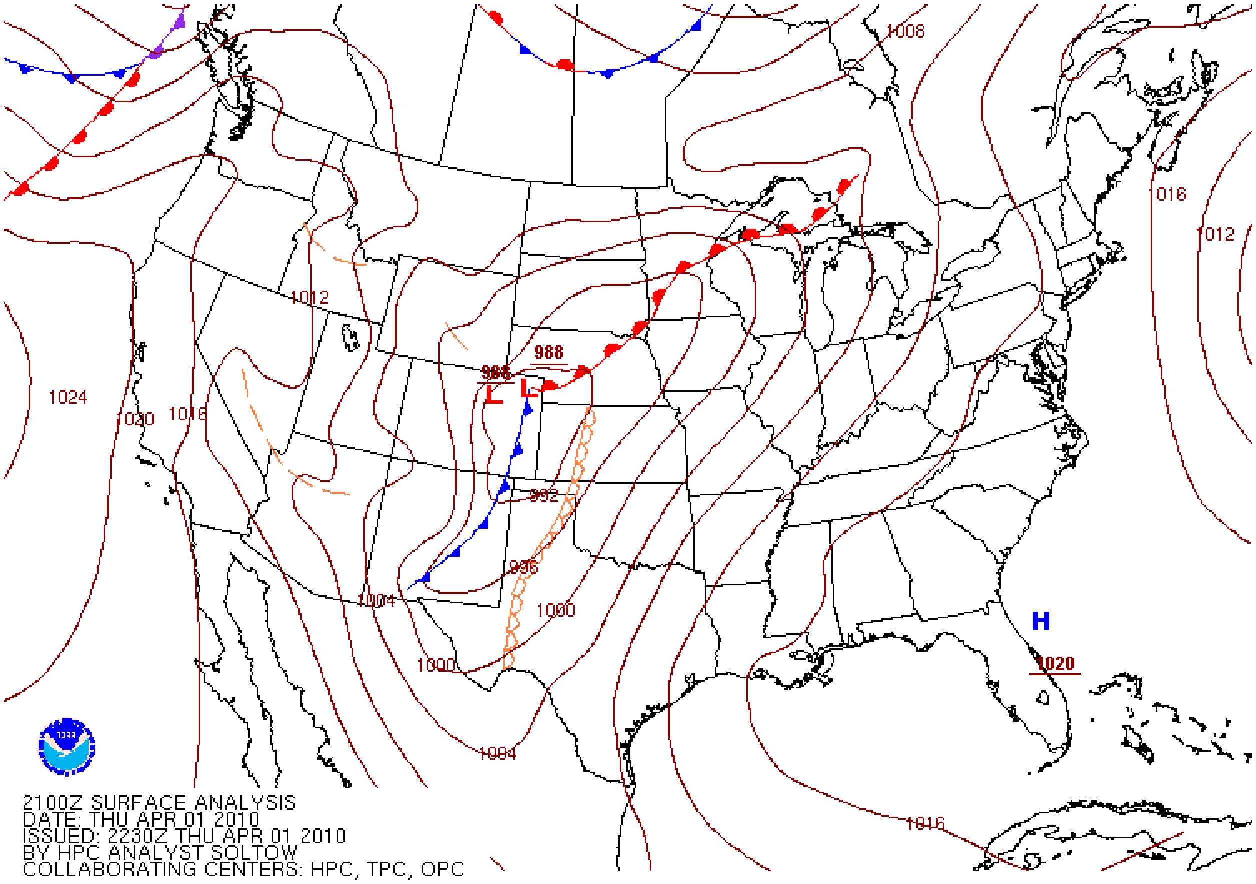

Figure 5-35. Surface weather map showing frontal activity and isobars of constant pressure (red lines) for April 1, 2010 at the 1500 hour MST.

The weather pattern described above generated strong southwesterly winds beginning at the 900 hour and lasting through the 1700 hour. Beginning at the 900 hour, wind gusts exceeded the historical 95th percentile of data at most sites as shown in Figures 5-28 through 5-34. In addition, sustained wind speeds reached then exceeded EPA's default threshold for blowing dust (Figure 5-2). Peak wind gusts ranged from 24 m/s at Desert View to 27 m/s at West Mesa (Figure 5-3). Peak wind speeds ranged from 12 m/s at Desert View to 16 m/s at Holman (Figure 5-2). Blowing dust caused elevated levels of PM_{10} during the same period of high winds as demonstrated by the time series plots in Figures 5-37 through 5-43. As wind speed and wind gusts exceed the 95th percentile of historical data, so do hourly PM_{10} concentrations on this date (900-1700 hours). During these hours, hourly PM_{10} concentrations spiked at all monitoring sites in the network (Figure 5-44). Satellite imagery captured the blowing dust throughout the southern New Mexico, northern Mexico and west Texas (Figures 5-45 and 5-46).

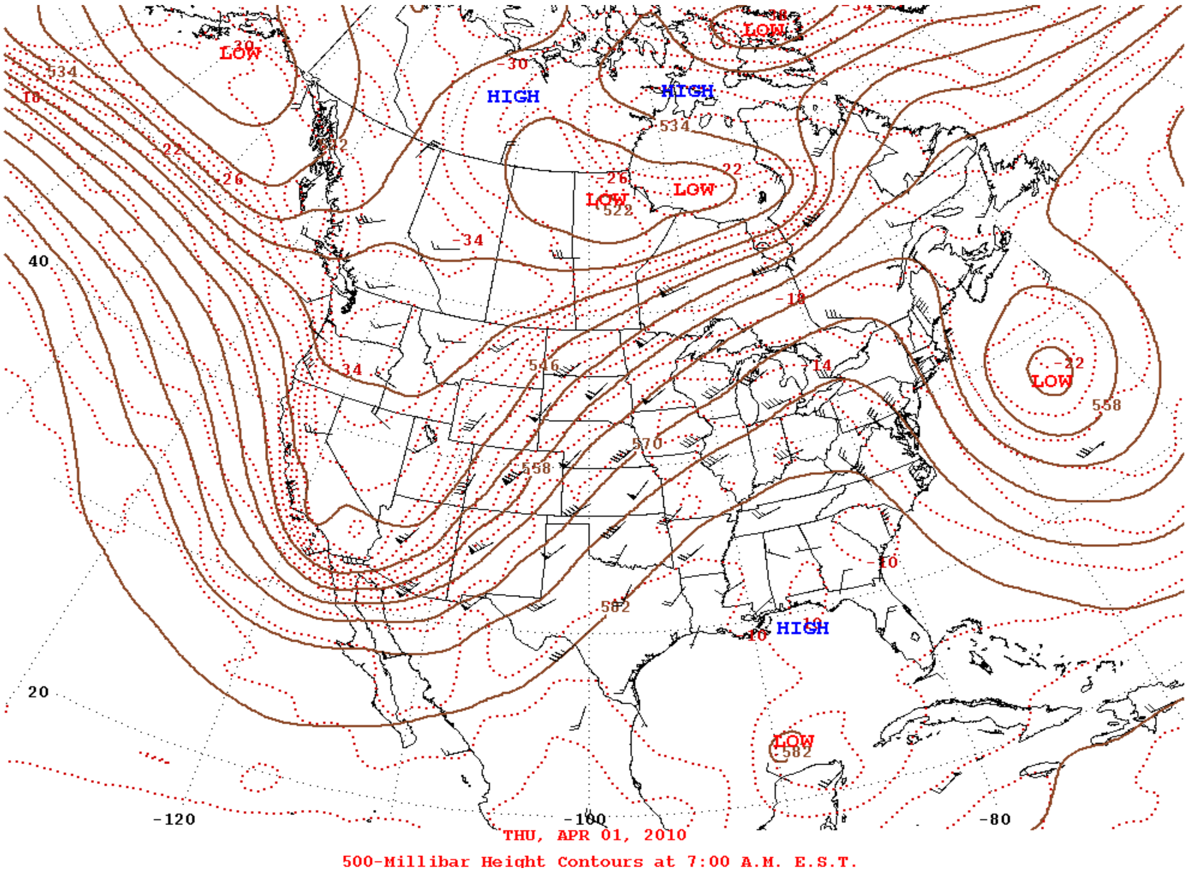

Figure 5-36. Upper air weather map showing geopotential heights (brown lines) at the 500 hour on April 1, 2010.

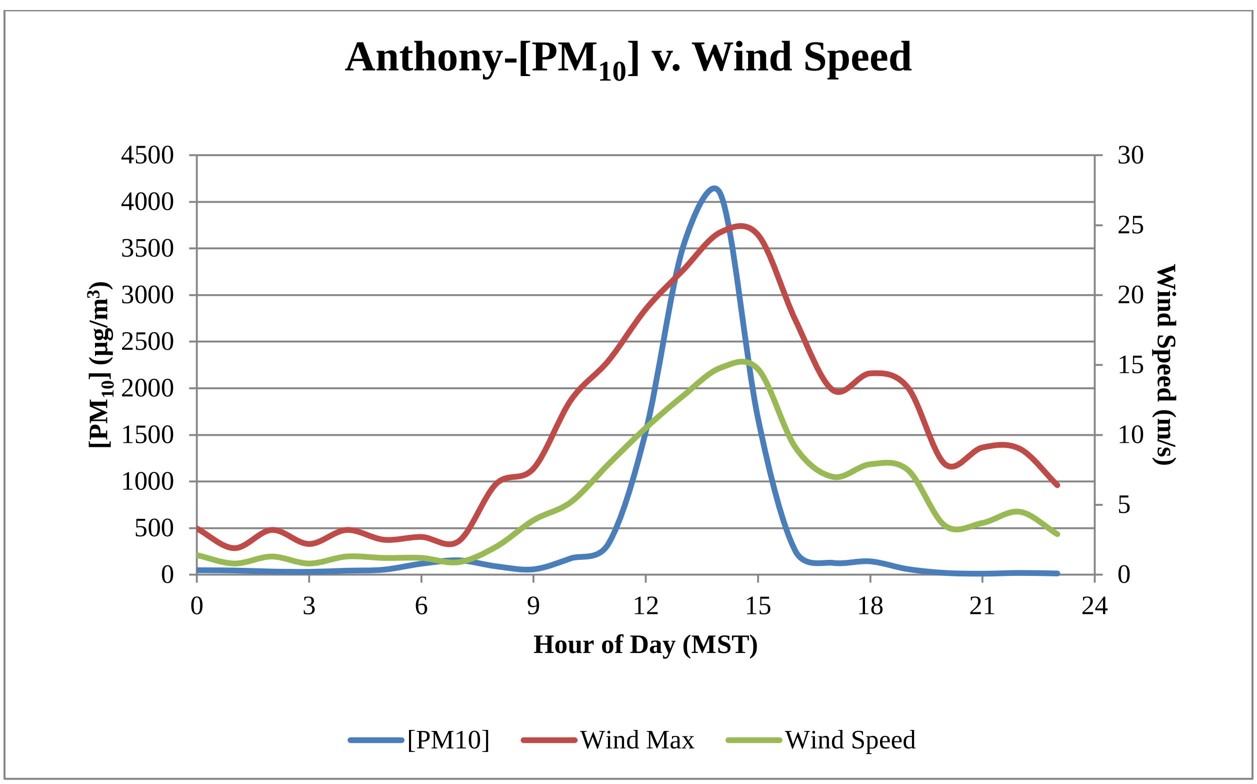

Figure 5-37. Time series plot of hourly observations showing increased PM_{10} concentrations as wind speeds and gusts increase.

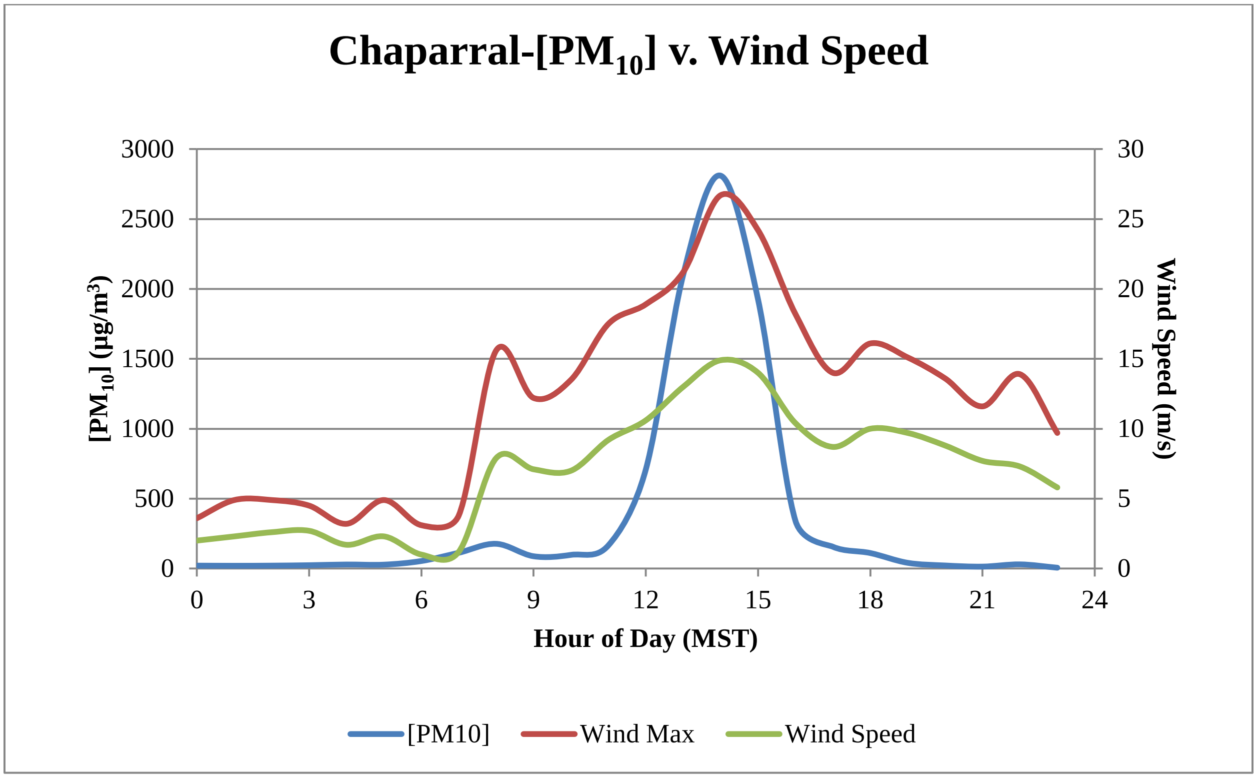

Figure 5-38. Time series plot of hourly observations showing increased PM_{10} concentrations as wind speeds and gusts increase.

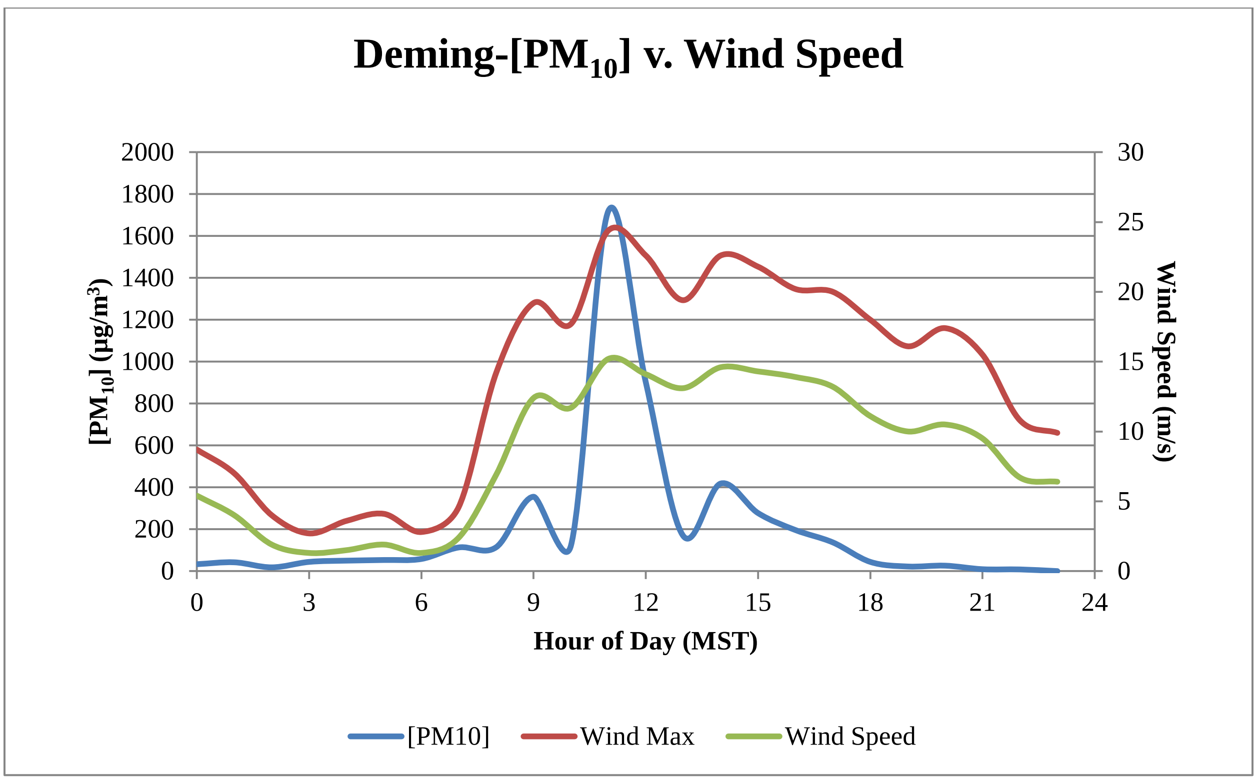

Figure 5-39. Time series plot of hourly observations showing increased PM_{10} concentrations as wind speeds and gusts increase.

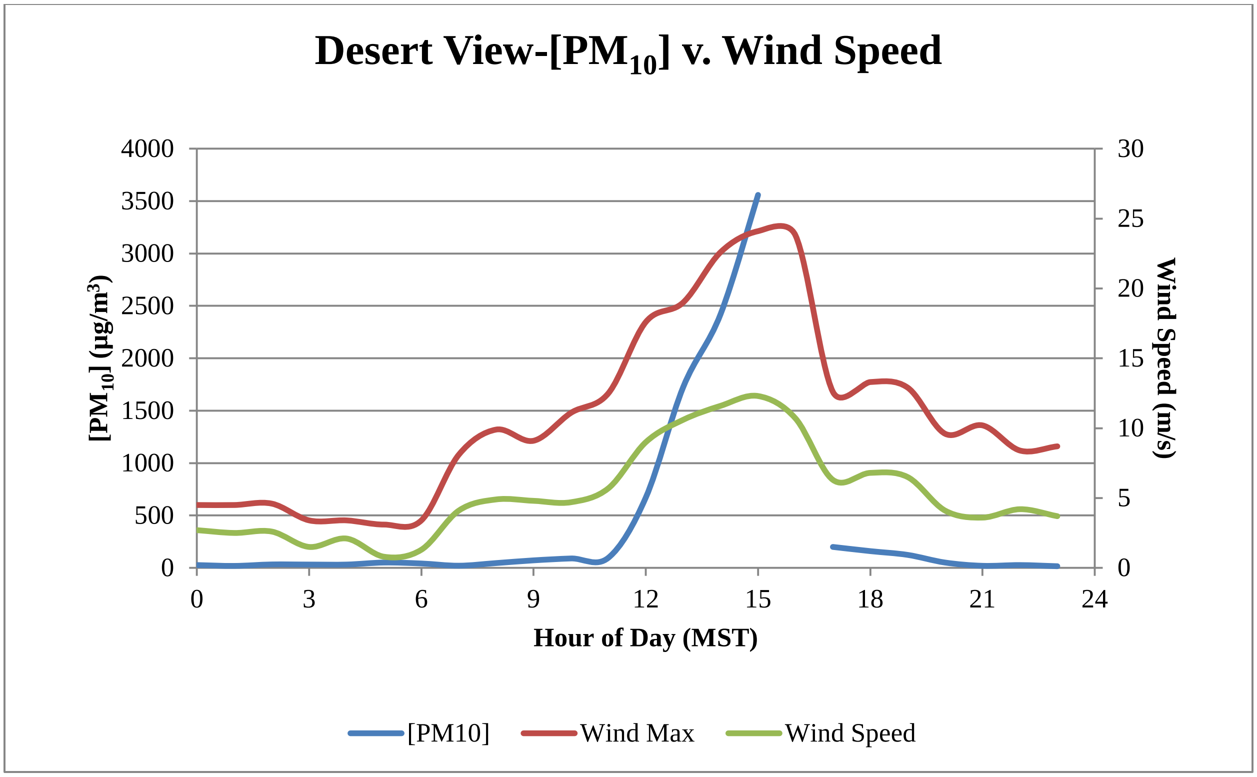

Figure 5-40. Time series plot of hourly observations showing increased PM_{10} concentrations as wind speeds and gusts increase.

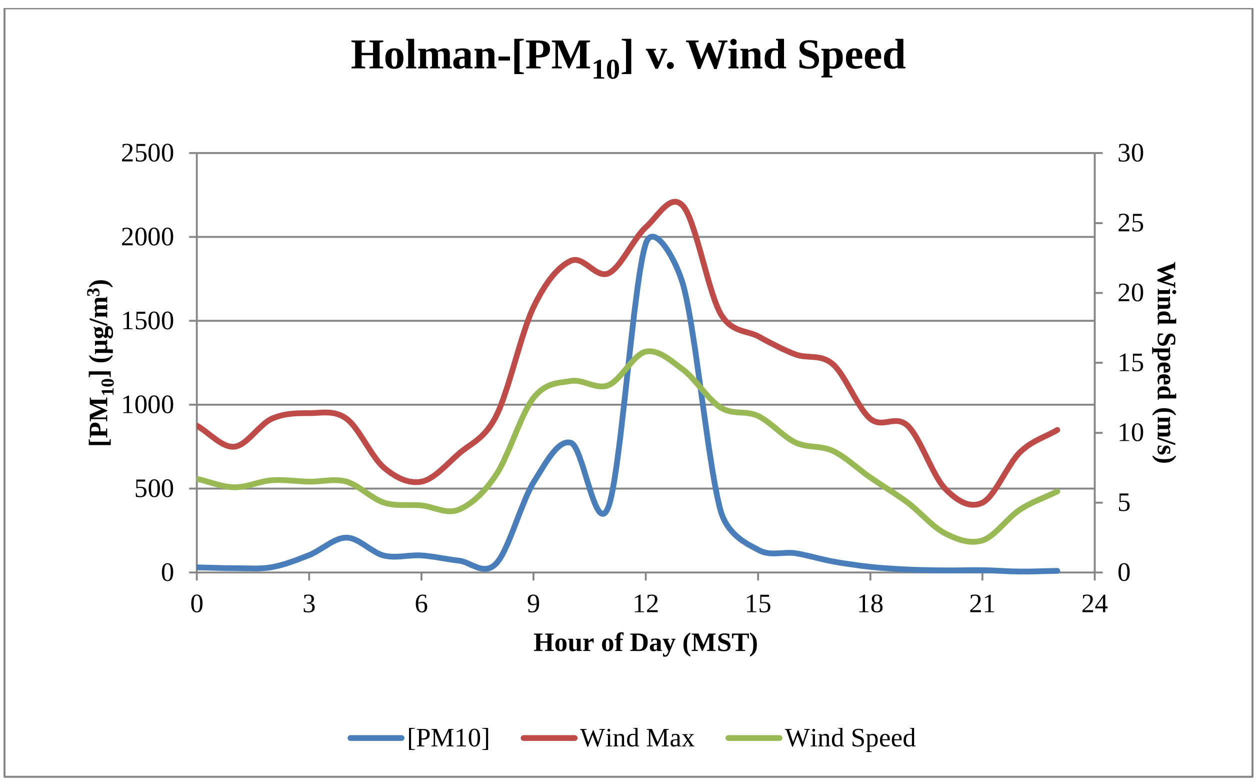

Figure 5-41. Time series plot of hourly observations showing increased PM_{10} concentrations as wind speeds and gusts increase.

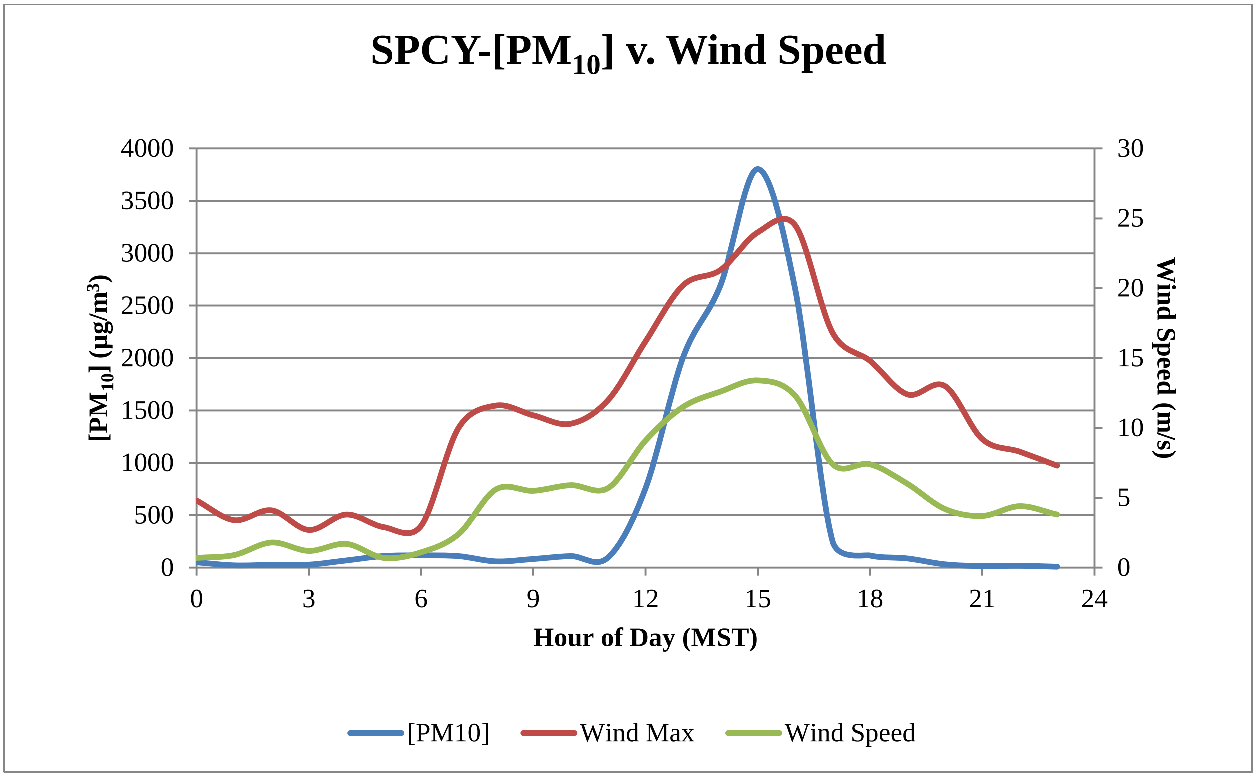

Figure 5-42. Time series plot of hourly observations showing increased PM_{10} concentrations as wind speeds and gusts increase.

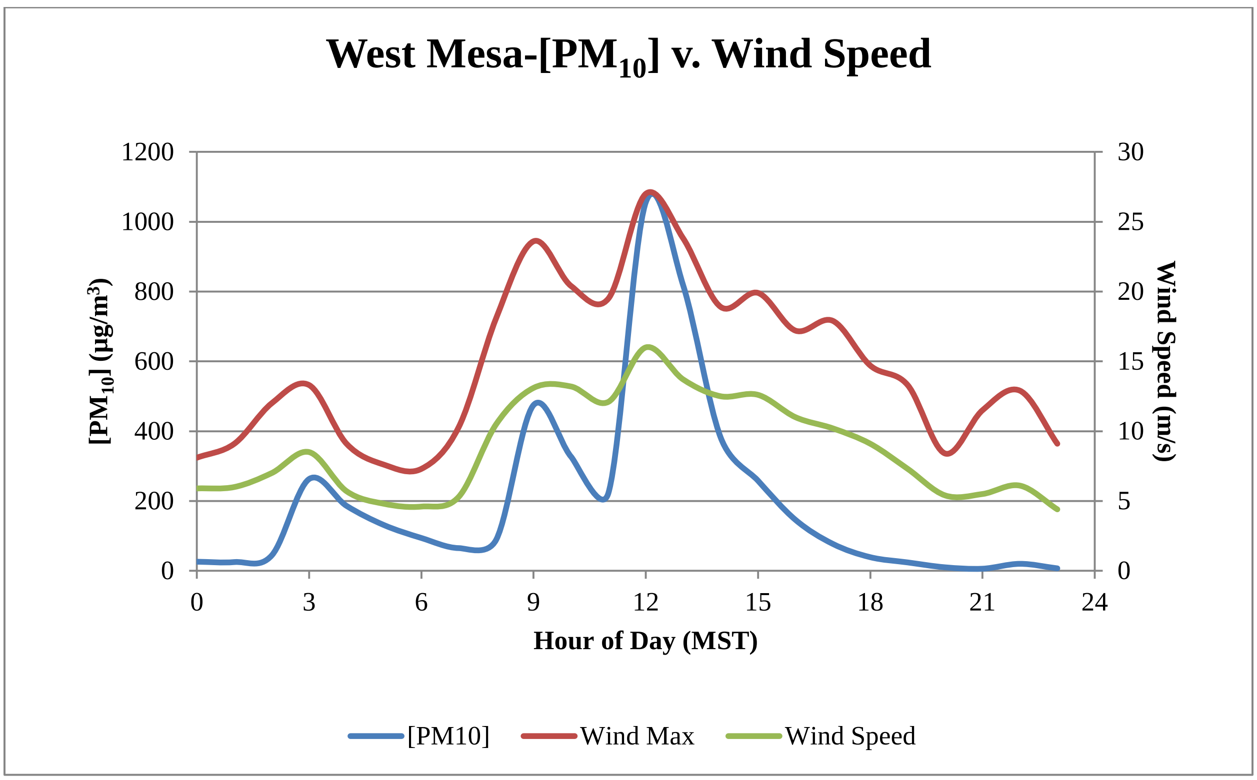

Figure 5-43. Time series plot of hourly observations showing increased PM_{10} concentrations as wind speeds and gusts increase.

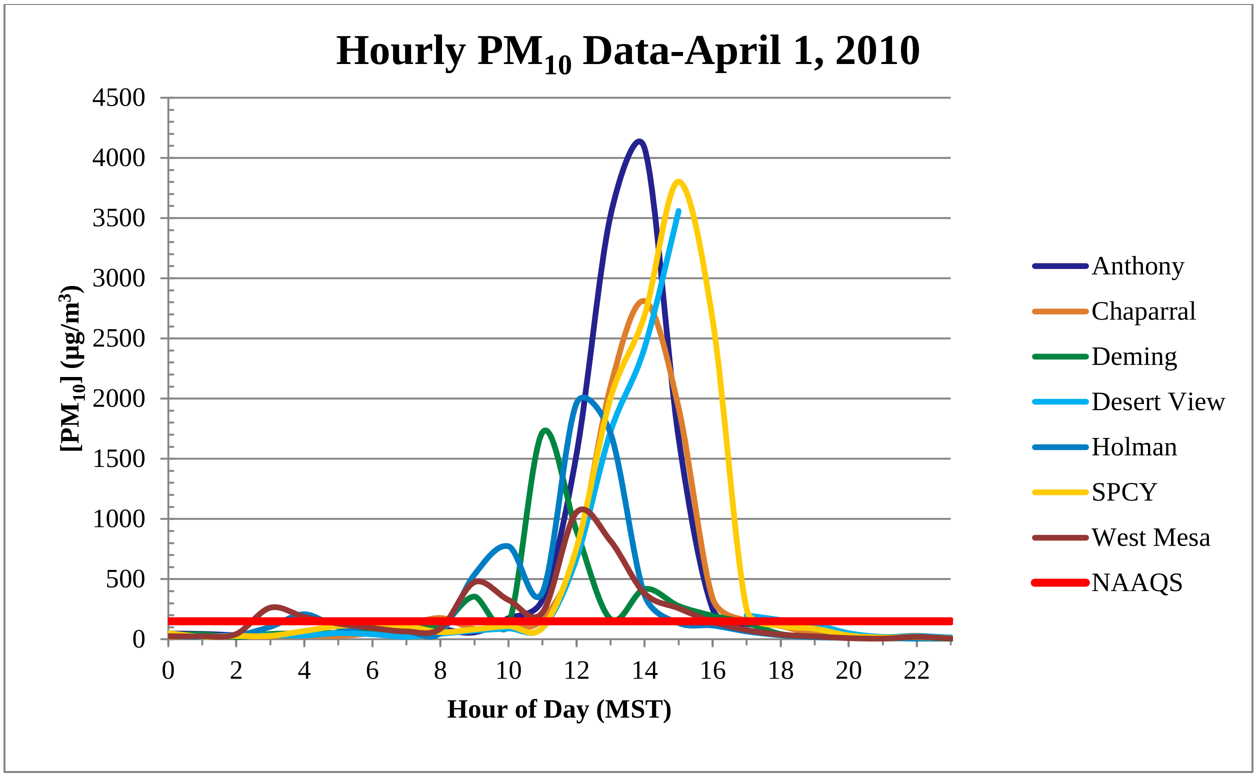

Figure 5-44. Hourly PM_{10} concentrations for Doña Ana and Luna Counties monitors on April 1, 2010.

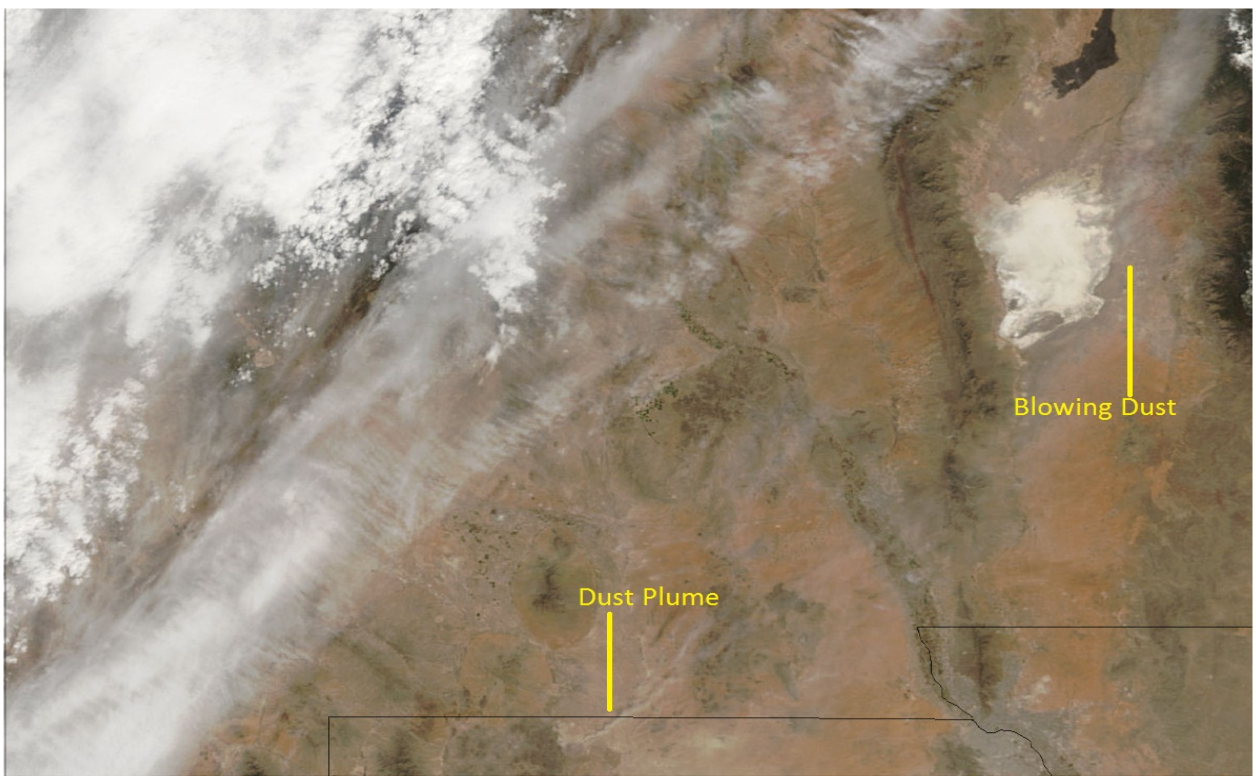

Figure 5-45. Satellite imagery of blowing dust on April 1, 2010 at the 1200 hour. Image courtesy of NASA.

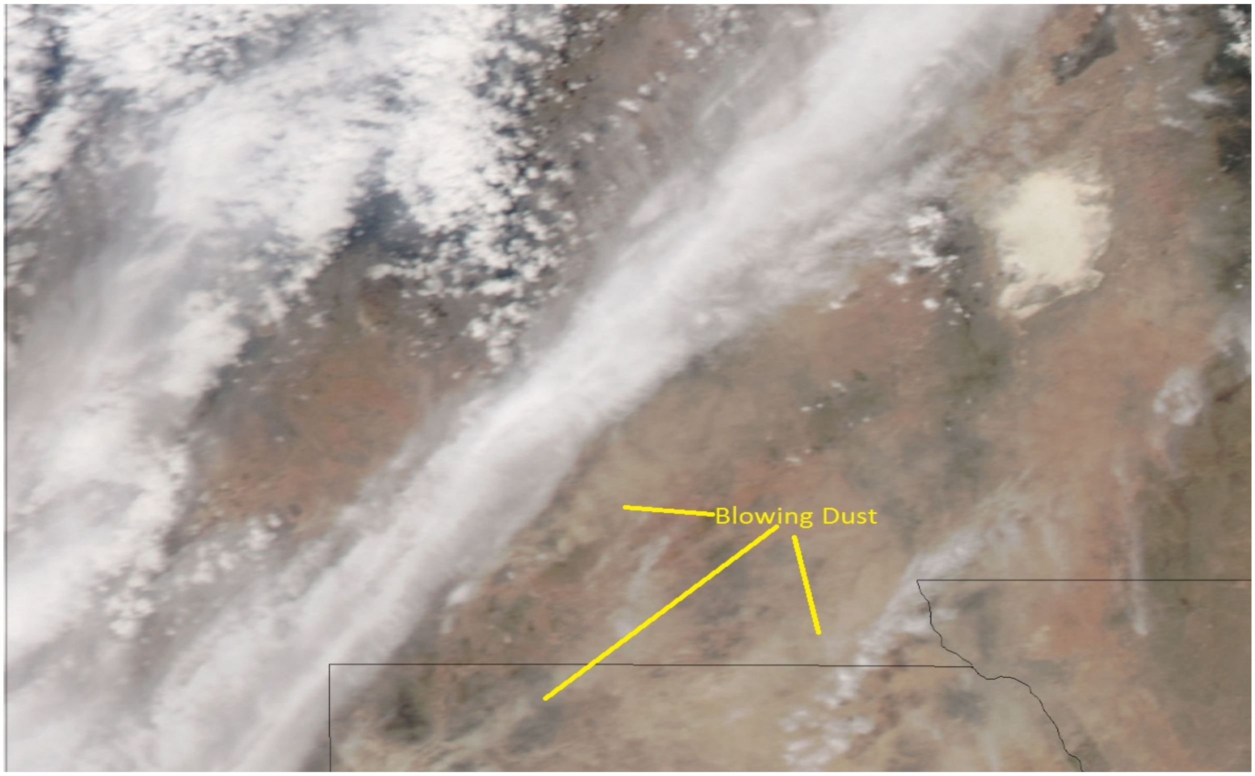

Figure 5-46. Satellite imagery of blowing dust on April 1, 2010 using images from the 1345 and 1505 hours. Images courtesy of NASA.

5.5 Affects Air Quality

The historical fluctuations and clear causal relationship analyses prove that the event in question affected air quality on April 1, 2010.

5.6 Natural Event

The CCR and nRCP analyses show that this was a natural event caused by high wind and blowing dust.

5.7 No Exceedance but for the Event

The Anthony monitor detected blowing dust around the 1100 hour with hourly concentrations heavily impacted until the 1600 hour. The six hourly PM_{10} values from 1100-1600 hours alone, exceed the 24-hour average standard at Anthony [(332 + 1538 + 3523 + 4080 + 1674 + 253) µg/m^3 = 11,400 µg/m^3; (11,400µg/m^3)/24 = 475 µg/m^3]. By replacing these six hourly values with the 95th percentile of hourly data at the Anthony site, the resulting 24-hour average (86 µg/m^3) does not exceed the NAAQS (Table 5-2). The values in red represent the 95th percentile of all hourly data collected at Anthony in the table below. NMED concludes that without the high wind and blowing dust at the Anthony site an exceedance would not have occurred.

Hour of Day (MST)	Recorded Hourly Data	Substituted Hourly Data
0	48	48
1	45	45
2	34	34
3	31	31
4	43	43
5	54	54
6	118	118
7	154	154
8	90	90
9	58	58
10	176	176
11	332	**94**
12	1538	**118**
13	3523	**136**
14	4080	**160**
15	1674	**161**
16	253	**163**
17	127	127
18	143	143
19	60	60
20	19	19
21	11	11
22	19	19
23	13	13
24-Hour Average	526	**86**

Table 5-2. Anthony: 95th percentile of data substituted for those hours when windblown dust was the most intense does not result in an exceedance at Anthony.

The Chaparral monitor detected blowing dust at the 1200 hour with hourly concentrations heavily impacted until the 1600 hour. The five hourly PM_{10} values from 1200-1600 hours alone, exceed the 24-hour average standard at Chaparral [(709 + 2102 + 2810 + 1924 + 341) µg/m^3 = 7,886 µg/m^3; (7,886 µg/m^3)/24 = 329 µg/m^3]. By replacing these eight hourly values with the 95th percentile of hourly data for the Chaparral site, the resulting 24-hour average (81 µg/m^3) does not exceed the NAAQS (Table 5-3). The values in red represent the 95th percentile of all hourly data collected at Chaparral in the table below. NMED concludes that without the high wind and blowing dust at the Chaparral site an exceedance would not have occurred.

Hour of Day (MST)	Recorded Hourly Data	Substituted Hourly Data
0	21	21
1	20	20
2	21	21
3	24	24
4	29	29
5	28	28
6	54	54
7	113	113
8	177	177
9	88	88
10	98	98
11	166	166
12	709	**116**
13	2102	**134**
14	2810	**159**
15	1924	**154**
16	341	**157**
17	156	156
18	111	111
19	41	41
20	22	22
21	14	14
22	30	30
23	6	6
24-Hour Average	379	**81**

Table 5-3. Chaparral: 95th percentile of data substituted for those hours when windblown dust was the most intense does not result in an exceedance at Chaparral.

The Deming monitor detected blowing dust at the 1100 hour with hourly concentrations heavily impacted until the 1600 hour. The six hourly PM_{10} values from 1100-1600 hours alone, exceed the 24-hour average standard at Deming [(1720 + 901 + 168 + 418 + 277 + 196) µg/m^3 = 3,680 µg/m^3; (3,680 µg/m^3)/24 = 153 µg/m^3]. By replacing these six hourly values with the 95th percentile of hourly data for the Deming site, the resulting 24-hour average (88 µg/m^3) does not exceed the NAAQS (Table 5-4). The values in red represent the 95th percentile of all hourly data collected at Deming in the table below. NMED concludes that without the high wind and blowing dust at the Deming site an exceedance would not have occurred.

Hour of Day (MST)	Recorded Hourly Data	Substituted Hourly Data
0	33	33
1	42	42
2	18	18
3	44	44
4	50	50
5	53	53
6	58	58
7	113	113
8	114	114
9	355	355
10	123	123
11	1720	**103**
12	901	**130**
13	168	**141**
14	418	**177**
15	277	**175**
16	196	**152**
17	137	137
18	44	44
19	22	22
20	26	26
21	9	9
22	8	8
23	0	0
24-Hour Average	205	**88**

Table 5-4. Deming: 95th percentile of data substituted for those hours when windblown dust was the most intense does not result in an exceedance at Deming.

The Desert View monitor detected blowing dust at the 1200 hour with hourly concentrations heavily impacted until the 1600 hour. The five hourly PM_{10} values from 1200-1600 hours alone, exceed the 24-hour average standard at Desert View [(672 + 1726 + 2423 + 3559 + 0) µg/m^3 = 8,380 µg/m^3; (8,380 µg/m^3)/24 = 349 µg/m^3]. By replacing these eight hourly values with the 95^{th} percentile of hourly data for the Desert View site, the resulting 24-hour average (84 µg/m^3) does not exceed the NAAQS (Table 5-5). The values in red represent the 95^{th} percentile of all hourly data collected at Desert View in the table below. NMED concludes that without the high wind and blowing dust at the Desert View site an exceedance would not have occurred.

Hour of Day (MST)	Recorded Hourly Data	Substituted Hourly Data
0	27	27
1	19	19
2	33	33
3	32	32
4	32	32
5	51	51
6	42	42
7	21	21
8	46	46
9	72	72
10	90	90
11	97	97
12	672	**135**
13	1726	**154**
14	2423	**193**
15	3559	**216**
16	No Data	**155**
17	200	200
18	160	160
19	124	124
20	51	51
21	20	20
22	27	27
23	16	16
24-Hour Average	414	**84**

Table 5-5. Desert View: 95^{th} percentile of data substituted for those hours when windblown dust was the most intense does not result in an exceedance at Desert View.

The Holman monitor detected blowing dust at the 900 hour with hourly concentrations heavily impacted until the 1400 hour. The six hourly PM_{10} values from 900-1400 hours alone, exceed the 24-hour average standard at Holman [(538 + 773 + 392 + 1961 + 1712 + 368) $\mu g/m^3$ = 5,744 $\mu g/m^3$; (5,744 $\mu g/m^3$)/24 = 239 $\mu g/m^3$]. By replacing these six hourly values with the 95th percentile of hourly data for the Holman site, the resulting 24-hour average (75 $\mu g/m^3$) does not exceed the NAAQS (Table 5-6). The values in red represent the 95th percentile of all hourly data collected at Holman in the table below. NMED concludes that without the high wind and blowing dust at the Holman site an exceedance would not have occurred.

Hour of Day (MST)	Recorded Hourly Data	Substituted Hourly Data
0	31	31
1	26	26
2	32	32
3	104	104
4	208	208
5	101	101
6	102	102
7	71	71
8	54	54
9	538	**83**
10	773	**82**
11	392	**92**
12	1961	**114**
13	1712	**131**
14	368	**160**
15	136	136
16	115	115
17	66	66
18	34	34
19	18	18
20	13	13
21	14	14
22	6	6
23	10	10
24-Hour Average	286	**75**

Table 5-6. Holman: 95th percentile of data substituted for those hours when windblown dust was the most intense does not result in an exceedance at Holman.

The SPCY monitor detected blowing dust at the 1200 hour with hourly concentrations heavily impacted until the 1700 hour. The six hourly PM_{10} values from 1200-1700 hours alone, exceed the 24-hour average standard at SPCY [(759 + 2005 + 2693 + 3803 + 2655 + 249) µg/m^3 = 12,164 µg/m^3; (12,164 µg/m^3)/24 = 507 µg/m^3]. By replacing these six hourly values with the 95th percentile of hourly data for the SPCY site, the resulting 24-hour average (87 µg/m^3) does not exceed the NAAQS (Table 5-7). The values in red represent the 95th percentile of all hourly data collected at SPCY in the table below. NMED concludes that without the high wind and blowing dust at the SPCY site an exceedance would not have occurred.

Hour of Day (MST)	Recorded Hourly Data	Substituted Hourly Data
0	51	51
1	22	22
2	27	27
3	29	29
4	69	69
5	111	111
6	117	117
7	110	110
8	60	60
9	83	83
10	110	110
11	98	98
12	759	**116**
13	2005	**135**
14	2693	**160**
15	3803	**160**
16	2655	**161**
17	249	**195**
18	116	116
19	88	88
20	32	32
21	15	15
22	18	18
23	9	9
24-Hour Average	555	**87**

Table 5-7. SPCY: 95th percentile of data substituted for those hours when windblown dust was the most intense does not result in an exceedance at SPCY.

The West Mesa monitor detected blowing dust at the 900 hour with hourly concentrations heavily impacted until the 1500 hour. The seven hourly PM_{10} values from 900-1500 hours alone, nearly exceed the 24-hour average standard at West Mesa [(475 + 327 + 223 + 1056 + 817 + 382 + 258) $\mu g/m^3$ = 3,538 $\mu g/m^3$; (3,538 $\mu g/m^3$)/24 = 147 $\mu g/m^3$]. By replacing these seven hourly values with the 95th percentile of hourly data for the West Mesa site, the resulting 24-hour average (87 $\mu g/m^3$) does not exceed the NAAQS (Table 5-8). The values in red represent the 95th percentile of all hourly data collected at West Mesa in the table below. NMED concludes that without the high wind and blowing dust at the West Mesa site an exceedance would not have occurred.

Hour of Day (MST)	Recorded Hourly Data	Substituted Hourly Data
0	26	26
1	25	25
2	44	44
3	263	263
4	186	186
5	131	131
6	94	94
7	65	65
8	89	89
9	475	**84**
10	327	**82**
11	223	**92**
12	1056	**117**
13	817	**135**
14	382	**161**
15	258	**160**
16	146	146
17	77	77
18	39	39
19	24	24
20	10	10
21	6	6
22	20	20
23	7	7
24-Hour Average	286	**87**

Table 5-8. West Mesa: 95th percentile of data substituted for those hours when windblown dust was the most intense does not result in an exceedance at West Mesa.

6 HIGH WIND EXCEPTIONAL EVENT: April 29, 2010

6.1 Summary of the Event

On April 29, 2010, a strong Pacific cold front moved through New Mexico causing high winds and widespread blowing dust in the border region. The $PM_{2.5}$ FRM Partisol at SPCY and four of NMED's PM_{10} FEM TEOM monitors recorded exceedances of the 24-hour average NAAQS. The SPCY $PM_{2.5}$ 24-hour average reached 50.2 µg/m^3 and the PM_{10} 24-hour averages ranged from 333 µg/m^3 at West Mesa to 604 µg/m^3 at Chaparral. Table 1-1 lists all of the 24-hour average concentrations for each site. In accordance with the EER, the AQB flagged this data on EPA's AQS database as high wind natural events on or before June 1, 2011. On this date, PM_{10} and $PM_{2.5}$ 24-hour averages spiked greatly compared to the days immediately before and after the event (Figure 6-1). The PM_{10} and $PM_{2.5}$ averages in this figure were calculated using FEM TEOM and FRM Partisol instrument data for the four days before and after the event, respectively. There was no data available for the PM_{10} SPCY or Desert View sites on this date.

As the event unfolded, the wind blew from the southwest throughout the border region. These high velocity winds passed over large areas of desert within New Mexico and Mexico. The co-occurrence of high winds and elevated levels of blowing dust, little to no point sources in the area, and the high hourly and daily PM_{10} concentrations support the assertion that this was an exceptional event, specifically a natural event caused by high wind and blowing dust.

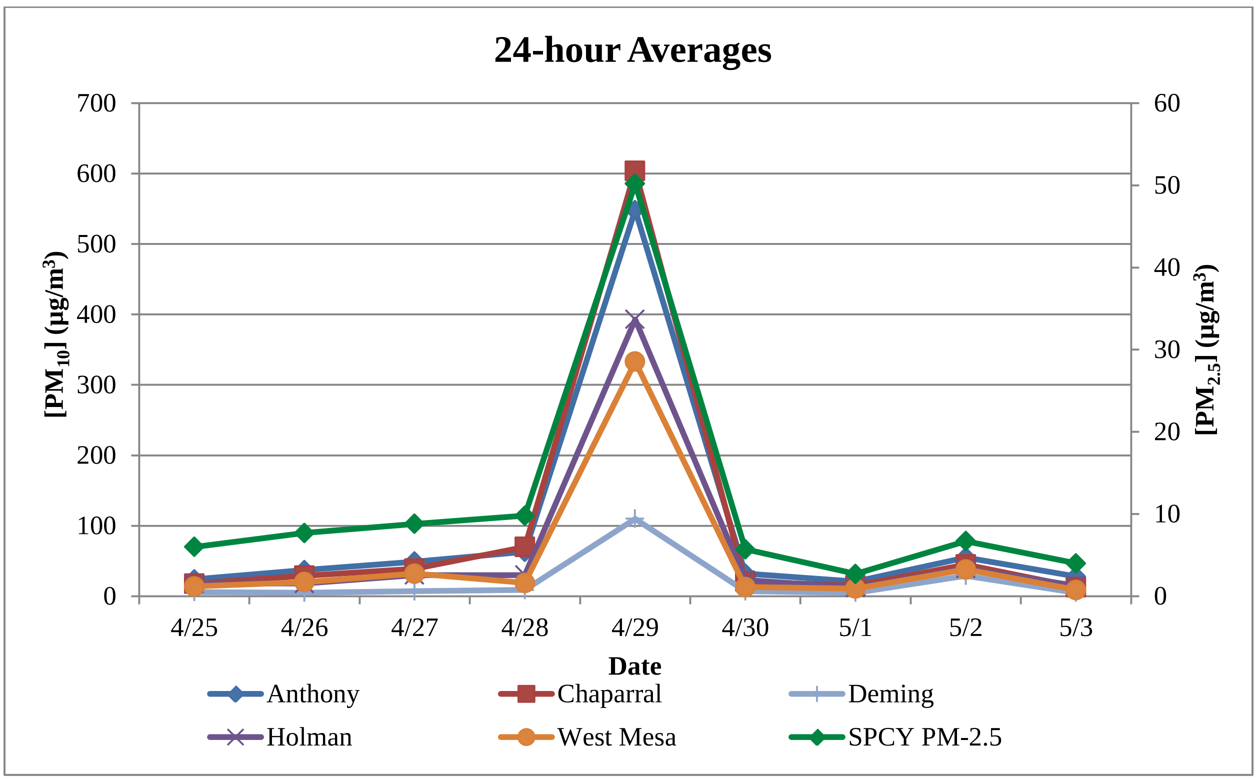

Figure 6-1. PM_{10} and $PM_{2.5}$ 24-hour averages four days before and after April 29, 2010.

6.2 Is Not Reasonably Controllable or Preventable

6.2.1 Suspected Source Areas and Categories Contributing to the Event

Sources of windblown dust contributing to this exceedance include the natural desert, residential properties, agricultural land and unpaved roads in Mexico and New Mexico. Doña Ana County Ordinance requires BACM for any dust producing activities. The largest sources of windblown dust are the playas of northern Mexico and desert land in New Mexico.

6.2.2 Sustained and Instantaneous Wind Speeds

EPA has indicated that sustained wind speeds of at least 11.2 m/s (25 mph) would be used as the default entrainment threshold for natural and well controlled anthropogenic sources contributing to natural events caused by high wind and blowing dust (EPA, 2011). Under the Doña Ana and Luna County NEAPs, EPA and NMED agreed that wind gusts exceeding 18 m/s would overwhelm any natural and well-controlled anthropogenic sources and cause windblown dust. On April 29, sustained wind speeds exceeded EPA's default threshold at all of the monitoring sites in southern New Mexico and wind gusts exceeded the NEAP's agreed upon threshold at all monitoring sites as well (Figures 6-2 and 6-3). Winds exceeded these thresholds for 22 hours at the Chaparral site. The meteorological tower at the Anthony site measures wind speed at two meters instead of the customary 10 meters. Due to this fact, this demonstration uses data from La Union (the closet site).

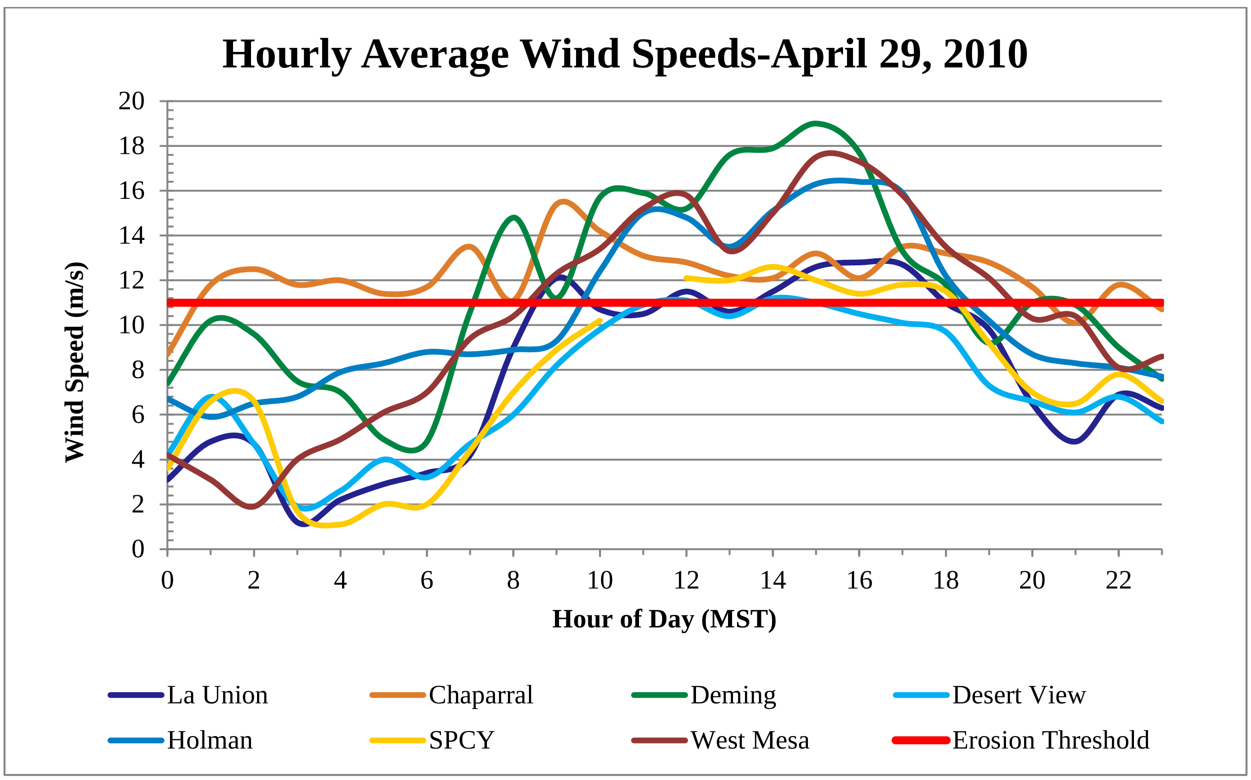

Figure 6-2. Sustained wind speeds at monitoring sites in Doña Ana and Luna Counties.

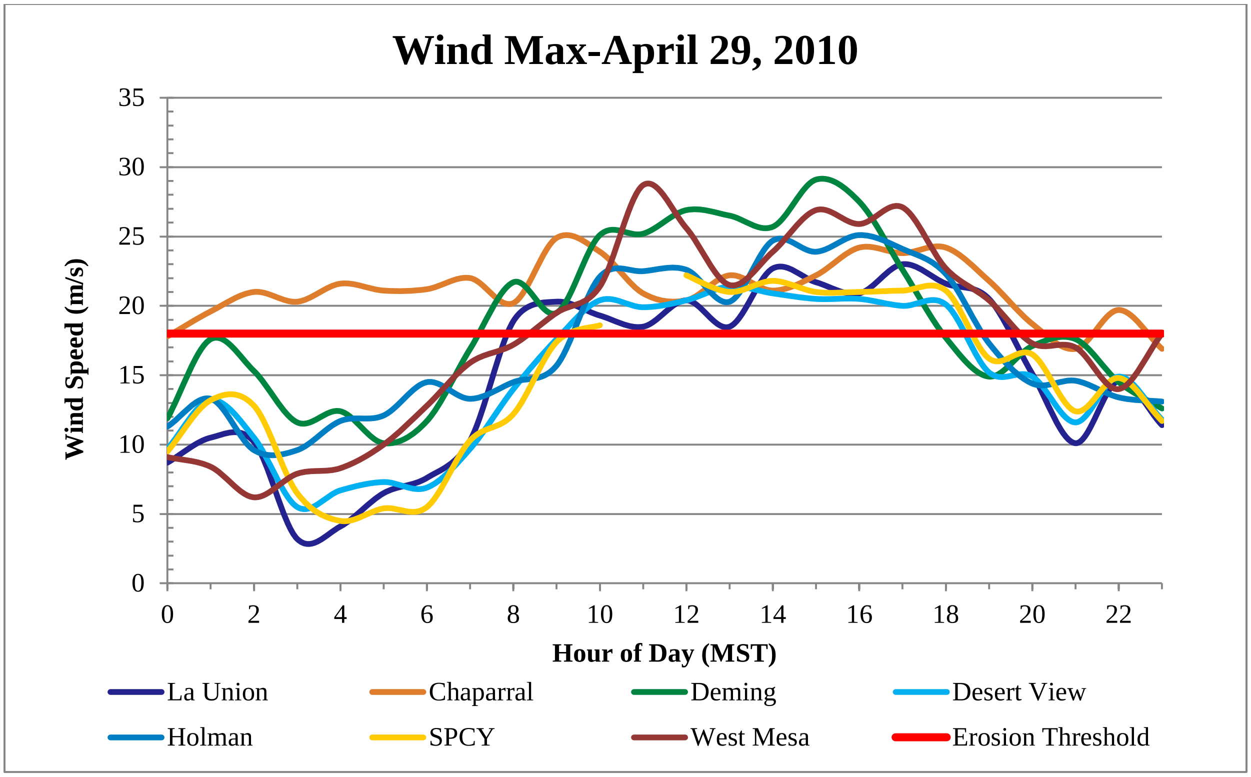

Figure 6-3. Maximum wind gusts at monitoring sites in Doña Ana and Luna Counties.

6.2.3 <u>Recurrence Frequency</u>

The monitoring sites in Doña Ana and Luna Counties can record exceedances of the PM_{10} NAAQS throughout the year. From 2003-2009 the FEM TEOM monitors have recorded 262 exceedances and the FRM Wedding monitors have recorded 10 exceedances (Figure 6-4). This large disparity in the number of monitored exceedances is due to the FRM Wedding sampling schedules of 1-in-6 days. There is additional evidence that under high loading conditions, the FEM TEOM monitors record 1.5 to 4 times higher concentrations as do the FRM Weddings. The Deming Airport and Desert View monitoring sites (FEM TEOMs) were established in 2006 and 2007 respectively and do not show exceedances until the year following startup (Table 2-1). Also, note that the FEM TEOM monitors at Holman, West Mesa and Chaparral were not part of the SLAMS network until 2006.

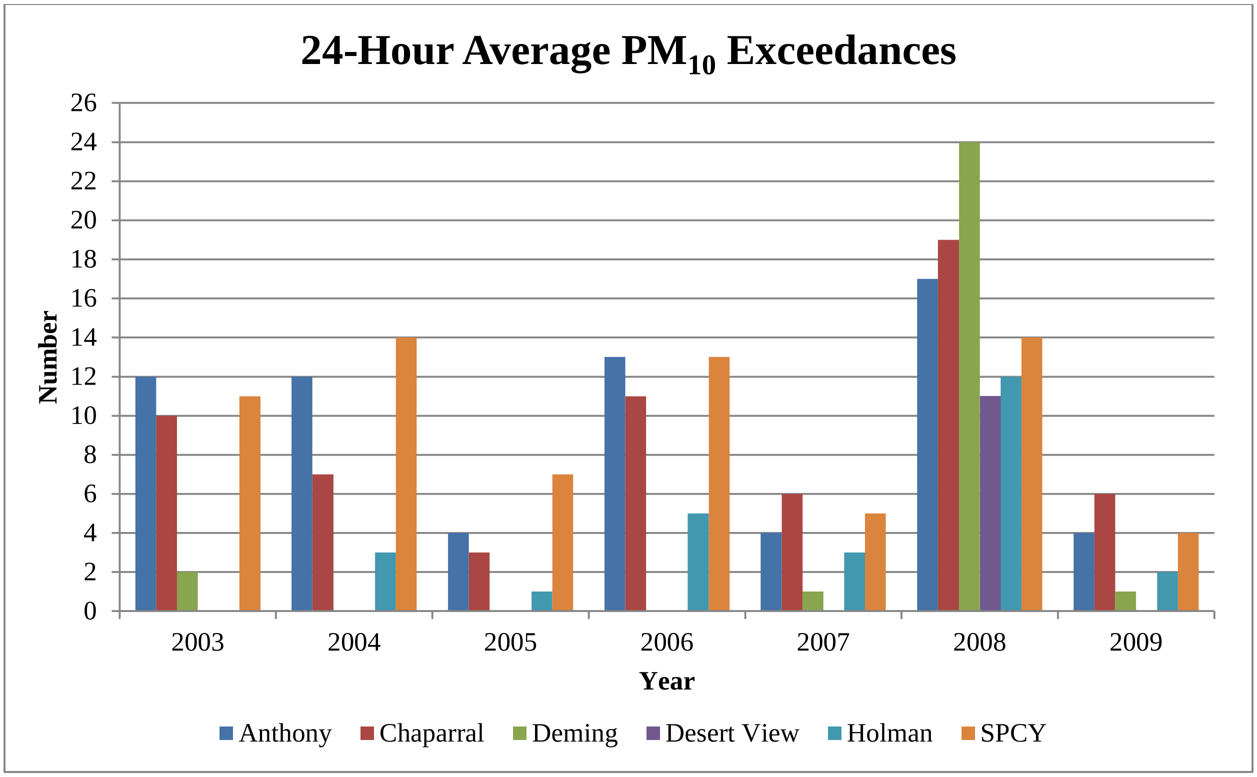

Figure 6-4. Exceedances recorded by the FEM TEOM and FRM Wedding monitors at Anthony, SPCY and Deming. All other monitors are FEM TEOM monitors.

6.2.4 Controls Analysis

The local ordinances and MOUs adopted under the NEAP direct the implementation of BACM for sources of dust in Doña Ana County. The ordinances regulate disturbed lands, construction and demolition, vacant parking lots and materials handling and transportation. Our investigation did not identify any unusual PM_{10} producing activities on this day, and anthropogenic emissions remained constant before, during and after the event. The most likely source contributing to the event is the playas of northern Mexico and desert land in New Mexico. The southern sites recorded the highest 24-hour averages in the monitoring network. A back-trajectory analysis using the HYSPLIT (Draxler et al., 2011; Rolph, 2011) model shows that the air masses traveled from Mexico to the monitors in southern Doña Ana County. The model starts four hours before the start of elevated PM_{10} concentrations during the event (Figure 6-5). Costs prohibit controlling dust from the natural desert terrain and falls outside NMED's jurisdiction when it originates in Mexico. NMED concludes that the sources that caused the event are not reasonably controllable.

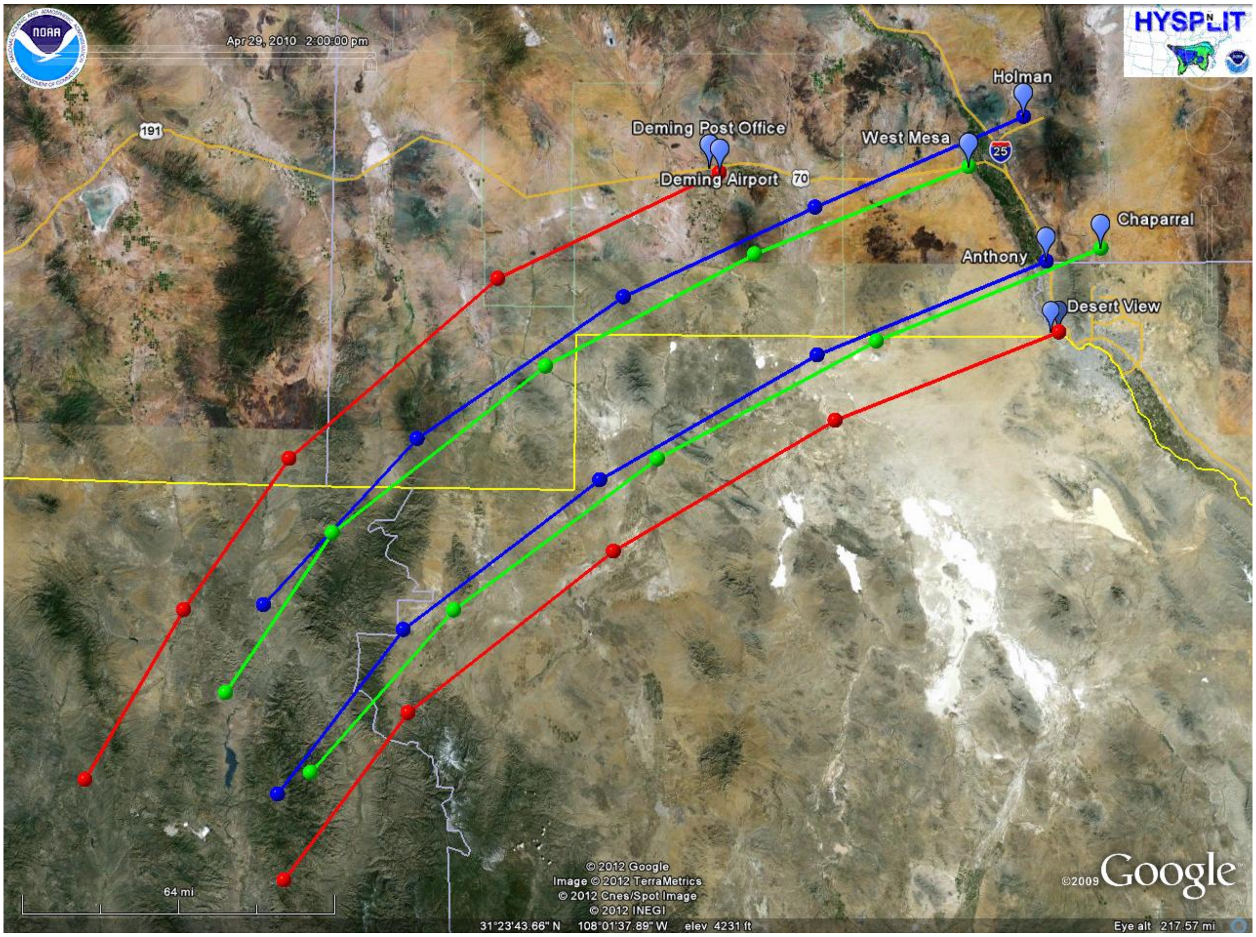

Figure 6-5. HYSPLIT back-trajectory model analysis for April 29, 2010.

6.3 Historical Fluctuations Analysis

6.3.1 Annual and Seasonal 24-hour Average Fluctuations

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 6-6 through 6-11). Most exceedances occur from late winter through early summer (February-June) and are associated with the passage of Pacific cold fronts. The only monitoring site to record exceedances when winds are calm is the SPCY site. 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). The maximum 24-hour average PM_{10} concentration recorded by NMED was 1110 µg/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.

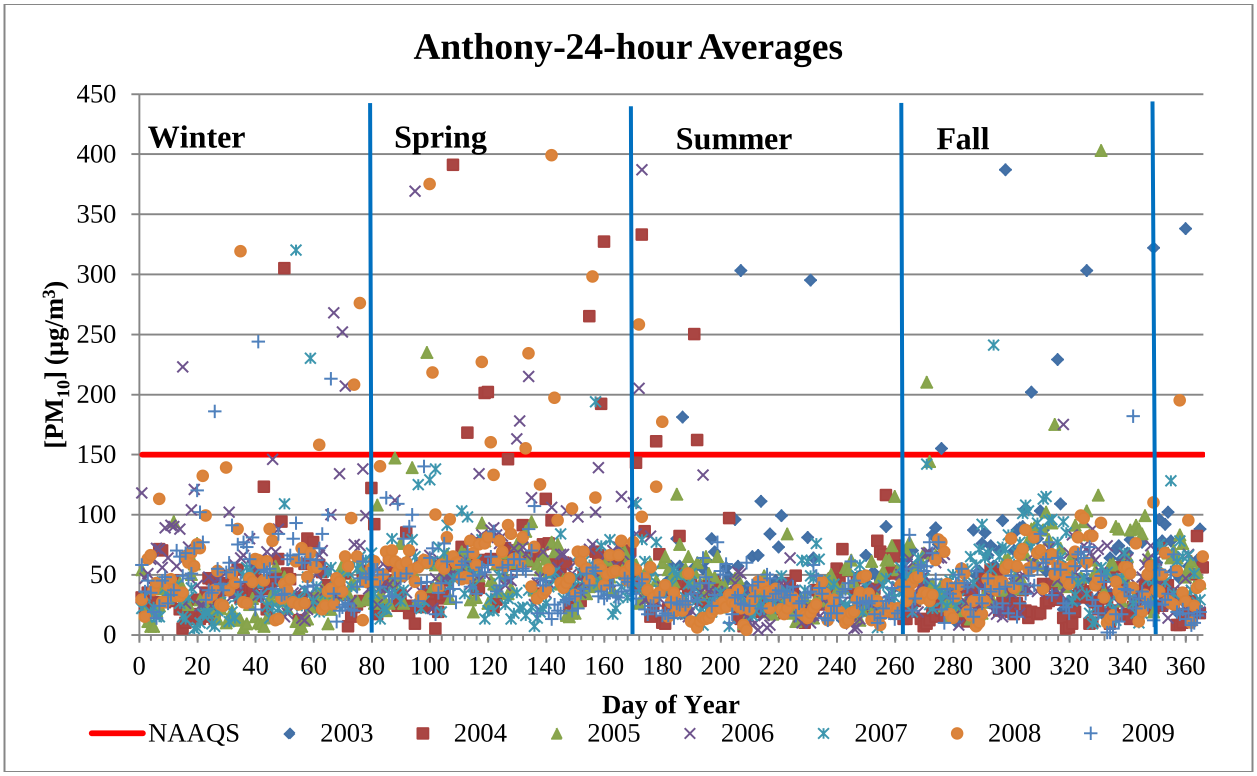

Figure 6-6. 24-hour average PM_{10} concentrations (FEM TEOM data) by day of year from 2003-2009

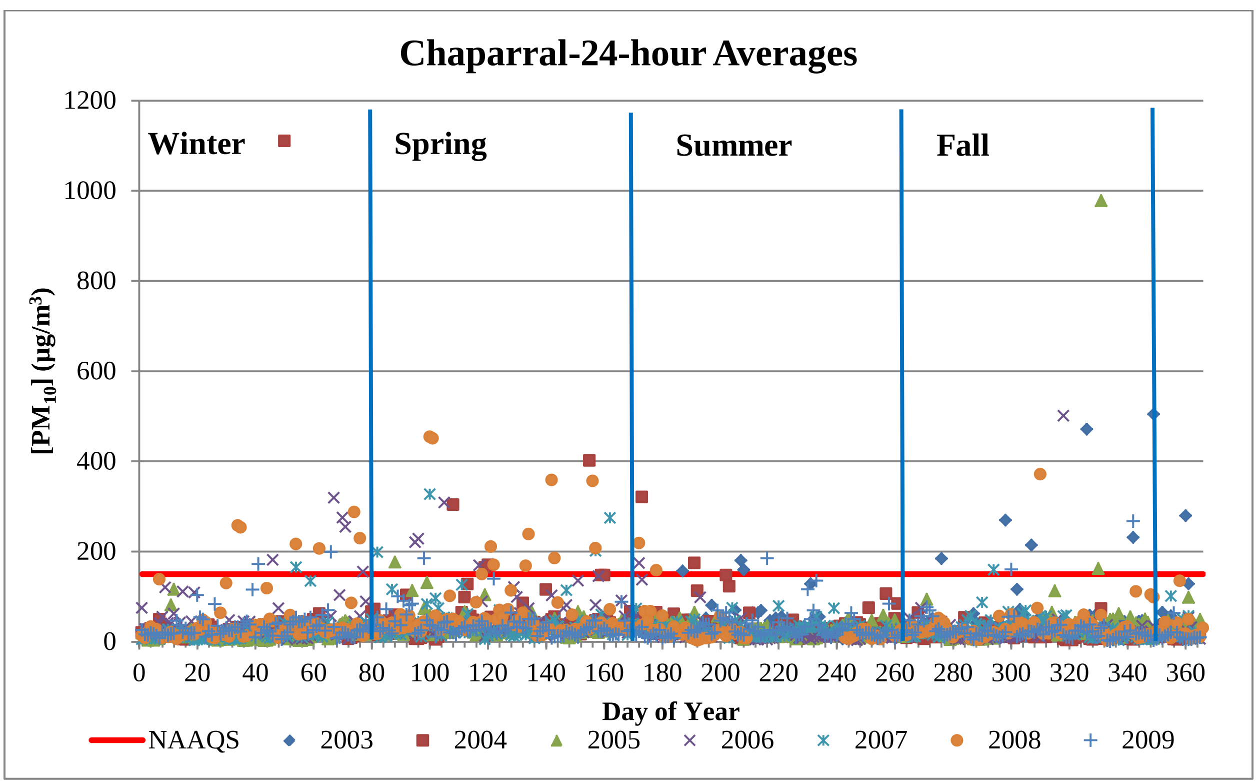

Figure 6-7. 24-hour average PM_{10} concentrations (FEM TEOM data) by day of year from 2003-2009

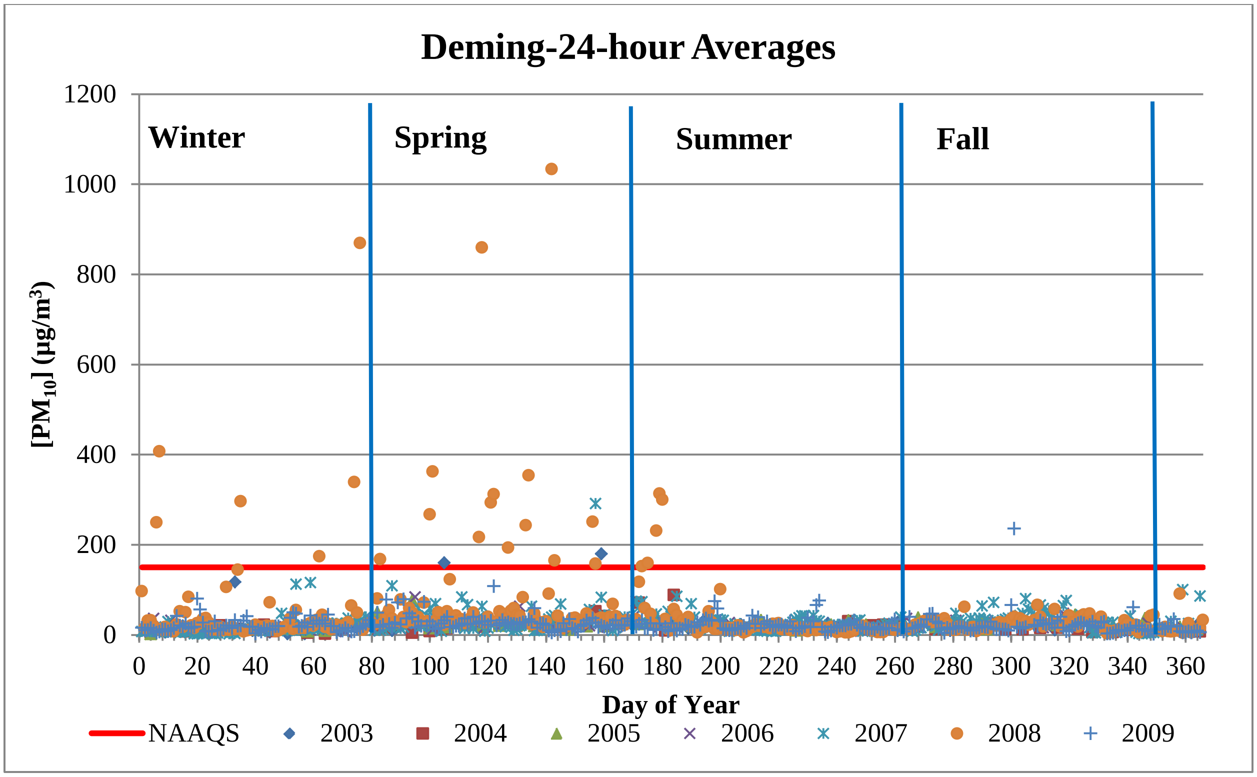

Figure 6-8. 24-hour average PM_{10} concentrations by day of year from 2003-2009. FRM Wedding data from 2003-2006. FEM TEOM data from 2007-2009.

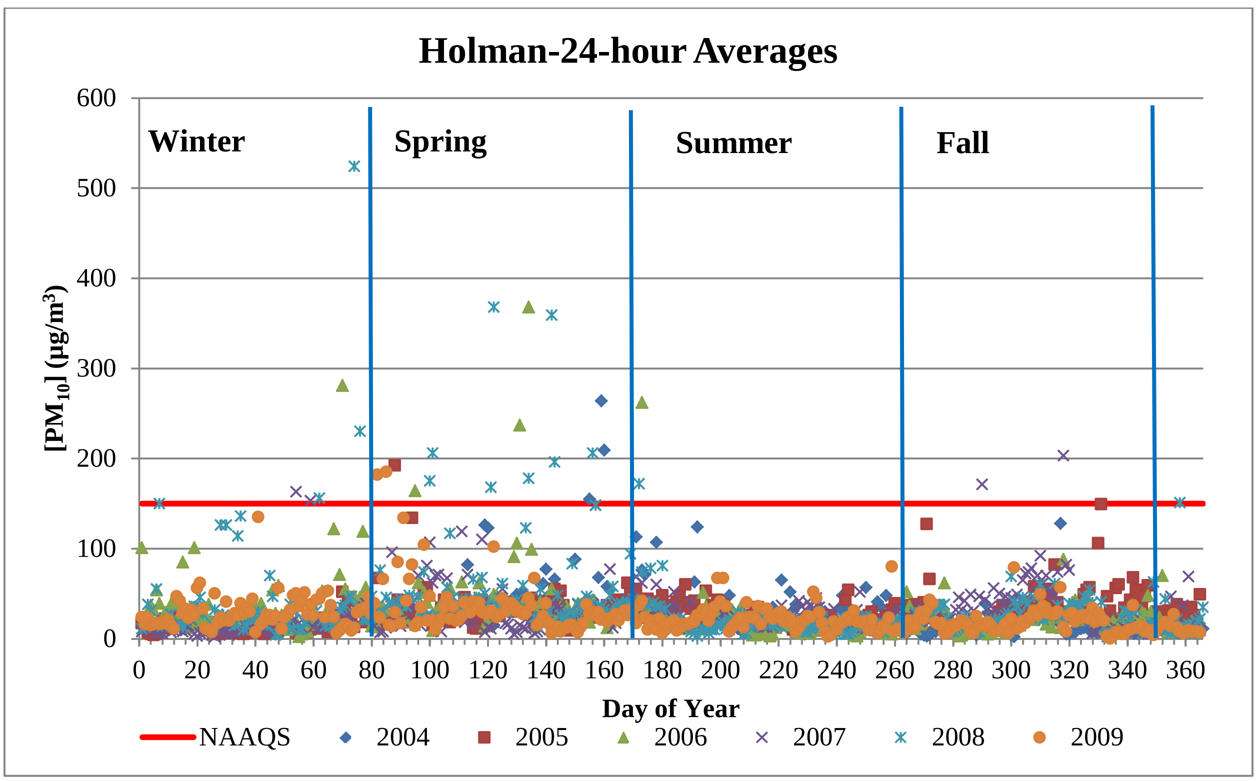

Figure 6-9. 24-hour average PM_{10} concentrations (FEM TEOM data) by day of year from 2004-2009

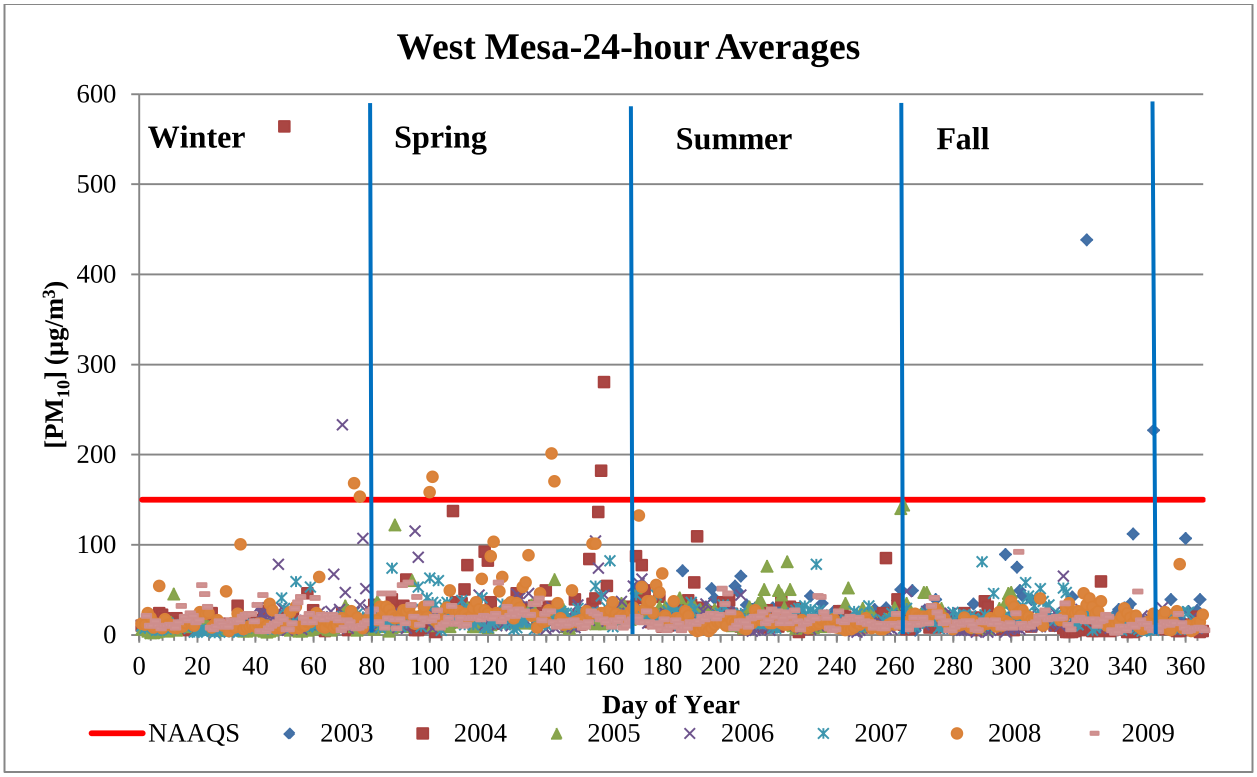

Figure 6-10. 24-hour average PM_{10} concentrations (FEM TEOM data) by day of year from 2003-2009

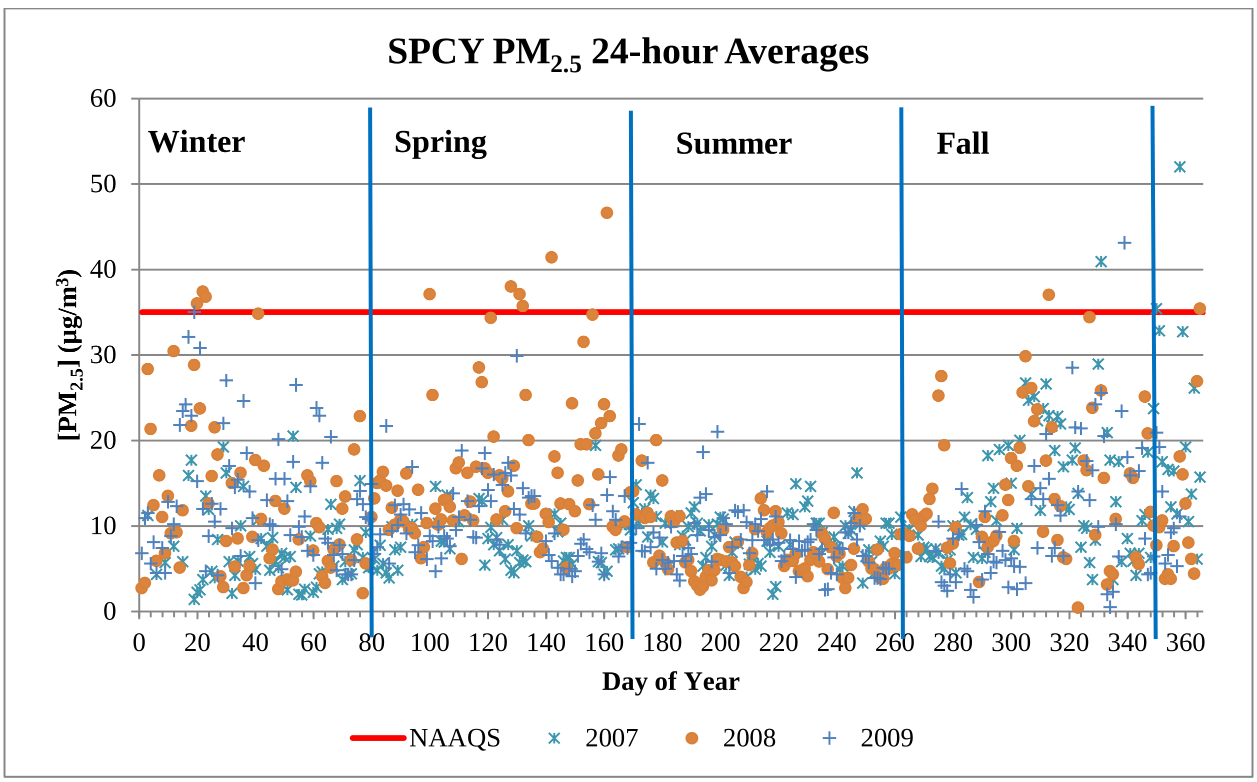

Figure 6-11. 24-hour average $PM_{2.5}$ concentrations (FRM Partisol data) by day of year from 2007-2009

Table 6-1 shows normal historical fluctuations with and without high wind natural events that caused exceedances from 2003-2009. The analysis excludes only those high wind events that resulted in an exceedance. The low wind exceedances recorded at SPCY for $PM_{2.5}$ from 2007-2009 are included in the analysis when high wind events are excluded. PM_{10} Data in this table includes FRM Wedding and FEM TEOM data from 2003-2009 when available and $PM_{2.5}$ data includes FRM Partisol data from 2007-2009. The recorded PM_{10} values for this day are above the maximum value recorded when no high wind exceedances are included and is above the 99th percentile of all PM_{10} and $PM_{2.5}$ 24-hour averages recorded.

Anthony	**Max**	**99th**	**95th**	**75th**	**50th**	**Mean**	**25th**	**5th**	**Minimum**
No Events	147	120	88	56	38	42	25	12	2
Events	403	234	100	57	38	47	25	12	2
Chaparral	**Max**	**99th**	**95th**	**75th**	**50th**	**Mean**	**25th**	**5th**	**Minimum**
No Events	149	116	65	35	24	28	15	6	1
Events	1110	254	90	37	24	35	15	6	1
Holman	**Max**	**99th**	**95th**	**75th**	**50th**	**Mean**	**25th**	**5th**	**Minimum**
No Events	153	119	62	34	23	27	14	6	0
Events	524	170	69	35	23	29	14	6	0
West Mesa	**Max**	**99th**	**95th**	**75th**	**50th**	**Mean**	**25th**	**5th**	**Minimum**
No Events	153	87	46	23	15	19	10	5	0
Events	564	106	47	23	15	20	10	5	0
SPCY $PM_{2.5}$	**Max**	**99th**	**95th**	**75th**	**50th**	**Mean**	**25th**	**5th**	**Minimum**
No Events	52	36	25	13	9	11	6	4	0
Events	52	37	25	13	9	11	6	4	0

Table 6-1. 24-hour average PM_{10} and $PM_{2.5}$ data distribution with and without high wind events included.

An hourly data distribution analysis was performed for hourly PM_{10} concentrations, wind speeds and wind gusts (Appendices A, B and C). All data for this analysis use the FEM TEOM monitors. NMED does not have a continuous FRM or FEM approved $PM_{2.5}$ monitor and an hourly data distribution is not available for the SPCY $PM_{2.5}$ site. Overlaying the hourly data for April 29 on the hourly data distribution plots shows that the values recorded during the high wind event exceed the 95th percentile for PM_{10}, wind speed and wind gusts (Figures 6-12 through 6-25). The top whisker of the of the box and whisker plots represent the 95th percentile of data. As stated previously, wind data used for the Anthony site come from the La Union site. The hourly PM_{10} values during the high wind blowing dust storm far exceed the historical 95th percentile of data.

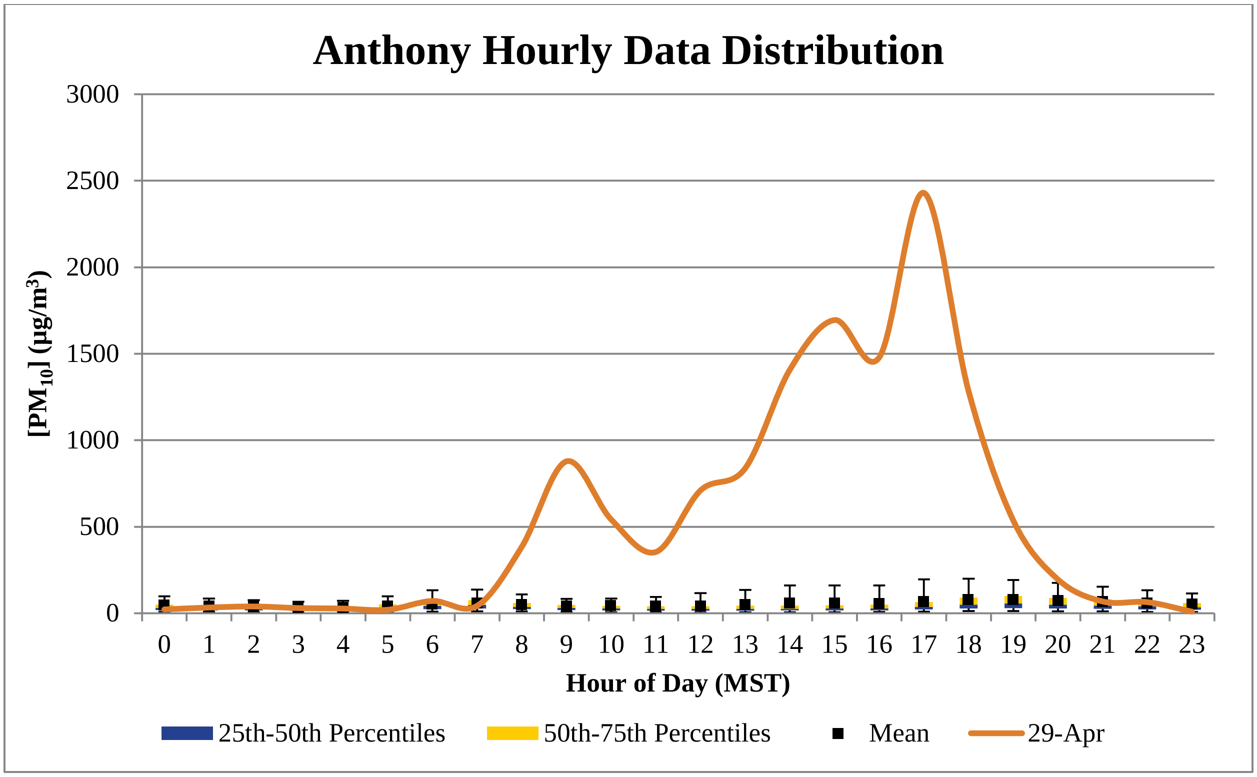

Figure 6-12. PM_{10} hourly data distribution from 2003-2009 overlaid by hourly values for April 29, 2010.

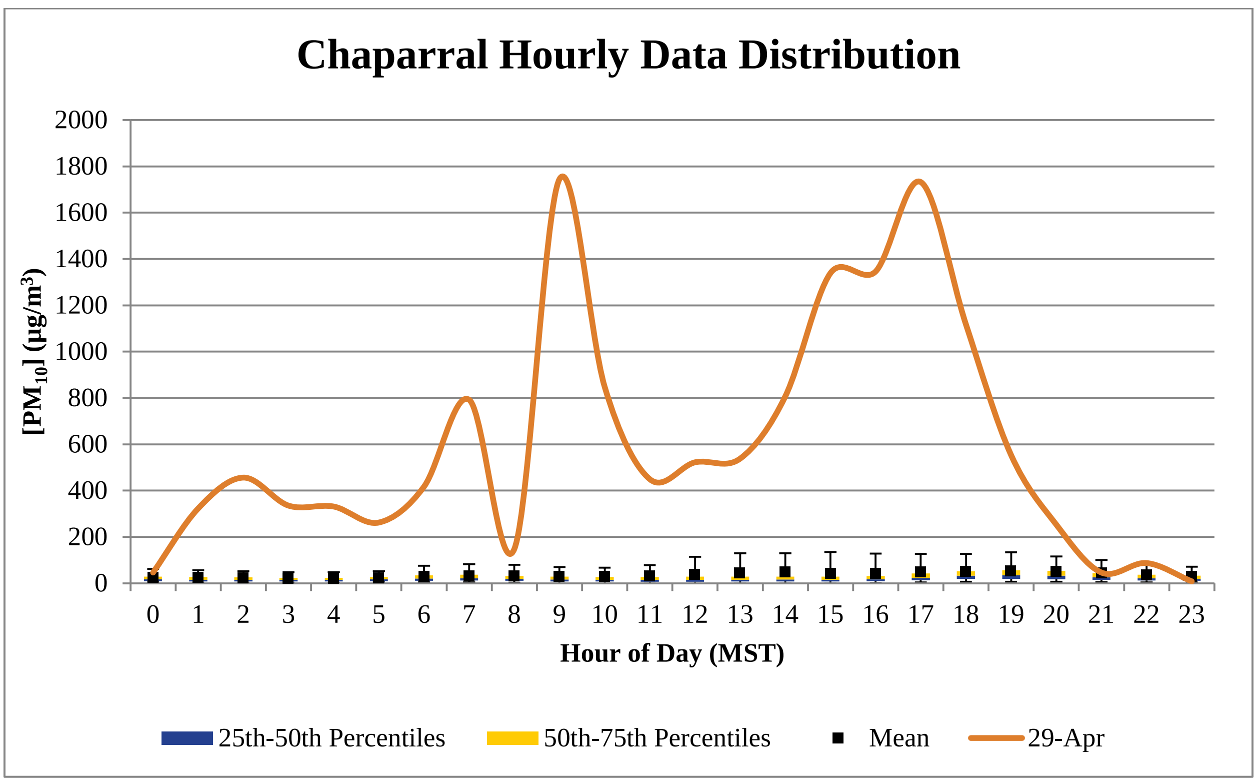

Figure 6-13. PM_{10} hourly data distribution from 2003-2009 overlaid by hourly values for April 29, 2010.

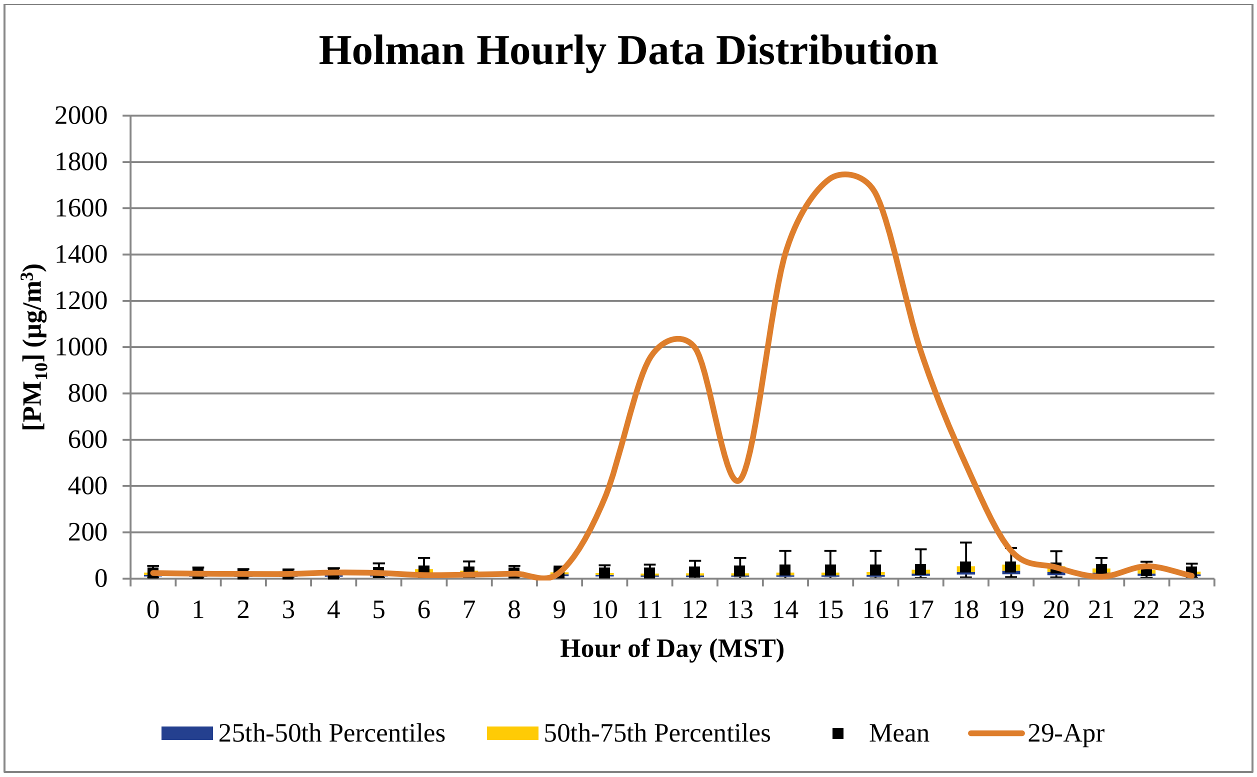

Figure 6-14. PM_{10} hourly data distribution from 2004-2009 overlaid by hourly values for April 29, 2010.

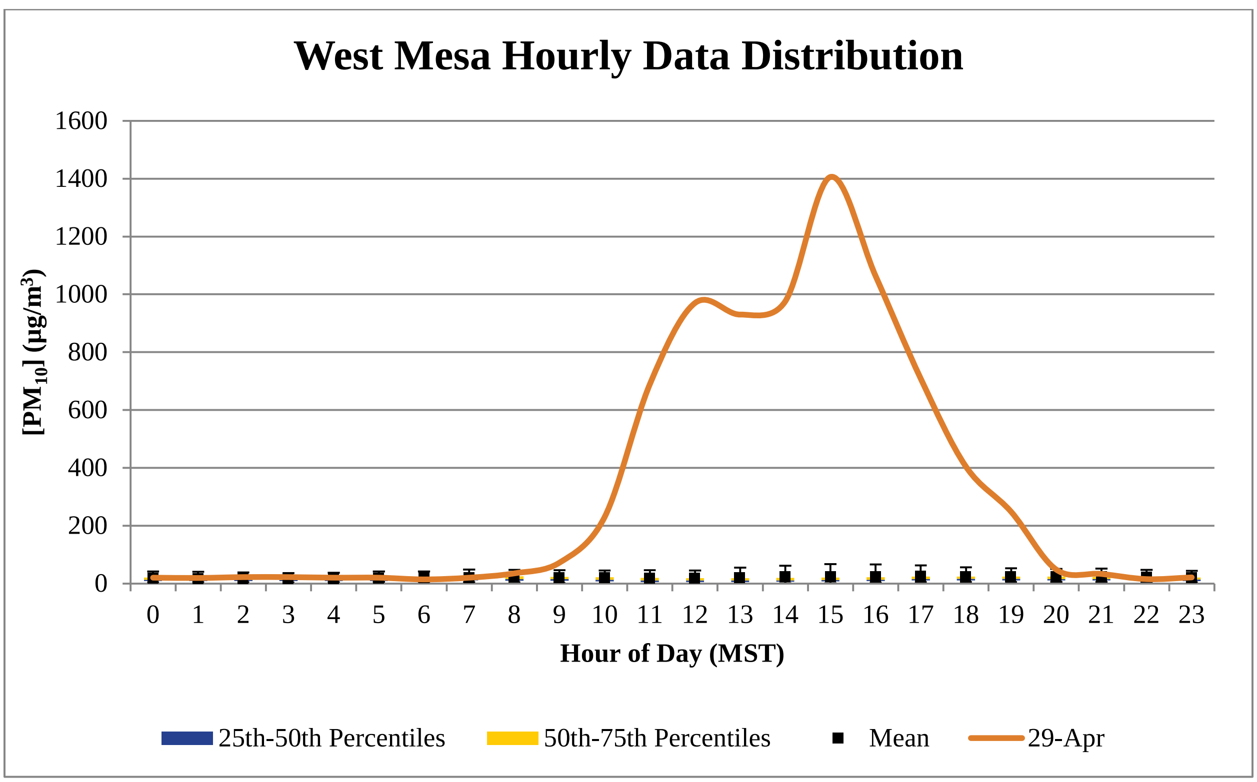

Figure 6-15. PM_{10} hourly data distribution from 2003-2009 overlaid by hourly values for April 29, 2010.

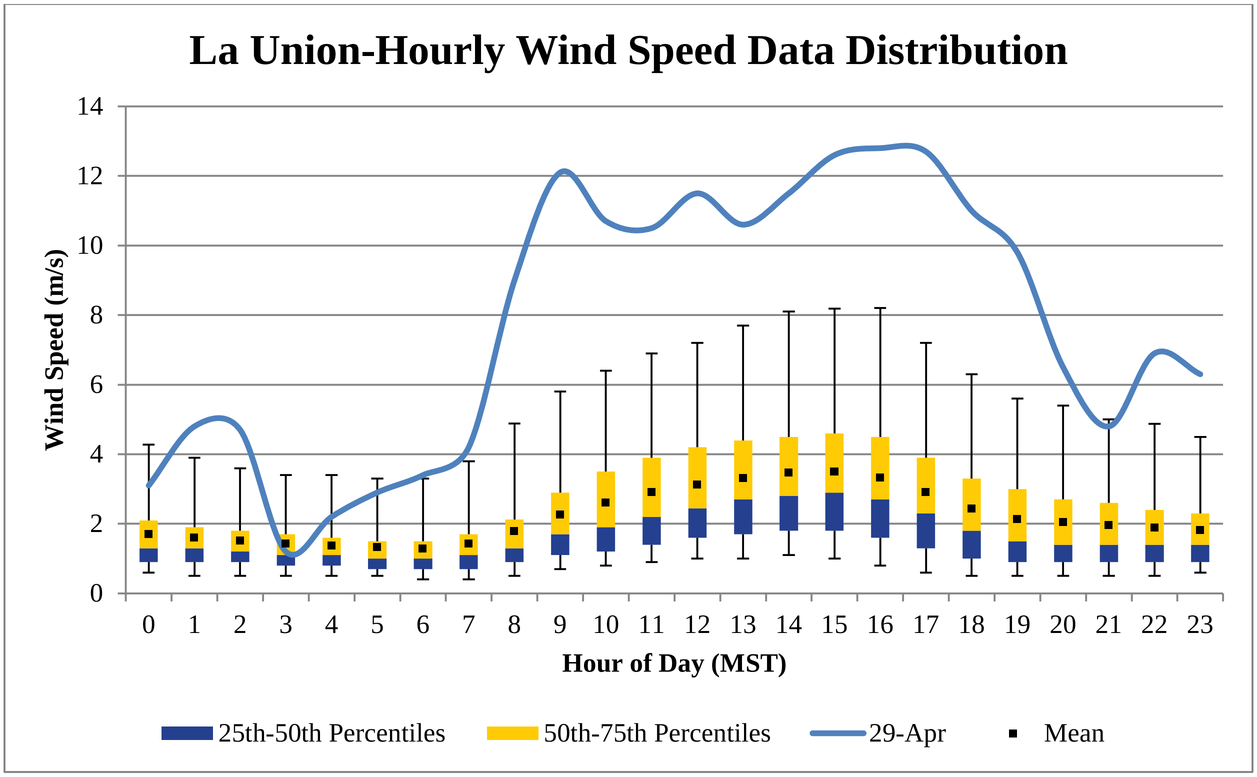

Figure 6-16. Hourly wind speed data distribution from 2003-2009 overlaid by hourly values for April 29, 2010.

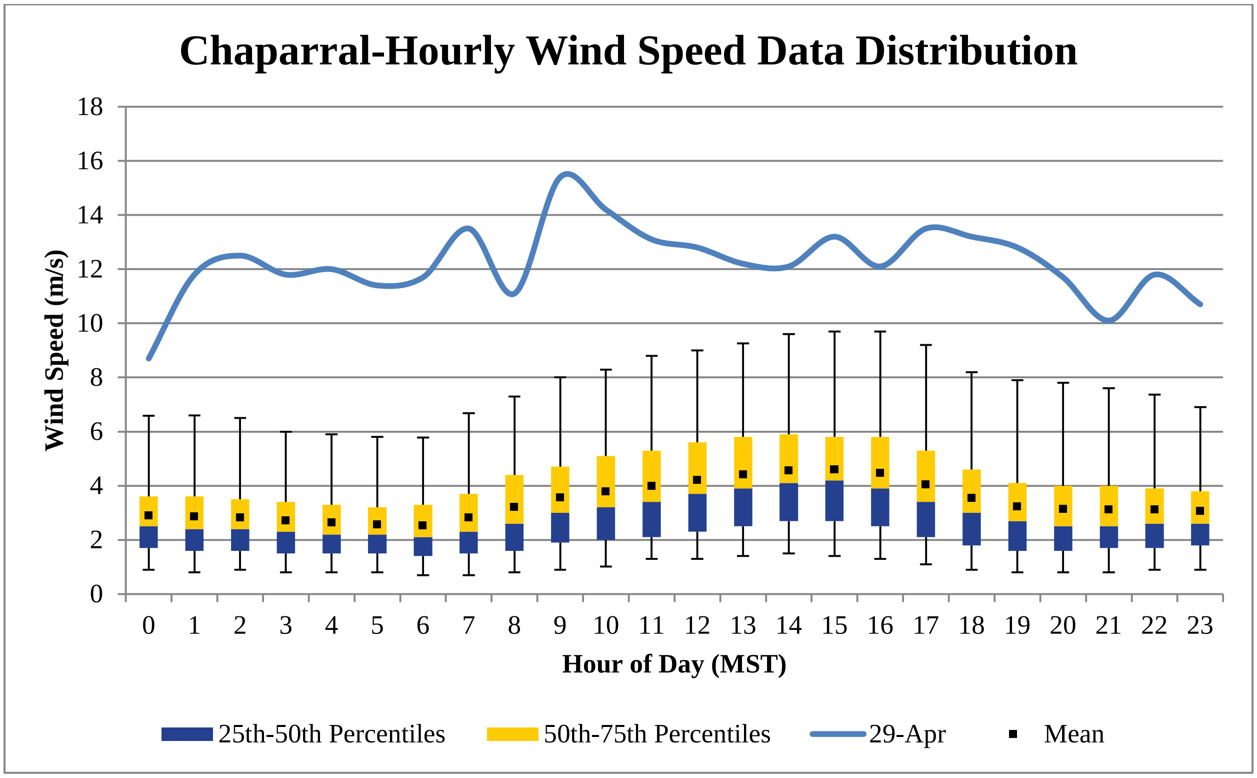

Figure 6-17. Hourly wind speed data distribution from 2003-2009 overlaid by hourly values for April 29, 2010.

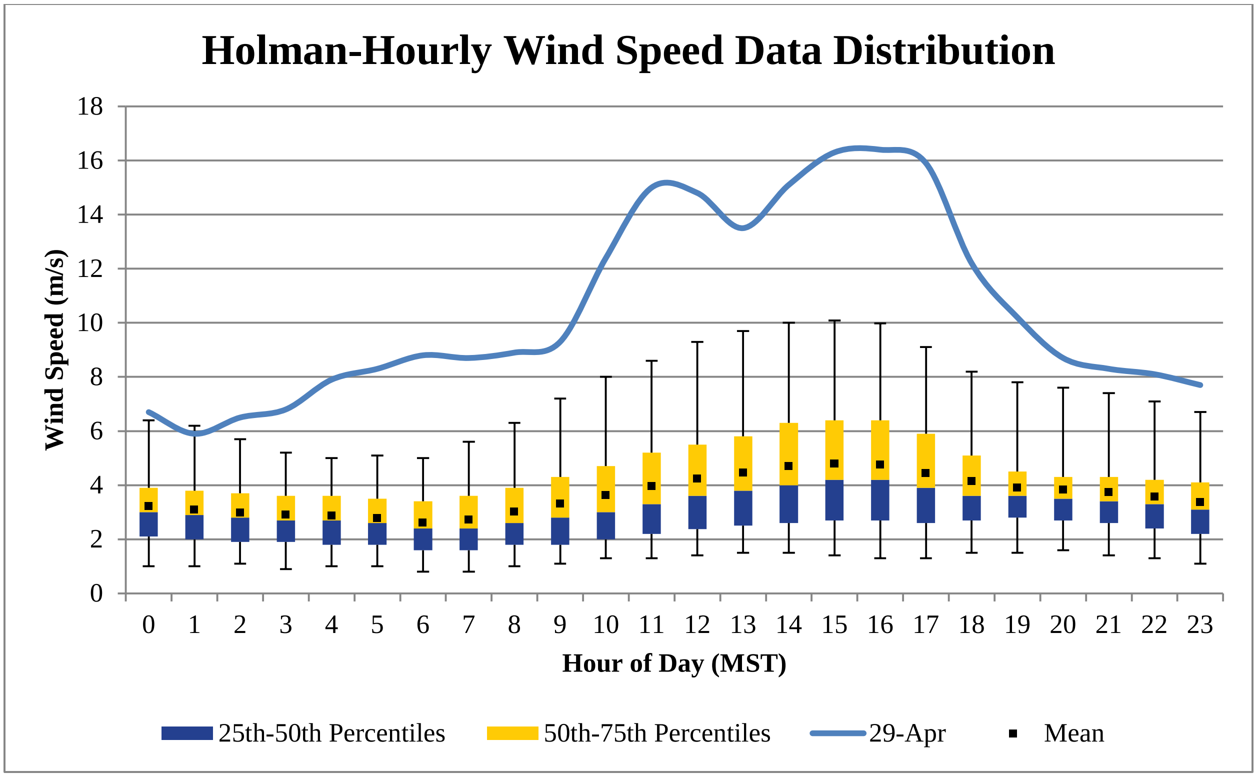

Figure 6-18. Hourly wind speed data distribution from 2004-2009 overlaid by hourly values for April 29, 2010.

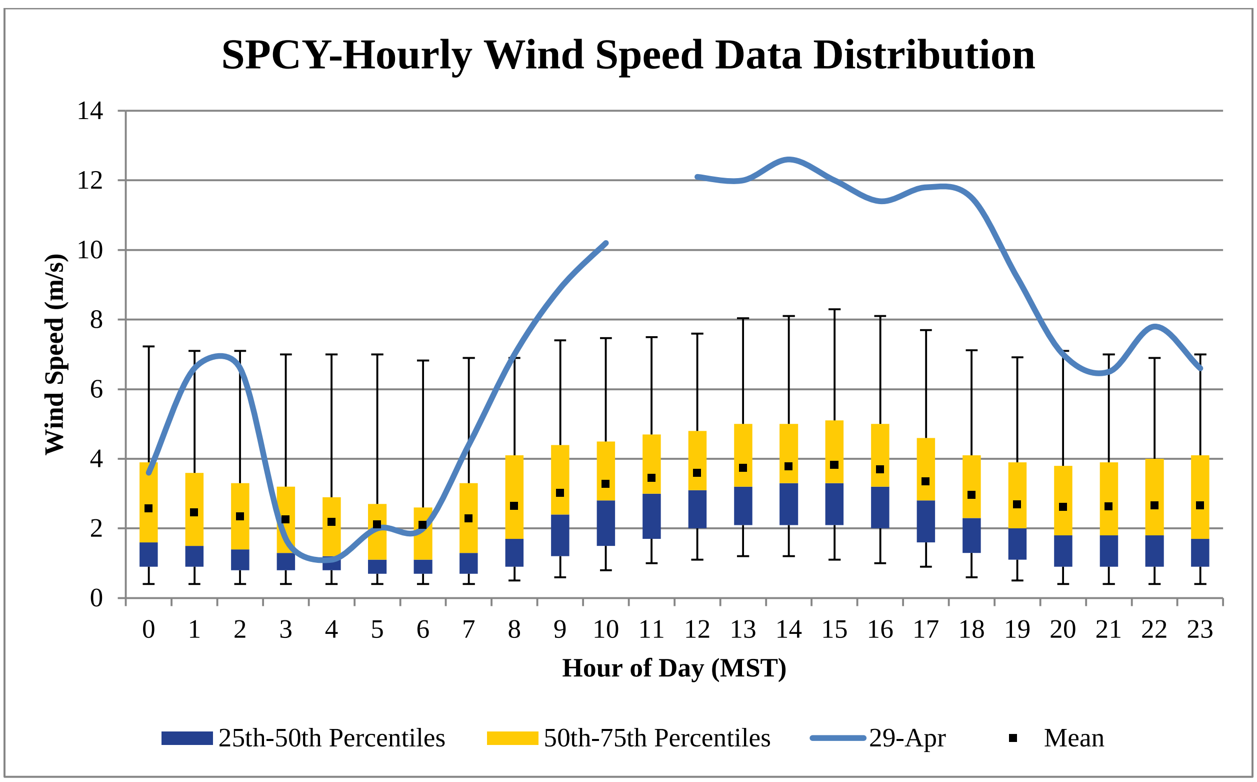

Figure 6-19. Hourly wind speed data distribution from 2003-2009 overlaid by hourly values for April 29, 2010.

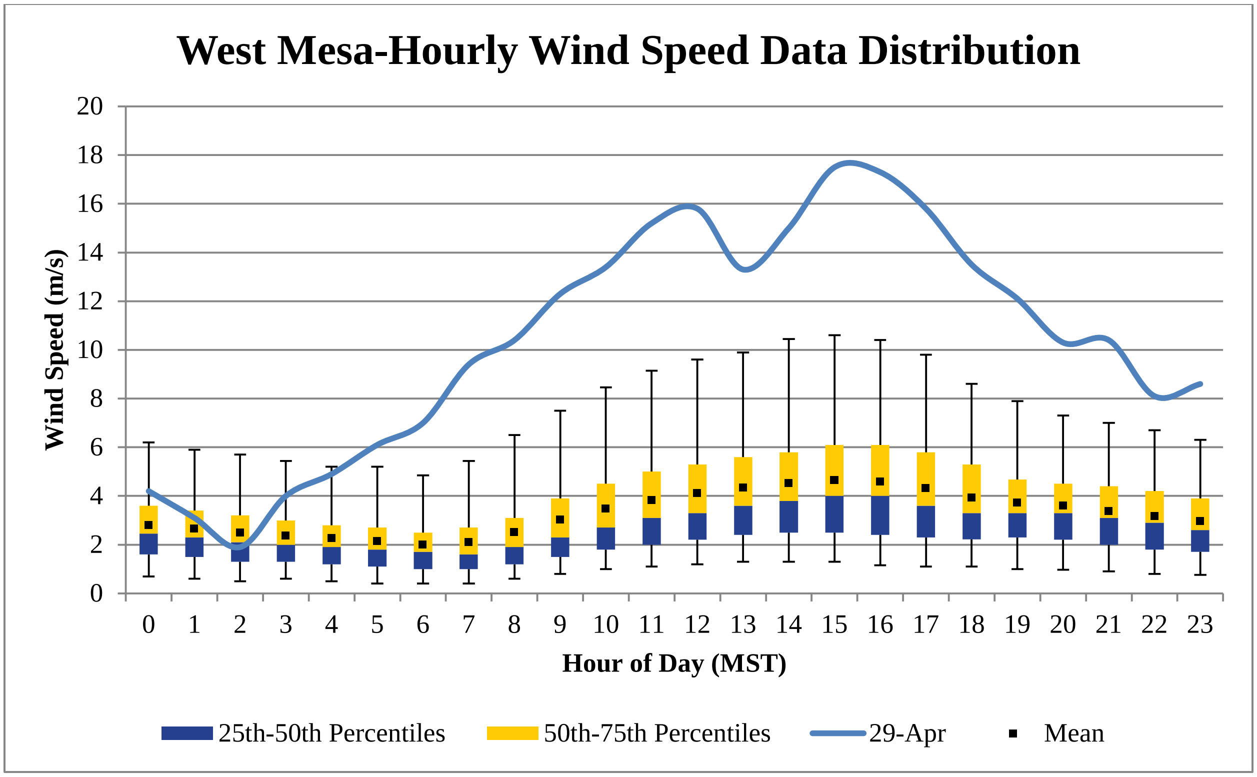

Figure 6-20. Hourly wind speed data distribution from 2003-2009 overlaid by hourly values for April 29, 2010.

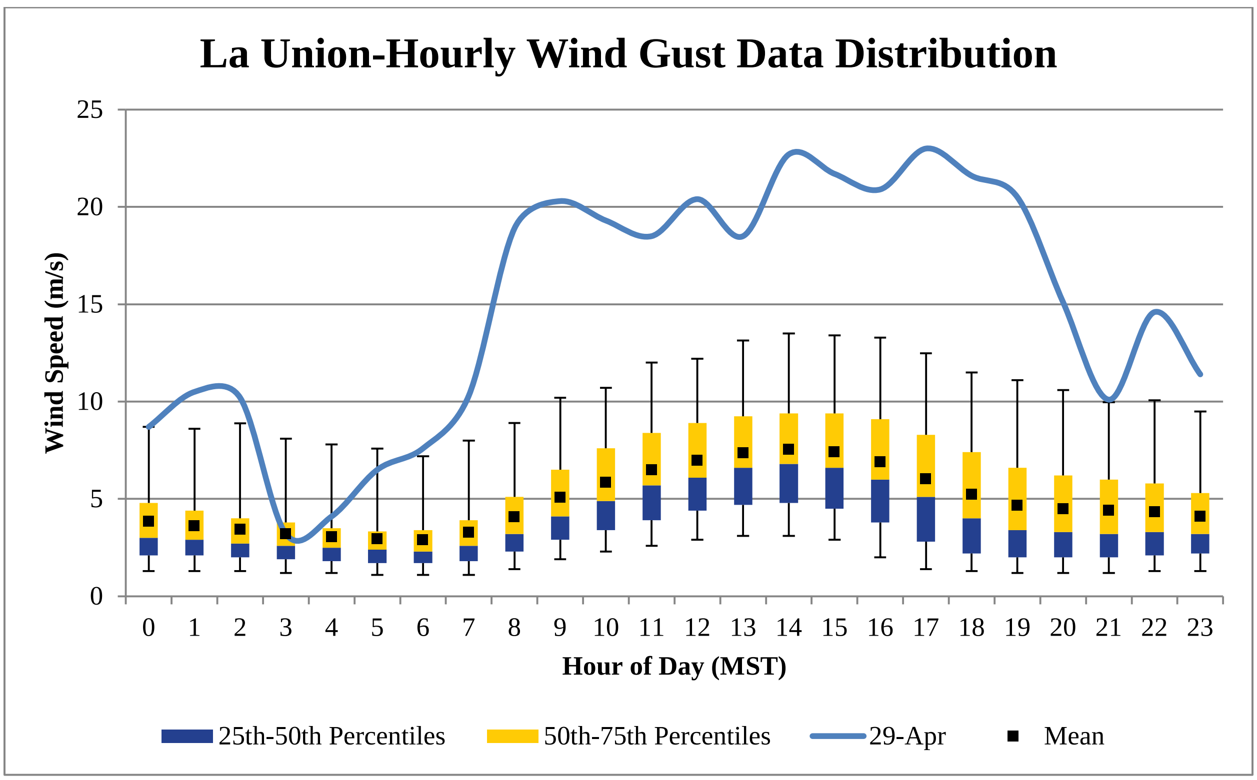

Figure 6-21. Hourly wind gust data distribution from 2003-2009 overlaid by hourly values for April 29, 2010.

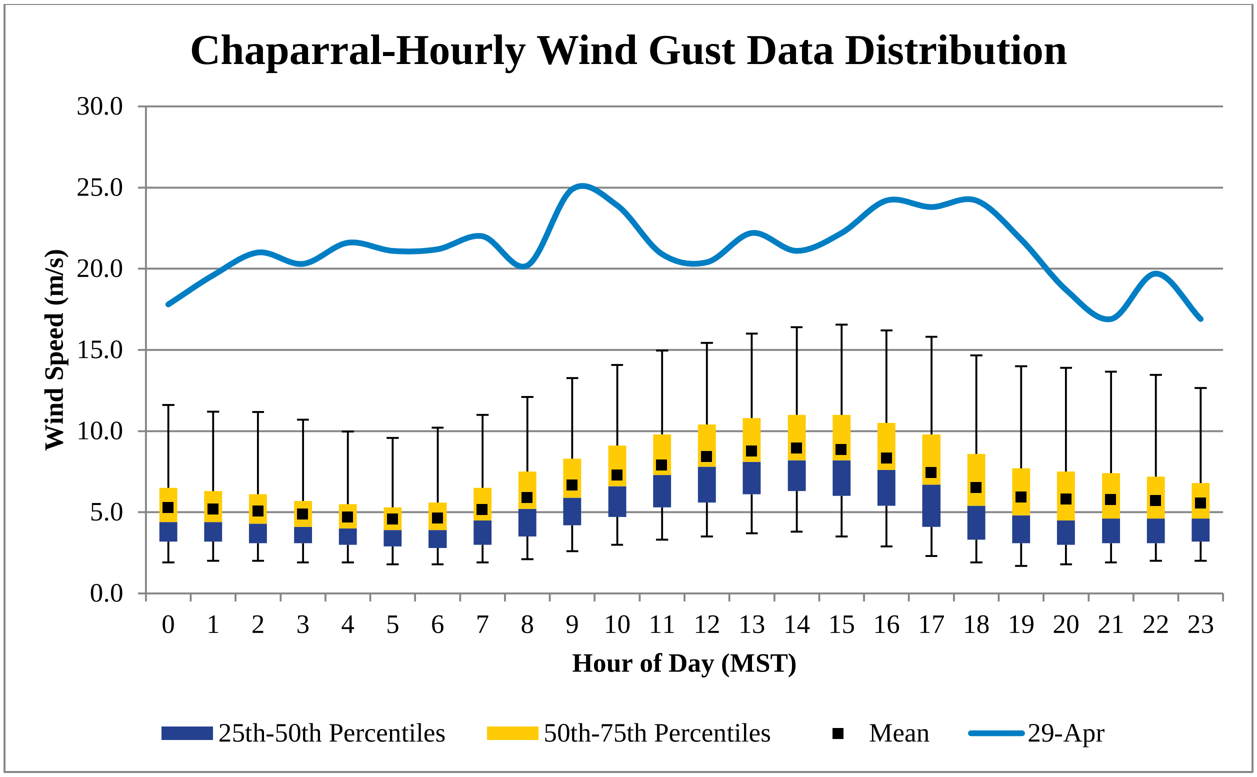

Figure 6-22. Hourly wind gust data distribution from 2003-2009 overlaid by hourly values for April 29, 2010.

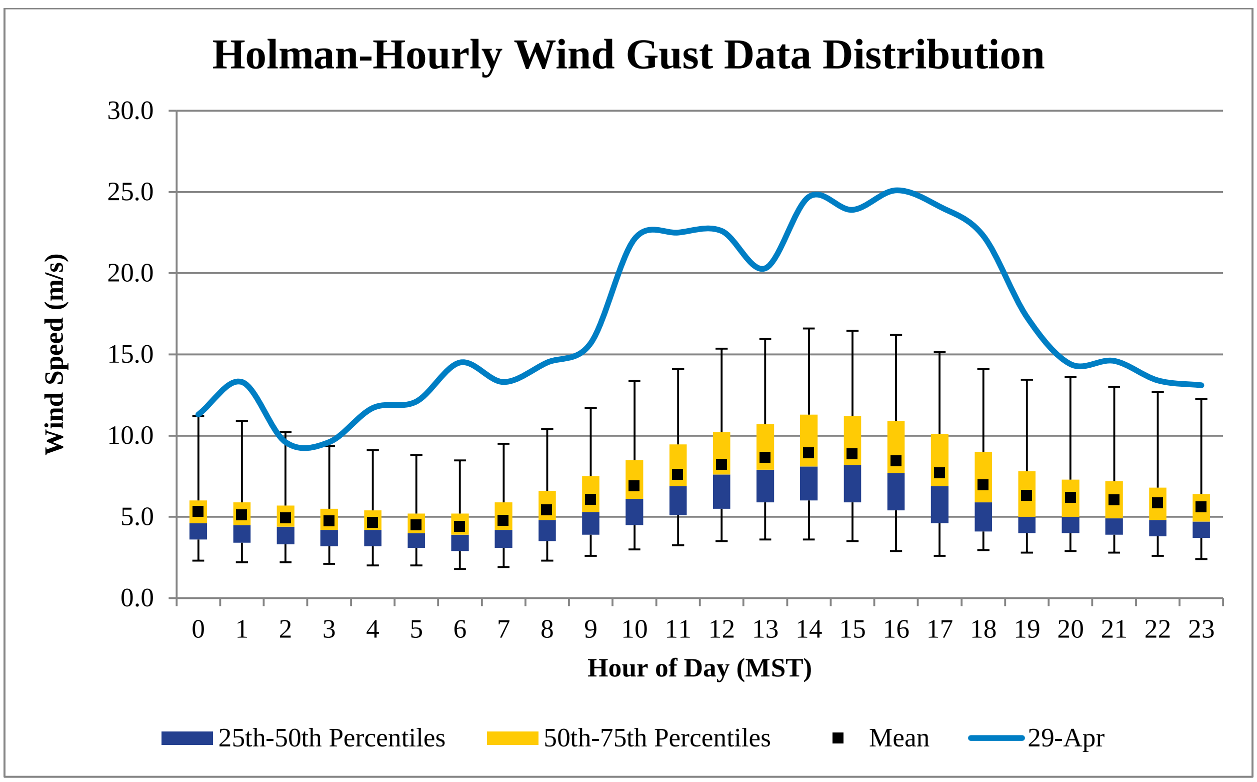

Figure 6-23. Hourly wind gust data distribution from 2004-2009 overlaid by hourly values for April 29, 2010.

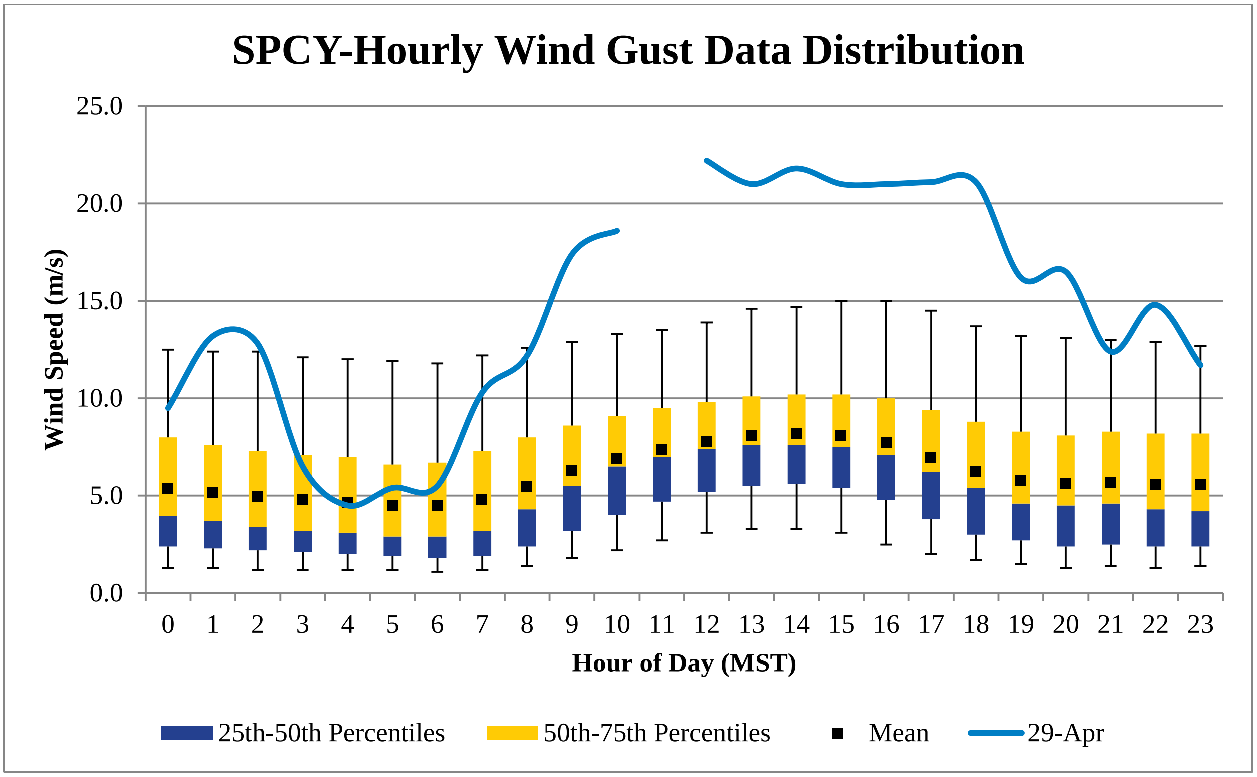

Figure 6-24. Hourly wind gust data distribution from 2003-2009 overlaid by hourly values for April 29, 2010.

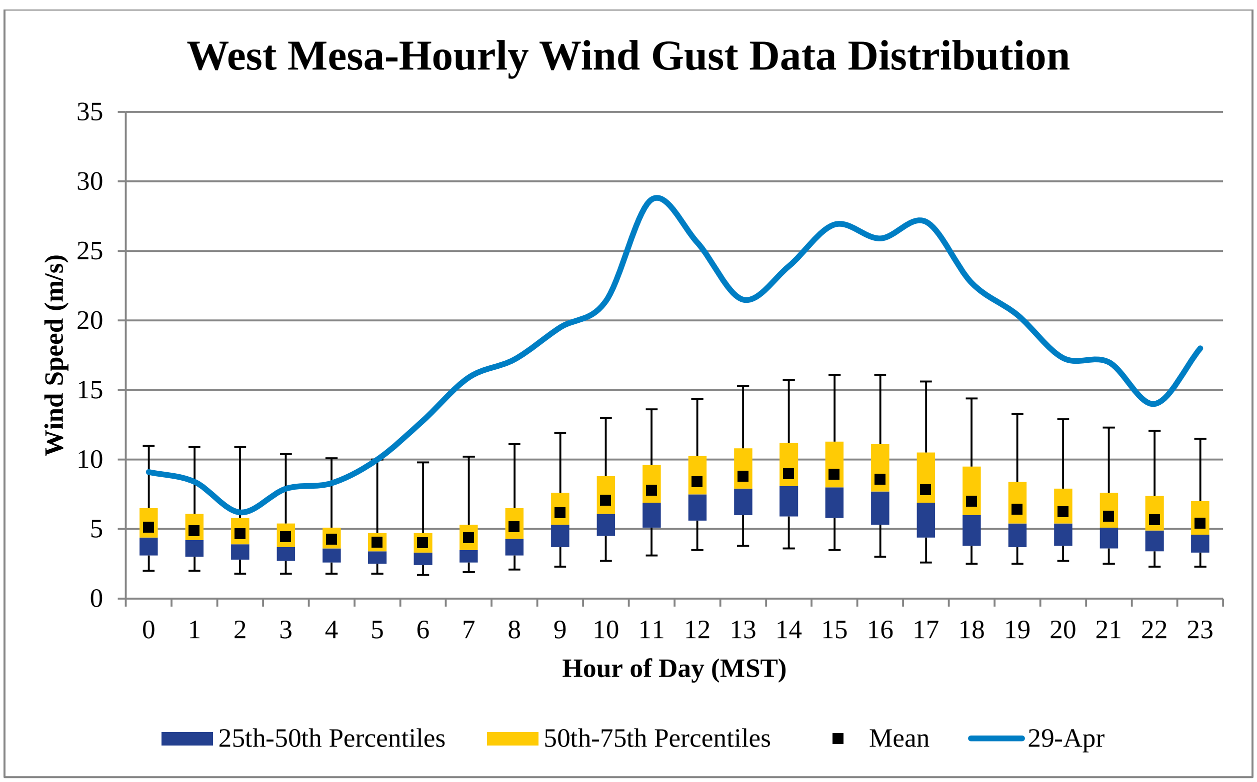

Figure 6-25. Hourly wind gust data distribution from 2003-2009 overlaid by hourly values for April 29, 2010.

6.4 Clear Causal Relationship

A strong Pacific cold front passed through New Mexico on April 29, 2010. As the Pacific cold front moved through New Mexico, a strong pressure gradient formed over southeastern Arizona, southwestern New Mexico and northwestern Chihuahua causing high winds at the surface (Figure 6-26). Surface winds flow perpendicular to the isobars from high to low pressure. As the day progressed, the wind direction in the upper atmosphere aligned with the surface wind direction (Figure 6-27). Diurnal heating of the surface allowed winds aloft to mix downward, increasing the surface wind velocities and provided the turbulence required for vertical mixing and horizontal transport.

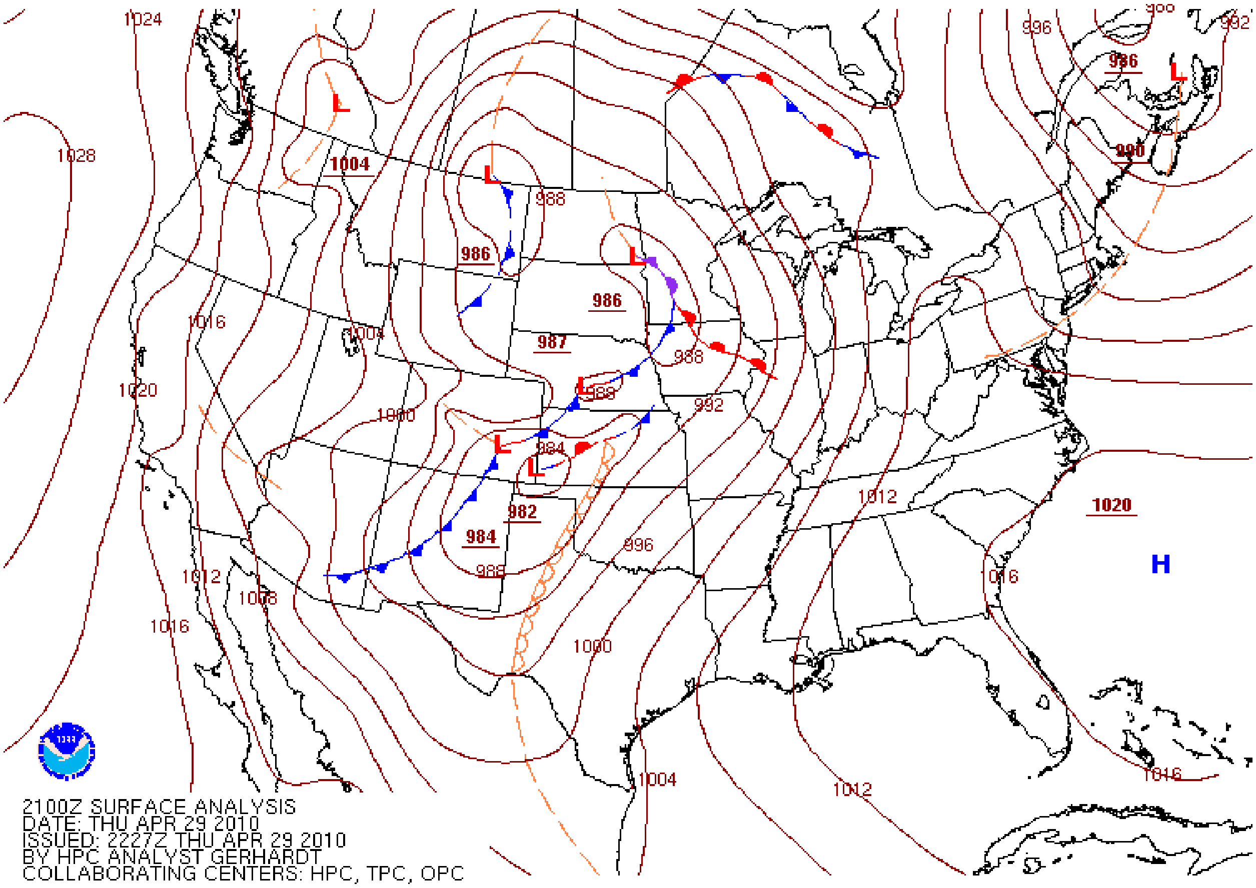

Figure 6-26. Surface weather map showing frontal activity and isobars of constant pressure (red lines) for April 29, 2010 at the 1500 hour MST.

The weather pattern described above generated strong southwesterly winds in the early morning hours that lasted throughout the day. Beginning at the 800 hour, wind gusts exceeded the historical 95th percentile of data at all sites. Many sites exceeded this level at midnight as shown in Figures 6-21 through 6-25. In addition, sustained wind speeds reached then exceeded EPA's default threshold for blowing dust by noon (Figure 6-2). Peak wind gusts ranged from 21 m/s at Desert View to 29 m/s at West Mesa (Figure 6-3). Peak wind speeds ranged from 11 m/s at Desert View to 18 m/s at West Mesa (Figure 6-2). Blowing dust caused elevated levels of PM_{10} during the same period of high winds as demonstrated by the time series plots in Figures 6-28 through 6-32. As wind speed and wind gusts exceed the 95th percentile of historical data at the monitoring sites, so do hourly PM_{10} concentrations on this date. Throughout the day, hourly PM_{10} concentrations spiked at all monitoring sites at the same time in the network (Figure 6-32). Satellite imagery captured the blowing dust throughout southern New Mexico, northern Mexico and west Texas (Figures 6-33 and 6-34). TCEQ also recorded exceedances of the PM_{10} standard in El Paso on this day and posted a brief description of the event with satellite imagery and visibility data on their website (Appendix E). The National Weather Service also reported in their weather bulletin that strong winds persisted throughout the region on this day (Appendix E).

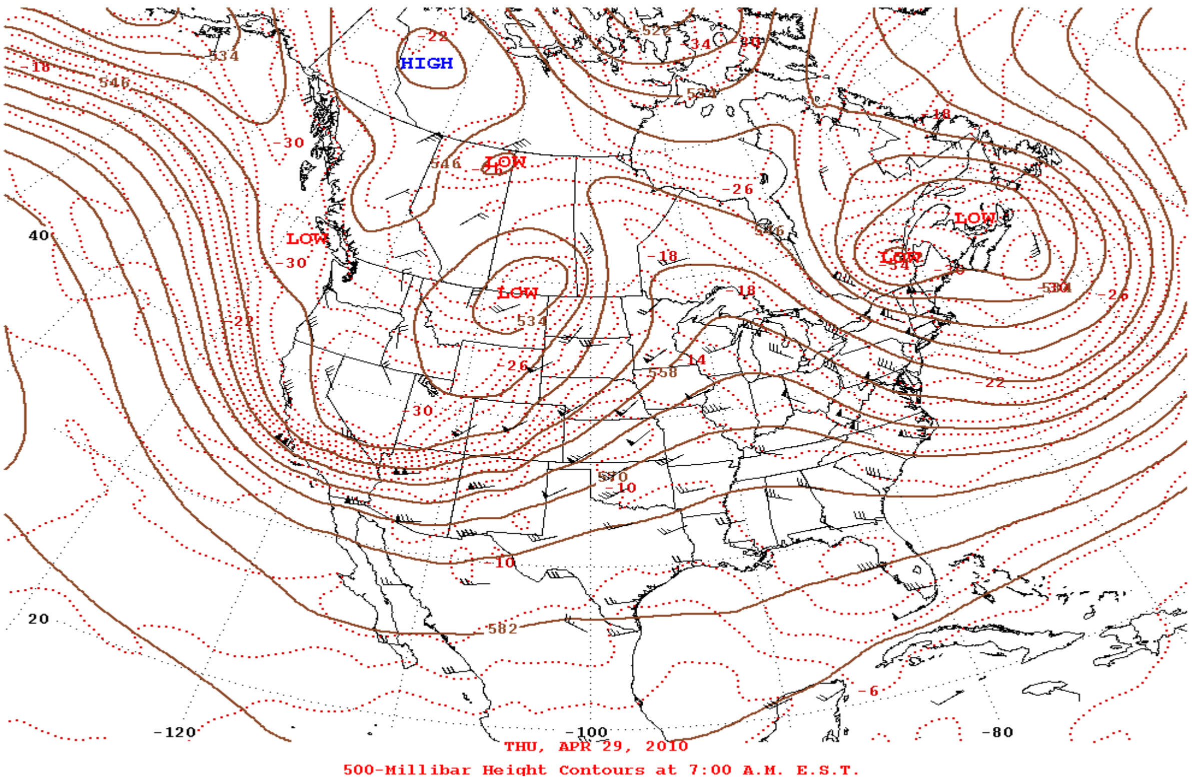

Figure 6-27. Upper air weather map showing geopotential heights (brown lines) at the 500 hour on April 29, 2010.

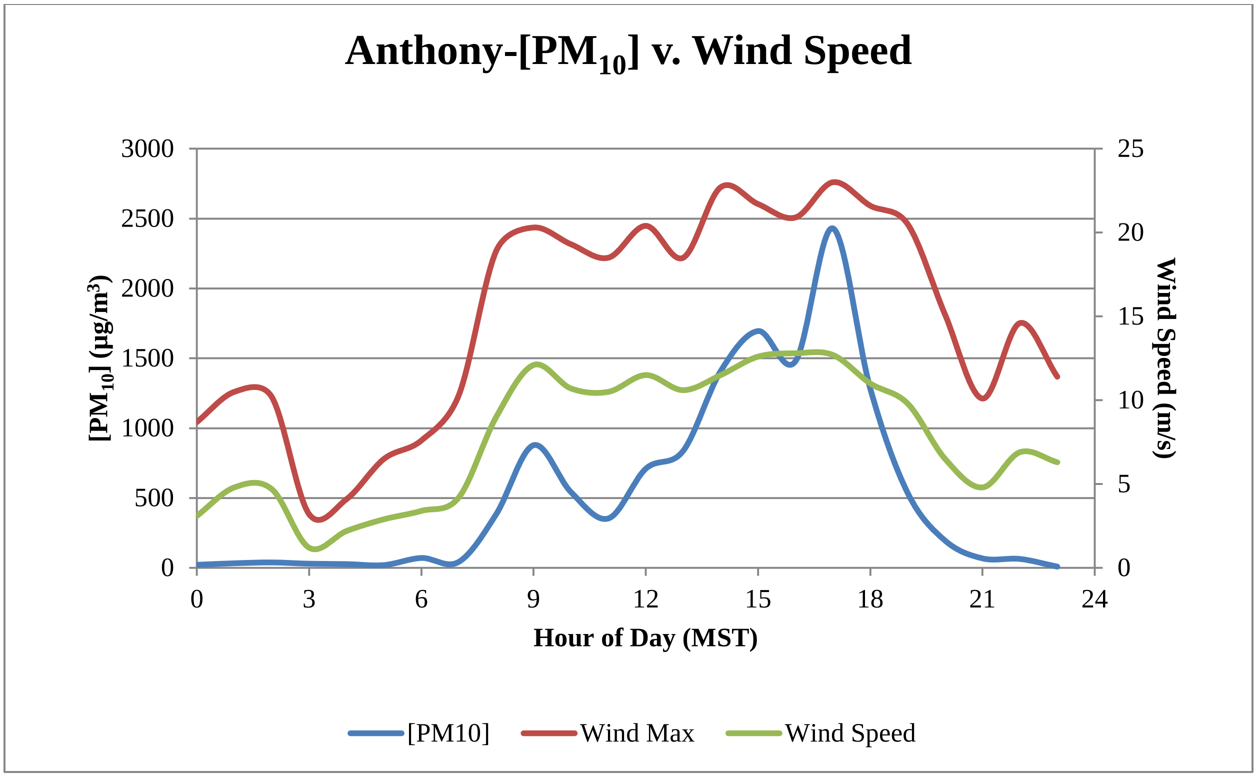

Figure 6-28. Time series plot of hourly observations showing increased PM_{10} concentrations as wind speeds and gusts increase.

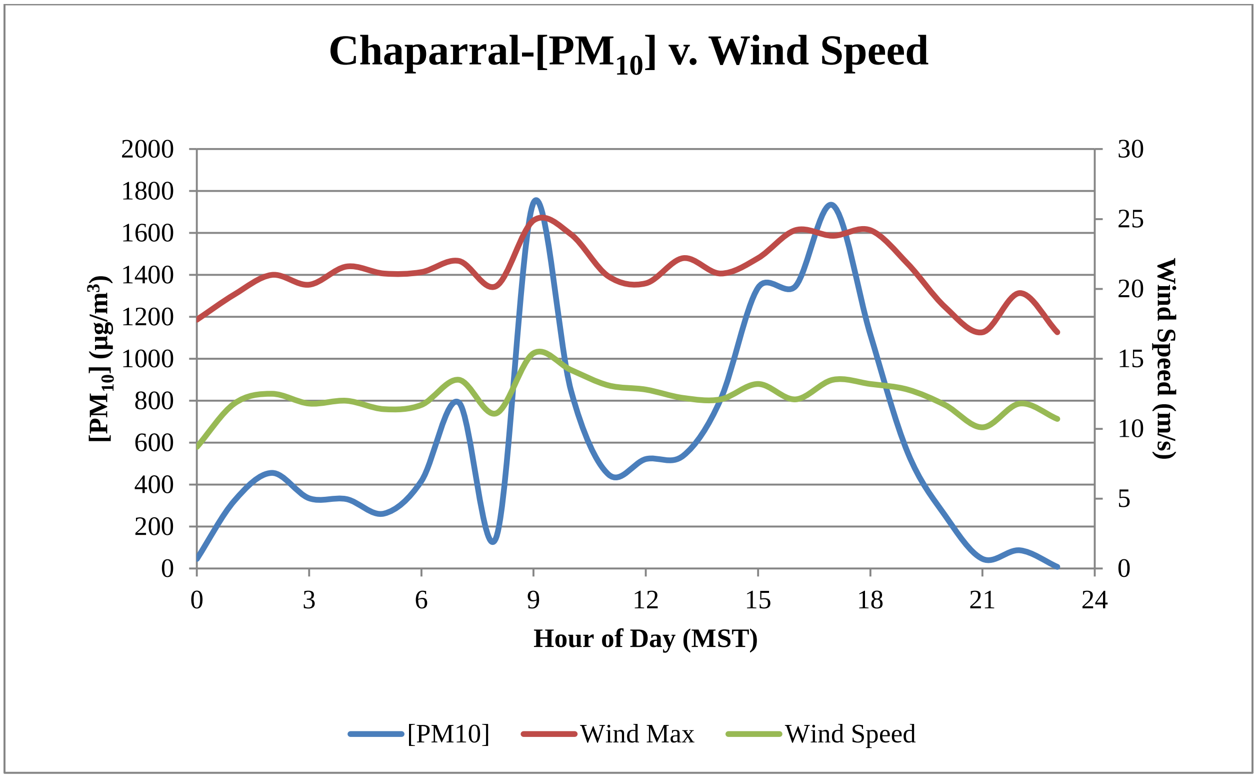

Figure 6-29. Time series plot of hourly observations showing increased PM_{10} concentrations as wind speeds and gusts increase.

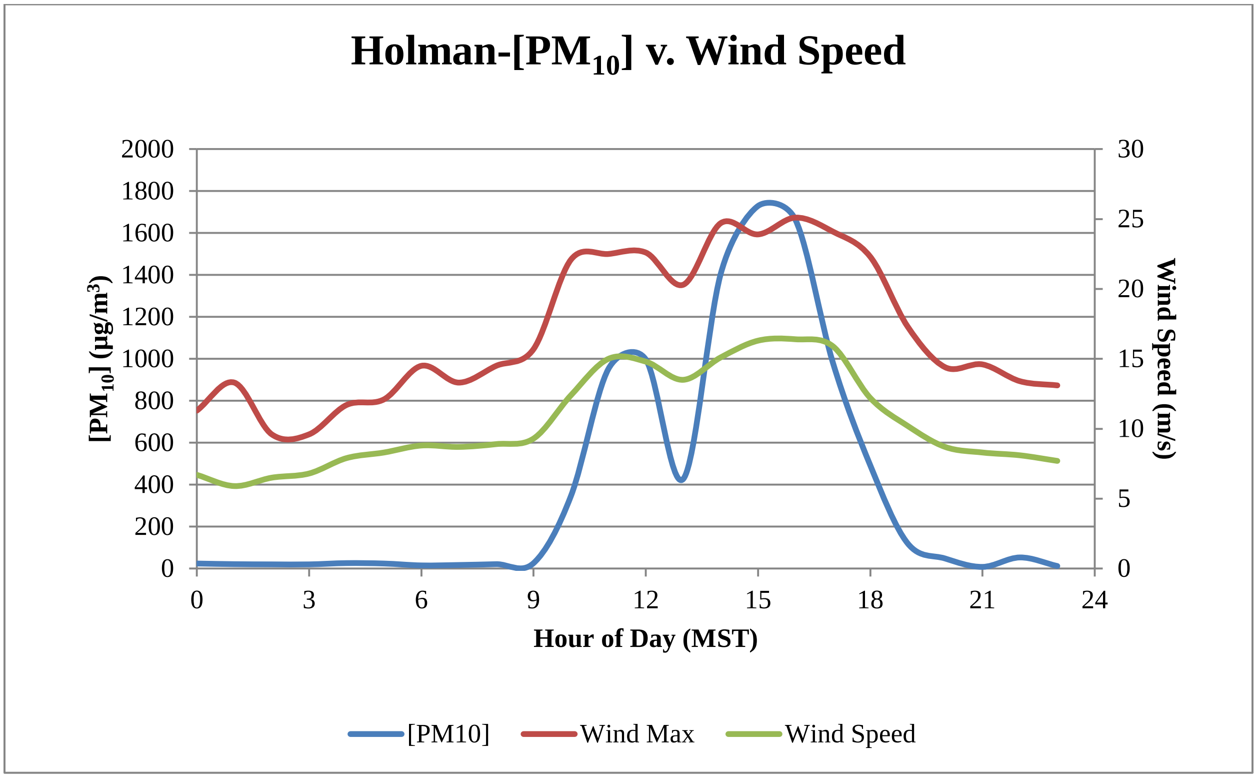

Figure 6-30. Time series plot of hourly observations showing increased PM_{10} concentrations as wind speeds and gusts increase.

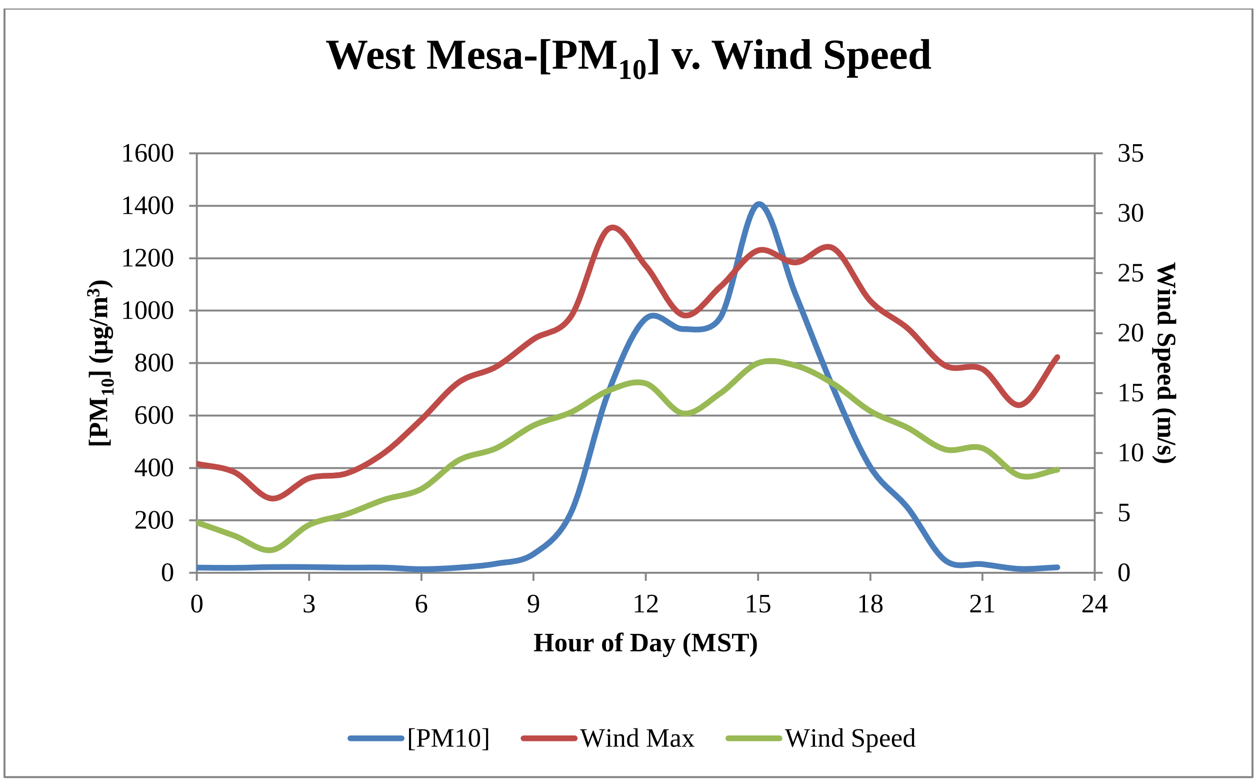

Figure 6-31. Time series plot of hourly observations showing increased PM_{10} concentrations as wind speeds and gusts increase.

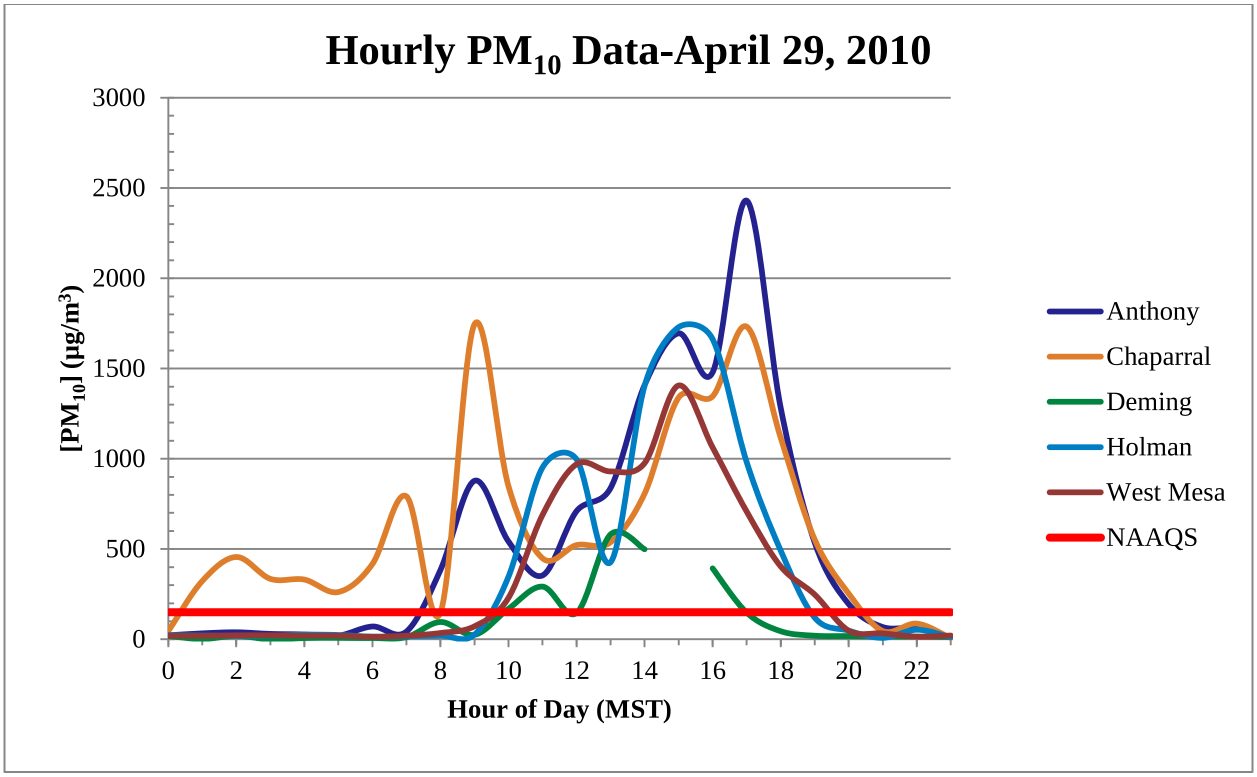

Figure 6-32. Hourly PM_{10} concentrations for Doña Ana and Luna Counties monitors on April 29, 2010.

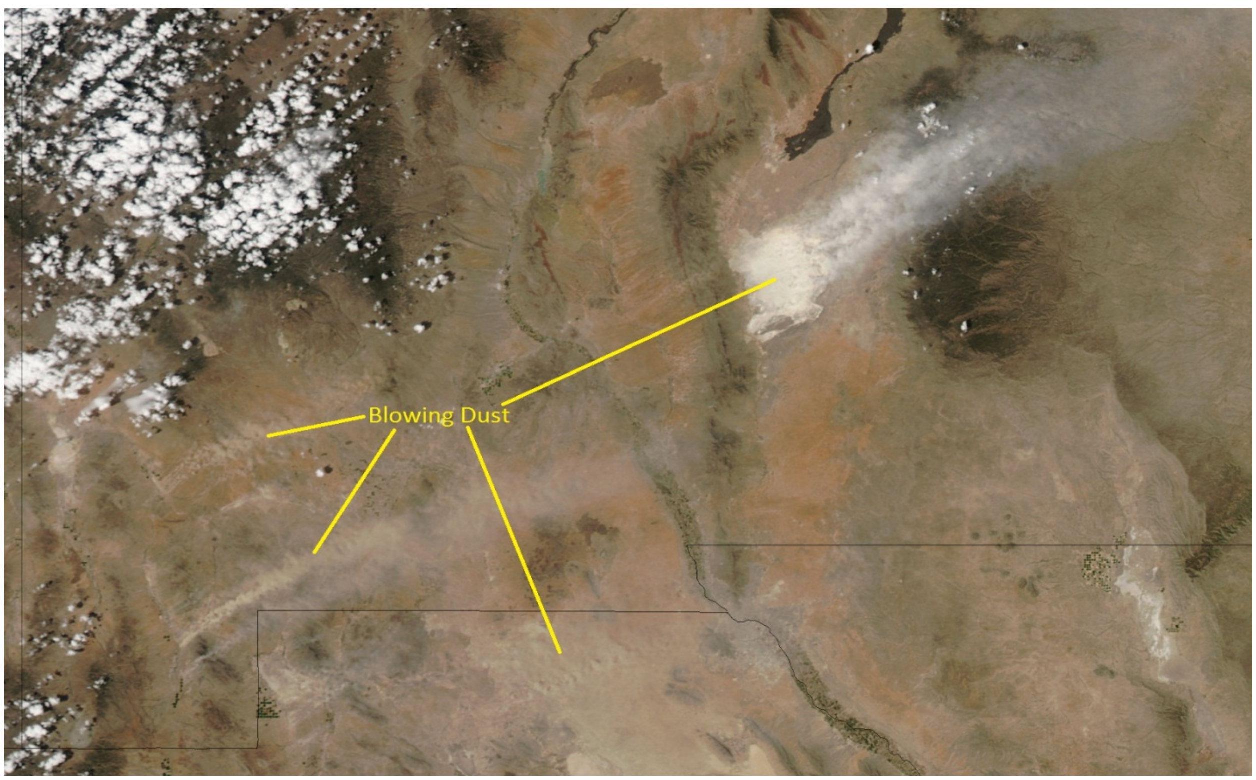

Figure 6-33. Satellite imagery of blowing dust on April 29, 2010 at the 1410 hour. Image courtesy of NASA.

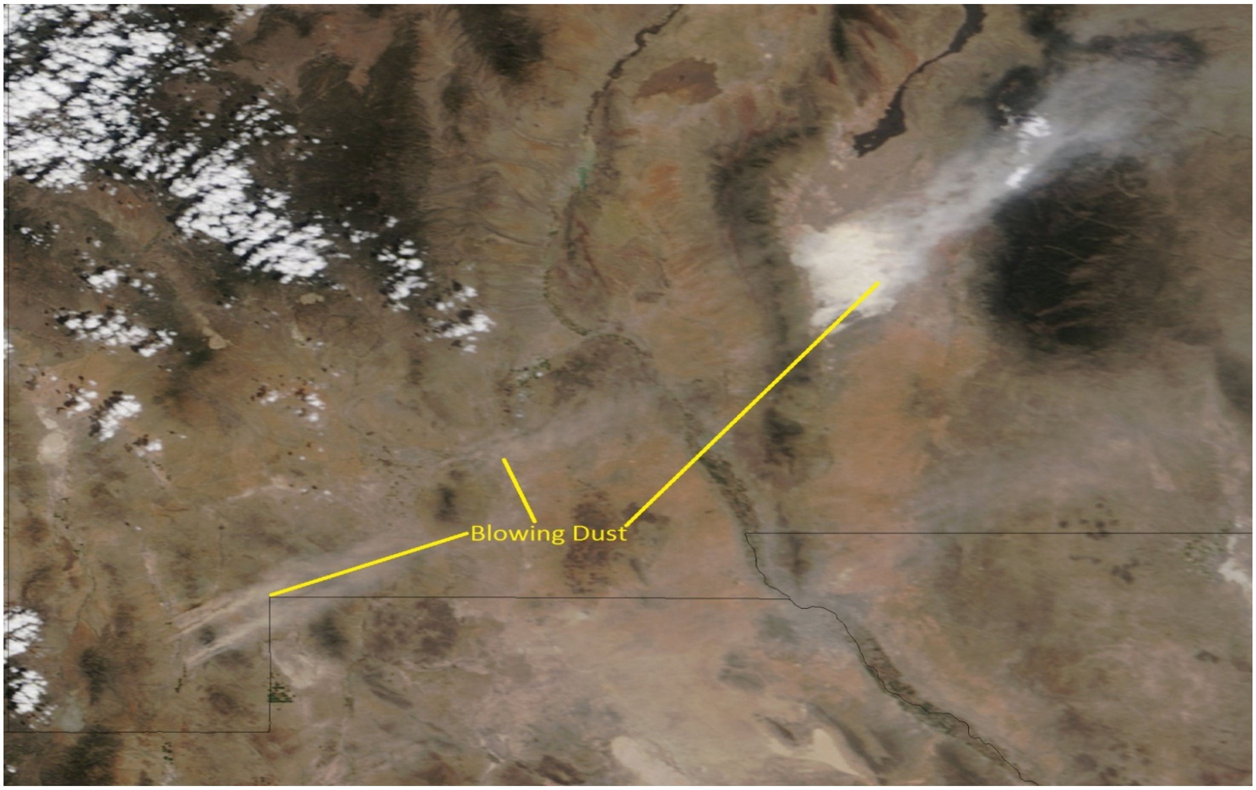

Figure 6-34. Satellite imagery of blowing dust on April 29, 2010 using images from the 1648-1655 hours. Image courtesy of NASA.

6.5 Affects Air Quality

The historical fluctuations and clear causal relationship analyses prove that the event in question affected air quality on April 29, 2010.

6.6 Natural Event

The CCR and nRCP analyses show that this was a natural event caused by high wind and blowing dust.

6.7 No Exceedance but for the Event

The Anthony monitor detected blowing dust around the 800 hour with hourly concentrations heavily impacted until the 1900 hour. The two hourly PM_{10} values from 1600-1700 hours alone, exceed the 24-hour average standard at Anthony [(1479 + 2430) µg/m^3 = 3,909 µg/m^3; (3,909 µg /m^3)/24 = 163 µg/m^3]. By replacing the hourly values impacted by windblown dust (800-1900 hours) with the 95th percentile of hourly data at the Anthony site, the resulting 24-hour average (97 µg/m^3) does not exceed the NAAQS (Table 6-2). The values in red represent the 95th percentile of all hourly data collected at Anthony in the table below. NMED concludes that without the high wind and blowing dust at the Anthony site an exceedance would not have occurred.

Hour of Day (MST)	Recorded Hourly Data	Substituted Hourly Data
0	22	22
1	33	33
2	39	39
3	30	30
4	27	27
5	20	20
6	71	71
7	43	43
8	384	**107**
9	878	**84**
10	542	**84**
11	354	**94**
12	710	**118**
13	838	**136**
14	1408	**160**
15	1695	**161**
16	1479	**163**
17	2430	**195**
18	1283	**201**
19	536	**193**
20	195	195
21	68	68
22	64	64
23	9	9
24-Hour Average	548	**97**

Table 6-2. Anthony: 95th percentile of data substituted for those hours when windblown dust was the most intense does not result in an exceedance at Anthony.

The Chaparral monitor detected blowing dust at the 100 hour with hourly concentrations heavily impacted until the 2000 hour. The three hourly PM_{10} values from 1500-1700 hours alone, exceed the 24-hour average standard at Chaparral [(1339 + 1346 + 1732) $\mu g/m^3$ = 4,417 $\mu g/m^3$; (4,417 $\mu g/m^3$)/24 = 184 $\mu g/m^3$]. By replacing the hourly values impacted by windblown dust (100 to 2000 hour) with the 95th percentile of hourly data for the Chaparral site, the resulting 24-hour average (111 $\mu g/m^3$) does not exceed the NAAQS (Table 6-3). The values in red represent the 95th percentile of all hourly data collected at Chaparral in the table below. NMED concludes that without the high wind and blowing dust at the Chaparral site an exceedance would not have occurred.

Hour of Day (MST)	Recorded Hourly Data	Substituted Hourly Data
0	46	46
1	323	**80**
2	456	**73**
3	335	**66**
4	331	**72**
5	262	**98**
6	417	**132**
7	792	**136**
8	148	**106**
9	1745	**83**
10	848	**82**
11	449	**92**
12	522	**116**
13	538	**134**
14	807	**159**
15	1339	**154**
16	1346	**157**
17	1732	**187**
18	1117	**195**
19	553	**186**
20	253	**172**
21	46	46
22	87	87
23	8	8
24-Hour Average	604	**111**

Table 6-3. Chaparral: 95th percentile of data substituted for those hours when windblown dust was the most intense does not result in an exceedance at Chaparral.

The Holman monitor detected blowing dust at the 1000 hour with hourly concentrations heavily impacted until the 1800 hour. The three hourly PM_{10} values from 1400-1600 hours alone, exceed the 24-hour average standard at Holman [(1404 + 1729 + 1663) µg/m^3 = 4,796 µg/m^3; (4,796 µg/m^3)/24 = 200 µg/m^3]. By replacing the hourly values impacted by blowing dust (1000-1800 hour) with the 95th percentile of hourly data for the Holman site, the resulting 24-hour average (72 µg/m^3) does not exceed the NAAQS (Table 6-4). The values in red represent the 95th percentile of all hourly data collected at Holman in the table below. NMED concludes that without the high wind and blowing dust at the Holman site an exceedance would not have occurred.

Hour of Day (MST)	Recorded Hourly Data	Substituted Hourly Data
0	24	24
1	21	21
2	20	20
3	20	20
4	26	26
5	24	24
6	15	15
7	17	17
8	21	21
9	26	26
10	347	**82**
11	952	**92**
12	997	**114**
13	427	**131**
14	1404	**160**
15	1729	**154**
16	1663	**152**
17	982	**187**
18	492	**195**
19	120	120
20	48	48
21	8	8
22	53	53
23	12	12
24-Hour Average	393	**72**

Table 6-4. Holman: 95th percentile of data substituted for those hours when windblown dust was the most intense does not result in an exceedance at Holman.

The West Mesa monitor detected blowing dust at the 1000 hour with hourly concentrations heavily impacted until the 1900 hour. The four hourly PM_{10} values from 1300-1600 hours alone, exceed the 24-hour average standard at West Mesa [(930 + 976 + 1406 + 1063) µg/m^3 = 4,375 µg/m^3; (4,375 µg/m^3)/24 = 182 µg/m^3]. By replacing the hourly values impacted by blowing dust (1000-1600 hour) with the 95^{th} percentile of hourly data for the West Mesa site, the resulting 24-hour average (77 µg/m^3) does not exceed the NAAQS (Table 6-5). The values in red represent the 95^{th} percentile of all hourly data collected at West Mesa in the table below. NMED concludes that without the high wind and blowing dust at the West Mesa site an exceedance would not have occurred.

Hour of Day (MST)	Recorded Hourly Data	Substituted Hourly Data
0	20	20
1	19	19
2	22	22
3	22	22
4	20	20
5	20	20
6	14	14
7	20	20
8	35	35
9	72	72
10	230	**82**
11	689	**92**
12	970	**117**
13	930	**135**
14	976	**161**
15	1406	**160**
16	1063	**157**
17	708	**189**
18	404	**196**
19	248	**186**
20	48	48
21	33	33
22	15	15
23	21	21
24-Hour Average	393	**77**

Table 6-5. West Mesa: 95^{th} percentile of data substituted for those hours when windblown dust was the most intense does not result in an exceedance at West Mesa.

7 HIGH WIND EXCEPTIONAL EVENT: June 6, 2010

7.1 Summary of Event

High winds and blowing dust caused an exceedance of the PM_{10} 24-hour NAAQS at the AQB's Anthony and SPCY sites. FEM TEOM continuous monitors recorded the 24-hour averages, with a midnight-to-midnight average concentration of 219 µg/m^3 at Anthony and 155 µg/m^3 at SPCY. In accordance with the EER, the AQB flagged this data on EPA's AQS database as a high wind natural event on or before June 1, 2011. Although no other monitoring site recorded an exceedance on this date, elevated PM_{10} concentrations (above the 95th percentile of data) were measured at Chaparral (83 µg/m^3) and Desert View (116 µg/m^3) monitoring sites (Figure 7-1). The averages in this figure were calculated using FEM TEOM instrument data for the four days before and after the event.

Unlike the other exceedances in this demonstration, a mesoscale weather system caused the high winds and blowing dust. As thunderstorms developed in southern Doña Ana County, downdrafts caused localized blowing dust. Winds blew from a predominately southeasterly direction just before the monitors detected elevated levels of PM_{10}. These high velocity winds passed over large areas of desert and anthropogenic sources in Texas and Mexico. The co-occurrence of high winds and elevated levels of blowing dust, little to no point sources in the area, and the high hourly and daily PM_{10} concentrations support the assertion that this was an exceptional event, specifically a natural event caused by high wind and blowing dust.

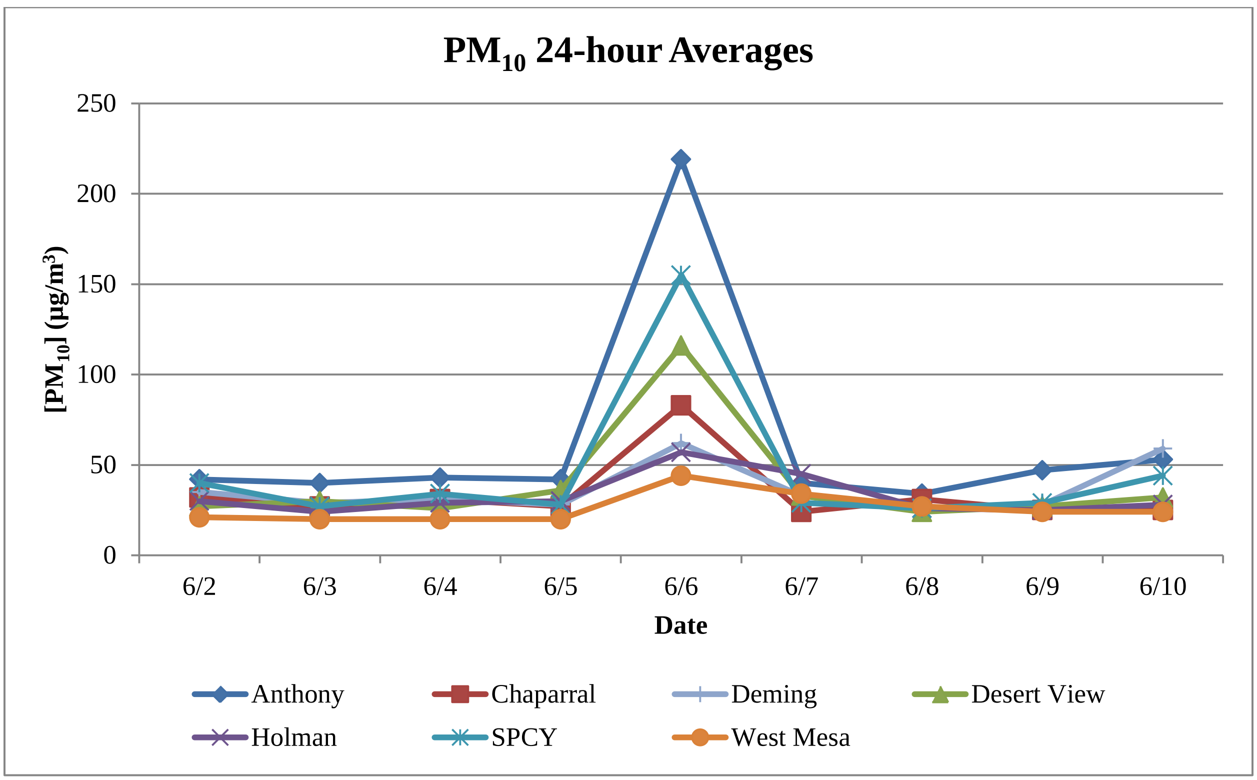

Figure 7-1. PM_{10} 24-hour averages four days before and after June 6, 2010.

7.2 Is Not Reasonably Controllable or Preventable

7.2.1 Suspected Source Areas and Categories Contributing to the Event

Sources of windblown dust contributing to this exceedance include the natural desert, residential properties, agricultural land and unpaved roads in Mexico and Texas. Doña Ana County Ordinance requires BACM for any dust producing activities. The largest and most likely sources of windblown dust are the natural desert in Mexico and Texas (see Section 7.2.4, below).

7.2.2 Sustained and Instantaneous Wind Speeds

EPA has indicated that sustained wind speeds of at least11.2 m/s (25 mph) would be used as the default entrainment threshold for natural and well controlled anthropogenic sources contributing to natural events caused by high wind and blowing dust (EPA, 2011). Under the Doña Ana and Luna County NEAPs, EPA and NMED agreed that wind gusts exceeding 18 m/s would overwhelm any natural and well-controlled anthropogenic sources and cause windblown dust. On June 6, sustained wind speeds exceeded EPA's default threshold at the Chaparral and SPCY monitoring sites and wind gusts exceeded the NEAPs agreed upon threshold at the monitoring sites in southern Doña Ana County (Figures 7-2 and 7-3). The meteorological tower at the Anthony site measures wind speed at two meters instead of the customary 10 meters. Due to this fact, this demonstration uses data from La Union (the closet site measuring wind speed at 10 m).

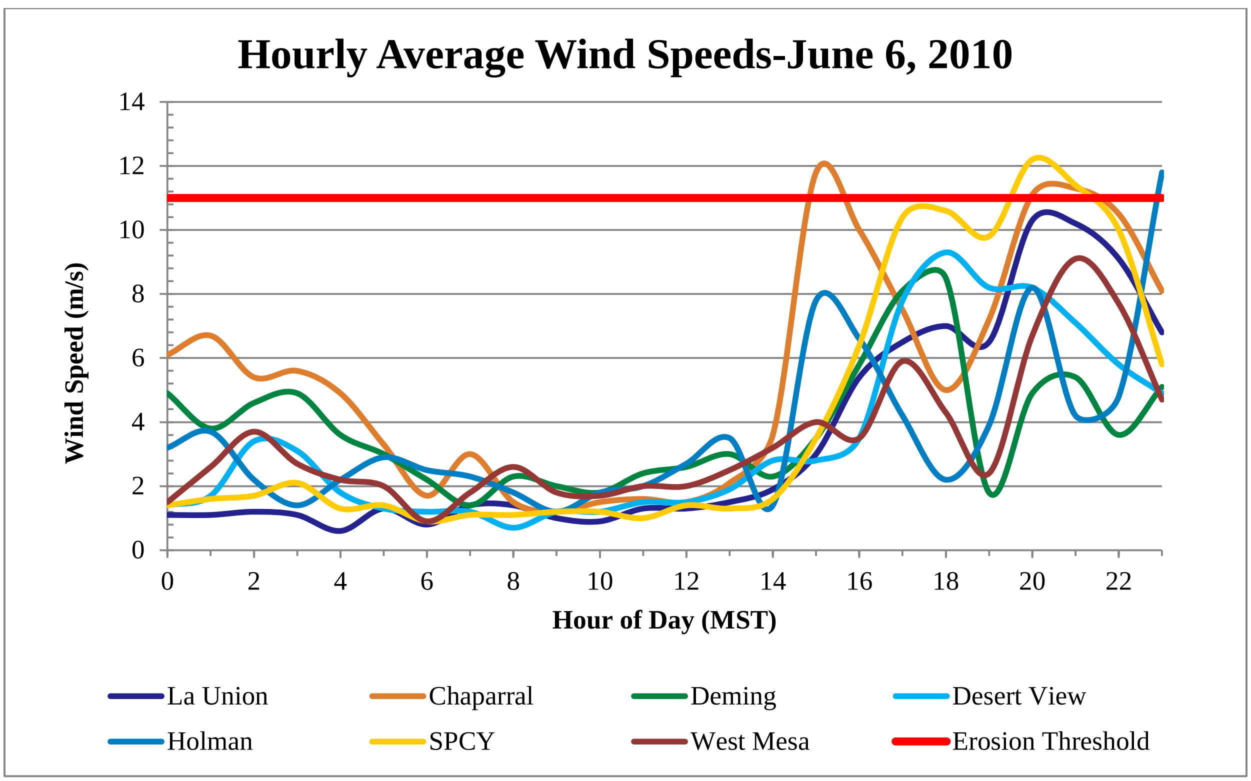

Figure 7-2. Sustained wind speeds at monitoring sites in Doña Ana and Luna Counties.

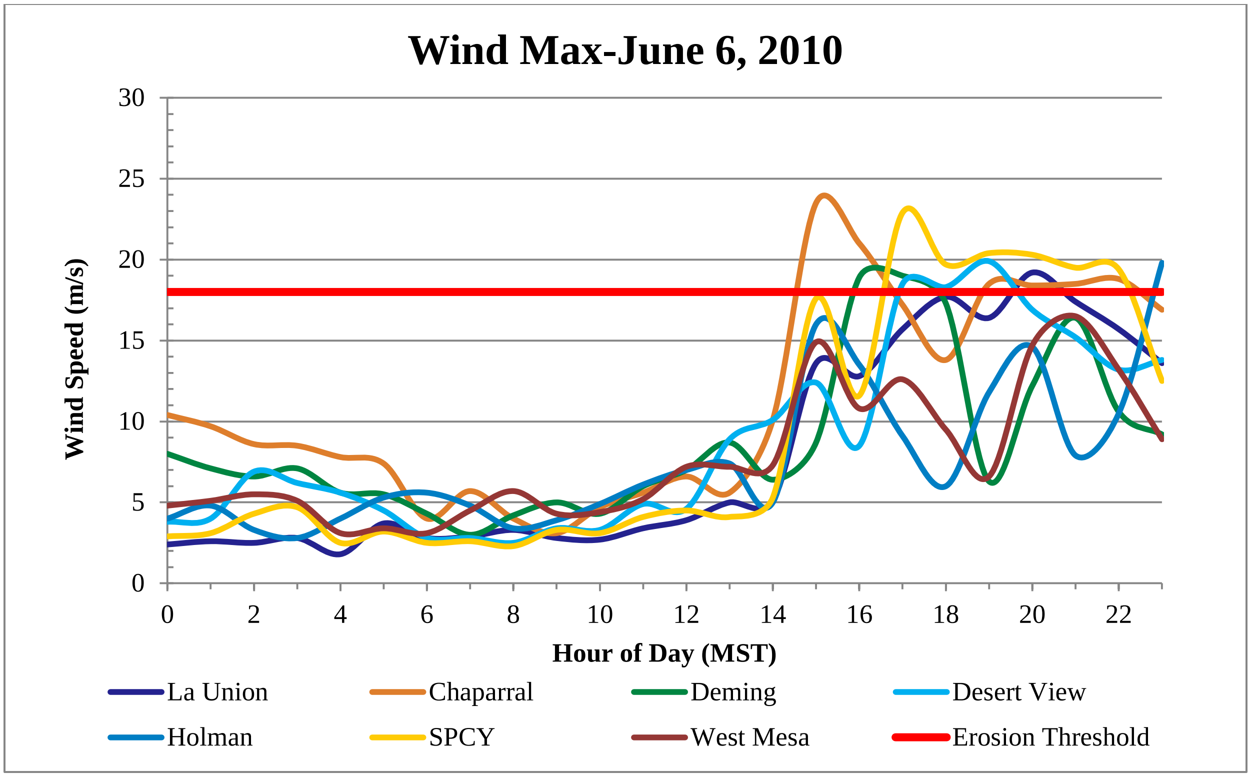

Figure 7-3. Maximum wind gusts at monitoring sites in Doña Ana and Luna Counties.

7.2.3 Recurrence Frequency

The Anthony monitoring site records exceedances of the PM_{10} NAAQS throughout the year. From 2003-2009 the FEM TEOM monitor has recorded 61 exceedances and the FRM Wedding monitor has recorded five exceedances (Figure 7-4).

The SPCY monitoring site records exceedances of the PM_{10} NAAQS throughout the year. From 2003-2009 the FEM TEOM monitor has recorded 68 exceedances and the FRM Wedding monitor has recorded three exceedances (Figure 7-4).

The large disparity in the number of monitored exceedances by the FEM TEOM is due to the FRM Wedding sampling schedule of 1-in-6 days. There is additional evidence that under high loading conditions, the FEM TEOM monitors record 1.5 to 2.5 times higher concentrations as do the FRM Weddings (TCEQ and NMED observations).

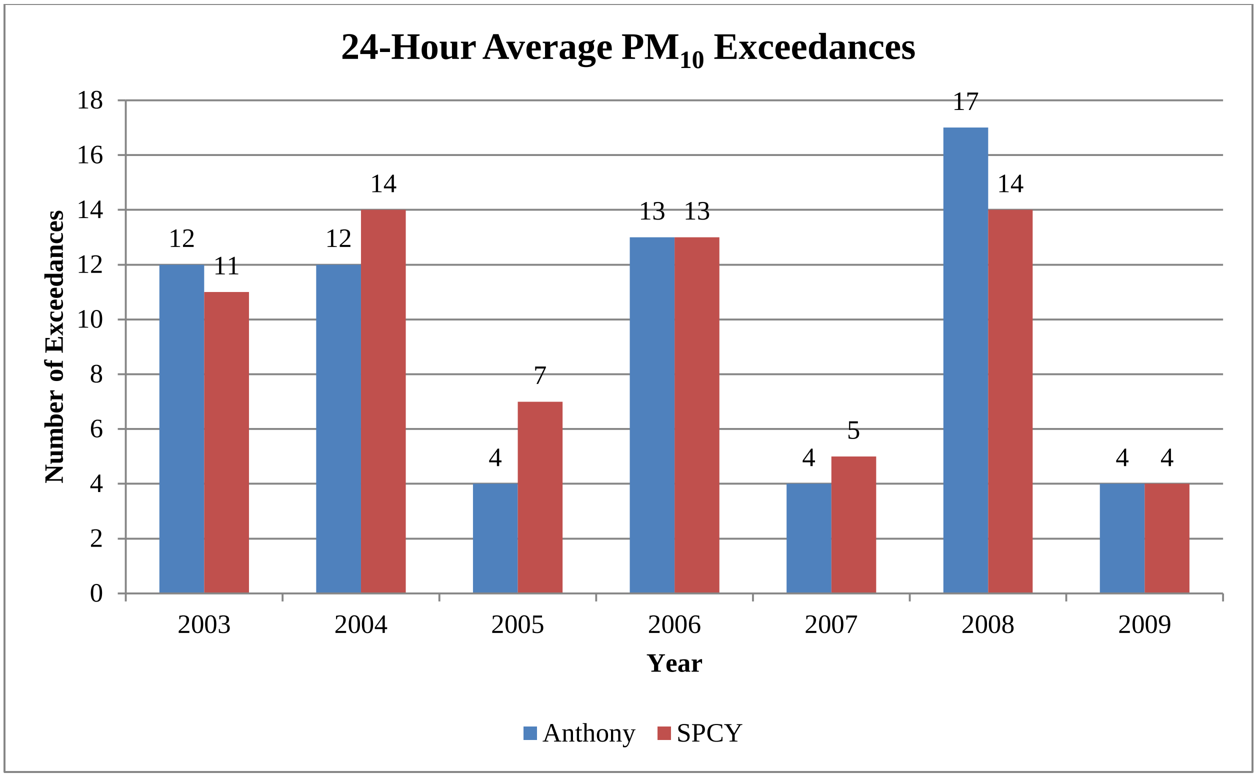

Figure 7-4. PM_{10} exceedances recorded by the FEM TEOM and FRM Wedding monitors at Anthony and SPCY.

7.2.4 Controls Analysis

The local ordinances and MOUs adopted under the NEAP direct the implementation of BACM for sources of dust in Doña Ana County. The ordinances regulate disturbed lands, construction and demolition, vacant parking lots and materials handling and transportation. Our investigation did not identify any unusual PM_{10} producing activities on this day, and anthropogenic emissions remained constant before, during and after the event. The most likely source contributing to the event is the desert in Texas and Mexico. The southern sites recorded the highest 24-hour averages in the monitoring network. A back-trajectory analysis using the HYSPLIT (Draxler et al., 2011; Rolph, 2011) model shows that the air masses traveled from Texas and Mexico to the monitors in southern Doña Ana County. The model starts four hours before the start of elevated PM_{10} concentrations measured during the event (Figure 7-5). Costs prohibit controlling dust from the natural desert terrain and falls outside NMED's jurisdiction when it originates outside of the state. As part of Texas' State Implementation Plan, BACM for the City of El Paso and Fort Bliss Military Base are required per Texas Administrative Code (Title 30 Part 1 Chapter 111). NMED concludes that the sources contributing to the event are not reasonably controllable.

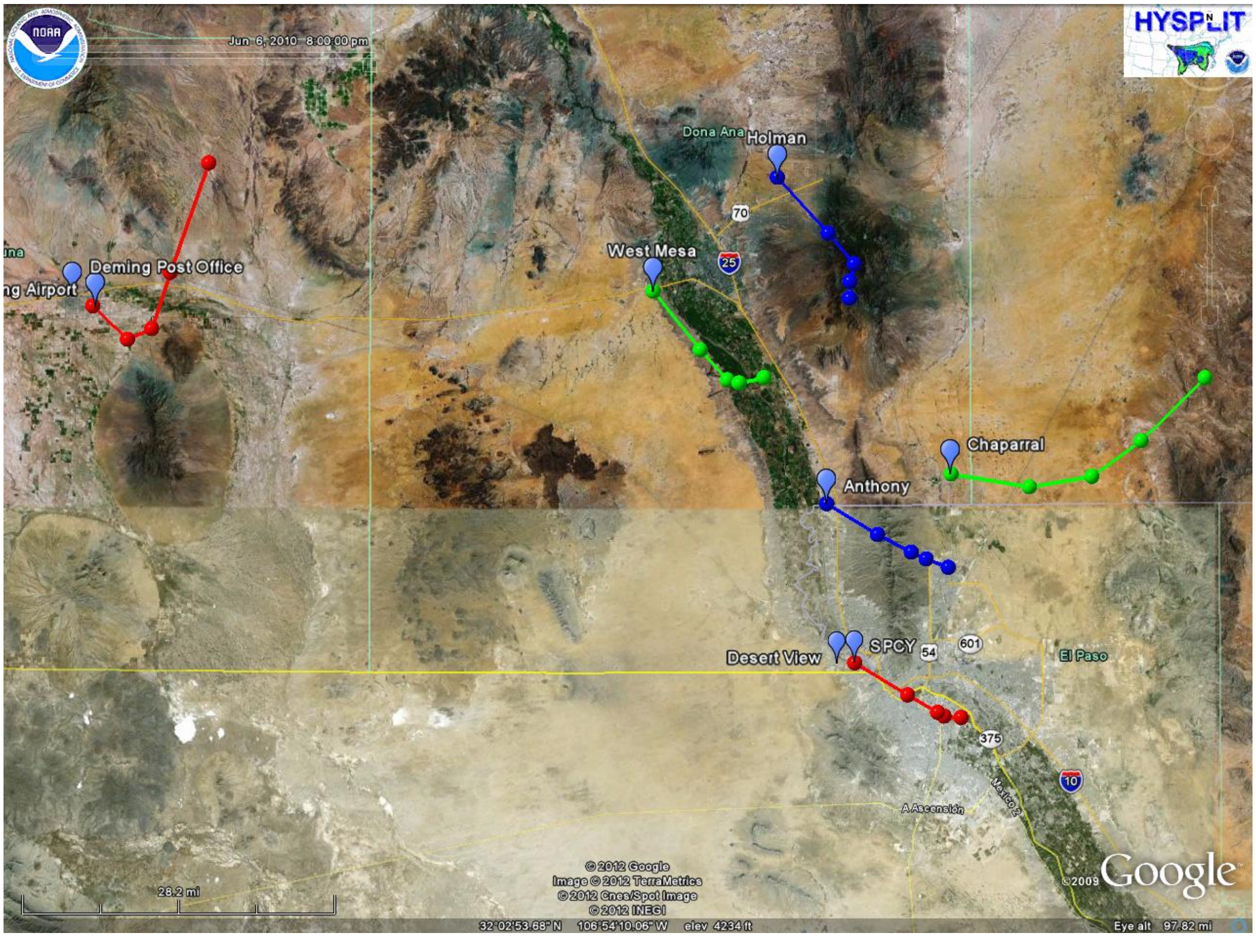

Figure 7-5. HYSPLIT back-trajectory model analysis for June 6, 2010.

7.3 Historical Fluctuations Analysis

7.3.1 Annual and Seasonal 24-hour Average Fluctuations

Established in 1988, the Anthony site has recorded PM_{10} exceedances every year since. High winds cause these exceedances and they can occur at any time of year (Figure 7-6). 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 at Anthony was 403 $\mu g/m^3$, recorded in 2005. High winds caused all recorded exceedances and NMED submitted natural events demonstrations to EPA under the NEAP or EER. NMED has never recorded an exceedance at Anthony in the absence of high winds.

The SPCY site has recorded PM_{10} exceedances every year since continuous FEM TEOM monitoring was established. High winds caused the majority of exceedances and can occur during any time of year (Figure 7-7). Most exceedances occur from late winter through early summer (February-June) and are usually associated with the passage of Pacific cold fronts. The maximum 24-hour average PM_{10} concentration was 1109 $\mu g/m^3$ at SPCY. SPCY is the only site in the network where low wind exceedances occurred. From 2003-2005 the FEM TEOM monitor recorded 14 low wind exceedances. Since 2005, NMED has not recorded a low wind

PM_{10} exceedance. Our initial investigation suggests international transport of fugitive dust from unpaved roads in Cd. Juárez and NMED continues to research the cause these pollution episodes. High winds and blowing dust caused all other exceedances at SPCY and NMED submitted natural events demonstrations to EPA under the NEAP or EER.

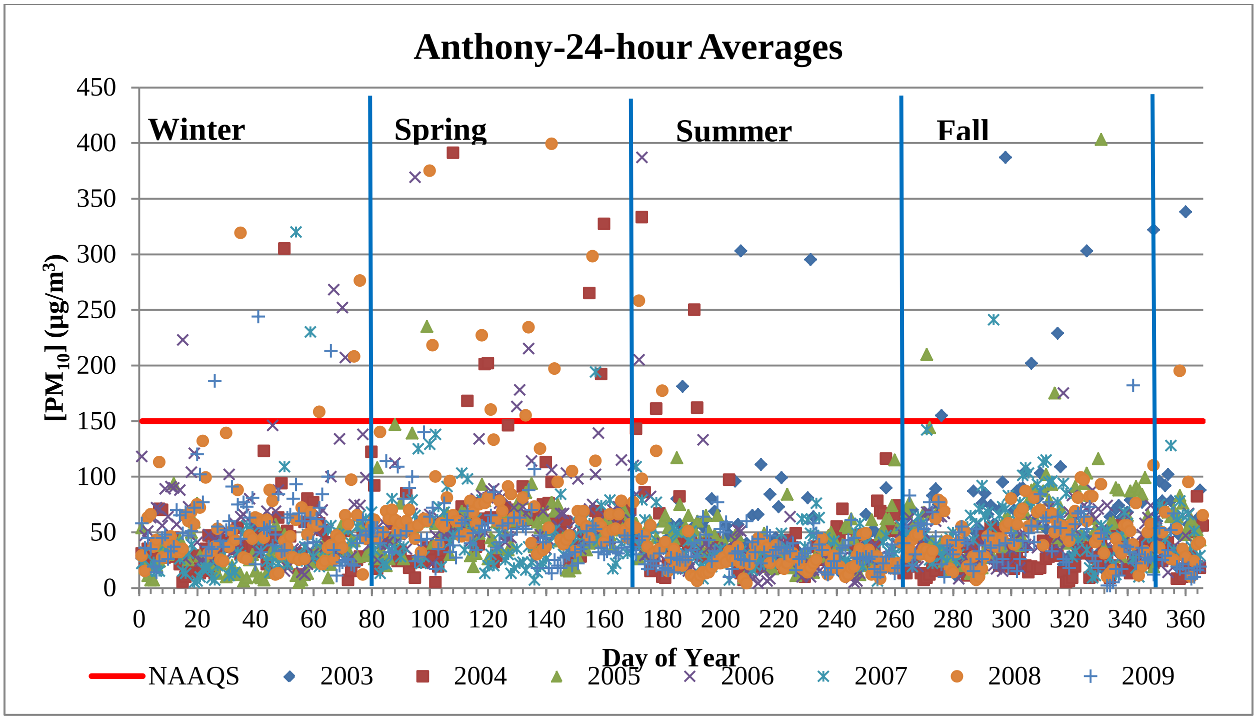

Figure 7-6. 24-hour average PM_{10} concentrations (FEM TEOM data) by day of year from 2003-2009

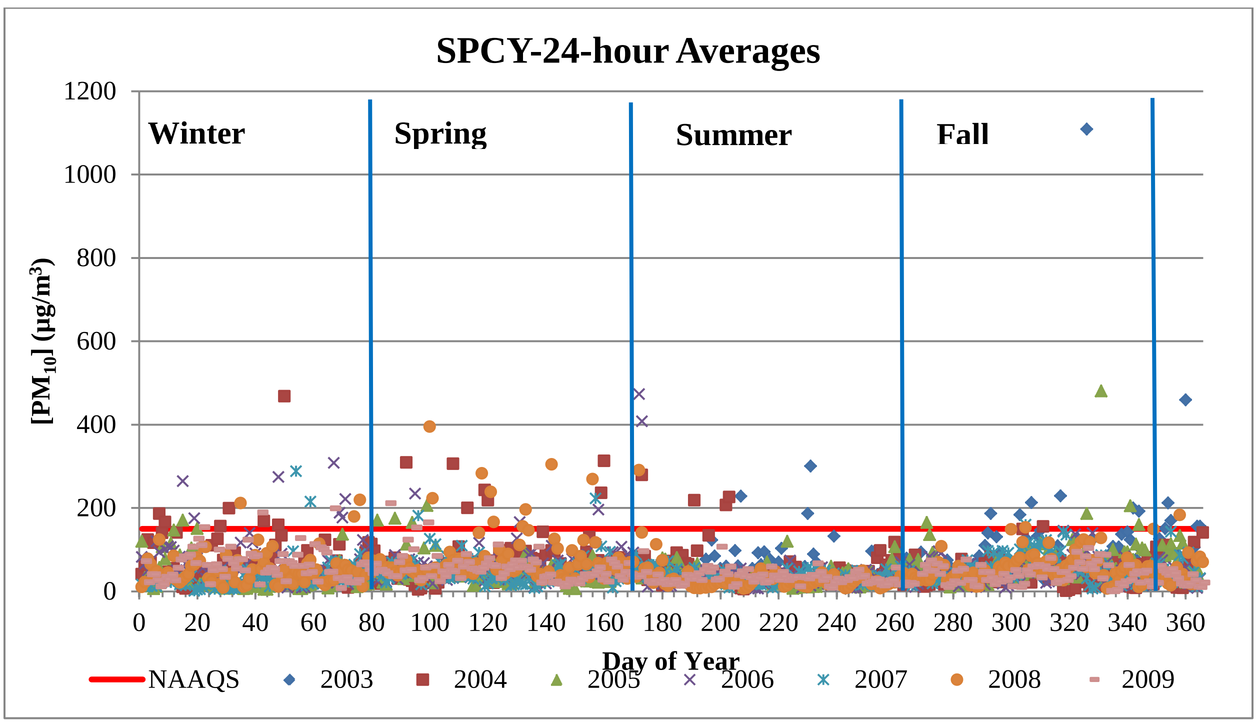

Figure 7-7. 24-hour average PM_{10} concentrations (FEM TEOM data) by day of year from 2003-2009

Table 7-1 shows normal historical fluctuations with and without high wind natural events that caused exceedances from 2003-2009. The analysis excludes only those high wind events that resulted in an exceedance. Data in this table include FRM Wedding and FEM TEOM data from 2003-2009. The recorded values for this day (219 µg/m^3 at Anthony and 155 µg/m^3 at SPCY) are above the 99th percentile of data when no high wind exceedances are included and is above the 95th percentile of all 24-hour averages recorded.

Anthony	Max	99th	95th	75th	50th	Mean	25th	5th	Minimum
No Events	147	120	88	56	38	42	25	12	2
Events	403	234	100	57	38	47	25	12	2
SPCY	**Max**	**99th**	**95th**	**75th**	**50th**	**Mean**	**25th**	**5th**	**Minimum**
No Events	212	143	108	60	39	46	24	11	0
Events	1109	227	123	63	40	51	25	11	0

Table 7-1. 24-hour average PM_{10} data distribution with and without high wind events included.

An hourly data distribution analysis was performed for hourly PM_{10} concentrations, wind speeds and wind gusts (Appendices A, B and C). All data used for the PM_{10} distribution charts come from the FEM TEOM monitors. Overlaying the hourly data for June 6 on the hourly data distribution plots shows that the values recorded during the high wind event exceed the 95th percentile for PM_{10}, wind speed and wind gusts (Figures 7-8 through 7-12). The top whisker of the of the box and whisker plots represent the 95th percentile of data. As stated previously, wind data used here comes from the La Union site. The hourly PM_{10} values during the high wind blowing dust storm far exceed the historical 95th percentile of data.

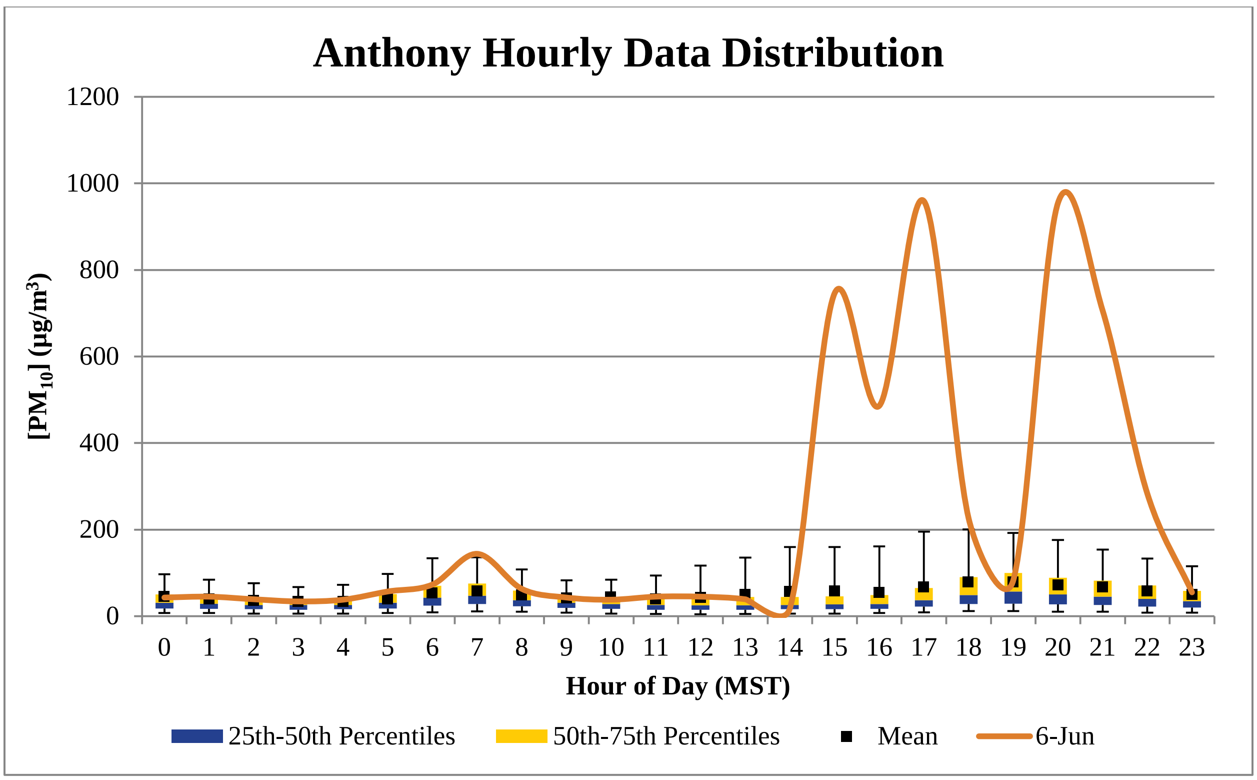

Figure 7-8. PM_{10} hourly data distribution from 2003-2009 overlaid by hourly values for June 6, 2010.

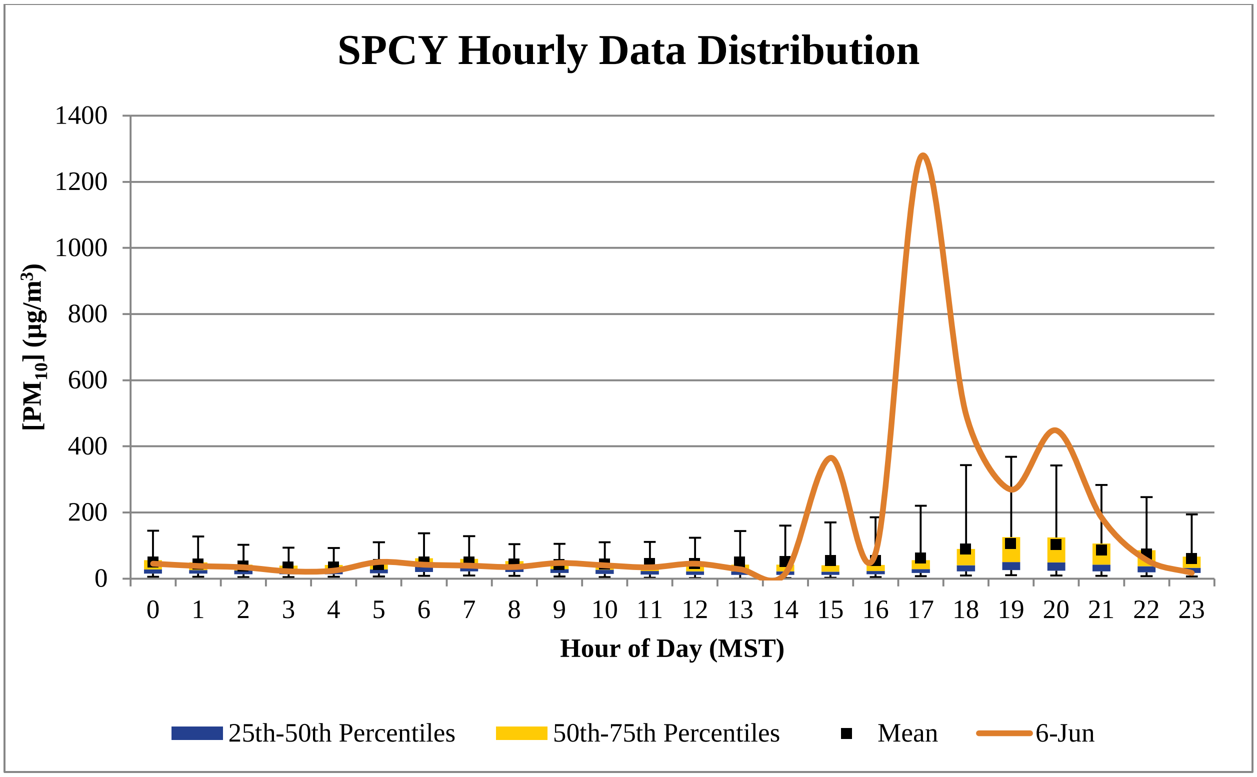

Figure 7-9. PM_{10} hourly data distribution from 2003-2009 overlaid by hourly values for June 6, 2010.

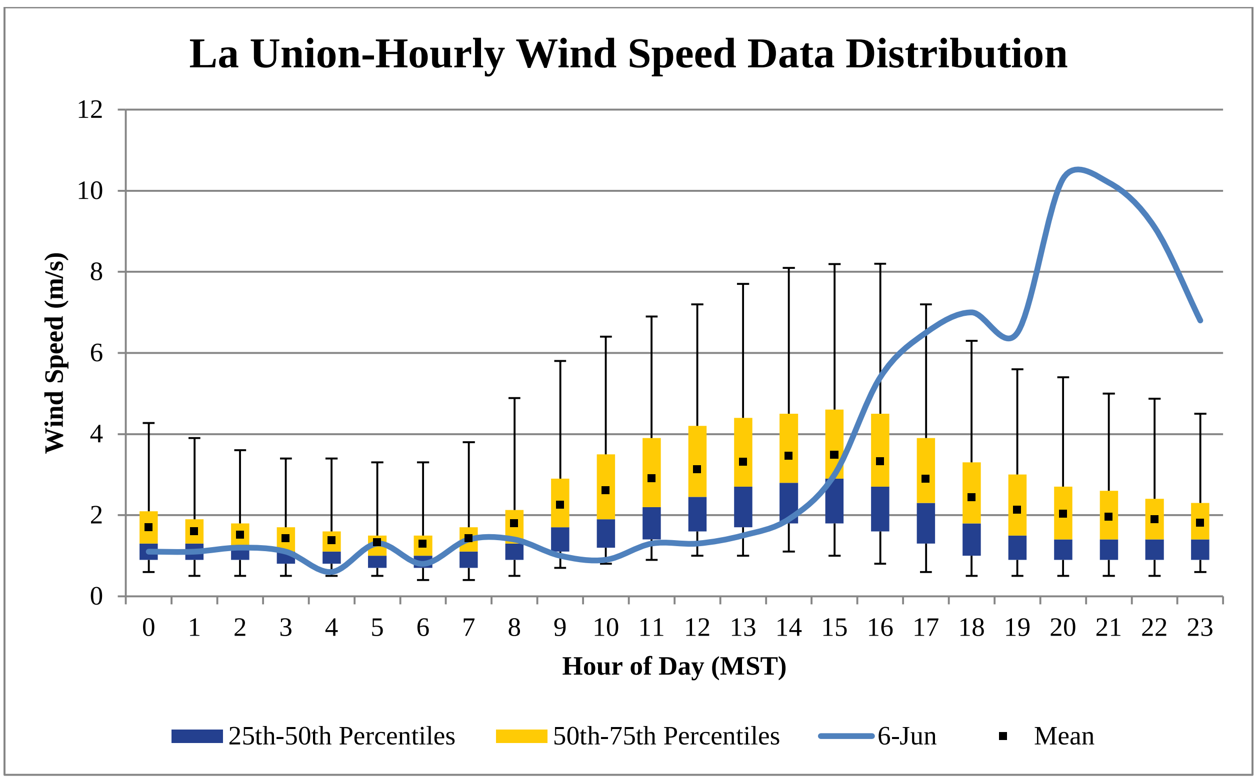

Figure 7-10. Hourly wind speed data distribution from 2003-2009 overlaid by hourly values for June 6, 2010.

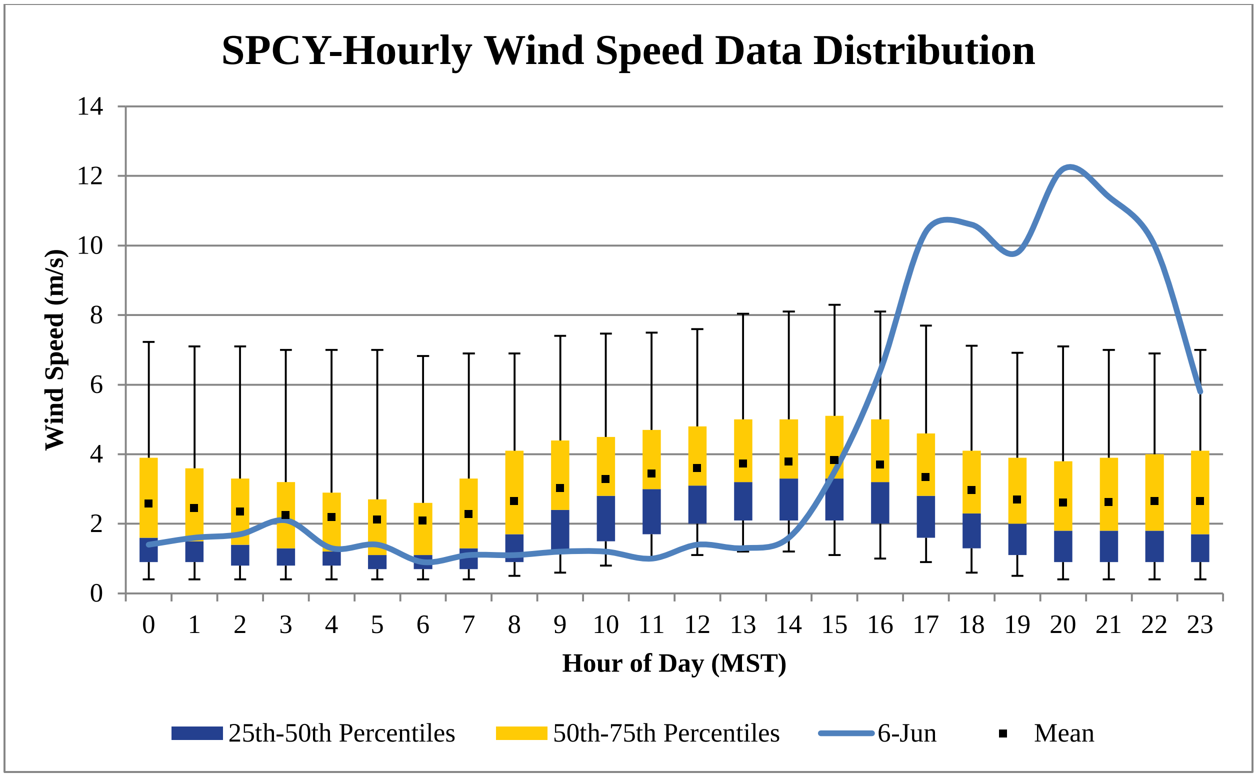

Figure 7-11. Hourly wind speed data distribution from 2003-2009 overlaid by hourly values for June 6, 2010.

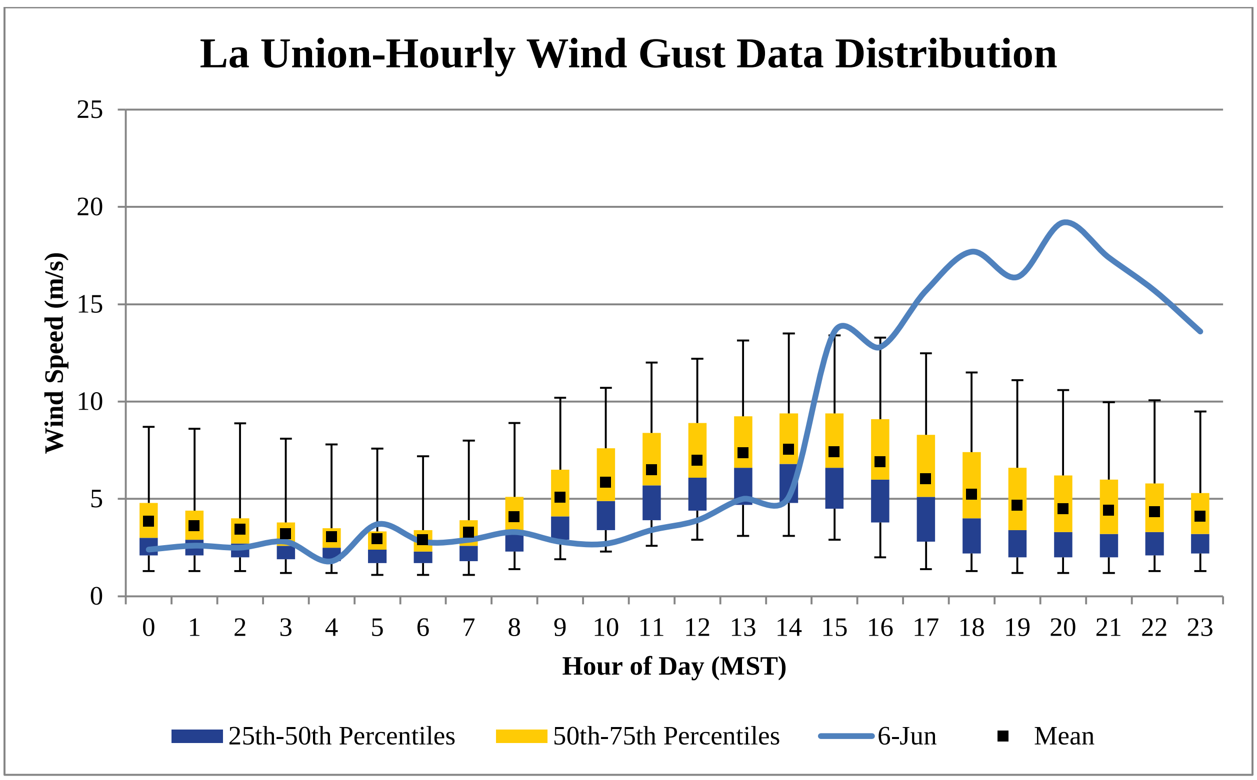

Figure 7-12. Hourly wind gust data distribution from 2003-2009 overlaid by hourly values for June 6, 2010.

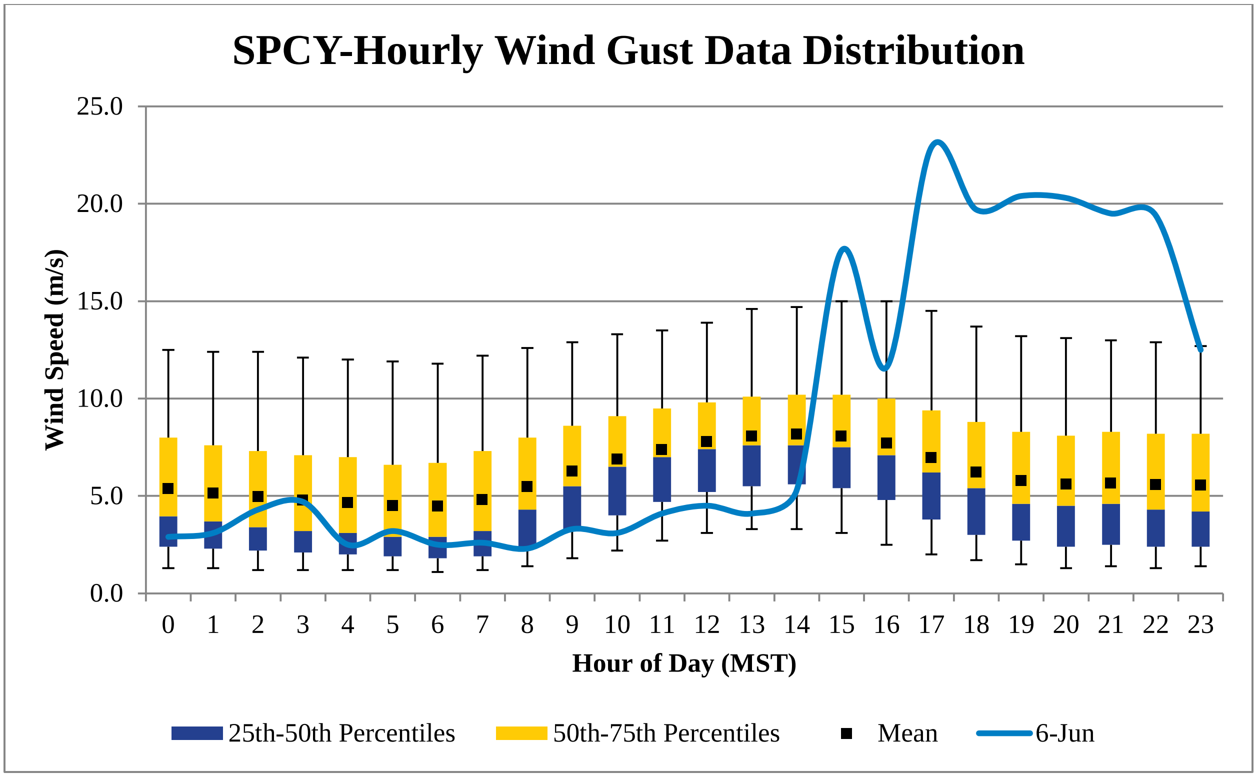

Figure 7-13. Hourly wind gust data distribution from 2003-2009 overlaid by hourly values for June 6, 2010.

7.4 Clear Causal Relationship

Numerous thunderstorms developed throughout the border region on June 6, 2010. The surface weather maps with radar images show the thunderstorms as the begun to develop and get bigger as the afternoon progressed (Figures 7-14 to 7-16). These maps show thunderstorms in the area during the time of elevated PM_{10} concentrations at the monitoring sites.

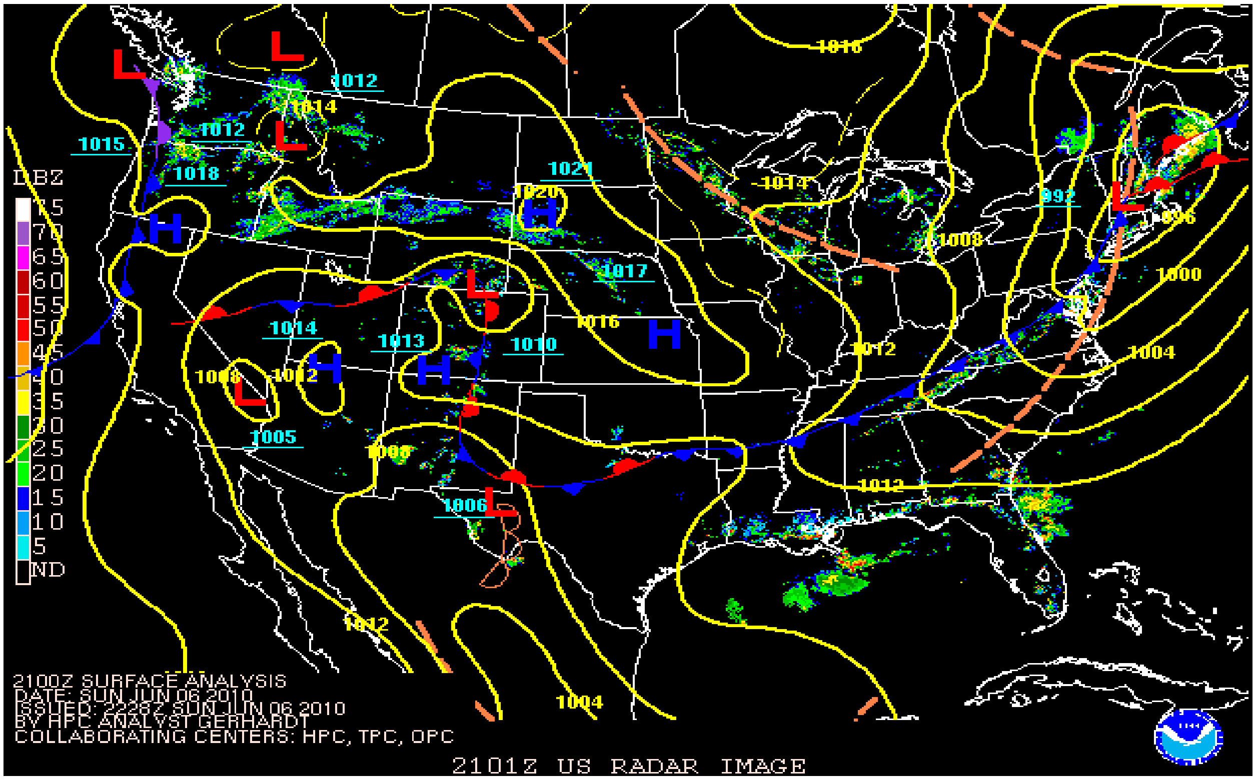

Figure 7-14. Surface weather map showing thunderstorm activity on June 6, 2010 at the 1500 hour MST.

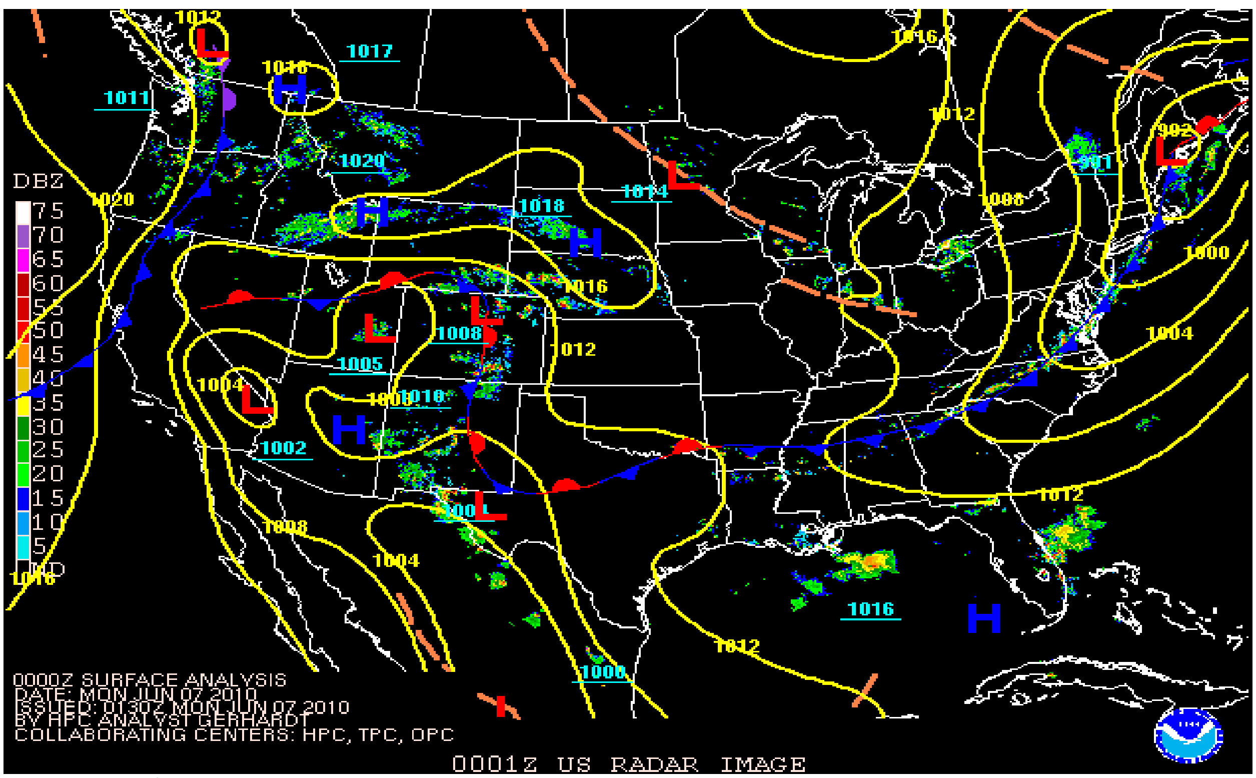

Figure 7-15. Surface weather map showing thunderstorm activity on June 6, 2010 at the 1800 hour MST.

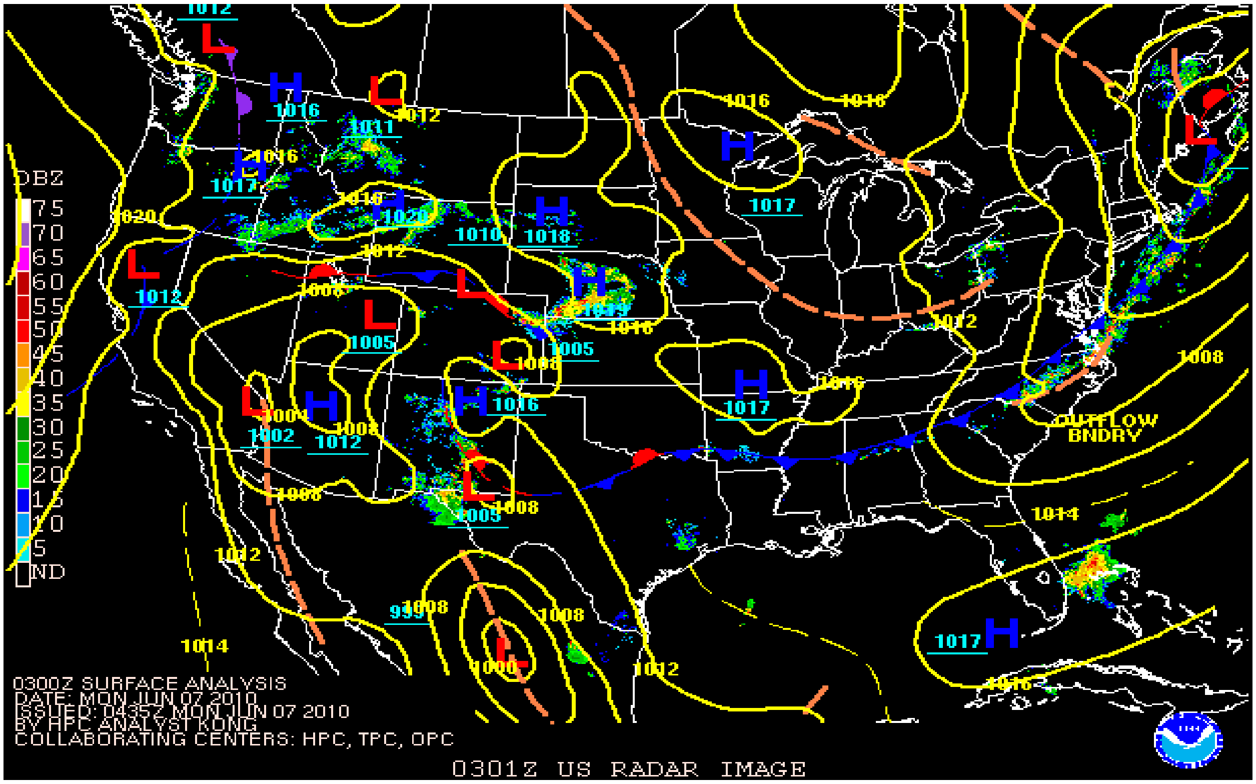

Figure 7-16. Surface weather map showing thunderstorm activity on June 6, 2010 at the 2100 hour MST.

The most likely cause of windblown dust is outflow caused by dry microbursts. The localized nature of the high PM_{10} concentrations and little precipitation supports this assertion. Convective weather cells in the upper atmosphere (Figure 7-17) and low moisture levels below cause dry microbursts. As rain falls from the high-level clouds, dry air below evaporates it and converts the falling rain into wind energy. Upper air sounding data best detect dry microbursts (Novlan et al., 2007). The sounding for a dry microburst depict an inverted V as seen in the sounding from the National Weather Service in Santa Teresa, NM (Figure 7-18). The blue line shows relative humidity while the red line depicts the environmental adiabatic lapse rate.

The weather pattern described above generated strong southeasterly winds beginning at the 1500 hour. At this time, wind gusts exceeded the historical 95^{th} percentile of data at La Union and SPCY (Figures 7-12 and 7-13). Peak wind gusts ranged from 16.5 m/s at West Mesa to 23.5 m/s at Chaparral (Figure 7-3). Blowing dust caused elevated levels of PM_{10} during the same period as high winds as demonstrated by the time series plots in Figure 7-19 and 7-20. As wind speed and wind gusts exceed the 95^{th} percentile of historical data so do hourly PM_{10} concentrations on this date (1500-2000 hours). During these hours, hourly PM_{10} concentrations spiked at all monitoring sites in the network (Figure 7-21).

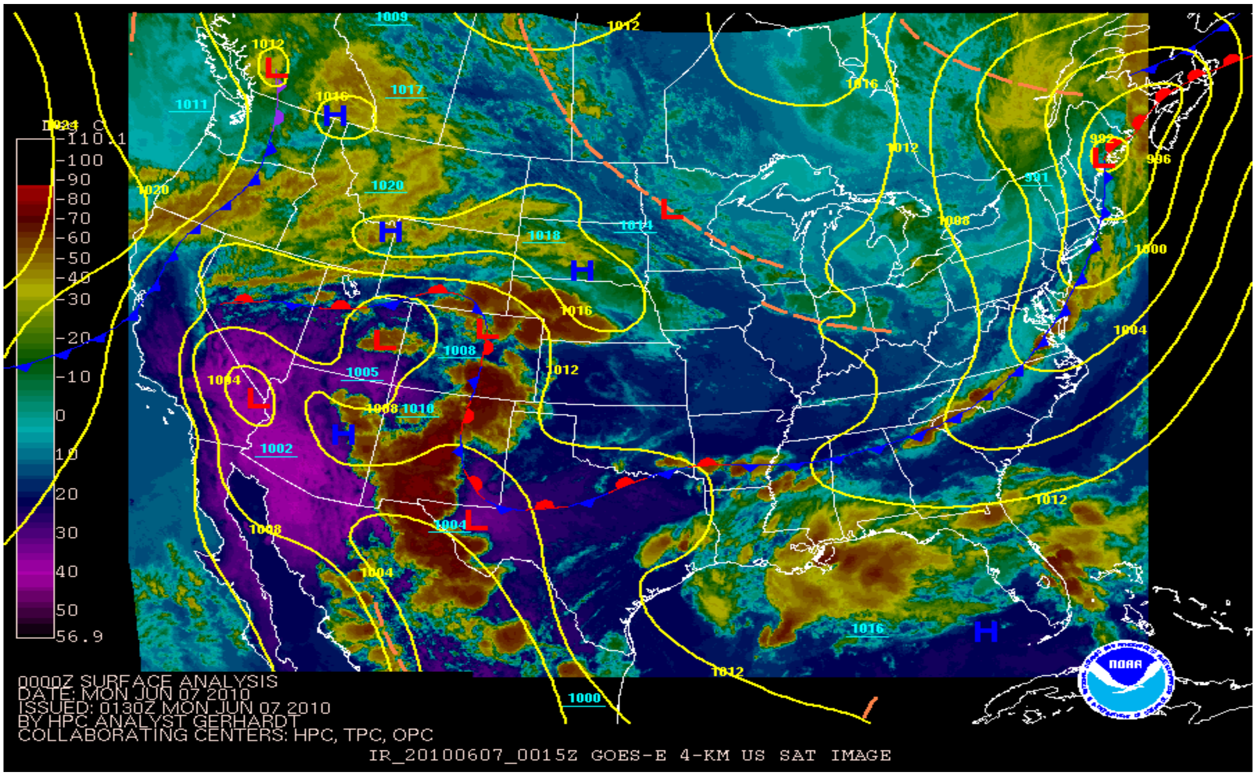

Figure 7-17. June 6, 2010 surface weather map with Infrared satellite image depicting moisture in the upper atmosphere for the 1800 hour MST.

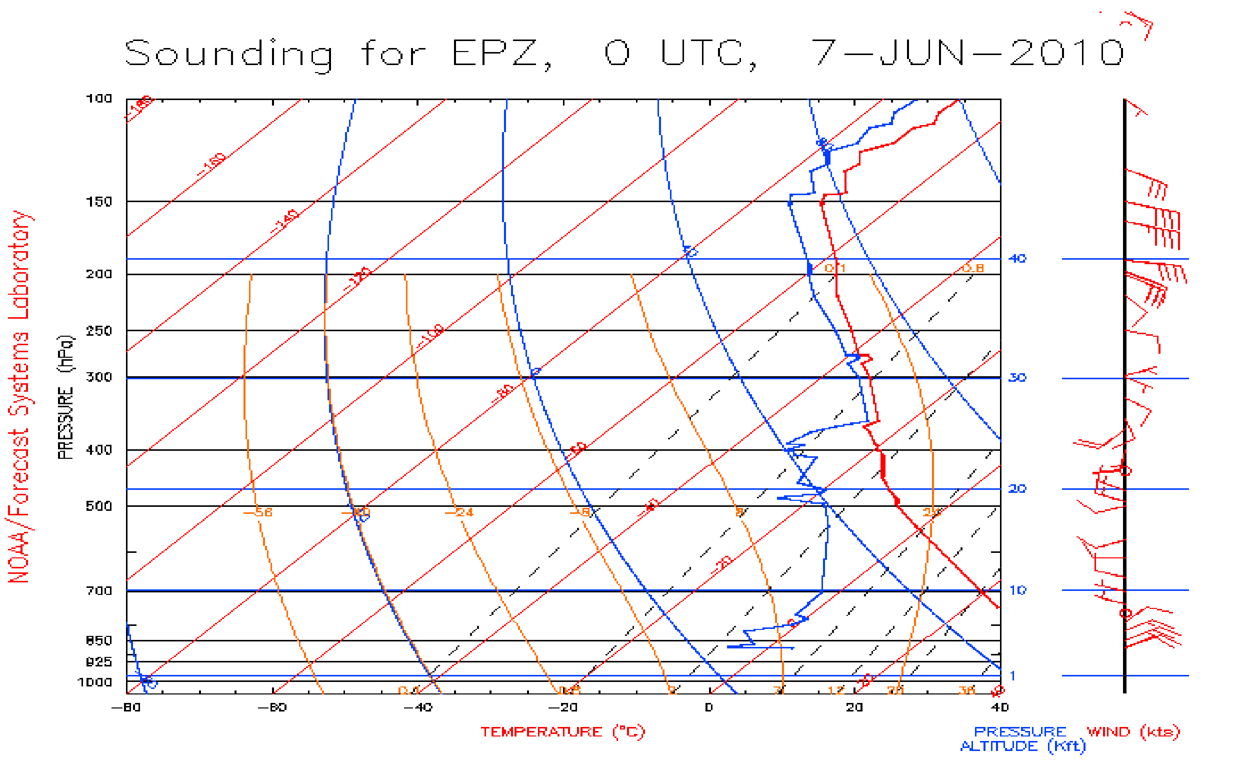

Figure 7-18. Skew-T plot for the sounding at the 1800 hour on June 6, 2010.

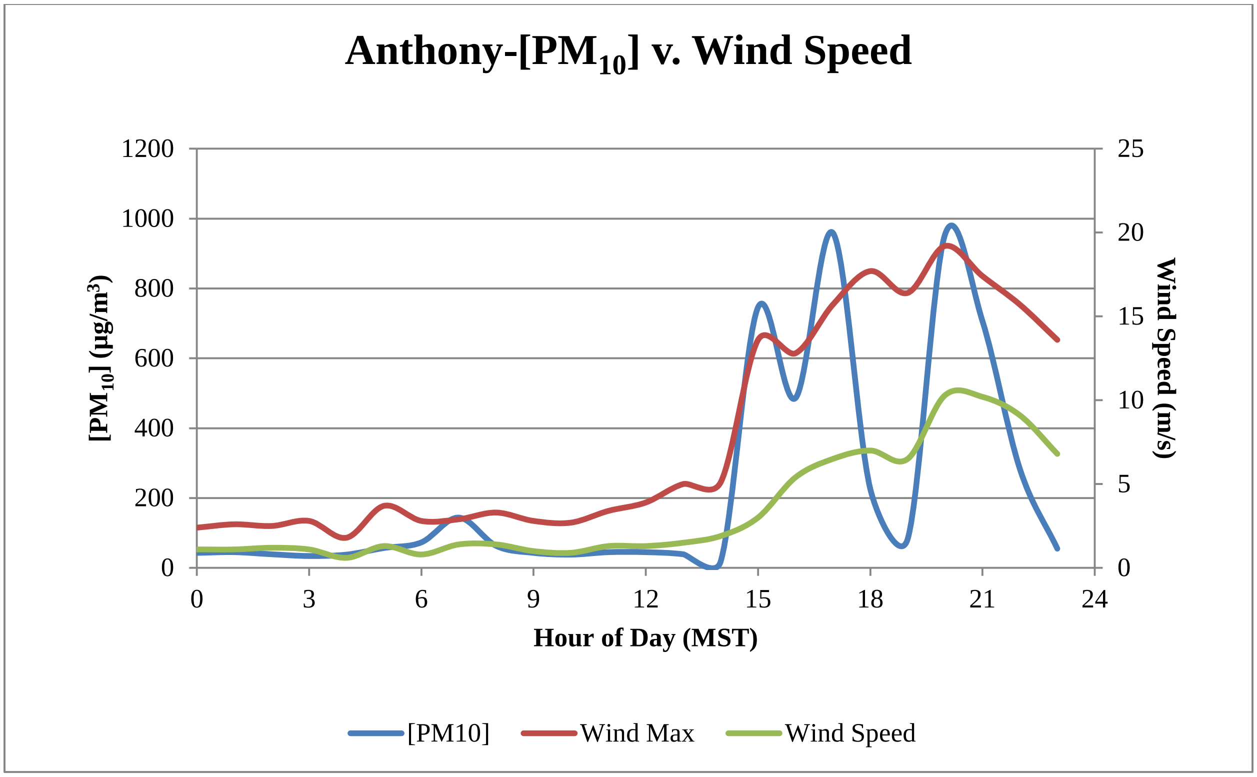

Figure 7-19. Time series plot of hourly observations showing increased PM_{10} concentrations as wind speeds and gusts increase.

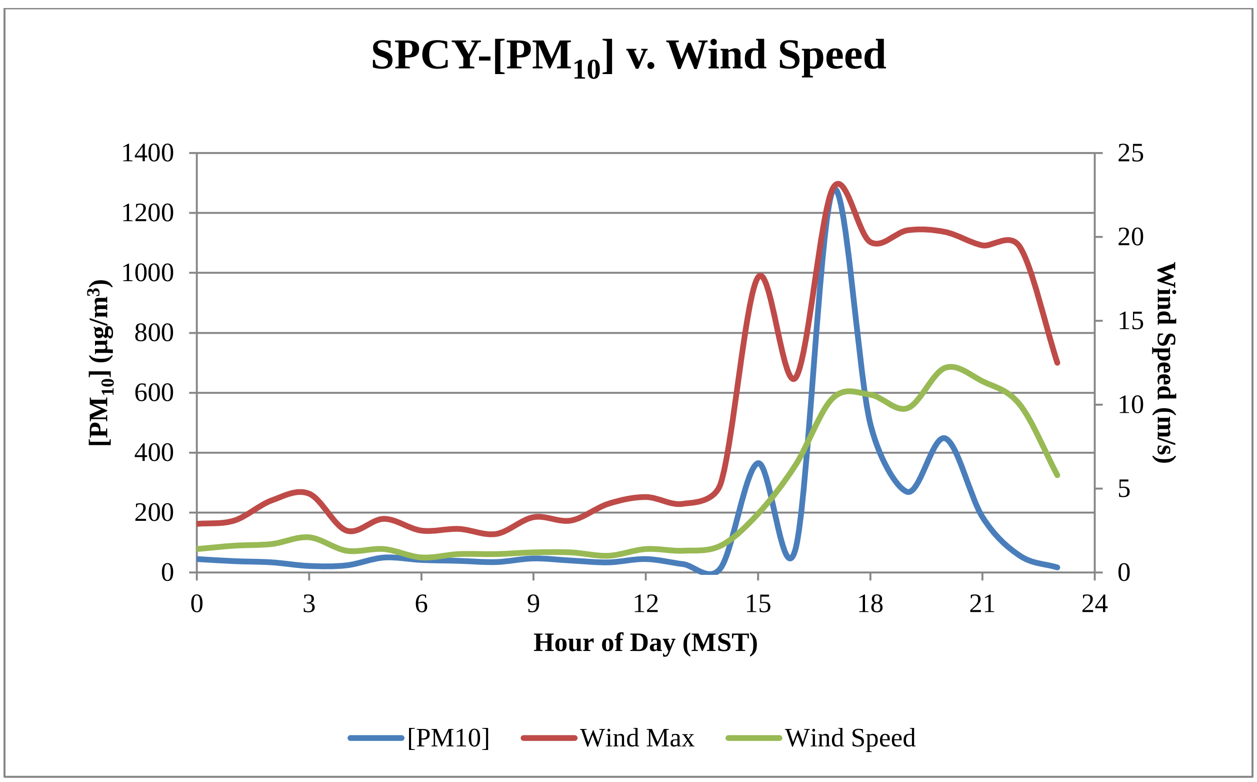

Figure 7-20. Time series plot of hourly observations showing increased PM_{10} concentrations as wind speeds and gusts increase.

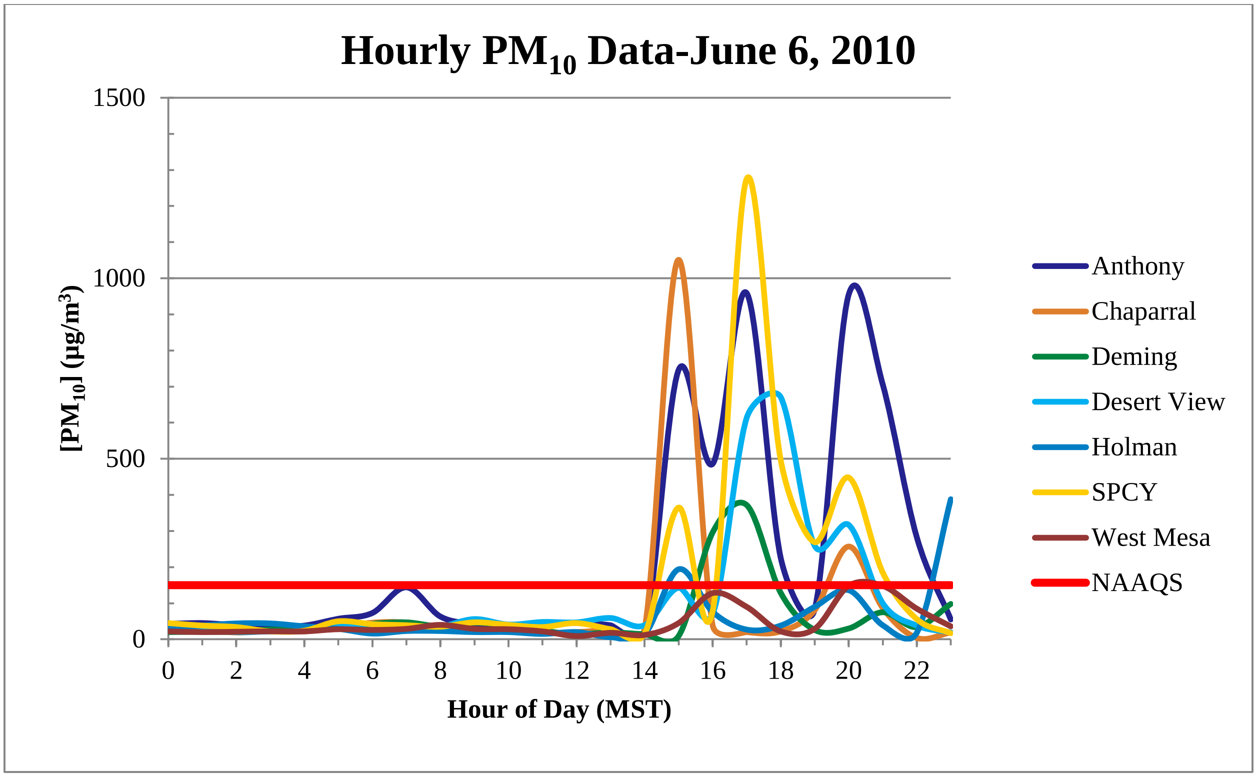

Figure 7-21. Hourly PM_{10} concentrations for Doña Ana and Luna Counties monitors.

7.5 Affects Air Quality

The historical fluctuations and clear causal relationship analyses prove that the event in question affected air quality on June 6, 2010.

7.6 Natural Event

The CCR and nRCP analyses show that this was a natural event caused by high wind and blowing dust.

7.7 No Exceedance but for the Event

The Anthony monitor detected two periods of blowing dust from the 1500 to 1700 hours and the 2000 to 2100 hours. The five hourly PM_{10} values (1500 to1700 hour and 2000 to 2100 hour) alone, exceed the 24-hour average standard at Anthony [(746 + 486 + 959 + 955 + 706 = 1,959) µg/m^3 = 4,078 µg/m^3; (4,078 µg/m^3)/24 = 170 µg/m^3]. By replacing these five hourly values with the 95th percentile of hourly data at the Anthony site, the resulting 24-hour average (94 µg/m^3) does not exceed the NAAQS (Table 7-2). The values in red represent the 95th percentile of all hourly data collected at Anthony, including data affected by high wind blowing dust events in the table below. NMED concludes that without the high wind and blowing dust an exceedance would not have occurred.

Hour of Day (MST)	Recorded Hourly Data	Substituted Hourly Data
0	43	43
1	45	45
2	39	39
3	34	34
4	38	38
5	57	57
6	73	73
7	144	144
8	63	63
9	43	43
10	38	38
11	45	45
12	45	45
13	39	39
14	18	18
15	746	**161**
16	486	**163**
17	959	**195**
18	226	226
19	83	83
20	955	**177**
21	706	**154**
22	283	283
23	55	55
24-Hour Average	219	**94**

Table 7-2. 95th percentile of data substituted for those hours when windblown dust was the most intense does not result in an exceedance at Anthony.

The SPCY monitor detected blowing dust at the 1500 hour and at the 1700 to 2100 hours. These five hourly PM_{10} values alone, approach the 24-hour average standard at SPCY [(365 + 1275 + 497 + 269 + 448) $\mu g/m^3$ = 3,039 $\mu g/m^3$; (3,039 $\mu g/m^3$)/24 = 126 $\mu g/m^3$]. By replacing these five hourly values with the 95th percentile of hourly data for the SPCY site, the resulting 24-hour average (75 $\mu g/m^3$) does not exceed the NAAQS (Table 7-3). The values in red represent the 95th percentile of all hourly data collected at SPCY in the table below. NMED concludes that without the high wind and blowing dust at the SPCY site an exceedance would not have occurred.

Hour of Day (MST)	Recorded Hourly Data	Substituted Hourly Data
0	45	45
1	38	38
2	34	34
3	22	22
4	24	24
5	50	50
6	42	42
7	39	39
8	35	35
9	47	47
10	40	40
11	34	34
12	45	45
13	28	28
14	15	15
15	365	**160**
16	78	78
17	1275	**195**
18	497	**201**
19	269	**193**
20	448	**178**
21	185	185
22	56	56
23	17	17
24-Hour Average	155	**75**

Table 7-3. SPCY: 95th percentile of data substituted for those hours when windblown dust was the most intense does not result in an exceedance at SPCY.

8 HIGH WIND EXCEPTIONAL EVENT: November 28, 2010

8.1 Summary of the Event

High winds and blowing dust caused exceedances of the PM_{10} NAAQS at the Anthony, Chaparral, Deming, Desert View, Holman and SPCY sites on November 28, 2010. Additionally, the SPCY site recorded exceedances of the annual and 24-hour $PM_{2.5}$ NAAQS on this day. Continuous FEM TEOM monitors recorded the PM_{10} exceedances at all sites. In addition, the non-continuous FRM Wedding monitor at SPCY recorded a PM_{10} exceedance. The non-continuous FRM Partisol monitor recorded the $PM_{2.5}$ exceedances. Table 1-1 lists all 24-hour averages recorded on this day. In accordance with the EER, the AQB flagged this data in EPA's AQS database as high wind natural events on or before June 1, 2011. Concentrations of PM_{10} spiked on this day compared to the days immediately before and after the event (Figure 8-1). The SPCY site recorded low wind spikes in $PM_{2.5}$ levels on the two days preceding and four days after the event.

A strong Pacific cold front passed through New Mexico causing wide spread blowing dust throughout the borderland. As the event unfolded, winds blew from a predominately west-southwest direction. These high velocity winds passed over large areas of desert within Arizona, New Mexico and Mexico. The co-occurrence of high winds and elevated levels of blowing dust, little to no point sources in the area, and the high hourly and daily PM_{10} concentrations support the assertion that this was an exceptional event, specifically a natural event caused by high wind and blowing dust.

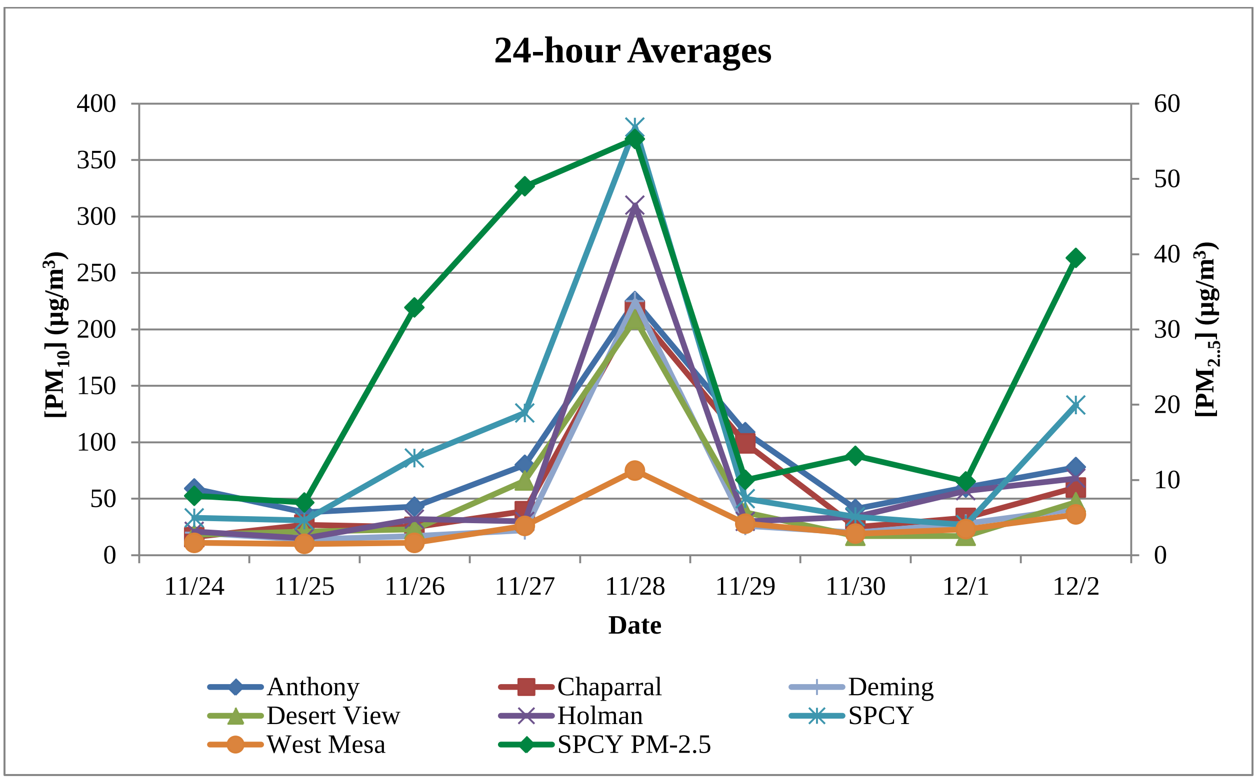

Figure 8-1. PM_{10} and $PM_{2.5}$ 24-hour averages four days before and after November 28, 2010.

8.2 Is Not Reasonably Controllable or Preventable

8.2.1 Suspected Source Areas and Categories Contributing to the Event

Sources of windblown dust contributing to this exceedance include the natural desert, residential properties, agricultural land and unpaved roads in Mexico and New Mexico. Doña Ana County Ordinance requires BACM for any dust producing activities. The largest sources of windblown dust are the playas of northern Mexico and desert land in New Mexico (see Section 8.2.4 below).

8.2.2 Sustained and Instantaneous Wind Speeds

EPA has indicated that sustained wind speeds of at least 11.2 m/s (25 mph) would be used as the default entrainment threshold for natural and well controlled anthropogenic sources contributing to natural events caused by high wind and blowing dust (EPA, 2011). Under the Doña Ana and Luna County NEAPs, EPA and NMED agreed that wind gusts exceeding 18 m/s (40 mph) would overwhelm any natural and well-controlled anthropogenic sources and cause windblown dust. On November 28, sustained wind speeds exceeded 11.2 m/s at five of the seven monitoring sites in southern New Mexico and wind gusts exceeded 18 m/s at all monitoring sites (Figures 8-2 and 8-3). Sustained wind speeds and wind gusts exceeded these thresholds for eight hours at one or more monitoring sites beginning at the 1000 hour. The meteorological tower at the Anthony site measures wind speed at two meters instead of the customary 10 meters. Due to this fact, this demonstration uses data from La Union (the closet site).

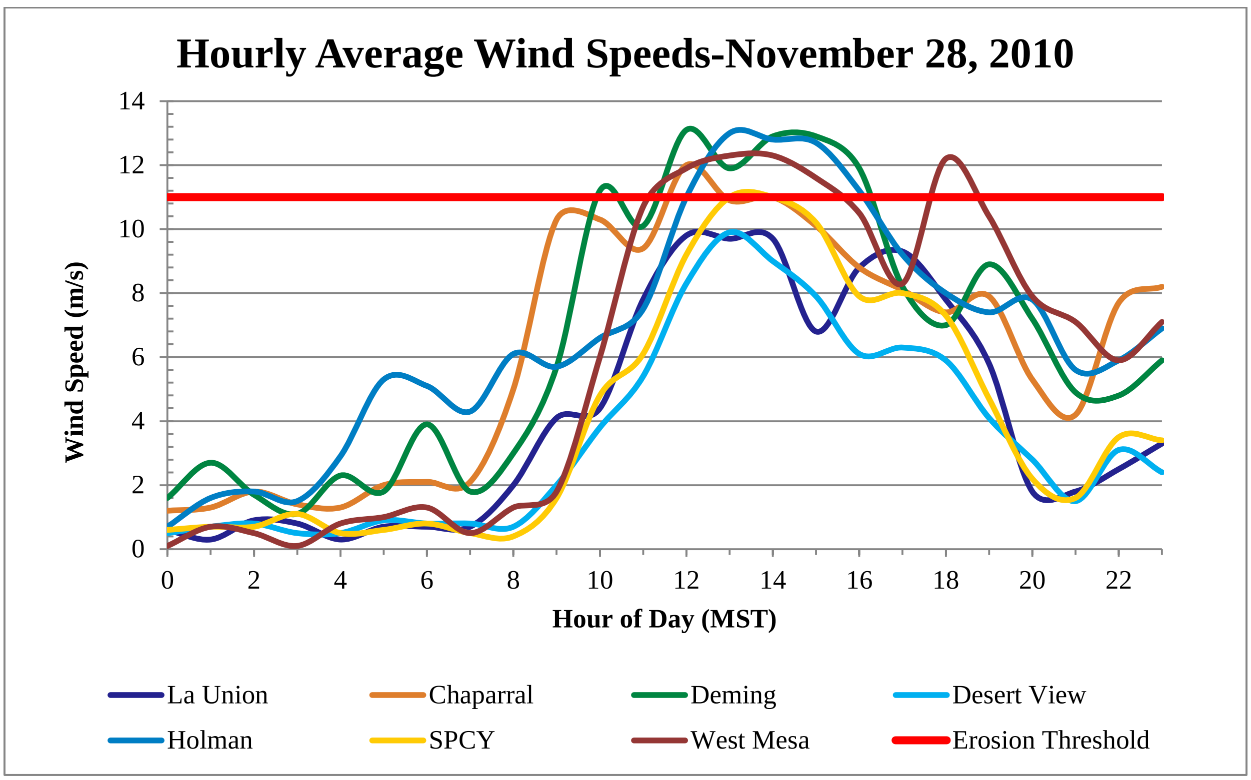

Figure 8-2. Sustained wind speeds at monitoring sites in Doña Ana and Luna Counties.

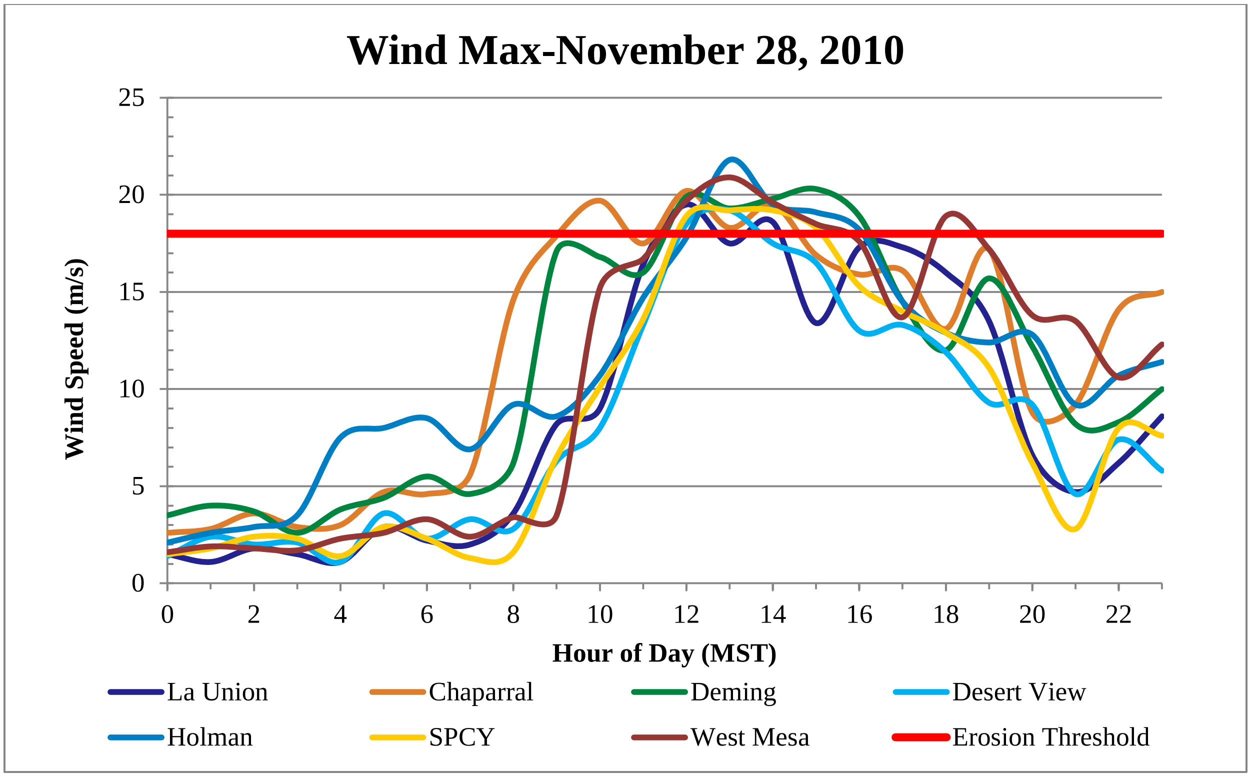

Figure 8-3. Maximum wind gusts at monitoring sites in Doña Ana and Luna Counties.

8.2.3 Recurrence Frequency

The monitoring sites in Doña Ana and Luna Counties can record exceedances of the PM_{10} NAAQS throughout the year. From 2003-2009 the FEM TEOM monitors have recorded 262 exceedances and the FRM Wedding monitors have recorded 10 exceedances (Figure 8-4). This large disparity in the number of monitored exceedances is due to the FRM Wedding sampling schedules of 1-in-6 days. There is additional evidence that under high loading conditions, the FEM TEOM monitors record 1.5 to 4 times higher concentrations as do the FRM Weddings (TCEQ). For instance, on this date the SPCY FRM Wedding monitor recorded a 24-hour average of 205 µg/m^3 compared to the SPCY FEM TEOM value of 379 µg/m^3 (379/205 = 1.85). The Deming Airport and Desert View monitoring sites (FEM TEOMs) were established in 2006 and 2007 respectively and do not show exceedances until the year following startup (Table 2-1). Also, note that the FEM TEOM monitors at Holman, West Mesa and Chaparral were not part of the SLAMS network until 2006.

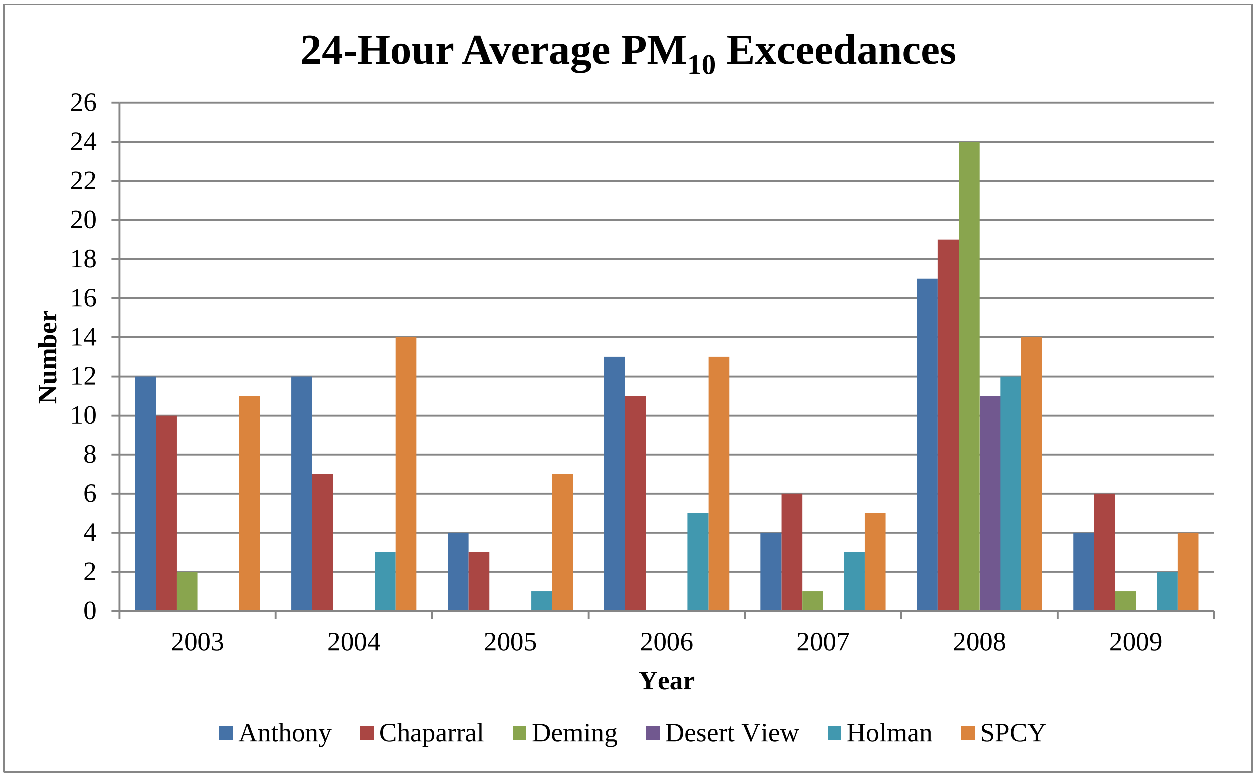

Figure 8-4. Exceedances recorded by the FEM TEOM and FRM Wedding monitors at Anthony, SPCY and Deming. All other monitors are FEM TEOM monitors.

8.2.4 Controls Analysis

The local ordinances and MOUs adopted under the NEAP direct the implementation of BACM for sources of dust in Doña Ana and Luna Counties (Appendix D). The ordinances regulate disturbed lands, construction and demolition, vacant parking lots and materials handling and transport. Our investigation did not identify any unusual PM_{10} producing activities on this day, and anthropogenic emissions remained constant before, during and after the event. The most significant source contributing to the event is the playas of northern Mexico (see Section 8.4 below). A back-trajectory analysis using the HYSPLIT model (Draxler et al., 2011; Rolph, 2011) shows that the air masses traveled from southeastern Arizona, southwestern New Mexico and northern Mexico to the monitors in Doña Ana and Luna Counties. The model run starts four hours before (600 hour) the start of elevated PM_{10} concentrations (1000 hour) during the event (Figure 8-5). Costs prohibit controlling dust from the natural desert terrain and falls outside NMED's jurisdiction when it originates in Mexico. NMED concludes that the sources that caused the event are not reasonably controllable.

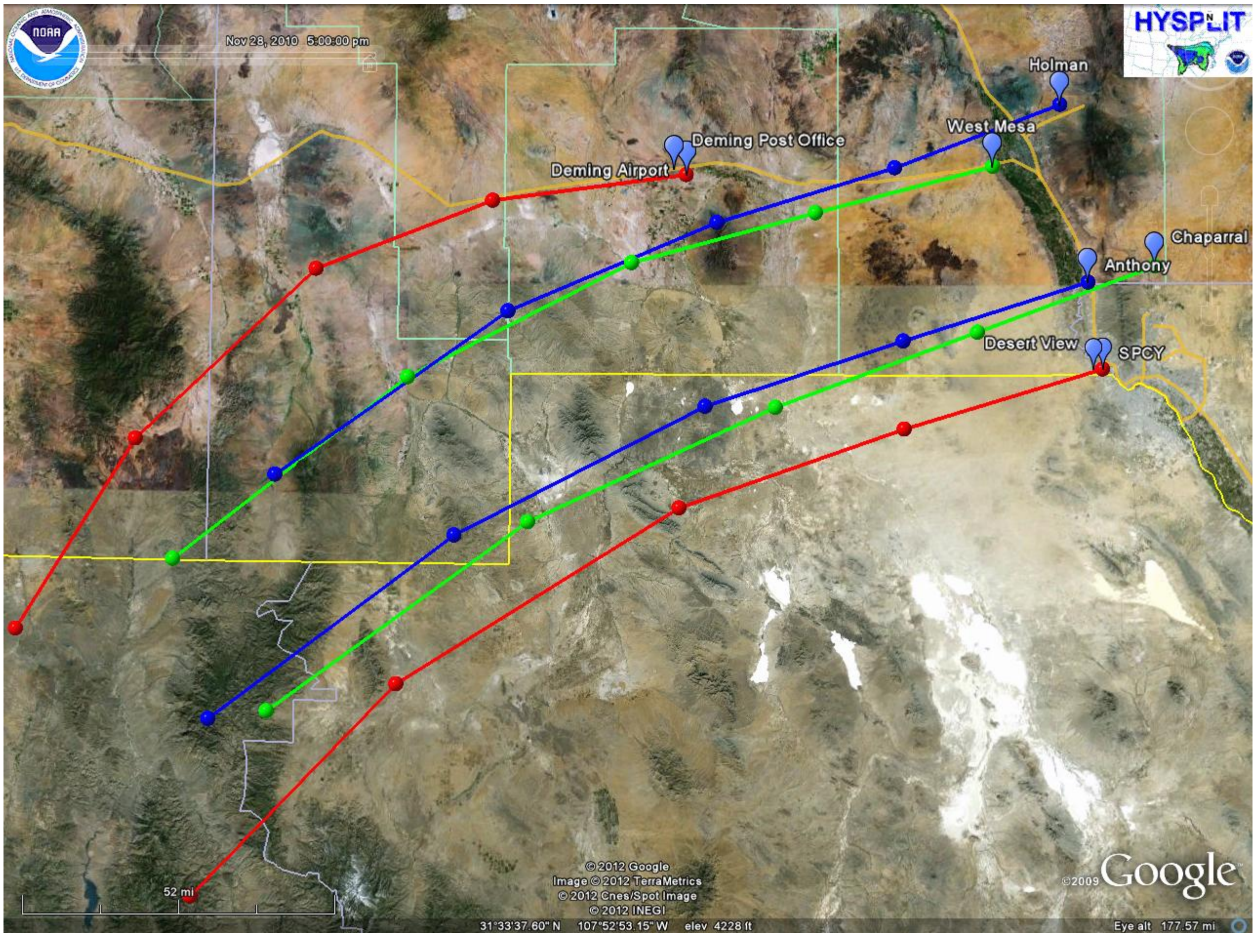

Figure 8-5. HYSPLIT back-trajectory model analysis for November 28, 2010.

8.3 Historical Fluctuations Analysis

8.3.1 Annual and Seasonal 24-hour Average Fluctuations

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 (Figures 8-6 through 8-12). Most exceedances occur from late winter through early summer (February-June) and are usually associated with the passage of Pacific cold fronts. The only monitoring site to record exceedances when winds are calm is the SPCY site. From 2003 to 2005, NMED recorded fourteen low wind PM_{10} exceedances at this site. NMED has not recorded a low wind exceedance of the PM_{10} 24-hour standard at this site since 2005. From 2007 to 2009, NMED recorded twelve low wind $PM_{2.5}$ 24-hour exceedances at SPCY. EPA lowered the $PM_{2.5}$ 24-hour NAAQS from 65 to 35 µg/m^3 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 low wind exceedances. The results of this study indicate that the source of $PM_{2.5}$ pollution came from Ciudad Juárez, Mexico (DuBois et al, 2009). Excluding the SPCY site, all other exceedances have been caused by high winds and blowing dust with natural events demonstrations submitted to EPA under the NEAP or EER.

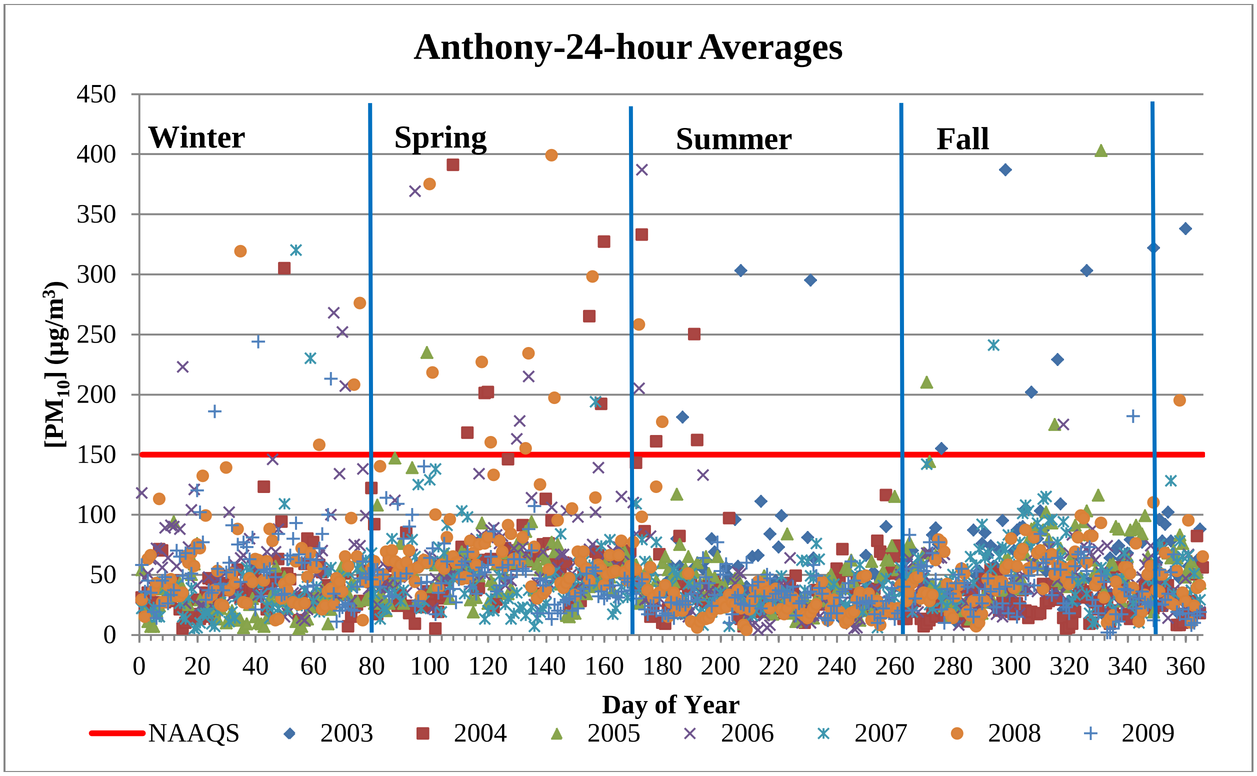

Figure 8-6. 24-hour average PM_{10} concentrations (FEM TEOM data) by day of year from 2003-2009

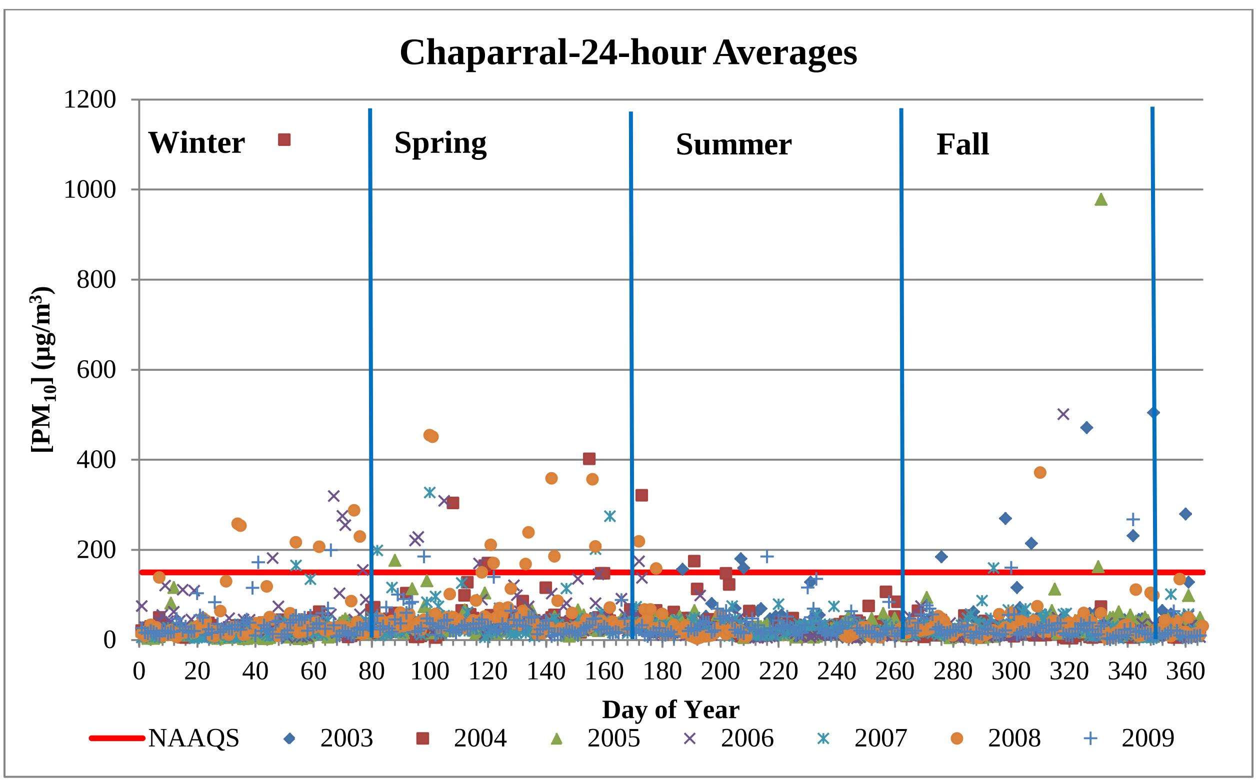

Figure 8-7. 24-hour average PM_{10} concentrations (FEM TEOM data) by day of year from 2003-2009

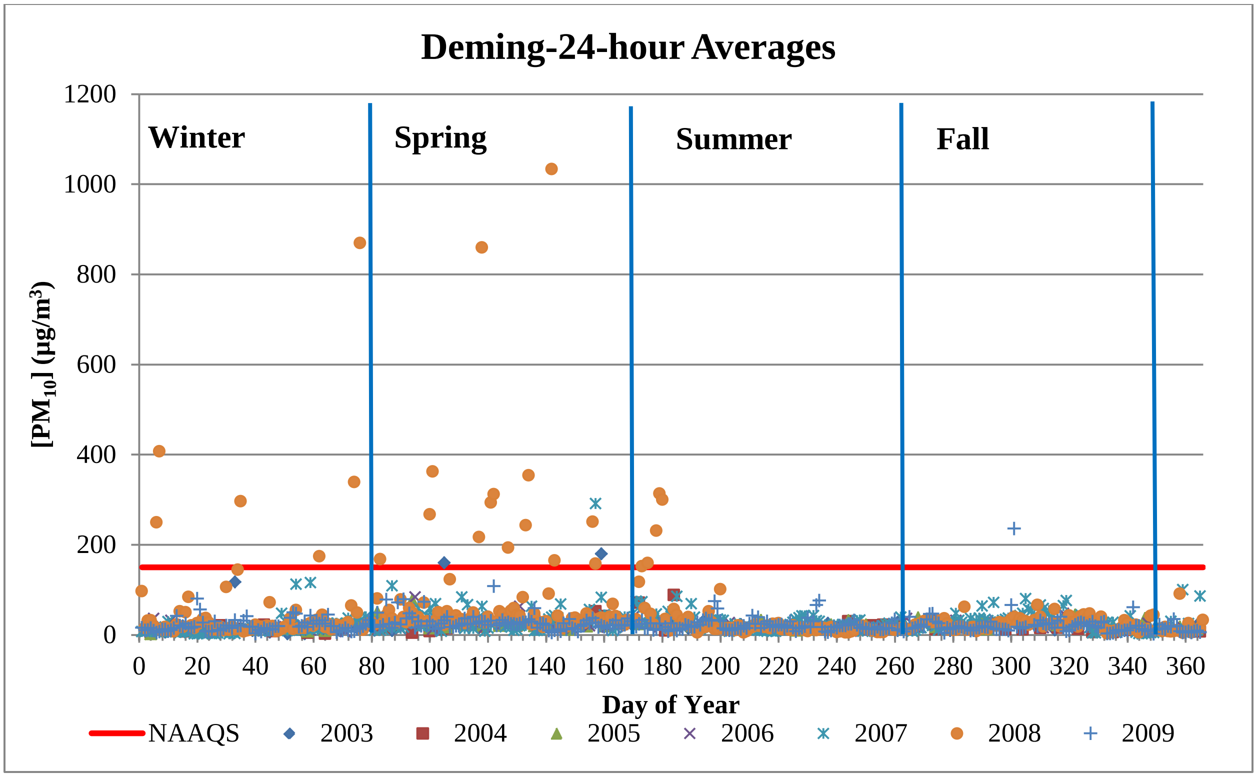

Figure 8-8. 24-hour average PM_{10} concentrations by day of year from 2003-2009. FRM Wedding data from 2003-2006. FEM TEOM data from 2007-2009.

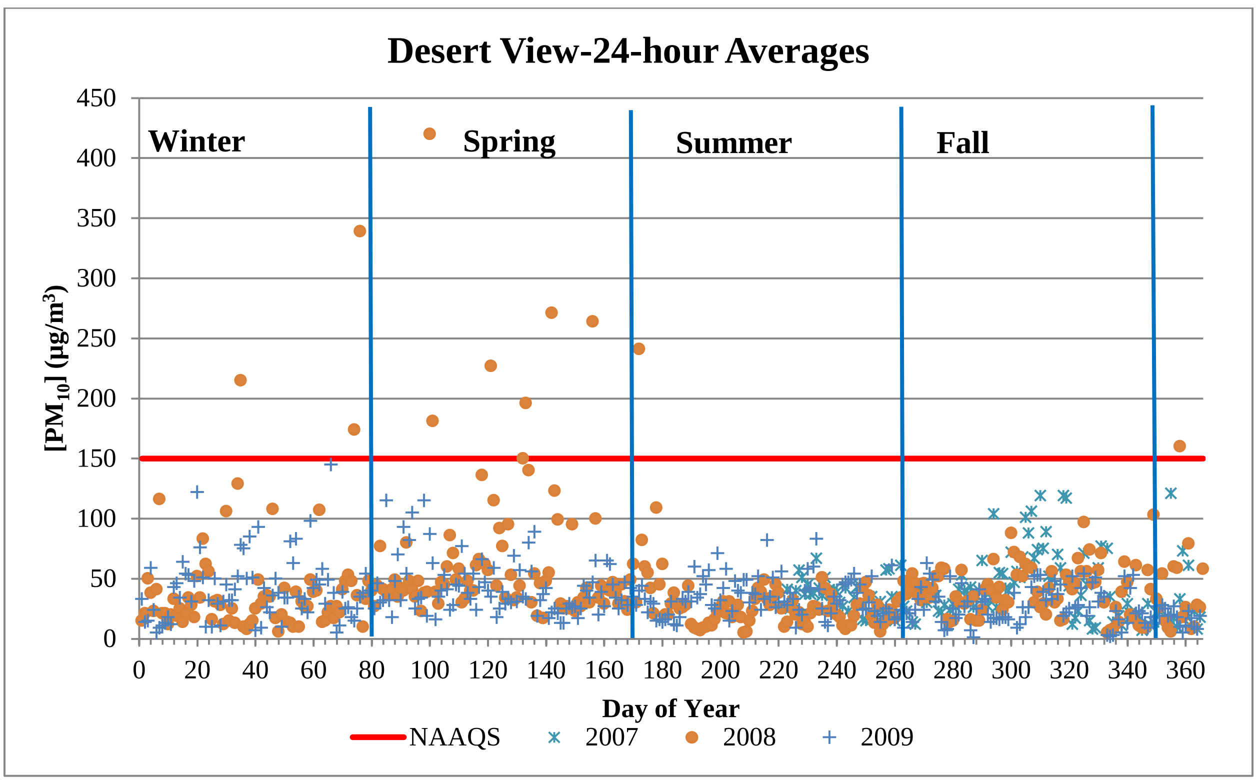

Figure 8-9. 24-hour average PM_{10} concentrations (FEM TEOM data) by day of year from 2007-2009

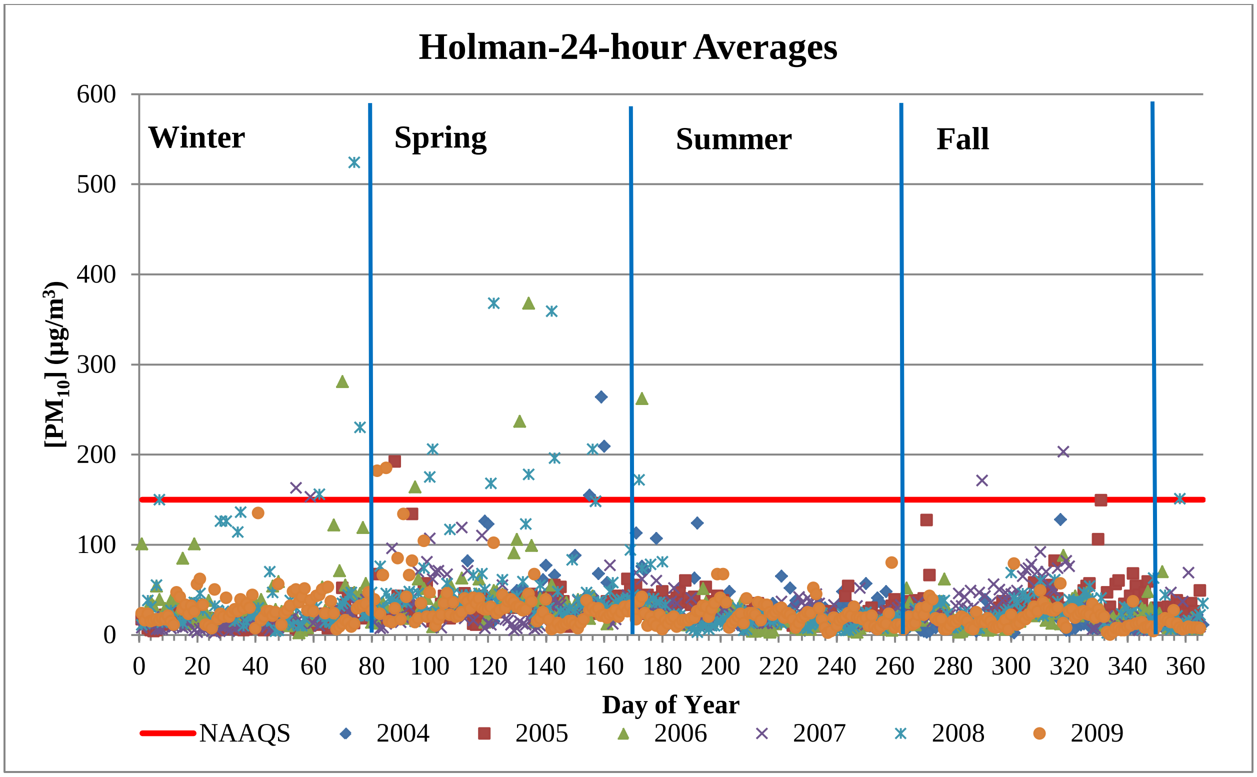

Figure 8-10. 24-hour average PM_{10} concentrations (FEM TEOM data) by day of year from 2004-2009

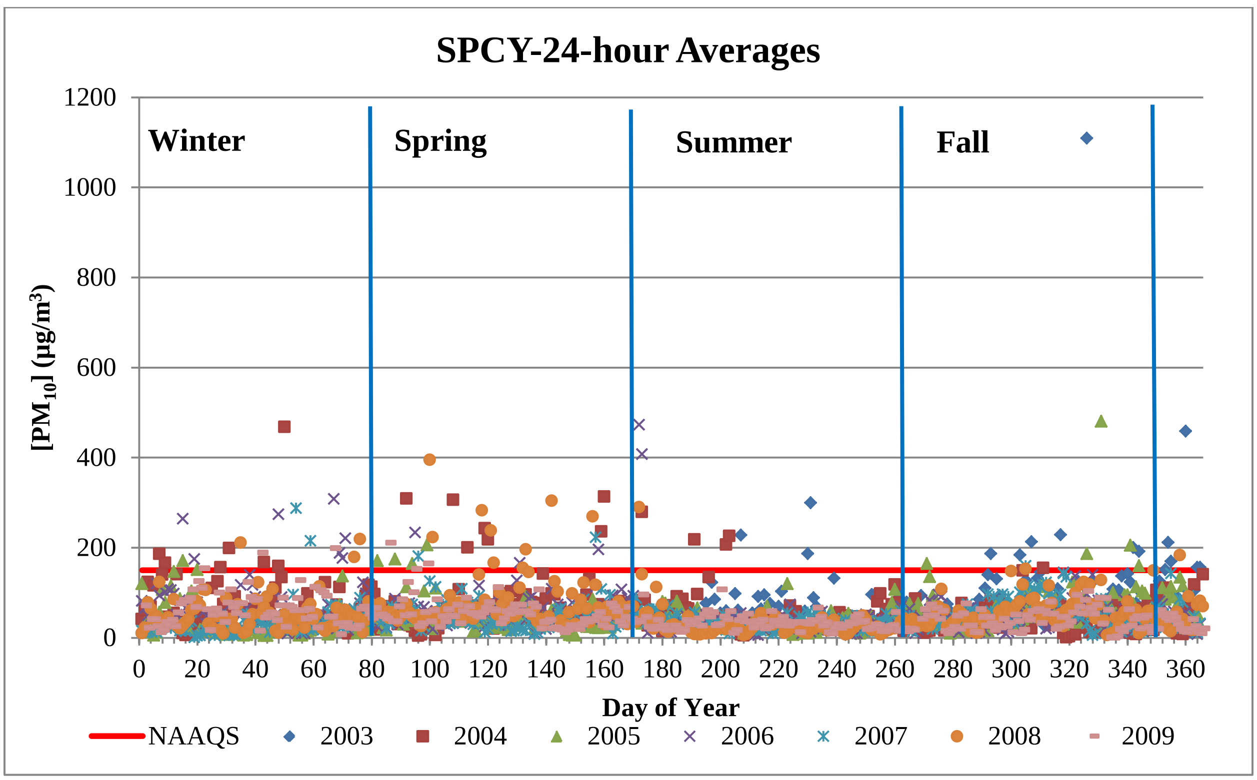

Figure 8-11. 24-hour average PM_{10} concentrations (FEM TEOM data) by day of year from 2003-2009.

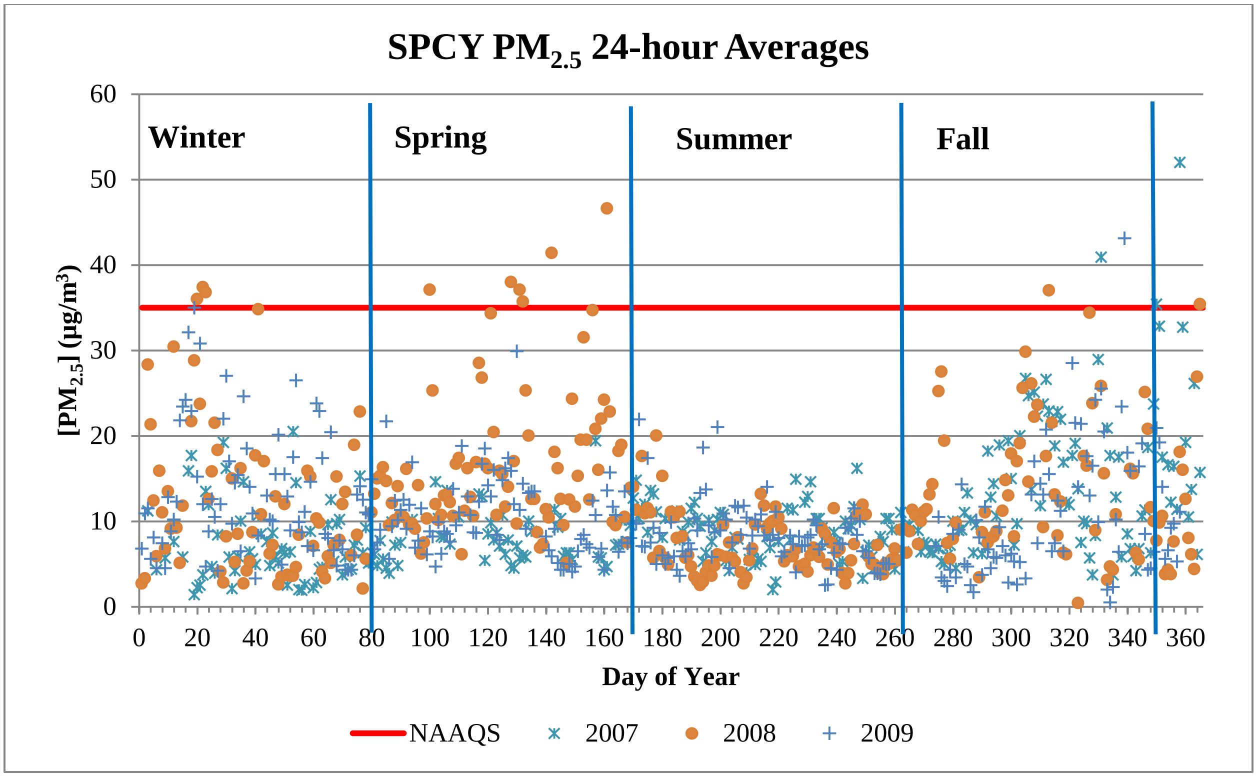

Figure 8-12. 24-hour average $PM_{2.5}$ concentrations (FRM Partisol data) by day of year from 2007-2009

Table 8-1 shows normal historical fluctuations with and without high wind natural events that caused exceedances from 2003-2009. The column labeled no events excludes only those high wind events that resulted in an exceedance. The low wind exceedances recorded at SPCY for PM_{10} from 2003 to 2005 and for $PM_{2.5}$ from 2007-2009 are included in the analysis when high wind events are excluded. PM_{10} Data in this table includes FRM Wedding and FEM TEOM data from 2003-2009 when available and $PM_{2.5}$ data includes FRM Partisol data from 2007-2009. The recorded PM_{10} values for this day (225 µg/m^3 at Anthony, 216 µg/m^3 at Chaparral, 225 µg/m^3 at Deming, 209 µg/m^3 at Desert View, 310 µg/m^3 at Holman and 379 µg/m^3 at SPCY) are above the maximum value recorded when no high wind exceedances are included. These values are also above the 95th percentile of all PM_{10} 24-hour averages for these sites. The recorded $PM_{2.5}$ concentration on this day (55.3 µg/m^3) is the highest value recorded at this site from 2007-2010.

Anthony	Max	99th	95th	75th	50th	Mean	25th	5th	Minimum
No Events	147	120	88	56	38	42	25	12	2
Events	403	234	100	57	38	47	25	12	2
Chaparral	**Max**	**99th**	**95th**	**75th**	**50th**	**Mean**	**25th**	**5th**	**Minimum**
No Events	149	116	65	35	24	28	15	6	1
Events	1110	254	90	37	24	35	15	6	1
Deming	**Max**	**99th**	**95th**	**75th**	**50th**	**Mean**	**25th**	**5th**	**Minimum**
No Events	152	88	53	28	19	23	12	6	2
Events	1033	239	65	28	19	28	12	6	2
Desert View	**Max**	**99th**	**95th**	**75th**	**50th**	**Mean**	**25th**	**5th**	**Minimum**
No Events	150	119	82	47	33	37	21	10	1
Events	420	176	90	48	33	40	21	10	1
Holman	**Max**	**99th**	**95th**	**75th**	**50th**	**Mean**	**25th**	**5th**	**Minimum**
No Events	153	119	62	34	23	27	14	6	0
Events	524	170	69	35	23	29	14	6	0
SPCY	**Max**	**99th**	**95th**	**75th**	**50th**	**Mean**	**25th**	**5th**	**Minimum**
No Events	212	143	108	60	39	46	24	11	0
Events	1109	227	123	63	40	51	25	11	0
SPCY $PM_{2.5}$	**Max**	**99th**	**95th**	**75th**	**50th**	**Mean**	**25th**	**5th**	**Minimum**
No Events	52	36	25	13	9	11	6	4	0
Events	52	37	25	13	9	11	6	4	0

Table 8-1. 24-hour average PM_{10} and $PM_{2.5}$ data distribution with and without high wind events included.

An hourly data distribution analysis was performed for hourly PM_{10} concentrations, wind speeds and wind gusts (Appendices A, B and C). All data for this analysis use the FEM TEOM monitors. NMED does not have a continuous FRM or FEM approved $PM_{2.5}$ monitor and an hourly data distribution is not available for the SPCY $PM_{2.5}$ site. Overlaying the hourly data for November 28, 2010 on the hourly data distribution plots shows that the values recorded during the high wind event exceed the 95th percentile for PM_{10}, wind speed and wind gusts (Figures 8-13 through 8-30). The top whisker of the of the box and whisker plots represent the 95th percentile of data. As stated previously, wind data used for the Anthony site come from the La Union site. The hourly PM_{10} values during the high wind blowing dust storm far exceed the historical 95th percentile of data.

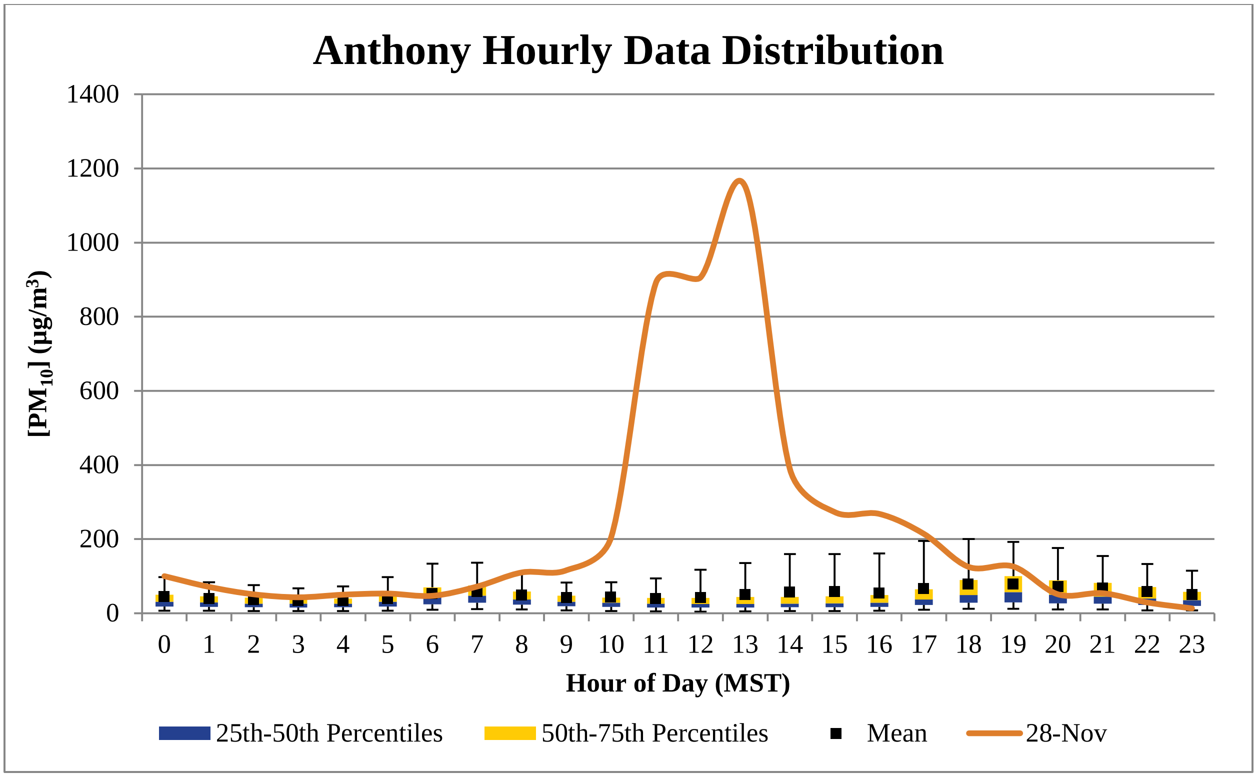

Figure 8-13. PM_{10} hourly data distribution from 2003-2009 overlaid by hourly values for November 28, 2010.

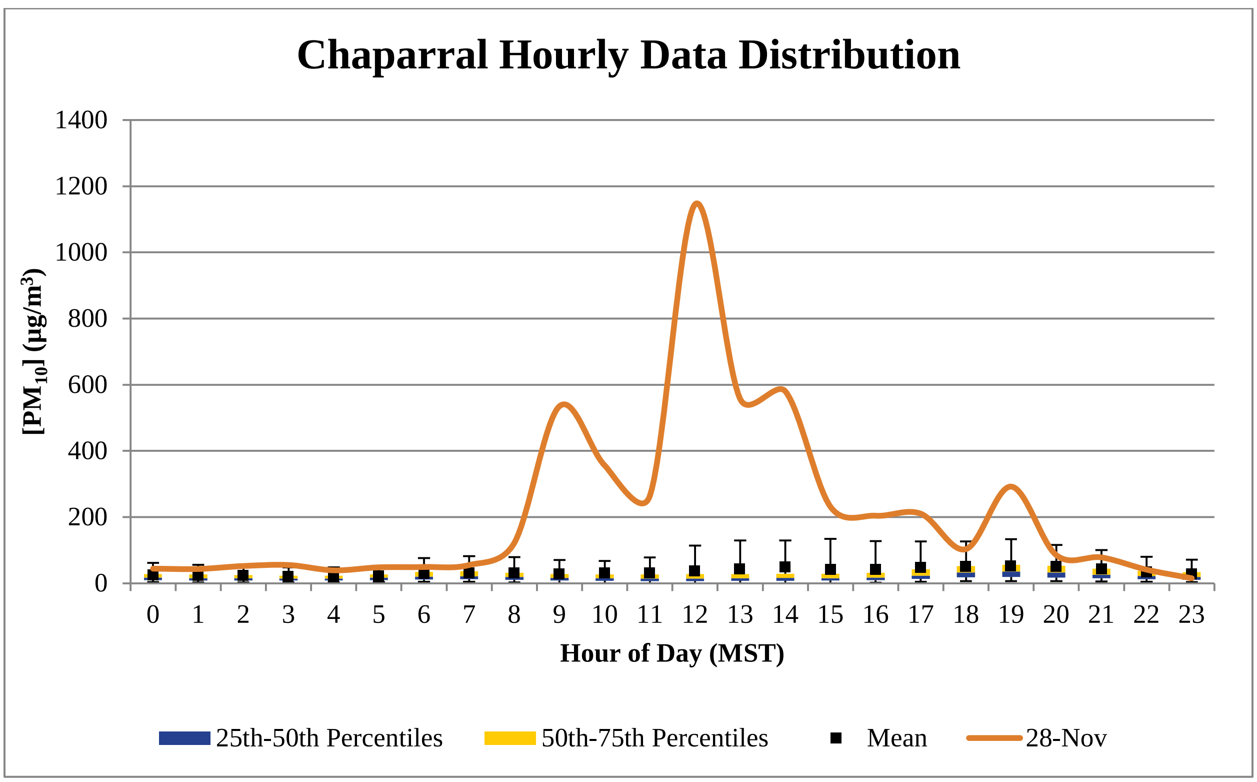

Figure 8-14. PM_{10} hourly data distribution from 2003-2009 overlaid by hourly values for November 28, 2010.

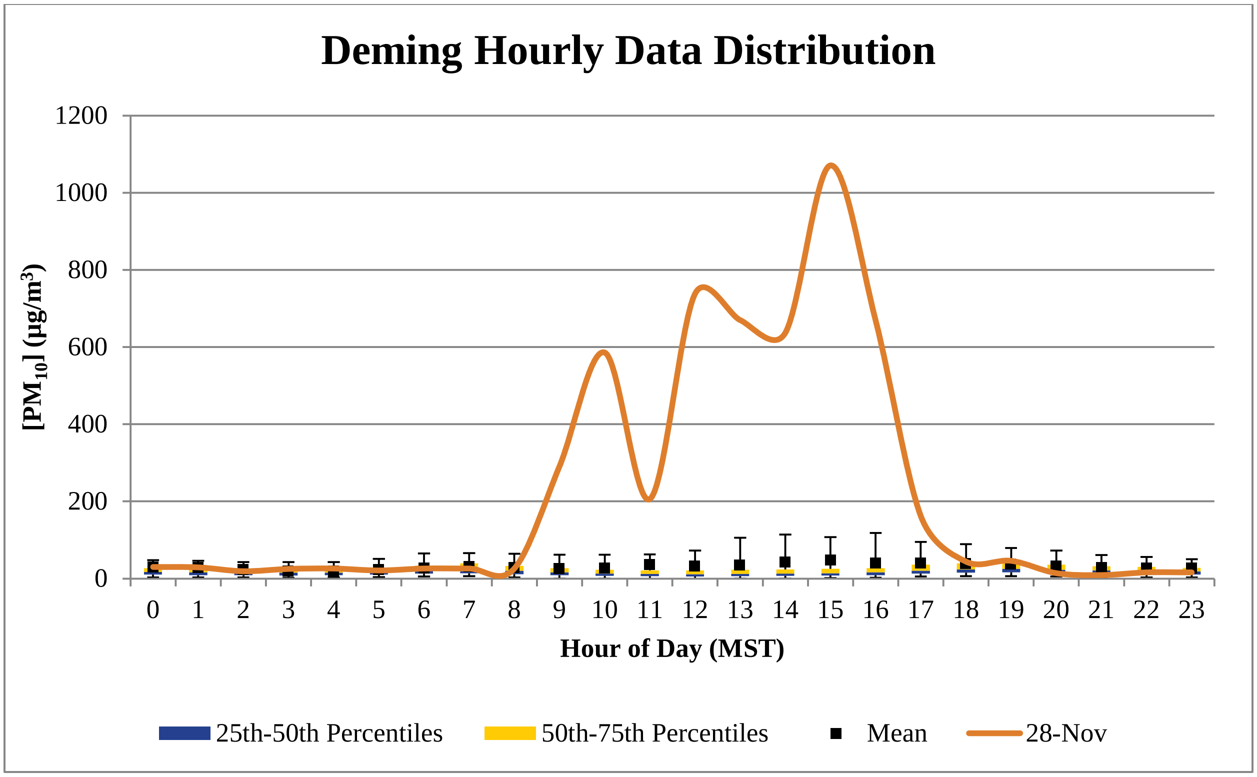

Figure 8-15. PM_{10} hourly data distribution from 2006-2009 overlaid by hourly values for November 28, 2010.

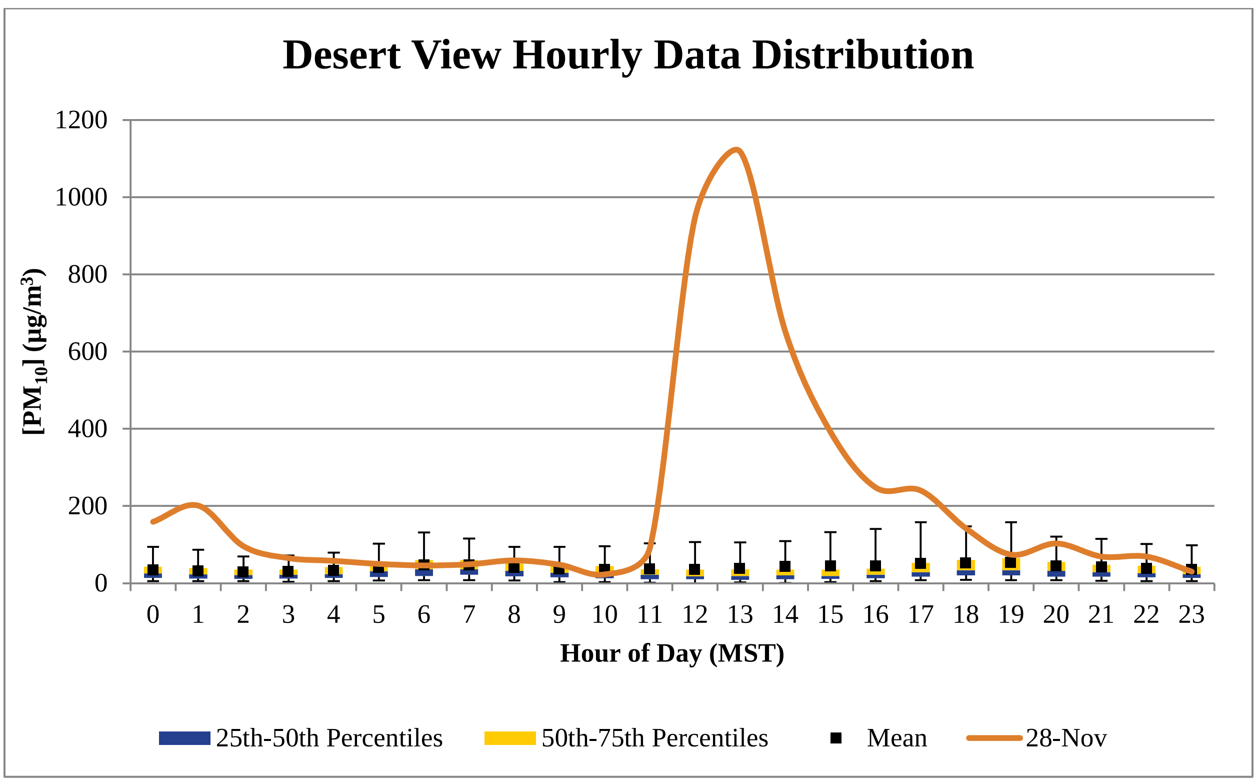

Figure 8-16. PM_{10} hourly data distribution from 2007-2009 overlaid by hourly values for November 28, 2010.

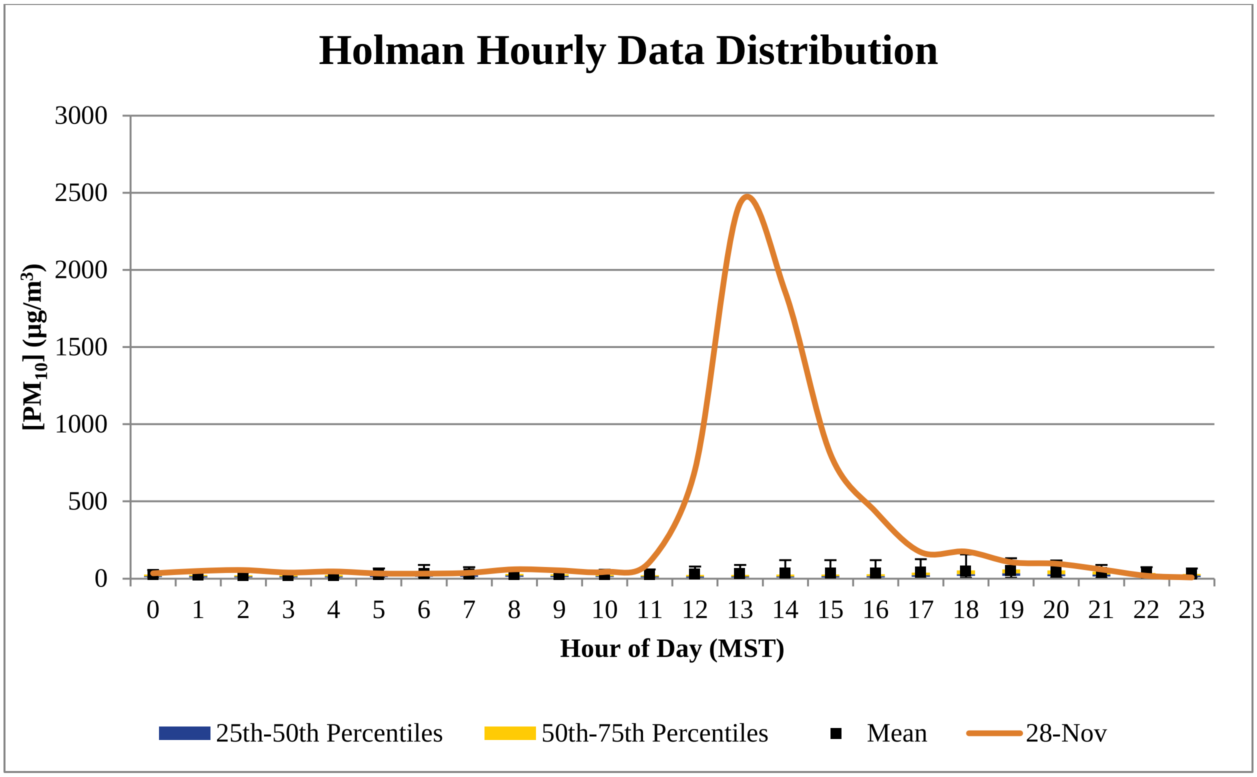

Figure 8-17. PM_{10} hourly data distribution from 2004-2009 overlaid by hourly values for November 28, 2010.

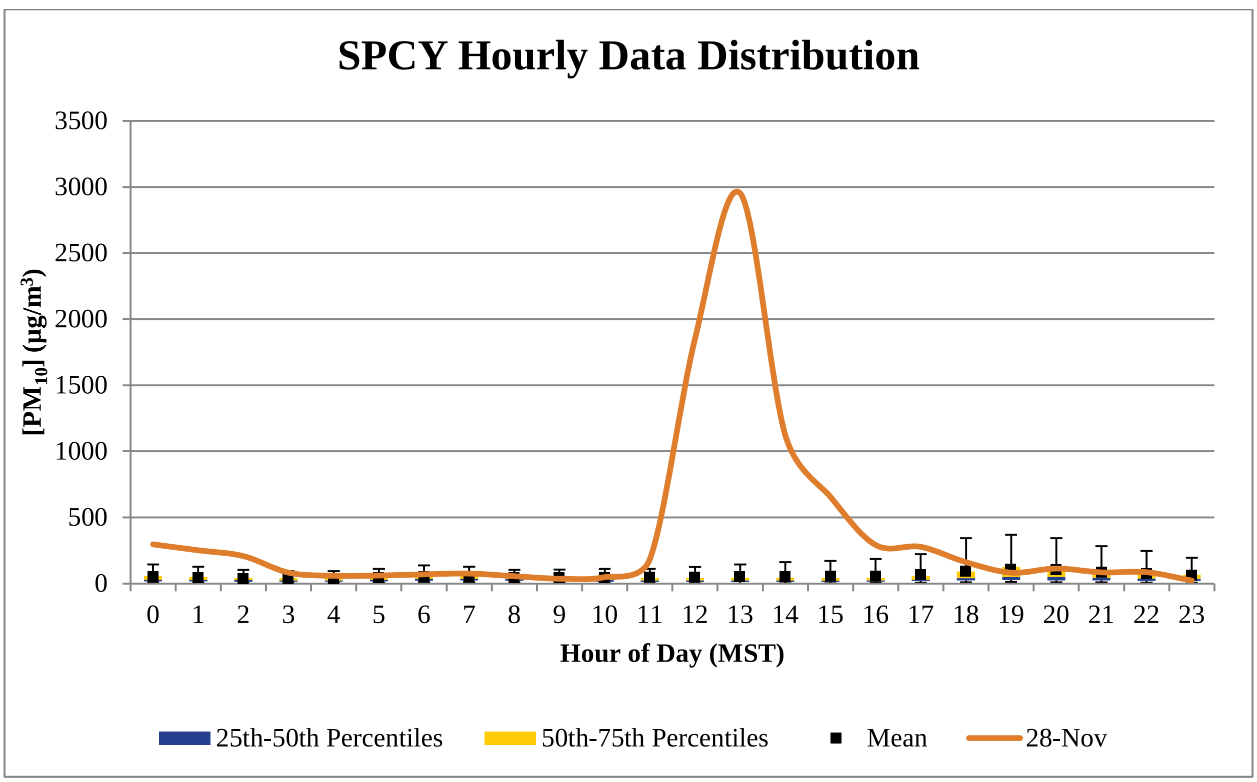

Figure 8-18. PM_{10} hourly data distribution from 2003-2009 overlaid by hourly values for November 28, 2010.

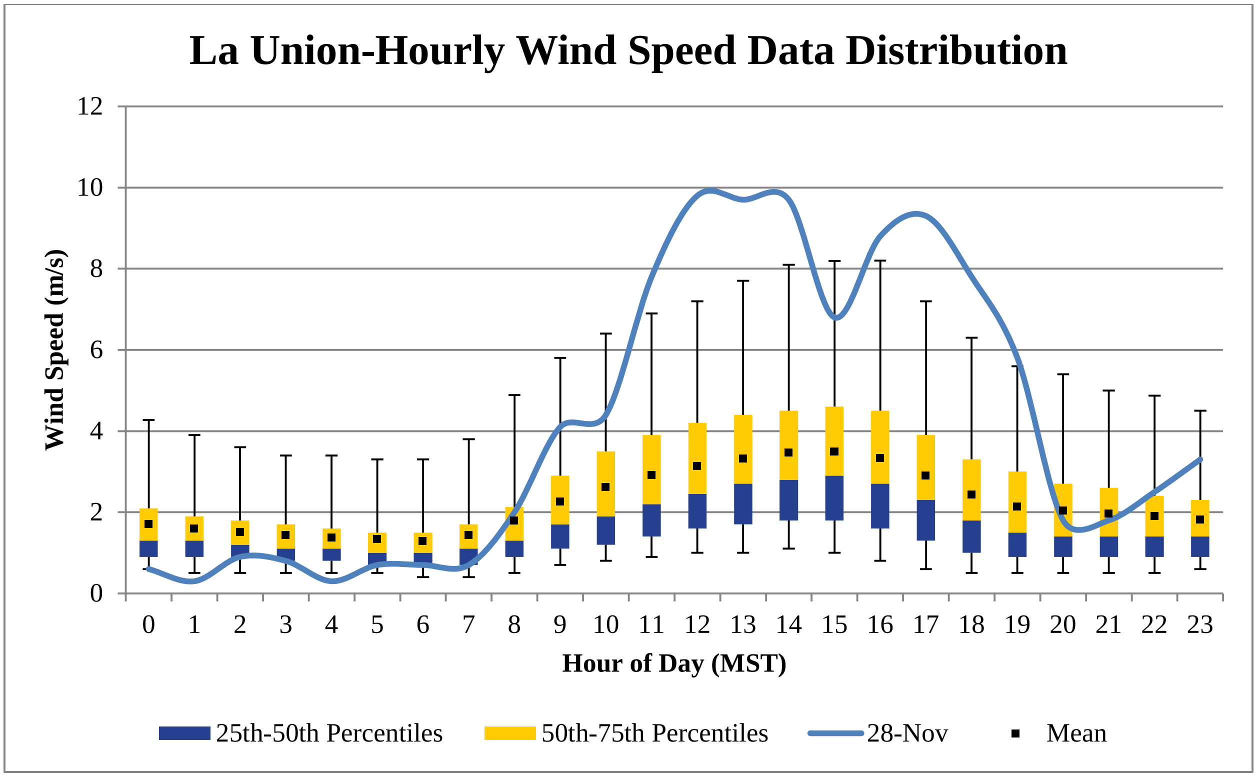

Figure 8-19. Hourly wind speed data distribution from 2003-2009 overlaid by hourly values for November 28, 2010.

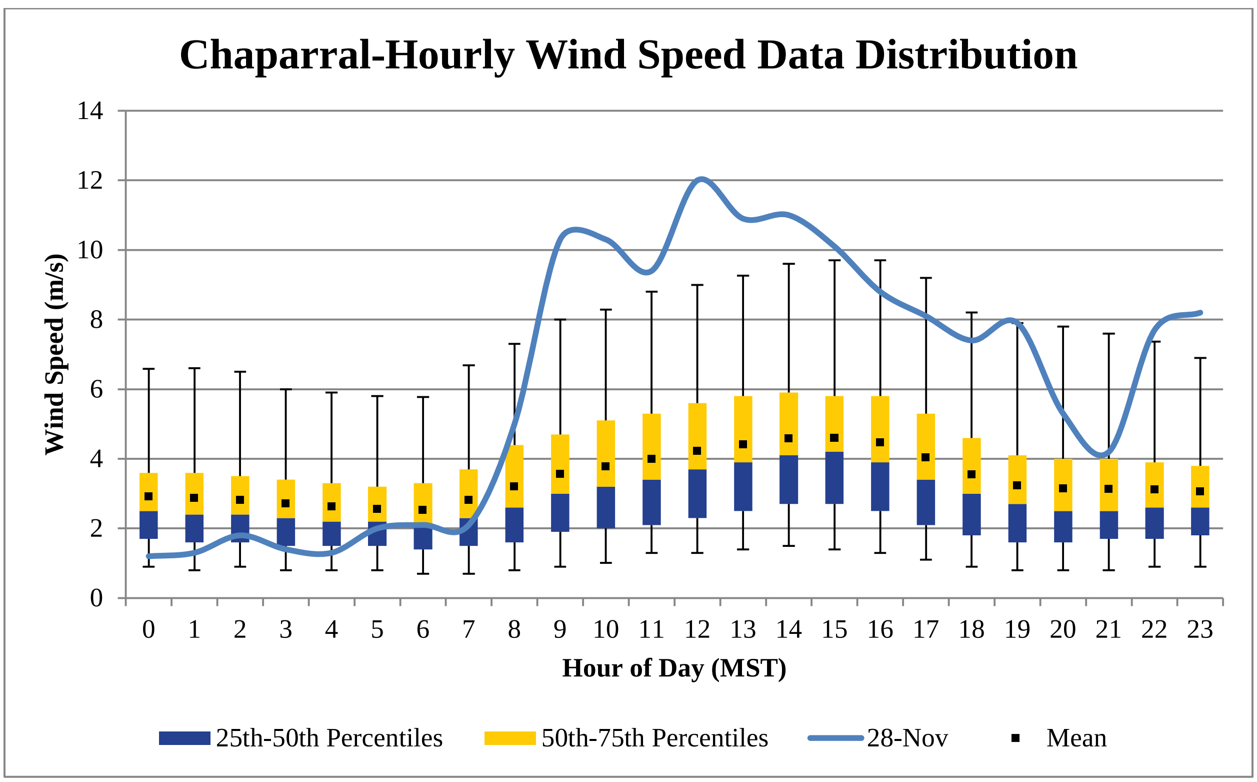

Figure 8-20. Hourly wind speed data distribution from 2003-2009 overlaid by hourly values for November 28, 2010.

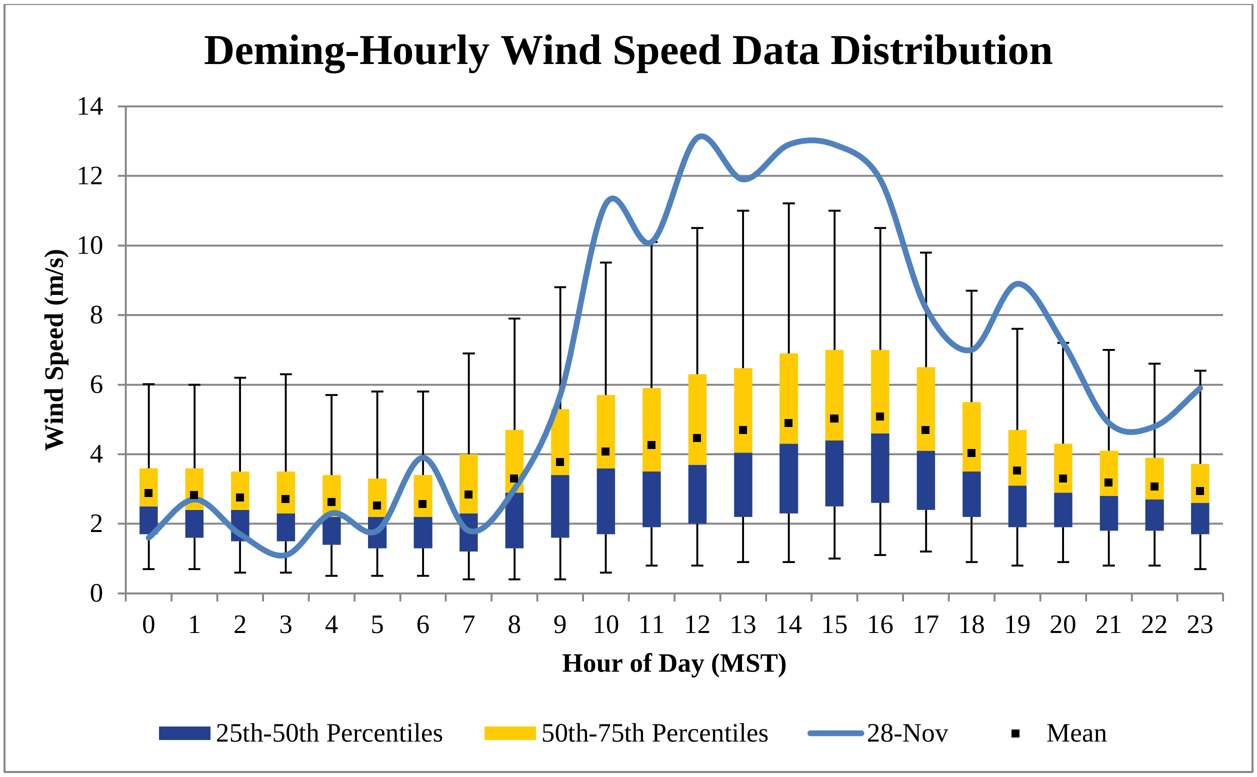

Figure 8-21. Hourly wind speed data distribution from 2003-2009 overlaid by hourly values for November 28, 2010.

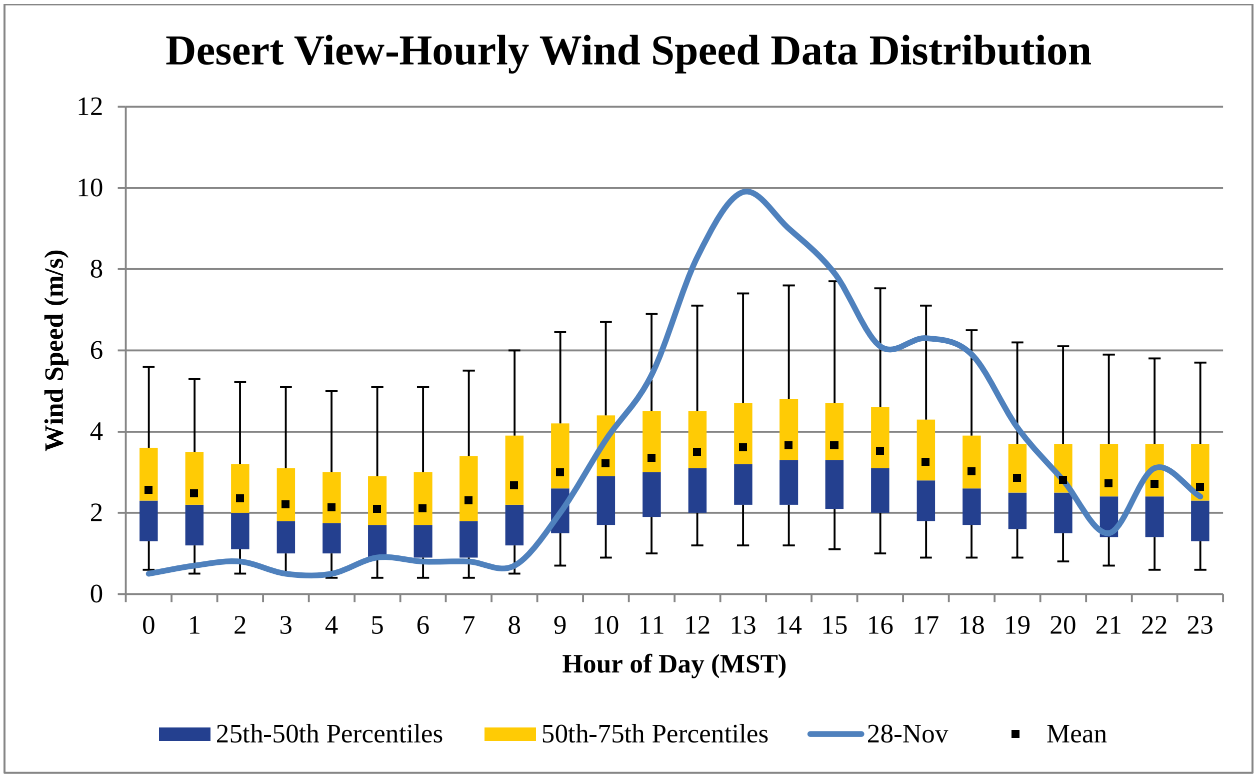

Figure 8-22. Hourly wind speed data distribution from 2003-2009 overlaid by hourly values for November 28, 2010.

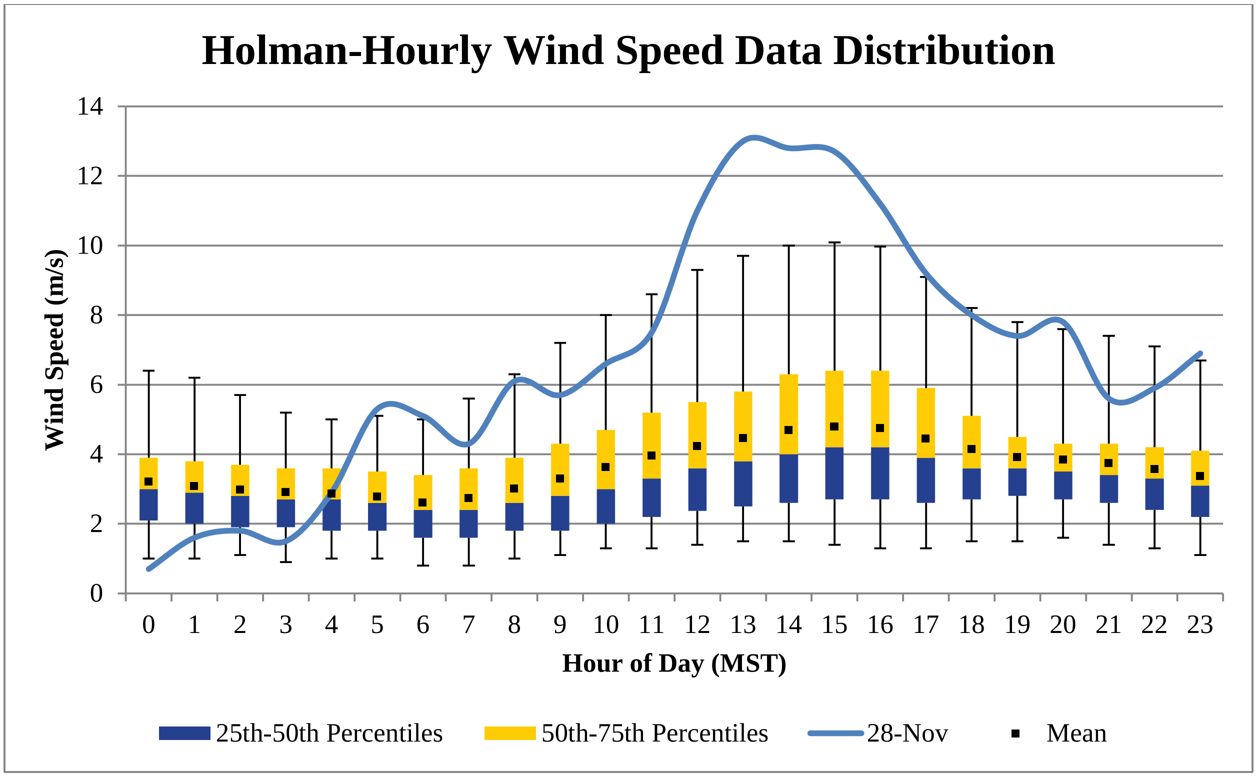

Figure 8-23. Hourly wind speed data distribution from 2004-2009 overlaid by hourly values for November 28, 2010.

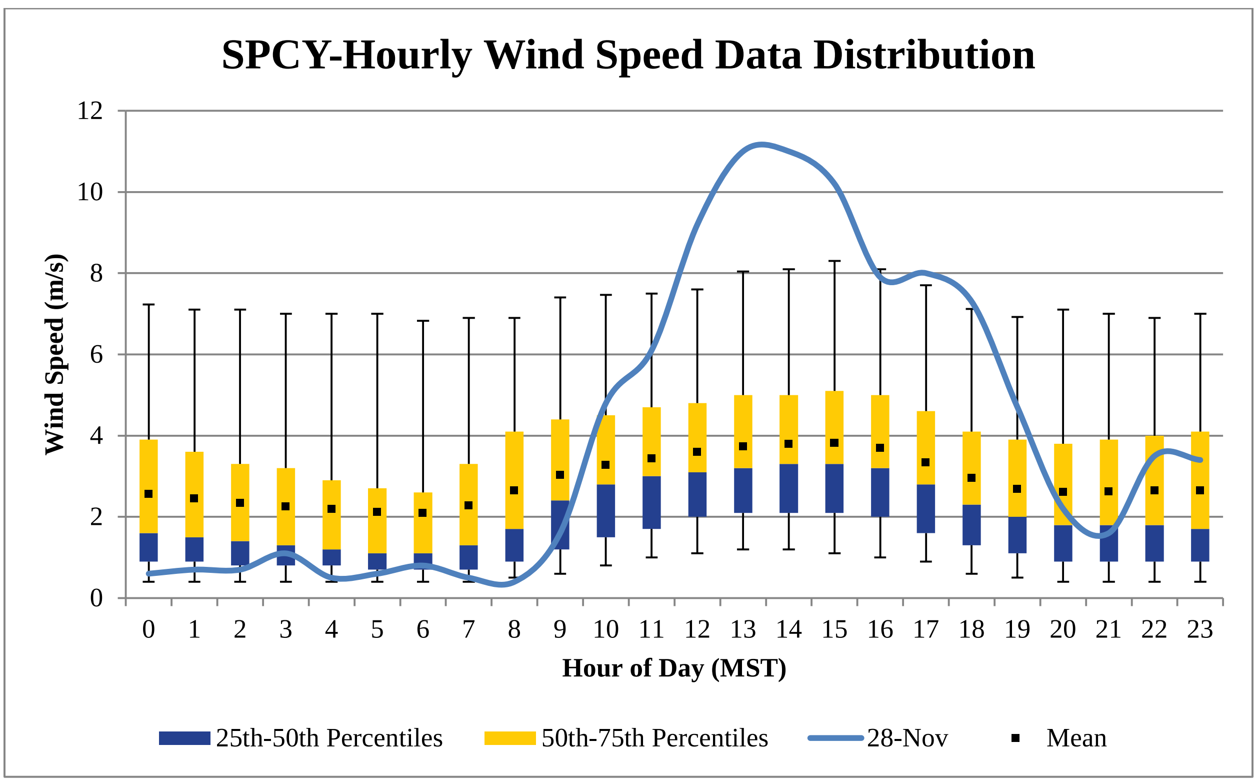

Figure 8-24. Hourly wind speed data distribution from 2003-2009 overlaid by hourly values for November 28, 2010.

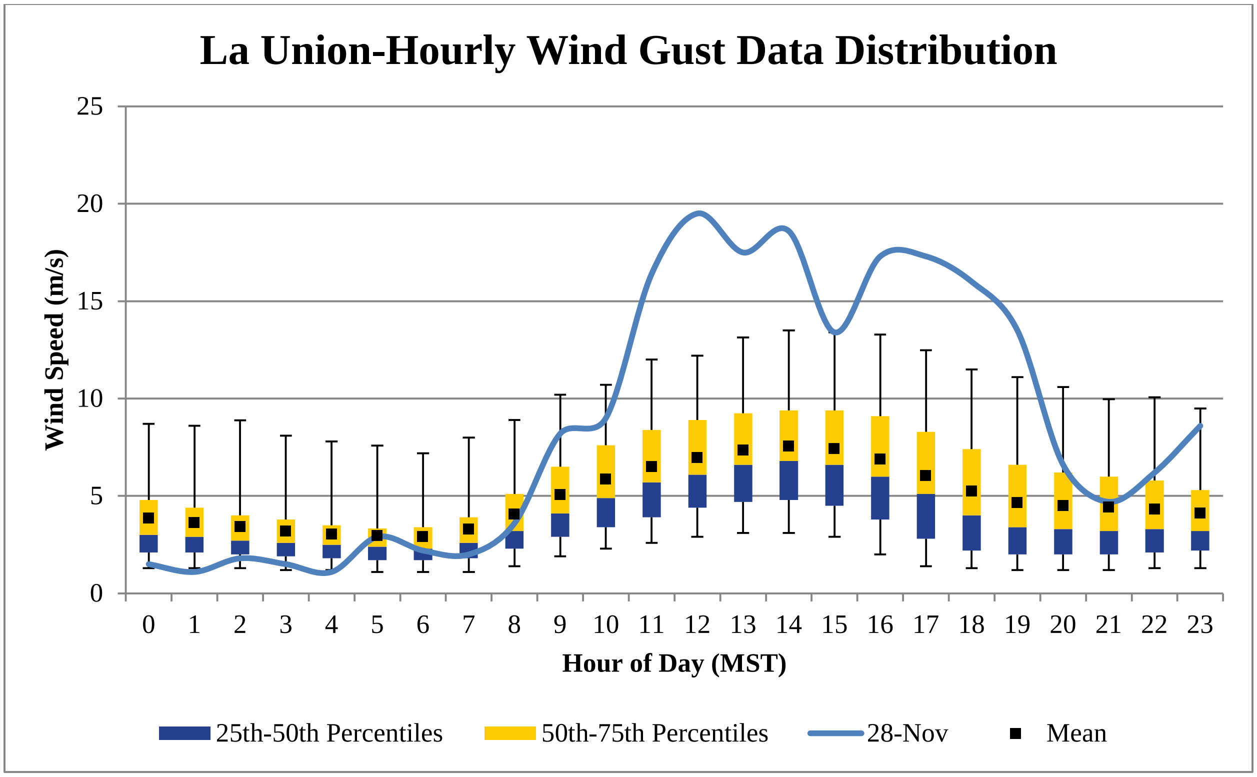

Figure 8-25. Hourly wind gust data distribution from 2003-2009 overlaid by hourly values for November 28, 2010.

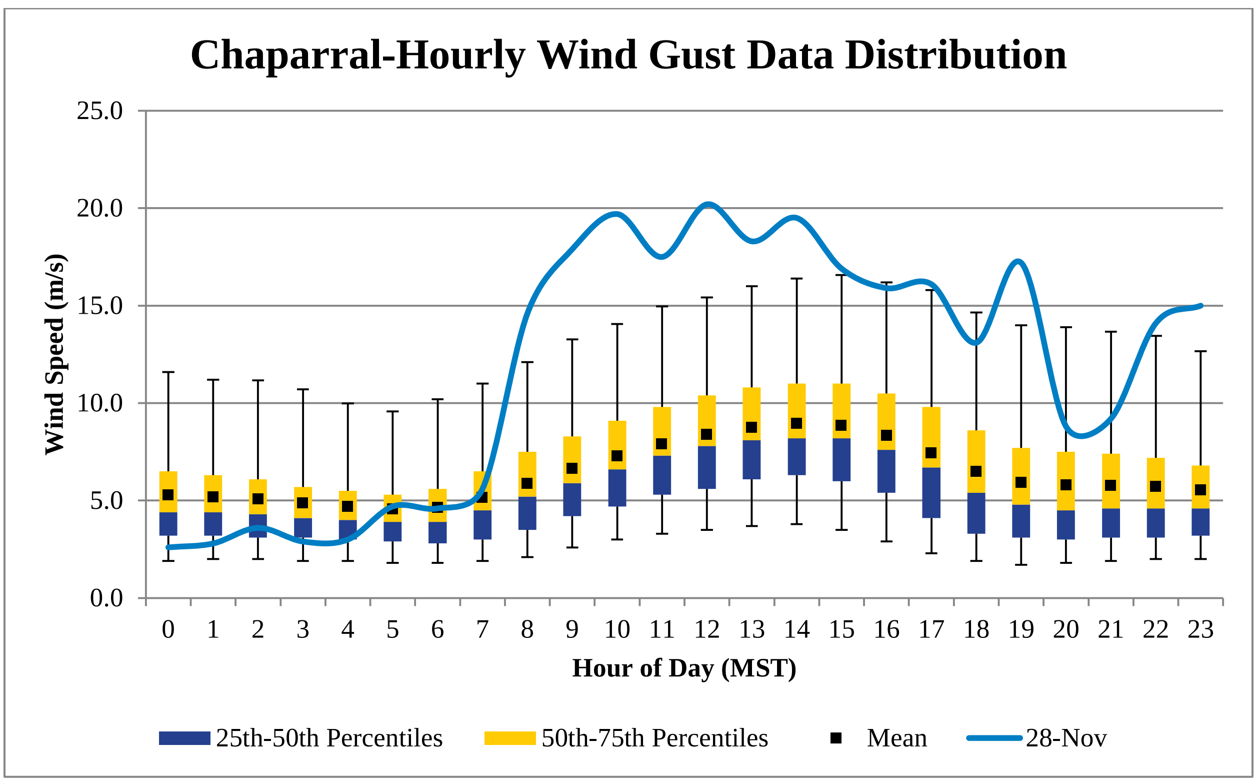

Figure 8-26. Hourly wind gust data distribution from 2003-2009 overlaid by hourly values for November 28, 2010.

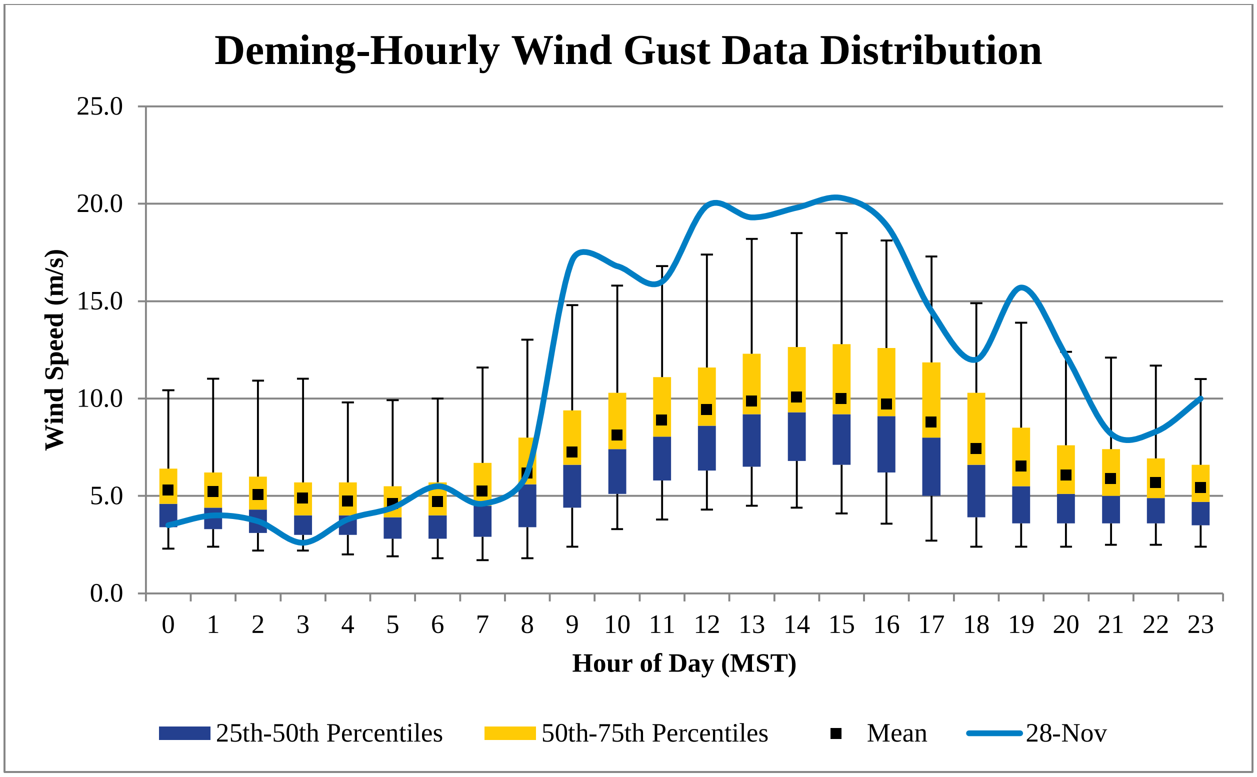

Figure 8-27. Hourly wind gust data distribution from 2003-2009 overlaid by hourly values for November 28, 2010.

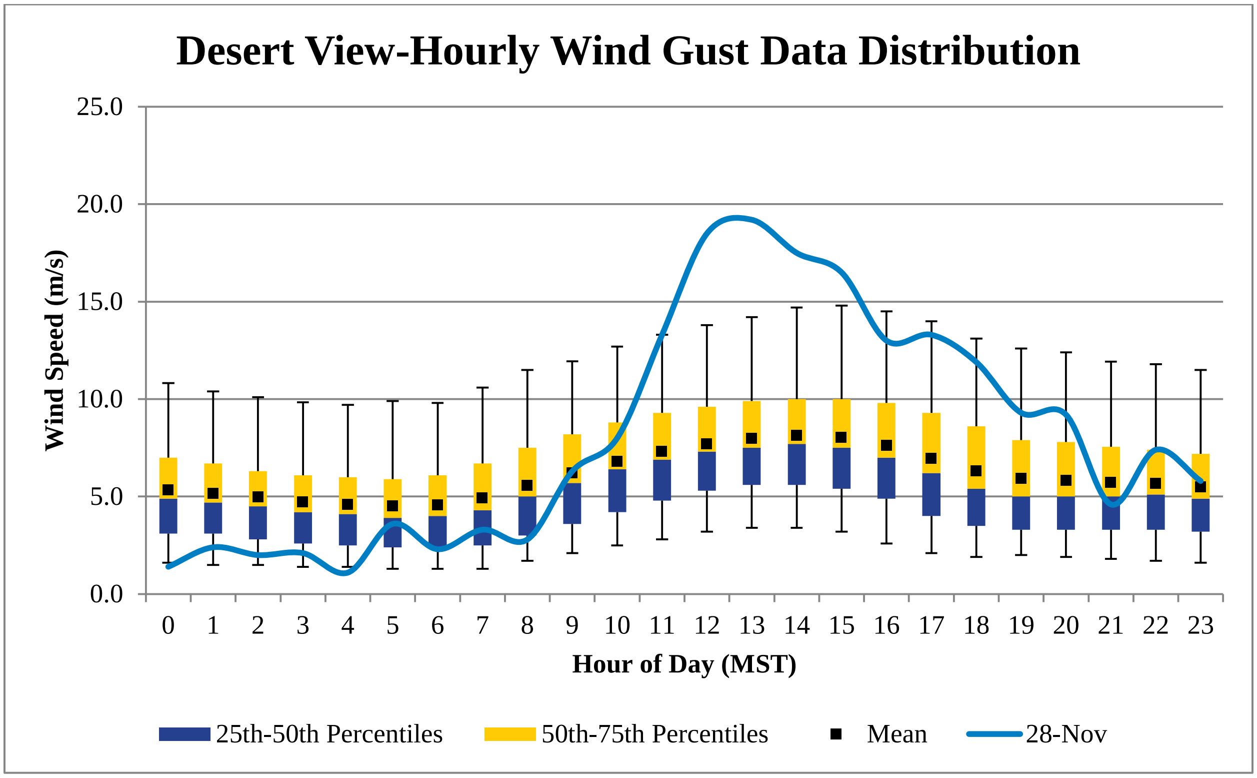

Figure 8-28. Hourly wind gust data distribution from 2003-2009 overlaid by hourly values for November 28, 2010.

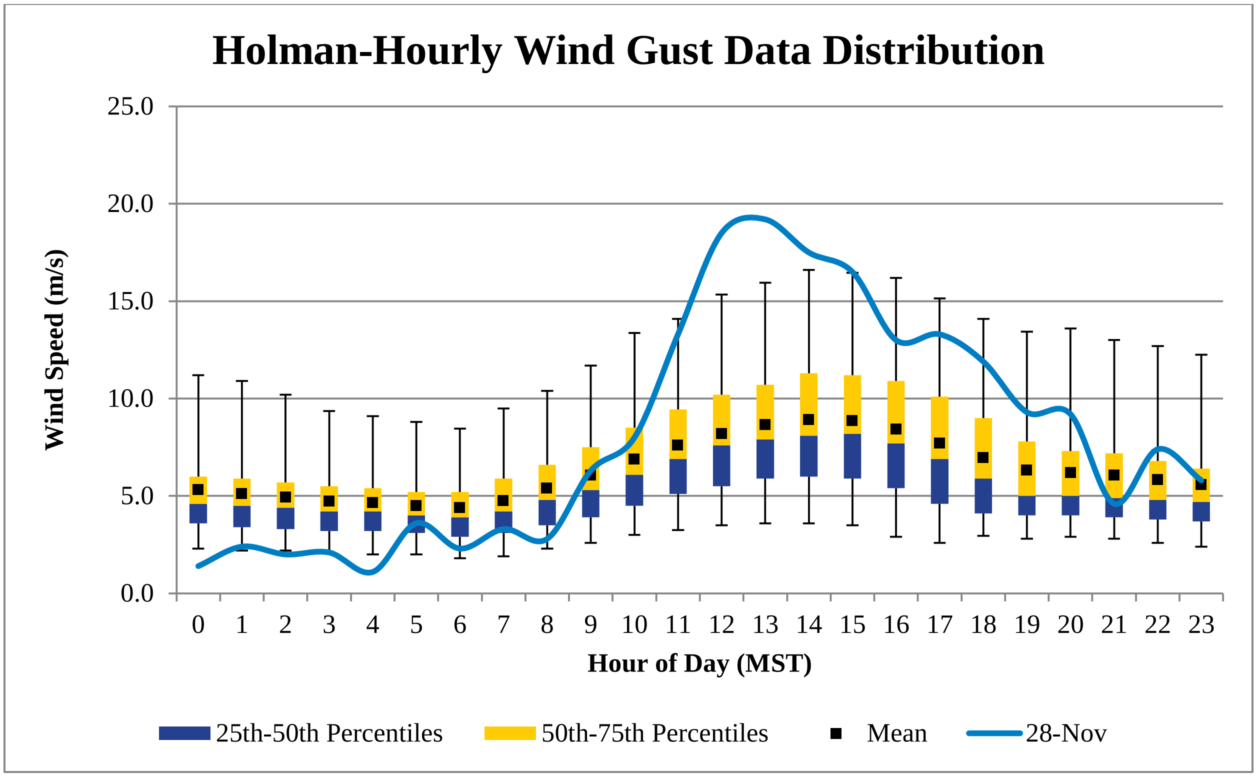

Figure 8-29. Hourly wind gust data distribution from 2004-2009 overlaid by hourly values for November 28, 2010.

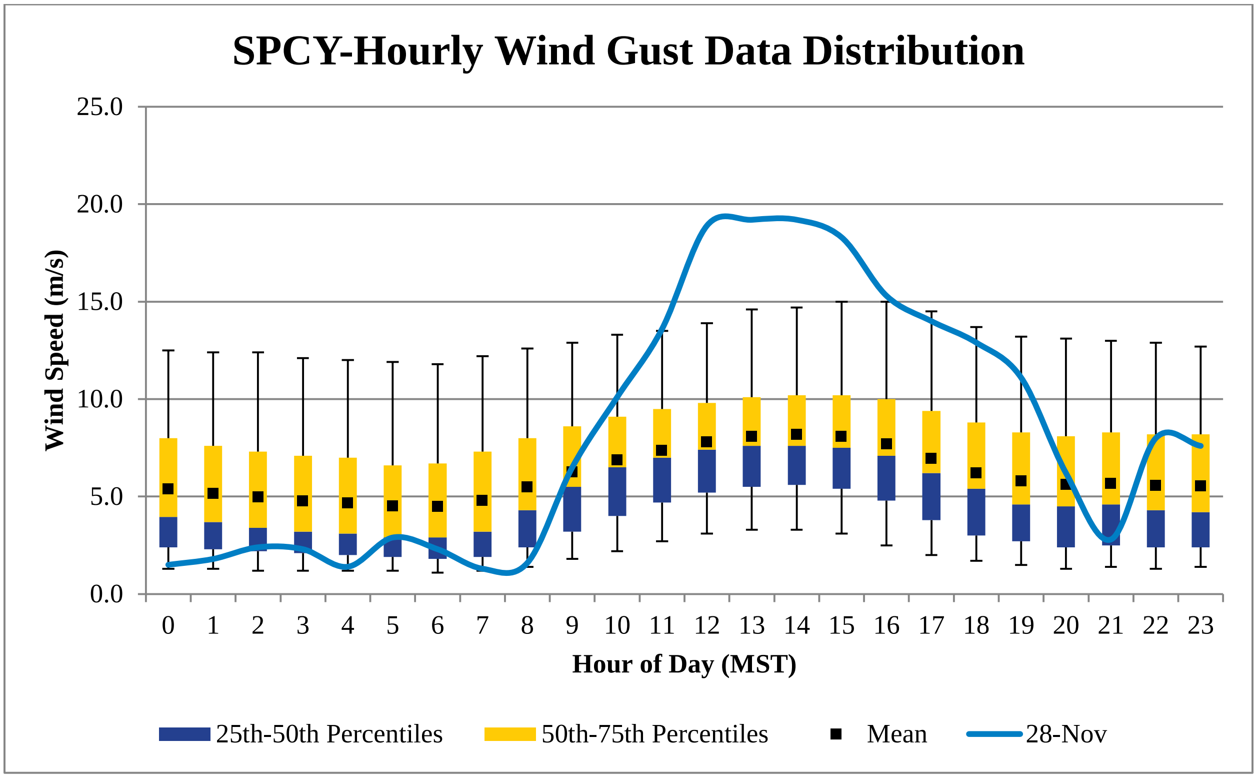

Figure 8-30. Hourly wind gust data distribution from 2003-2009 overlaid by hourly values for November 28, 2010.

8.4 Clear Causal Relationship

A strong Pacific cold front passed through New Mexico on November 28, 2010. As the Pacific cold front moved through New Mexico, a strong pressure gradient formed over southeastern Arizona, southwestern New Mexico and northwestern Chihuahua causing high winds at the surface (Figure 8-31). Surface winds flow perpendicular to the isobars from high to low pressure. As the day progressed, the wind direction in the upper atmosphere aligned with the surface wind direction (Figure 8-32). Diurnal heating of the surface allowed winds aloft to mix downward, increasing the surface wind velocities and provided the turbulence required for vertical mixing and horizontal transport.

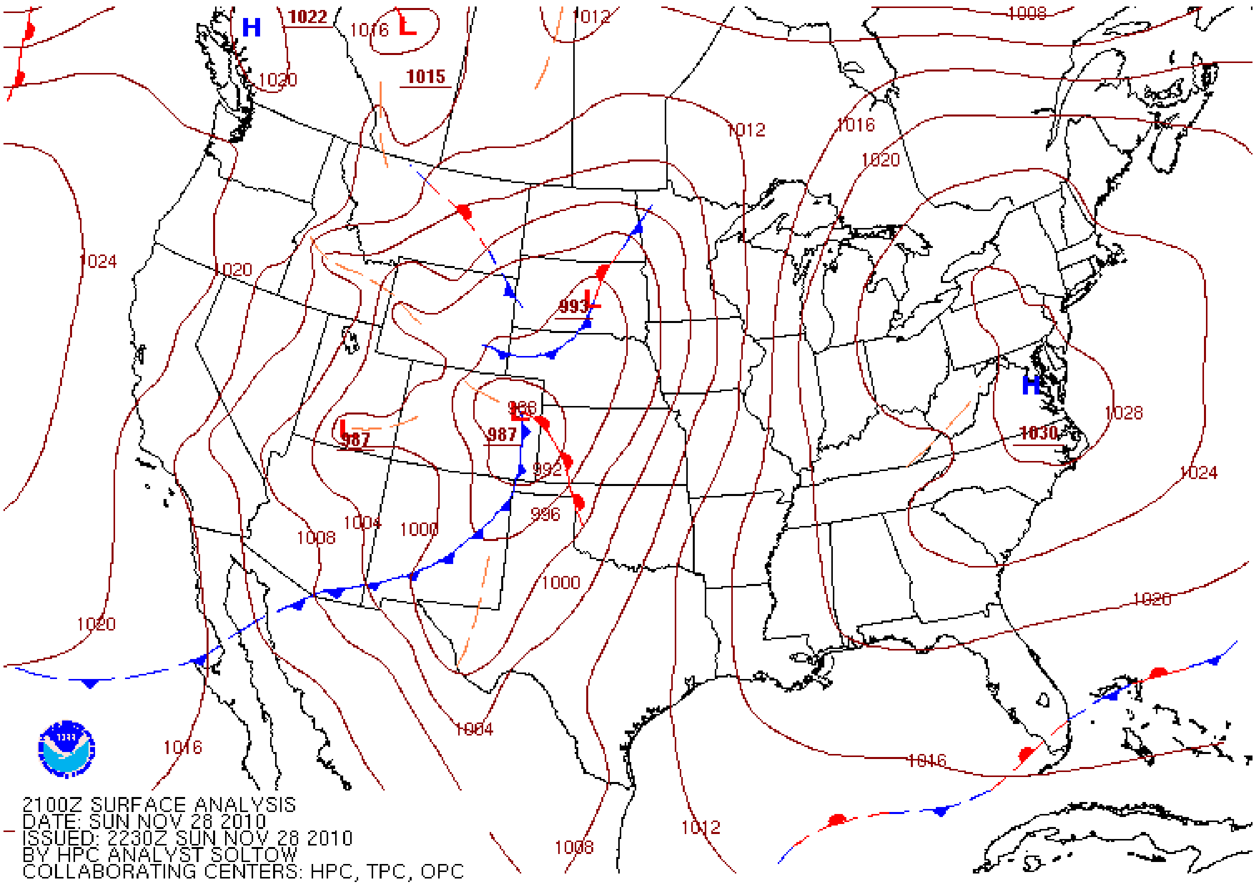

Figure 8-31. Surface weather map showing frontal activity and isobars of constant pressure (red lines) for November 28, 2010 at the 1400 hour MST.

The weather pattern described above generated strong west-southwesterly winds beginning at the 1000 hour and lasting through the 1800 hour. Beginning at the 1000 hour, sustained wind speeds exceeded 11.2 m/s (25 mph) at the Deming site. Peak wind speeds ranged from 10 m/s at La Union to 13 m/s at Deming (Figure 8-2). Wind gusts reached 18 m/s starting at the 900 hour at the Chaparral site. Peak wind gusts ranged from 19 m/s at Desert View to 22 m/s at West Mesa (Figure 8-3). Blowing dust caused elevated levels of PM_{10} during the same period of high winds as demonstrated by the time series plots in Figures 8-33 through 8-38. As wind speed and wind gusts exceed the 95th percentile of historical data, so do hourly PM_{10} concentrations on this date

(1000-1800 hours). During these hours, hourly PM_{10} concentrations spiked at all monitoring sites in the network. Maximum hourly PM_{10} concentrations range from 1071 µg/m^3 at Deming to 2952 µg/m^3 at SPCY (Figure 8-39). Satellite imagery captured the blowing dust throughout southern New Mexico, northern Mexico and west Texas (Figures 8-40 and 8-41). TCEQ also recorded exceedances of the PM_{10} standard in El Paso on this day and posted a brief description of the event with satellite imagery and visibility data on their website (Appendix E). The National Weather Service also reported in their weather bulletin that strong winds persisted throughout the region on this day (Appendix E).

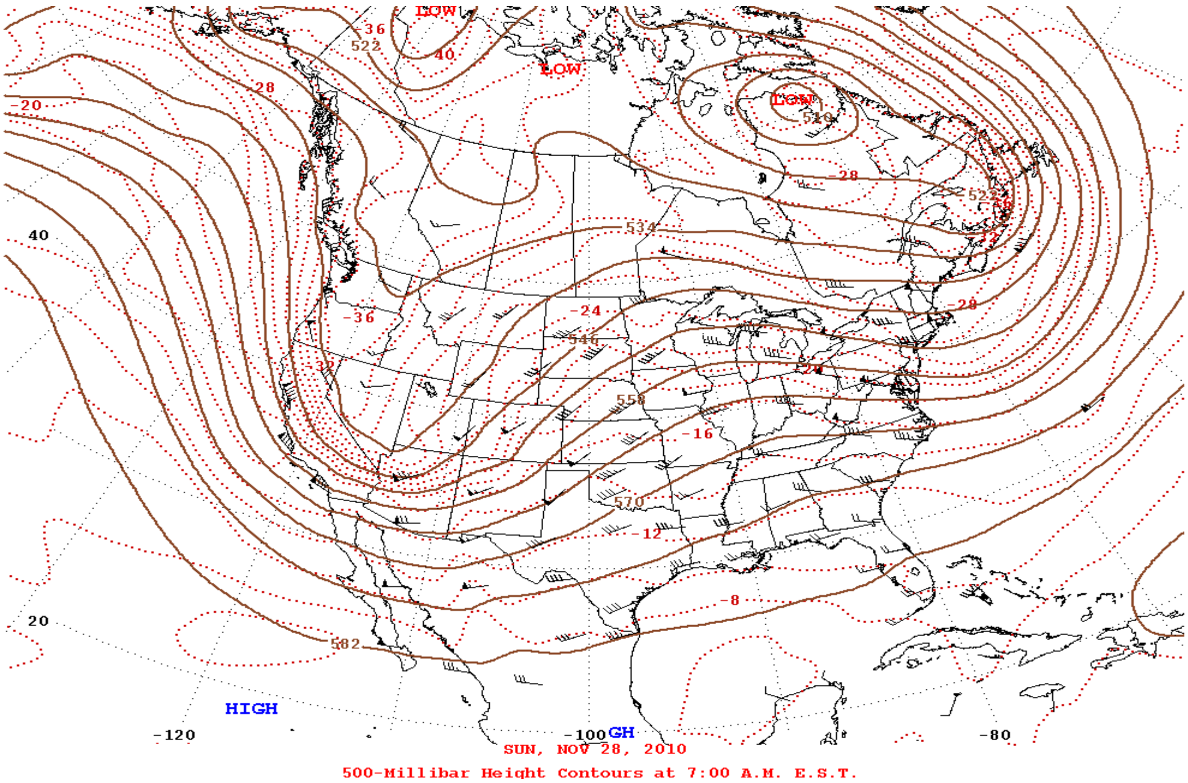

Figure 8-32. Upper air weather map showing geopotential heights (brown lines) at the 500 hour on November 28, 2010.

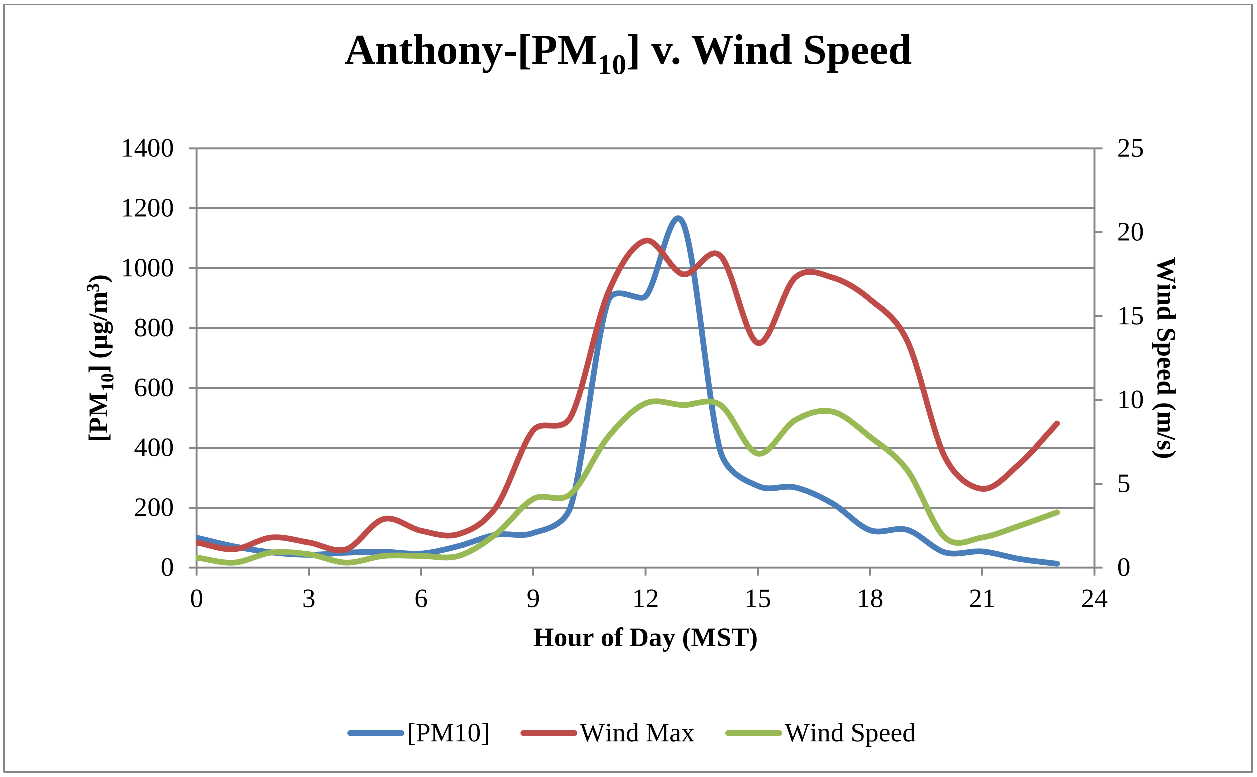

Figure 8-33. Time series plot of hourly observations showing increased PM_{10} concentrations as wind speeds and gusts increase.

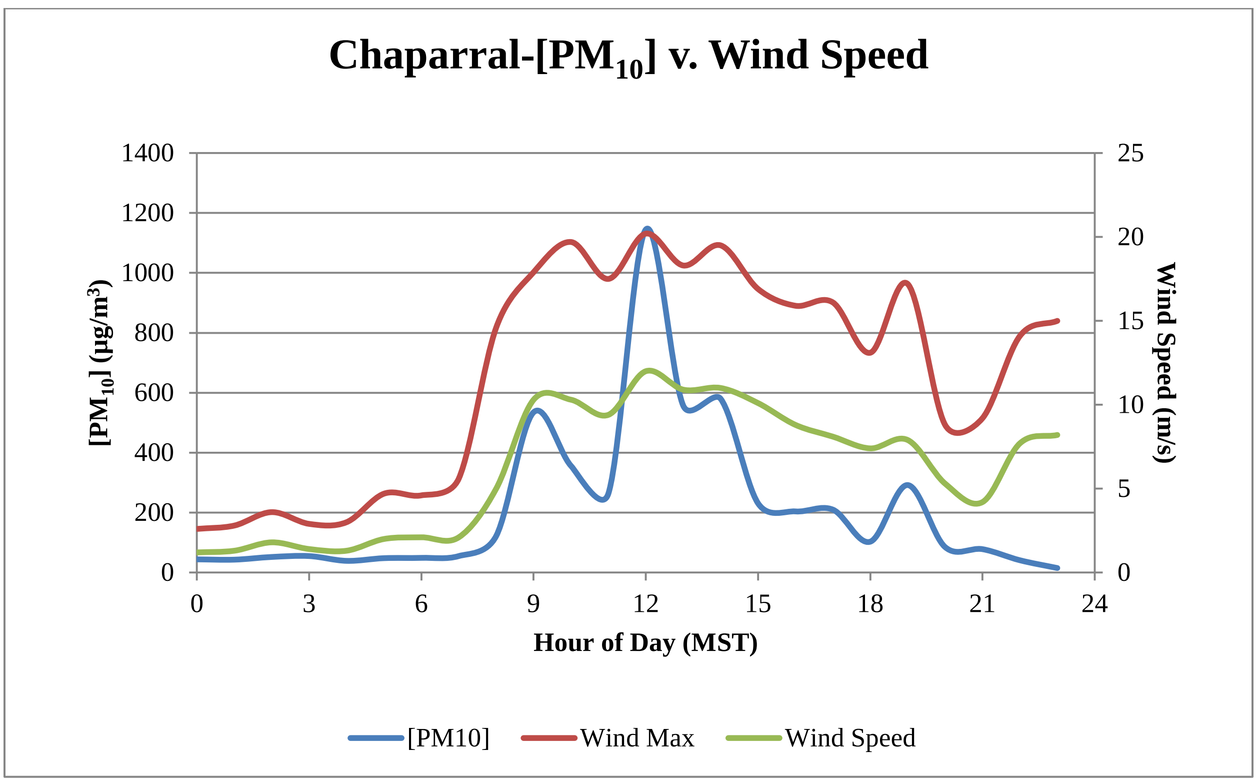

Figure 8-34. Time series plot of hourly observations showing increased PM_{10} concentrations as wind speeds and gusts increase.

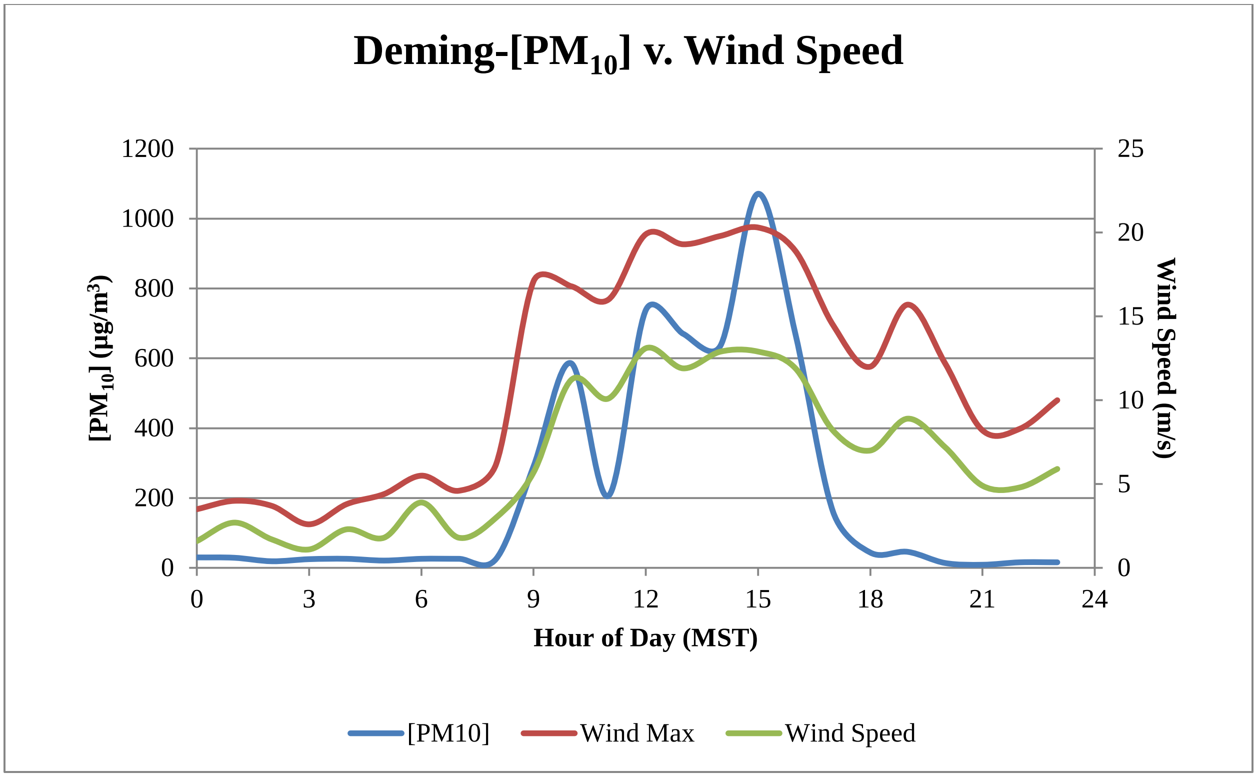

Figure 8-35. Time series plot of hourly observations showing increased PM_{10} concentrations as wind speeds and gusts increase.

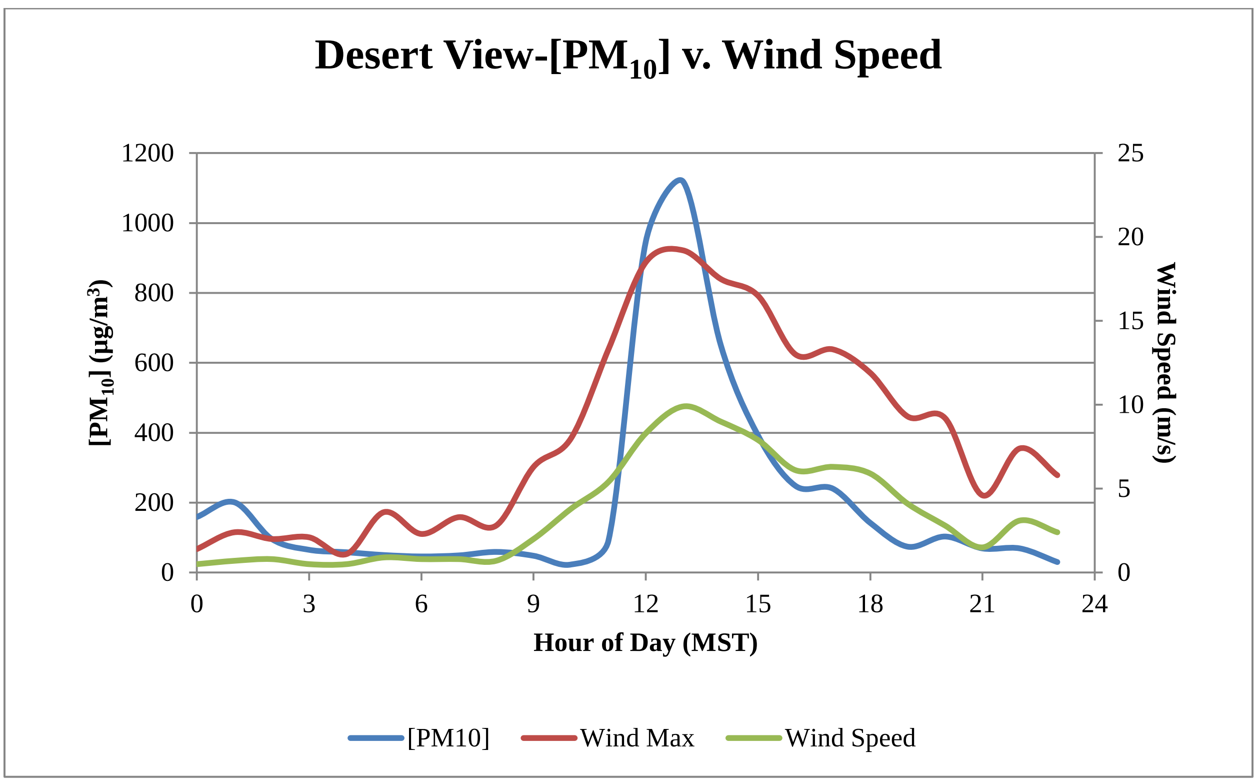

Figure 8-36. Time series plot of hourly observations showing increased PM_{10} concentrations as wind speeds and gusts increase.

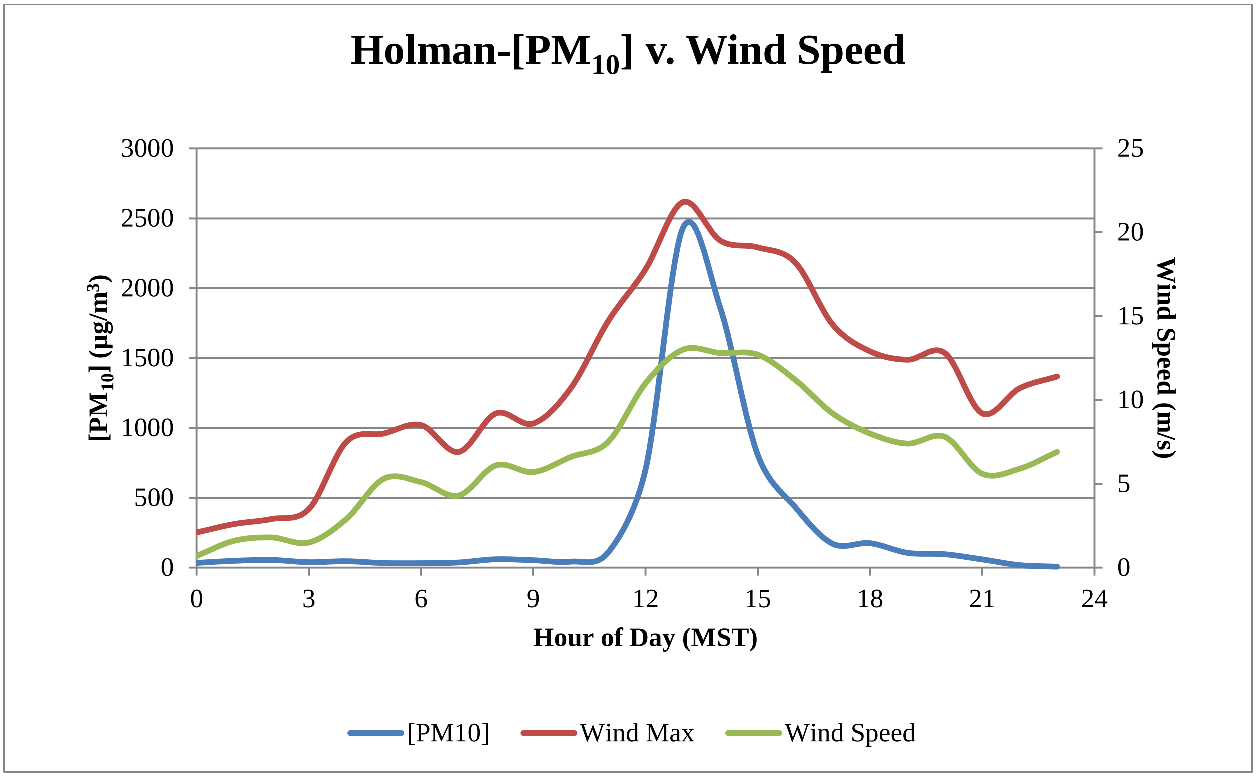

Figure 8-37. Time series plot of hourly observations showing increased PM_{10} concentrations as wind speeds and gusts increase.

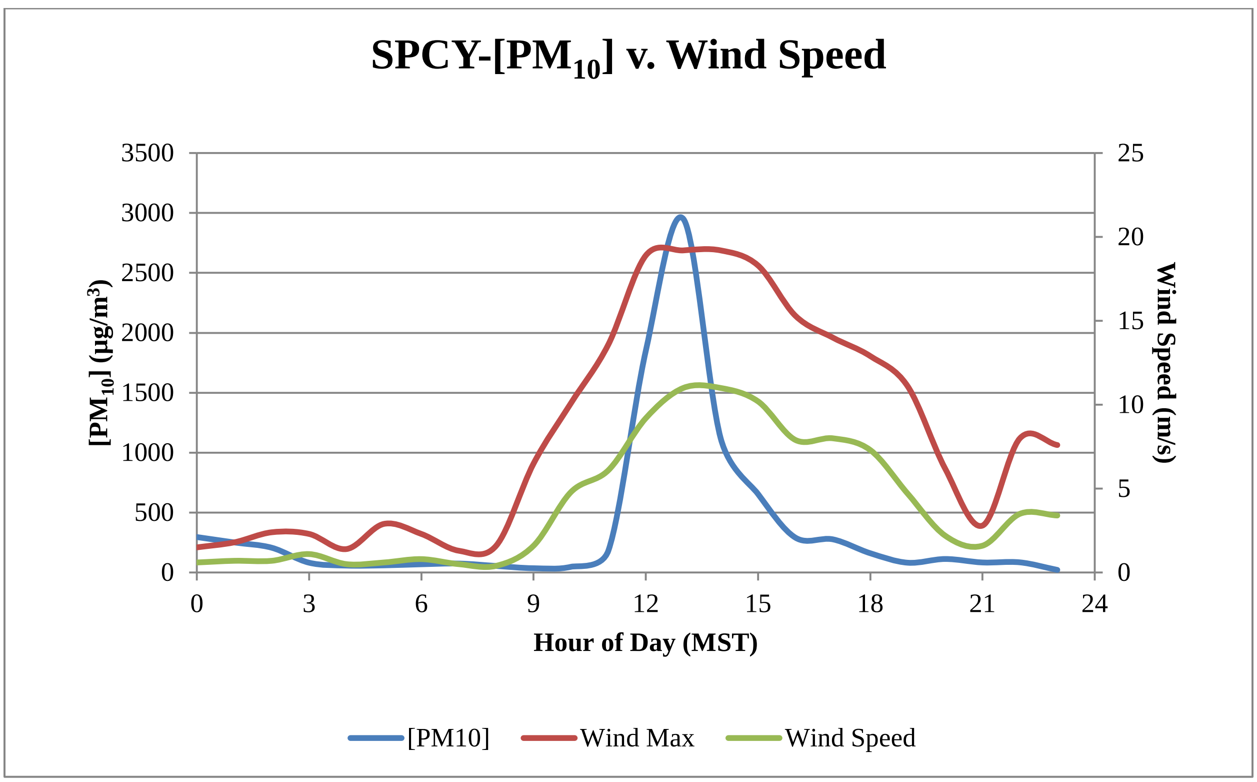

Figure 8-38. Time series plot of hourly observations showing increased PM_{10} concentrations as wind speeds and gusts increase.

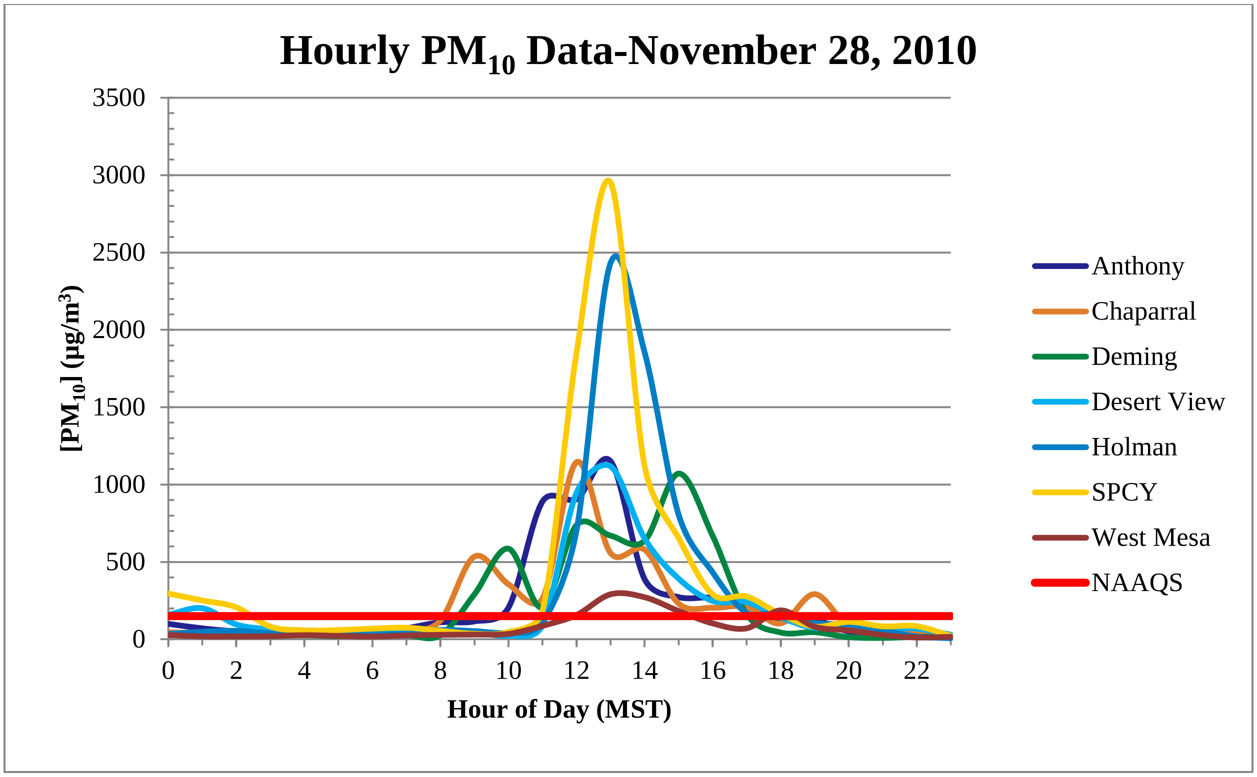

Figure 8-39. Hourly PM_{10} concentrations for Doña Ana and Luna Counties monitors on November 28, 2010.

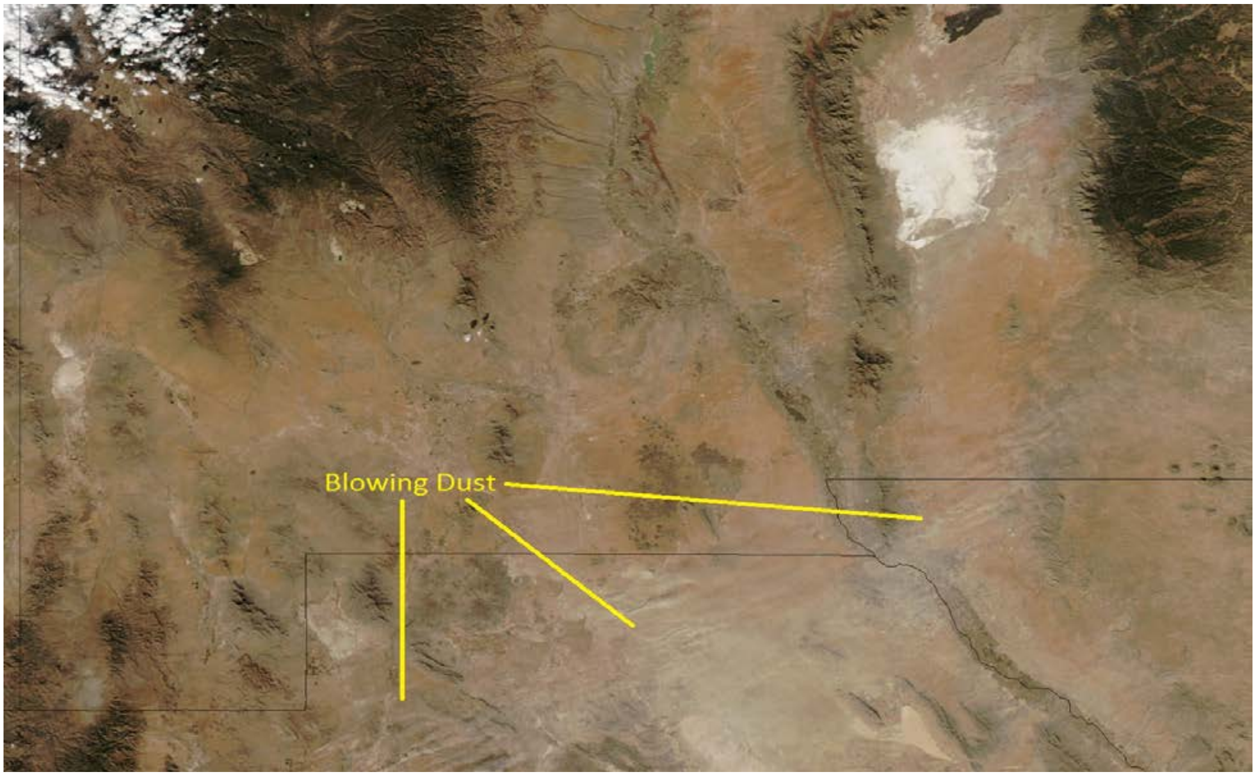

Figure 8-40. Satellite imagery of blowing dust on November 28, 2010 at the 1325 hour. Image courtesy of NASA.

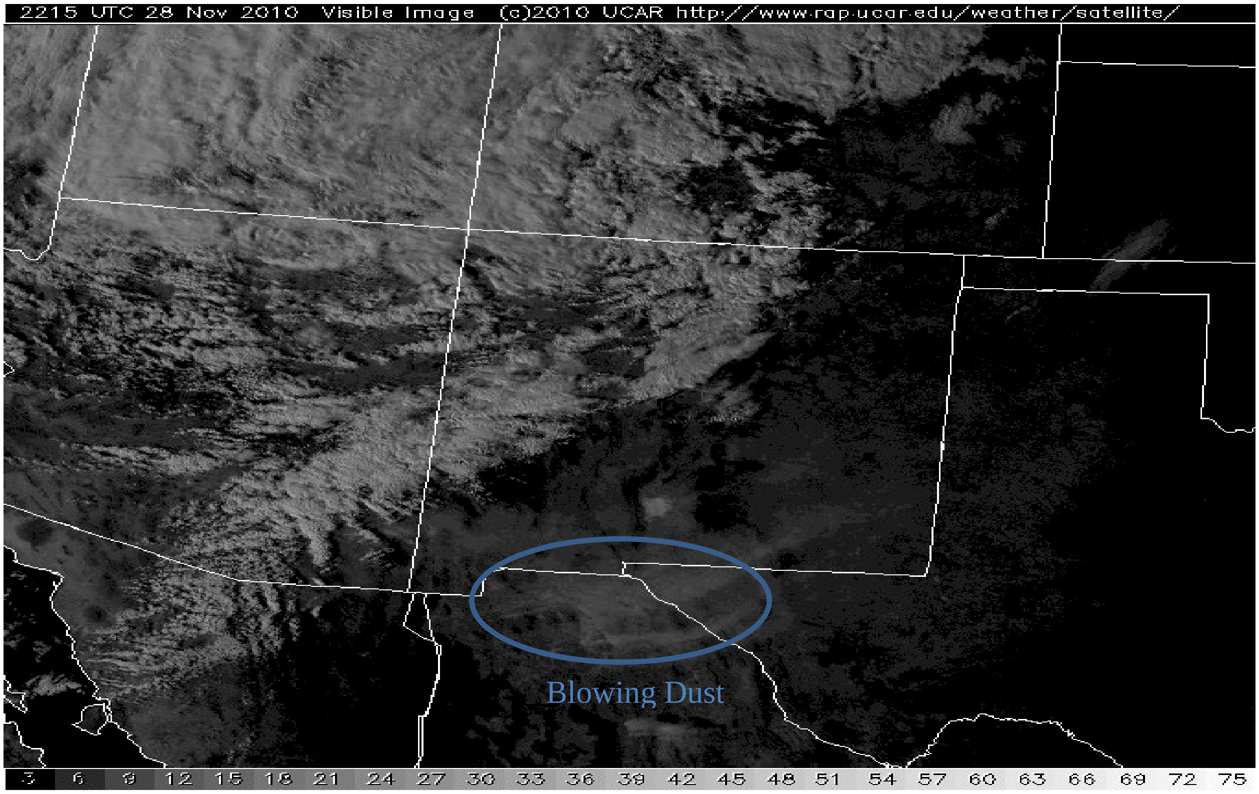

Figure 8-41. Satellite imagery of blowing dust on November 28, 2010 using images at the 1515 hour. Image courtesy of UCAR.

8.5 Affects Air Quality

The historical fluctuations and clear causal relationship analyses prove that the event in question affected air quality on November 28, 2010.

8.6 Natural Event

The CCR and nRCP analyses show that this was a natural event caused by high wind and blowing dust.

8.7 No Exceedance but for the Event

The Anthony monitor detected blowing dust around the 1000 hour with hourly concentrations heavily impacted until the 1700 hour. These eight hourly PM_{10} values alone, exceed the 24-hour average standard at Anthony [(205 + 891 + 906 + 1151 + 389 + 273 + 268 + 214) µg/m^3 = 4,297 µg/m^3; (4,297 µg/m^3)/24 = 179 µg/m^3]. By replacing these eight hourly values with the 95th percentile of hourly data at the Anthony site, the resulting 24-hour average (93 µg/m^3) does not exceed the NAAQS (Table 8-2). The values in red represent the 95th percentile of all hourly data collected at Anthony in the table below. NMED concludes that without the high wind and blowing dust at the Anthony site an exceedance would not have occurred.

Hour of Day (MST)	Recorded Hourly Data	Substituted Hourly Data
0	100	100
1	71	71
2	51	51
3	43	43
4	50	50
5	53	53
6	47	47
7	72	72
8	110	110
9	116	116
10	205	**84**
11	891	**94**
12	906	**118**
13	1151	**136**
14	389	**160**
15	273	**161**
16	268	**163**
17	214	**195**
18	125	125
19	126	126
20	51	51
21	54	54
22	29	29
23	13	13
24-Hour Average	225	**93**

Table 8-2. Anthony: 95th percentile of data substituted for those hours when windblown dust was the most intense does not result in an exceedance at Anthony.

The Chaparral monitor detected blowing dust at the 900 hour with hourly concentrations heavily impacted until the 1700 hour. These hourly PM_{10} values alone, exceed the 24-hour average standard at Chaparral [(535 + 356 + 264 + 1145 + 557 + 580 + 231 + 204 + 210) µg/m^3 = 4,082 µg/m^3; (4,082 µg/m^3)/24 = 170 µg/m^3]. By replacing these hourly values with the 95th percentile of hourly data for the Chaparral site, the resulting 24-hour average (95 µg/m^3) does not exceed the NAAQS (Table 8-3). The values in red represent the 95th percentile of all hourly data collected at Chaparral in the table below. NMED concludes that without the high wind and blowing dust at the Chaparral site an exceedance would not have occurred.

Hour of Day (MST)	Recorded Hourly Data	Substituted Hourly Data
0	44	44
1	43	43
2	52	52
3	55	55
4	39	39
5	48	48
6	49	49
7	55	55
8	122	122
9	535	**83**
10	356	**82**
11	264	**92**
12	1145	**116**
13	557	**134**
14	580	**159**
15	231	**154**
16	204	**157**
17	210	**187**
18	103	103
19	292	292
20	85	85
21	78	78
22	41	41
23	15	15
24-Hour Average	216	**95**

Table 8-3. Chaparral: 95th percentile of data substituted for those hours when windblown dust was the most intense does not result in an exceedance at Chaparral.

The Deming monitor detected blowing dust at the 900 hour with hourly concentrations heavily impacted until the 1600 hour. These hourly PM_{10} values from alone, exceed the 24-hour average standard at Deming [(1720 + 901 + 168 + 418 + 277 + 196) $\mu g/m^3$ = 4,868 $\mu g/m^3$; (4,868 $\mu g/m^3$)/24 = 203 $\mu g/m^3$]. By replacing these hourly values with the 95th percentile of hourly data for the Deming site, the resulting 24-hour average (66 $\mu g/m^3$) does not exceed the NAAQS (Table 8-4). The values in red represent the 95th percentile of all hourly data collected at Deming in the table below. NMED concludes that without the high wind and blowing dust at the Deming site an exceedance would not have occurred.

Hour of Day (MST)	Recorded Hourly Data	Substituted Hourly Data
0	30	30
1	29	29
2	19	19
3	25	25
4	26	26
5	21	21
6	26	26
7	26	26
8	26	26
9	291	**87**
10	586	**94**
11	206	**103**
12	738	**130**
13	670	**141**
14	637	**177**
15	1071	**175**
16	669	**152**
17	162	162
18	44	44
19	46	46
20	14	14
21	9	9
22	16	16
23	16	16
24-Hour Average	225	**66**

Table 8-4. Deming: 95th percentile of data substituted for those hours when windblown dust was the most intense does not result in an exceedance at Deming.

The Desert View monitor detected blowing dust at the 1200 hour with hourly concentrations heavily impacted until the 1700 hour. These hourly PM_{10} values alone, equals the 24-hour average standard at Desert View [(947 + 1118 + 652 + 392 + 248 + 240) µg/m^3 = 3,597 µg/m^3; (3,597 µg/m^3)/24 = 150 µg/m^3]. By replacing these eight hourly values with the 95th percentile of hourly data for the Desert View site, the resulting 24-hour average (103 µg/m^3) does not exceed the NAAQS (Table 8-5). The values in red represent the 95th percentile of all hourly data collected at Desert View in the table below. NMED concludes that without the high wind and blowing dust at the Desert View site an exceedance would not have occurred.

Hour of Day (MST)	Recorded Hourly Data	Substituted Hourly Data
0	159	159
1	201	201
2	96	96
3	65	65
4	58	58
5	50	50
6	46	46
7	49	49
8	59	59
9	48	48
10	23	23
11	91	91
12	947	**135**
13	1118	**154**
14	652	**193**
15	392	**216**
16	248	**155**
17	240	**195**
18	142	142
19	74	74
20	103	103
21	69	69
22	69	69
23	30	30
24-Hour Average	209	**103**

Table 8-5. Desert View: 95th percentile of data substituted for those hours when windblown dust was the most intense does not result in an exceedance at Desert View.

The Holman monitor detected blowing dust at the 1200 hour with hourly concentrations heavily impacted until the 1600 hour. These hourly PM_{10} values alone, exceed the 24-hour average standard at Holman [(704 + 2432 + 1856 + 806 + 433) µg/m^3 = 6,231 µg/m^3; (6,231 µg/m^3)/24 = 260 µg/m^3]. By replacing these hourly values with the 95th percentile of hourly data for the Holman site, the resulting 24-hour average (81 µg/m^3) does not exceed the NAAQS (Table 8-6). The values in red represent the 95th percentile of all hourly data collected at Holman in the table below. NMED concludes that without the high wind and blowing dust at the Holman site an exceedance would not have occurred.

Hour of Day (MST)	Recorded Hourly Data	Substituted Hourly Data
0	34	34
1	49	49
2	55	55
3	39	39
4	46	46
5	33	33
6	32	32
7	37	37
8	60	60
9	53	53
10	43	43
11	109	109
12	704	**114**
13	2432	**131**
14	1856	**160**
15	806	**154**
16	433	**152**
17	171	171
18	175	175
19	106	106
20	96	96
21	59	59
22	18	18
23	7	7
24-Hour Average	310	**81**

Table 8-6. Holman: 95th percentile of data substituted for those hours when windblown dust was the most intense does not result in an exceedance at Holman.

The SPCY monitor detected blowing dust at the 1200 hour with hourly concentrations heavily impacted until the 1700 hour. These hourly PM_{10} values alone, exceed the 24-hour average standard at SPCY [(1851 + 2952 + 1121 + 655 + 291 + 277) µg/m^3 = 7,147 µg/m^3; (7,147 µg/m^3)/24 = 298 µg/m^3]. By replacing these hourly values with the 95th percentile of hourly data for the SPCY site, the resulting 24-hour average (121 µg/m^3) does not exceed the NAAQS (Table 8-7). The values in red represent the 95th percentile of all hourly data collected at SPCY in the table below. NMED concludes that without the high wind and blowing dust at the SPCY site an exceedance would not have occurred.

Hour of Day (MST)	Recorded Hourly Data	Substituted Hourly Data
0	296	296
1	251	251
2	207	207
3	82	82
4	58	58
5	60	60
6	69	69
7	75	75
8	55	55
9	36	36
10	48	48
11	184	184
12	1851	**116**
13	2952	**135**
14	1121	**160**
15	655	**160**
16	291	**161**
17	277	**195**
18	161	161
19	82	82
20	113	113
21	84	84
22	85	85
23	22	22
24-Hour Average	379	**121**

Table 8-7. SPCY: 95th percentile of data substituted for those hours when windblown dust was the most intense does not result in an exceedance at SPCY.

9 HIGH WIND EXCEPTIONAL EVENT: December 29, 2010

9.1 Summary of the Event

High winds and blowing dust in southern Doña Ana County resulted in an exceedance of the PM_{10} NAAQS at the SPCY monitoring site on this date. The weather conditions causing high winds did not follow the typical pattern described throughout this demonstration. In front of an approaching Pacific cold front, a slow moving warm front situated above Oklahoma created a pressure gradient and surface trough that caused the high winds throughout New Mexico. The FEM TEOM continuous monitor at SPCY recorded a 24-hour average concentration of 207 $\mu g/m^3$. In accordance with the EER, the AQB flagged this data on EPA's AQS database as a high wind natural event on or before June 1, 2011. Although no other monitoring site recorded an exceedance on this date, elevated PM_{10} concentrations were measured at Anthony (126 $\mu g/m^3$), Chaparral (135 $\mu g/m^3$), and Deming (90 $\mu g/m^3$) monitoring sites (Figure 9-1). The averages in this figure were calculated using FEM TEOM instrument data for the four days before and after the event. The large spike on the following day was the result of the cold front passing through New Mexico causing high wind and blowing dust (see Section 10).

As the event unfolded, the wind blew from the west-southwest throughout the border region. These high velocity winds passed over large areas of desert within New Mexico and Mexico. The co-occurrence of high winds and elevated levels of blowing dust, little to no point sources in the area, and the high hourly and daily PM_{10} concentrations support the assertion that this was an exceptional event, specifically a natural event caused by high wind and blowing dust.

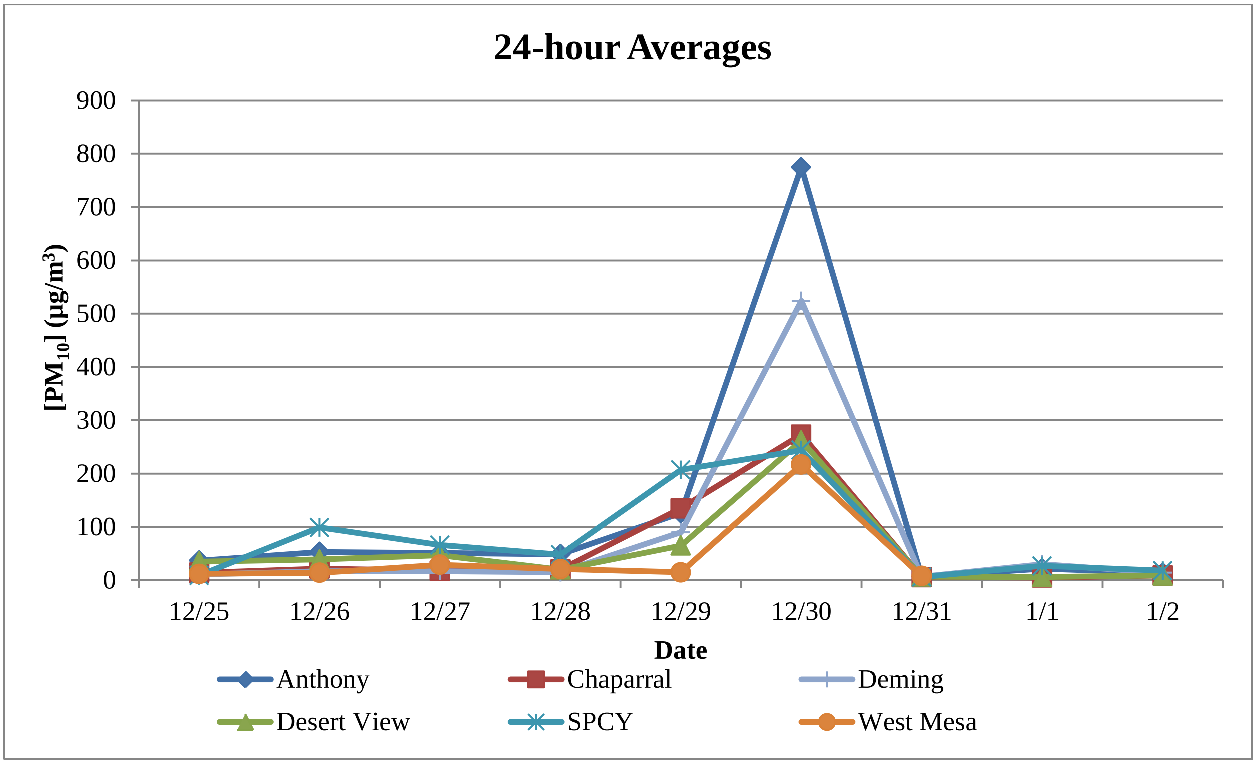

Figure 9-1. PM_{10} 24-hour averages four days before and after December 29, 2010.

9.2 Is Not Reasonably Controllable or Preventable

9.2.1 Suspected Source Areas and Categories Contributing to the Event

Sources of windblown dust contributing to this exceedance include the natural desert, residential properties, agricultural land and unpaved roads in Mexico and New Mexico. Doña Ana County Ordinance requires BACM for any dust producing activities. The Camino Real Landfill may have contributed to this exceedance as well. The landfill has a current Title V operating permit with a dust control plan containing high wind event control measures. The largest and most likely sources of windblown dust are desert lands in New Mexico and Mexico (see Section 9.2.4 below).

9.2.2 Sustained and Instantaneous Wind Speeds

EPA has indicated that sustained wind speeds of at least 11.2 m/s (25 mph) would be used as the default entrainment threshold for natural and well controlled anthropogenic sources contributing to natural events caused by high wind and blowing dust (EPA, 2011). Under the Doña Ana and Luna County NEAPs, EPA and NMED agreed that wind gusts exceeding 18 m/s would overwhelm any natural and well-controlled anthropogenic sources and cause windblown dust. On December 29, sustained wind speeds exceeded EPA's default threshold and wind gusts exceeded the NEAPs agreed upon threshold at the Deming and Chaparral monitoring sites (Figures 9-2 and 9-3). The meteorological tower at the Anthony site measures wind speed at two meters instead of the customary 10 meters. Due to this fact, this demonstration uses data from La Union (the closet site measuring wind speed at 10 m).

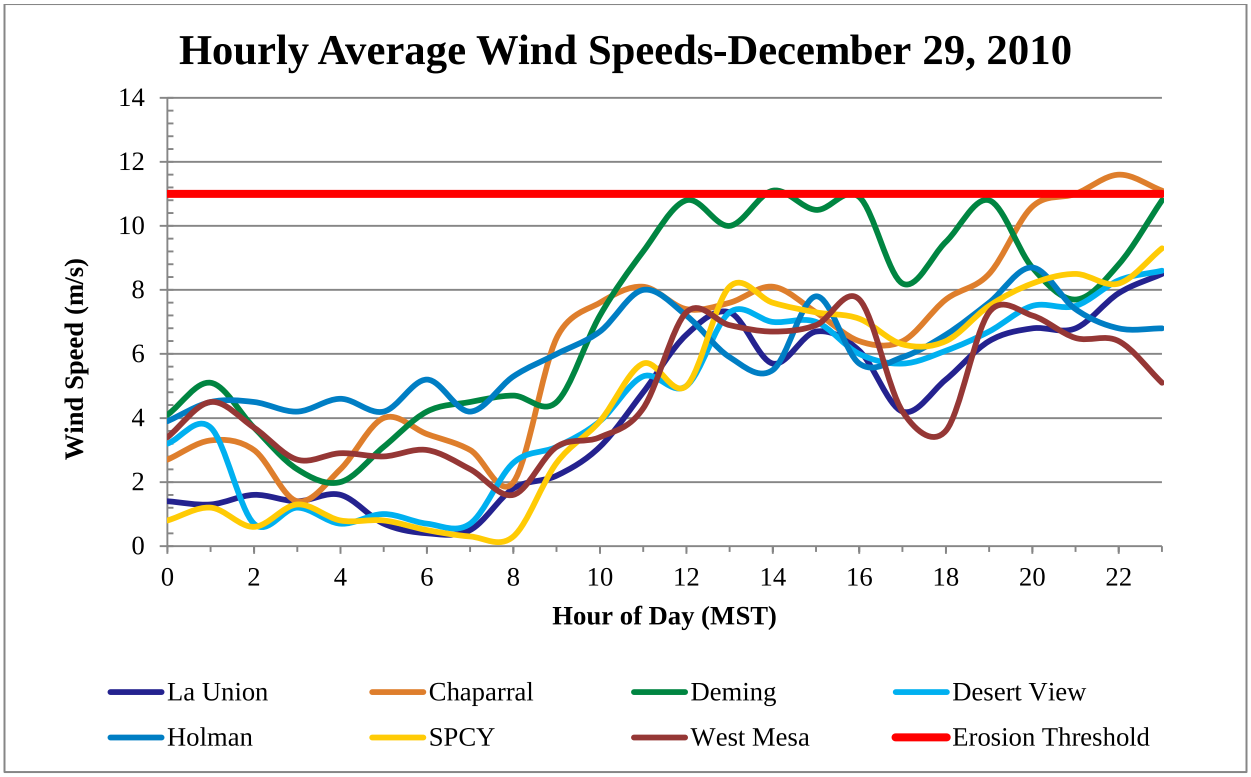

Figure 9-2. Sustained wind speeds at monitoring sites in Doña Ana and Luna Counties.

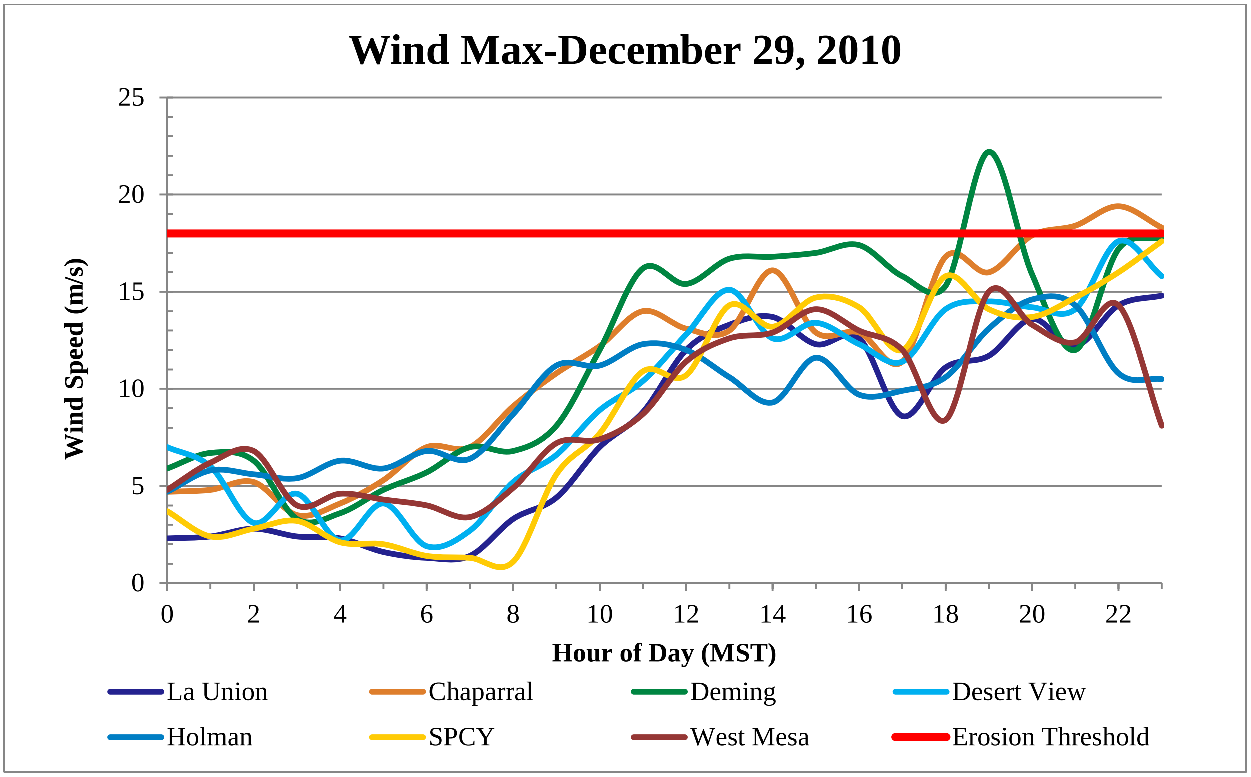

Figure 9-3. Maximum wind gusts at monitoring sites in Doña Ana and Luna Counties.

9.2.3 Recurrence Frequency

The SPCY monitoring site records exceedances of the PM_{10} NAAQS throughout the year. From 2003-2009 the FEM TEOM monitor has recorded 68 exceedances and the FRM Wedding monitor has recorded three exceedances (Figure 9-4). This large disparity in the number of monitored exceedances is due to the FRM Wedding sampling schedule of 1-in-6 days. There is additional evidence that under high loading conditions, the FEM TEOM monitors record 1.5 to 2.5 times higher concentrations as do the FRM Weddings (TCEQ and NMED observations).

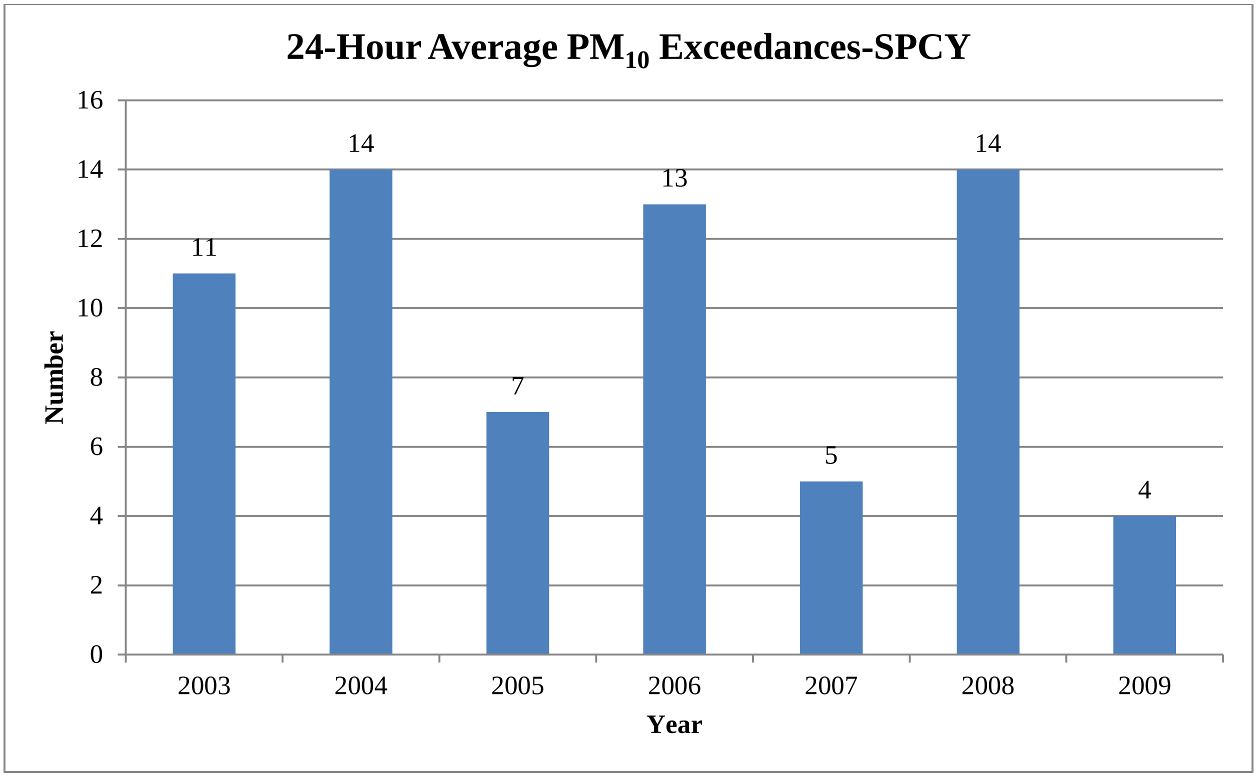

Figure 9-4. PM_{10} exceedances recorded at SPCY.

9.2.4 Controls Analysis

The local ordinances and MOUs adopted under the NEAP direct the implementation of BACM for sources of dust in Doña Ana County. The ordinances regulate disturbed lands, construction and demolition, vacant parking lots and materials handling and transportation. Our investigation did not identify any unusual PM_{10} producing activities on this day, and anthropogenic emissions remained constant before, during and after the event. The most likely source contributing to the event is desert lands in New Mexico.

The Camino Real Landfill's dust control plan uses a combination of control measures to limit fugitive dust emissions at the facility. Control measures include watering (~70,000 gal/day), application of stabilizer on a quarterly basis, rock armoring, vegetative ground cover, speed limits, site access restrictions and site design and development to provide windbreaks and limit disturbed surface areas. These control measures limit emissions from unpaved parking lots, haul and access roads, disturbed surface areas, storage piles and material handling and transport operations. The dust control plan contains control measures during high wind events and includes increasing water application, restricting or terminating non-essential landfill operations and in extreme cases, closing the landfill. Control measures are also in place for after hours, weekends and holidays.

Under the conditions of the landfill's Title V operating permit, they are required to submit annual and semiannual compliance certifications to NMED. In the semiannual compliance certification for the time-period covering the December 29, 2010, Camino Real Landfill reported that they followed their dust control plan and recordkeeping requirements.

The southern Doña Ana and Deming sites recorded the highest 24-hour averages in the monitoring network. A back-trajectory analysis using the HYSPLIT (Draxler et al., 2011; Rolph, 2011) model shows that the air masses traveled from southeastern Arizona and southwestern New Mexico to the Deming site. For the southern Doña Ana County sites, air masses travelled from northern Mexico to the monitors. The model starts four hours before the start of elevated PM_{10} concentrations measured during the event (Figure 9-5). The air masses that travelled to the SPCY site crossed directly over the Camino Real Landfill (Figure 9-6). Costs prohibit controlling dust from the natural desert terrain and falls outside NMED's jurisdiction when it originates in Mexico. NMED concludes that the anthropogenic sources contributing to the event were reasonably controlled and the natural sources are not reasonably controllable.

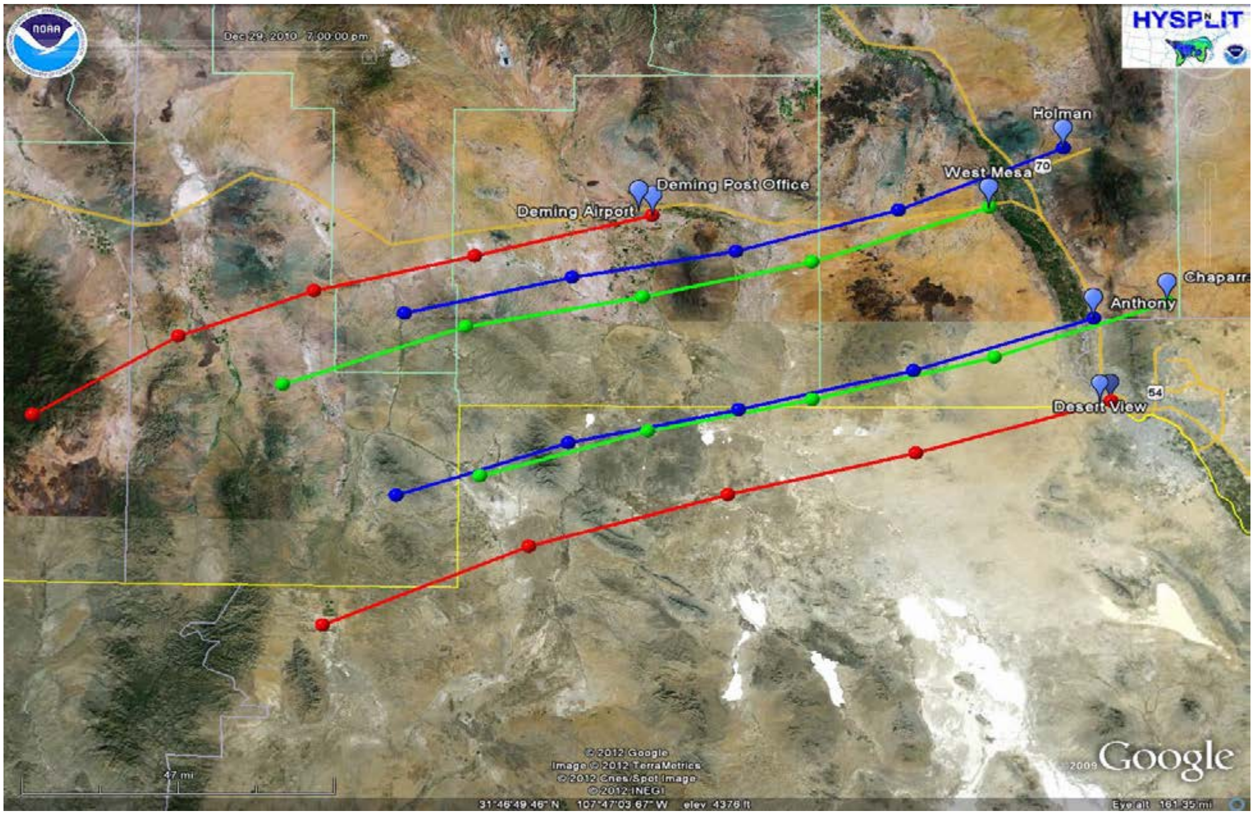

Figure 9-5. HYSPLIT back-trajectory model analysis for December 29, 2010.

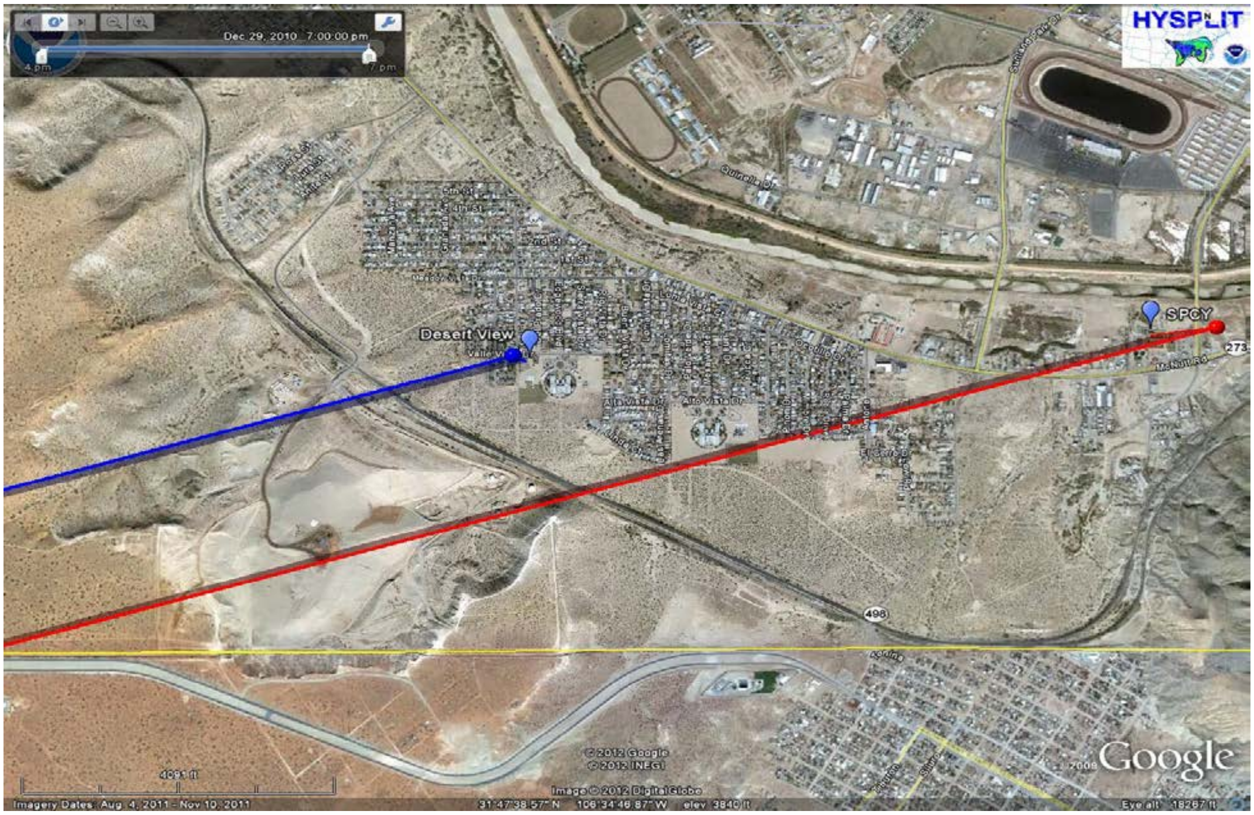

Figure 9-6. HYSPLIT back-trajectory model analysis for December 29, 2010 zoomed in on the SPCY and Desert View sites.

9.3 Historical Fluctuations Analysis

9.3.1 Annual and Seasonal 24-hour Average Fluctuations

The SPCY site has recorded PM_{10} exceedances every year since continuous FEM TEOM monitoring was established. High winds caused the majority of exceedances and can occur during any time of year (Figure 9-7). Most exceedances occur from late winter through early summer (February-June) and are usually associated with the passage of Pacific cold fronts. The maximum 24-hour average PM_{10} concentration was 1109 µg/m^3 at SPCY. SPCY is the only site in the network where low wind exceedances occurred. From 2003-2005 the FEM TEOM monitor recorded 14 low wind exceedances. Since 2005, NMED has not recorded a low wind PM_{10} exceedance. Our initial investigation suggests international transport of fugitive dust from unpaved roads in Cd. Juárez and NMED continues to research the cause these pollution episodes. High winds and blowing dust caused all other exceedances at SPCY and NMED submitted natural events demonstrations to EPA under the NEAP or EER.

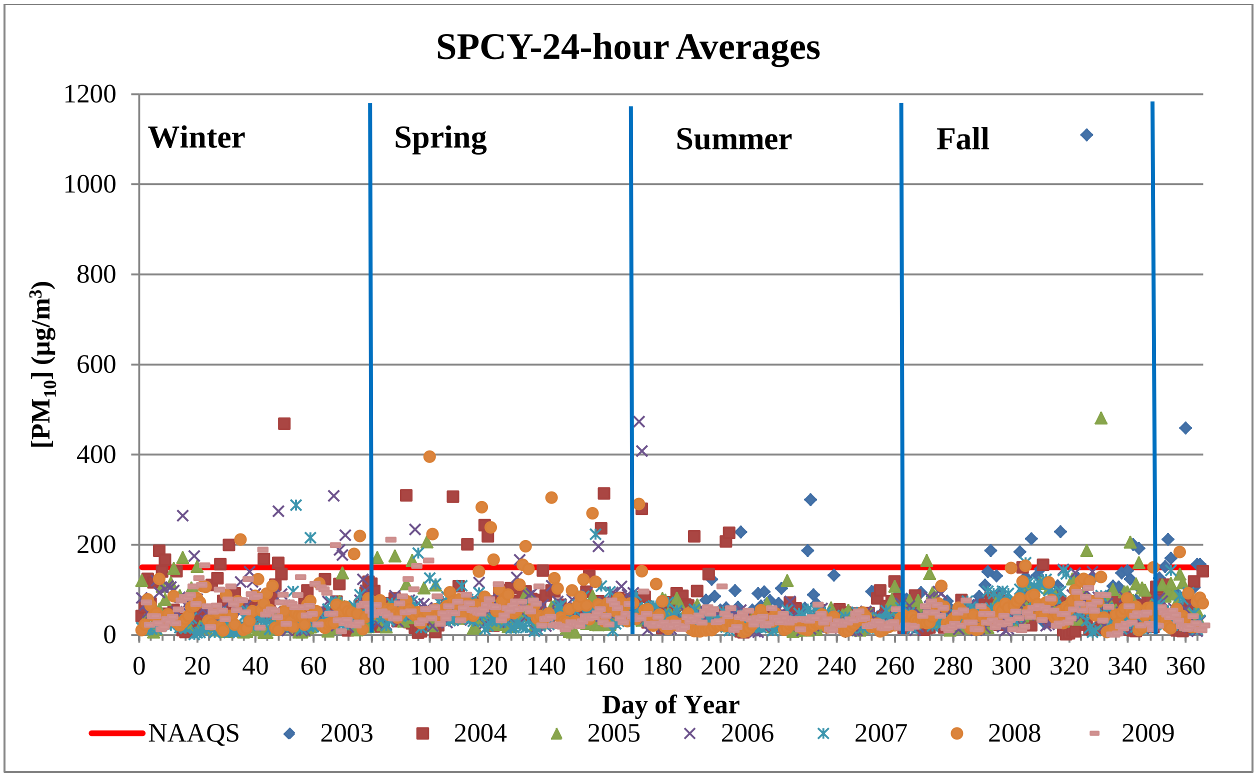

Figure 9-7. 24-hour average PM_{10} concentrations (FEM TEOM data) by day of year from 2003-2009

Table 9-1 shows normal historical fluctuations with and without high wind natural events that caused exceedances from 2003-2009. The analysis excludes only those high wind events that resulted in an exceedance (low wind exceedances included in no events row). Data in this table include FRM Wedding and FEM TEOM data from 2003-2009. The recorded value for this day (199 µg/m^3 on 02/10/10) is above the maximum value recorded when no high wind exceedances are included and is above the 95th percentile of all 24-hour averages recorded.

SPCY	Max	99th	95th	75th	50th	Mean	25th	5th	Minimum
No Events	212	143	108	60	39	46	24	11	0
Events	1109	227	123	63	40	51	25	11	0

Table 9-1. 24-hour average PM_{10} data distribution with and without high wind events included.

An hourly data distribution analysis was performed for hourly PM_{10} concentrations, wind speeds and wind gusts (Appendices A, B and C). All data used for the PM_{10} distribution charts come from the FEM TEOM monitor. Overlaying the hourly data for December 29 on the hourly data distribution plots shows that the values recorded during the high wind event exceed the 95th percentile for PM_{10}, wind speed and wind gusts (Figures 9-8 through 9-10). The top whisker of the of the box and whisker plots represent the 95th percentile of data. As stated previously, wind data used here comes from the La Union site. The hourly PM_{10} values during the high wind blowing dust storm far exceed the historical 95th percentile of data.

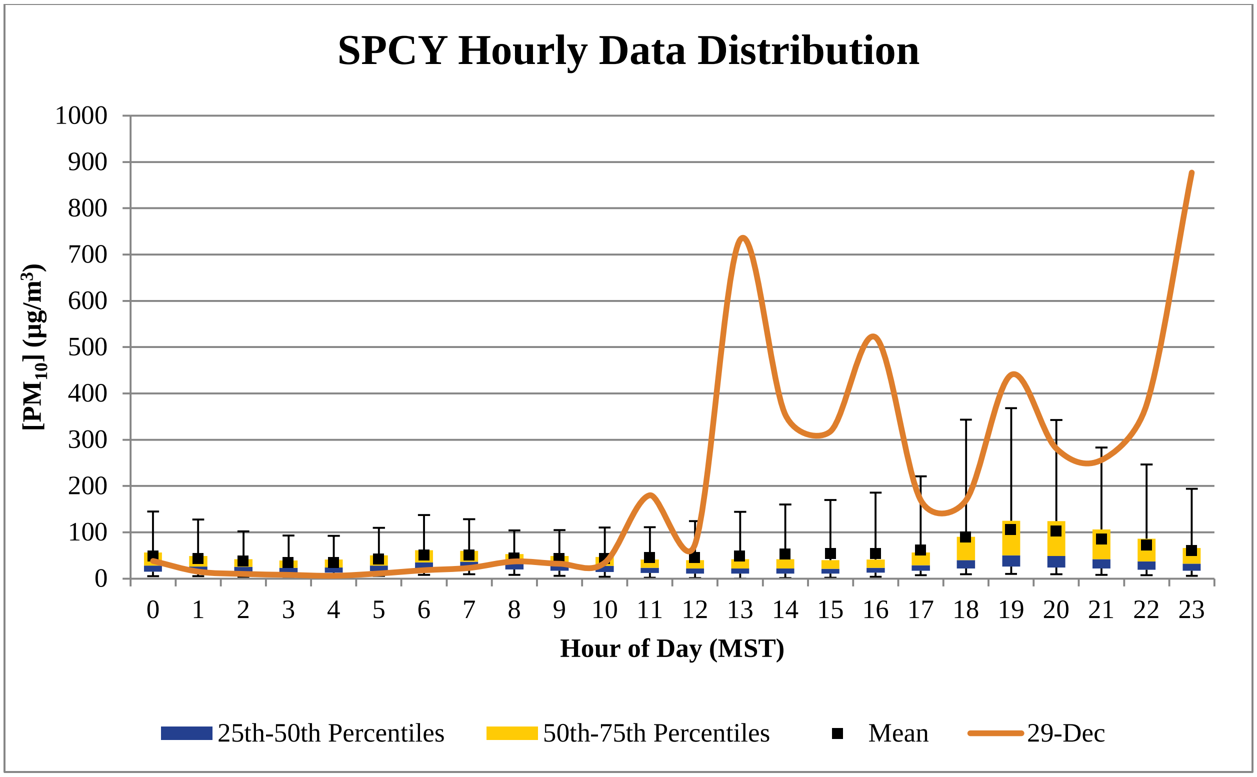

Figure 9-8. PM_{10} hourly data distribution from 2003-2009 overlaid by hourly values for December 29, 2010.

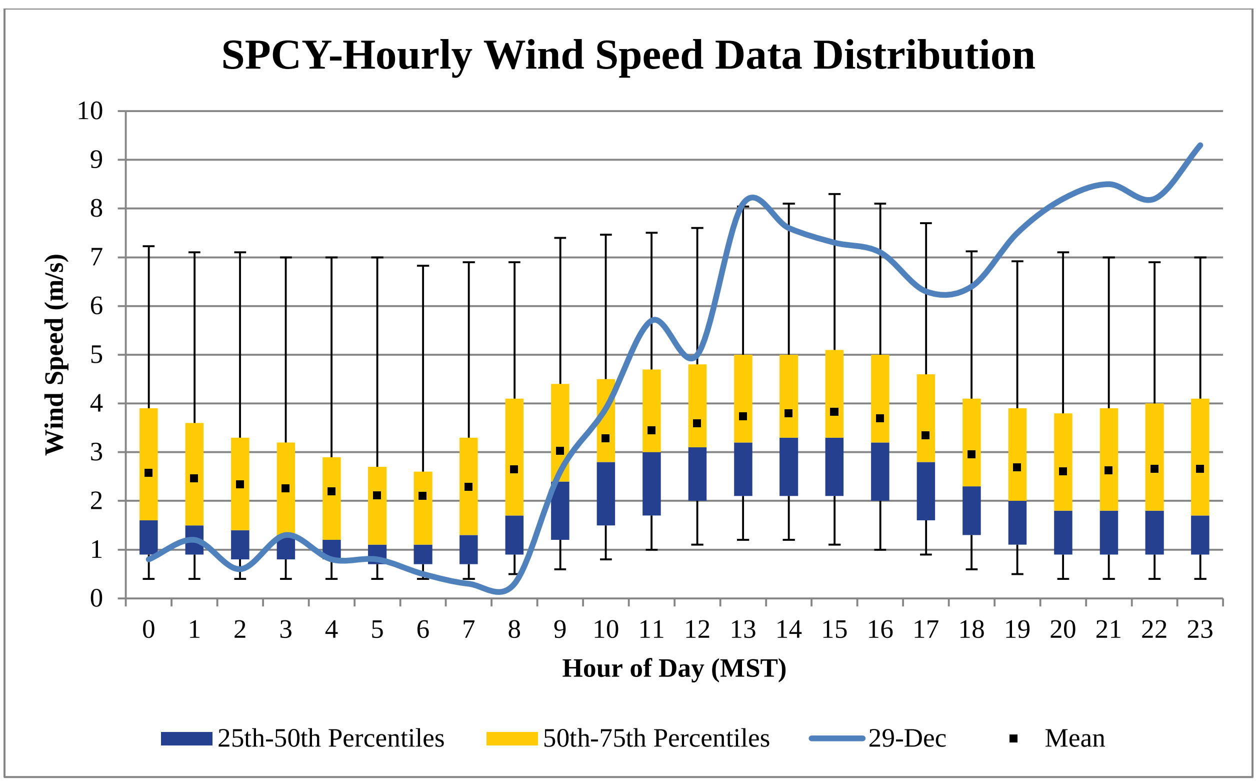

Figure 9-9. Hourly wind speed data distribution from 2003-2009 overlaid by hourly values for December 29, 2010.

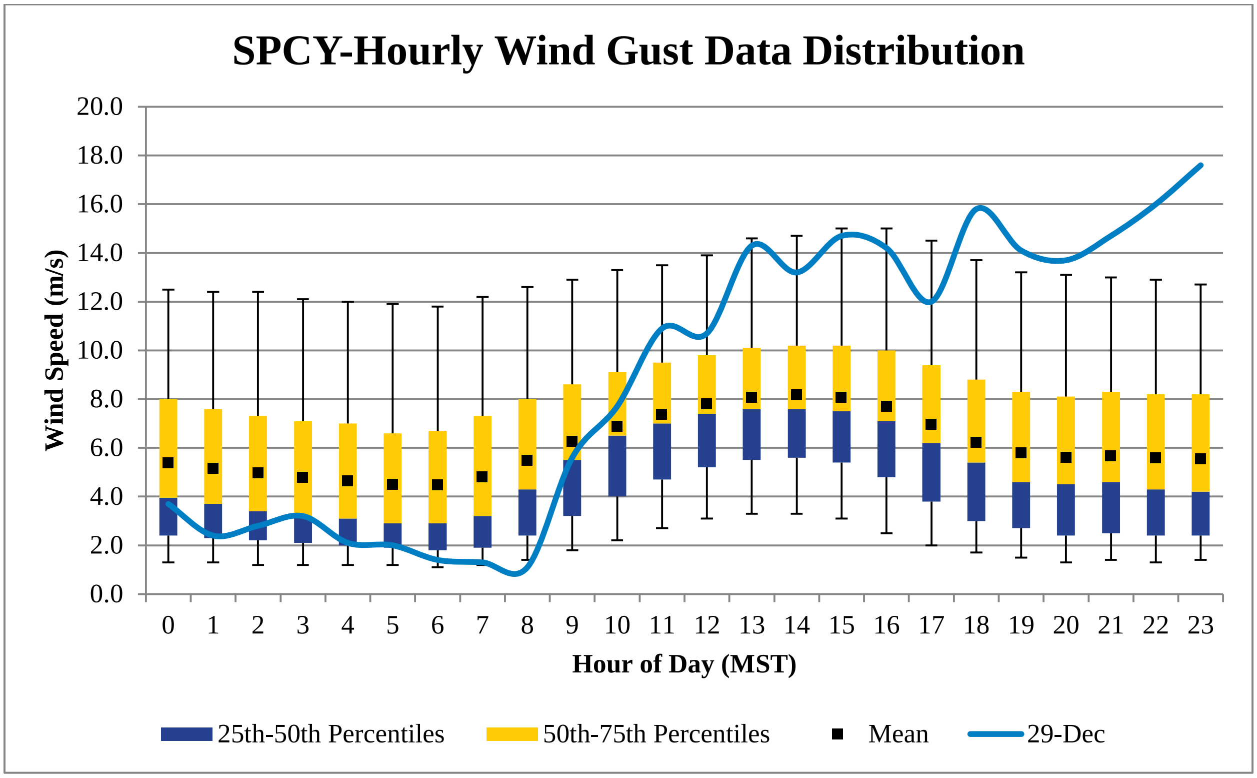

Figure 9-10. Hourly wind gust data distribution from 2003-2009 overlaid by hourly values for December 29, 2010.

9.4 Clear Causal Relationship

Prior to the arrival of a Pacific cold front, a warm front with an area of low pressure along the Oklahoma, Colorado and Kansas border created a pressure gradient over southeastern Arizona, southwestern New Mexico and northern Mexico. The center of low pressure also created a surface trough bisecting New Mexico from the southwest to northeast corner and caused high winds (Figure 9-11). In the evening, the Pacific cold front moved across California and into Arizona, pushing the warm front to the northeast and tightening the pressure gradient over southeastern Arizona, southwestern New Mexico and northern Mexico. Surface winds flow perpendicular to the isobars from high to low pressure. Unlike most high wind blowing dust days, an upper level low pressure system was not associated with the early hours of the event and winds aloft did not enhance surface flows (Figure 9-11). Diurnal heating provided the turbulence required for vertical mixing and horizontal transport of dust.

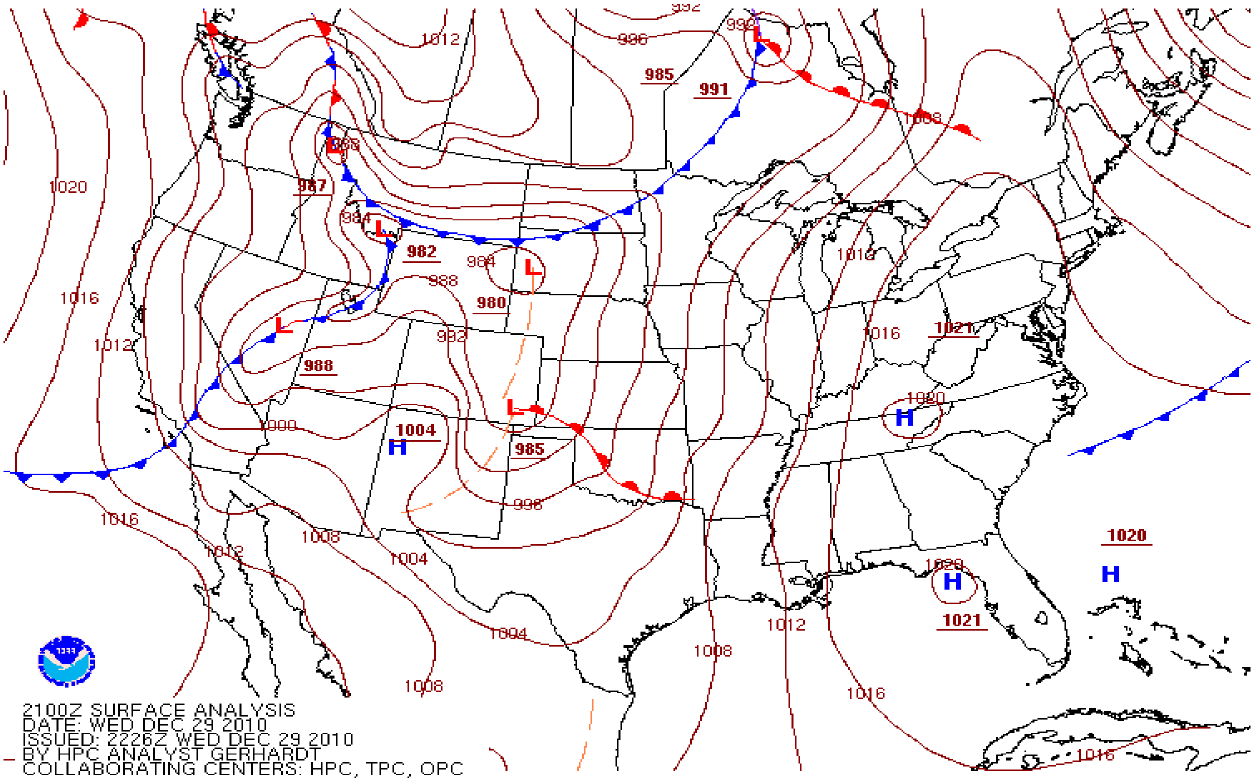

Figure 9-11. Surface weather map showing frontal activity and isobars of constant pressure (red lines) for December 29, 2010 at the 1400 hour MST.

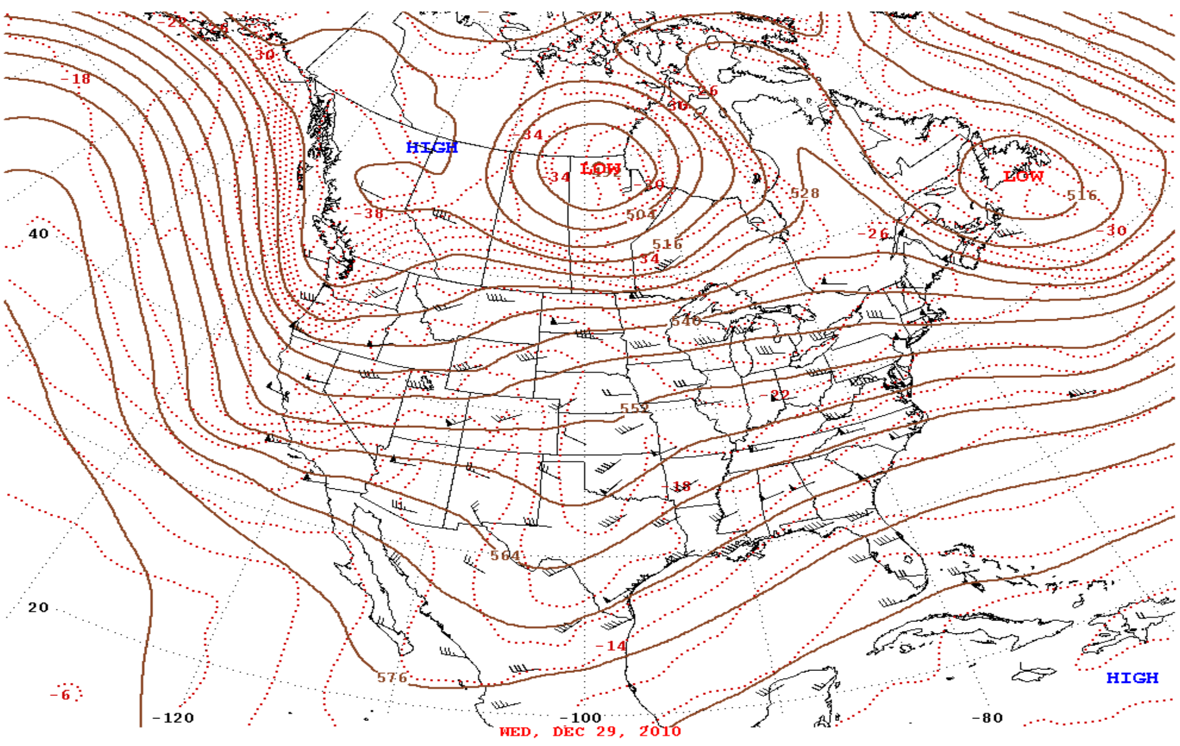

Figure 9-12. Upper air weather map showing geopotential heights (brown lines) at the 500 hour on December 29, 2010.

The weather pattern described above generated west-southwesterly winds beginning at the 1300 hour and lasting through the day. Beginning at the 1300 hour, wind speeds exceeded the historical 95th percentile of data at SPCY as shown in Figure 9-9. Peak wind gusts ranged from 15 m/s at La Union to 22 m/s at Deming (Figure 9-3). Peak wind speeds ranged from 11 m/s at SPCY to 12 m/s at Chaparral (Figure 9-2). Blowing dust caused elevated levels of PM_{10} during the same period as high winds as demonstrated by the time series plot in Figure 9-13. Hourly PM_{10} concentrations spiked at all monitoring sites in the network beginning at the 1300 hour (Figure 9-14).

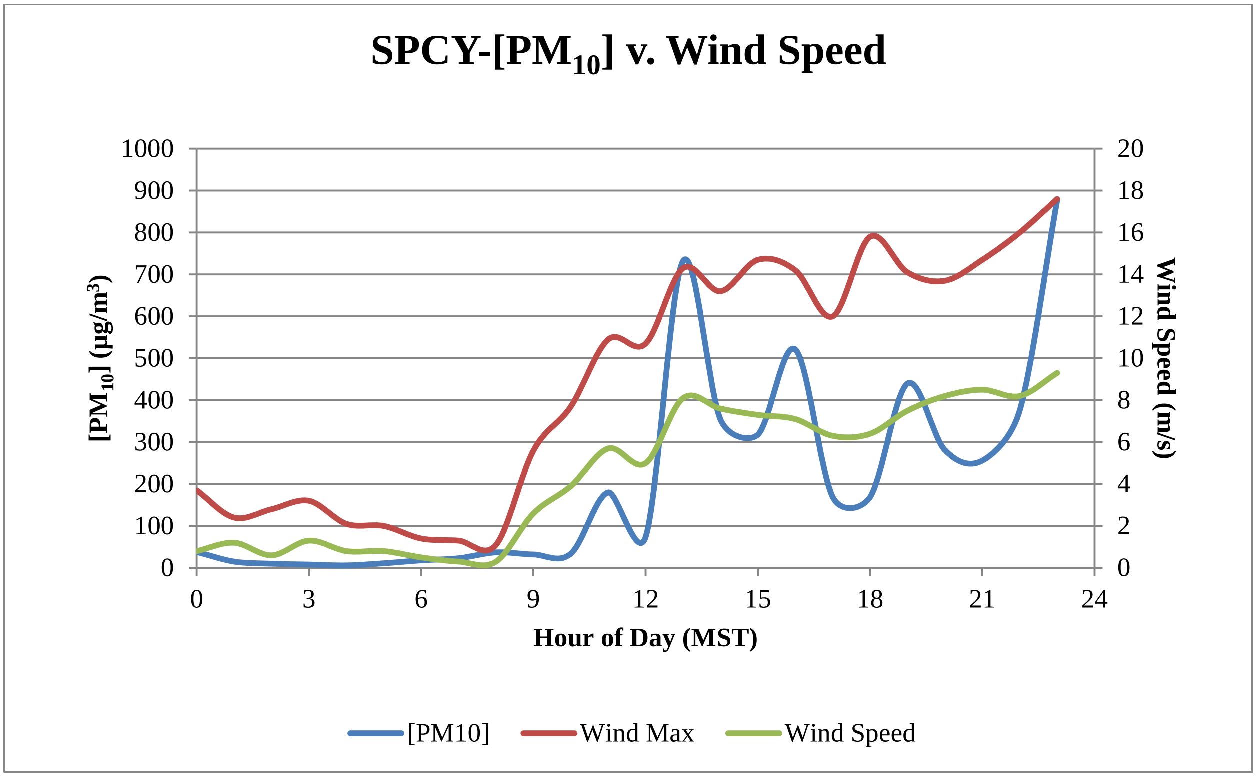

Figure 9-13. Time series plot of hourly observations showing increased PM_{10} concentrations as wind speeds and gusts increase.

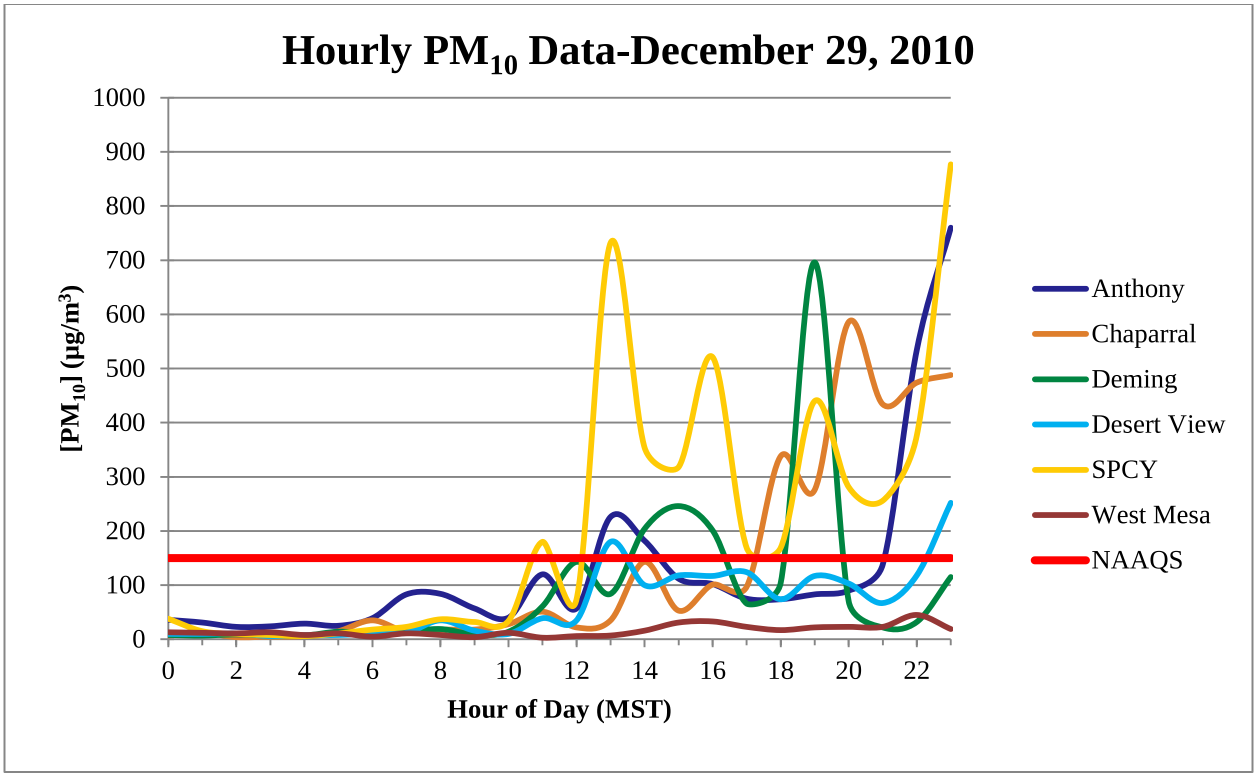

Figure 9-14. Hourly PM_{10} concentrations for Doña Ana and Luna Counties monitors.

9.5 Affects Air Quality

The historical fluctuations and clear causal relationship analyses prove that the event in question affected air quality on December 29, 2010.

9.6 Natural Event

The CCR and nRCP analyses show that this was a natural event caused by high wind and blowing dust.

9.7 No Exceedance but for the Event

The SPCY monitor detected blowing dust around the 1300 hour with hourly concentrations heavily impacted until the 2300 hour. These hourly PM_{10} values alone, exceed the 24-hour average standard at SPCY [(732 + 354 + 318 + 521 + 169 + 169 + 440 + 281 + 256 + 376 + 877) $\mu g/m^3$ = 4,493 $\mu g/m^3$; (4,493 $\mu g/m^3$)/24 = 187 $\mu g/m^3$]. By replacing these hourly values with the 95th percentile of hourly data at the SPCY site, the resulting 24-hour average (95 $\mu g/m^3$) does not exceed the NAAQS (Table 9-2). The values in red represent the 95th percentile of all hourly data collected at SPCY, including data affected by high wind blowing dust events in the table below. NMED concludes that without the high wind and blowing dust an exceedance would not have occurred.

Hour of Day (MST)	Recorded Hourly Data	Substituted Hourly Data
0	38	38
1	15	15
2	10	10
3	8	8
4	6	6
5	11	11
6	18	18
7	23	23
8	37	37
9	32	32
10	34	34
11	180	180
12	74	74
13	732	**135**
14	354	**160**
15	318	**160**
16	521	**161**
17	169	**195**
18	169	**201**
19	440	**193**
20	281	**178**
21	256	**155**
22	376	**133**
23	877	**115**
24-Hour Average	207	**95**

Table 9-2. 95th percentile of data substituted for those hours when windblown dust was the most intense does not result in an exceedance at SPCY.

10 HIGH WIND EXCEPTIONAL EVENT: December 30, 2010

10.1 Summary of the Event

High winds and blowing dust caused exceedances of the PM_{10} NAAQS at the Anthony, Chaparral, Deming, Desert View, SPCY and West Mesa sites on December 30, 2010. Additionally, the SPCY site recorded exceedances of the annual $PM_{2.5}$ NAAQS on this day. Continuous FEM TEOM monitors recorded the PM_{10} exceedances at all sites. The non-continuous FRM Partisol monitor recorded the $PM_{2.5}$ exceedance. Table 1-1 lists all 24-hour averages recorded on this day. In accordance with the EER, the AQB flagged this data in EPA's AQS database as high wind natural events on or before June 1, 2011. Concentrations of PM_{10} spiked on this day compared to the days immediately before and after the event (Figure 10-1).

A strong Pacific cold front and associated upper level weather system passed through New Mexico causing wide spread blowing dust throughout the borderland. As the event unfolded, winds blew from a predominately southwest direction. These high velocity winds passed over large areas of desert within New Mexico and Mexico. The co-occurrence of high winds and elevated levels of blowing dust, little to no point sources in the area, and the high hourly and daily PM_{10} concentrations support the assertion that this was an exceptional event, specifically a natural event caused by high wind and blowing dust.

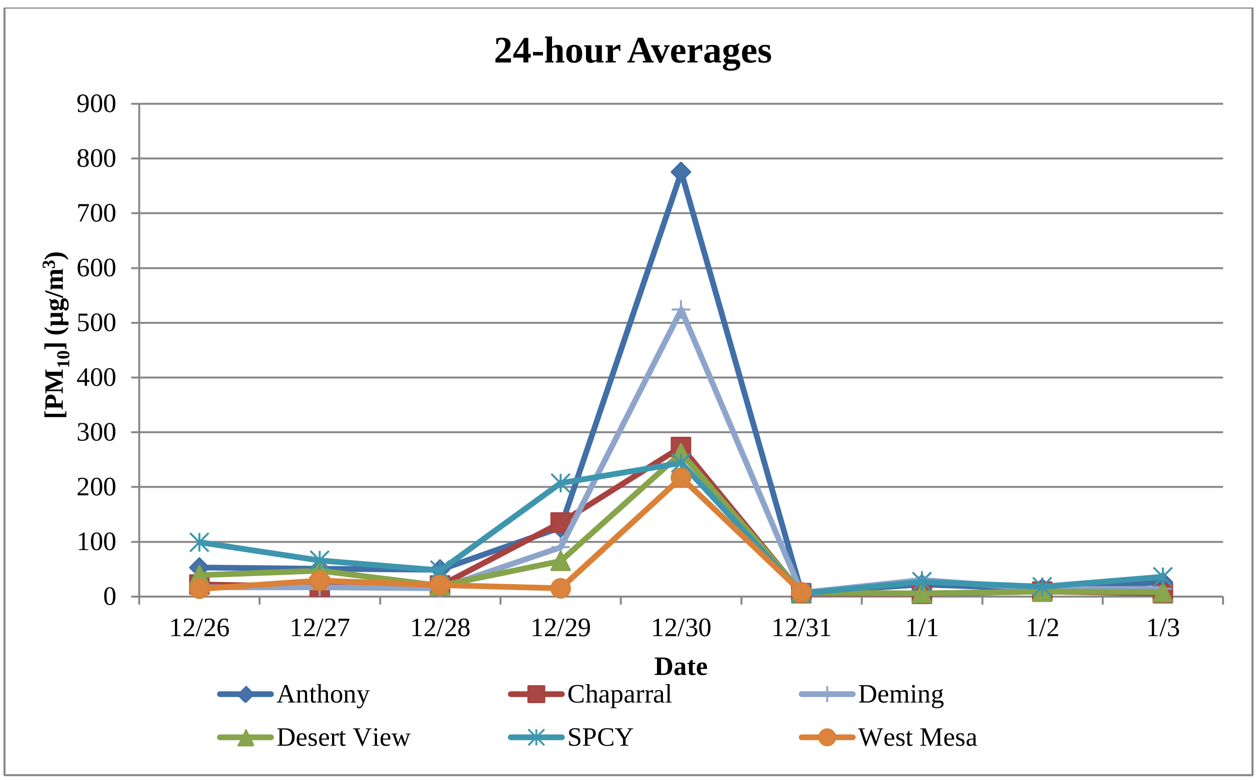

Figure 10-1. PM_{10} 24-hour averages four days before and after December 30, 2010.

10.2 Is Not Reasonably Controllable or Preventable

10.2.1 Suspected Source Areas and Categories Contributing to the Event

Sources of windblown dust contributing to this exceedance include the natural desert, residential properties, agricultural land and unpaved roads in Mexico and New Mexico. Doña Ana County Ordinance requires BACM for any dust producing activities. The largest sources of windblown dust are the playas of northern Mexico and desert land in New Mexico (see Section 10.2.4 below).

10.2.2 Sustained and Instantaneous Wind Speeds

EPA has indicated that sustained wind speeds of at least 11.2 m/s (25 mph) would be used as the default entrainment threshold for natural and well controlled anthropogenic sources contributing to natural events caused by high wind and blowing dust (EPA, 2011). Under the Doña Ana and Luna County NEAPs, EPA and NMED agreed that wind gusts exceeding 18 m/s (40 mph) would overwhelm any natural and well-controlled anthropogenic sources and cause windblown dust. On December 30, sustained wind speeds exceeded 11.2 m/s and wind gusts exceeded 18 m/s at all monitoring sites in southern New Mexico (Figures 10-2 and 10-3). Sustained wind speeds and wind gusts exceeded these thresholds for seven hours at one or more monitoring sites from the 800 to 1400 hour. The meteorological tower at the Anthony site measures wind speed at two meters instead of the customary 10 meters. Due to this fact, this demonstration uses data from La Union (the closet site).

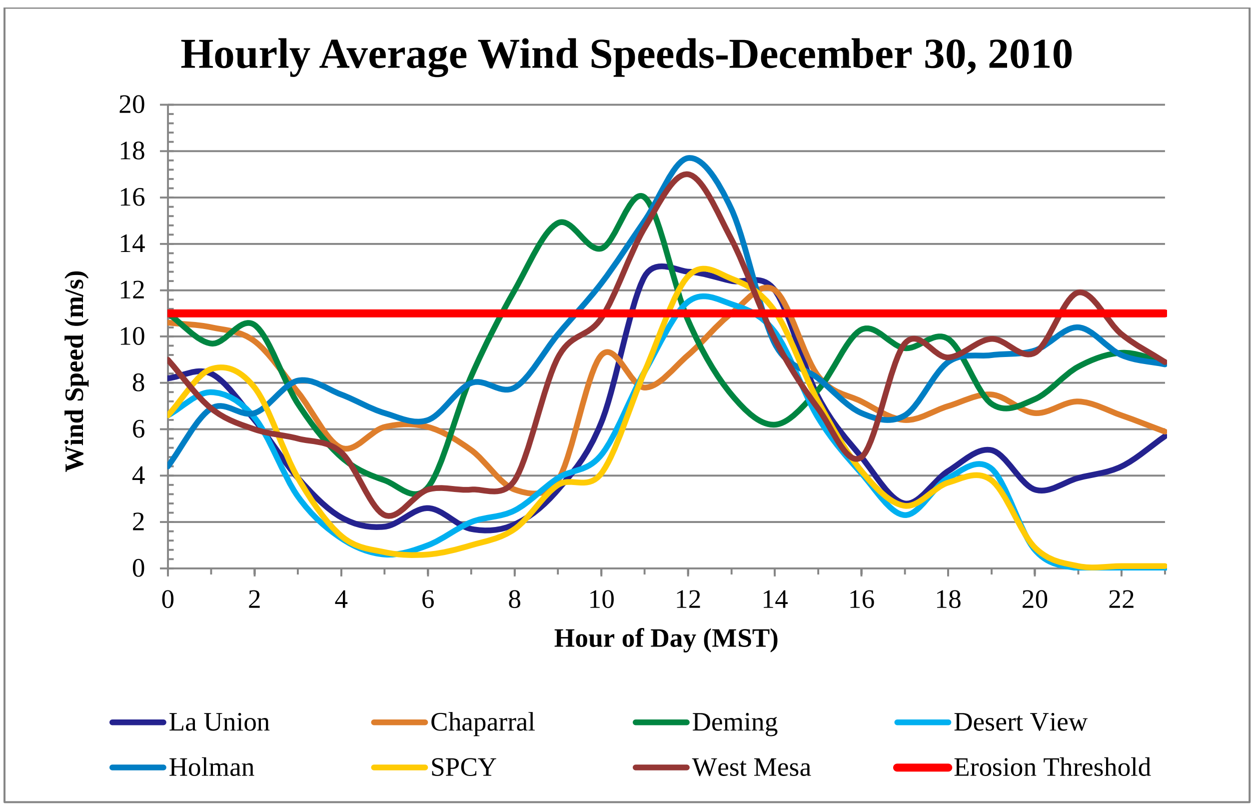

Figure 10-2. Sustained wind speeds at monitoring sites in Doña Ana and Luna Counties.

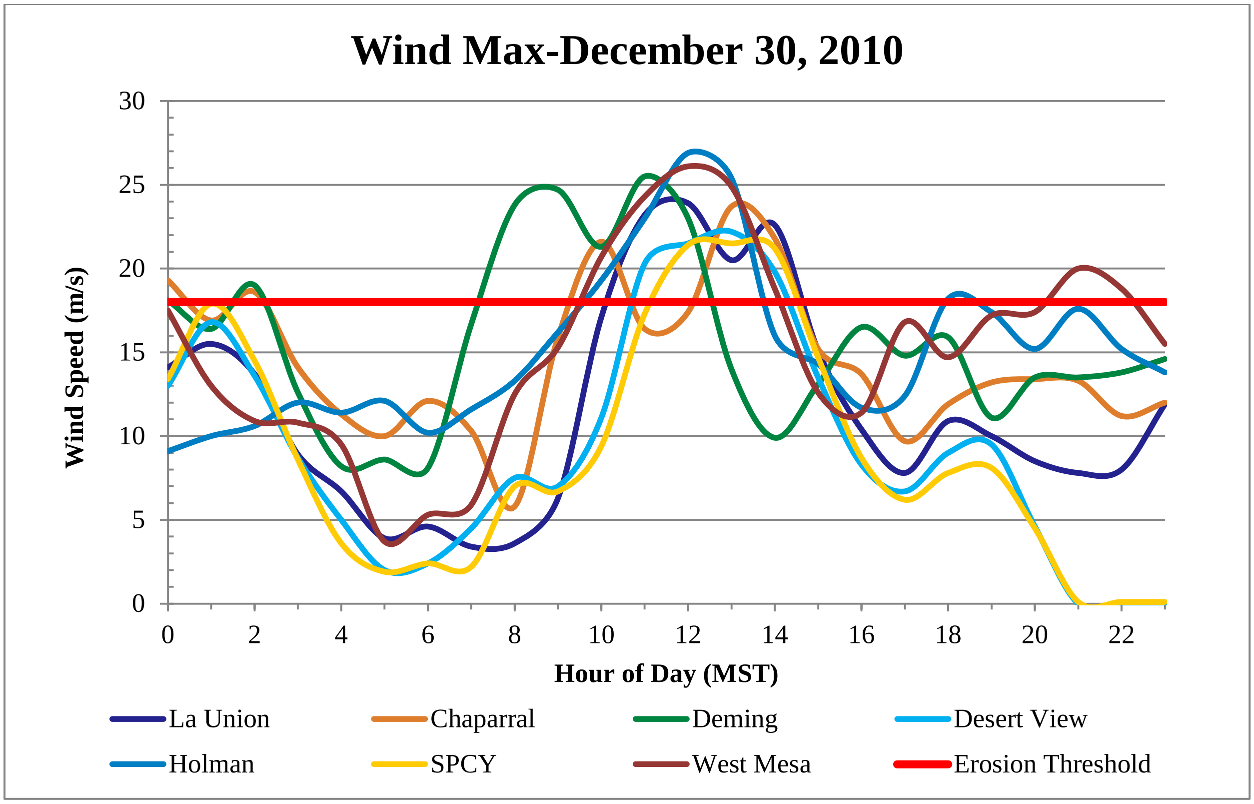

Figure 10-3. Maximum wind gusts at monitoring sites in Doña Ana and Luna Counties.

10.2.3 Recurrence Frequency

The monitoring sites in Doña Ana and Luna Counties can record exceedances of the PM_{10} NAAQS throughout the year. From 2003-2009 the FEM TEOM monitors have recorded 262 exceedances and the FRM Wedding monitors have recorded 10 exceedances (Figure 10-4). This large disparity in the number of monitored exceedances is due to the FRM Wedding sampling schedules of 1-in-6 days. There is additional evidence that under high loading conditions, the FEM TEOM monitors record 1.5 to 4 times higher concentrations as do the FRM Weddings (TCEQ and NMED Observations). The Deming Airport and Desert View monitoring sites (FEM TEOMs) were established in 2006 and 2007 respectively and do not show exceedances until the year following startup (Table 2-1). Also, note that the FEM TEOM monitors at Holman, West Mesa and Chaparral were not part of the SLAMS network until 2006.

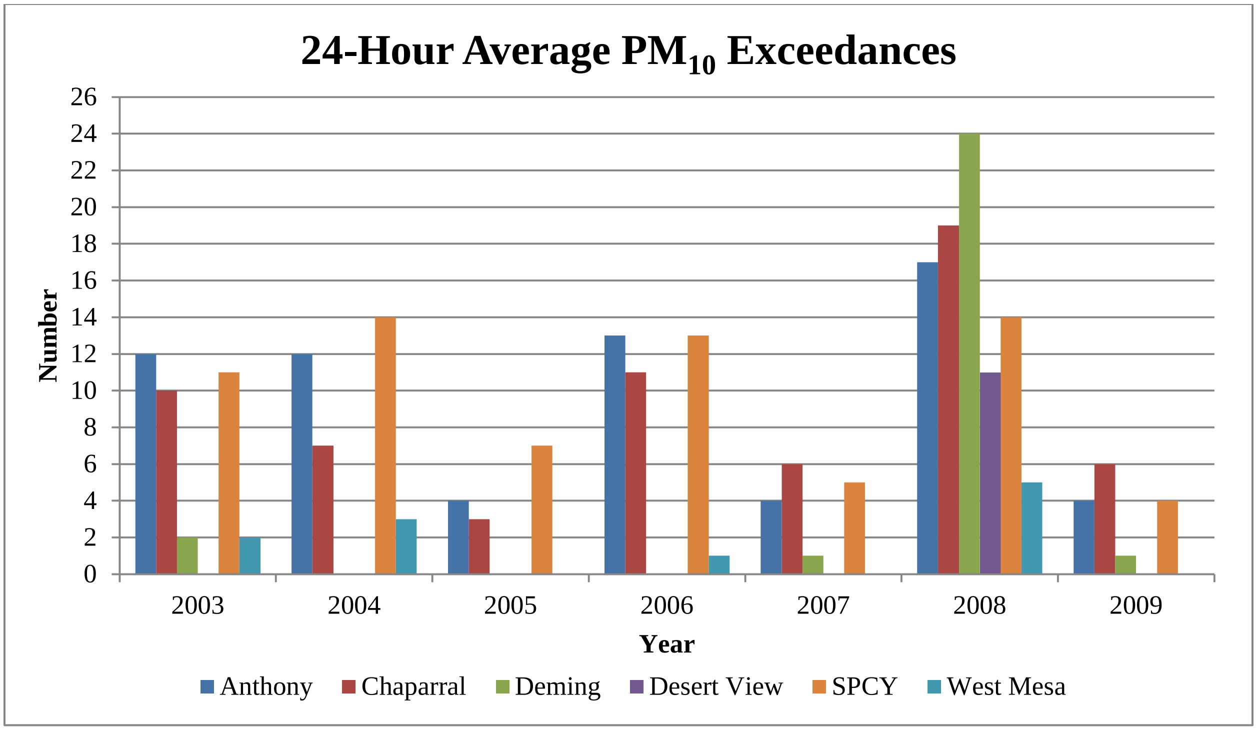

Figure 10-4. Exceedances recorded from 2003 to 2009 at monitors with an exceedance on December 30, 2010.

10.2.4 Controls Analysis

The local ordinances and MOUs adopted under the NEAP direct the implementation of BACM for sources of dust in Doña Ana and Luna Counties (Appendix D). The ordinances regulate disturbed lands, construction and demolition, vacant parking lots and materials handling and transport. Our investigation did not identify any unusual PM_{10} producing activities on this day, and anthropogenic emissions remained constant before, during and after the event. The most significant source contributing to the event is the playas of northern Mexico (see Section 10.4 below). A back-trajectory analysis using the HYSPLIT model (Draxler et al., 2011; Rolph, 2011) shows that the air masses traveled from southwestern New Mexico and northern Mexico to the monitors in Doña Ana and Luna Counties. The model run starts four hours before (600 hour) the start of elevated PM_{10} concentrations (1000 hour) during the event (Figure 10-5). Costs prohibit controlling dust from the natural desert terrain and falls outside NMED's jurisdiction when it originates in Mexico. NMED concludes that the sources that caused the event are not reasonably controllable.

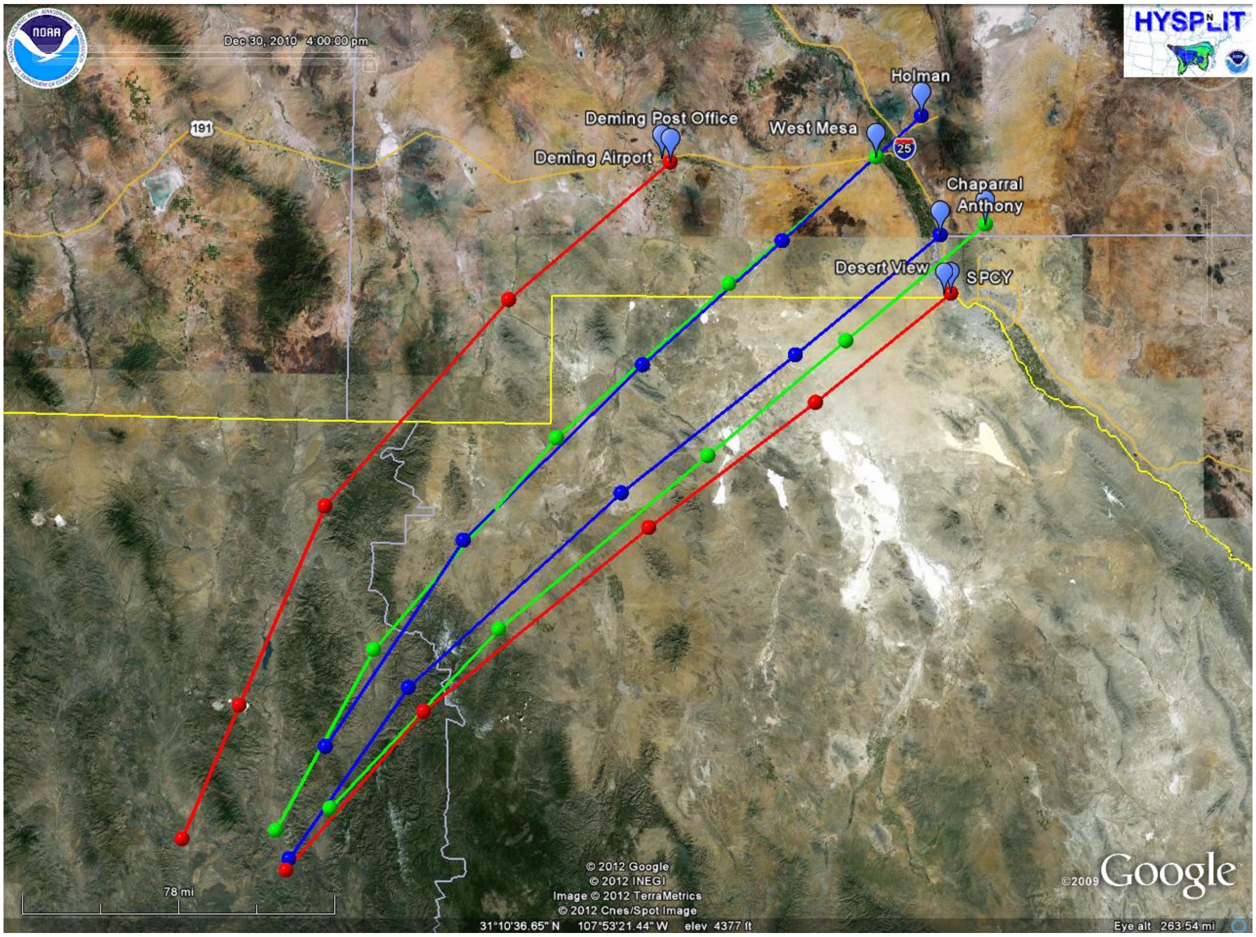

Figure 10-5. HYSPLIT back-trajectory model analysis for December 30, 2010.

10.3 Historical Fluctuations Analysis

10.3.1 Annual and Seasonal 24-hour Average Fluctuations

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 (Figures 10-6 through 10-12). Most exceedances occur from late winter through early summer (February-June) and are usually associated with the passage of Pacific cold fronts. The only monitoring site to record exceedances when winds are calm is the SPCY site. From 2003 to 2005, NMED recorded fourteen low wind PM_{10} exceedances at this site. NMED has not recorded a low wind exceedance of the PM_{10} 24-hour standard at this site since 2005. From 2007 to 2009, NMED recorded twelve low wind $PM_{2.5}$ 24-hour exceedances at SPCY. EPA lowered the $PM_{2.5}$ 24-hour NAAQS from 65 to 35 $\mu g/m^3$ 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 low wind exceedances. The results of this study indicate that the source of $PM_{2.5}$ pollution came from Ciudad Juárez, Mexico (DuBois et al, 2009). Excluding the SPCY site, all other exceedances have been caused by high winds and blowing dust with natural events demonstrations submitted to EPA under the NEAP or EER.

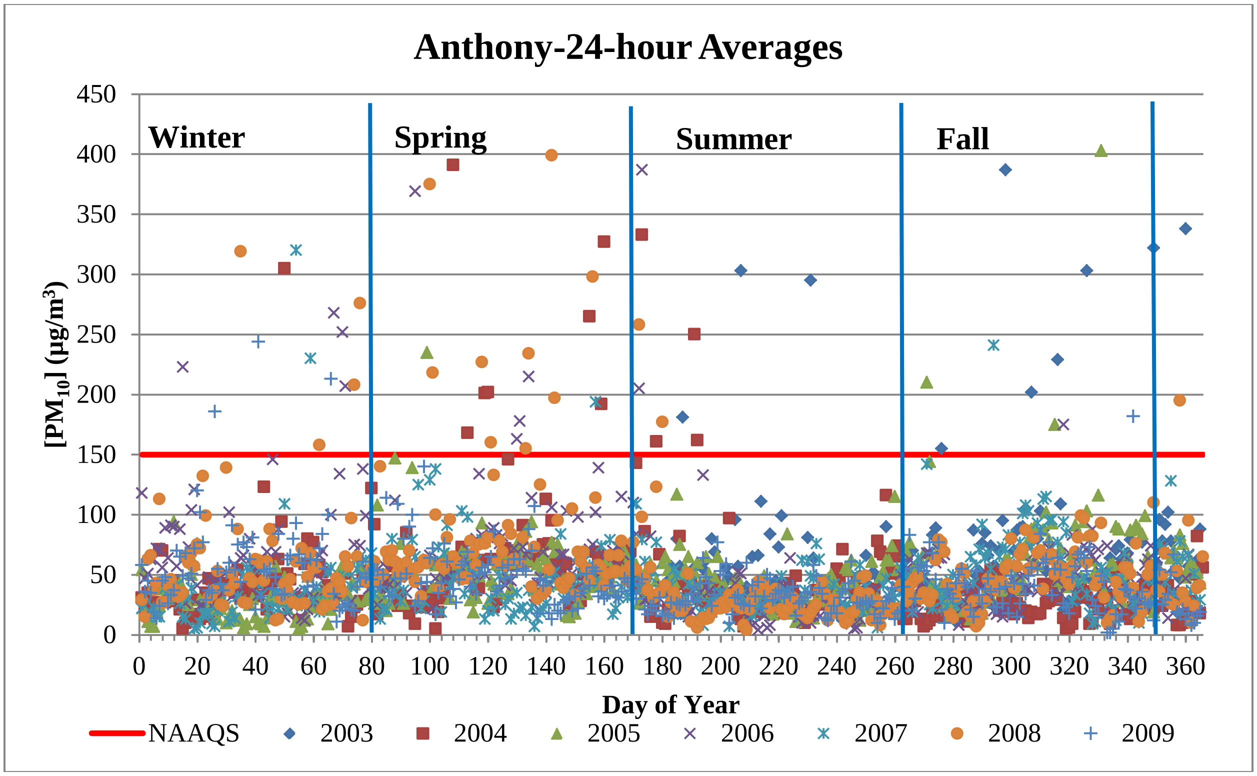

Figure 10-6. 24-hour average PM_{10} concentrations (FEM TEOM data) by day of year from 2003-2009

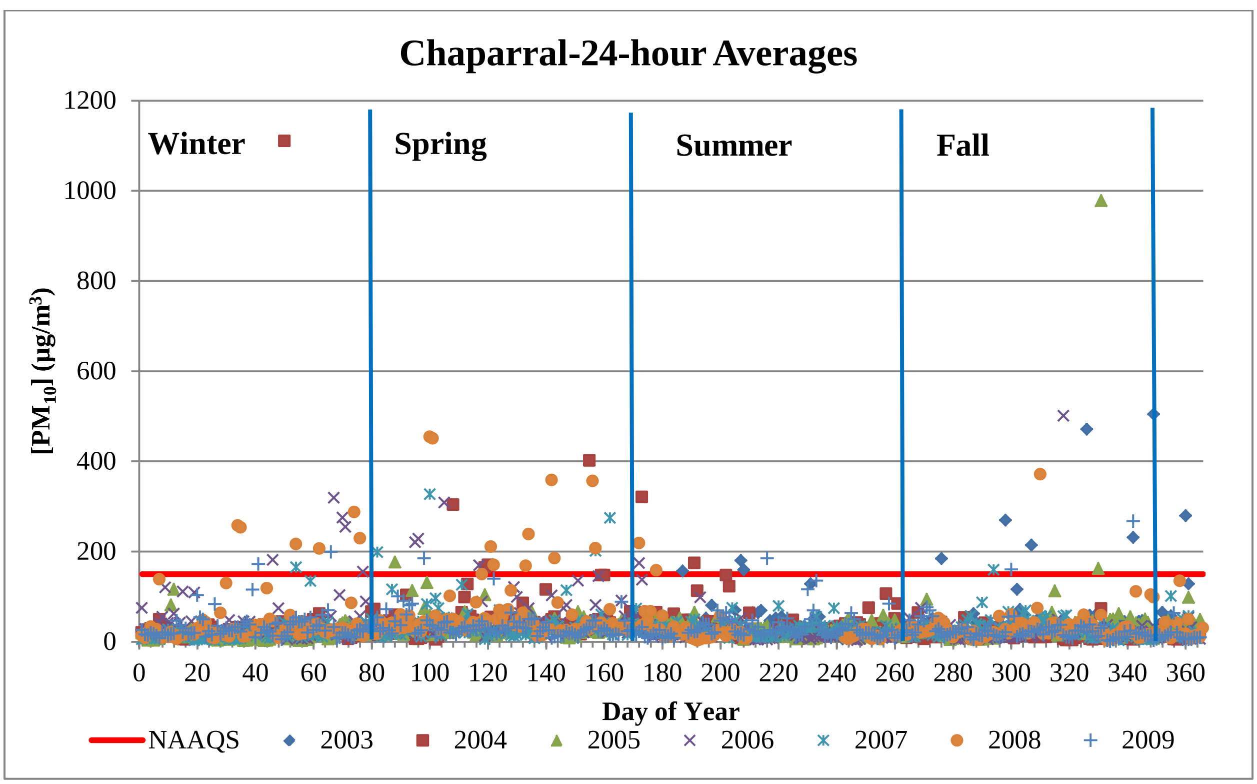

Figure 10-7. 24-hour average PM_{10} concentrations (FEM TEOM data) by day of year from 2003-2009

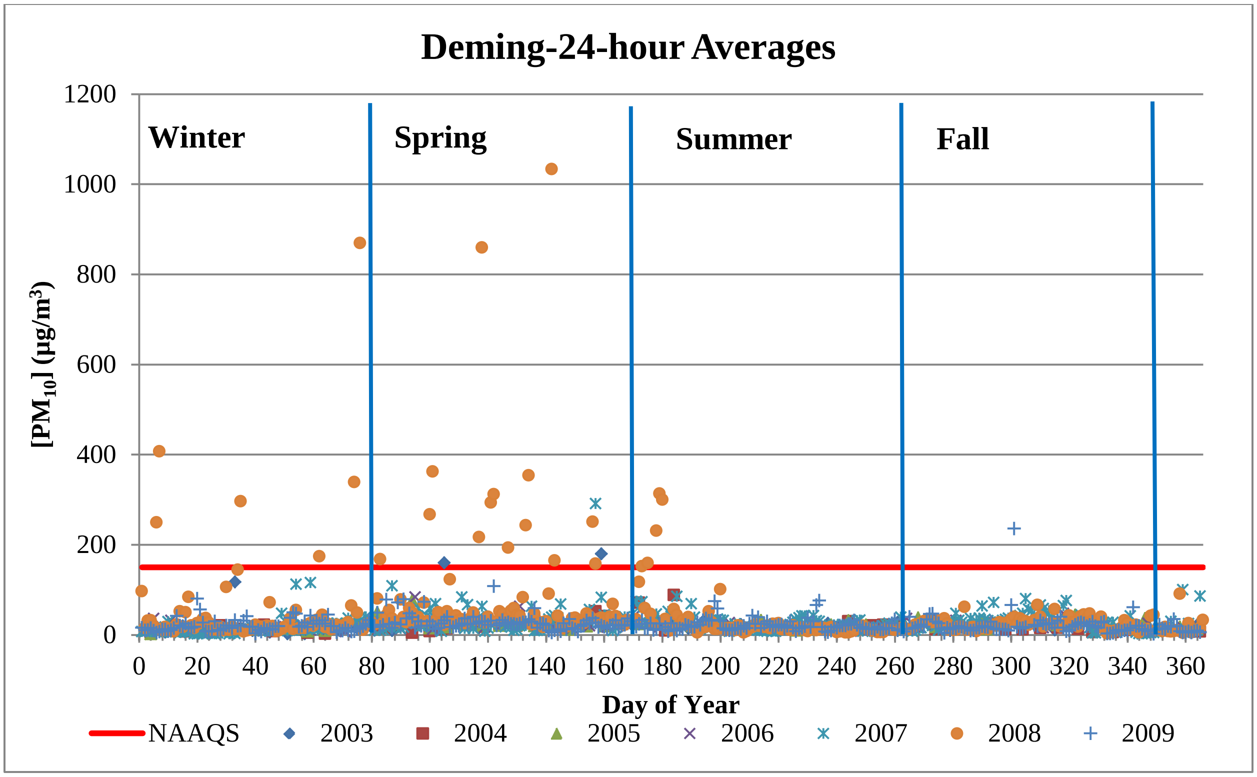

Figure 10-8. 24-hour average PM_{10} concentrations by day of year from 2003-2009. FRM Wedding data from 2003-2006. FEM TEOM data from 2007-2009.

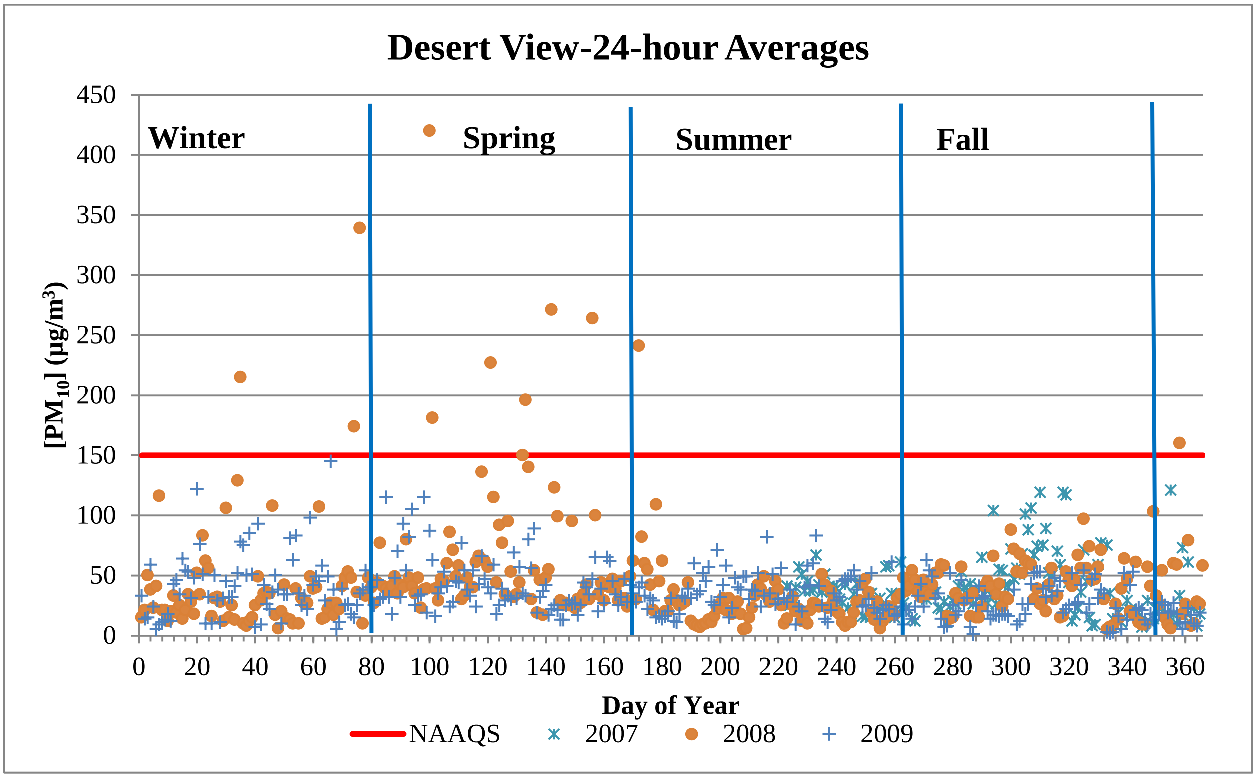

Figure 10-9. 24-hour average PM_{10} concentrations (FEM TEOM data) by day of year from 2007-2009

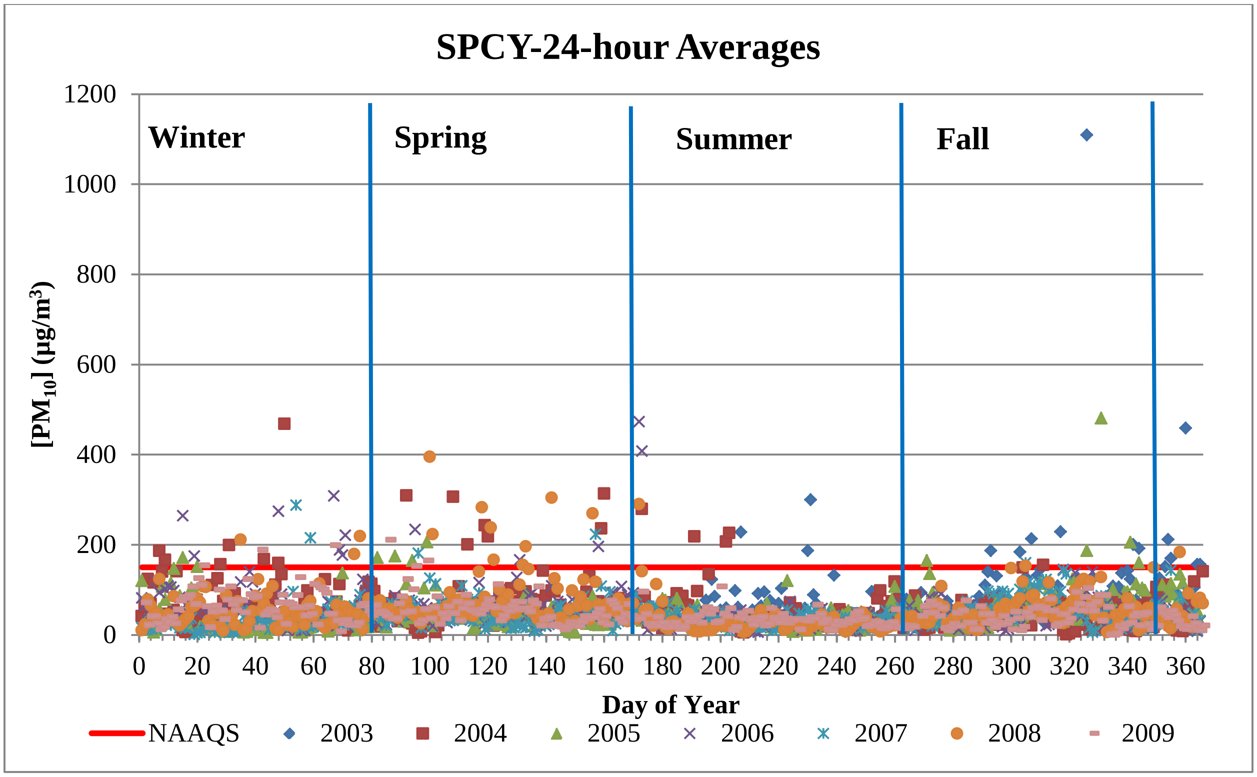

Figure 10-10. 24-hour average PM_{10} concentrations (FEM TEOM data) by day of year from 2003-2009.

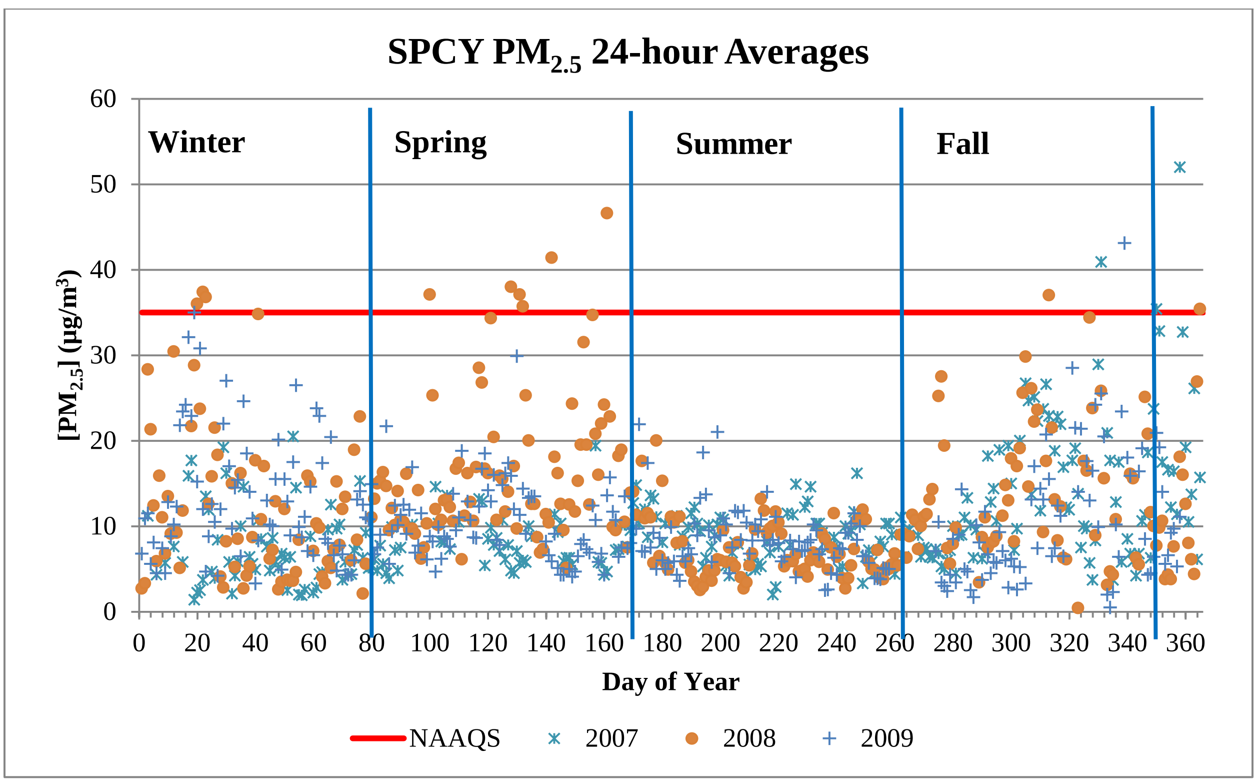

Figure 10-11. 24-hour average $PM_{2.5}$ concentrations (FRM Partisol data) by day of year from 2007-2009

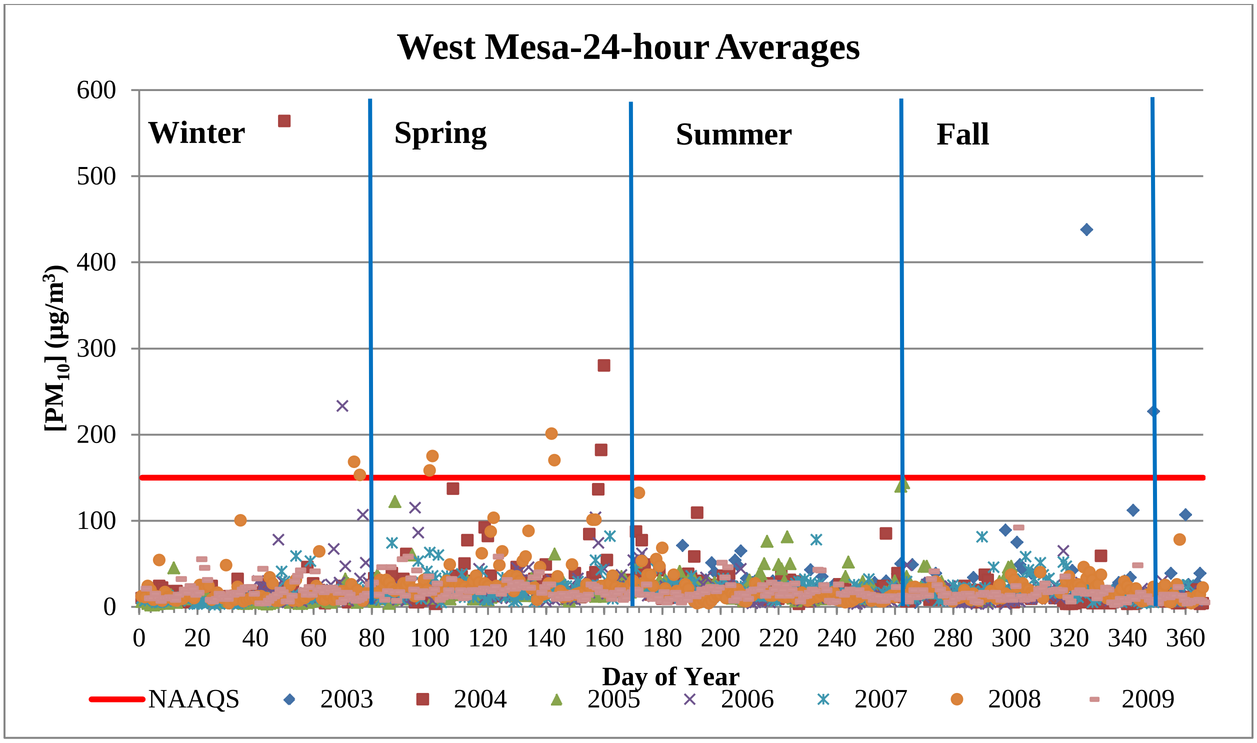

Figure 10-12. 24-hour average PM_{10} concentrations (FEM TEOM) by day of year from 2003-2009.

Table 10-1 shows normal historical fluctuations with and without high wind natural events that caused exceedances from 2003-2009. The column labeled no events excludes only those high wind events that resulted in an exceedance. The low wind exceedances recorded at SPCY for PM_{10} from 2003 to 2005 and for $PM_{2.5}$ from 2007-2009 are included in the analysis when high wind events are excluded. PM_{10} Data in this table includes FRM Wedding and FEM TEOM data from 2003-2009, when available, and $PM_{2.5}$ data includes FRM Partisol data from 2007-2009. The recorded PM_{10} values for this day (775 µg/m^3 at Anthony, 273 µg/m^3 at Chaparral, 524 µg/m^3 at Deming, 262 µg/m^3 at Desert View, 244 µg/m^3 at SPCY and 217 µg/m^3 at West Mesa) are above the maximum value recorded when no high wind exceedances are included. These values are also above the 95th percentile of all PM_{10} 24-hour averages for these sites. The recorded $PM_{2.5}$ concentration on this day (32.1 µg/m^3) is above the 95th percentile of all $PM_{2.5}$ 24-hour averages for this site.

Anthony	Max	99th	95th	75th	50th	Mean	25th	5th	Minimum
No Events	147	120	88	56	38	42	25	12	2
Events	403	234	100	57	38	47	25	12	2
Chaparral	**Max**	**99th**	**95th**	**75th**	**50th**	**Mean**	**25th**	**5th**	**Minimum**
No Events	149	116	65	35	24	28	15	6	1
Events	1110	254	90	37	24	35	15	6	1
Deming	**Max**	**99th**	**95th**	**75th**	**50th**	**Mean**	**25th**	**5th**	**Minimum**
No Events	152	88	53	28	19	23	12	6	2
Events	1033	239	65	28	19	28	12	6	2
Desert View	**Max**	**99th**	**95th**	**75th**	**50th**	**Mean**	**25th**	**5th**	**Minimum**
No Events	150	119	82	47	33	37	21	10	1
Events	420	176	90	48	33	40	21	10	1
SPCY	**Max**	**99th**	**95th**	**75th**	**50th**	**Mean**	**25th**	**5th**	**Minimum**
No Events	212	143	108	60	39	46	24	11	0
Events	1109	227	123	63	40	51	25	11	0
SPCY $PM_{2.5}$	**Max**	**99th**	**95th**	**75th**	**50th**	**Mean**	**25th**	**5th**	**Minimum**
No Events	52	36	25	13	9	11	6	4	0
Events	52	37	25	13	9	11	6	4	0
West Mesa	**Max**	**99th**	**95th**	**75th**	**50th**	**Mean**	**25th**	**5th**	**Minimum**
No Events	153	87	46	23	15	19	10	5	0
Events	564	106	47	23	15	20	10	5	0

Table 10-1. 24-hour average PM_{10} and $PM_{2.5}$ data distribution with and without high wind events included.

An hourly data distribution analysis was performed for hourly PM_{10} concentrations, wind speeds and wind gusts (Appendices A, B and C). All data for this analysis use the FEM TEOM monitors. NMED does not have a continuous FRM or FEM approved $PM_{2.5}$ monitor and an hourly data distribution is not available for the SPCY $PM_{2.5}$ site. Overlaying the hourly data for December 30, 2010 on the hourly data distribution plots shows that the values recorded during the high wind event exceed the 95th percentile for PM_{10}, wind speed and wind gusts (Figures 10-13 through 10-30). The top whisker of the of the box and whisker plots represent the 95th percentile of data. As stated previously, wind data used for the Anthony site come from the La Union site. The hourly PM_{10} values during the high wind blowing dust storm far exceed the historical 95th percentile of data.

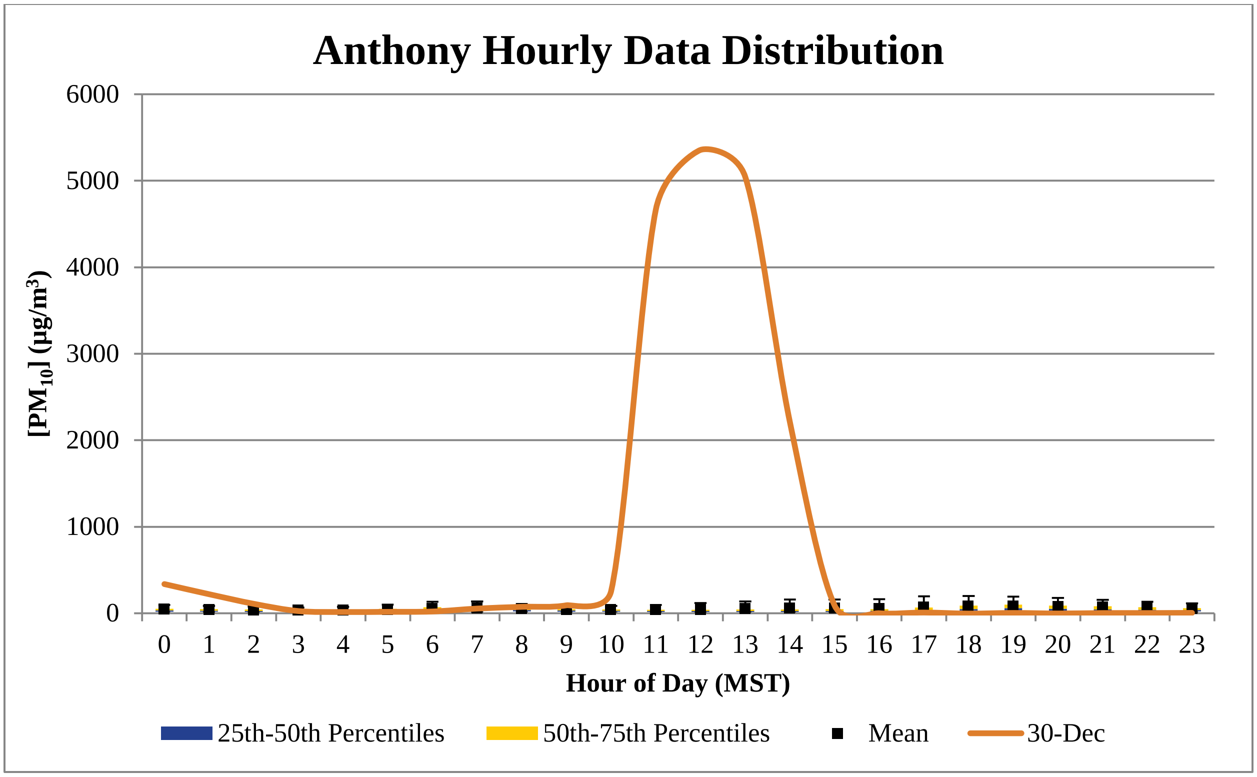

Figure 10-13. PM_{10} hourly data distribution from 2003-2009 overlaid by hourly values for December 30, 2010.

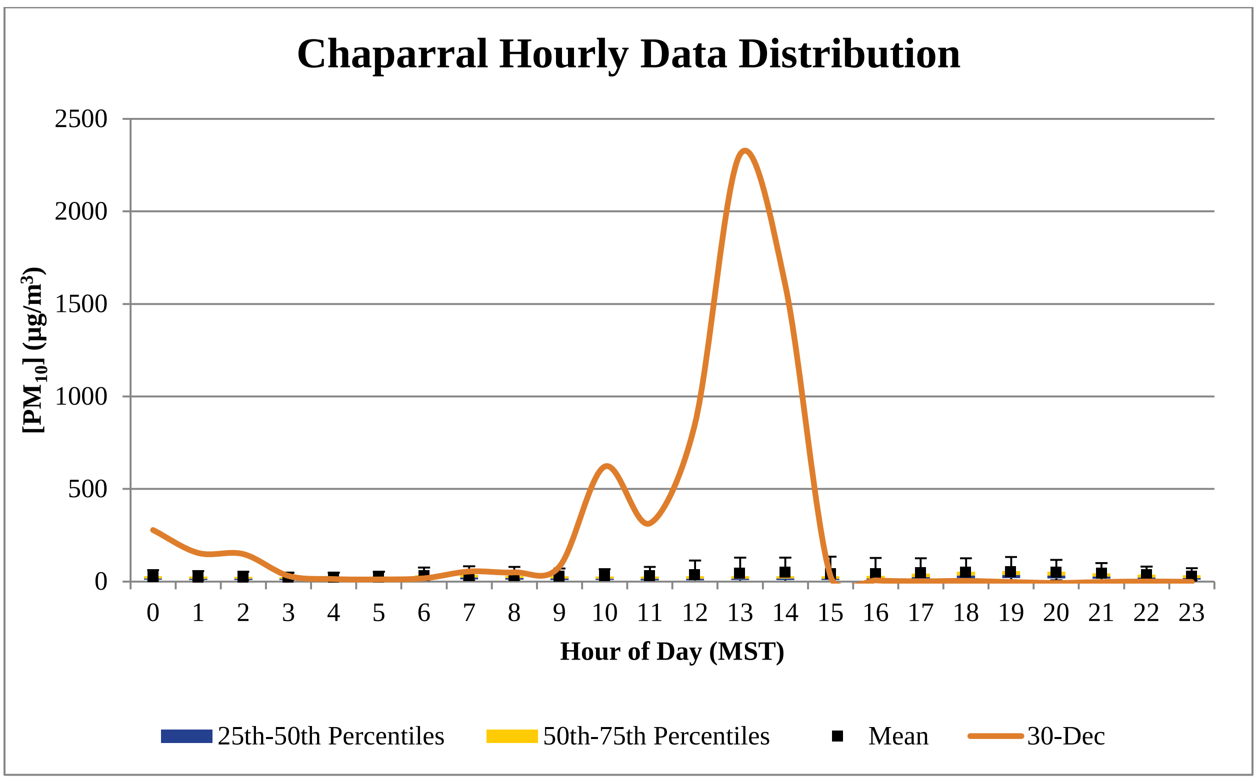

Figure 10-14. PM_{10} hourly data distribution from 2003-2009 overlaid by hourly values for December 30, 2010.

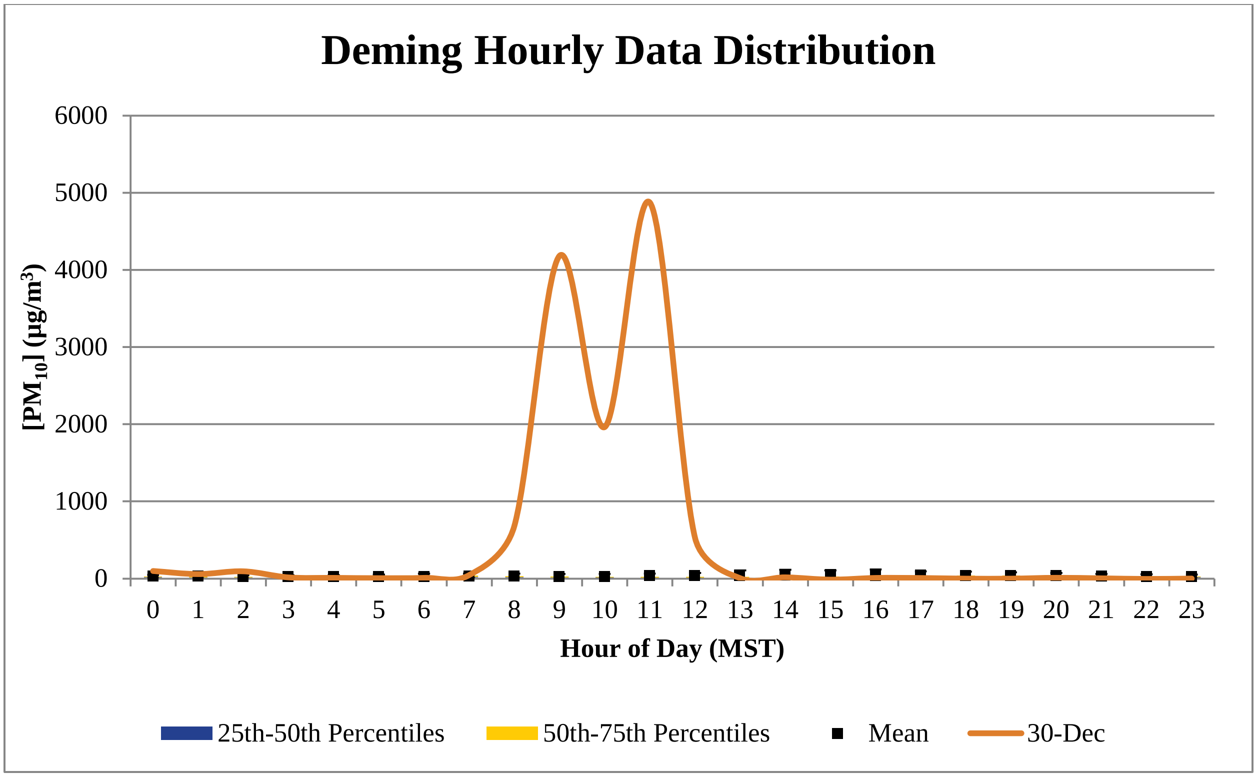

Figure 10-15. PM_{10} hourly data distribution from 2006-2009 overlaid by hourly values for December 30, 2010.

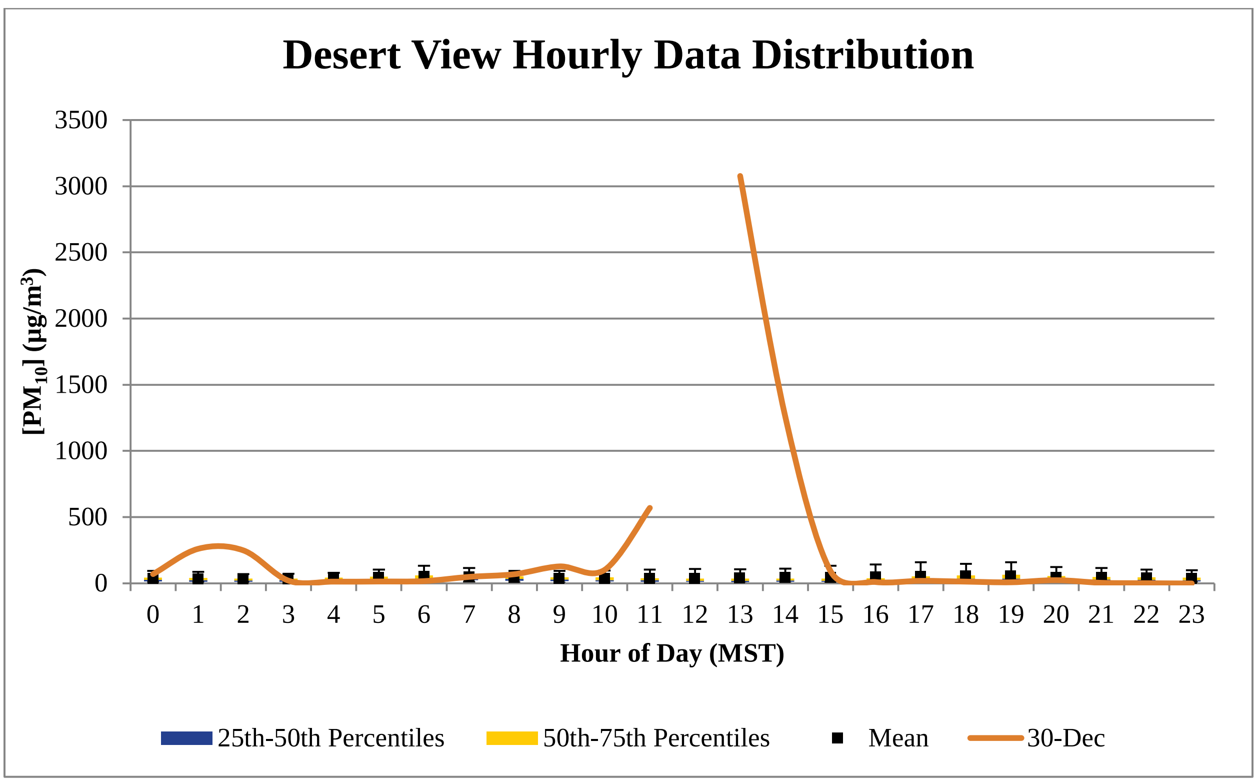

Figure 10-16. PM_{10} hourly data distribution from 2007-2009 overlaid by hourly values for December 30, 2010.

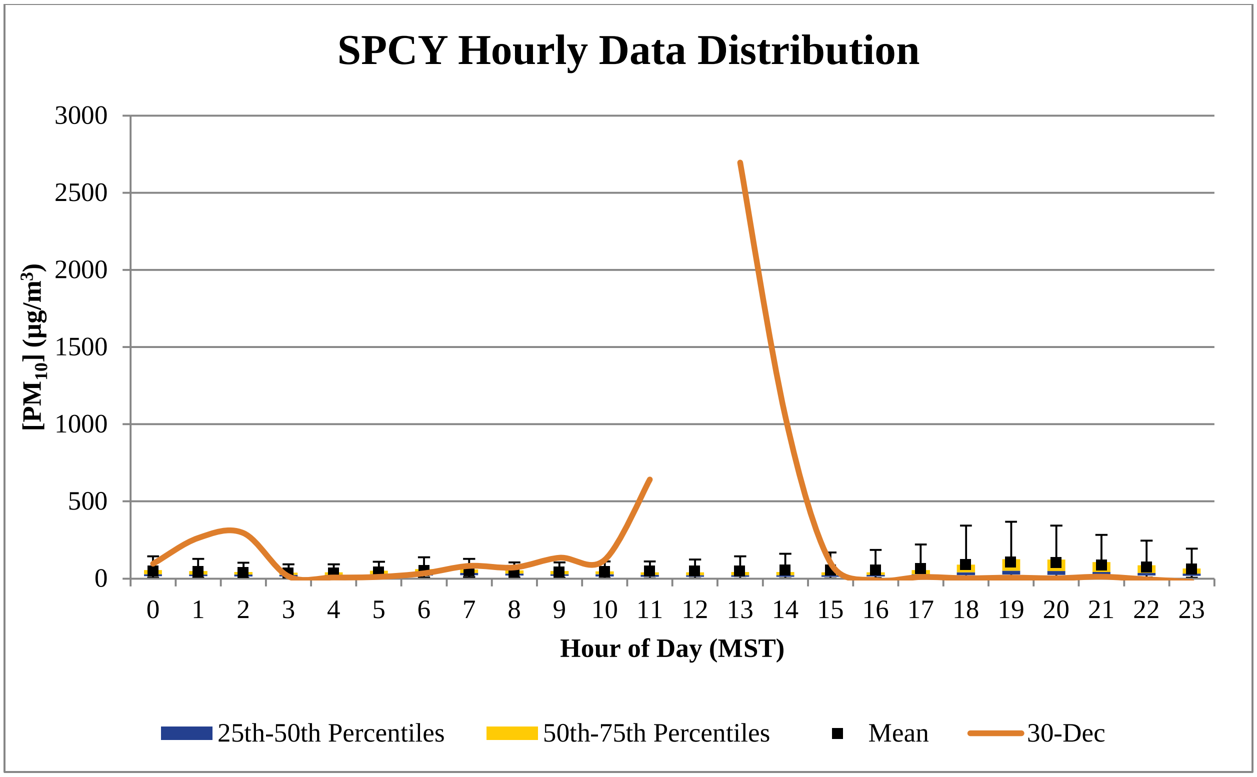

Figure 10-17. PM_{10} hourly data distribution from 2003-2009 overlaid by hourly values for December 30, 2010.

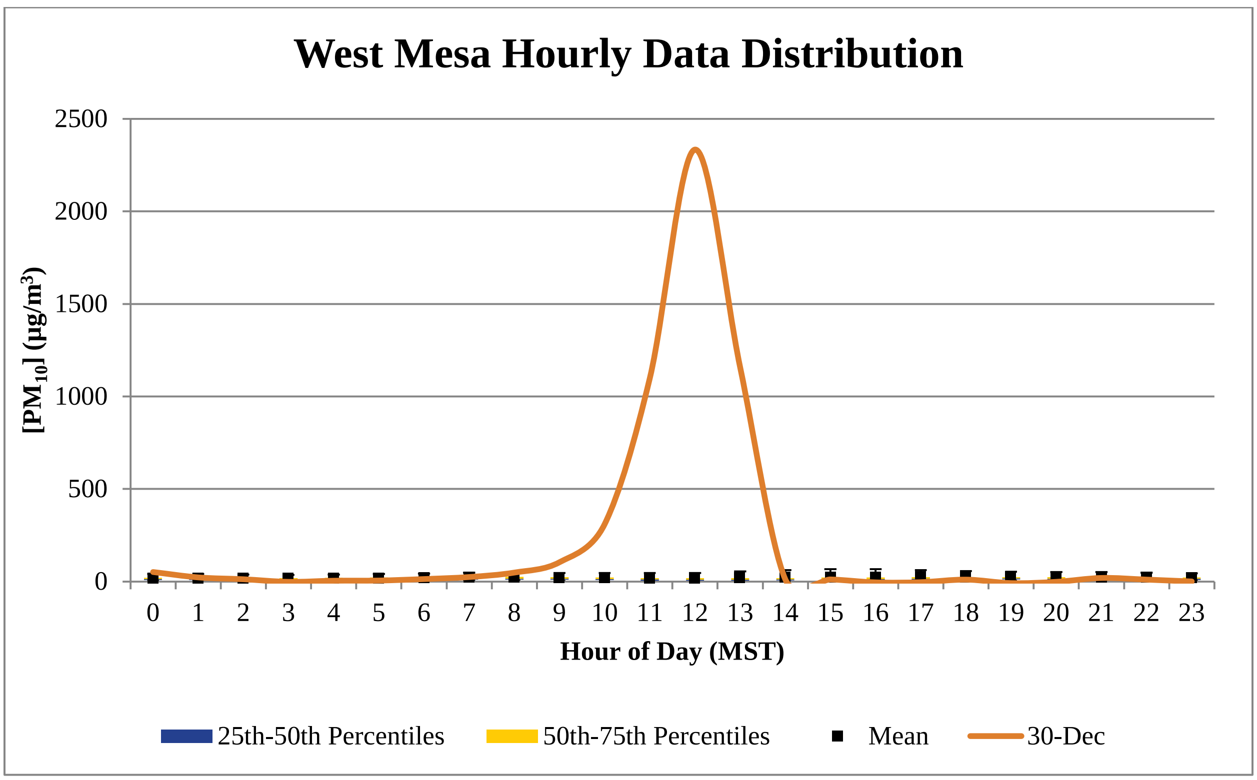

Figure 10-18. PM_{10} hourly data distribution from 2003-2009 overlaid by hourly values for December 30, 2010.

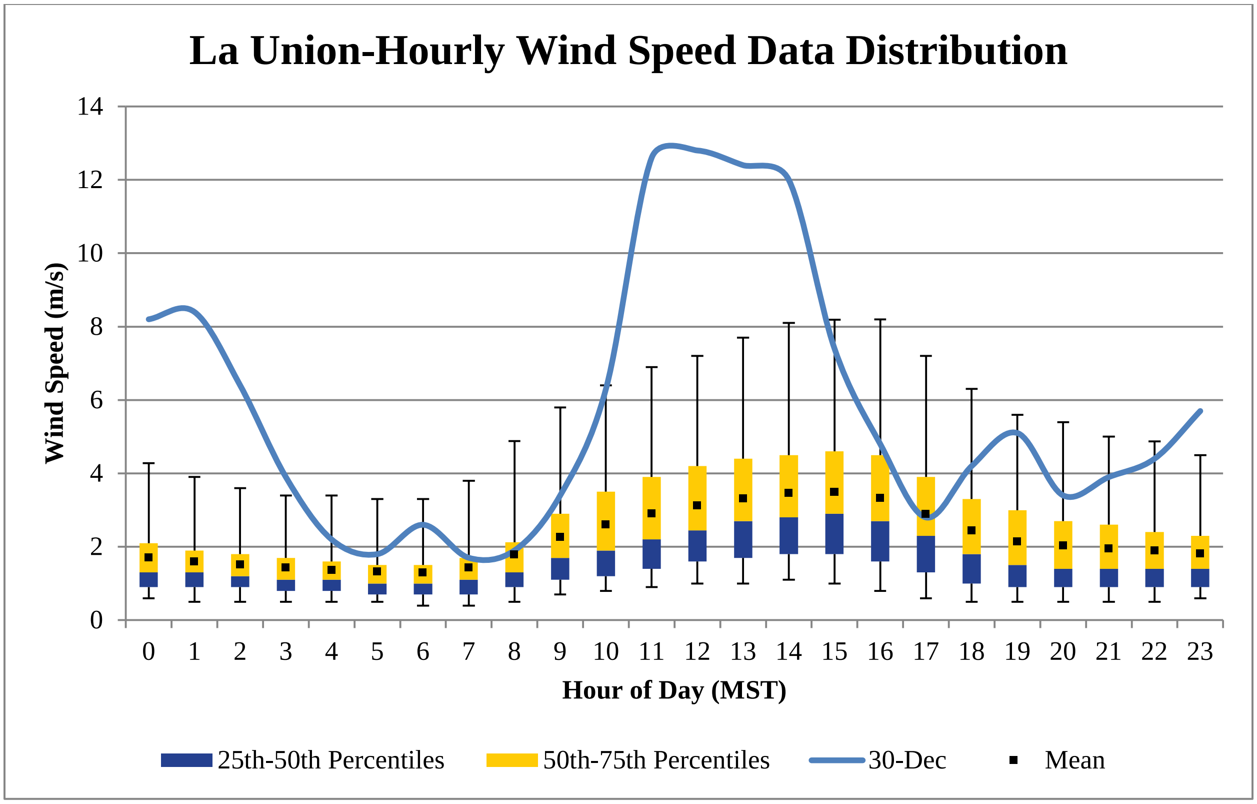

Figure 10-19. Hourly wind speed data distribution from 2003-2009 overlaid by hourly values for December 30, 2010.

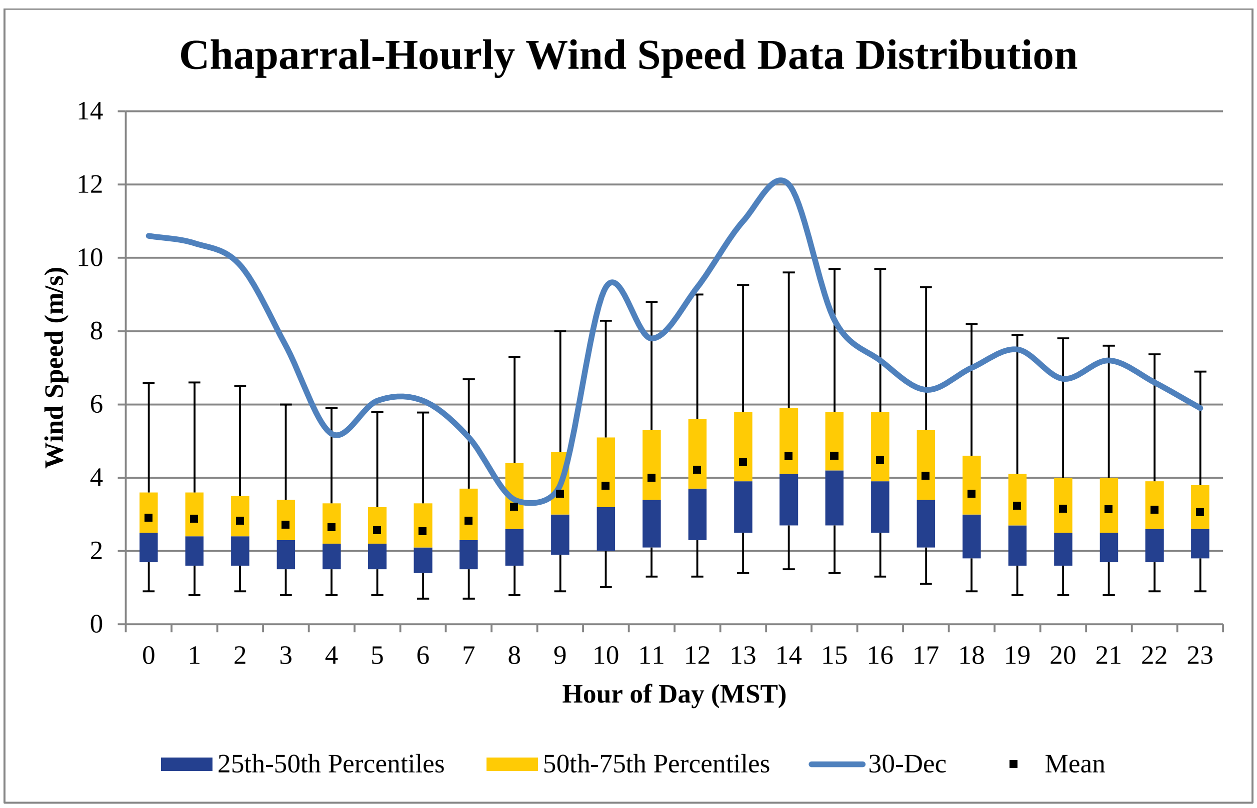

Figure 10-20. Hourly wind speed data distribution from 2003-2009 overlaid by hourly values for December 30, 2010.

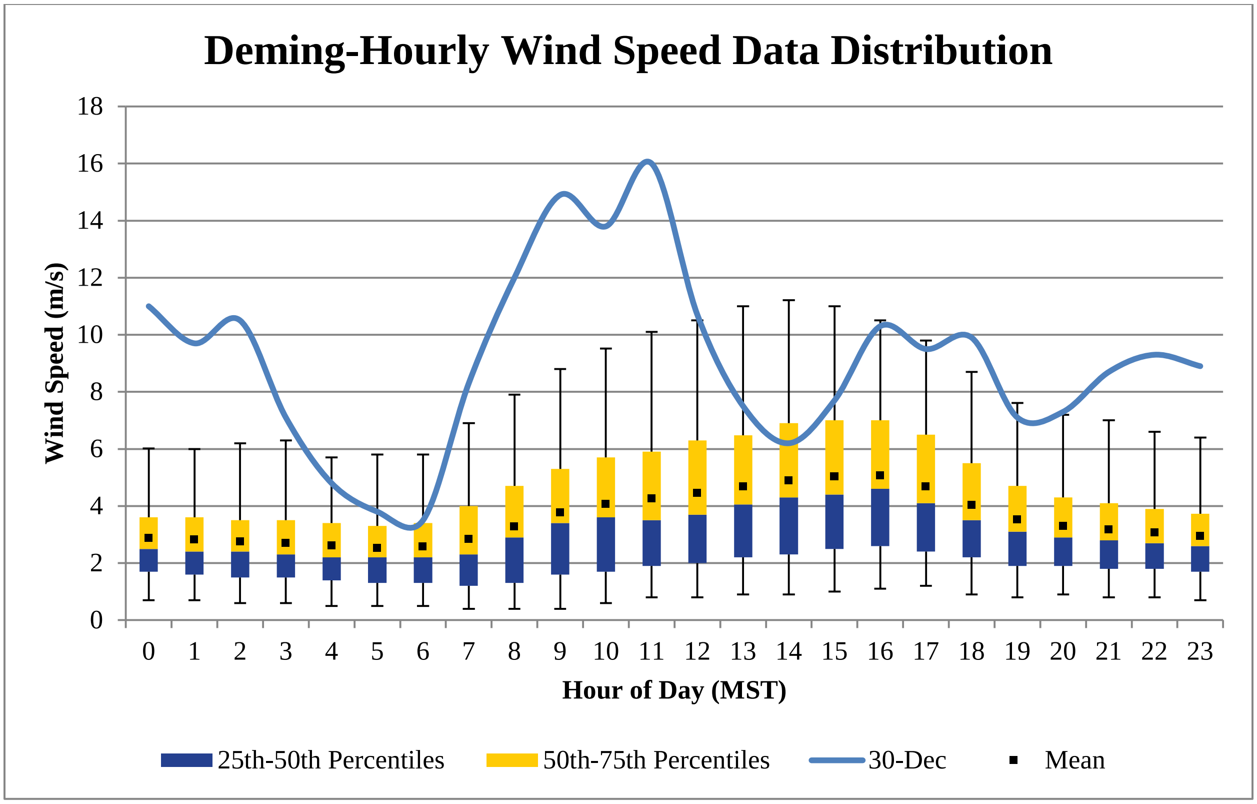

Figure 10-21. Hourly wind speed data distribution from 2003-2009 overlaid by hourly values for December 30, 2010.

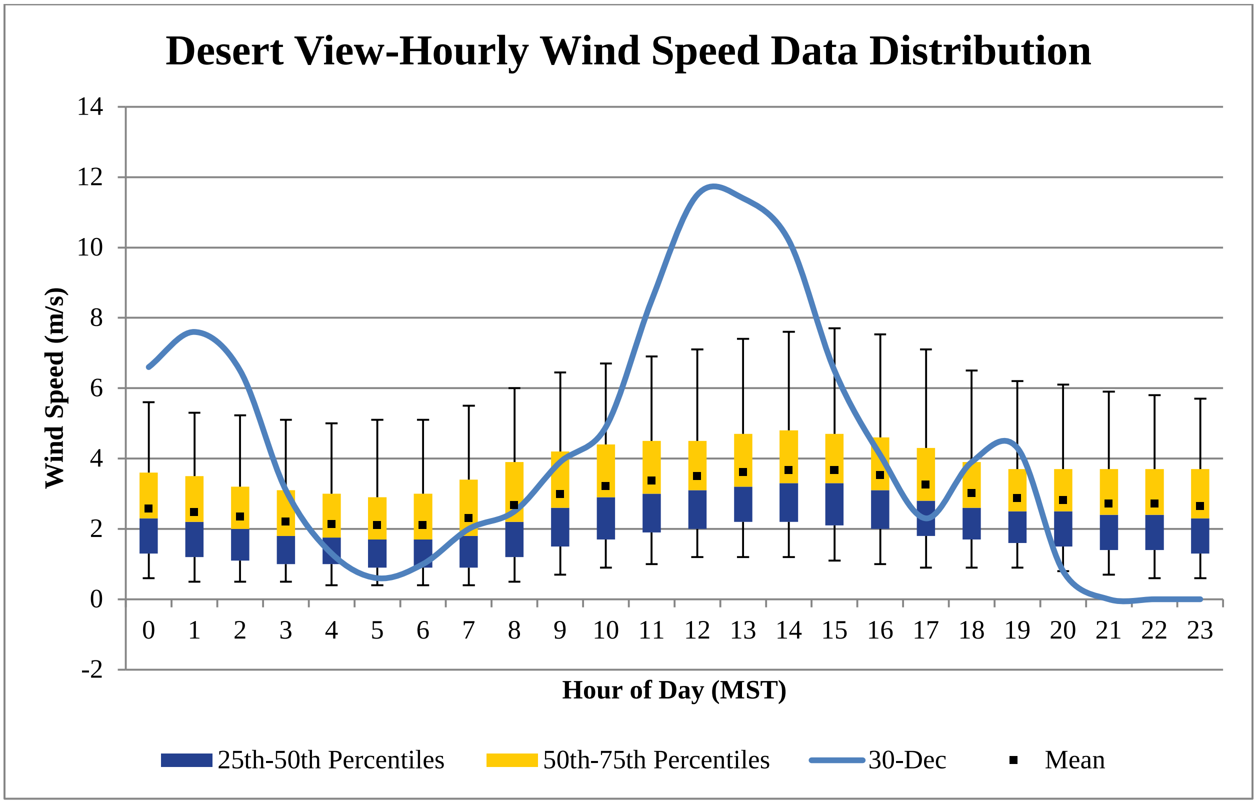

Figure 10-22. Hourly wind speed data distribution from 2003-2009 overlaid by hourly values for December 30, 2010.

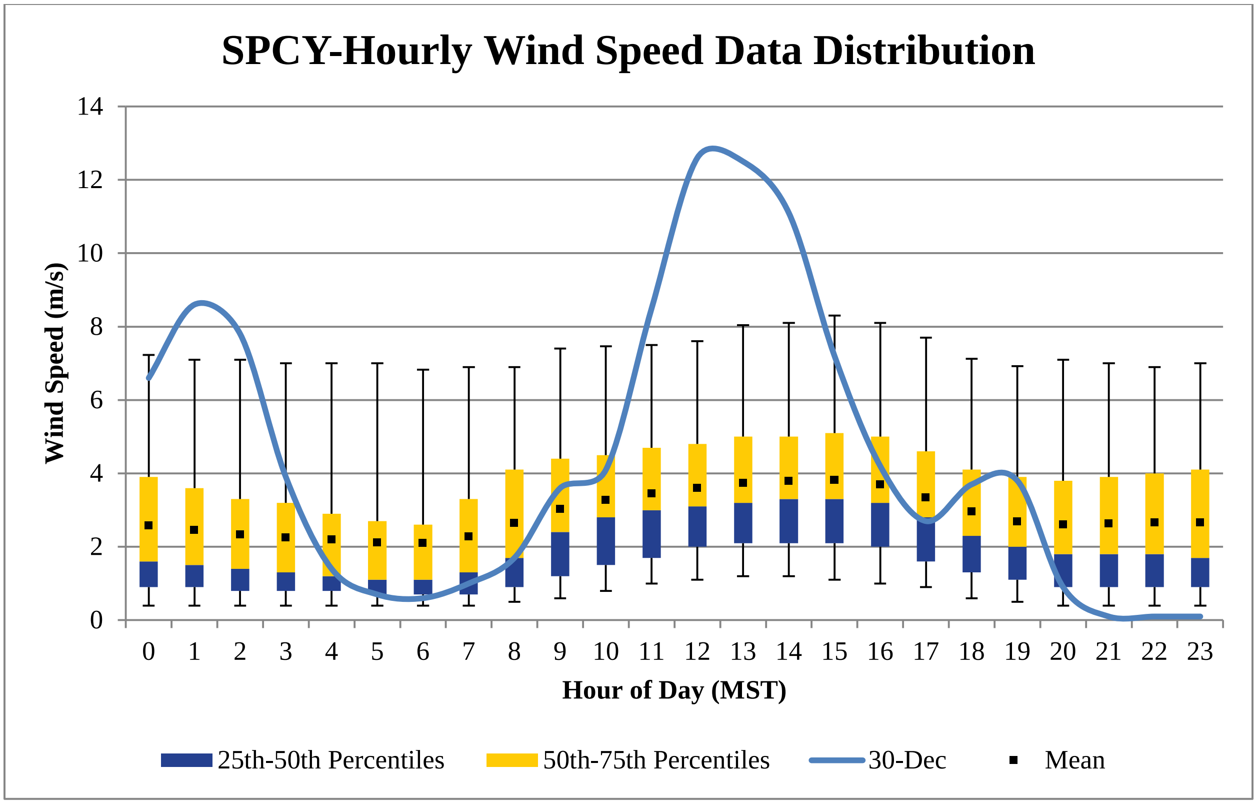

Figure 10-23. Hourly wind speed data distribution from 2003-2009 overlaid by hourly values for December 30, 2010.

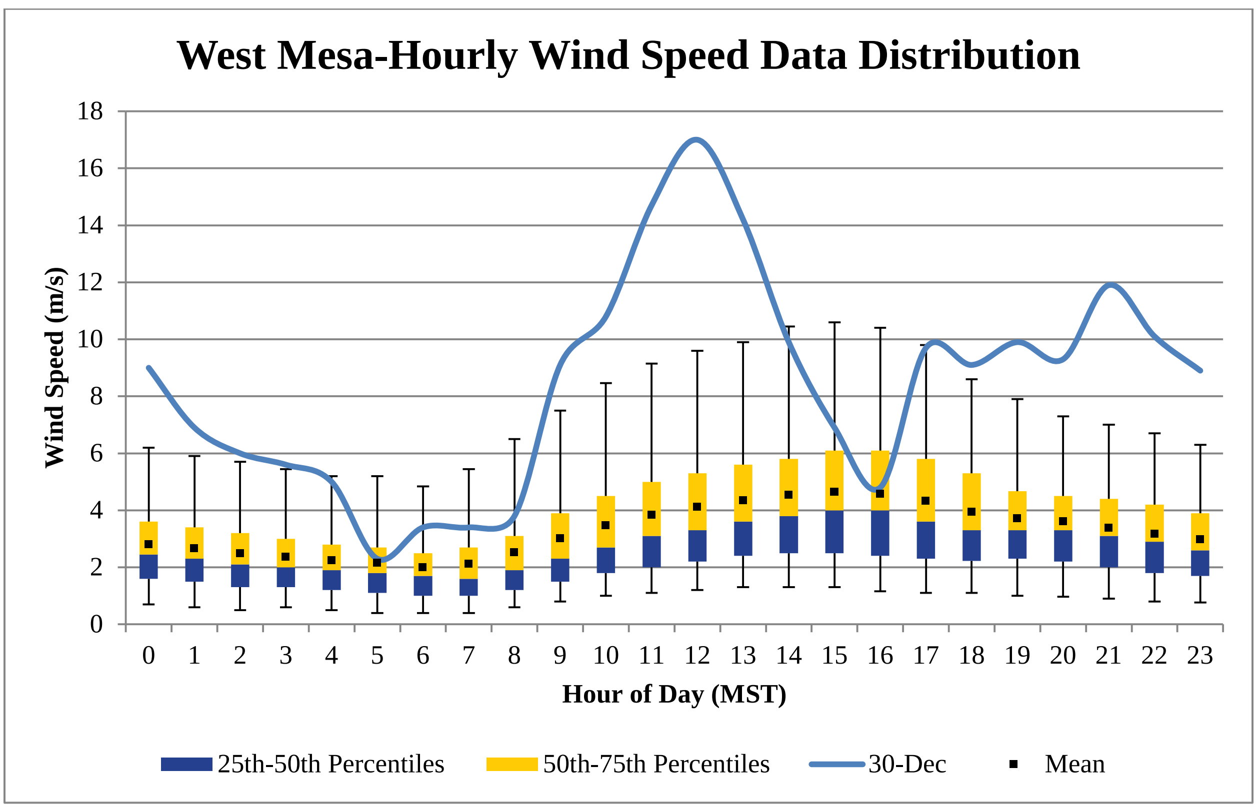

Figure 10-24. Hourly wind speed data distribution from 2003-2009 overlaid by hourly values for December 30, 2010.

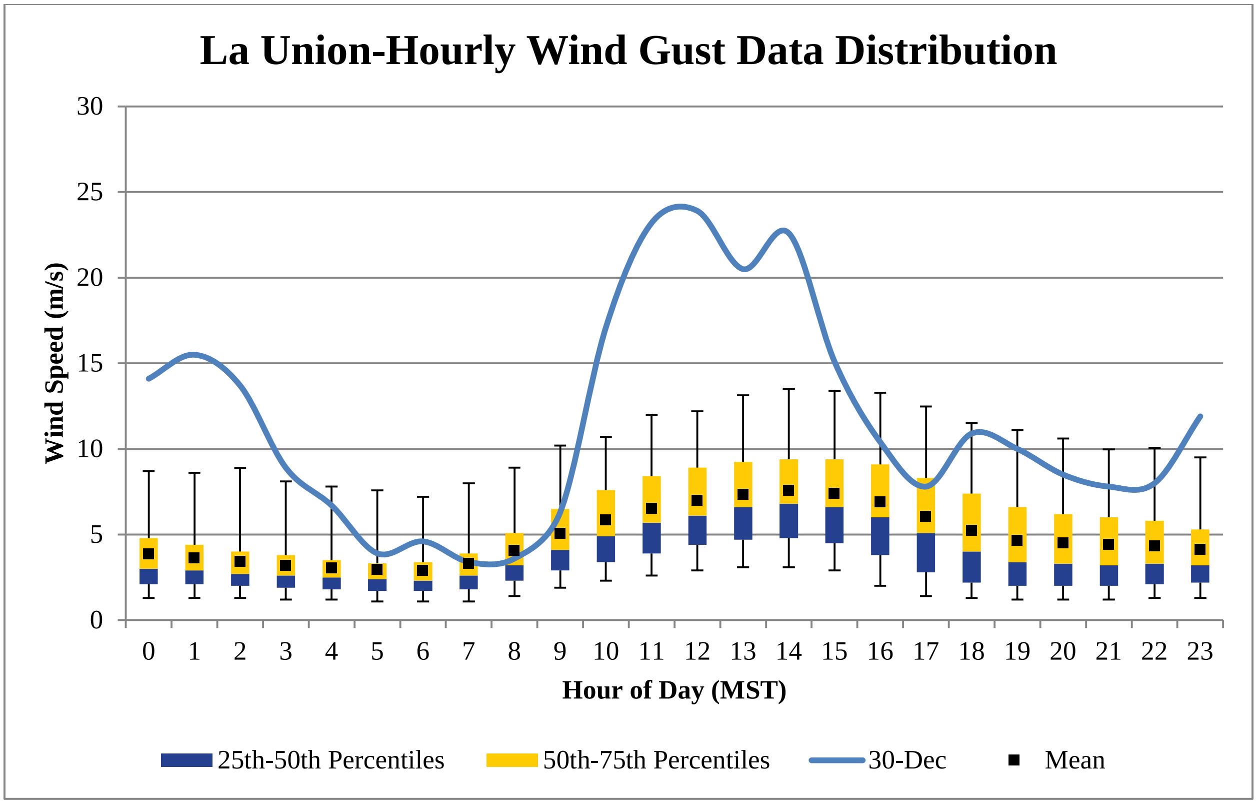

Figure 10-25. Hourly wind gust data distribution from 2003-2009 overlaid by hourly values for December 30, 2010.

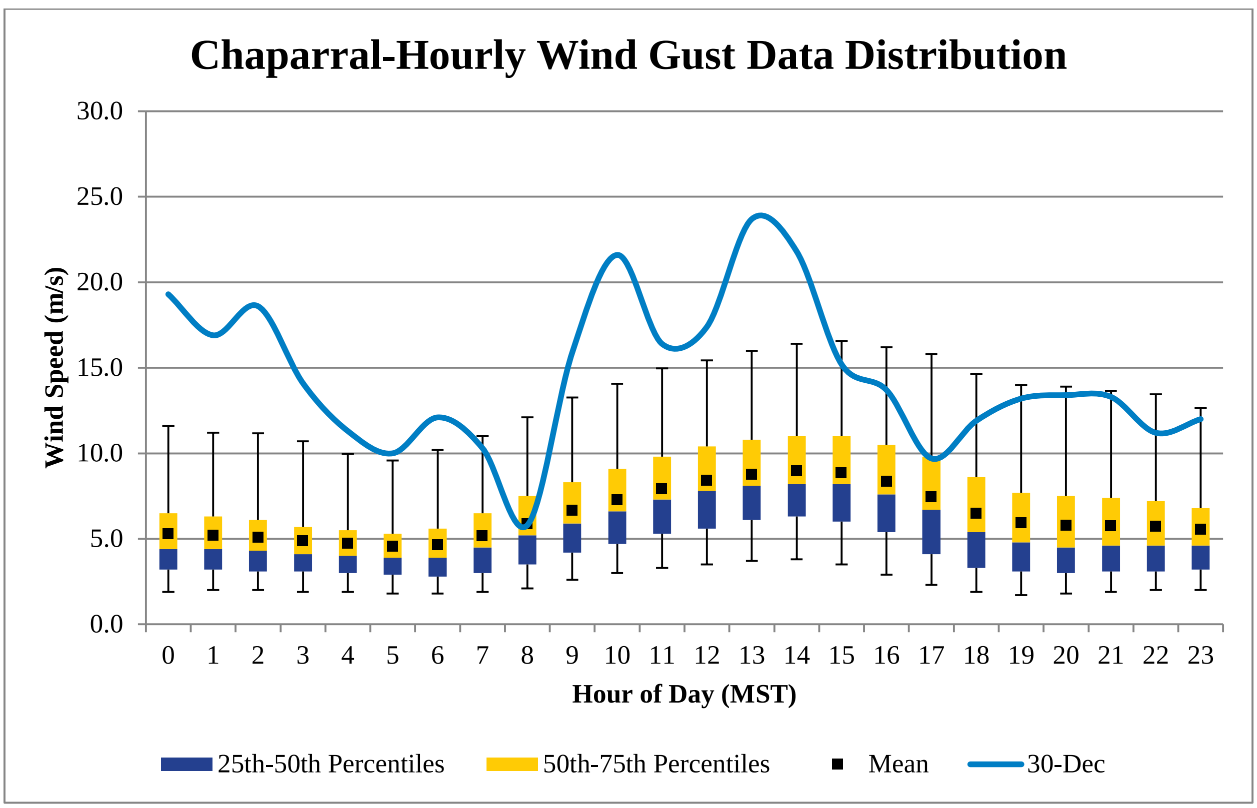

Figure 10-26. Hourly wind gust data distribution from 2003-2009 overlaid by hourly values for December 30, 2010.

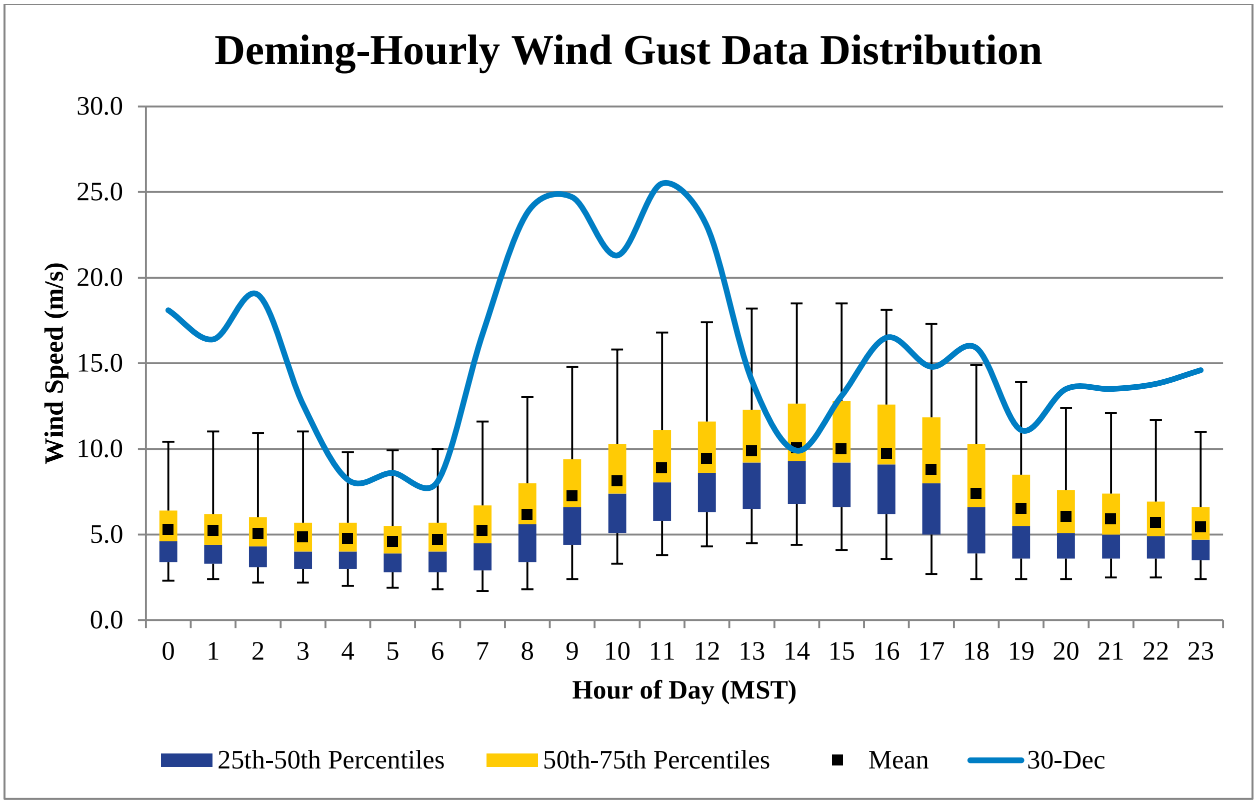

Figure 10-27. Hourly wind gust data distribution from 2003-2009 overlaid by hourly values for December 30, 2010.

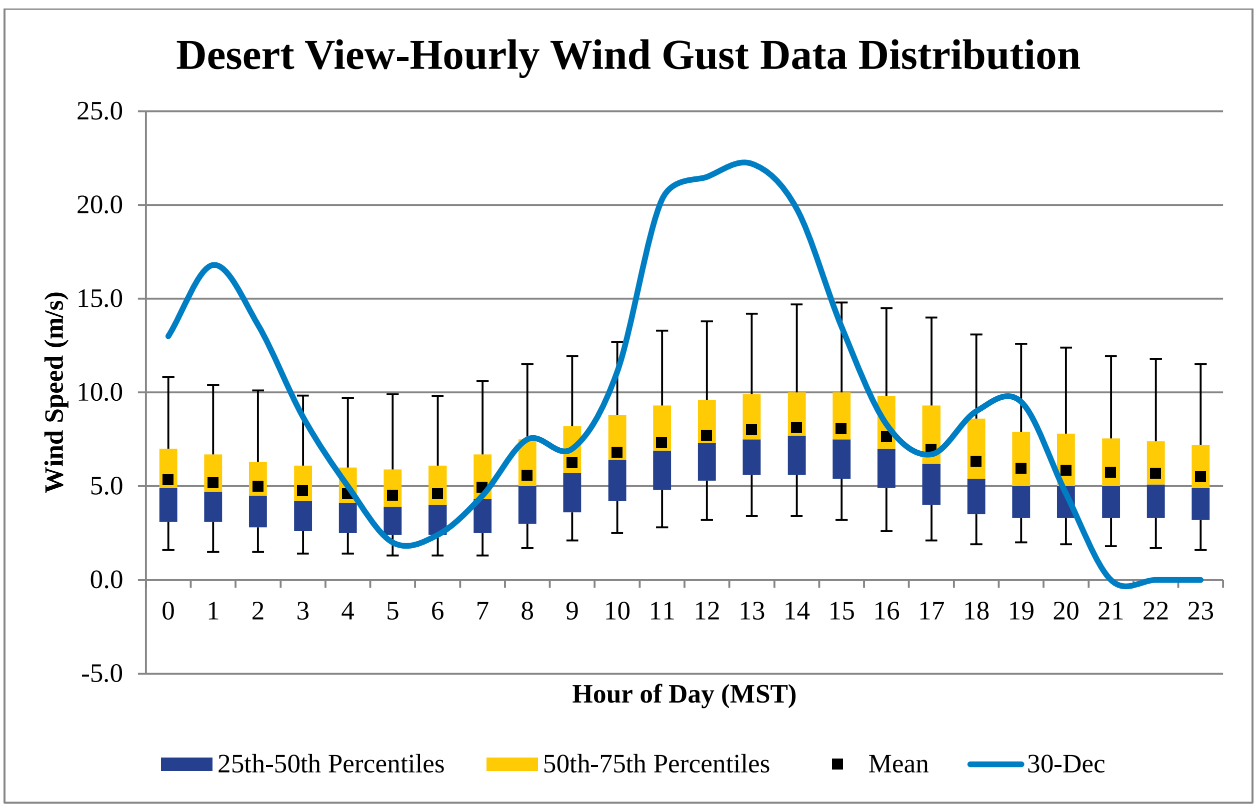

Figure 10-28. Hourly wind gust data distribution from 2003-2009 overlaid by hourly values for December 30, 2010.

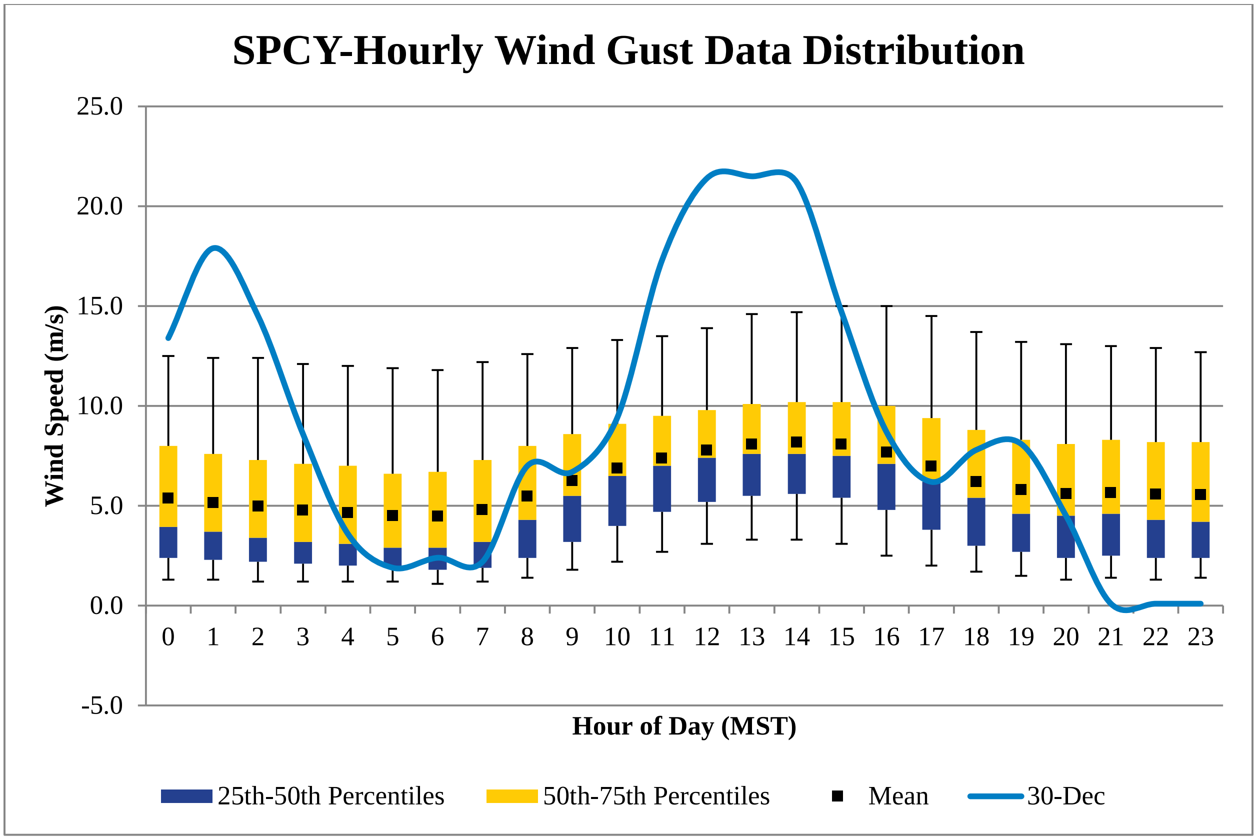

Figure 10-29. Hourly wind gust data distribution from 2003-2009 overlaid by hourly values for December 30, 2010.

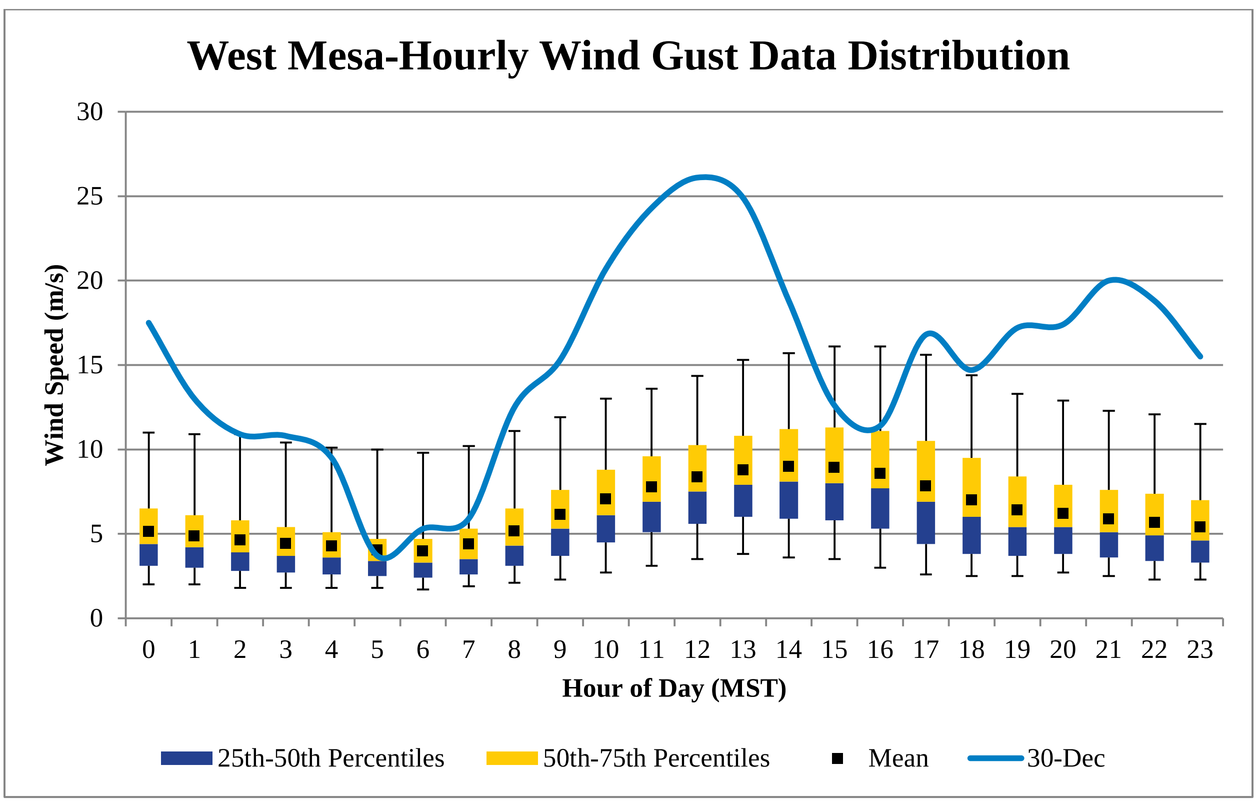

Figure 10-30. Hourly wind gust data distribution from 2003-2009 overlaid by hourly values for December 30, 2010.

10.4 Clear Causal Relationship

A strong Pacific cold front passed through New Mexico on December 30, 2010. As the Pacific cold front moved through New Mexico, a strong pressure gradient formed over southwestern New Mexico and northwestern Chihuahua causing high winds at the surface (Figure 10-31). Surface winds flow perpendicular to the isobars from high to low pressure. As the day progressed, the wind direction in the upper atmosphere aligned with the surface wind direction (Figure 10-32). The alignment of the upper level low and diurnal heating of the surface allowed winds aloft to mix downward, increasing the surface wind velocities and provided the turbulence required for vertical mixing and horizontal transport.

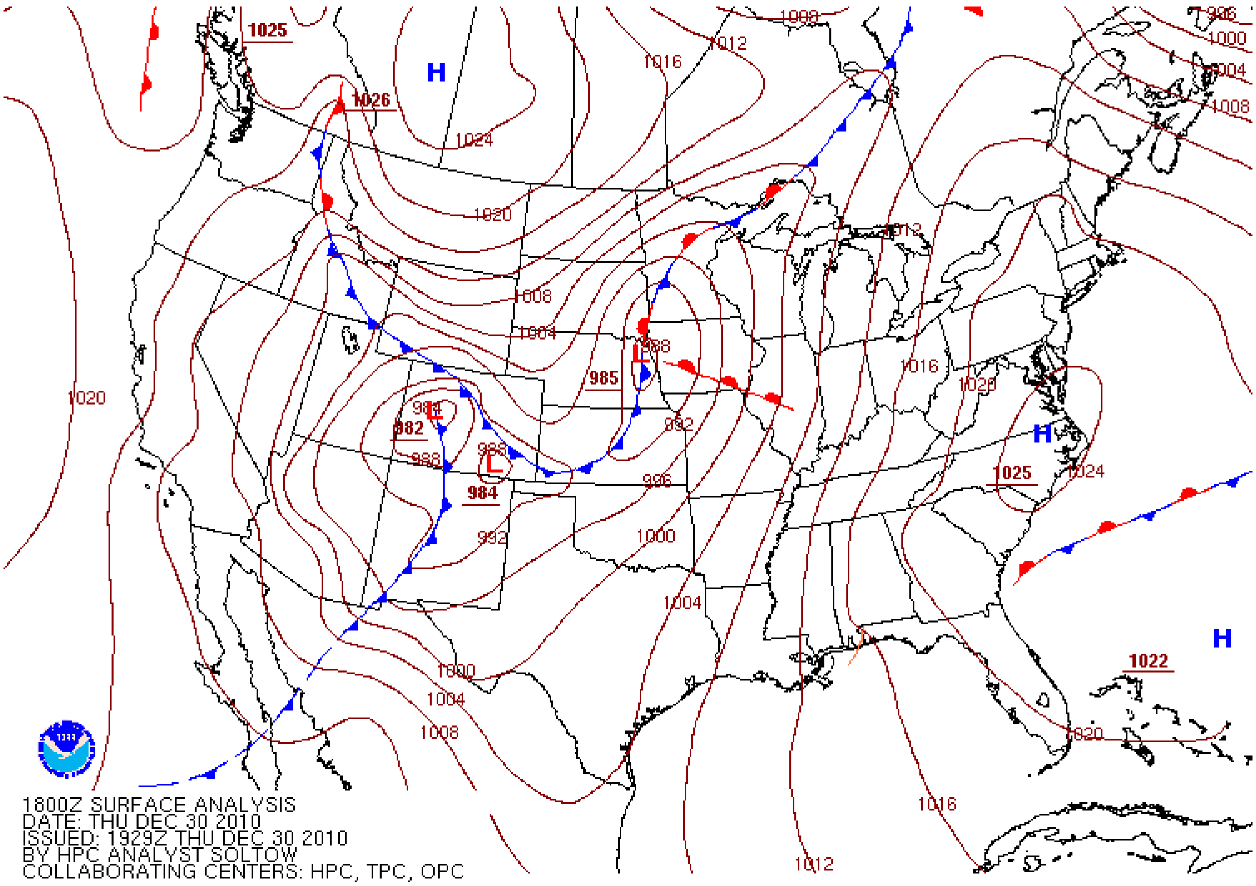

Figure 10-31. Surface weather map showing frontal activity and isobars of constant pressure (red lines) for December 30, 2010 at the 1100 hour MST.

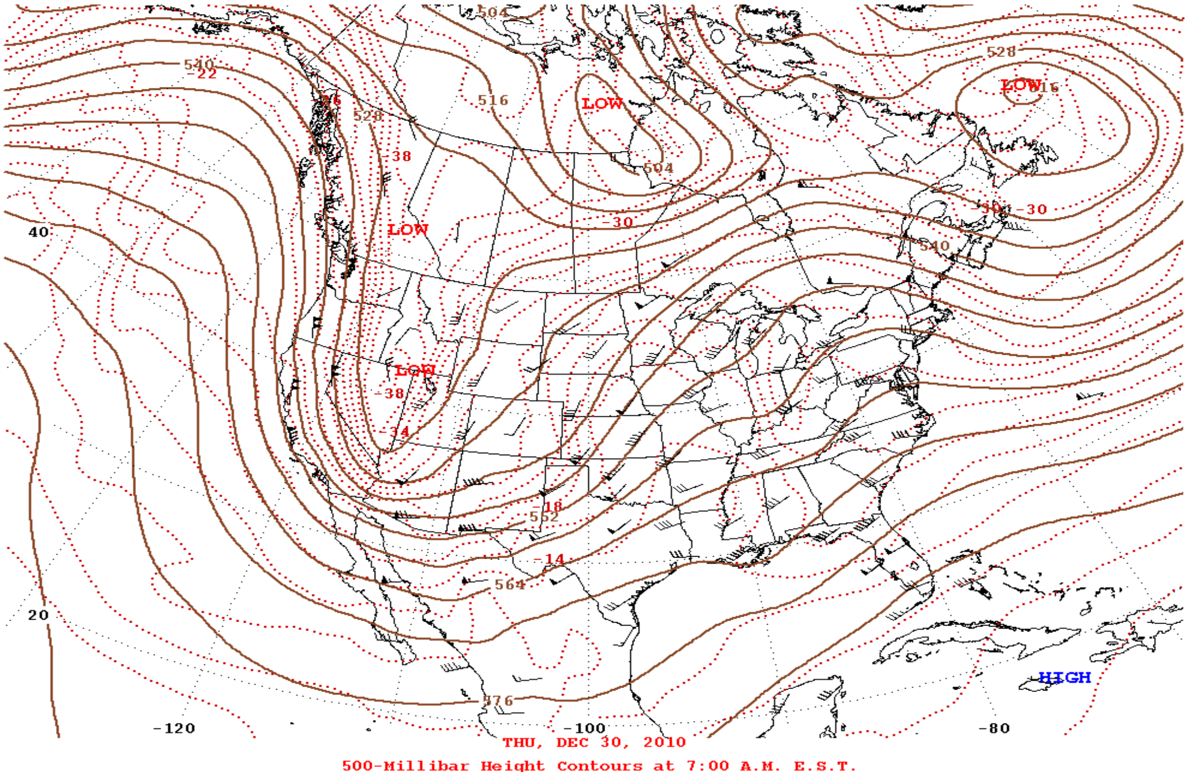

Figure 10-32. Upper air weather map showing geopotential heights (brown lines) at the 500 hour on December 30, 2010.

The weather pattern described above generated strong southwesterly winds beginning at the 800 hour and lasting through the 1400 hour. Beginning at the 800 hour, sustained wind speeds exceeded 11.2 m/s (25 mph) at the Deming site. Peak wind speeds ranged from 11.5 m/s at Desert View to 17.7 m/s at Holman (Figure 10-2). Wind gusts reached 18 m/s starting at the 900 hour at the Chaparral site. Peak wind gusts ranged from 21.5 m/s at SPCY to 26.9 m/s at Holman (Figure 10-3). Blowing dust caused elevated levels of PM_{10} during the same period of high winds as demonstrated by the time series plots in Figures 10-33 through 10-38. As wind speed and wind gusts exceed the 95th percentile of historical data, so do hourly PM_{10} concentrations on this date (800-1400 hours). During these hours, hourly PM_{10} concentrations spiked at all monitoring sites in the network. Maximum hourly PM_{10} concentrations range from 2,309 µg/m^3 at Chaparral to 5,357 µg/m^3 at Anthony (Figure 10-39). Satellite imagery captured the blowing dust throughout southern New Mexico, northern Mexico and west Texas (Figure 10-40). NASA's Calypso satellite also captured dust in the atmosphere in the western half of state including Doña Ana and Luna Counties (Figures 10-41 and 10-42). TCEQ also recorded exceedances of the PM_{10} standard in El Paso on this day and posted a brief description of the event with satellite imagery and visibility data on their website (Appendix E). The National Weather Service also reported in their weather bulletin that strong winds persisted throughout the region on this day (Appendix E).

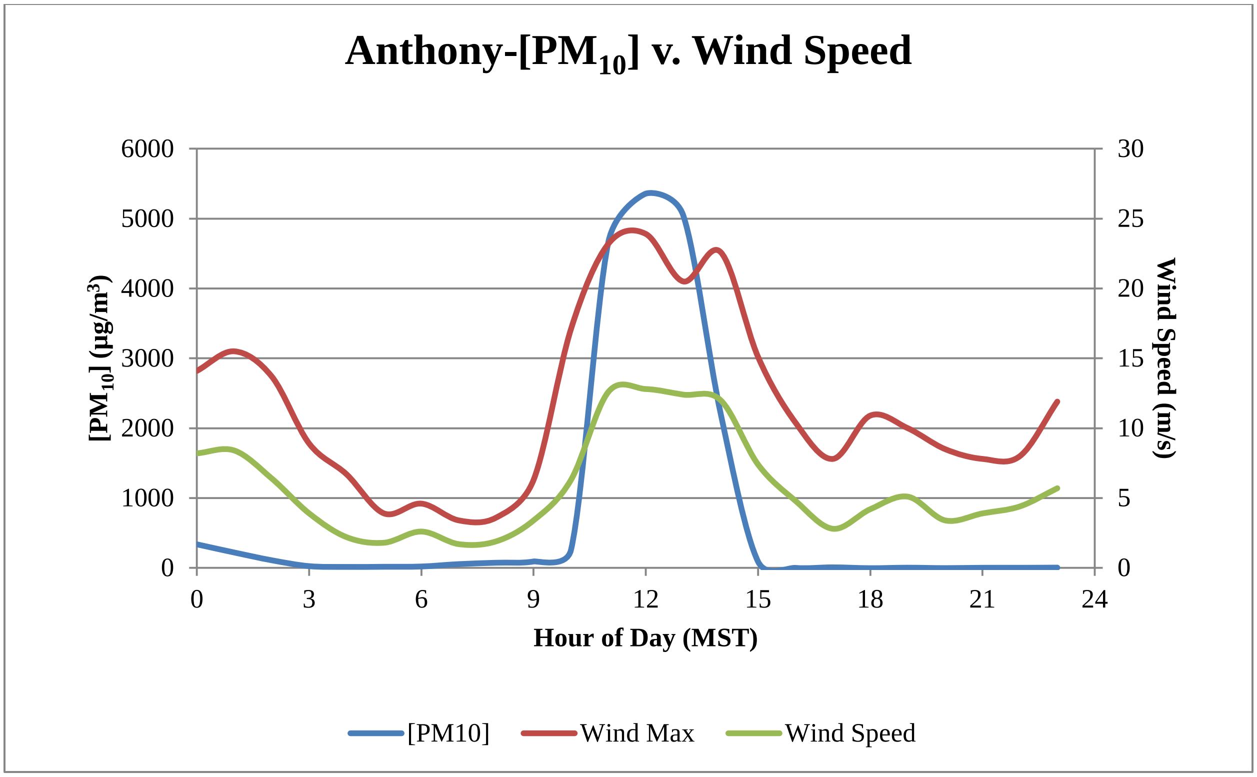

Figure 10-33. Time series plot of hourly observations showing increased PM_{10} concentrations as wind speeds and gusts increase.

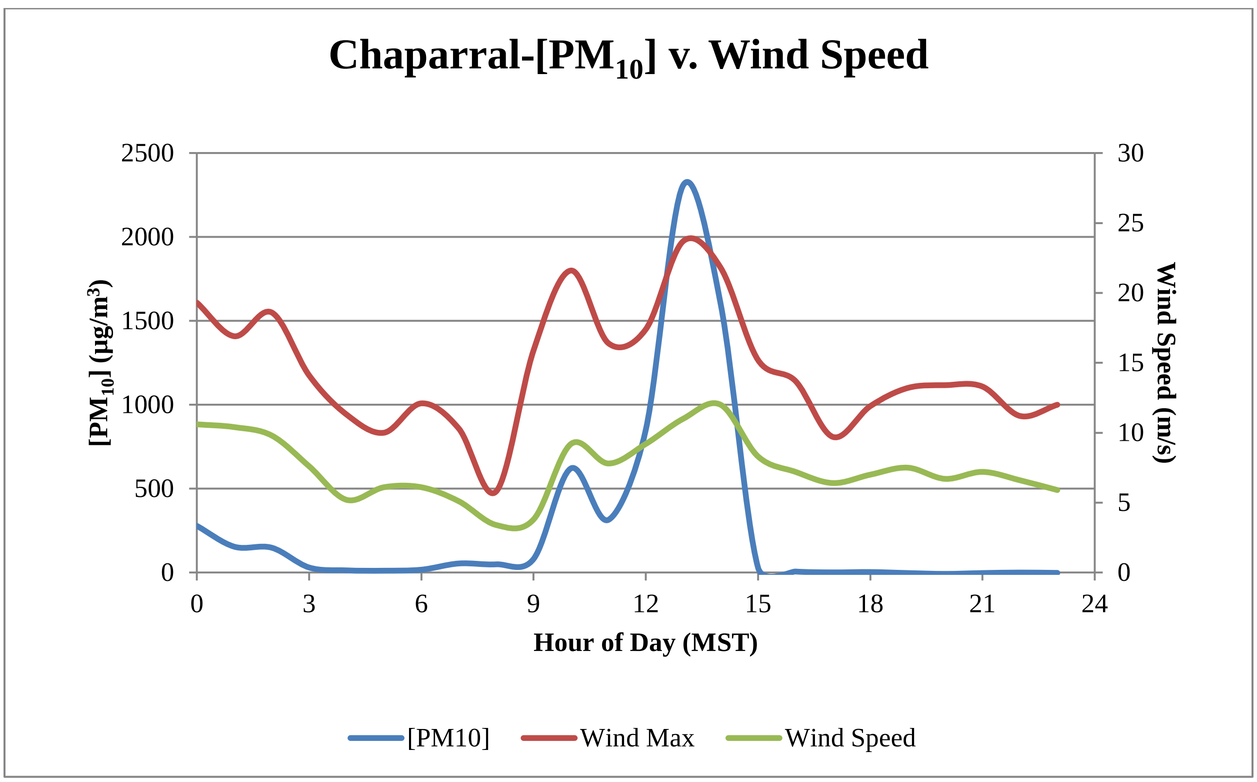

Figure 10-34. Time series plot of hourly observations showing increased PM_{10} concentrations as wind speeds and gusts increase.

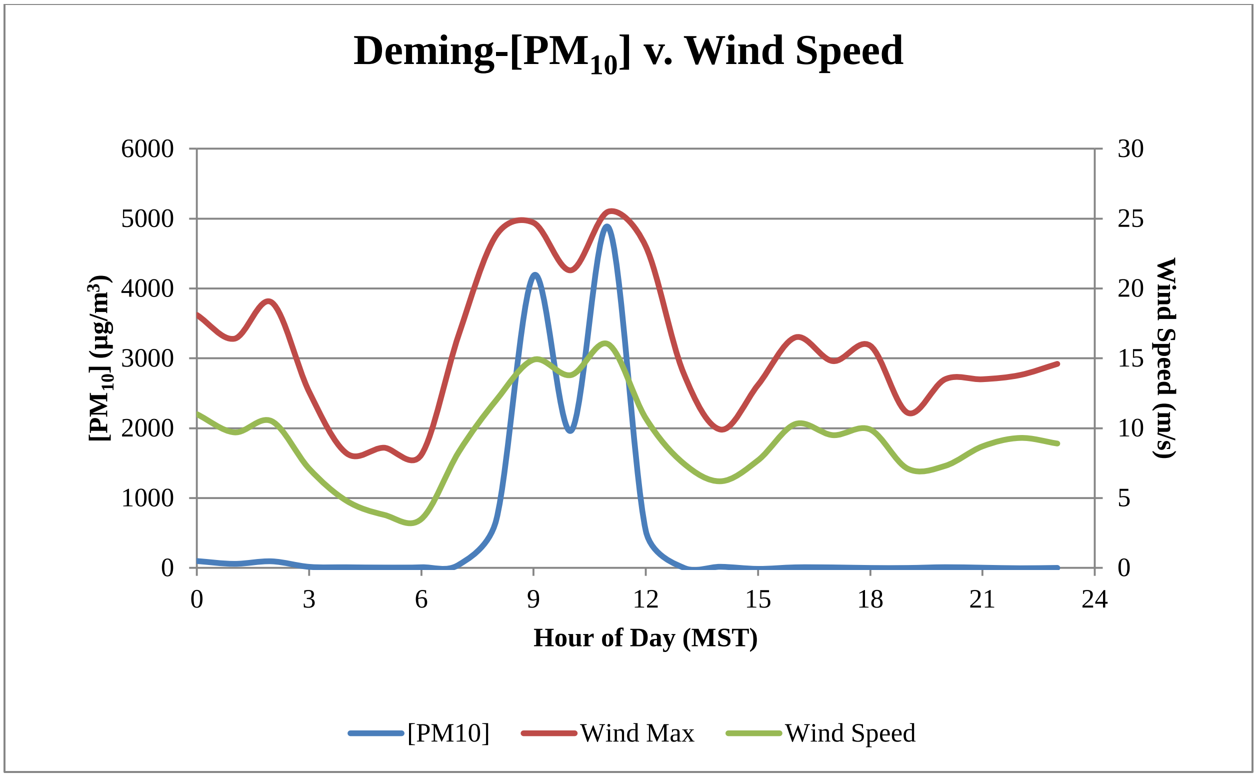

Figure 10-35. Time series plot of hourly observations showing increased PM_{10} concentrations as wind speeds and gusts increase.

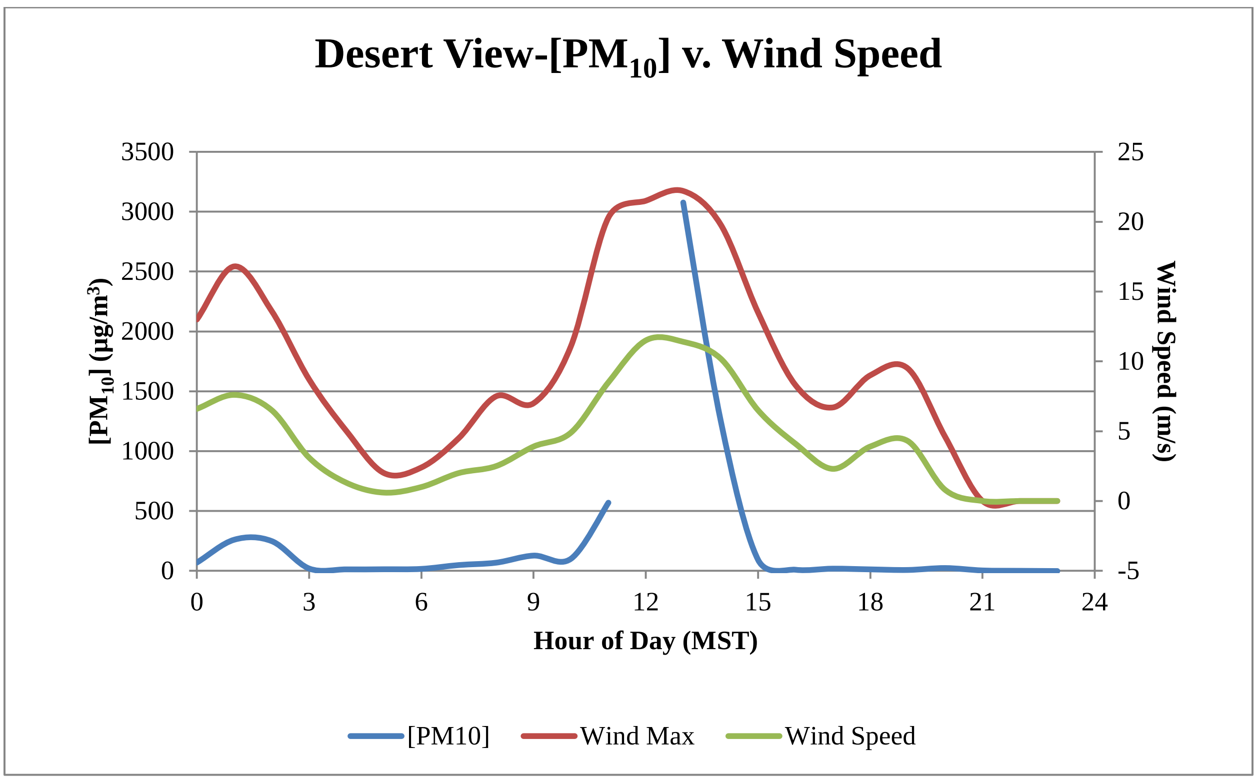

Figure 10-36. Time series plot of hourly observations showing increased PM_{10} concentrations as wind speeds and gusts increase.

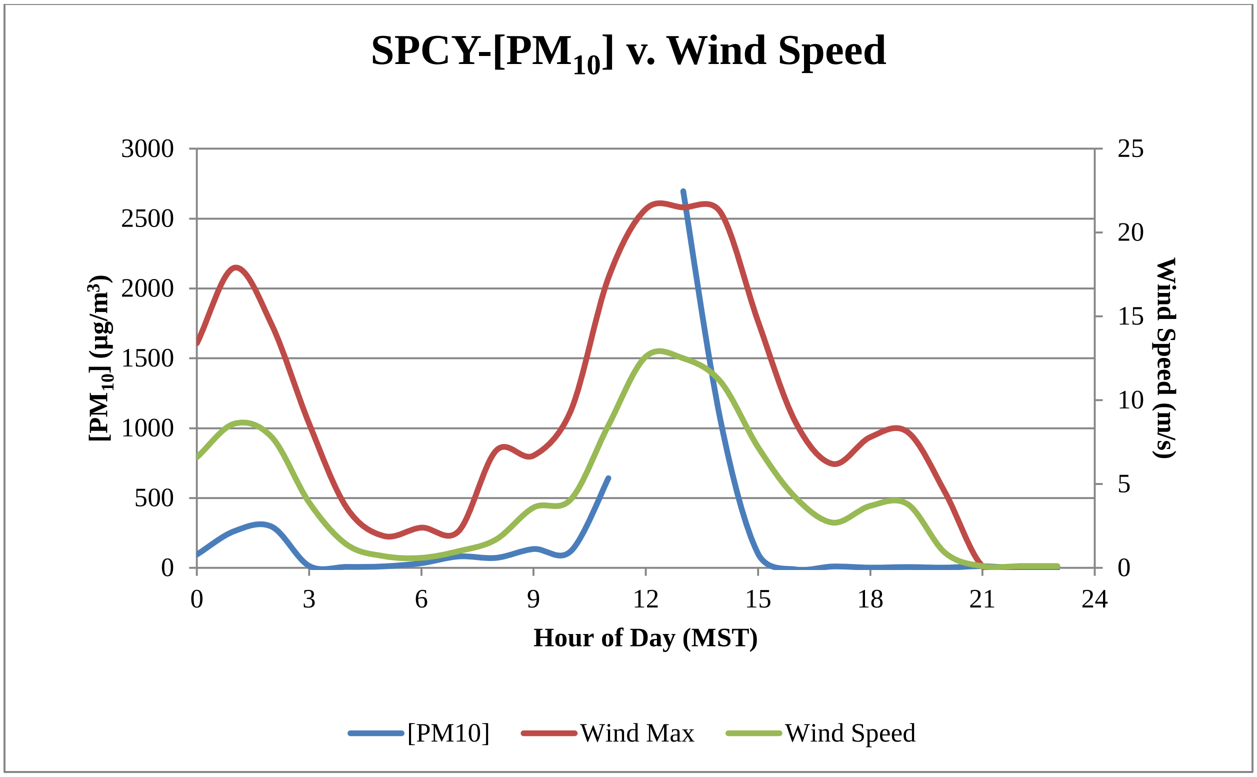

Figure 10-37. Time series plot of hourly observations showing increased PM_{10} concentrations as wind speeds and gusts increase.

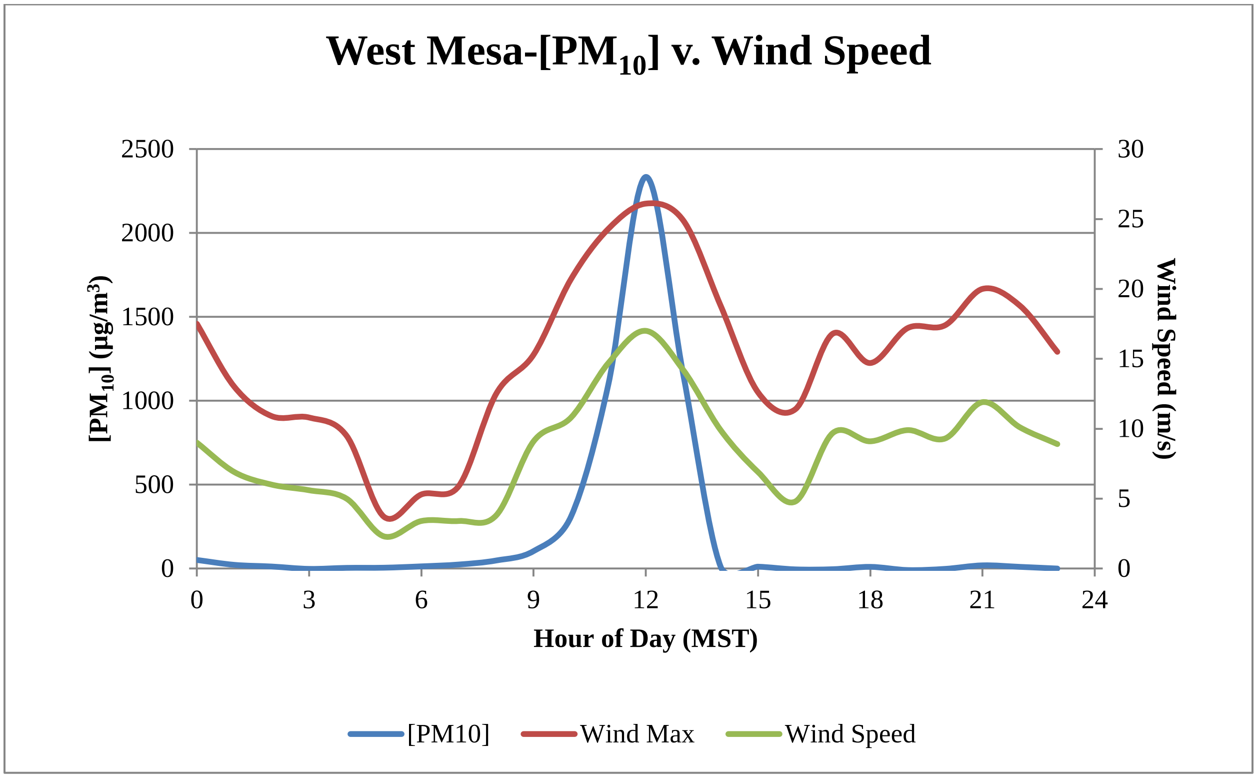

Figure 10-38. Time series plot of hourly observations showing increased PM_{10} concentrations as wind speeds and gusts increase.

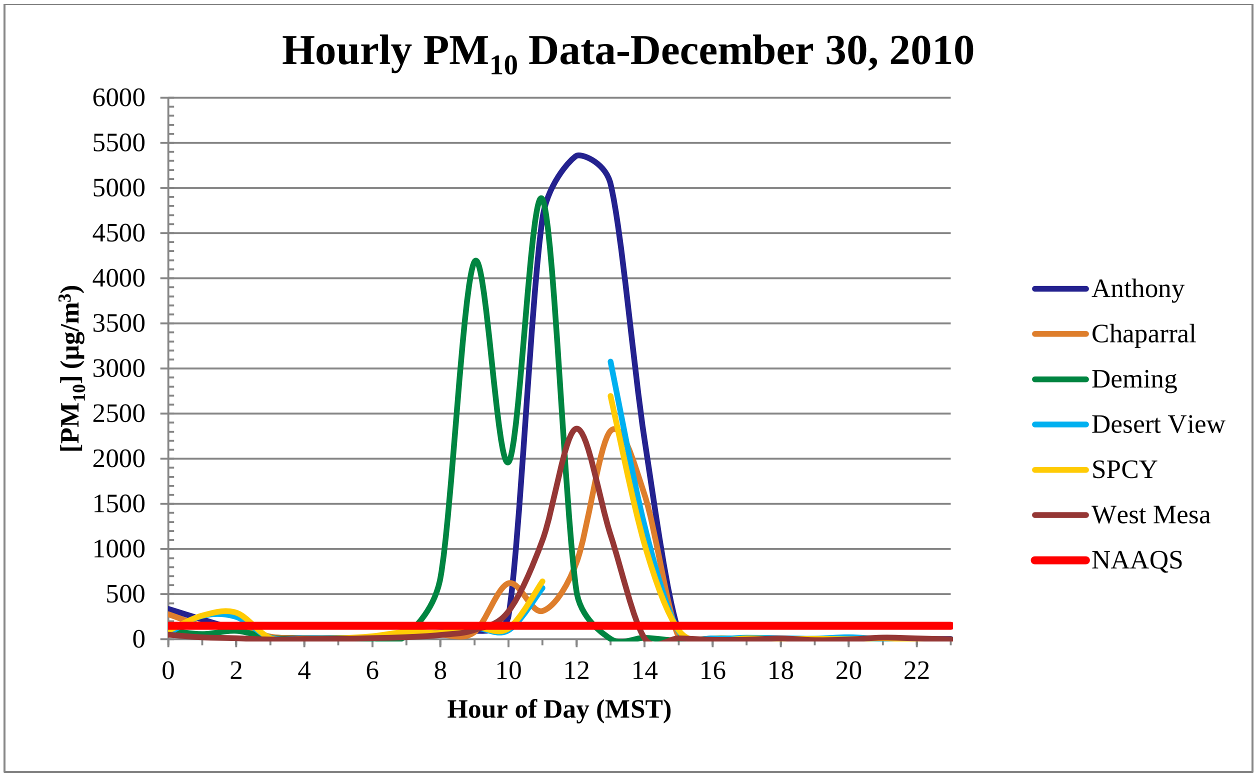

Figure 10-39. Hourly PM_{10} concentrations for Doña Ana and Luna Counties monitors on November 28, 2010.

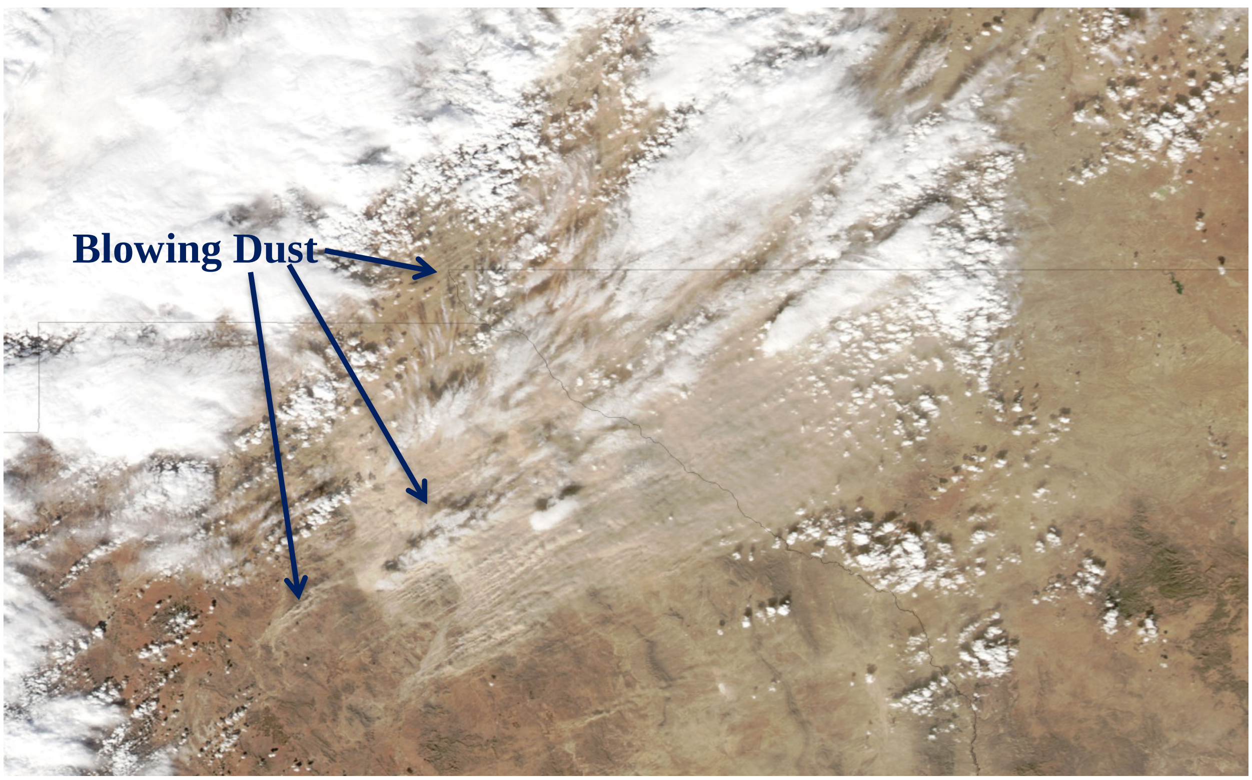

Figure 10-40. Satellite imagery of blowing dust on December 30, 2010 at the 1325 hour. Image courtesy of NASA.

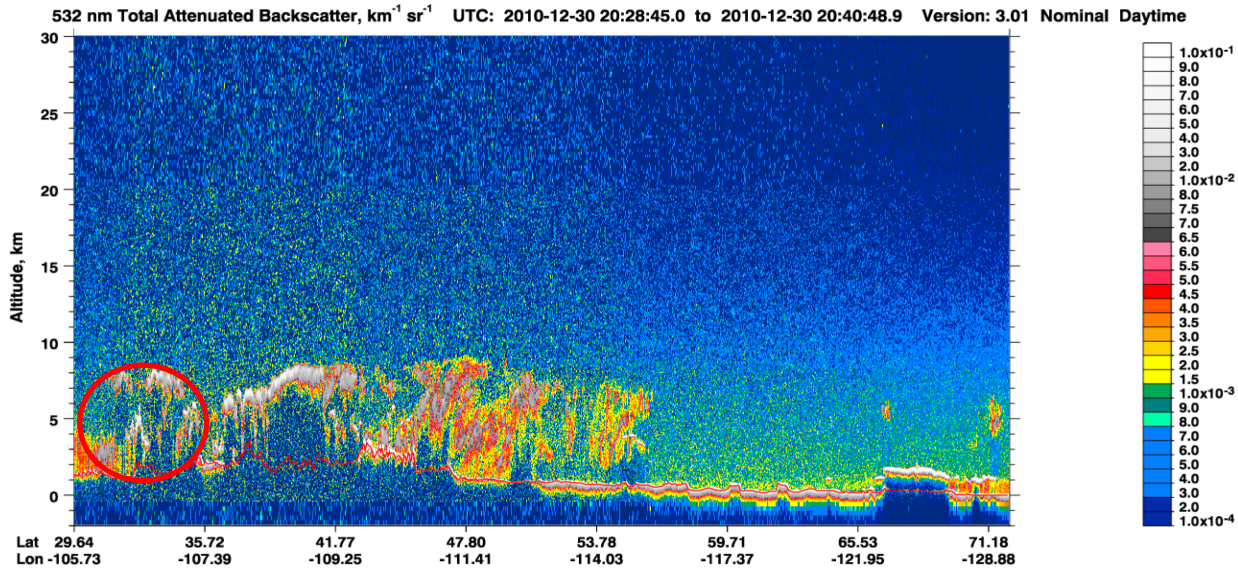

Figure 10-41. Total Attenuated Backscatter plot for December 30, 2010.

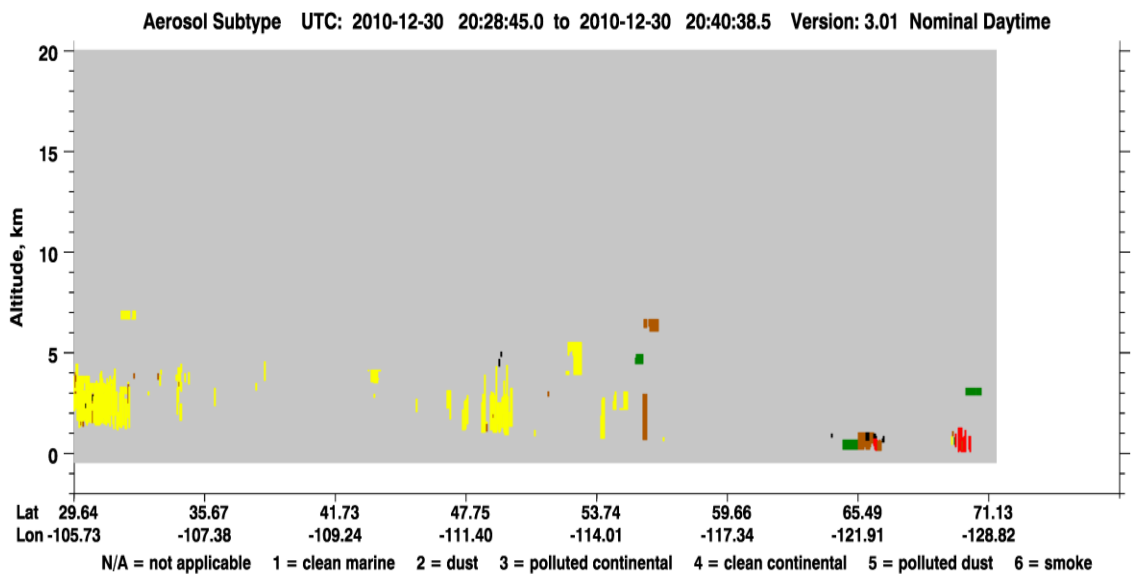

Figure 10-42. Aerosol Subtype Plot of the CALIPSO Total Attenuated Backscatter.

10.5 Affects Air Quality

The historical fluctuations and clear causal relationship analyses prove that the event in question affected air quality on December 30, 2010.

10.6 Natural Event

The CCR and nRCP analyses show that this was a natural event caused by high wind and blowing dust.

10.7 No Exceedance but for the Event

The Anthony monitor detected blowing dust around the 1000 hour with hourly concentrations heavily impacted until the 1400 hour. The 1200 hourly PM_{10} value alone, exceeds the 24-hour average standard at Anthony (5,357 µg/m^3/24 = 223 µg/m^3). By replacing the five hourly values (1000 to 1400 hour) with the 95th percentile of hourly data at the Anthony site, the resulting 24-hour average (69 µg/m^3) does not exceed the NAAQS (Table 10-2). The values in red represent the 95th percentile of all hourly data collected at Anthony in the table below. NMED concludes that without the high wind and blowing dust at the Anthony site an exceedance would not have occurred.

Hour of Day (MST)	Recorded Hourly Data	Substituted Hourly Data
0	337	337
1	220	220
2	109	109
3	25	25
4	14	14
5	16	16
6	20	20
7	54	54
8	74	74
9	92	92
10	258	**84**
11	4668	**94**
12	5357	**118**
13	5046	**136**
14	2210	**160**
15	90	90
16	0	0
17	8	8
18	-4	-4
19	3	3
20	-3	-3
21	2	2
22	2	2
23	4	4
24-Hour Average	775	**69**

Table 10-2. Anthony: 95th percentile of data substituted for those hours when windblown dust was the most intense does not result in an exceedance at Anthony.

The Chaparral monitor detected blowing dust at the 1000 hour with hourly concentrations heavily impacted until the 1400 hour. Two hourly PM_{10} values alone (1300 to 1400 hour), exceed the 24-hour average standard at Chaparral [(2,309 + 1,601) $\mu g/m^3$ = 3,910 $\mu g/m^3$; (3,910 $\mu g/m^3$)/24 = 163 $\mu g/m^3$]. By replacing these hourly values with the 95th percentile of hourly data for the Chaparral site, the resulting 24-hour average (60 $\mu g/m^3$) does not exceed the NAAQS (Table 10-3). The values in red represent the 95th percentile of all hourly data collected at Chaparral in the table below. NMED concludes that without the high wind and blowing dust at the Chaparral site an exceedance would not have occurred.

Hour of Day (MST)	Recorded Hourly Data	Substituted Hourly Data
0	278	278
1	154	154
2	148	148
3	30	30
4	13	13
5	11	11
6	17	17
7	54	54
8	49	49
9	81	81
10	621	**82**
11	314	**92**
12	852	**116**
13	2309	**134**
14	1601	**159**
15	29	29
16	6	6
17	1	1
18	3	3
19	-3	-3
20	-8	-8
21	-3	-3
22	0	0
23	-2	-2
24-Hour Average	273	**60**

Table 10-3. Chaparral: 95th percentile of data substituted for those hours when windblown dust was the most intense does not result in an exceedance at Chaparral.

The Deming monitor detected blowing dust at the 800 hour with hourly concentrations heavily impacted until the 1200 hour. One hourly PM_{10} value alone (1100 hour), exceeds the 24-hour average standard at Deming (4,874 µg/m^3/24 = 203 µg/m^3). By replacing these hourly values (800 to 1200 hour) with the 95th percentile of hourly data for the Deming site, the resulting 24-hour average (37 µg/m^3) does not exceed the NAAQS (Table 10-4). The values in red represent the 95th percentile of all hourly data collected at Deming in the table below. NMED concludes that without the high wind and blowing dust at the Deming site an exceedance would not have occurred.

Hour of Day (MST)	Recorded Hourly Data	Substituted Hourly Data
0	98	98
1	58	58
2	94	94
3	15	15
4	9	9
5	5	5
6	9	9
7	45	45
8	682	**106**
9	4183	**87**
10	1963	**94**
11	4874	**103**
12	529	**130**
13	5	5
14	16	16
15	-14	-14
16	8	8
17	7	7
18	-1	-1
19	-1	-1
20	10	10
21	3	3
22	-5	-5
23	0	0
24-Hour Average	524	**37**

Table 10-4. Deming: 95th percentile of data substituted for those hours when windblown dust was the most intense does not result in an exceedance at Deming.

The Desert View monitor detected blowing dust at the 1100 hour with hourly concentrations heavily impacted until the 1400 hour. Two hourly PM_{10} values alone (1300 to 1400 hour), exceeds the 24-hour average standard at Desert View [(3,077 + 1,257) µg/m^3 = 4,334 µg/m^3; (4,334 µg/m^3)/24 = 181 µg/m^3]. By replacing the four hourly values (1100 to 1400 hour) with the 95th percentile of hourly data for the Desert View site, the resulting 24-hour average (72 µg/m^3) does not exceed the NAAQS (Table 10-5). The values in red represent the 95th percentile of all hourly data collected at Desert View in the table below. NMED concludes that without the high wind and blowing dust at the Desert View site an exceedance would not have occurred.

Hour of Day (MST)	Recorded Hourly Data	Substituted Hourly Data
0	69	69
1	260	260
2	248	248
3	19	19
4	12	12
5	13	13
6	16	16
7	48	48
8	68	68
9	127	127
10	101	101
11	569	**111**
12	No Data	**135**
13	3077	**154**
14	1257	**193**
15	92	92
16	9	9
17	18	18
18	12	12
19	7	7
20	23	23
21	3	3
22	0	0
23	-2	-2
24-Hour Average	262	**72**

Table 10-5. Desert View: 95th percentile of data substituted for those hours when windblown dust was the most intense does not result in an exceedance at Desert View.

The SPCY monitor detected blowing dust at the 1100 hour with hourly concentrations heavily impacted until the 1400 hour. Two hourly PM_{10} values alone (1300 to 1400 hour), exceed the 24-hour average standard at SPCY [(2,696 + 1,051) µg/m^3 = 3,747 µg/m^3; (3,747 µg/m^3)/24 = 156 µg/m^3]. By replacing the four hourly values from the 1100 to 1400 hour with the 95th percentile of hourly data for the SPCY site, the resulting 24-hour average (72 µg/m^3) does not exceed the NAAQS (Table 10-6). The values in red represent the 95th percentile of all hourly data collected at SPCY in the table below. NMED concludes that without the high wind and blowing dust at the SPCY site an exceedance would not have occurred.

Hour of Day (MST)	Recorded Hourly Data	Substituted Hourly Data
0	96	96
1	263	263
2	295	295
3	14	14
4	7	7
5	11	11
6	34	34
7	82	82
8	72	72
9	135	135
10	121	121
11	642	**94**
12	No Data	**116**
13	2696	**135**
14	1051	**160**
15	102	102
16	-11	-11
17	10	10
18	2	2
19	6	6
20	2	2
21	12	12
22	-5	-5
23	-21	-21
24-Hour Average	244	**72**

Table 10-6. SPCY: 95th percentile of data substituted for those hours when windblown dust was the most intense does not result in an exceedance at SPCY.

The West Mesa monitor detected blowing dust at the 1000 hour with hourly concentrations heavily impacted until the 1300 hour. These hourly PM_{10} values alone, exceed the 24-hour average standard at West Mesa [(310 + 1,099 + 2,334 + 1,157) µg/m^3 = 4,900 µg/m^3; (4,900 µg/m^3)/24 = 204 µg/m^3]. By replacing these hourly values with the 95th percentile of hourly data for the West Mesa site, the resulting 24-hour average (31 µg/m^3) does not exceed the NAAQS (Table 10-7). The values in red represent the 95th percentile of all hourly data collected at West Mesa in the table below. NMED concludes that without the high wind and blowing dust at the West Mesa site an exceedance would not have occurred.

Hour of Day (MST)	Recorded Hourly Data	Substituted Hourly Data
0	51	51
1	22	22
2	12	12
3	-2	-2
4	4	4
5	5	5
6	13	13
7	24	24
8	48	48
9	104	104
10	310	**82**
11	1099	**92**
12	2334	**117**
13	1157	**135**
14	11	11
15	11	11
16	-5	-5
17	-4	-4
18	10	10
19	-9	-9
20	-2	-2
21	19	19
22	10	10
23	0	0
24-Hour Average	217	**31**

Table 10-7. West Mesa: 95th percentile of data substituted for those hours when windblown dust was the most intense does not result in an exceedance at West Mesa.

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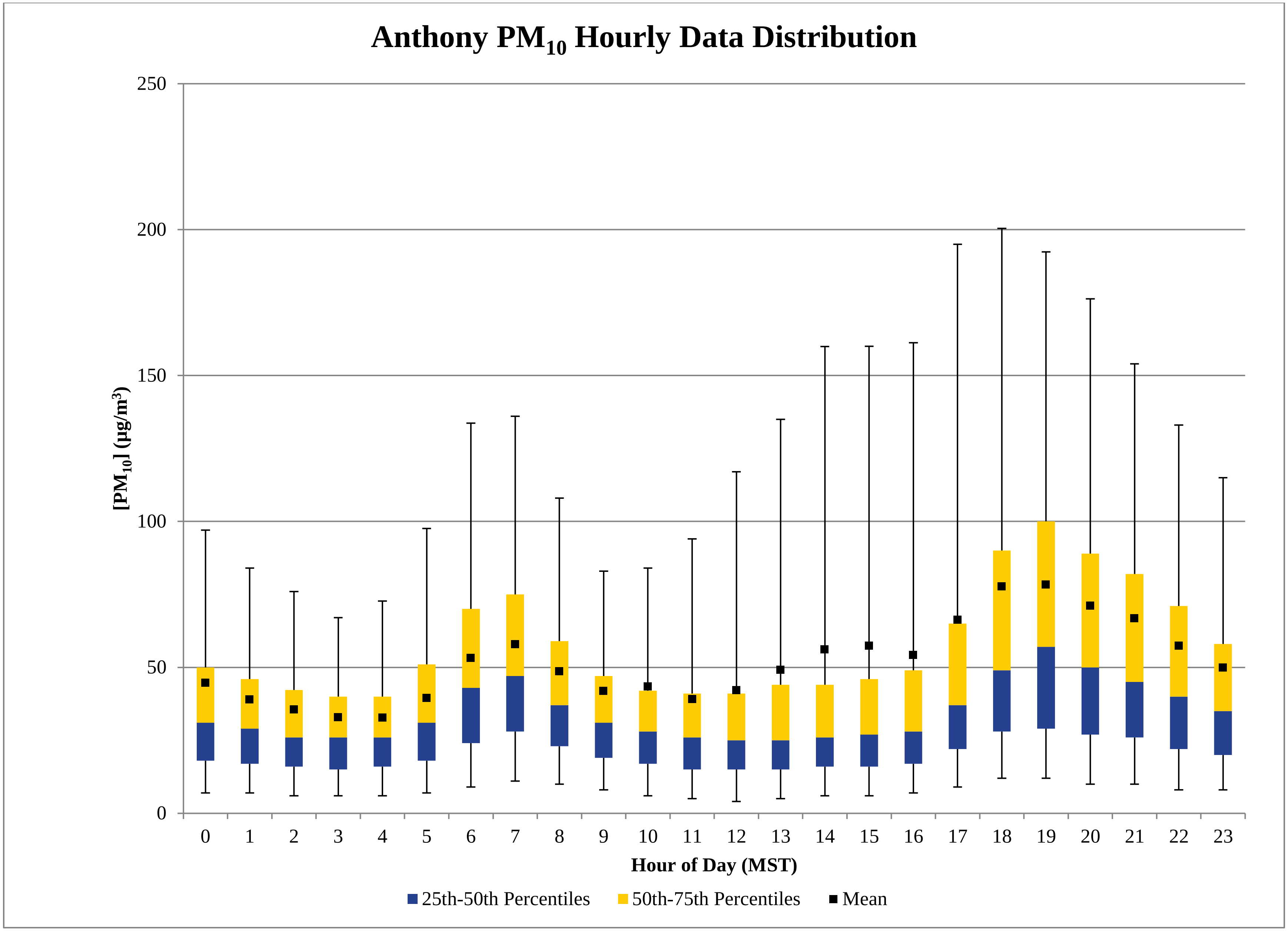
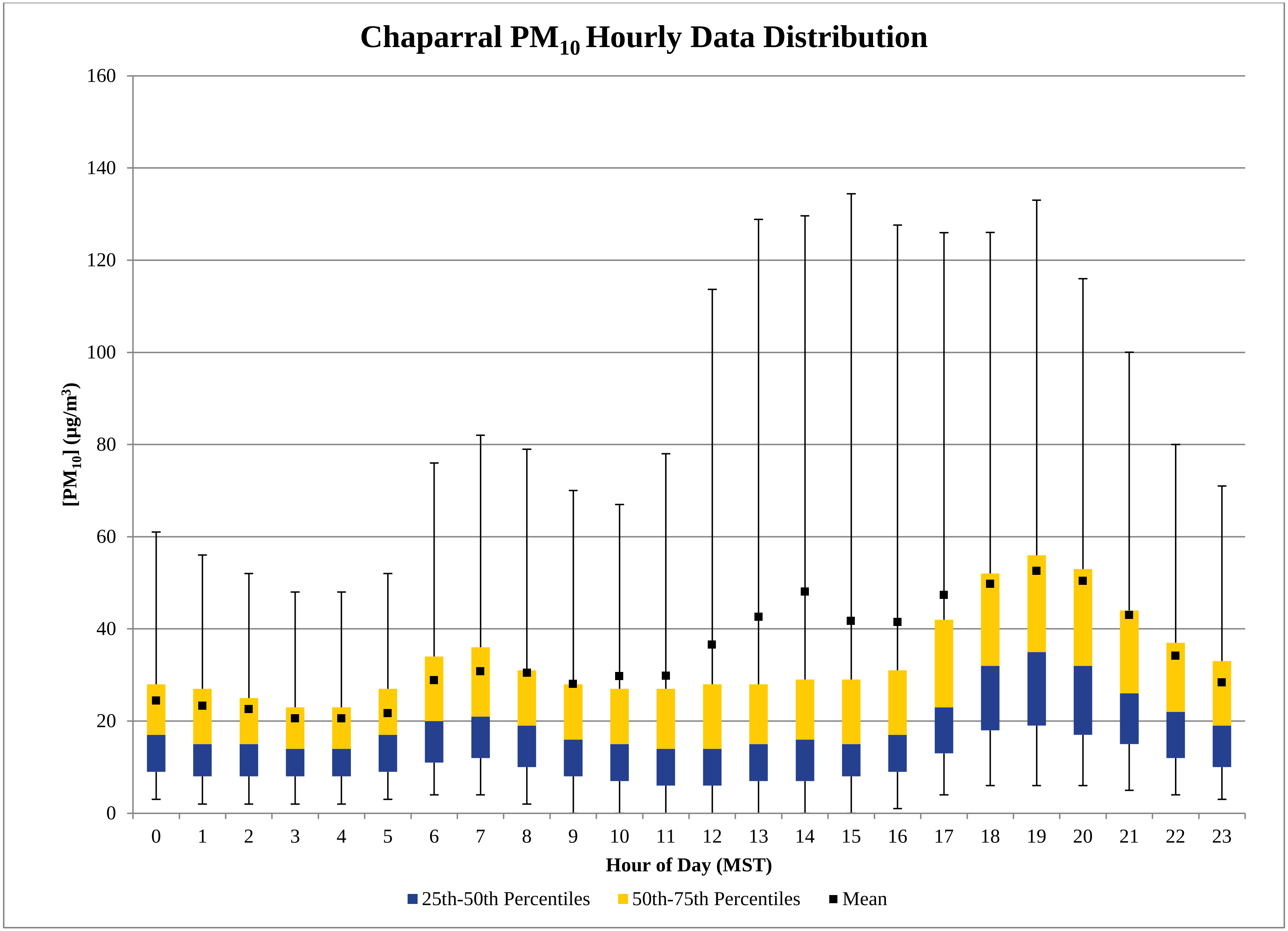
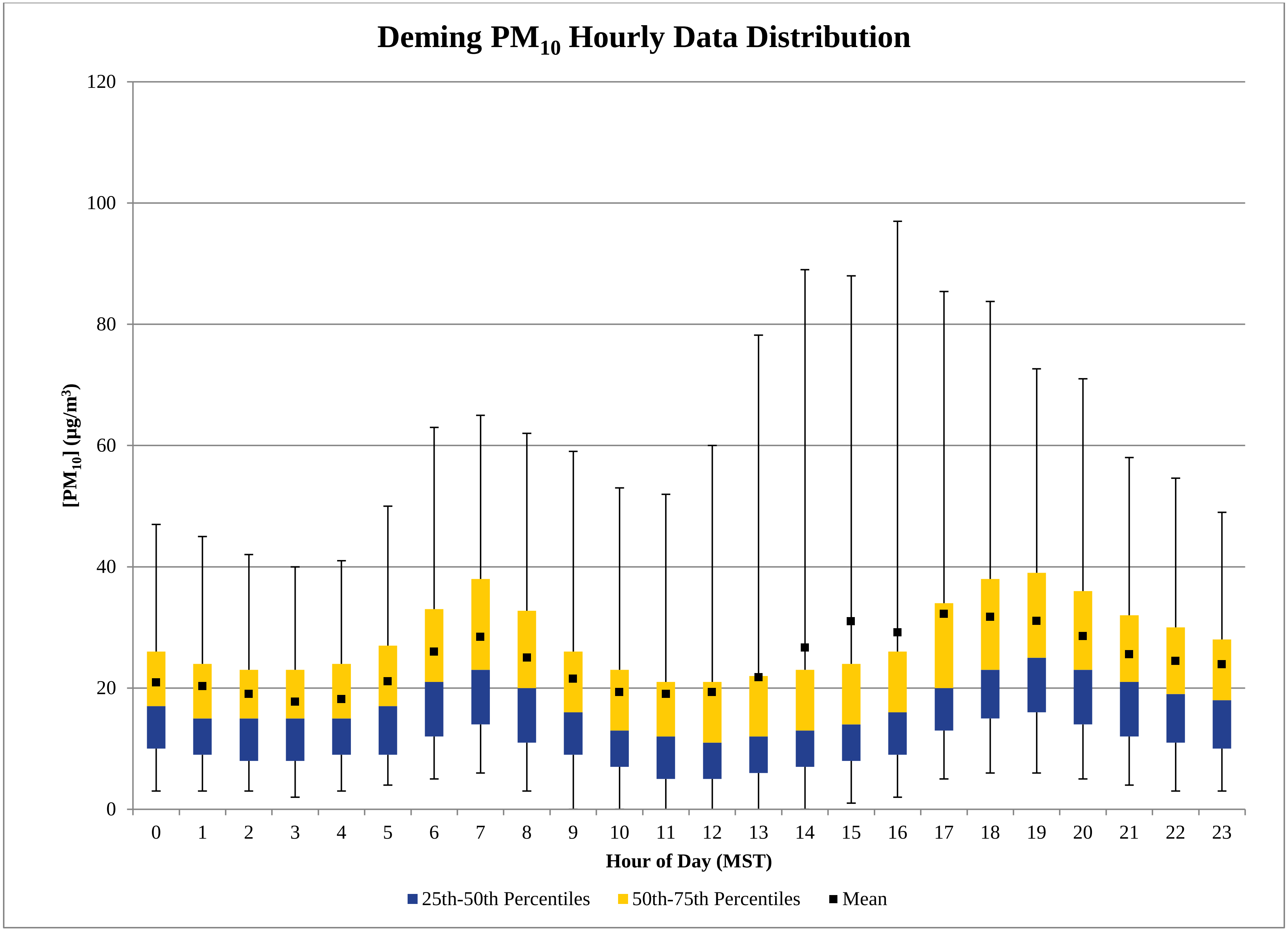
APPENDIX A

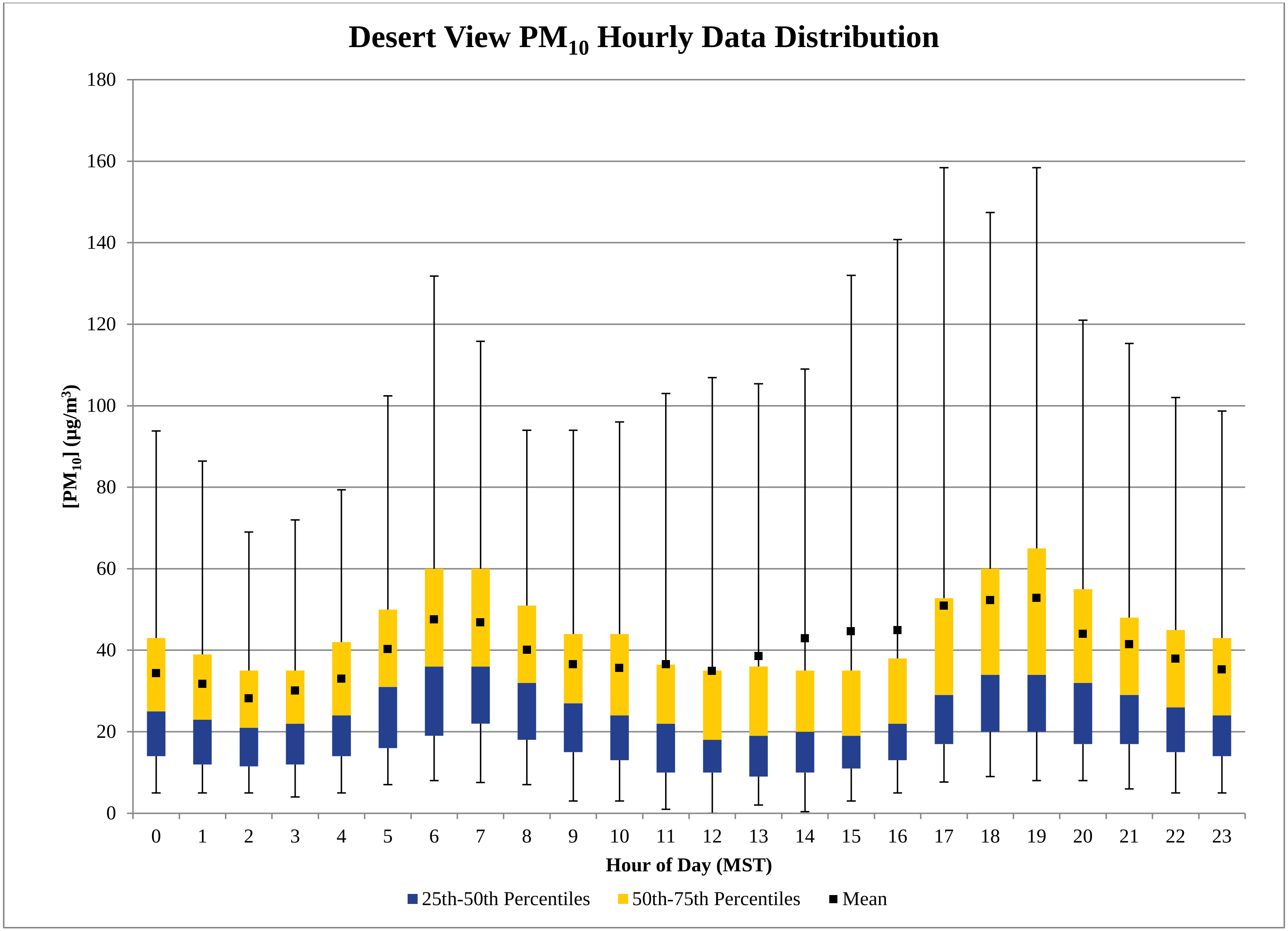
Hourly PM_{10} Data Distribution Charts

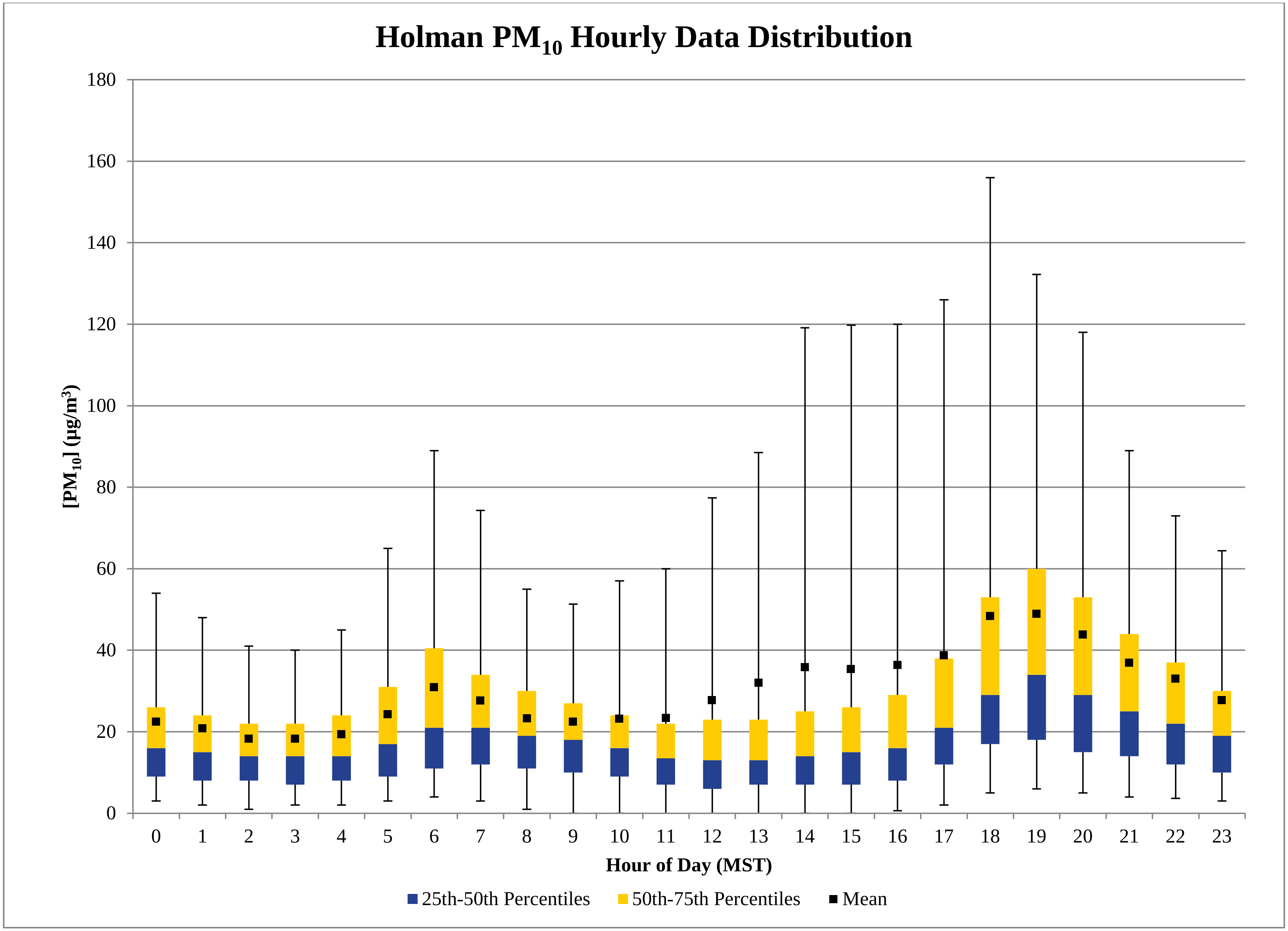


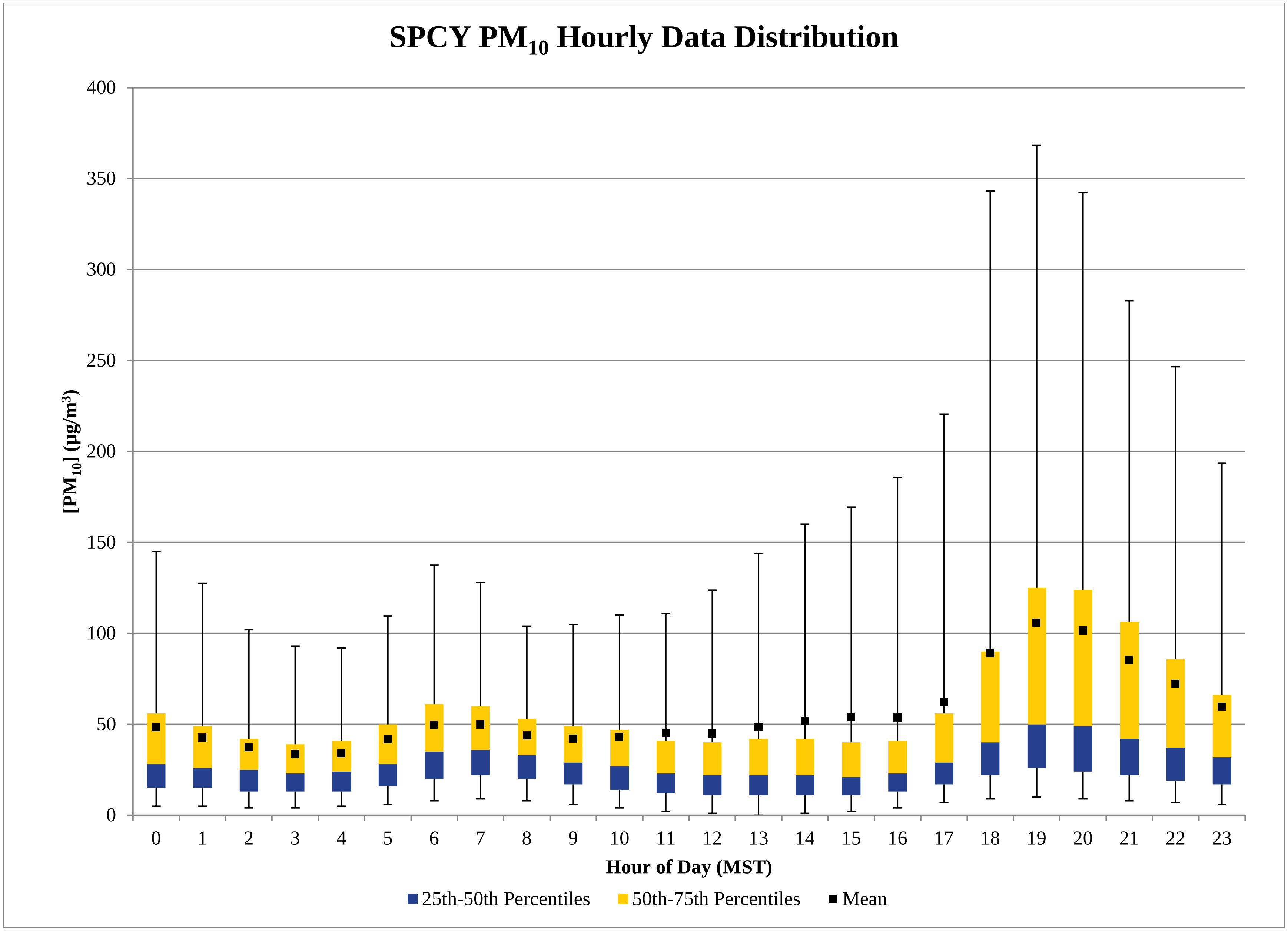
Anthony PM10 Hourly Data Distribution
[PM10] (µg/m3)
0
50
100
150
200
250
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23
Hour of Day (MST)
25th-50th Percentiles
50th-75th Percentiles
Mean

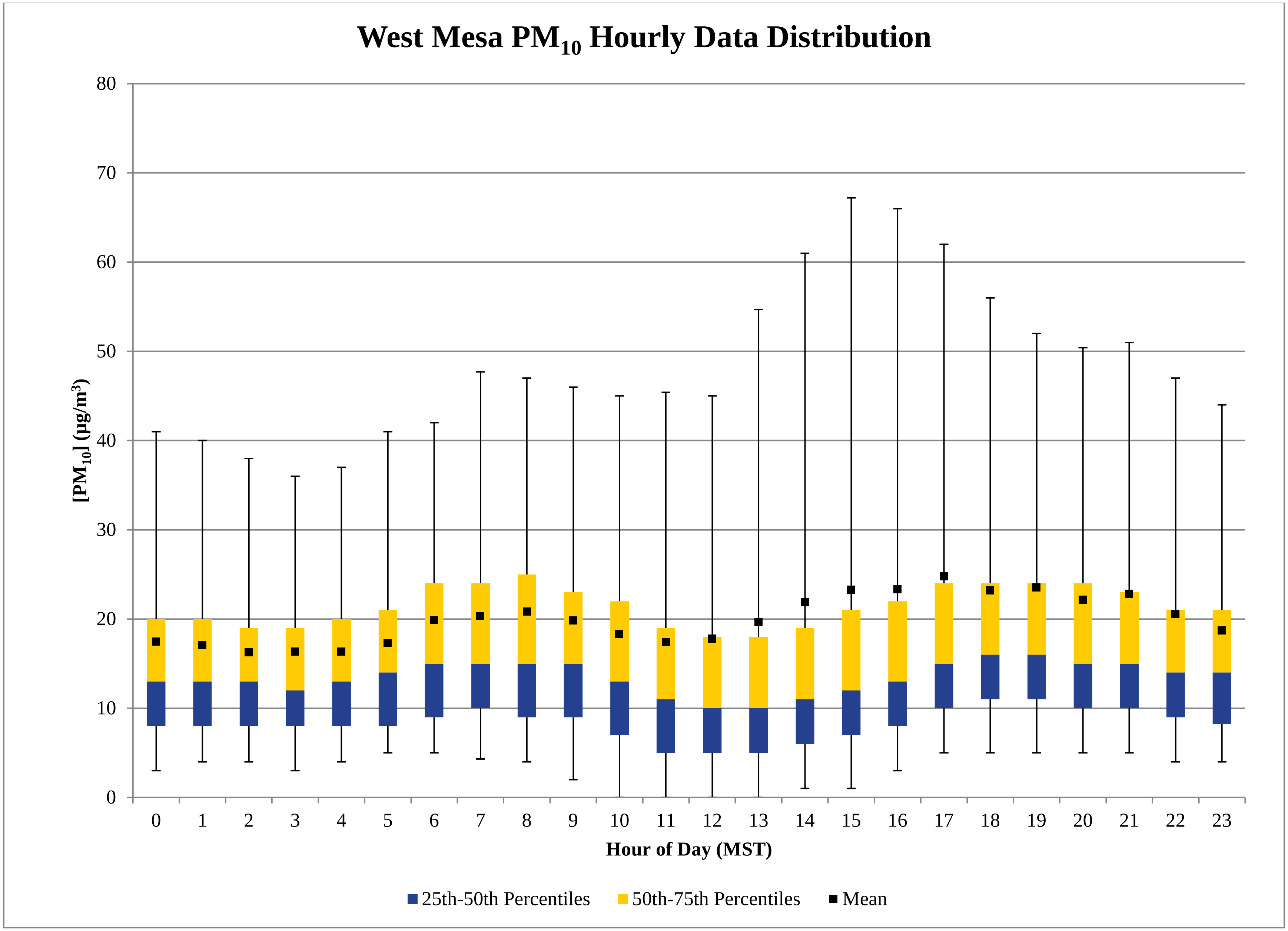

Chaparral PM10 Hourly Data Distribution
[PM10] (µg/m3)
0
20
40
60
80
100
120
140
160
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
Hour of Day (MST)
25th-50th Percentiles
50th-75th Percentiles
Mean


Deming PM_{10} Hourly Data Distribution
$[PM_{10}]$ (µg/m³)
0
20
40
60
80
100
120
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23
Hour of Day (MST)
25th-50th Percentiles
50th-75th Percentiles
Mean


Desert View PM_{10} Hourly Data Distribution
180
160
140
120
100
80
60
40
20
0
$[PM_{10}]$ ($\mu g/m^3$)
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23
Hour of Day (MST)
25th-50th Percentiles
50th-75th Percentiles
Mean

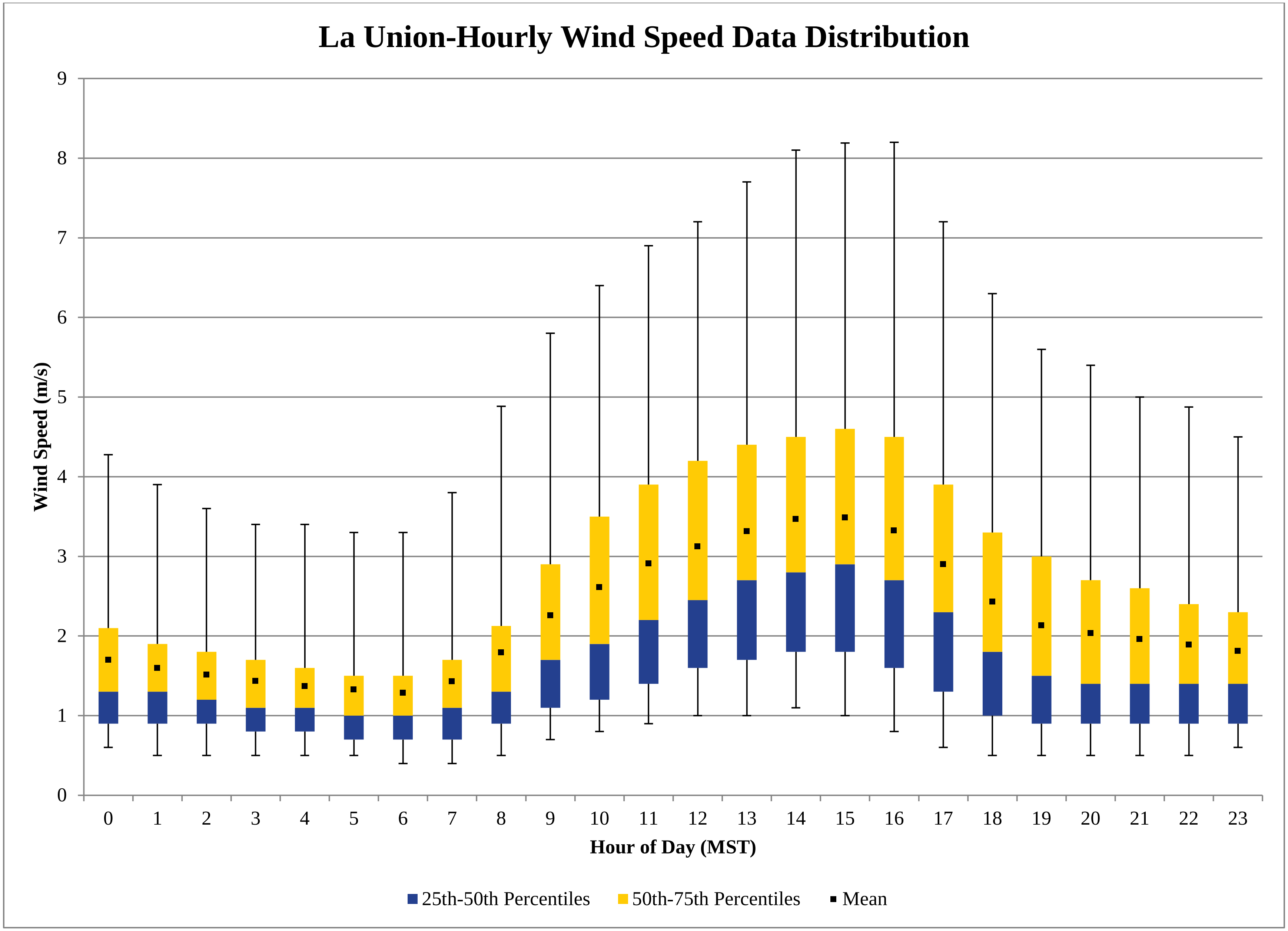

Holman PM10 Hourly Data Distribution
[PM10] (µg/m3)
180
160
140
120
100
80
60
40
20
0
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23
Hour of Day (MST)
25th-50th Percentiles
50th-75th Percentiles
Mean

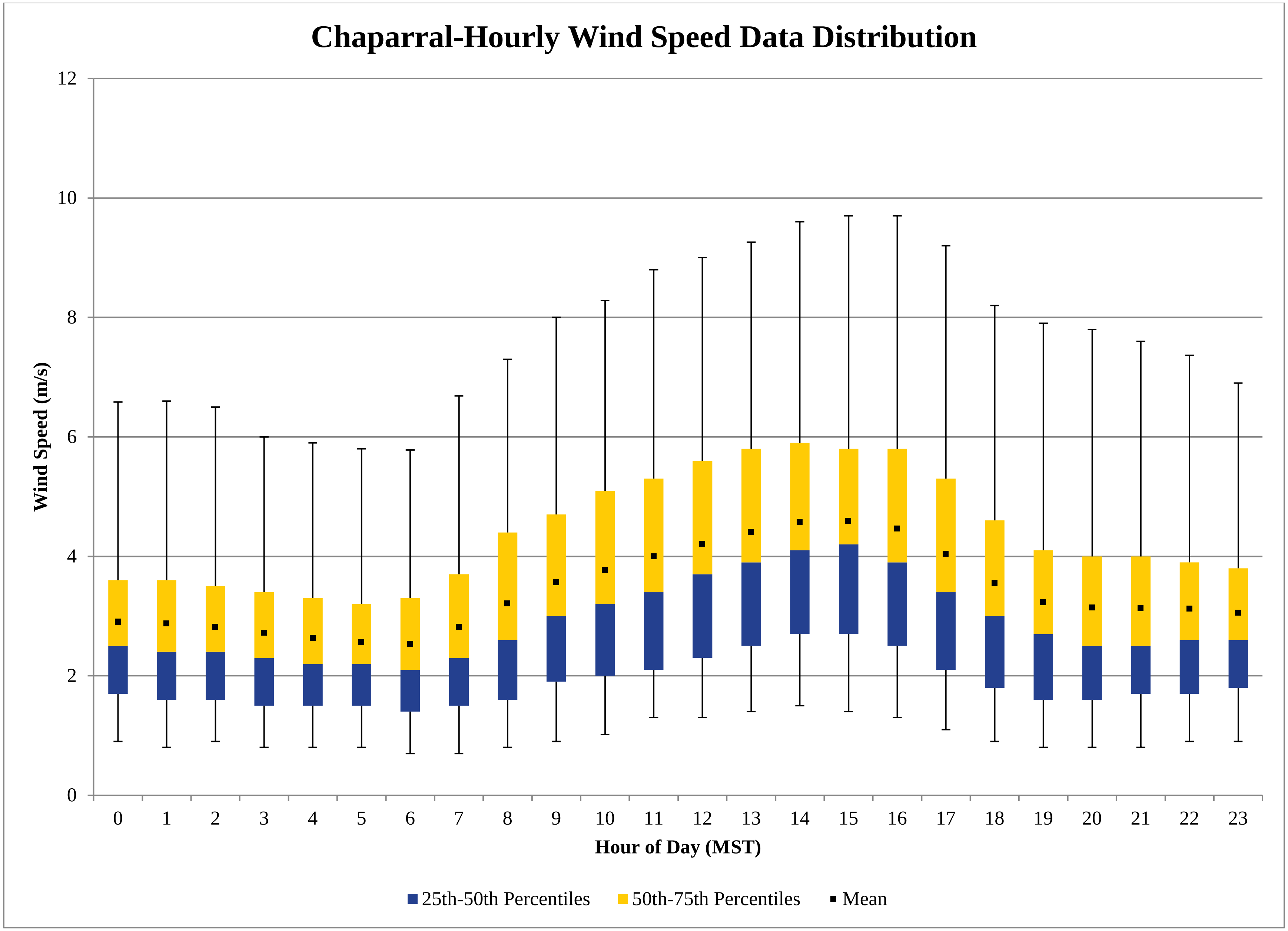

SPCY PM_{10} Hourly Data Distribution
400
350
300
250
200
150
100
50
0
$[PM_{10}]$ (µg/m^3)
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23
Hour of Day (MST)
25th-50th Percentiles
50th-75th Percentiles
Mean

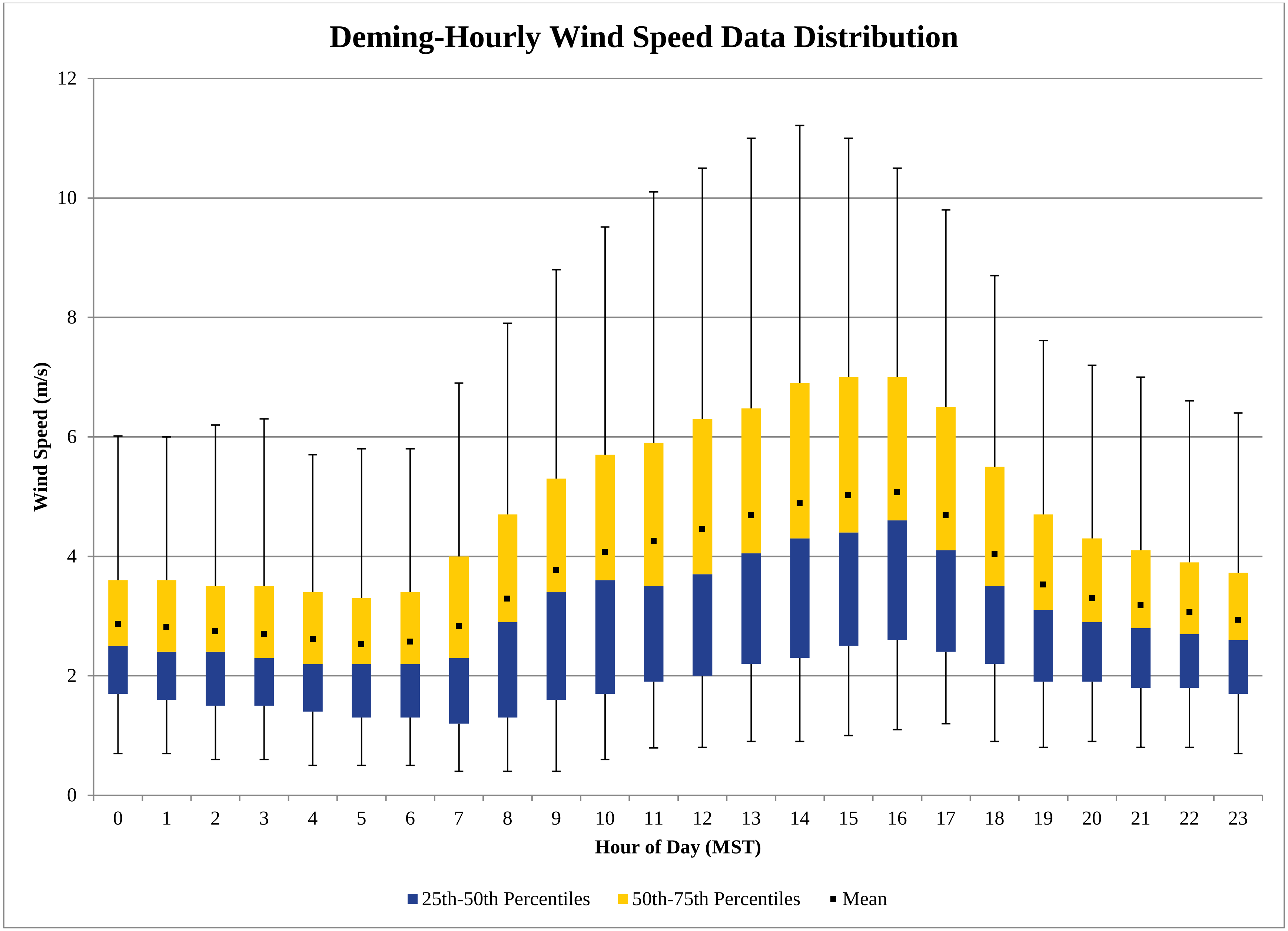

West Mesa PM10 Hourly Data Distribution
[PM10] (µg/m3)
80
70
60
50
40
30
20
10
0
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23
Hour of Day (MST)
25th-50th Percentiles
50th-75th Percentiles
Mean

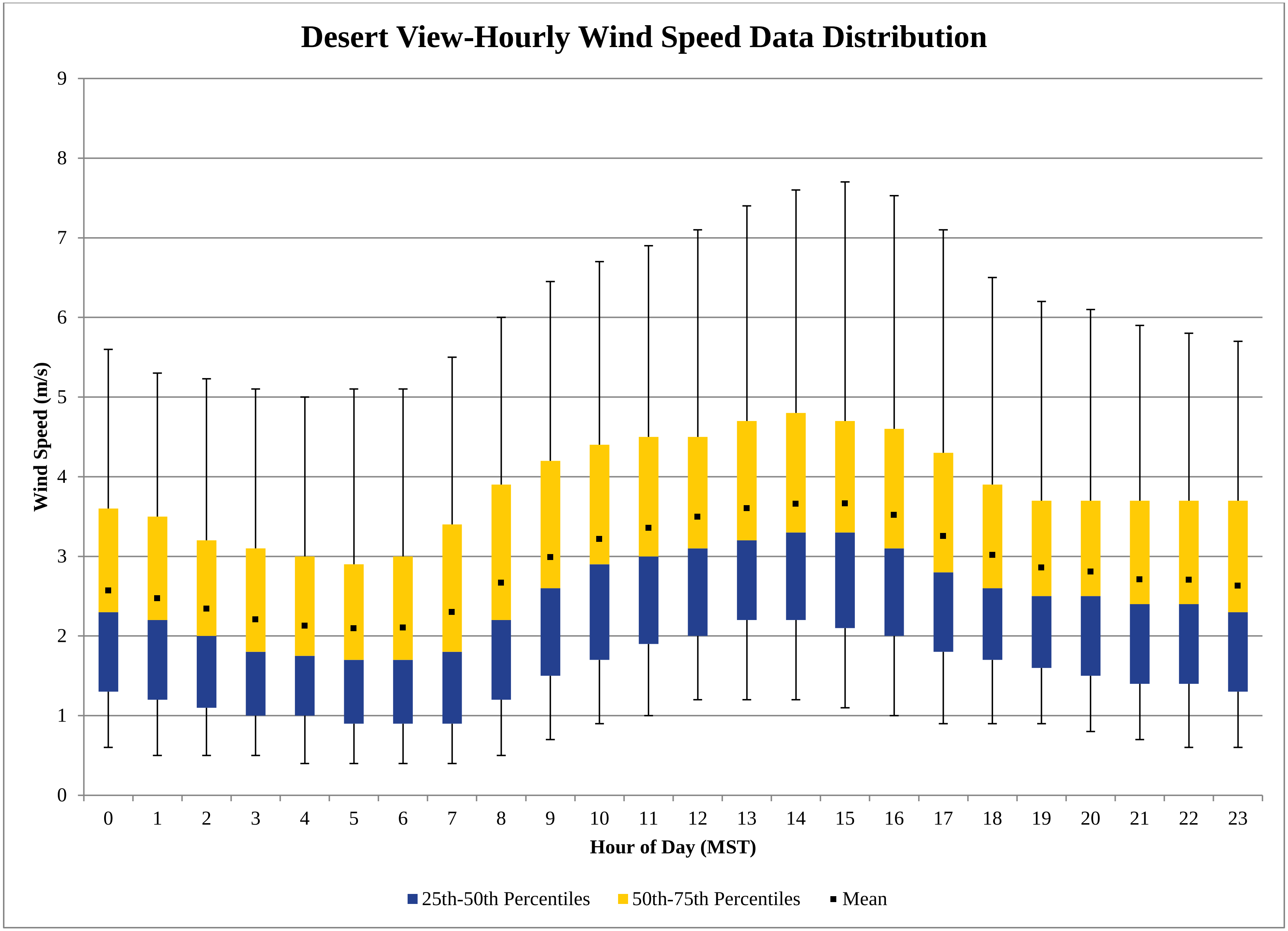
APPENDIX B

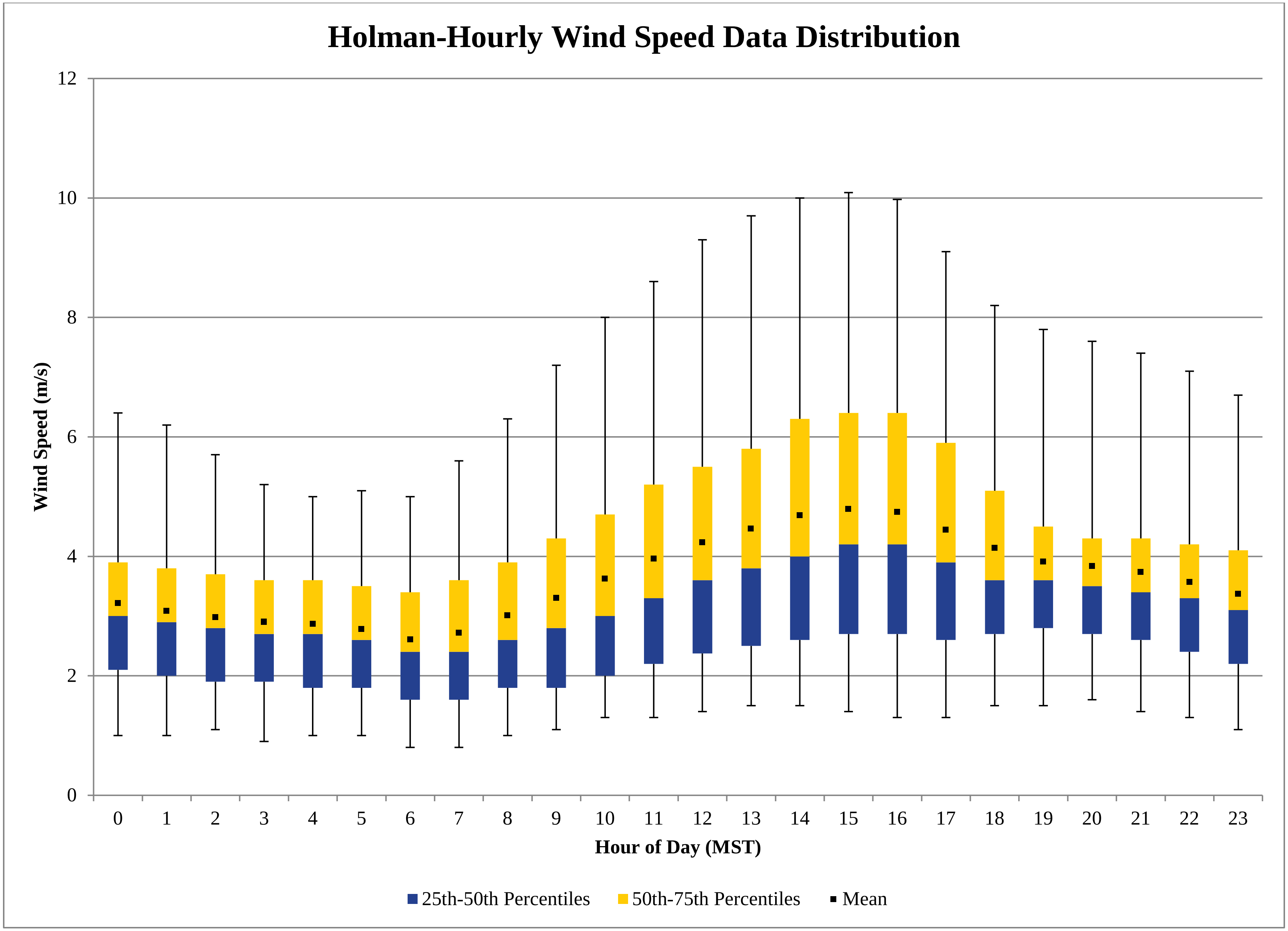
Hourly Wind Speed Data Distribution Charts

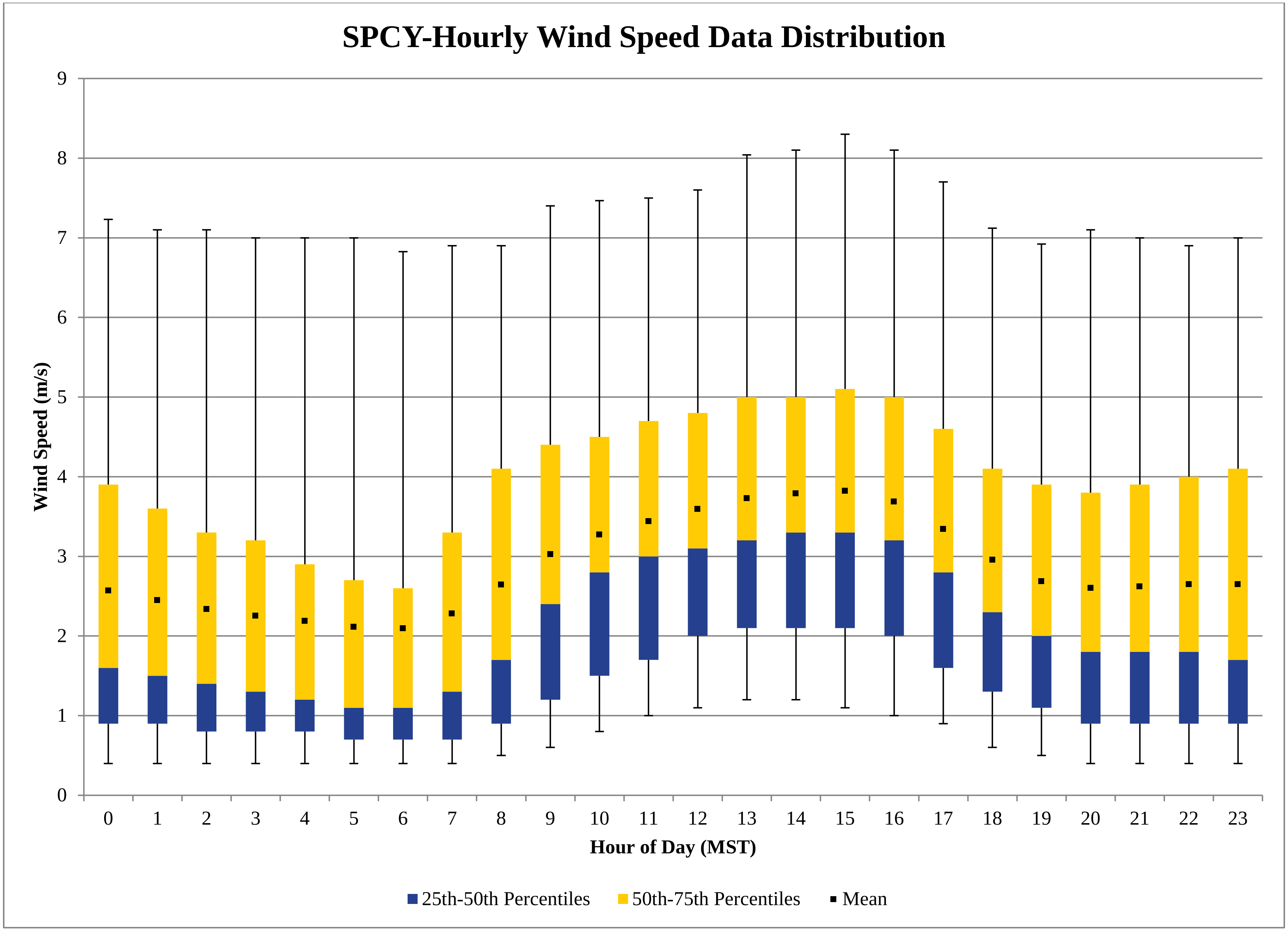

La Union-Hourly Wind Speed Data Distribution
Wind Speed (m/s)
0
1
2
3
4
5
6
7
8
9
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23
Hour of Day (MST)
25th-50th Percentiles
50th-75th Percentiles
Mean

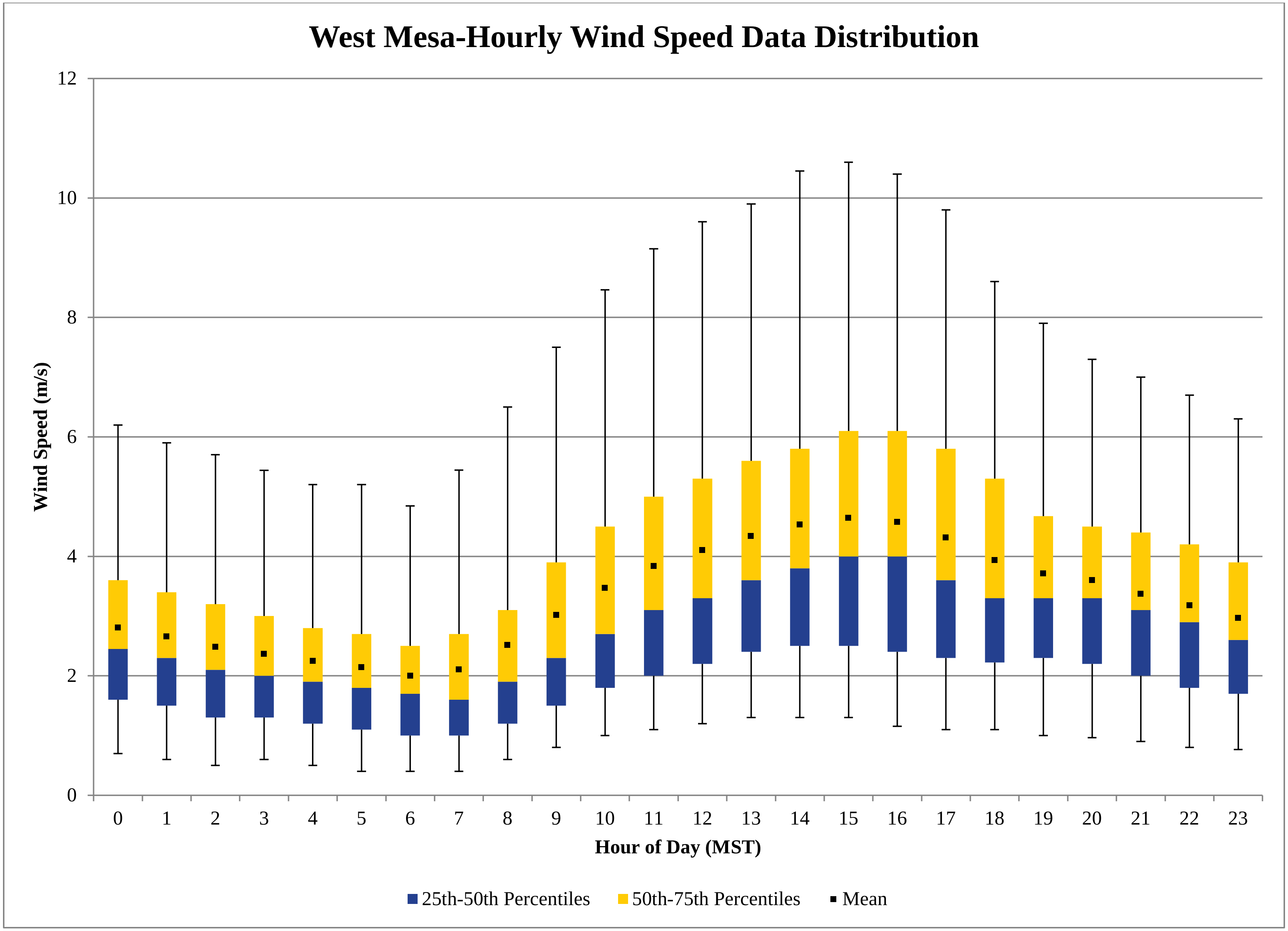

Chaparral-Hourly Wind Speed Data Distribution
Wind Speed (m/s)
0
2
4
6
8
10
12
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23
Hour of Day (MST)
25th-50th Percentiles
50th-75th Percentiles
Mean


Deming-Hourly Wind Speed Data Distribution
Wind Speed (m/s)
0
2
4
6
8
10
12
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23
Hour of Day (MST)
25th-50th Percentiles
50th-75th Percentiles
Mean


Desert View-Hourly Wind Speed Data Distribution
Wind Speed (m/s)
0
1
2
3
4
5
6
7
8
9
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23
Hour of Day (MST)
25th-50th Percentiles
50th-75th Percentiles
Mean

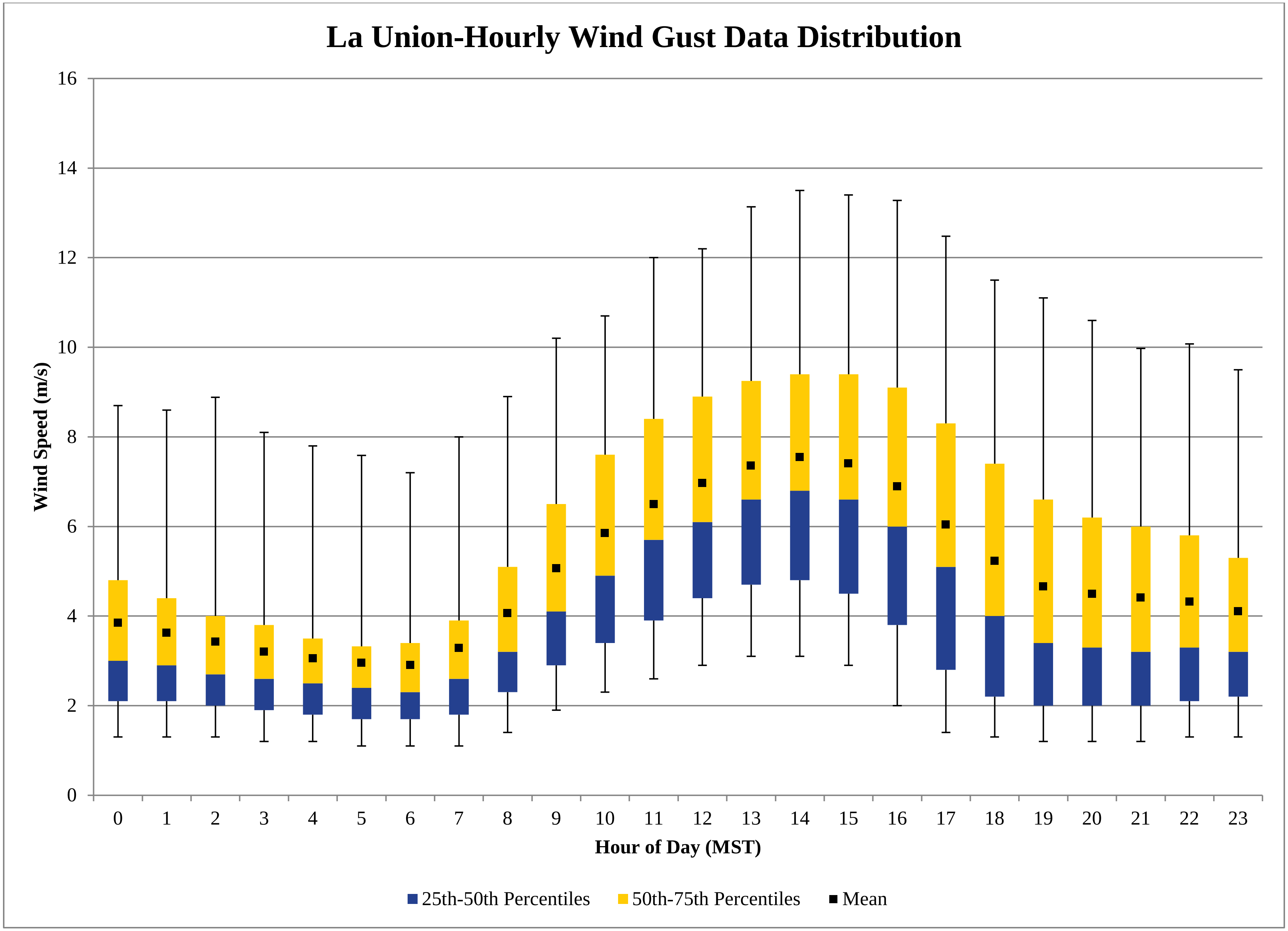

Holman-Hourly Wind Speed Data Distribution
Wind Speed (m/s)
0
2
4
6
8
10
12
Hour of Day (MST)
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
25th-50th Percentiles
50th-75th Percentiles
Mean

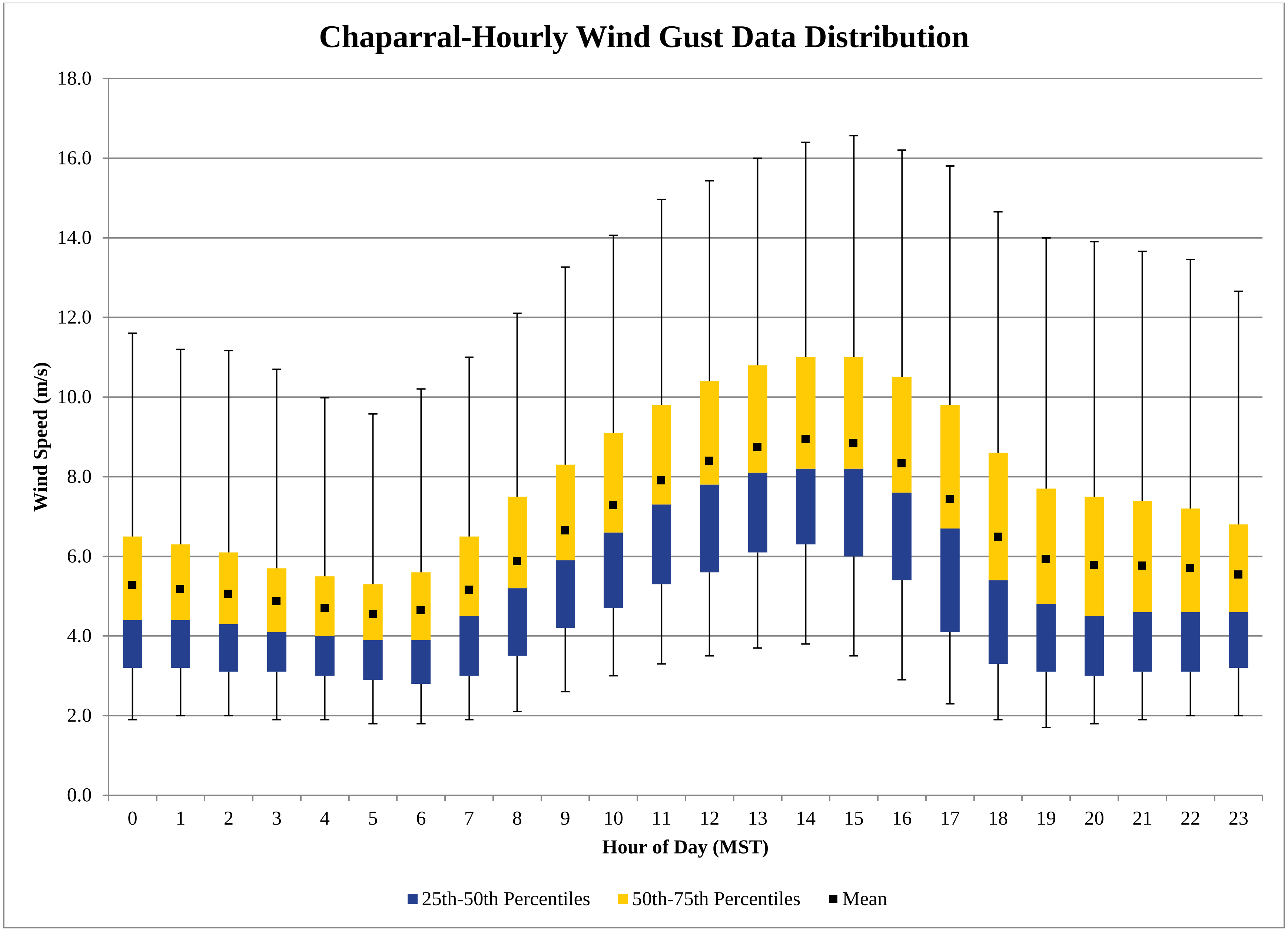

SPCY-Hourly Wind Speed Data Distribution
Wind Speed (m/s)
0
1
2
3
4
5
6
7
8
9
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23
Hour of Day (MST)
25th-50th Percentiles
50th-75th Percentiles
Mean


West Mesa-Hourly Wind Speed Data Distribution
Wind Speed (m/s)
0
2
4
6
8
10
12
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23
Hour of Day (MST)
25th-50th Percentiles
50th-75th Percentiles
Mean

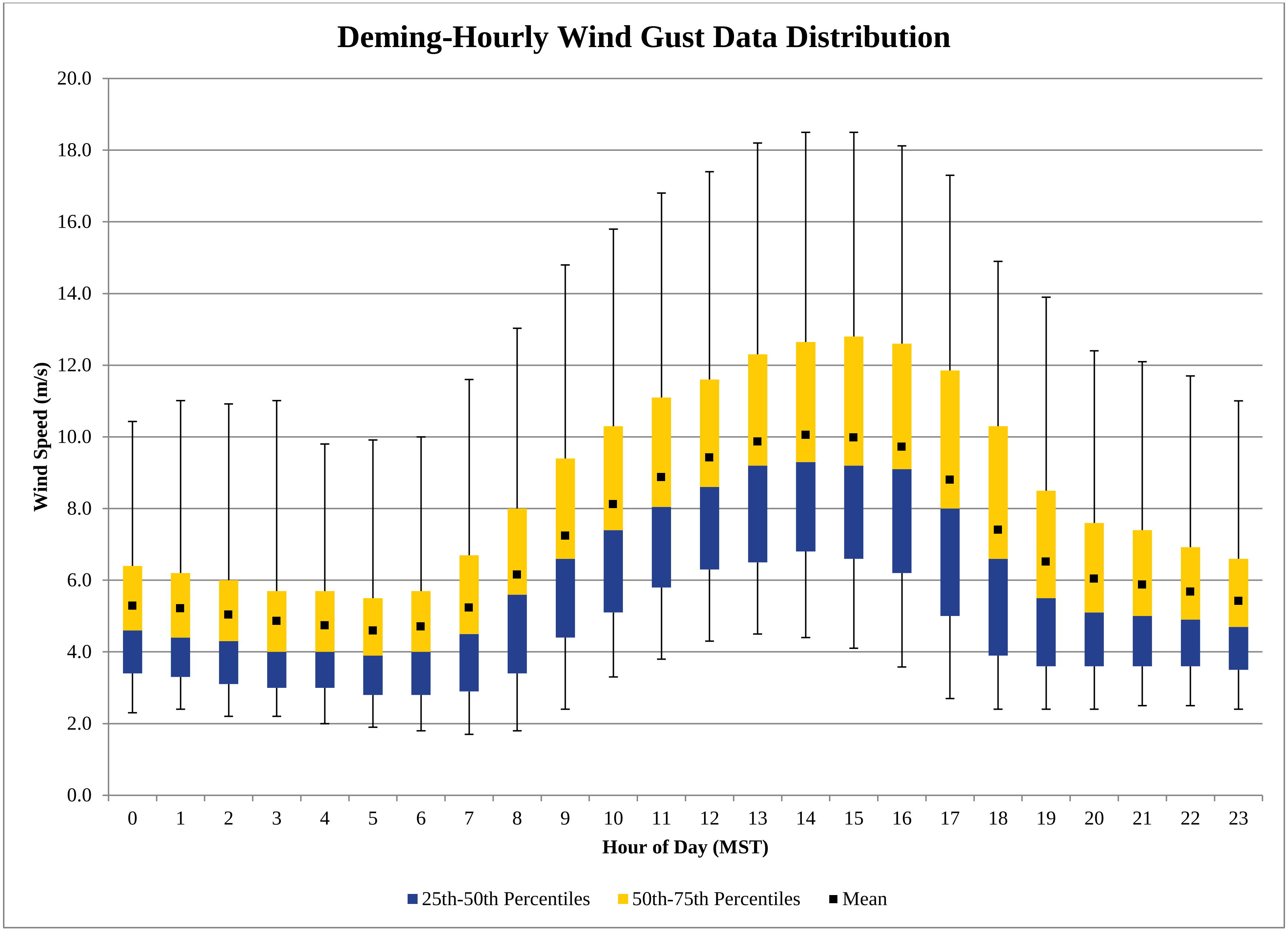
APPENDIX C

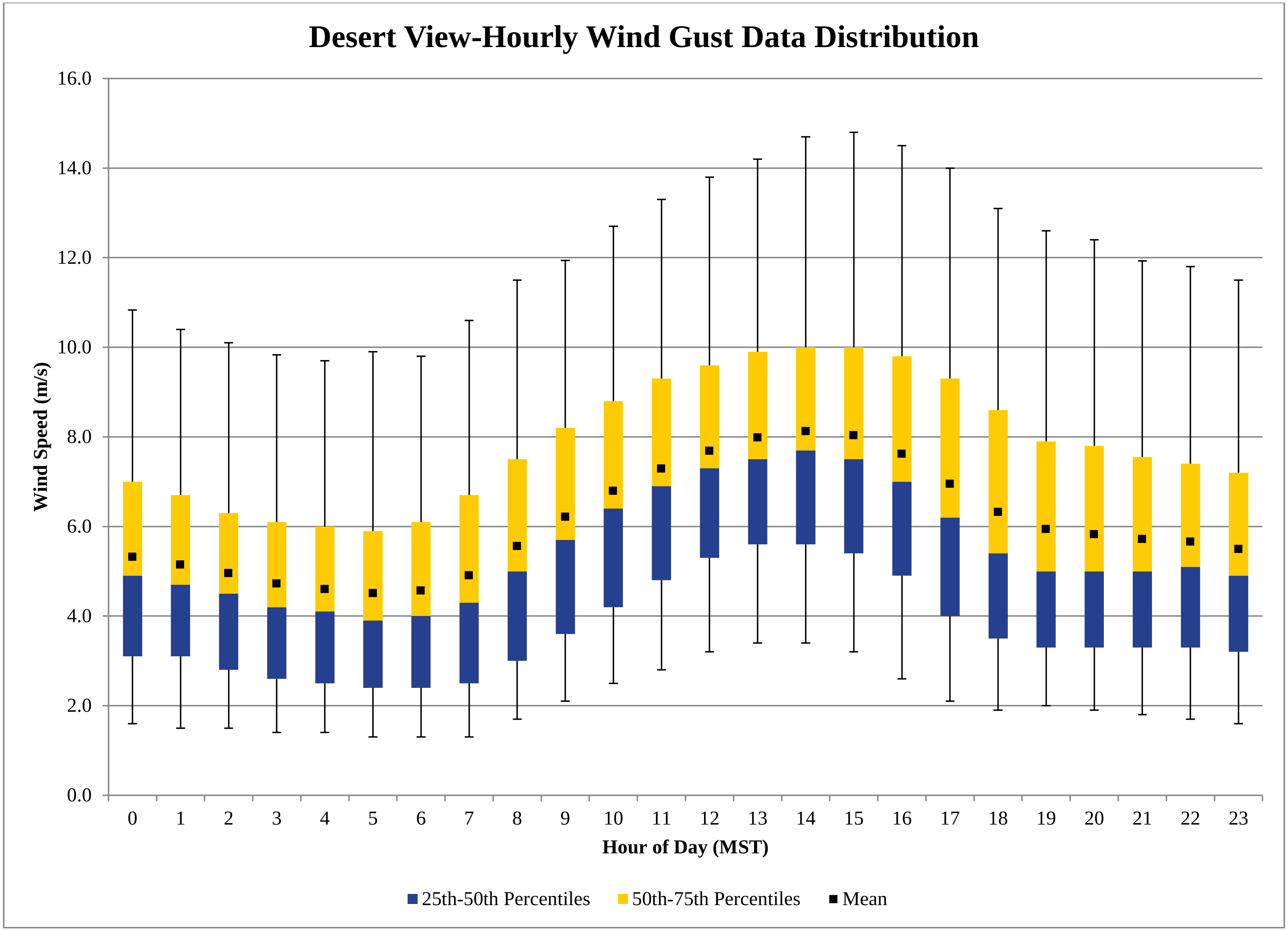
Hourly Wind Gust Data Distribution Charts

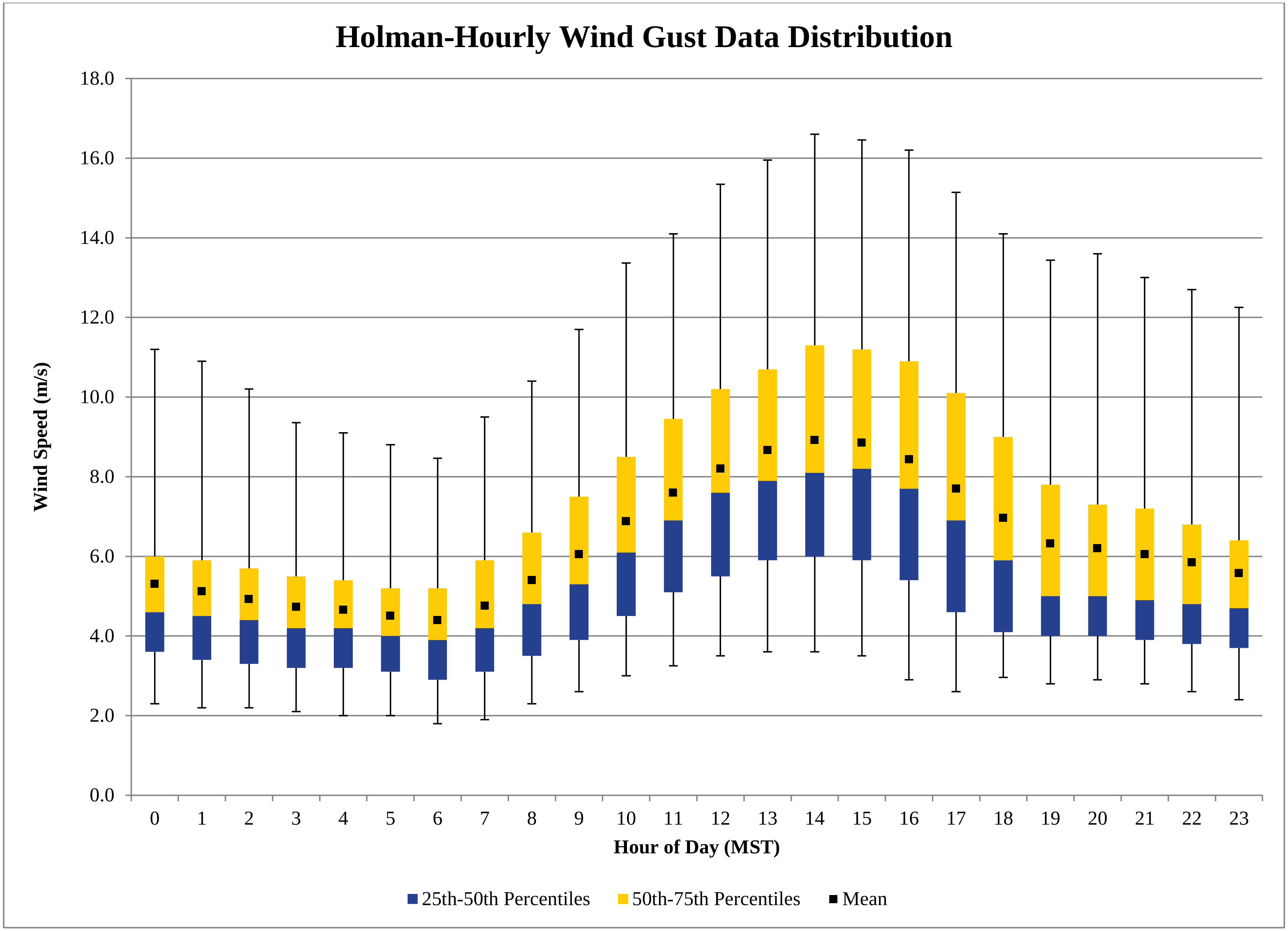

La Union-Hourly Wind Gust Data Distribution
Wind Speed (m/s)
0
2
4
6
8
10
12
14
16
Hour of Day (MST)
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23
25th-50th Percentiles
50th-75th Percentiles
Mean

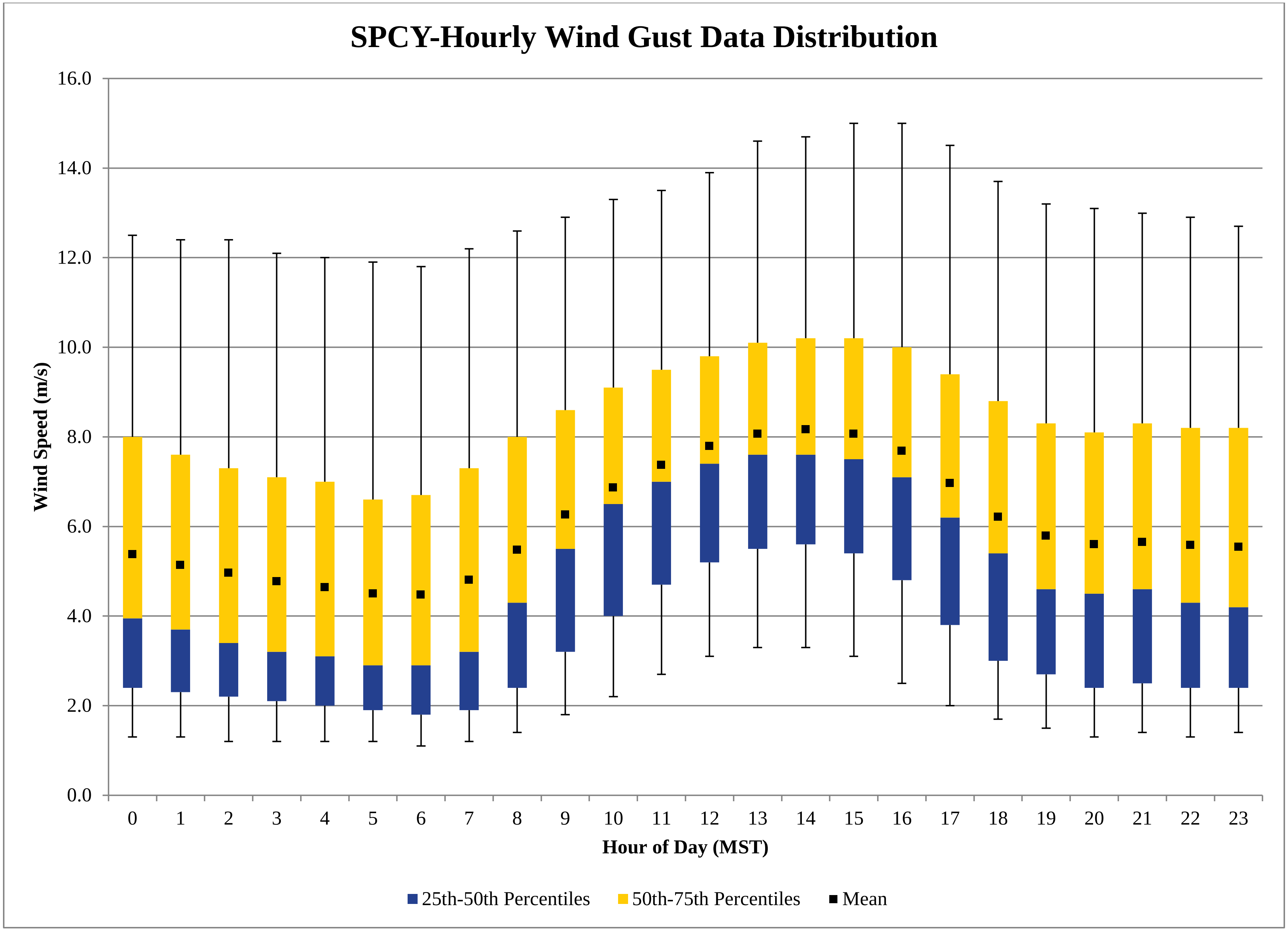


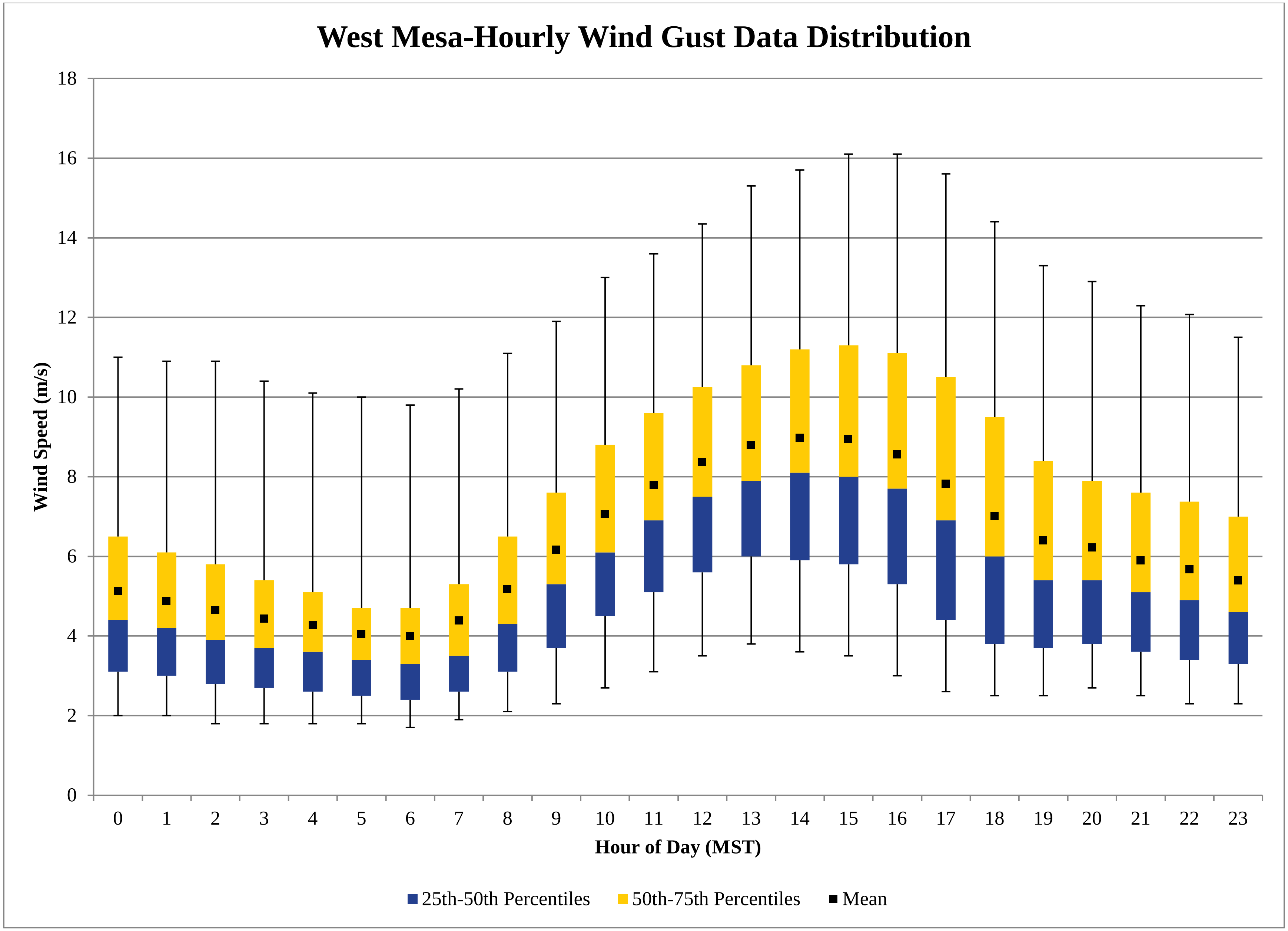
Chaparral-Hourly Wind Gust Data Distribution
18.0
16.0
14.0
12.0
10.0
8.0
6.0
4.0
2.0
0.0
Wind Speed (m/s)
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
Hour of Day (MST)
25th-50th Percentiles
50th-75th Percentiles
Mean


Deming-Hourly Wind Gust Data Distribution
Wind Speed (m/s)
20.0
18.0
16.0
14.0
12.0
10.0
8.0
6.0
4.0
2.0
0.0
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23
Hour of Day (MST)
25th-50th Percentiles
50th-75th Percentiles
Mean


Desert View-Hourly Wind Gust Data Distribution
Wind Speed (m/s)
0.0
2.0
4.0
6.0
8.0
10.0
12.0
14.0
16.0
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23
Hour of Day (MST)
25th-50th Percentiles
50th-75th Percentiles
Mean


Holman-Hourly Wind Gust Data Distribution
Wind Speed (m/s)
18.0
16.0
14.0
12.0
10.0
8.0
6.0
4.0
2.0
0.0
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23
Hour of Day (MST)
25th-50th Percentiles
50th-75th Percentiles
Mean


SPCY-Hourly Wind Gust Data Distribution
Wind Speed (m/s)
0.0
2.0
4.0
6.0
8.0
10.0
12.0
14.0
16.0
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23
Hour of Day (MST)
25th-50th Percentiles
50th-75th Percentiles
Mean



West Mesa-Hourly Wind Gust Data Distribution
Wind Speed (m/s)
0
2
4
6
8
10
12
14
16
18
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23
Hour of Day (MST)
25th-50th Percentiles
50th-75th Percentiles
Mean

APPENDIX D

Local Dust Control Ordinances

ARTICLE V. - STANDARDS FOR EROSION CONTROL

Sec. 32-301. - Soil and water erosion control.

(a) Under this chapter, temporary ponding and terracing is recommended for construction sites during grading operations and measures should be continued until final paving, wall construction and landscaping is in place.

(b) Ponding below natural grade is encouraged (depressed storage). Construction of dikes to control runoff is not acceptable due to possible dike failure resulting in washouts and greater drainage problems than the original runoff presented.

(Ord. No. 1789, § I, 4-3-00)

Sec. 32-302. - Wind erosion control.

(a) *Purpose and intent of this article.* The purpose of this section of article V is to protect and maintain the natural environment and to reduce the health effects caused by the creation of fugitive dust, more specifically PM10, consistent with the policies of the city's comprehensive plan and the natural events action plan for Dona Ana County. This article shall accomplish the requirements of these planning documents by preventing or limiting the activities that create fugitive dust, more specifically the operations and activities associated with new or existing construction and development.

The intent of this section of article V is to prevent the contribution of man-made dust production on a regular basis. This chapter is also intended to realize that when natural events do occur, such as fugitive dust creation through high winds, the contribution of man-made dust is limited in its negative health and safety impacts. Also, the actions required within this article are not intended to cease all man-made dust generation activities when such natural events occur and the actions taken to reduce dust generation may be overcome by the natural occurrence.

(b) *Applicability.* The provisions of this ordinance shall apply to any activity, equipment, operation and/or practice, man-made or man-caused, capable of generating fugitive dust.

(1) Exemptions: Any person seeking an exemption from any of the provisions of this article shall submit a petition to the city building official for approval. The following activities are automatically exempted from the provisions of this article:

a. Regular agricultural operations, including cultivating, tilling, harvesting, growing, the raising of farm animals or fowl, excluding unpaved roads associated with such operations.

b. Governmental activities during emergencies, life threatening situations or in conjunction with any officially declared disaster or state of emergency.

c. Operations conducted by essential service utilities to provide electricity, natural gas, oil and gas transmission, cable television, telephone, water and sewage during service outages and emergency disruptions.

d. Temporary use of unpaved roads and parking lots which generate less than 20 vehicle trips per day for less than three successive calendar days.

(2) *Control plan submittal and requirements.* In addition to standards established in subsequent sections of this article, if the construction and demolition operation or activity are subject to this article V, a control plan shall be required. The control plan or description requirements may be separate documents or incorporated as part of required building and/or construction plans. The following shall constitute the minimum information required within the control plan or description for reasonably available control measures (RACMs) as part of building and/or subdivision construction.

a. Name(s), address(es) and phone number(s) of person(s) responsible for the preparation, submittal and implementation of the control plan and responsible for the dust generating operations.

b. A plot plan or plat of survey of the site which describes:

1. The total area of land surface to be disturbed and the total area of the entire project site, in acres or square feet, depending on scale;

2. The operation(s) and activities to be carried out on the site;

3. All actual and potential sources of fugitive dust emissions on the site;

4. Delivery, transport and storage areas for the site, including types of materials stored and size of piles.

c. A description of RACMs or combination thereof to be applied during all periods of dust generating operations to each of the fugitive dust sources described on the plot plan or plat. For each source identified at least one control measure must be implemented. The same control measure(s) may be used for more than one dust generating activity. Specific details must include:

1. If dust suppressants are to be applied, then the type of suppressant, method, frequency, and intensity of application, the number and capacity of application equipment to be used, and any pertinent information on environmental impacts and/or certifications related to appropriate and safe use for ground applications;

2. The specific surface treatment(s) and/or other RACMs utilized to control material track-out and sedimentation where unpaved and/or access points join paved surfaces; and

3. For each fugitive dust source at least one auxiliary RACM designated as a contingency measure shall be described in the original control plan. Should the original RACM in the control plan prove ineffective, immediate and effective implementation of the contingency measure shall obviate the requirement of submitting a revised control plan.

(3) *Control plan review and approval.* Review and approval of the RACMs shall be the responsibility of the building official or designee. Approval may be conditioned to requiring additional measures, actions, or other activities, in addition to those actions proposed within the control plan documentation.

(4) *Implementation.* Approval and issuance of the building and/or subdivision construction permit(s) and the approval of all outlined RACMs contained within the control plan or description shall mandate the implementation of said RACMs by the developer, contractor, builder, owner, and/or agents as part of construction activities.

(5) *Other violation prohibited.* Implementation of RACMs shall not allow the creation of other violations of these design standards or other provisions of the Municipal Code.

(c) *General and non-construction activity standards.*

(1) *Ground cover removal prohibited.* No person shall disturb the topsoil or remove ground cover on any real property within the city limits and thereafter allow the property to remain unoccupied, unused, vacant or undeveloped unless reasonable actions are taken to prevent generation of dust.

(2) *Vacant land—Weed eradication and dust suppression.*

a. For all vacant or undeveloped lots, weed eradication is limited to removal of specific weeds only through mowing or hoeing and not the removal of natural vegetation. Clearing of the entire lot is prohibited.

b. Once weeds are removed or mowed, dust suppression can be achieved through watering, chemical suppressant application, or the expansion of natural, non-weed vegetation areas on the site. Expansion of natural vegetation areas is encouraged.

c. Natural vegetation shall consist of those plant varieties that are indigenous to New Mexico or that are determined to be native or natural plant varieties by the city's community development department.

(3) *Storage of materials and material transport.* Actions shall be taken to ensure that such areas or uses with the potential of becoming or generating fugitive dust and particulate matter, shall be covered, moistened, compacted, or otherwise treated to prevent fugitive dust creation.

(4) *Parking time delay agreements.* For businesses that require an approved

parking time delay agreement and corresponding business license with the city, the agreement shall include implementation of RACMs during the two year delay period prior to pavement installation.

(5) *Unpaved parking lots and roadways.* Actions shall be taken to ensure that such areas or uses with the potential of becoming or generating fugitive dust and particulate matter, shall be covered, moistened, compacted, or otherwise treated to prevent fugitive dust creation. Existing, non-conforming, unpaved parking lots and roadways shall be brought into conformance in accordance with the provisions established for the expansion of non-conforming uses and structures within the zoning code, as amended, and the control plan requirements of this article.

(6) *Existing operations.* For existing, on-going, and/or permanently-sited institutional, governmental, commercial and/or industrial facilities or operations which may continuously generate fugitive dust, individual control plans with corresponding RACMs shall be submitted to the community development department for approval. Approval shall be made by the building official/community development director or designee and shall be communicated in writing to the property/business owner. Letters of approval and approved control plans shall be kept at the property subject to this provision.

(d) *Design and construction standards.* These standards shall apply for all design and construction activities on real property within the city limits including, but not limited to, subdivisions, large lot residential, office, commercial, and industrial building construction.

(1) *Subdivision requirements.*

a. For all subdivisions, RACMs shall be outlined and approved as part of the overall review of the subdivision construction drawings through the community development department.

b. Developers of the subdivision shall be allowed to grade for the subdivision only after complete subdivision construction drawing approval and permit issuance. No separate grading permits shall be allowed.

c. Letters of credits for all construction activities of the subdivision shall reflect the necessary cost of implementing RACMs for dust suppression.

(2) *Large lot residential, office, commercial, and industrial construction requirements.* For all large lot residential properties, in which the total area is greater than or equal to one-half acre, and for all office, commercial, industrial, institutional, or governmental construction activities, RACMs shall be outlined and approved as part of the building permit by the community development department.

a. Grading activities shall only be allowed to commence after building plan approval and permit issuance. No separate grading or site only development permits shall be granted.

b. Letters of credits for dust control plan implementation for the building may be necessary to ensure implementation of RACMs for dust suppression.

(3) *Cessation of operations.* Once construction has commenced, the disturbed area cannot sit for more than ten successive calendar days. RACMs must be outlined and implemented for all disturbed areas during periods of ceased operations more than two successive calendar days and less than ten successive calendar days.

(4) *City construction projects.* Construction activities by the city shall require RACMs outlined within the construction drawings. This applies to those projects not part of a subdivision, i.e., road reconstruction or utility replacements, or buildings not issued building permits by the city, i.e., new city buildings or utility substations. Compliance to such RACMs shall be the responsibility of the contractor and subject to verification by the public works department, utilities department or community development department's building/project inspectors or the city architect's staff.

(e) *Reasonably available control measures (RACMs).* Reasonably available control measures to be implemented in accordance with this article for all construction activities within the city limits shall include, but not be limited to:

(1) Designing subdivisions or building sites to utilize existing, pre-development grades;

(2) Watering disturbed areas on a regular and minimum basis throughout daily construction activities;

(3) Applying palliatives or chemical soil suppressant/stabilizer for idle construction periods;

(4) Constructing snow and/or wind fences;

(5) Re-seeding or re-vegetation of graded or disturbed areas;

(6) Grading for street and utility placement only as part of subdivision construction;

(7) Building all interior and perimeter cinder block, rockwalls, and retaining walls as part of the overall construction of all subdivisions and not part of the individual building permit for each lot. Walls shall serve as wind break and help to reduce the entrainment of dust;

(8) Grading the building pad site only plus five feet in all directions of the pad site;

(9) Retaining natural vegetation during the construction phase of buildings excluding the building pad site;

(10) Utilizing existing or natural vegetation as part of the required landscaping for the site as elsewhere required within these design standards, to limit grading activities, to promote water conservation, and to reduce dust generation;

(11) Installing non-natural landscaping or vegetation in the latter part of construction to reduce the amount of disturbed area and the potential for dust generation;

(12) Implementing any other proposed dust suppressing agent or activity approved by the building official or designee; or

(13) Combining any two or more of the above items.

(f) *Corrections, effective date, and enforcement.*

(1) *Correction of condition.* If the community development department, code enforcement section of the police department, or other personnel document that a person is in non-compliance with any of the provisions contained within the article above, he or she will notify the person of that fact and specify a period of time in which the person must achieve compliance. Failure to comply within 24 hours or as the time determined by the city constitutes grounds for a notice of violation per the city's enforcement ordinances. Correction of condition may include the amendment of plans to reflect additional or new control measures to be taken in the event that original measures prove to be insufficient or ineffective.

(2) *Remedial action.* The city community development department, its designated agent and any other authorized city representative, after proper notice, may enter upon any real property where dust is being generated and take such remedial and corrective action as he or she deems necessary when the owner, occupant, operator, or any tenant, lessee, or holder of any possessory interest or right in the involved land fails to do so.

(3) *Costs.* Any costs incurred in connection with any remedial or corrective action taken by the city, pursuant to this section, shall be assessed against the owner of the property involved. Failure to pay the full amount of such incurred costs shall result in a lien against the property. The lien shall remain in full force and effect until all costs have been fully paid, which may include cost of collection and reasonable attorney fees.

(4) *Effective date.* For all existing emission sources governed by this article, the activity must be completed within six months of the effective date or be brought into full compliance. For existing, on-going, and/or permanently-sited institutional, governmental, commercial and/or industrial facilities or operations, the dust control provisions of this article shall be submitted in writing, approved, and implemented within six months of the effective date of this article.

(5) *Liability.* All persons owning, operating, or in control of any equipment or property who shall cause, permit, or participate in, any violation of this article shall be individually and collectively liable to any penalty or punishment imposed by and under the municipal code for the city.

(6) *Offenses.* Any person who violates any provision of this article, including, but not limited to, any application requirement; any permit condition; any fee or filing

requirement; any duty to allow or carry out inspection, or any requirements by the city is guilty of a misdemeanor and shall pay civil penalty levied by the court of competent jurisdiction. Each day of violation constitutes a separate offense.

(Ord. No. 1789, § I, 4-3-00; Ord. No. 1929, §§ I, II, 8-5-02)

Secs. 32-303—32-399. - Reserved.

Chapter 172. EROSION CONTROL

[HISTORY: Adopted by the Board of County Commissioners of Doña Ana County 12-15-2000 by Ord. No. 194-00. Amendments noted where applicable.]

GENERAL REFERENCES

General penalty — See Ch. 1, Art. III.
Design and construction standards — See Ch. 157.
Flood damage prevention — See Ch. 207.
Grading permits — See Ch. 217.
Land use and zoning — See Ch. 250.
Roads — See Ch. 279.
Subdivision of land — See Ch. 300.

Article I. General Provisions

§ 172-1. Authority and purpose.

The Board of Commissioners of Doña Ana County is authorized by statute, in particular NMSA § 4-37-1, to enact ordinances to protect and promote the health, safety, and general welfare of the residents of the unincorporated areas of Doña Ana County. The purpose of this chapter is to protect and maintain the natural environment and to reduce the negative health effects caused by the creation of fugitive dust, more specifically "PM10," which refers to a size of particulate matter within dust that has been identified by the scientific and medical communities and by the federal Environmental Protection Agency (EPA) as a significant health risk in high concentrations in the air. This chapter is enacted consistent with the goals and policies of the Comprehensive Plans for Doña Ana County and for the Las Cruces Extraterritorial Zone, and as a part of the New Mexico Environment Department's Natural Events Action Plan (NEAP) for Doña Ana County and the State of New Mexico. This chapter shall accomplish the requirements of these documents by preventing, limiting, or mitigating the effects of activities which create fugitive dust (which includes PM10s) or have a tendency to make land more vulnerable to natural erosion forces that create fugitive dust. The objective of this chapter is to ensure that all surface disturbance activities use erosion control measures to mitigate visible fugitive dust on an ongoing basis for the protection of health and safety of the residents of Doña Ana County. This chapter also attempts to ensure that when natural events do occur, such as fugitive dust creation through high winds, the contribution of human-generated dust is limited in its negative health and safety impacts. Emissions that are regulated by federal or state law to require filtering or similar treatment prior to release into the air are not considered "fugitive," and are not regulated by this chapter.

§ 172-2. Applicability.

Under the conditions outlined below, the provisions of this chapter shall apply to any human activity, operation and/or practices, or any condition caused by human activity, which generates dust, causes water erosion, or makes the land more vulnerable to erosion by natural erosion forces. In the development of County land for public purposes, County policies shall be consistent with the purposes of this chapter, and shall be conducted so as to minimize the creation or aggravation of erosive forces.

§ 172-3. Interpretation and conflict.

Where this chapter imposes greater restrictions than those imposed by other rules, regulations, agreements, or County ordinances or resolutions, the provisions of this chapter shall be prevailing and controlling. Where two or more provisions of this code are conflicting, the most restrictive shall apply.

§ 172-4. Appeals.

A determination that a property requires an erosion control plan (ECP) or erosion mitigation plan (EMP), or that a proposed ECP or EMP is insufficient, or both, shall be subject to administrative appeal to the County Manager, and then to the Board of County Commissioners. A property owner wishing to appeal a determination shall request an appeal in writing, directed to the County Manager.

§ 172-5. New development.

Any development that requires a permit under any County ordinance, other than for construction of a single-family dwelling unit (multiple applications within a subdivision shall not apply), shall require an erosion control plan to be submitted consistent with Article II. Grading for all construction, including single-family dwelling units, shall be limited to the building pad site, pond and driveway plus an additional five feet in all directions from these areas.

§ 172-6. Existing conditions.

The owner of any property that is determined to be in a condition vulnerable to erosion by natural forces due to human development of the property may be required to submit an erosion mitigation plan (EMP) consistent with Article II, if the condition of the property is determined to pose a significant health threat due to the nature or extent of the vulnerable condition of the property, or its location near concentrations of vulnerable populations, such as of school children, or ill or elderly persons.

§ 172-7. Exempt activities.

Although Doña Ana County encourages the use of reasonable erosion control measures in all activities, the following activities are exempt from the regulations and restrictions of this chapter:

A. Regular agricultural operations covered by the Right to Farm Act, NMSA §§ 47-9-1 through 47-9-7, including cultivating, tilling, growing, and harvesting crops, and the raising of farm animals or fowl.
B. Governmental activities during life-threatening situations or other emergencies, or in connection with any officially declared disaster or state of emergency.
C. Operations conducted by essential service utilities to provide electricity, natural gas, oil and gas transmission lines, telephone, water and sewage during or to avoid service outages and emergency disruptions.
D. Temporary use of unpaved roads and parking lots that generate fewer than 20 vehicle trips per day for fewer than three successive calendar days.

§ 172-8. Definitions.

The following words, terms and phrases, when used in this chapter, shall have the meanings ascribed to them in this section, except where the context clearly indicates a different meaning:

ACTIVE OPERATIONS
Any human activity that is capable of generating or generates visible fugitive dust, including bulk material storage, handling and processing; earth moving; construction, renovation and demolition activities; and the movement of motorized vehicles on any unpaved roadways and parking areas.

BULK MATERIAL
Sand, gravel, soil, aggregate and any other inorganic or organic solid matter capable of releasing visible fugitive dust.

CHEMICAL SOIL STABILIZATION/SUPPRESSION

A method of dust control implemented by any person to mitigate PM10 emissions by applying asphaltic emulsions, acrylics, adhesives, or any other approved materials that are not prohibited for use by the New Mexico Environment Department, the Environmental Protection Agency, or any other law, rule, or regulation.

DISTURBED AREA
Any area in which the soil will be altered by grading, leveling, scraping, cut-and-fill activities, excavation, brush and timber clearing, grubbing, and unpaved soils on which vehicle operations and/or movement will or has occurred.

DUST-GENERATING OPERATION
Any activity capable of generating fugitive dust, including, but not limited to, activities associated with creating a disturbed area, construction and demolition activities, and the movement of vehicles on unpaved roadways or parking areas.

DUST SUPPRESSANT
Water, hygroscopic materials, or nontoxic chemical stabilizers used as a treatment to reduce visible fugitive dust emissions. Dust suppressants shall be used as recommended by the manufacturer and in concentrations and application frequencies sufficient to prevent violation of this chapter.

EROSION CONTROL MEASURES (ECMs)
Techniques used to limit the emission and/or airborne transport of fugitive dust from its original site to accomplish satisfactory results for temporary and/or extended suppression of dust and PM10 emission(s).

EROSION CONTROL PLAN (ECP)
A written description of all reasonably available control measures (RACMs) to be implemented at a work site and/or in transit to and from a work site for any earth moving, construction, or potential dust-generating operation. Such written description may be incorporated into building and construction plans or a separate document submitted with said plans.

FUGITIVE DUST
Any particulate matter entrained in the ambient air that is caused from man-made and natural activities without first passing through a stack or duct designed to control flow, including, but not limited to, emissions caused by movement of soil, vehicles, equipment, and windblown dust. Excluded particulate matter includes matter emitted directly from the exhaust of motor vehicles, or from other combustion devices, portable brazing, soldering or welding equipment, and pile drivers.

HIGH WIND CONDITIONS
On-site hourly average wind speed greater than 15 miles per hour, gusts of 20 miles per hour, or an active wind advisory issued by the National Weather Service for Doña Ana County.

NATIVE PLANTS
Plants that are indigenous to the state or have been imported from other places and have become established in wildlands without cultivation. *Editor's Note: Amended at time of adoption of Code (see Ch. 1, General Provisions, Art. I).*

NATURAL COVER
Any vegetation that exists on the property, prior to any construction activity or achieved through vegetation restoration back to a natural state, including the placement of sod.

PALLIATIVE
Any agent used to lessen or reduce dust emissions.

PARTICULATE MATTER

Any material emitted or entrained into the air as liquid or solid particulate, with the exception of uncombined water.

PM10
Particulate matter, both filterable and condensable, with an aerodynamic diameter less than or equal to a nominal 10 micrometers.

REASONABLY AVAILABLE CONTROL MEASURE (RACM)
Any device, system, process modification, apparatus, technique, or control measure, or combination thereof, which results in the lowest emissions rate possible taking into consideration the RACMs' technological and economical feasibility as determined by approval of the erosion control plan.

STABILIZED or STABILIZATION
The ongoing process necessary to reduce the fugitive-dust-generating capability of a surface by paving, dust suppression, watering, compacting or revegetating the disturbed surface sufficient to prevent a violation of this chapter.

TRACK-OUT
Visible bulk material deposited upon a paved public or private roadway and capable of going airborne due to mechanical actions.

Article II. Development Standards and Process

§ 172-9. Erosion control plan (ECP) required.

Other than for a single-family dwelling unit, any grading, construction, demolition, or other development requiring a permit or other form of approval under any County ordinance shall have an approved erosion control plan (ECP) in place prior to receiving a permit. The ECP may be separate documents or incorporated as part of required building and/or construction plans.

§ 172-10. ECP documentation.

Editor's Note: Amended at time of adoption of Code (see Ch. 1, General Provisions, Art. I). The following shall constitute the minimum information required within the ECP to be submitted as part of an application for building and/or subdivision construction to describe the erosion control measures (ECMs) proposed for the project. For all subdivisions, ECMs shall be outlined and approved as part of the overall review of the subdivision construction drawings through the Engineering and Community Development Departments.

A. Name(s), address(es) and phone number(s) of person(s) responsible for the preparation, submittal and implementation of the ECP, and for the dust-generating operations generally.

B. A site plan or plat of survey of the site that describes:

   (1) The total area of land surface to be disturbed and the total area of the entire project site, in acres or square feet, depending on scale.
   (2) The operation(s) and activities to be carried out on the site.
   (3) All anticipated sources of fugitive dust emissions on the site.
   (4) Temporary drainage and/or ponding facilities to minimize soil erosion and localized flooding of adjacent properties from water utilized on site for development or for dust control.
   (5) Delivery, transport and storage areas for the site, including types of materials to be stored, and proposed maximum sizes of stockpiles for different types of materials.

C. A description of ECMs or combination thereof to be applied during all periods of dust-generating operations to each of the fugitive dust sources described on the site plan or plat. For each source identified, at least one control measure must be implemented. The same control measure(s) may be used for more than one dust generating activity. Specific details must include:

(1) If dust suppressants are to be applied, the type of suppressant, method, frequency, and intensity of application, the number and capacity of application equipment to be used, and any pertinent information on environmental impacts and/or certifications related to appropriate and safe use for ground applications;
(2) The specific surface treatment(s) and/or other ECMs utilized to control material track-out and sedimentation where unpaved and/or access points join paved surfaces;
(3) For each fugitive dust source, at least one auxiliary ECM designated as a contingency measure shall be described in the original control plan. Should the original ECM in the control plan prove ineffective, immediate and effective implementation of the contingency measure shall obviate the requirement of submitting a revised control plan; and
(4) ECMs to be implemented prior to any period of inactivity of 10 days or more, due to any reason other than extended rainfall.

D. A description of ECMs or combination thereof to be used to minimize the negative effects of water usage on site during the development activities. All approved measures should be continued until final paving, wall or fence construction and landscaping is in place.

E. The person responsible for implementing the objectives of the ECP shall keep accurate records and document all activities in carrying out the ECP. These records shall be made available upon request by the County staff.

§ 172-11. ECP review and approval.

Editor's Note: Amended at time of adoption of Code (see Ch. 1, General Provisions, Art. I). Review and approval of a proposed ECP shall be the responsibility of the County Engineering and Community Development Departments or their designees. Approval may be conditioned upon the implementation of additional measures, actions, or other activities, in addition to those included in the proposed ECP. Approval and issuance of the building and/or subdivision construction permit(s) and the approval of all outlined ECMs contained within the control plan or description shall constitute a mandate that the approved ECMs be implemented by the developer, contractor, builder, owner, and/or agents as part of construction activities.

§ 172-12. Erosion control measures (ECMs).

Erosion control measures included with an erosion control plan required by this chapter may include, but are not necessarily limited to, any one or more of the following measures:

A. General guidelines.

(1) Designing subdivisions or building sites to utilize existing, predevelopment grades;
(2) Watering disturbed areas on a regular and minimum basis throughout daily construction activities;
(3) Applying palliatives or chemical soil suppressant/stabilizer for idle construction periods;
(4) Constructing snow and/or wind fences;
(5) Reseeding or revegetation of graded or disturbed areas;
(6) Grading for street and utility placement only as part of subdivision construction;
(7) Building some or all interior and perimeter cinder block, rock walls, and retaining walls as part of the overall construction of all subdivisions and not part of the individual building permit for each lot;

(8) Retaining natural vegetation during the construction phase of buildings, excluding the building pad site;
(9) Utilizing existing or natural vegetation as part of the required landscaping for the site as elsewhere required within these design standards, to limit grading activities, to promote water conservation, and to reduce dust generation;
(10) Installing vegetation or nonnatural landscaping elements in the latter part of construction to reduce the amount of disturbed area and the potential for dust generation; or
(11) Implementing any other reasonable dust-suppressing agent or activity.

B. Active operations in construction areas and other land disturbances.

(1) Short-term control measures may include:
(a) Regularly scheduled wet suppression;
(b) Dust suppressants applied in amounts and rates recommended by the manufacturer and maintained as recommended by the manufacturer;
(c) Upwind temporary windbreaks, including fabric fences with the bottom of the fence sufficiently anchored to the ground to prevent material from blowing underneath the fence;
(d) Starting construction upwind and stabilizing disturbed areas before disturbing additional areas; and/or
(e) Stopping active operations during high wind periods.

(2) Long-term control measures may include:
(a) Site stabilization using dust suppressants applied in amounts and rates recommended by the manufacturer and maintained as recommended by the manufacturer;
(b) Reseeding using native grasses;
(c) Xeriscaping;
(d) Tree planting; and/or
(e) Permanent perimeter and interior fencing.

C. Specific construction guidelines. The following additional ECMs may be incorporated in a proposed ECP to mitigate the effects of the specified activities:

(1) Unpaved roadways.
(a) Paving using asphalt, recycled asphalt, asphaltic concrete, concrete, or double-penetration (consistent with subdivision or zoning requirements); *Editor's Note: See Ch. 250, Land Use and Zoning; and Ch. 300,Subdivision of Land.*
(b) Dust suppressants applied in amounts and rates recommended by the manufacturer and maintained as recommended by the manufacturer;
(c) Regularly scheduled wet suppression; and/or
(d) The use of traffic controls, including decreased speed limits with appropriate enforcement; vehicle access restrictions and controls; road closures and barricades; and off-road vehicle access controls and closures.

(2) Trucks hauling bulk materials on public roadways.
(a) Properly secured tarps or cargo covering that covers the entire surface of the load;
(b) Dust suppressants applied in amounts and rates recommended by the manufacturer;
(c) Maintaining six inches of freeboard from the rim of the truck bed. "Freeboard" means the vertical distance from the highest portion of the load to the lowest part of the rim of the truck bed; and/or
(d) Preventing leakage from the truck bed, sideboards, tailgate or bottom dump gate.

(3) Bulk material handling.

(1) Spray bars;
(2) Wetting agents (surfactants) added to bulk material;
(3) Wet suppression through manual application;
(4) Dust suppressants added to bulk materials in amounts and rates recommended by the manufacturer and maintained as recommended by the manufacturer;
(5) Stopping bulk material handling during high wind conditions;
(6) Reduced process speeds; and/or
(7) Reduced drop heights.

(4) Industrial sites.
(a) Pave roadways and parking area with asphalt, recycled asphalt, asphaltic concrete, and concrete;
(b) Regularly scheduled vacuum street cleaning;
(c) Regular wet suppression of unpaved areas;
(d) Dust suppression applied in amounts and rates recommended by the manufacturer and maintained as recommended by the manufacturer;
(e) Wind breaks;
(f) Enclosures;
(g) Increased wet suppression applications during high wind conditions;
(h) Slowing active operations during high wind conditions; and/or
(i) Stopping active operations during high wind conditions.

(5) Demolition and renovation activities when asbestos-containing materials are not present. If asbestos containing material may be present, all demolition or renovation activity shall be performed in accordance with the federal standards referenced in 20 NMAC 11.64, Emission Standards for Hazardous Air Pollutants for Stationary Sources. In other instances, the following ECMs may be utilized:
(a) Constant wet suppression on the debris piles during demolition;
(b) Dust suppression applied on the debris piles in amounts and rates recommended by the manufacturer;
(c) Enclosures;
(d) Curtains or shrouds;
(e) Negative-pressure dust collectors; and/or
(f) Stopping demolition during high wind conditions.

(6) Milling, grinding or cutting of paved or concrete surfaces.
(a) Constant wet suppression;
(b) Ongoing cleanup of milled, ground or cut material;
(c) Dust suppression applied in amounts and rates recommended by the manufacturer and maintained as recommended by the manufacturer.
(d) Enclosures;
(e) Negative-pressure dust collectors; and/or
(f) Curtains or shrouds.

(7) Pressure blasting operations.
(a) Use of nonfriable abrasive material;
(b) Curtains or shrouds;
(c) Negative-pressure dust collectors;
(d) Constant wet suppression; and/or
(e) Ongoing clean up of abrasive material.

Article III. General Nonconstruction Activity Standards

§ 172-13. Ground cover removal prohibited.

No person shall disturb the topsoil or remove ground cover on any real property within the County unless reasonable actions are taken to prevent generation of dust caused by the disturbed condition.

§ 172-14. Weed eradication and dust suppression.

A. Weed eradication is limited to removal of specific weeds; clearing of the entire lot is prohibited.
B. Once weeds are removed or mowed, dust suppression can be achieved through watering, chemical suppressant application, or the expansion of natural vegetation areas on the site. Expansion of natural vegetation areas is encouraged.

§ 172-15. Storage of materials and material transport.

Actions shall be taken to ensure that materials storage and material transport areas or uses with the potential of becoming or generating fugitive dust and particulate matter shall be covered, moistened, compacted, or otherwise treated to prevent fugitive dust creation.

Article IV. Existing Conditions

§ 172-16. Existing human-created vulnerable conditions.

If the condition of a property is determined to pose a significant health threat, due to the nature or extent of existing development that makes the property vulnerable to natural erosion forces, or due to its location near concentrations of vulnerable populations, such as of school children, or ill or elderly persons, an erosion mitigation plan (EMP) shall be required.

§ 172-17. Determination.

Editor's Note: Amended at time of adoption of Code (see Ch. 1, General Provisions, Art. I). The initial determination that a property is in such a condition may be made by any law enforcement or code enforcement or other County agent authorized to make such a determination, subject to review by the Community Development Director.

§ 172-18. Plan submission requirement.

Once the determination has been made in writing, the property owner shall be required to submit within 30 working days a proposed erosion mitigation plan, which may include any of the erosion control measures (ECMs) presented in this chapter, or other reasonable plans for eliminating or mitigating the vulnerable condition of the property. The plan may include a proposed timeline for implementation.

§ 172-19. Review of EMP.

Editor's Note: Amended at time of adoption of Code (see Ch. 1, General Provisions, Art. I). Upon receipt of a proposed EMP by the County representative making the determination that a plan is required, the EMP shall be submitted for review to the County Engineering and Community Development Departments. The determination of whether the EMP is sufficient shall be made by the County Community Development Director or other authorized County staff member. If the plan is determined to be insufficient, that determination and the reasons therefor shall be provided to the applicant in writing, and the applicant shall be given 10 working days to revise the EMP to address the insufficiencies.

Article V. Enforcement

§ 172-20. Enforcement; penalty.

Editor's Note: Amended at time of adoption of Code (see Ch. 1, General Provisions, Art. I). Any violation of the provisions of this chapter, including any failure to implement any ECM of an approved ECP or EMP, may be subject to any penalties or remedies allowed by law, including NMSA § 4-37-3 and the general penalty set forth in Chapter 1, General Provisions, Article III, General Penalty. In addition, the County may enforce the provisions of this chapter through the procedures in Chapter 146, Dangerous Buildings, or any similar ordinance subsequently enacted. The County may also pursue injunctive relief or any other remedies available under the law.

DEMING, NEW MEXICO: CITY CODE

Title 11
BUILDING REGULATIONS

Chapter 5
WIND EROSION AND DUST CONTROL

11-5-1: DEFINITIONS:

As used in this chapter, the following words and terms shall mean:

AMBIENT AIR: That portion of the atmosphere, external to buildings, to which the general public has access. Land owned or controlled by the stationary source and to which public access is precluded by a fence, physical barriers, or other effective means is exempted from the ambient air.

APPLICANT: Any person, corporation, or public or private organization proposing a development which would involve disturbance to the natural terrain.

CHEMICAL SOIL STABILIZATION/SUPPRESSIVE: A method of dust control implemented by any person to mitigate emissions by applying petroleum resins, asphaltic emulsions, acrylics, adhesives, or any other approved material that are not prohibited for use by the city, the state environment department, the environmental protection agency, or any other law, rule, or regulation.

CLEARING: Any activity that removes the vegetative surface cover.

CONSTRUCTION DEMOLITION ACTIVITIES: Any on site activities preparatory to or related to building alteration, rehabilitation, removal or razing, or improvement on real property, including the placement and upkeep of mobile or manufactured homes or buildings. "Construction" also means construction of roadway systems including, arterials, expressways, interstates, tunnels, overpasses, bridges, interchanges, residential and commercial streets within a subdivision, and airport runway improvements.

DISTURBED AREA: Any area in which the soil will be altered by grading, leveling, scraping, cut and fill activities, excavation, brush and timber clearing, grubbing, and unpaved soils on which vehicle operations and/or movement will or has occurred.

DUST CONTROL AND SOIL EROSION PLAN: A written description of all reasonably available control measures (RACMs) to be implemented at a work site and/or in transit to and from a work site for any earthmoving, construction, or potential dust generating operation. Such written description may be incorporated into building and construction plans or a separate document submitted with said plans.

DUST GENERATION OPERATION: Any activity capable of generating fugitive dust, including, but not limited to, activities associated with creating a disturbed area, construction and demolition activities, and the movement of vehicles on unpaved roadways or parking areas.

EROSION AND DUST CONTROL PLAN: A set of plans indicating the specific measures and sequencing to be used to control sediment and erosion on a development site during and after construction.

EROSION CONTROL: A measure that prevents erosion.

EXCAVATE: Any act by which earth, sand, gravel, or any other similar material is dug into, cut, removed, displaced, relocated, or bulldozed, and includes the resulting conditions.

FILL: Any act by which earth, sand, gravel, or any other similar material is placed or moved to a new location aboveground. The fill is also the difference in elevation between a point of existing undisturbed ground and a designated point of higher elevation of the final grade.

FUGITIVE DUST OR DUST: Organic and inorganic particulate matter in quantities and of a duration that may with reasonable likelihood injure human or animal health or plant life, reduce safe visibility, cause property damage, or degrade visibility. Water vapor, steam, or particulate matter emissions emanating from a duct or stack of process equipment are not fugitive dust.

GRADING: Excavation or fill of material, including the resulting conditions thereof.

GRUBBING: The process of digging up and removing the roots, trunk, branches and stems of all plants in order to clear the land.

HIGH WIND EVENT: A climatological occurrence in which the average wind speed exceeds a threshold in which fugitive dust will be generated from undisturbed areas, naturally covered areas, disturbed areas, and construction sites, regardless of reasonably available control measure implementation. Notwithstanding other climatic conditions, the average wind speed for high wind events is a sustained wind speed of twenty five (25) miles per hour or greater.

LAND DISTURBING ACTIVITY: Any physical land development activity which includes such actions as clearance of vegetation, moving or filling of land, removal or excavation of soil or mineral resources or similar activities.

NATURAL COVER: Any vegetation which exists on the property, prior to any construction activity or achieved through vegetation restoration back to a natural state, including the placement of sod.

PALLIATIVE: Any agent used to lessen or reduce dust emissions.

PARTICULATE MATTER: Any material emitted or entrained into the air as liquid or solid particulate, with the exception of uncombined water.

START OF CONSTRUCTION: The first land disturbing activity associated with a development, including land preparation such as clearing, grading, and filling; installation of streets and walkways; excavation for basements, footings, piers, or foundations; erection of temporary forms; and installation of accessory buildings such as garages.

STRIPPING: Any activity that removes or significantly disturbs the vegetative surface cover, including clearing and grubbing operations.

VISIBLE DUST EMISSION: Dust of such opacity as to obscure an observer's view to a degree equal to or greater than an opacity of twenty percent (20%), for a period or periods aggregating more than three (3) minutes in any one hour.

WIND SPEED: The average wind velocity, regardless of direction, based on a sixty (60) minute average from the nearest weather report or PM10 monitoring station, or by a portable wind instrument located at the site. (Ord. 1144, 7-10-2006)

11-5-2: PURPOSE; APPLICABILITY:

A. Purpose And Intent: The purpose of this chapter is to protect and maintain the natural environment and to reduce the health effects caused by the creation of fugitive dust and wind erosion as a result of the operations and activities with new or existing construction and development. This chapter is also intended to limit the negative health and safety impacts when natural events do occur, such as fugitive dust creation through high winds. Also, the actions required within this chapter are not intended, necessarily, to cease all manmade dust generation activities when such natural events occur and the actions taken to reduce dust generation may be overcome by the natural occurrence.

B. Applicability: The provisions of this chapter are applicable to any situation involving any disturbance to the terrain, topsoil or vegetative ground cover, including grading, grubbing, stripping, cut and fill activity and similar operations, upon any property within the city of Deming as provided for in this chapter. Compliance with the requirements as described in this chapter shall not be construed to relieve the owner/applicant of any obligations to obtain necessary state or federal permits.

C. Exemptions: Any person seeking an exemption from any of the provisions of this chapter shall submit a petition to the city building official for approval. The following activities are automatically exempted from the provisions of this chapter:

1. Regular agricultural operations, including cultivating, tilling, harvesting, growing, and the raising of farm animals or fowl, excluding unpaved roads associated with such operations.

2. Governmental activities during emergencies, health or life threatening situations or in conjunction with any officially declared disaster or state of emergency.

3. Operations conducted by essential service utilities to provide electricity, natural gas, oil and gas transmission, cable television, telephone, water and sewage during service outages and emergency disruptions.

4. Temporary use of unpaved roads and parking lots which generate less than twenty (20) vehicle trips per day for less than three (3) successive calendar days.

5. Excavations for cemeteries for burial of human or animal remains.

6. Existing quarry operations actively engaged in excavating rock, sand, and/or gravel. (Ord. 1144, 7-10-2006)

11-5-3: GENERAL PROVISIONS:

A. Each person shall use reasonably available control measures (RACMs) to prevent a violation of this chapter. No person shall allow fugitive dust, track out, or transported material from any active operation, open storage pile, paved or unpaved roadway or disturbed surface area, or inactive disturbed surface area to be carried beyond the property line, right of way, easement or any other area under control of the person generating or allowing the fugitive dust. Failure to comply with this subsection shall be a violation of this chapter.

B. No person shall permit building materials or any construction waste or other materials to be blown from the site by the wind.

C. Failure to comply with a fugitive dust control term or condition shall be a violation of this chapter.

D. A person whose violation of this chapter results in fugitive dust being deposited upon land beyond the limits of the permitted area shall take all actions necessary to remedy damage caused by a violation proven with credible evidence. Such remedies may include, but are not limited to, compensation, removal of the fugitive dust and/or repair of any damage, obtaining permission from property owners or operators before doing any work on the damaged property. It shall be a separate violation of this part to fail to remove the fugitive dust and repair the damage as specified in the written schedule or any extension agreed to by the person and the damaged property owner. No violation will occur if the failure to perform the corrective actions is for any reason beyond the control of the person performing the work including, without limitation, acts of God or government preemption in connection with a national emergency or if the allegedly damaged property owner refuses to grant reasonable permission and access to conduct the remediation activities.

E. The city, in adopting this chapter, shall collect a twenty five dollar ($25.00) permit fee for review of a stand alone soil erosion and dust control plan. Otherwise, the fee will be considered as incorporated in other permit fees being collected at the time of the review. (Ord. 1144, 7-10-2006)

11-5-4: DUST CONTROL AND SOIL EROSION PLAN:

In order to obtain permit approval for any land disturbing activity involving a site of three thousand five hundred (3,500) square feet or more, and prior to the issuance of any building permit and prior to the commencement of any activity on the site, the applicant shall file with the building official a soil erosion and dust control plan and shall obtain the building official's approval of such plan. In assessing the plan, the building official may consult with any person, agency, or organization he or she deems appropriate.

The following constitutes the minimum information required in the control plan as part of any building or subdivision development:

A. Name, address and phone number of person(s) responsible for the preparation, submittal and implementation of the control plan.

B. A plot or plat of survey of the site which describes:

1. The total area of land surface to be disturbed and the total area of the entire project site, in areas or square feet, depending on scale;

2. The operation(s) and activities to be carried out on the site;

3. All actual and potential sources of fugitive dust emissions on the site.

C. A description of RACMs or combination thereof to be applied during all periods of dust generating operations to each of the fugitive dust sources described on the plot or plat. For each source identified at least one control measure must be implemented. The same control measure(s) may be used for more than one dust generating activity.

D. Approval and issuance of the building and/or subdivision construction permit(s) and the approval of all outlined RACMs contained within the control plan shall mandate the implementation of said RACMs by the developer, contractor, builder, owner, and/or agents as part of construction activities. (Ord. 1144, 7-10-2006)

11-5-5: REASONABLY AVAILABLE CONTROL MEASURES (RACMS):

Reasonably available control measures to be implemented in accordance with this chapter may include, but are not limited to, the following:

A. Using dust suppressants applied in amounts and rates recommended by the manufacturer;

B. Using wet suppression;

C. Upwind windbreaks, including fabric fences;

D. Starting construction at the location that is upwind from the prevailing wind direction and stabilizing disturbed areas before disturbing additional areas;

E. Stopping active operations during high wind;

F. Cleanup and removal of track out material;

G. Retaining natural vegetation during the construction phase of building excluding the building pad site;

H. Utilizing existing or natural vegetation as part of the required landscaping for the site;

I. Temporary seeding or revegetation for soil stabilization when grades are not ready for permanent seeding;

J. Surfacing with gravel or other mulch material of a size and density sufficient to prevent surface material from being airborne;

K. Mulching and crimping of straw or hay as specified;

L. Installing permanent perimeter and/or interior fence walls;

M. Designing subdivisions of building sites to utilize existing predevelopment grades;

N. Applying palliatives or chemical soil suppressant/stabilizer for idle construction areas;

O. Restricting access to lot by subcontractors by providing parking areas. (Ord. 1144, 7-10-2006)

11-5-6: GENERAL AND NONCONSTRUCTION STANDARDS:

A. Ground Cover Removal Prohibited: No person, no matter the size of the property, shall disturb the topsoil or remove ground cover on any real property within the city limits and thereafter allow the property to remain unoccupied, unused, vacant, or undeveloped unless reasonable actions are taken to prevent generation of dust. Such reasonable actions must be submitted to the building official in the form of a wind erosion and dust control plan and must be approved by the building official prior to any removal of ground cover by the applicant.

B. Vacant Land; Weed Eradication And Dust Suppression:

1. For all vacant or underdeveloped lots, weed eradication is limited to removal of specific weeds only through mowing or hoeing and not the removal of natural vegetation. Clearing of the entire lot is prohibited.

2. Once weeds are removed or mowed, dust suppression can be achieved through watering, chemical suppressant application, or the expansion of natural, nonweed vegetation areas on site. Natural vegetation shall consist of those plant varieties that are indigenous to New Mexico or that are determined to be native or natural plant varieties by the city building official.

C. Storage Of Materials: Actions shall be taken to ensure that such areas or uses with the potential of becoming or generating fugitive dust and particulate matter, shall be covered, moistened, compacted, or otherwise treated to prevent fugitive dust creation.

D. Existing Operations: For existing operations, ongoing, and/or permanently sited institutional, commercial and/or industrial facilities or operations which may continuously generate fugitive dust, individual control plans with the corresponding RACMs shall be submitted to the building official for approval. Approval shall be made by the building official or his or her designee and shall be communicated in writing to the property/business owner. (Ord. 1144, 7-10-2006)

11-5-7: CORRECTION OF VIOLATIONS:

A. Notification: Where a person fails to comply with control measures approved by the building official or with any provision of this chapter, the building official or his or her designee, or city code enforcement officer, shall notify the person of that fact and specify a period of time in which the person must achieve compliance. Failure to comply within a twenty four (24) hour minimum or within the time determined by the city constitutes grounds for a notice of violation. The building official may also issue a stop work order where a building permit has been issued. Correction of conditions may include the amendment of plans to reflect additional or new control measures.

B. Remedial Action: The city or its designated agent, after proper notice, may enter upon any real property where dust is being generated and take such remedial and corrective action as he or she deems necessary when the owner, occupant, operator, or any tenant, lessee, or holder of any possessory interest or right in the involved land fails to do so.

C. Costs: Any costs incurred in connection with any remedial or corrective action taken by the city, pursuant to this chapter, shall be assessed against the owner of the property involved. Failure to pay the full amount of such incurred costs shall result in a lien against the property. The lien shall remain in full force and effect until all costs have been fully paid, which may include cost of collection and reasonable attorney fees.

D. Effective Date: For all existing emission sources governed by this chapter, the activity must be completed within six (6) months of the effective date hereof or be brought into full compliance. For existing, ongoing, and/or permanently sited institutional, governmental, commercial and/or industrial facilities or operations, the dust control provisions of this chapter shall be submitted in writing, approved, and implemented within six (6) months of the effective date hereof.

E. Liability: All persons owning, operating, or in control of any equipment or property who shall cause, permit, or participate in, any violation of this chapter shall be individually and collectively liable to any penalty or punishment imposed by and under this code.

F. Offenses: Any persons who violate any provision of this chapter, including, but not limited to, any application requirement; any permit condition; any fee or filing requirement; any duty to allow or carry out inspection, or any requirement by the city is guilty of a misdemeanor and shall be punished as provided in section 1-4-1 of this code, and a separate offense shall be deemed committed on each day during or on which a violation occurs or continues. (Ord. 1144, 7-10-2006)

11-5-8: CITY NOT LIABLE:

A. Nothing contained in this chapter is intended to be construed to create or form the basis for any liability on the part of the city, or its officers, employees or agents for any injury or damage resulting from the failure of responsible parties to comply with the provisions of this chapter, or by reason or in consequence of any inspection, notice, order, certificate, building permit, permission or approval authorized or issued or done in connection with the implementation or enforcement of this chapter, or by reason of any action or inaction on the part of the city related in any manner to the enforcement of this chapter by its officers, employees or agents.

B. The building official, code enforcement officer, or other city employee charged with the enforcement of this chapter, acting in good faith and without malice on behalf of the city, shall not be personally liable for any damage that may accrue to persons or property as a result of any act required by the city, or by reason of any act or omission in the discharge of these duties. Any suit brought against the building official, code enforcement officer, or other city employee because of an act or omission performed in the enforcement of any provisions of this chapter shall be defended by the city.

C. Nothing in this chapter shall impose any liability on the city or any of its officers or employees for construction or cleanup of the erosion and sediment control measures listed herein. (Ord. 1144, 7-10-2006)

LUNA COUNTY BUILDING CODE ORDINANCE NUMBER 75

AN ORDINANCE PROVIDING FOR THE ESTABLUSHMENT OF MINIMUM STANDARDS FOR CONSTRUCTION IN LUNA COUNTY AND FOR THE PROVISION OF PENALTIES, CIVIL REMEDIES, SEVERABILITY AND EFFECTIVE DATE.

Whereas, the health, safety and welfare of the residents of Luna County require the regulation of the erection, construction, maintenance, enlargement, moving, removal, conversion, occupancy, equipment, use, height, demolition, alteration, and repairs, of all buildings and/or structures within Luna County; and

Whereas, it is deemed necessary and desirable to ensure orderly and integrated development within Luna County in compliance with policies and guidelines set out in the Luna County Comprehensive Land Use Plan and all other County policies and regulations; and

Whereas, Luna County remains essentially rural in nature in which open space and the natural landscape predominate over the developed environment; rural lifestyles and rural based landowners are fostered; the conversion of undeveloped areas into sprawling low density development is reduced; and

Whereas, Section 4-3 7-1 NMSA 1978 provides all counties are granted the same powers as municipalities, and included in this grant of powers are those powers necessary and proper to provide for the safety, preserve the health, promote the prosperity and improve the order, comfort and convenience of Luna County and its inhabitants;

Whereas, Section 3-17-6, NMSA 1978 provides that a municipality may adopt by ordinance the conditions, provisions, limitations, and terms of a building code, plumbing code, electrical code, fire prevention code, and any other code not in conflict with the laws of New Mexico;

NOW, THEREFORE BE IT ORDAINED BY THE LUNA COUNTY BOARD OF COUNTY COMMISSIONERS AS FOLLOWS:

ARTICLE l GENERAL PROVISIONS

1.1 Short Title: This Ordinance shall be known as the "Building Code Ordinance", and shall be referred to herein as "this Ordinance".

1.2 Purpose: This Ordinance shall provide for the regulation of all construction, whether residential or commercial or other use, including any additions, expansions, repairs, remodel, or renovation to any building or structures in Luna County; provide for the issuance of permits for such work; establish minimum standards of workmanship and materials to be used in such work; and provide for the inspection, administration, penalties and enforcement of the regulation.

1.3 Jurisdiction: This Ordinance shall provide for the regulation of construction activities within the County, but not within the boundaries of municipalities.

1.4 Interpretation and Conflict: The regulations provided herein are held to be the minimum standards necessary to carry out the purposes of this Ordinance. This Ordinance is not intended to interfere with, or abrogate or annul any other valid ordinance or statute. In the event the provisions of this Ordinance conflict with other County rules, regulations or ordinances pertaining to the subject matter herein, the provisions of this Ordinance shall prevail.

1.5 Meaning of Terms: Wherever the terms "Luna County Planning Director", "County Planning Director", or “Luna County Planner" appear in this Ordinance they shall be read and understood as including any other person or position authorized by the County Manager or the County Board of County Commissioners to administer or otherwise carryout the requirements of the Ordinance.

1.6 Definitions:

"Agriculture": An agricultural use or activity requires a tract containing five (5) or more contiguous acres in active, current use for the production of farm crops for sale and profit, including vegetables, fruit, cotton, grain and other crops and the processing of crops to the generally recognizable minimum level of marketability and storage thereof on the premises; the open range grazing of livestock or irrigated pasture for grazing livestock; animal and poultry husbandry, dairy operations, floriculture and horticulture; and accessory uses customarily incidental to agricultural activities. Provided further that agriculture does not include commercial slaughter houses, meatpacking plants, fertilizer yards, or other similar animal related uses.

"Building”: any structure used or intended for supporting or sheltering any use or occupancy.

"Building Official": shall mean the officer, or official, or inspector or other designated authority charged with the administration and enforcement of any Code, or the building official's duly authorized representative.

"Certificate of Compliance": shall mean a certificate issued to the property owner by the Luna County Code Compliance Officer or other designated County official, or a New Mexico State Building Official evidencing the fact that the requirements of this ordinance as set forth in this Ordinance, have been met.

"CID": State of New Mexico Construction Industries Division.

"Code": shall mean a standard that is an extensive compilation of provisions covering broad subject matter or that is suitable for adoption into law, any adopted uniform code pertaining to construction activities.

“Code Compliance Officer": shall mean the person designated by Luna County to enforce various County codes or ordinances.

"Community Liquid Waste System": A liquid waste system or sewerage system, publicly or privately owned and operated, including collectio10 and treatment facilities constructed to serve one or more lots.

"Community Water System": A water system or utility, publicly or privately owned, that relies on surface and/or groundwater diversions other than wells permitted by the State Engineer under Section 72-12-1, NMSA, 1978, and that consists of common storage and/or distribution facilities operated for the delivery of water to multiple service connections. A community water supply system shall have sufficient water rights to serve all Jots within the community. A community water system shall include mutual domestic water associations established in accordance with New Mexico law.

"Contiguous": refers to adjacent lots or parcels of land sharing a boundary line.

"County": shall mean Luna County, New Mexico.

"County Commission": shall mean the Board of County Commissioners of Luna County.

"Development": the use of any land; the carrying out of any building activity including construction, reconstruction, conversion or enlargement of any building or structure; the making of any material change in the use, or intensity of use, or appearance of any building, structure, or land; the establishment of a commercial parking lot or the dividing of land into lots, blocks, or parcels, including the construction of roads, the installation of water, sanitary sewer and stormwater management facilities or other utilities.

"Dwelling": any building or portion thereof, which is designed or used exclusively for residential purposes.

“Dwelling Unit, Accessory": A self-contained living quarter attached to, or detached from, or under the same roof as the main or principal dwelling, located on the same site as the main or principal dwelling created by:
a) the conversion of an existing single family dwelling; or
b) the construction of an addition to an existing single family dwelling; or
c) the construction of a detached structure which is subordinate to the main of principal dwelling.
The gross floor area of any such accessory dwelling unit shall be no larger than 50% of the gross floor area of the original main or principal dwelling.

"Dwelling, Apartment or Dwelling Multiple": a building or portion thereof that contains three (3) or more dwelling units, and for purposes of this Ordinance, includes residential condominiums.

"Family": One (1) or more persons occupying a dwelling unit and living as a single housekeeping unit as distinguished from a group occupying a boarding house, dormitory, lodging house, or hotel, as herein defined.

"Fire Marshal": the Luna County Fire Marshal or a person discharging the duties of Fire Marshal

"FPC": Fire Prevention Code.

"Flood Hazard Boundary Map": an official map issued by the Federal Emergency Management Agency, where the areas within special flood hazards are designated.

"Flood Prone Area": an area where a temporary condition of partial or complete inundation of normally dry land results from the unusual and rapid accumulation or runoff of surface waters.

"Footing": that portion of the foundation of a structure that spreads and transmits loads directly to the soil or piles.

"Grade Level": the lowest point of elevation of the finished surface of the ground, paving or sidewalk within the area between the building and the property line or, when the property line is more than five (5) feet from the building, between the building and a line five (5) feet from the building.

"Habitable": as applied to any form of housing, such as manufactured homes, site built homes, or mobile homes, means that there are no known defects, damage or deterioration to the home which creates a dangerous or unsafe situation or condition. All plumbing, heating and electrical systems are in safe working order and must meet all applicable codes.

"IBC": International Building Code.

"IRC": International Residential Code.

"Inspector": shall mean the Luna County Building Inspector or the Code Compliance Officer or a person duly delegated by the Luna County Building Inspector or the Code Compliance Officer, or a person instructed or requested by the Luna County Building Inspector or the Code Compliance Officer to provide a written report with respect to any matter set out in this Ordinance.

"LCBO": shall mean the Luna County Building Official; see also Inspector and Building Official.

"Lot": shall mean a parcel of land occupied or intended for occupancy by one main building together with its accessory buildings and uses customarily incidental to it.

"Lot of Record": A lot which is part of a subdivision, the map or plat of which has been recorded in the office of the County Clerk of Luna County, or a lot described by metes and bounds or by survey plat prepared by a land surveyor licensed in the state of New Mexico, which has been recorded in the office of the County Clerk of Luna County.

"Modular Home": a standardized factory fabricated transportable building module not having a chassis or wheels of its own, designed and constructed in accordance with the International Building Code and intended to be placed on a permanent foundation and requires a building permit for installation.

"NFPA": National Fire Protection Association.

"NMBC": New Mexico Building Code.

"Non-Residential Property": a building or structure or parts thereof not occupied in whole or in part for the purposes of human habitation including the land and premises appurtenant thereto.

"Occupancy": shall mean the purpose that a building, or part thereof, is used or intended to be used.

"Officer": shall mean the Code Compliance Officer of Luna County, the person designated by Luna County to administer and enforce various codes and ordinances.

"Owner": shall mean any person, agent, firm or corporation having a legal or equitable interest in the property.

"Parcel": shall mean a unit of land capable of being described by location and boundaries and not dedicated for public or common use.

"Permit": shall mean an official document or certificate issued by the building official, the County Planner, or other authorized authority, as appropriate, authorizing performance of a specified activity.

"Person": shall mean a natural person including any individual, partnership, company, corporation, firm, association, trust, estate, foundation, state and federal agency, institution, county, city, town, village, or municipality or other legal entity, however organized.

"Property": shall mean any area, plot, or parcel of land in Luna County, which is under a common ownership or is separately identified for assessment by the Luna County Assessor's Office. Property shall include land under the ownership of the United States, the State of New Mexico, or any local government or school district entity. This definition is intended to be inclusive and not limiting, and shall therefore include all land within the boundaries of Luna County, New Mexico, except that the definition of property, and therefore this Ordinance, shall exclude property within the boundaries of the City of Deming and the Village of Columbus, and any hereafter incorporated municipality.

"Property Occupant": shall mean any person who is occupying any property, whether by legal right or without legal right

"Property Owner": shall mean the person who is the recorded owner of any property according to the records contained in the Luna County Clerk's Office.

"Repair": shall mean the reconstruction, renewal, refinishing or refurbishing of all or any part of an existing building or structure, or property for the purpose of its maintenance.

"Residential Property": any property or building that is used, designed, or intended for use as a dwelling unit, dwelling, or apartment dwelling and includes the yards, accessory buildings and vacant property belonging to such property.

"Sewage": shall mean residential liquid wastes, commercial liquid wastes, industrial liquid wastes, and any drainage, but does not include storm water.

"Sewerage System": shall mean a system for transporting sewage owned and operated by Luna County, a municipality or a private disposal system approved by the state of New Mexico Environmental Department.

"Shall": shall be construed as mandatory.

"Site Built Residences": residences constructed at the permanent building site but which may incorporate the use of some prefabricated building components.

"Smoke Detector": an approved device that senses visible or invisible particles of combustion.

"Special Flood Hazard Area": land in the flood plain subject to a one percent or greater chance of flooding in any given year.

"Standards": the provisions and measures of physical conditions and occupancy set out in this Ordinance.

"Street or Road": shall mean all property dedicated or intended for public or private access to property, or subject to public easements therefore.

"Structure": shall mean that which is built or constructed, an edifice or building of any kind, or any piece of work artificially built up or composed of parts joined together in some definite manner. Without limiting the generality of the foregoing, structure shall include a wall, fence, sign or billboard.

"Temporary": applies to facilities or structures that are not of permanent construction, and are not intended to be permanently erected and maintained on a site. Tents and air supported structures are considered temporary for purposes of this Ordinance.

"Terrain Management": means the control of floods, drainage, and erosion and measures required for adapting proposed development to existing soil characteristics and topography.

"UMC": Uniform Mechanical Code.

"UPC": Uniform Plumbing Code.

''Utility Service": connection to an electrical service pole or other approved receptacle, or gas and water meter installation, but does not include electrical mainline extension or gas and water mainline extension or water main tap or meter box and setter installation.

“Use”: shall mean the use for which land or buildings are occupied or maintained, arranged, designed, or intended.

"Variance": Any deviation from the Regulations of this Ordinance as approved by the Board of County Commissioners, where such variance will not be contrary to the public interest; however, the allowable use of the premises is not subject to change by variance.

"Wastewater": means the liquid-or water-carried wastes removed from residential properties, businesses, institutions and other uses, including bath and toilet wastes, laundry waste, and kitchen waste but not including toxic, hazardous, or industrial waste.

Words not Defined: Any word or term not defined in this Ordinance shall have the meaning ascribed to it in the Luna County Subdivision ordinance or the Luna County Zoning ordinance or the Deming/Luna County Extra-Territorial Zoning regulations, or they shall have their ordinary accepted meaning within the context with which they are used.

ARTICLE 2 BUILDING STANDARDS-GENERAL

2.1 Adoption of International Building code and Other Codes

Each and all of the regulations, provisions, penalties, conditions, terms and all appendices of the latest editions of:

2.1.1 International Building Code
2.1.2 International Residential Code
2.1.3 New Mexico Commercial Building Code
2.1.4 New Mexico Residential Code
2.1.5 National Electric Code
2.1.7 New Mexico Non-Load Bearing Straw Construction Building Code (Phase III)
2.1.8 New Mexico Plumbing Code
2.1.9 Uniform Plumbing and Mechanical Code
2.1.10 New Mexico Mechanical Code
2.1.11 New Mexico Electrical Code
2.1.12 New Mexico Electrical Safety Code (Phase III)
2.1.13 National Fire Protection Association, Fire Prevention Code
2.1.14 NFIP Regulations, 44 CFR, Section 60.3; Flood Insurance Study, and Flood Insurance Rate Map, effective October 19,2010

Are hereby referred to, adopted and incorporated as fully as if set out verbatim herein and any amendments thereto, including the most recent additions, updates, revisions, or editions thereof.

2.2 Copies of Codes Available for inspection

One or more copies of applicable codes adopted in Article 2.1 of this Ordinance shall be available for review and inspection during regular business hours in the Office of the LCBO.

2.3 Fee Schedule

The Fee Schedule for Building Permits shall be established by the Luna County Board of County Commissioners. No permit shall be issued nor shall an application be considered complete prior to the receipt of said fee.

2.4 Building Permits Required

Any construction, residential or commercial or other use, any additions, expansions, repairs, remodel, or renovation to any building or structure, to include site built and modular buildings or structures, shall have a building permit issued by the LCBO or a New Mexico State Building Official, and follow procedures required by the Codes adopted in this ordinance. The Building Permit must be displayed in a conspicuous place at the building site. If the LCBO, or State Building Official or the Luna County Code Compliance Officer determines that the property for which a permit has been requested is in violation, has outstanding violations, or may be in non-compliance with any part of this Ordinance, or the Luna County Subdivision Ordinance, or any other applicable county, state or federal regulation, the LCBO, State Building Official or the Luna County Code Compliance Officer may deny issuance of the permit until such time as the property has been deemed compliant.

2.5 Exceptions to Requirement for Permits

a) One-story detached accessory structures used as tool and storage sheds, playhouses and similar uses, provided the floor area does not exceed 120 square feet (11.15 m^2).
b) Fences not over 6 feet high.
c) Retaining walls that are not laterally supported at the top and that retain in excess of 36 inches (915mm) of unbalanced fill, unless supporting a surcharge or impounding class I, II or III-A liquids.
d) Water tanks supported directly upon grade if the capacity does not exceed 5,000 gallons (18,927L) and the ratio of height to diameter or width does not exceed 2 to 1.
e) Sidewalks and driveways not more than 30 inches (762mm) above grade and not over any basement or story below and which are not part of an accessible route.
f) Painting, papering, tiling, carpeting, cabinets, counter tops and similar finish work.
g) Temporary motion picture, television and theater stage sets and scenery.
h) Prefabricated swimming pools accessory to a group R-3 occupancy, as applicable in the NMRBC, which are less than 24 inches (610mm) deep, do not exceed 5,000 gallons (19,000L) and are installed entirely above ground.
i) Shade cloth structures constructed for nursery or agricultural purposes and not including services systems.
j) Swings and other playground equipment accessory to one- and two-family dwellings.
k) Window awnings supported by an exterior wall of group R-3, as applicable in the NMRBC, and group U occupancies.
l) Movable cases, counters and partitions not over 5 feet, 9 inches (1,753mm) in height.
m) Any work not otherwise regulated by the New Mexico construction codes and the CID rules.

2.6 Alternate Materials, Alternate Design and Methods of Construction

Pursuant to the International Building Code, and the International Residential Code, as amended from time to time, where materials, design and construction methods are specified in any of the Codes or Rules and Regulations adopted in Article 2 of this ordinance, alternate materials, design and methods of construction may be allowed provided any alternate has been approved, and is authorized by the Luna County Building Official (LCBO), or other authorized official.

The LCBO, or other authorized official, may approve any such alternate provided the LCBO, or other authorized official, is satisfied the proposed design is satisfactory and complies with the provisions of those codes and rules and regulations set out in Article 2 of this ordinance, and that the material and method of work proposed is at least the equivalent of that prescribed in any of the codes and rules and regulations set out in Article 2 of this ordinance.

The LCBO, or other authorized official, shall require that sufficient evidence or proof to substantiate any claims made about alternate material, design or methods of construction. Without limiting the generality of the foregoing sentence, the LCBO may require a study and/or certificate of code compliance from a qualified engineer or architect as evidence or proof of claims made about alternate material, design, or methods of construction.

Whenever there is insufficient evidence of compliance with any of the provisions of this code or evidence that any material or construction does not conform to the requirements of this code, the LCBO, or other authorized official, may require tests by an approved agency as proof of compliance to be made at no expense to Luna County.

The details of any action by the LCBO, or other authorized official, granting approval of an alternate shall be recorded and retained in the files of the Luna County Building Official's Office or the County Planner's office.

2.7 Use of Waste Tires for Construction

2.7.1 No use of waste or scrap tires, baled or non-baled, or processed tires, or used tires for the construction of any building or structure is permitted on any site or lot in Luna County unless all of the following conditions are met to the satisfaction of Luna County:

a) such proposed use constitutes no environmental hazard and that it will not endanger the health or safety of the residents of Luna County. To this end, Luna County may require the owner or his/her authorized agent to produce and submit to the County an environmental impact assessment prepared by a qualified Environmental Consultant showing no adverse environmental impact. Prior to taking any decision, the County may consult with any state agency or it may engage its own consultant to undertake an oversight review of the environmental impact assessment prepared by the owner's or his/her authorized agent's consultant;

b) a building permit is obtained from the Construction Industries Division of the State of New Mexico;

c) written approval is obtained from the Fire Marshal, or other authorized official, which written approval shall state clearly that there is sufficient fire suppression measures in place on the lot or site; and, that in his/her opinion Luna County has the capability to effectively deal with any building or structure fire that may occur. The Fire Marshal may also prescribe specific fire prevention measures that shall be taken by the owner or his/her authorized agent;

d) the owner or his/her authorized agent shall submit design and construction plans to the County Planner and to the Construction Industries Division showing clearly the use of waste or scrap tires, or processed tires, and that such design complies with all requirements of the International Building Code. These drawings shall be stamped and signed by a professional engineer licensed in the State of New Mexico, or by an architect licensed in the State of New Mexico;

e) a financial guarantee in favor of Luna County, in the form of a bond, cashier's check, or other form satisfactory to the Luna County Attorney, and in an amount satisfactory to Luna County shall be posted with the County Clerk. The amount of the financial guarantee shall be sufficient to cover the full cost of any clean-up, disposal of materials, and the removal of all buildings and structures on the site or lot. The amount of the financial guarantee shall be in the sole discretion of Luna County. The owner, or his/her authorized agent shall keep the financial guarantee current. The County shall retain the right to request an increase in the financial guarantee as circumstances warrant. The financial guarantee shall be released at the time the project is completed to the satisfaction of the Building Official; and,

f) a permit for the proposed use is ob1ained from the Luna County Planning Department. The County shall not issue any permit unless and until it is fully satisfied that conditions set out in Article 2.6.1 a), b), c), d) and e) of this Ordinance have been fulfilled.

2.7.2 If the owner or his/her authorized agent, or any successor, fails to maintain full compliance with the conditions upon which approval of a proposed use is given, the County, after giving notice to comply, may revoke the permit. Upon revocation, all operations shall cease and site clean-up shall commence immediately.

2.8 On-Site Utility and Development Requirements

Approved on-site utilities, to include water, sewer, and electricity are prerequisite to issuance of a building permit. All housing units shall be connected to a waste disposal system permitted and approved by the New Mexico Environment Department, a domestic water well permitted by the New Mexico State Engineer, or be connected to an approved potable water utility whether private or municipal. For purposes of this section:

2.8.1 There shall be no multiple users connected to a domestic water well nor to any on-site liquid waste disposal system except for properly permitted community water systems and properly permitted cluster wastewater systems, or as otherwise provided herein.

2.8.2 All electrical, plumbing, and gas hookups shall be inspected and approved by an inspector of CID, as the case may be prior to occupancy and before a Certificate of Occupancy will be issued by the LCBO, or other authorized official.

2.8.3 Any water/well, sewer/septic, electric, or natural gas/LP utility provider that connects service to individual parcels before the land owner holds a valid building permit is in violation of this ordinance and the service shall be disconnected.

2.8.4 Any waste disposal system must be approved by the New Mexico Environment Department

2.8.5 No building permit or other permit shall be issued until and unless the applicant for such permit can show to the satisfaction of the Luna County Planner, that the applicant has legal access to a lot or parcel of land either by means of a public road or by means of a properly recorded easement, and such access shall provide reasonable physical ingress and egress to and from the parcel of land.

2.9 Smoke Detectors

Smoke detectors shall be required in all dwelling units to include site built, and modular, occupied or installed after the effective date of this Ordinance.

2.10 Flood Hazard Installation Requirements

The Luna County Floodplain Manager is hereby appointed the Floodplain Administrator to administer and implement the Flood Hazard Installation provisions of this Ordinance and other appropriate sections of 44 CFR pertaining to floodplain management. No residential, commercial or other use or development shall be located or installed in a flood-prone area, such as a Flood Hazard Area as designated by the National Flood Insurance Rate Map for Luna County, or in, on, or over the path of an arroyo, or floodway without the prior approval of the County Floodplain Manager and the issuance of a floodplain development permit. All development and all construction related to such development shall comply with the minimum standards as adopted by, or may be amended by, the Federal Emergency Management Agency (FEMA). A new or replacement water supply system or sanitary sewage system may be required within a designated flood hazard area which shall be designed to minimize or eliminate infiltration of flood waters into the system as well as discharges from the system into flood waters, and the on-site waste disposal system must be located so as to avoid impairment of them or contamination from them during flooding.

2.11 Flood Hazard Installation Base Flood Elevation

All new construction and substantial improvements of structures designed for human occupancy being built in a special flood hazard area shall be constructed such that all electrical, heating, ventilation, plumbing and other service facilities are located so as to prevent water from entering or accumulating within the components during conditions of flooding and must meet one of the following conditions:

2.11.1 The lowest floor level elevated at least one (1) foot above the base flood elevation where base flood elevations are determined.

2.11.2 The lowest floor level, with respect to site built structures, elevated two (2) feet above the highest adjacent grade in areas where no base flood elevations are determined.

2.12 Flood Hazard Minimum Fill Requirement

Any building or structure to be constructed in "A" Zones, as designated by the National Flood Insurance Rate Map for Luna County, where no base flood elevations are determined, must have its lowest floor level constructed a minimum of two (2) feet above the highest adjacent grade. The material used to raise the lowest floor above the highest adjacent grade must be compacted to the satisfaction of the LCBO, the County Planner, or other authorized official, who may require that the landowner provide a report from a qualified geo-technical consultant that the soil is sufficiently compacted to accommodate the intended development. This section shall apply only to dwellings or structures erected or installed after the date of this ordinance as amended.

2.13 Storm Water, Grading, Drainage and Dust Control

2.13.1 No property owner shall alter the natural flow of storm water across their property in such a manner as to increase the flood hazard on other properties

2.13.2 Except for agricultural operations, no person shall clear any land of its natural vegetation without having in place and implementing a plan, approved by the Officer, to prevent soil, sand, dust, and building materials, construction waste or other materials from being blown by the wind from the said land. In the event the owner, lessee, occupant, or any agent or representative thereof having charge or control of such land fails or refuses to prevent such materials from being blown from the land by the wind, the County may take such corrective action as it deems advisable and the cost of doing so shall constitute a lien on the subject land.

2.14 Lighting

2.14.1 Lighting fixtures, lamps and their supports and connections shall be maintained in a safe and complete condition, without visible deterioration.

2.14.2 All properties that are being developed, remodeled, refurbished, or rehabilitated shall comply with the Night Sky Protection Act, NMSA 1978, § 74-12-1 through § 74-12-11.

2.15 Roofs

2.15.1 All roofs shall be kept clear of debris such as tires, concrete blocks, rocks, and other objects, materials, and structures not approved by the builder, manufacturer or installer, or for which a permit has not been issued.

2.16 Set-Back

2.16.1 All permitted structures shall have a twenty-five (25) foot set-back from the front property line, a five foot set-back from the side property line, and a five (5) foot set-back from the rear property line.

ARTICLE 3 ADMINISTRATION AND ENFORCEMENT

This Ordinance and all codes, rules, regulations and other provisions set out in said Ordinance shall be enforced by the Luna County Building Official (LCBO), who is certified by the State of New Mexico Construction Industries Division, and has such powers and duties as are enumerated in and set forth in the current provisions of the Codes adopted in Article 2 of this Ordinance, or by a Luna County Code Compliance Officer. Article 2 of this Ordinance may be enforced by an inspector employed by the State of New Mexico Construction Industries Division. The LCBO shall not enforce any code provisions pertaining to gas service installations or related matters.

3.1 Any Building Inspector of the Luna County Planning Office, and the Luna County Fire Marshall, and any Electrical Inspector of the State of New Mexico, and any Plumbing Inspector of the State of New Mexico, and any Environmentalist of the State of New Mexico Environment Department, and any Engineer or Technician or Technologist or Water Resource Specialist of the State Engineer's Office of the State of New Mexico, and any other qualified person, may be authorized by the Code Compliance Officer to help enforce the standards set out in this Ordinance, or may be requested by the Code Compliance Officer to give a written report, or other advice to aid in the administration and enforcement of this Ordinance.

3.2 Notice of Violation

3.2.1 In addition to the criminal penalties provided for in this Ordinance, any such violation, after reasonable efforts to secure voluntary compliance with this Ordinance have failed, shall be subject to abatement as follows:

a) Notice of Violation. (i) If, after inspection, or the observation of any County or State employee, the Officer is satisfied that a violation does exist, the Officer shall serve, or cause to be served by personal service, or send by prepaid registered mail to the owner of record of the property, or to the occupant or tenant of the property, or both, and to all persons shown by the records to have an interest in the property, a Notice of Violation setting out the particulars of the violation(s). The Notice shall establish that the abatement of the violation(s) by the owner, or occupant or tenant, or both, shall begin in not more than ten (10) days and shall be completed in not more than ninety (90) days after service of the Notice. The Notice shall be served at the owner's or occupant's or tenant's last known address; (ii) In the event a violation of this ordinance constitutes an immediate danger to the public health and safety, the notice provisions of this subsection shall not apply, and the violation may be prosecuted and abated immediately.

b) Placard. If the Officer is unable to achieve service under Article 3.2.1 a) he/she may place a placard containing the terms of the Notice in a conspicuous place on the property or building, and the placing of the placard shall be deemed to be sufficient service of the Notice on the Owner or other persons.

c) Extension of Time Frame for Abatement. Where the Officer is satisfied that there is good and sufficient reason to extend the time frame for abatement of the violation(s), he/she may extend the time frame set out in Article 3.2.1 a) above for a period of time not to exceed forty-five (45) days beyond the time period set out in the original Notice.

d) Failure to Correct. In the event the owner, occupant or tenant of the property where the violation exists, has failed to correct the violation(s) within the prescribed period of time, then the Officer shall issue a citation or file a complaint charging violation of this Ordinance with the Magistrate Court, or other appropriate court of jurisdiction, demanding that the owner of the property, or the occupant, or both, be held to answer to the Court for the violation**.**

3.3 Certificate of Occupancy/Compliance

3.3.1 All buildings or structures. to include site built, and modular, whether titled or untitled are subject to this Ordinance and shall, prior to use, be inspected by the LCBO, or other authorized official.

3.3.2 Following the final inspection of a building or structure, the Officer will issue a Certificate of Occupancy/Compliance, when the building or structure is in compliance with the standards of this Ordinance.

3.4 Prohibition

3.4.1 The Code Compliance Officer may issue a Notice prohibiting the occupancy of any unsafe or uninhabitable building.

3.5 Citation Uniform Non-Traffic

3.5.1 The use of uniform non-traffic citation forms is authorized for use in enforcement of this Ordinance, except as otherwise provided.

3.6 Penalties and Remedies

Any person violating or failing, or refusing to comply with the provisions of this Ordinance and the Codes adopted may be prosecuted in any court of competent jurisdiction within the County, and shall be punished by a fine of not more than three hundred dollars ($300), the Board of County Commissioners may apply to the District Court for appropriate injunctive relief to compel compliance by any person whose conduct violates any provision of this Ordinance. The County shall be entitled to recover a reasonable attorney's fee if required to enforce this Ordinance through the issuance of a demand letter, or in enforcing any portion of this Ordinance in any Court of competent jurisdiction. After the effective date of this ordinance, all violations are subject to issuance of a citation.

3.7 Variance

3.7.1 It is the intention of the Board of County Commissioners that all variances be temporary in duration. The County Commission may grant a variance to the regulations set out in Article 4.2 of this Ordinance for the sole propose of permitting one accessory dwelling unit on any property in Luna County on the following grounds only:

a) To provide living accommodation to an immediate member of the family of the owner-occupant of the principal dwelling unit which family member requires immediate and urgent care because he/she is disabled, physically or mentally infirm, has a disease which is or will become debilitating, or is incapable of being gainfully employed because of their condition. A certificate or letter signed by a physician licensed in the State of New Mexico attesting to the medical condition and the need for care of the family member who will occupy the accessory dwelling unit shall be required by the County Commission as proof of the medical condition.

3.7.2 The County Commission shall not grant any variance which will cause the County to incur or absorb any costs. In granting any variance the County Commission may impose such conditions as will:

a) Substantially secure the objectives of the standards set out in this Ordinance;

b) Not adversely affect the health safety and general welfare of the general public and the immediate property owners;

c) Impose whatever time limits may be reasonable and appropriate in the circumstances. Any variance granted shall be for a period of time not to exceed three (3) years from the date of granting such variance. If necessary, the variance may be renewed prior to the expiration of the term of the variance upon written application by the owner -occupant. Such renewal shall be for a period of time not to exceed three (3) years. All variances granted by the County Commission must be renewed prior to the expiration of either the initial time limit imposed by the County Commission or any renewal period granted by the County Commission. There shall be no limits on the number of renewals provided the reason for the initial variance remains valid;

d) Impose conditions on the type, quality and design of any proposed construction;

e) Impose height limits;

f) Require buffering in the form of fencing and/or vegetation to protect and shield adjacent land uses;

g) Ensure compatibility with other development in the adjacent area. Compatibility as used here shall include, but is not limited to the following: land use, height, scale, density, water supply and liquid waste disposal facilities; and,

h) Accomplish any other purpose and effect deemed advisable and appropriate by the County Commission.

3.7.3 Procedure. The following procedure shall apply to all requests for a variance:

a) All requests for a variance shall be in writing and submitted to the Luna County Planner. The written request shall set out the following information:

i. a description of the specific variance requested;

ii. the reasons for the request;

iii. the supporting information, such as medical certificates, for such request;

iv. the period of time for which the variance is necessary (initial variance may be for a maximum three year period, subject to renewal);

v. a description of the action the owner-occupant will take to discontinue the use of, and remove, the additional accessory dwelling when the reason for the variance no longer exists.

b) The County Planner shall review the written request for variance for completeness and shall, within ten (10) days of receipt of the request, inform the applicant either that the request is complete or the nature of any additional information that is required. Until the request is complete, no further action shall be taken by the County Planner or the County Commission.

c) The County Planner shall confer with and seek the advice of the Code Compliance Officer and the County Attorney, as appropriate, with respect to the request for variance.

d) The County Planner shall notify all property owners within five hundred (500) feet of the subject property by first class regular mail at least ten (10) days prior to the County Commission meeting at which the variance application will be heard. Such notice shall briefly describe the nature of the variance and the date, time and location of the hearing.

e) The County Planner shall submit a written report together with his/her recommendation to the County Commission five (5) days prior to the hearing date.

f) The County Board of Commissioners shall hold a public hearing on all requests for a variance, or a renewal of a variance, under this section. The public hearing shall be held at a regularly scheduled County Commission meeting. The public hearing shall be considered a quasi-judicial proceeding to be conducted in accordance with quasi-judicial procedures adopted by the County Commission. The County Board of Commissioners will then decide the matter during its regular business meeting

g) The written decision and order of the County Commission, together with any conditions, shall be prepared, signed and filed with the County Clerk within ten (10) working days after the date the County Commission made its decision. The County Planner shall keep a written record of the variance granted and shall show the location and nature of the variance on a county map specifically designated for that purpose.

ARTICLE 4 GENERAL PROVISIONS

4.1 Conformance Mandatory

Except as otherwise provided by this ordinance, no building shall hereafter be used, erected, constructed, reconstructed, moved or altered, nor shall any land be used or developed, except in conformity with the regulations, herein set out in applicable parts of this Ordinance.

4.2 One Main Dwelling Unit per Lot

Every dwelling unit hereafter erected, enlarged or structurally altered shall he located on a "lot" as defined in Article I, Section 1.6, Definitions of this Ordinance, and in no case shall there be more than one main dwelling unit on one lot. Land that is part of one lot and that is not in excess of the area requirements for that lot shall not be used to satisfy the area requirements of any other lot.

ARTICLE 5 SEVERABILITY

If any article, section, subsection, paragraph, sentence, clause, phrase, provision, standard or any portion thereof of this Ordinance is, for any reason, held to be unconstitutional, invalid, or void, the remaining portions shall not be affected since it is the express intention of the Luna County Board of County Commissioners to pass such article, section, subsection, paragraph, sentence, clause, phrase, provision, standard, and every part thereof separately and independently from every other part.

ARTICLE 6 EFFECTIVE DATE AND REPEAL

This Ordinance shall be recorded and .authorized by the County Clerk following adoption by the Board of County Commissioners. The effective date of this Ordinance shall be thirty (30) days after the Ordinance has been recorded. Adoption of this Ordinance hereby repeals the following provisions of Luna County Ordinance No. 3 7, Second Revision: Article 3; Article 6, Section 6.3, Sub-section 6.3.3; Article 6, Section 6.3, Sub-section 6.3.6; Article 6, Section 6.5; Article 6, Section 6.6; Article 6, Section 6.8, Sub-section 6.8.9; Article 7; and Article 16, Section 16.2.

APPENDIX E

TCEQ Reports & National Weather Service Bulletins

www.tceq.texas.gov/airquality/monops/air-pollution-events/2010

www.srh.noaa.gov/epz/?n=events

WEST TEXAS DUST STORM MARCH 26, 2010

Analyses for a major air pollution event

Images

- Satellite Animation - West Texas
- WebCam Animation - El Paso Chelsea Street
- WebCam Animation - El Paso Ranger Peak
- Satellite Image 5:39 pm MDT - GOES Visual/Infrared Composite
- Satellite Image 2:16 pm MDT - West Texas True Color (from UT CSR)
- Satellite Image 2:16 pm MDT - El Paso True Color (from UW SSEC)
- Satellite Image 2:16 pm MDT - El Paso True Color (from UT CSR)
- Satellite Image 2:26 pm MDT - West Texas False Color (from UT CSR)
- Graph - El Paso PM10 (5-minute data)
- Graph - El Paso PM2.5 (5-minute data)
- Graph - El Paso Peak Wind Gust (5-minute data)
- Graph - El Paso Wind Speed Average (5-minute data)
- Graph - El Paso Wind Direction Resultant (5-minute data)
- Graph - El Paso UTEP CAMS 12 (5-minute data)
- Graph - El Paso Sun Metro CAMS 40 (5-minute data)
- Graph - El Paso Chamizal CAMS 41 (5-minute data)
- Graph - El Paso Socorro CAMS 49 (5-minute data)

Description

Strong gusty west-southwest winds caused heavy blowing dust in parts of northern Mexico, southern New Mexico, far West Texas, and the southern Panhandle on Friday, March 26th, 2010. Wind gusts of 50 to 70 miles per hour (mph) covered much of the area and gust as high as 86 mph was reported at Guadalupe Pass with a gust to 84 mph at the El Paso Airport.

Satellite imagery showed large dust plumes originating in northern Mexico blowing into the El Paso area.

The highest daily average PM10 measurement in the El Paso area was 201 micrograms per cubic meter (µg/m3) at the Socorro Continuous Air Monitoring Station (CAMS) 49, which rated as **Unhealthy for Sensitive Groups** on the U.S. Environmental Protection Agency (EPA) Air Quality Index (AQI) scale. The other two PM10 sites in El Paso also measured PM10 at Level Orange. PM2.5 measurements in Lubbock and Odessa suggest that PM10 levels probably reach "Moderate" on the AQI in those areas. The highest one hour PM10 measurement was 1,046 µg/m3 was at Socorro CAMS 49 from 4:00 to 5:00 p.m. MDT.

Some airport minimum visibility and peak wind gust observations are shown below:

Airport Location	Lowest Visibility (miles)	Peak Gust (mph)
El Paso	0.0625	84
Deming NM	0.25	60
Alamogordo NM	0.5	48
Las Cruces NM	0.5	46
Holloman AFB NM	0.75	59
Cannon AFB NM	1.25	63
Artesia NM	2	63
Seminole	2.5	47
Odessa	2.5	44
Guadalupe Pass	2.9	86
Lubbock	4	53
Pecos	4	47
Midland Airpark	4	46
Clovis NM	5	56
Wink	5	52
Midland	5	46
Big Spring	5	44
Marfa	5	43
Alpine	5	39
Carlsbad NM	6	62
Plainview	7	54
Hobbs NM	7	45
Snyder	7	43
Hobbs NM	8	46
Childress	8	46
Fort Stockton	8	43

Last Modified Thu, 15 Mar 2012

WEST TEXAS DUST STORM APRIL 29, 2010

Analysis of a major air pollution event

Images

- Satellite Animation - West Texas
- WebCam Animation - El Paso Chelsea Street
- Satellite Image 2:16 pm MDT - El Paso True Color (from UT CSR)
- Satellite Image 2:03 pm MDT - West Texas True Color (from UT CSR)
- Satellite Image 2:03 pm MDT - West Texas False Color (from UT CSR)
- Satellite Image 3:08 pm MDT - West Texas False Color (from UT CSR)

Description

Strong gusty west-southwest winds caused heavy blowing dust in parts of northern Mexico, southern New Mexico, far West Texas, and the Panhandle on Friday, April 29th, 2010. Wind gusts of 50 to 70 miles per hour (mph) covered much of the area and gusts as high as 77 mph were reported at Guadalupe Pass and at Ruidoso, New Mexico. Wind gusts as high as 65 mph were measured in the El Paso area. Satellite imagery showed large dust plumes originating in northern Mexico blowing into the El Paso area.

The highest daily average PM10 measurement in the El Paso area was 249 micrograms per cubic meter (µg/m3) at the UTEP Continuous Air Monitoring Station (CAMS) 12, which rated as Unhealthy for Sensitive Groups on the U.S. Environmental Protection Agency (EPA) Air Quality Index (AQI) scale. The other two PM10 sites in El Paso also measured PM10 at Level Orange. PM2.5 measurements in Amarillo suggest that PM10 levels may have reached "Moderate" in that area. The highest one hour PM10 measurement was 949 µg/m3 was at UTEP CAMS 12 from 3:00 to 4:00 p.m. MDT.

Some airport minimum visibility and peak wind gust observations are shown below:

Airport Location	Lowest Visibility (miles)	Peak Gust (mph)
Ruidoso NM	0.75	77
Deming NM	1	67
Clovis Cannon AFB NM	1.25	62
El Paso	1.5	62
Holloman AFB NM	1.75	61
Alamogordo NM	2	52
Las Cruces NM	2.5	61
Clovis NM	2.5	53
Artesia NM	3	69
Childress	3	44
Guadalupe Pass	4	77
Dalhart	4	55
Dumas	4	48
Pecos	4	41
Carlsbad NM	5	54
Hereford	5	50
Amarillo	5	46
Borger	7	48
Plainview	7	46
Pampa	7	44
Perryton	7	44
Lubbock	8	47

Last Modified Thu, 15 Mar 2012

EL PASO DUST STORM NOVEMBER 28, 2010

Analysis of a major air pollution event

Images

- Satellite Animation - West Texas
- Satellite Comparison - True Color November 28th vs 26th
- Satellite Image - El Paso True Color
- El Paso PM10 Graph
- El Paso Peak Wind Gust Graph

Description

Very strong gusty southwest winds caused intense blowing dust in parts of northern Mexico, far West Texas, and southern New Mexico on Sunday, November 28th. Wind gusts as high as 69 miles per hour (mph) were reported at Guadalupe Pass, 63 mph at the El Paso Skyline Park Continuous Ambient Monitoring Station (CAMS) 72, and 54 mph at the El Paso Airport. The most intense blowing dust was in northern Mexico based on satellite imagery, which showed large dust plumes blowing into the Ciudad Juarez and El Paso area from the southwest. The highest measured PM10 daily average was 251 micrograms per cubic meter (µg/m3) at Socorro CAMS 49 on the southeast side of the El Paso area. This measurement rated as Level Orange, **Unhealthy for Sensitive Groups**, on the U.S. Environmental Protection Agency (EPA) Air Quality Index (AQI) scale. The highest measured one-hour average PM10 reached 1,846 µg/m3 also at Socorro CAMS 49.

Some airport minimum visibility and peak wind gust observations are shown below:

Airport Location	Lowest Visibility (miles)	Peak Gust (mph)
Ciudad Juarez MX	1	46
El Paso	1.75	54
Guadalupe Pass	2.5	69
Deming NM	2.5	46
Holoman AFB NM	4	44
Alamogordo NM	5	40
Pecos	5	32
Las Cruces NM	7	46
Carlsbad NM	8	48
Artesia NM	8	45

Last Modified Thu, 15 Mar 2012

Southwest Weather Bulletin

Spring-Summer 2010 Edition
National Weather Service Santa Teresa-El Paso

El Nino Brings Wild Stormy Weather to New Mexico and Western Texas

A pronounced El Nino circulation pattern combined with an unusually south Polar jet stream to bring active stormy weather to southern New Mexico and western Texas from late autumn through the winter and early spring. A series of strong and deep low pressure systems moving across the southwestern United States resulted in periods of heavy snows, high destructive winds and even thunderstorms with hail and heavy rains. By April, Cloudcroft had received over 150 inches of snow. In addition periods of cool weather occurred with temperatures below normal for much of the period. By the early spring, warming temperatures and melting snow over the mountains enhanced the flood threat across the Borderland.

In fact it was a very stormy winter and early spring for much of the United States. Record-setting heavy snows fell from the Mid-Atlantic and Washington DC areas all the way to the southern plains including the Dallas TX vicinity. In addition extremely heavy rains flooded much of southern New England. In April portions of Mississippi, Tennessee and Arkansas were devastated by historic floods and tornadoes.

Snow covers the city of El Paso after a winter storm moved across the region Nov 30 and Dec 1. (Mike Hardiman NWS/NOAA)

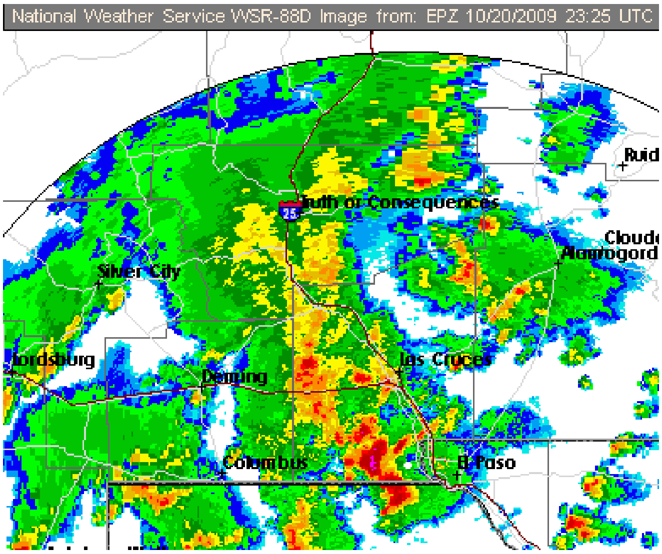
National Weather Service El Paso/Santa Teresa
Meteorologist-In-Charge – Jesse Haro
Warning Coordination Meteorologist – John Fausett
Science Officer – Val Macblain
Newsletter Editor-Writer/Senior Forecaster – Joe Rogash

Autumn and Early Winter 2009 Bring Severe Thunderstorms…Damaging Winds and Heavy Snows

Severe thunderstorms moved into the El Paso-Santa Teresa area on Oct 20. (Joe Rogash NWS/NOAA)

Oct 20: Severe thunderstorms strike the Borderland producing wind gusts to 70 mph over El Paso. Thunderstorms also drop over an inch of rain at La Mesa NM while heavy rains flood streets at Silver City. Dime-sized hail falls at Hurley.

Oct 28-29: A winter-like storm with a strong cold front moves across the region with 9 inches of snow falling at Cloudcroft and light snow falling around El Paso. Winds gust to 73 mph at St. Augustine Pass with wind gusts near 60 mph reported over east El Paso.



Santa Teresa radar image shows severe thunderstorms moving into the Santa Teresa-El Paso area during the late afternoon of Oct 20.

A winter-like storm brought snow to the Franklin Mountains in El Paso on Oct 29. (Chris Carney NWS/NOAA)

Snow over the Franklin Mountains on Dec 01. (Greg Lundeen NWS/NOAA)

Nov 29-Dec 1: A major winter storm with a deep low pressure system and strong cold front moves slowly across New Mexico and western Texas. The storm initially brings rain showers and isolated thunderstorms with heavy rain before a push of cold air causes the rain to change over to moderate and heavy snows. Over an inch of water falls on some locations during the period. Heaviest snows fall upon the Sacramento Mountains with 10 to 20 inches reported around Cloudcroft. In addition 12 inches of snow fall at Sierra Blanca in Hudspeth County Texas with 3 to 6 inches falling across the El Paso metropolitan area. 1 to 3 inches of snow also fall around Las Cruces and Alamogordo.

Dec 3: A fast moving upper disturbance brings 1 to 3 more inches of snow around El Paso and Las Cruces.

Santa Teresa after the Dec 01 snows.
(Joe Rogash NWS/NOAA

Dec 01 snows brought winter fun for these young Santa Teresa residents. (Joe Rogash NWS/NOAA)

Major Wind Storm Blasts Western Texas and Southern New Mexico

High winds seriously damaged the administrative building at White Sands Missile Range. (Shari Vialpando Las Cruces Sun News)

On December 8 a broad upper-level trough covered the western United States while an embedded and very energetic short wave entered the southern Rockies. The dynamics of the disturbance were enhanced by a pronounced jet stream aloft extending across southern New Mexico. The resultant circulations generated a deep surface low which moved across New Mexico into the Texas panhandle. This pattern induced very strong pressure gradients both at the surface and aloft resulting in a major wind storm and widespread damage over the Borderland during the morning and early afternoon.

Winds gusted to around 100 mph east of Las Cruces at St. Augustine Pass and Aguirre Springs, seriously damaging a large administrative building at White Sands Missile

Trailer blown over at White Sands Missile Range. (Shari Vialpando Las Cruces Sun News)

Wind damage at Cloudcroft NM. (John Fausett NWS/NOAA)

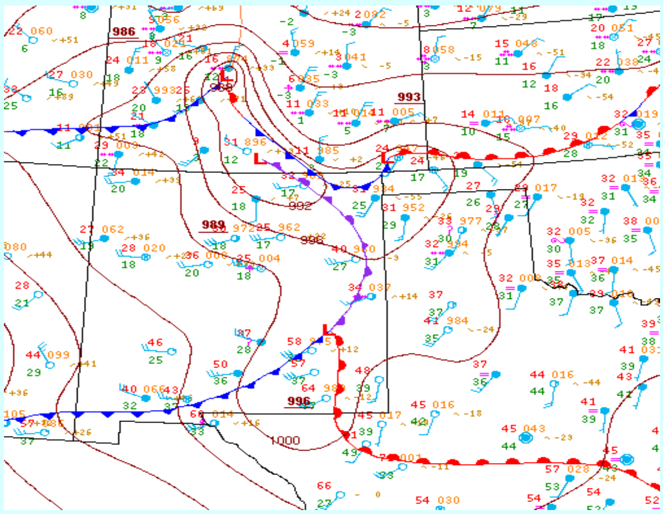
Range where 2 people suffered minor injuries. Further north, wind gusts near 70 mph blew down trees and over a hundred power lines around Cloudcroft and Mescalero, and damaged numerous buildings including the Elderly Day Care Center. Power was knocked out across this area with no electricity available for some persons for at least a week. A state of emergency was thus declared for Cloudcroft.

The El Paso area was hard hit as winds gusted to near 80 mph over eastern portions of the city. The winds blew roofs off of buildings and broke windshields on numerous motor vehicles. Several children suffered minor injuries when the winds shattered windows on a school bus. The winds also collapsed a large awning on Cohen Stadium. Falling rocks and debris forced the closure of Trans Mountain Road and Highway 54 causing traffic jams across the city. Trees and power lines were also blown down around west Texas resulting in electrical outages. Downed power lines even initiated a fire which destroyed a building in Hueco Village. Finally the storm dropped 4 inches of snow over Pinos Altos NM.

Winds damaged the Elderly Day Care Center at Mescalero NM . (Mereya Braden Ruidoso News)

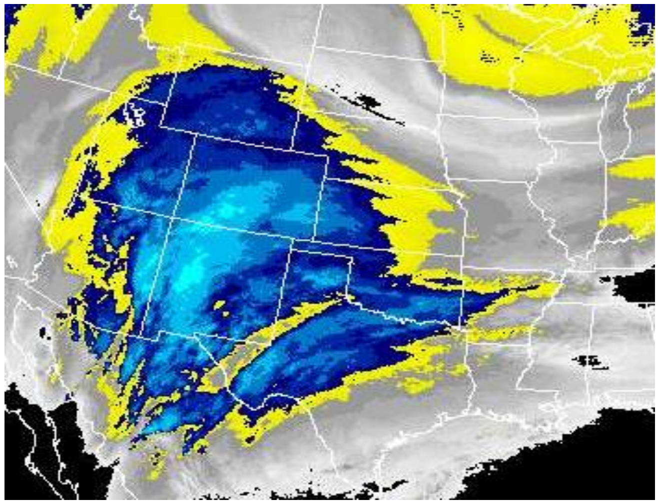
An electrical fire destroyed this building in Hueco Village TX after winds blew down nearby power lines. (Greg Lundeen NWS/NOAA)

Winds blew down this carport in El Paso.
(El Paso Fire Department for the El Paso Times)



Weather map showing the Dec 08 storm system.

Cloudcroft NM on Dec 9. (Mike Hardiman NWS/NOAA)



Satellite image of Jan 28 storm over the southwest.

December 23: Storm brings 9 inches of snow to Cloudcroft while 8 inches of snow fall at Pinos Altos and 4 to 6 inches occur around Silver City.

Dec 29: 1-3 inches of snow fall around El Paso and Las Cruces.

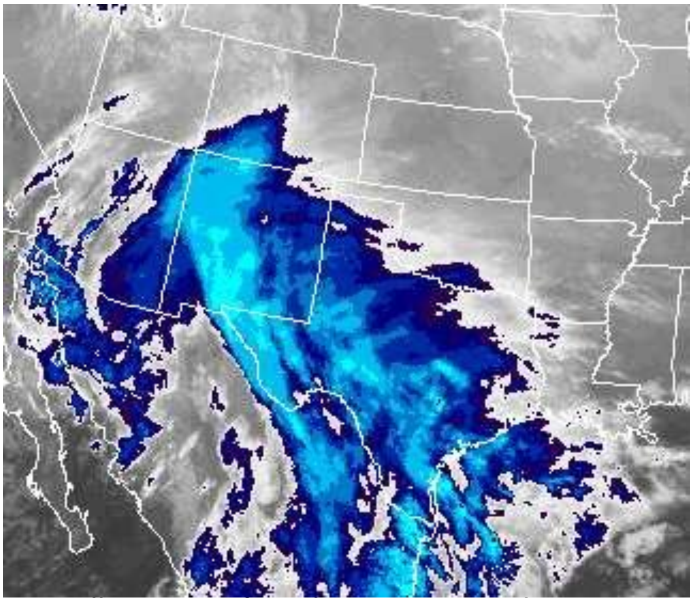
Jan 20: Winds gust to almost 70 mph at St. Augustine Pass with gusts from 50 to 60 mph in the El Paso and Las Cruces areas. 4 inches of snow also fall near Silver City.

Jan 22-23: Winter storm initially brings moderate to heavy rains over southwestern NM, flooding a camp ground near Gila Hot Springs when the Gila River overflows. After cold air pushes into the region, 12 to 24 inches of snow fall around Cloudcroft with 5 to 10 inch snows in the Silver City vicinity.

Jan 27-29: Low pressure system with a cold front drops heavy rains over portions of southern New Mexico and western Texas. 2.5 inches of rain fall at Virden NM with .5 to 1 inch of rain falling most elsewhere.

Cloudcroft experienced more heavy snows on Feb 3-4. (Mike Hardiman NWS/NOAA)

Colder air then moves into the Borderland causing the rain to change over to snow. As a result 6 to 12 inches of snow fall around Cloudcroft with 6 inches falling at Bayard and up to 2 inches falling around El Paso and Deming.



Satellite image of another strong storm hitting the southwestern United States on Feb 3.

Feb 3-4: Winter storm dumps heavy rains over portions of the lowlands and heavy snows over higher mountain areas. Almost 1.5 inches of rain fall over sections of northeast El Paso with around a half inch to an inch of rain most elsewhere. On the mountains over a foot of snow falls around Cloudcroft while in southwestern New Mexico 10 inches of snow fall at Duncan with 8 inches reported at Elk.

Feb 10-11: 4 to 6 inches of snow fall around Cloudcroft.

Feb 22-23: Another 8 to 12 inches of snow fall at Cloudcroft with 5 inches of snow falling near Santa Clara and Silver City. Portions of northeast El Paso also receive an inch of snow.

Cloudcroft after the Feb 3-4 snows. (Mike Hardiman NWS/NOAA)

Feb 28: Winds gust over 60 mph and small hail falls over east El Paso. To the north 6 more inches of snow fall at Cloudcroft.

Mar 8. Ice pellets fall over portions of El Paso.

Mar 10: Winds gust to 66 mph over El Paso.

Mar 26: Major wind storm blows through southern New Mexico and western Texas. Winds gust to 84 mph at El Paso Airport to tie a record. Winds also gust to 115 mph at St. Augustine Pass with gusts to 84 mph at White Sands Space Harbor and 75 mph at White Sands Missile Range Headquarters. Blowing dust lowers visibilities to under a quarter mile over sections of El Paso and around Deming forcing the closure of Highways 180 and 11.

April 1: Another storm brings wind gusts to 96 mph at St. Augustine Pass and gusts around 70 mph over El Paso and White Sands Missile Range. The high winds blow the roof off of a Masonic Lodge at Truth or Consequences.

The Lordsburg Playas after early February heavy rains. (Mike Hardiman NWS/NOAA)

Forest Road 14 in Grant County during early March. By the end of winter the heavy snow accumulations made driving almost impossible across the Gila National Forest. (U.S. Forest Service)

Apr 4: In El Paso 2 boys and a girl (ages 2,5 and 7) suffer serious injuries when the large inflated jumping balloon they are in is picked up by a dust devil and carried up at least 10 feet before crashing to the ground 3 houses away.

Apr 12: A severe thunderstorm drops golf ball-sized hail near Horizon City TX.

April 14: Severe thunderstorms bring torrential rains and golf ball-sized hail to Tornillo TX, collapsing a carport. The heavy rains flood homes and streets and cause an arroyo to overflow.

April 16-17. Heavy rains fall across Sierra County NM as 1 to 2 inches of rain are reported around Truth or Consequences, Winston and Monticello.

April 22: Windy across the region with wind gusts around 60 mph over Deming and El Paso. Thunderstorms with small hail also move through Hurley and Mescalero.

Apr 29: Low pressure system produces wind gusts around 60 to 70 mph including in the El Paso and Las Cruces vicinities.

Blowing dust over Santa Teresa on April 1. (Joe Rogash NWS/NOAA)

3 children were injured in this jumping balloon when it was carried off by a dust devil on April 4. (Jay Koester El Paso Times)

Poppies in bloom on the Franklin Mountains in west El Paso.
(Greg Lundeen NWS/NOAA)

Charlotte Rogash

Charlotte Rogash

Spotters…Please call the National Weather Service If You Observe:

Tornado or Funnel Cloud…Report Time, Location and Movement

Hail…1/2 Inch or Larger

Damaging Winds…Damage To Buildings, Motor Vehicles, Trees, Power Lines And Other Structures

Flash Flooding…Flooding Of Streets and Buildings , Or If Rivers, Streams And Arroyos Flood Or Overflow

Heavy Rains…1/2 Inch of Rain In Less Than 30 Minutes Or At Least 1 Inch Of Rain In Less Than 2 Hours

Blowing Dust…Whenever Blowing Dust Reduces The Visibility To Less Than 2 Miles.

Snow Amounts Greater Than An Inch

Southwest Weather Bulletin

Fall-Winter 2010-2011 Edition
National Weather Service El Paso-Santa Teresa

Warm Dry Late Spring Weather is Followed by Stormy Monsoon Over the Borderland

Westerly winds brought warm mostly dry weather to southern New Mexico and far western Texas in May with a series of upper level troughs causing periods of breezy to windy conditions. But by early June high pressure aloft covered the southern Rockies resulting in hot record high temperatures along with little or no rainfall.

Toward the middle of June however the desert heat low became established over Arizona causing easterly winds which transported moist unstable air into the Borderland. Thus more active weather develops in late June and especially in mid-July when upper-level disturbances generated thunderstorms with heavy rains, hail and damaging winds.

Thunderstorm winds cause severe damage around Gila NM on July 19. (Mike Hardiman NWS/NOAA)

While high pressure aloft resulted in mostly dry weather over the El Paso area in August, it remained rather wet and stormy across southern New Mexico. Then in mid September an upper level low pressure system produced much needed heavy rains around El Paso. In late September high pressure aloft ended the 2010 monsoon with early autumn warm and dry weather through almost all locations.

National Weather Service El Paso/Santa Teresa
Meteorologist-In-Charge – Jesus Haro
Warning Coordination Meteorologist – John Fausett
Science Officer – Val Macblain
Newsletter Editor-Writer/Senior Forecaster – Joe Rogash

Spring-Summer Seasonal Weather Highlights

Heavy rains cause flooding in the Hatch-Rincon NM area on July 11. (Norm Dettlaf Las Cruces Sun News)

May 2: Windy with gusts around 50 mph across the region.

May 10-11: Windy each day with gusts around 50 mph.

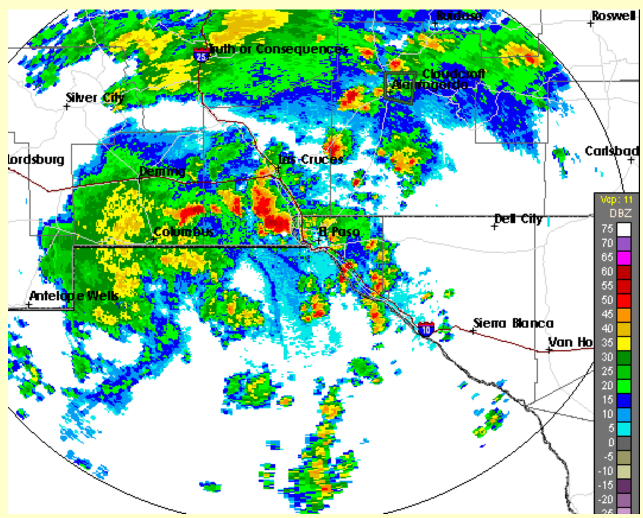
May 26: Severe thunderstorms drop golf ball-size hail at Sierra Blanca TX.

May 27: Thunderstorms bring nickel-size hail to Cloudcroft NM.

June 2010: A hot month across the Borderland with El Paso reaching at least 100 degrees on 14 days. Two heat-related deaths are reported.

June 5: El Paso hits 106 to set a record high temperature for the day.

June 6: Another hot day as El Paso's temperature soars to 110 degrees to set a new record. The intense heat also generates severe thunderstorms across the region.



Radar image showing flood-producing thunderstorms during the afternoon of July 11.

Thunderstorm winds gust to 84 mph at El Paso causing 4 soldiers to become injured when their field tent collapses. Strong thunderstorms with heavy rains and hail also move across Otero and Hudspeth Counties.

June 7: Thunderstorms produce wind gusts near 50 mph around El Paso, Las Cruces and Truth or Consequences.

Thunderstorms with heavy rains flood portions of west El Paso on July 24. (Vanessa Monsisvais El Paso Times)

June 24: Severe thunderstorms produce wind gusts to 60 mph over El Paso while dime-size hail falls at Lake Roberts NM.

June 28: Thunderstorms dump heavy rains over El Paso with water rescues required after roads become flooded. In addition winds gust over 60 mph across portions of the city. Widespread thunderstorms also cause heavy rains over much of southern New Mexico.

July 2: Thunderstorms drop almost an inch of rain at Williamsburg NM.

July 10: An inch of rain falls just north of Silver City.

July 11: A deep southerly flow transports abundant moisture into the area while an upper level disturbance enters from the west. This weather pattern generates showers and thunderstorms with torrential rains from late morning through the evening. Over 4 inches of rain fall near Anthony TX with 2 to 3 inches around Santa Teresa and west El Paso. High water floods West Canal Road Bridge in Hatch. In the Radium Springs and Rincon area floodwaters push cars off the road near Highway 187 and Santiago Peak Road.

West El Paso after July 24 heavy rains. (Vanessa Monsisvais El Paso Times)

Strong thunderstorms with heavy rains near Las Cruces on July 24. (Jeff Passner)

Destructive Microburst Strikes Gila New Mexico

Trailer destroyed by high winds. (Mike Hardiman NWS/NOAA)

Winds also destroy a pole barn. (Mike Hardiman)

During the afternoon of July 19 a severe thunderstorm hits Gila New Mexico, producing extreme damaging wind gusts along with small hail and heavy rains. The greatest damage was along a one mile-long swath where wind speeds reached almost 90 mph.

On the south side of Gila the winds overturned and destroyed a new trailer while another mobile home suffered significant damage when the roof was blown off.

A large pole barn was destroyed and damage occurred to other buildings and property in the vicinity. In addition the winds uprooted a pine tree and flattened vegetation.

Pine tree blown down. (Mike Hardiman NWS/NOAA)

Gila NM property damage. (Loretta Brown)

July 12: Heavy rains and flooding force a truck into a creek near Cliff NM in Grant County.

July 14: An inch of rain falls in only 20 minutes at 16 Springs NM in northeast Otero County.

July 15: Severe thunderstorms drop one inch-diameter hail near Las Cruces while 1.25 inches of rain fall in 40 minutes north of Silver City.

July 20: Heavy rains and small hail fall over Silver City with lightning strikes causing power outages across the area.

July 21: Severe thunderstorms with heavy rains move across Luna and Grant Counties. Wind gusts of 60 mph damage a hangar at Columbus Airport while rains flood portions of Highway 11. In addition almost 2 inches of rain flood rural areas near Deming. In Grant County a drainage ditch overflows and floods a street in Hurley and about 2 inches of rain are measured at Buckhorn.

During the evening and early morning hours of July 25-26 torrential rains flood potions of Las Cruces. (Diana Alba Las Cruces Sun News)

Thunderstorms with heavy rains in the Las Cruces area on July 25. (Jeff Passner)

Thunderstorms with heavy rains move over west El Paso on July 31. (Joe Rogash NWS/NOAA)

July 22: Two inches of rain fall near Radium Springs in Dona Ana County causing rural flooding.

July 23: Thunderstorms with heavy rains and small hail flood buildings in downtown Hatch NM. Street flooding is also reported over Deming and across Highway 187 near Kingston and Caballo State Park.

July 24. Thunderstorms produce almost 2 inches of rain in less than an hour over portions of west El Paso flooding several areas. The floodwaters also damage the historic Rosa's Cantina restaurant.

July 25-26: Evening and early morning showers and thunderstorms dump torrential rains across the Las Cruces area. New Mexico State University records a record 3.36 inches of water with numerous buildings, homes and streets flooded around Las Cruces, Mesilla and Dona Ana. Floodwaters

Thunderstorm with heavy rains fall around Las Cruces on July 31. (Jeff Passner)

damage at least 6 buildings at NMSU. Several water rescues occur when vehicles stall on flooded roads.

Further north in Sierra County, heavy rains flood streets and buildings around Truth or Consequences and Poverty Creek, where 1.3 inches of rain fall in an hour. Finally 1.3 inches of rain are measured near Silver City.

July 28: Showers and thunderstorms drop 2 inches of rain over McGregor Range in southwestern Otero County.

July 29: Showers and thunderstorms with torrential rains move across portions of the Borderland. 1.5 inches of rain fall in 30 minutes 6 miles north of Silver City. Flooding also occurs across Highway 11 north of Columbus. Minor street flooding is reported around Mimbres and Deming. In west Texas, roads and canals flood in the Fort Hancock vicinity.

July 30: Heavy rains fall over Hudspeth County with 1 to 2 inches of rainfall flooding roads around Dell City.

July 31: Showers and thunderstorms produce over an inch of rain around Las Cruces and Silver City. 12.21 inches of rain is also recorded for the month at Cloudcroft NM which is double their July average.

August 1: Heavy rains and flooding damage Forest Road 150 at Rocky Canyon in the Gila National Forest.

August 4: An inch of rain falls in 20 minutes at Poverty Creek. Heavy rains also cause minor flooding at Mimbres.

August 12: A severe thunderstorm produces wind gusts to 65 mph at Las Cruces with heavy rains and small hail also occurring over portions of El Paso and near Silver City.

August 13: Severe thunderstorms strike the Fabens TX area. High winds blow down 4 light poles with hail also reported.

Large hail falls over Animas NM on August 15. (Shannon Lasher)

On August 24 thunderstorms drop heavy rains across Dona Ana County. (Daniel Vasquez)

August 15: Nickel-size hail and minor wind damage occur near Animas NM when evening severe thunderstorms move across Hidalgo County.

August 16: Showers and thunderstorms deluge Grant County. Three inches of rain fall 5 miles west of Silver City with 1 to 2 inches elsewhere in the vicinity. Several streets are closed in Silver City due to flooding.

Severe thunderstorm developing over El Paso on September 15. (Dave Novlan NWS/NOAA)

This thunderstorm produces large hail over El Paso on September 15. (Lance Tripoli NWS/NOAA)

August 18: 1.5 inches of rain fall in an hour at Radium Springs.

August 23: Heavy rains flood Highway 13 near Mayhill NM while penny-size hail falls over El Paso TX.

August 24: Thunderstorms dump 2 inches of rain near Radium Springs flooding streets while almost an inch of rain falls in 30 minutes at Dona Ana. Further north heavy rains cause rock slides near Alamogordo.

August 27: Almost an inch of rain falls in an hour at San Lorenzo NM.

August 30 : Thunderstorms drop almost an inch of rain over Las Cruces.

September 13: Showers and thunderstorms with heavy rains strike portions of Dona Ana and El Paso Counties. Some streets flood in El Paso while over an inch of rain falls at La Mesa.

September 15: Severe thunderstorms with quarter-size hail and heavy rains hit east El Paso. Two families are forced out of their homes after the roofs collapse.

September 21: Over an inch of rain falls near Dona Ana NM.

September 22-23: Portions of east El Paso flood as up to 2 inches of rain fall. A woman is rescued after floodwaters sweep her car from the road.

Flooding over El Paso after the heavy rains of September 13. (Mark Lambie El Paso Times)

September 22-23 heavy rains flood portions of east El Paso. (Vanessa Monsisvais El Paso Times)

Cactus flowers in bloom at Santa Teresa. (Charlotte Rogash)

Sunrise over Santa Teresa. (Greg Lundeen NWS/NOAA)

Spotters…Please call the National Weather Service If You Observe:

Tornado or Funnel Cloud…Report Time, Location and Movement

Hail…1/2 Inch or Larger

Damaging Winds…Damage To Buildings, Motor Vehicles, Trees, Power Lines And Other Structures

Flash Flooding…Flooding Of Streets and Buildings , Or If Rivers, Streams And Arroyos Flood Or Overflow

Heavy Rains…1/2 Inch of Rain In Less Than 30 Minutes Or At Least 1 Inch Of Rain In Less Than 2 Hours

Blowing Dust…Whenever Blowing Dust Reduces The Visibility To Less Than 2 Miles.

Snow Amounts Greater Than An Inch

Southwest Weather Bulletin

Spring-Summer 2011 Edition

National Weather Service El Paso/Santa Teresa

La Nina Brings Severe Drought, Extreme Cold and Record Warmth to the Borderland

An extensive La Nina was present over the eastern Pacific with ocean temperatures cooler than normal from late autumn through the winter and early spring. As a result the circulation pattern over the western United States was dominated by high pressure and westerly winds. Consequently after a severe weather outbreak in October, extremely dry weather developed across the Borderland. From October 21 2010 through April 30 2011, El Paso and other locations experienced only 3 days of measurable precipitation with most of the region getting less than 10 percent of normal rainfall. Thus severe drought conditions existed by the middle of April causing a high to extreme wildfire danger.

The most significant weather event of the winter was a historic outbreak or Arctic air which brought extremely cold temperatures and blizzard conditions to the Borderland in early February, virtually paralyzing the area for several days. But despite this period of unusual cold, overall temperatures were near normal for the November 2010 to February 2011 period.

This severe thunderstorm produced large hail and high winds over Otero County on October 20.
(Joe Rogash NWS/NOAA)

Persistent west to southwest winds combined with upper level disturbances to bring very warm, dry and occasionally windy early spring conditions with both March and April 2011 the warmest and driest on record for El Paso and most other locations.

National Weather Service El Paso/Santa Teresa
Meteorologist-In-Charge – Jesse Haro
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Seasonal Weather Highlights

Funnel cloud over Otero County on October 20. (Jeff Passner)

October 4: Thunderstorms produce heavy rains and small hail across the region. Almost an inch of rain falls over portions of Las Cruces while streets flood around Deming.

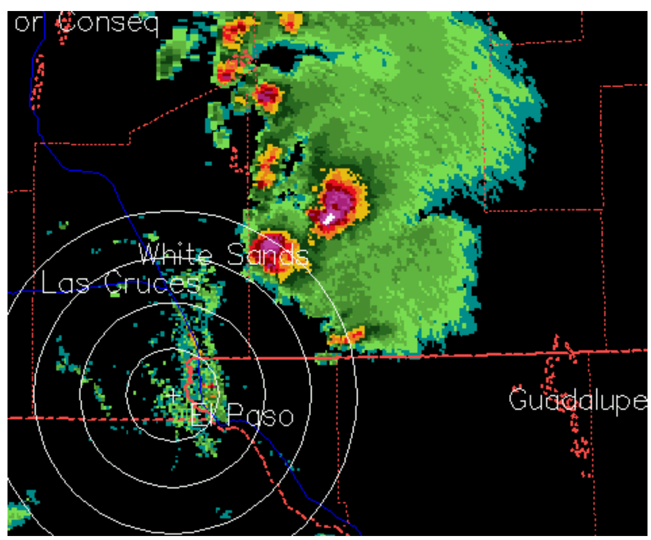
October 20: Late afternoon and evening severe supercell thunderstorms hammer portions of Otero and El Paso Counties. Baseball-sized hail smashes a vehicle north of Orogrande while one inch-diameter hail falls over El Paso. Winds gust to 66 mph hour at White Sands Missile Range. 1 to 2 inches of rain also fall around portions of Otero County.

October 25: Windy across the area with gusts around 50 mph.

November 28-29: Windy across the region as wind gusts are measured to 66 mph over east El Paso with gusts from 40 to 50 mph most elsewhere. A strong cold front also lowers temperatures around 20 degrees on the 29th.

December 30: A powerful low pressure system with a strong cold front moves across the southern Rockies bringing stormy weather conditions. Winds gust above 70 mph over portions of east El Paso and Dripping Springs near Las Cruces with 50-60 mph gusts most elsewhere. After the cold front passes during the morning, temperatures fall

This thunderstorm produced heavy rains and small hail over Las Cruces on October 4. (Jeff Passner)



Oct 20 Santa Teresa radar image of late afternoon severe thunderstorms over Otero County NM.

Wind gusts around 50 mph damaged this building in El Paso on October 25. (Victor Calzada /El Paso Times)

Silver City during the Dec 30 snowstorm. (Terrance Vestal/Silver City Sun News)

rapidly to near or below freezing with snow developing. The snow and high winds create blizzard conditions through the afternoon and evening. The snow was especially heavy over Grant County as 7 to 14 inches fall around Silver City while 9 to 12 inches of snow are reported in the Pinos Altos area. Elsewhere 6 inches of snow fall in the Cloudcroft vicinity with 1 to 3 inches around El Paso and Las Cruces.

January 2011: Extremely dry with most of the lower elevations receiving no measurable precipitation for the month.

Lake Roberts after the Dec 30 snowstorm. (Greg Lundeen NWS/NOAA)

Gila Wilderness after the Dec 30 heavy snows. (Greg Lundeen NWS/NOAA)

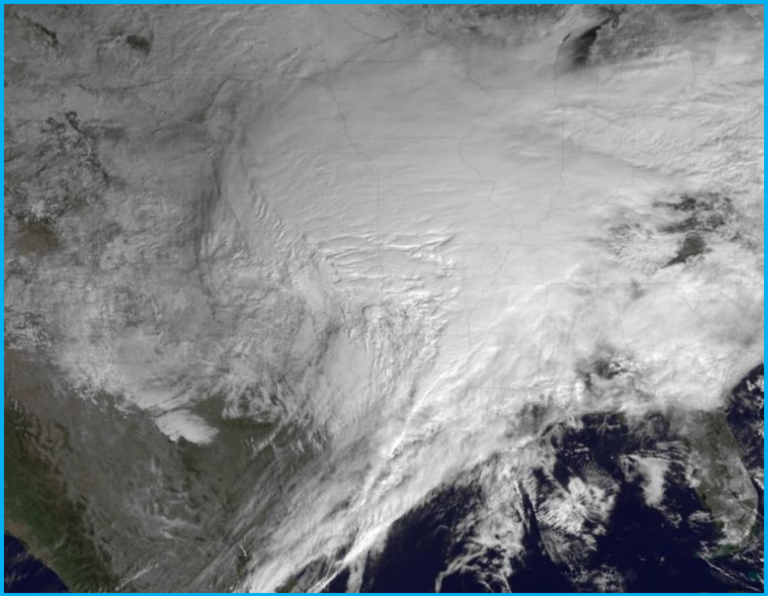
Cloudcroft on Dec 31. (CloudcroftWebcam.com)

HISTORIC ARCTIC BLAST FREEZES THE BORDERLAND

Feb 2 blizzard conditions caused numerous traffic accidents around the El Paso area. (Rudy Gutierrez/El Paso Times)

Beginning on January 31 and continuing into early February 2011, a historic winter storm slammed most of the United States from the Rocky Mountains to the east coast with an associated blast of Arctic air plunging southward into the southwest. The initial surge of frigid air first penetrated southern New Mexico and far western Texas on Feb 1 with extremely cold air covering the entire area and much of Arizona by Feb 2. Concurrently an upper-level trough moved eastward across the southern Rockies, producing areas of moderate and heavy snow, especially over northern Otero County. Total snow amounts were around 6-12 inches in the Alamogordo and Cloudcroft areas with 9 inches falling near Tyrone in Grant county. Elsewhere 2 to 5 inch snowfalls were common.

By the morning of Feb 2, the combination of frigid temperatures and near blizzard conditions virtually paralyzed El Paso, Las Cruces and other towns across the Borderland with offices, schools and businesses shut down. The snow and blowing snow also caused numerous traffic accidents from icy roads and low visibilities.



Visible satellite image of the historic February 2011 winter storm.

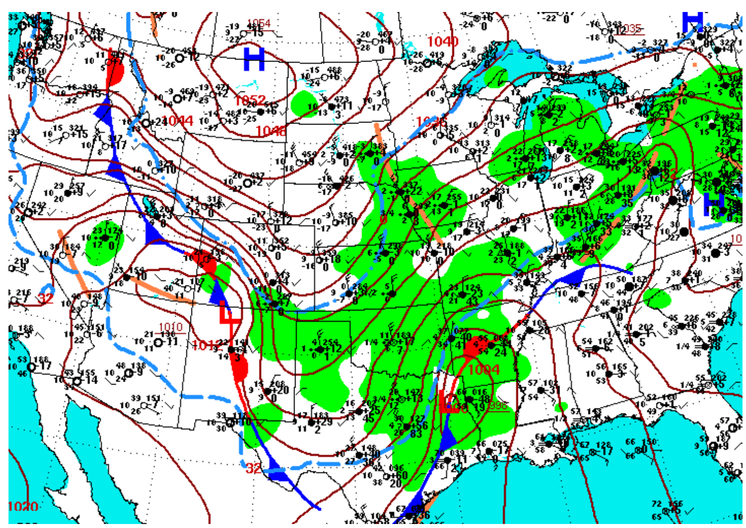
El Paso set an all-time record low maximum temperature with a high of only 15 degrees. Elsewhere afternoon temperatures generally ranged from 10 to 20 across the deserts while in the mountains Cloudcroft remained extremely chilly with a high of only -1. Temperatures continued to plunge after sunset with readings bitterly cold by sunrise. Over the lowlands Feb 3 morning lows included -13 for Alamogordo, -9 for Silver City, and -5 for both Santa Teresa and Truth or Consequences. Temperatures across El Paso were near 0. Along the mountains temperatures were especially frigid with a low of -30 at the Inn of the Mountain Gods near Mescalero and around -20 in the Cloudcroft vicinity. Again most offices, schools, and businesses were closed on Feb 3 as daytime highs were only around 10 to 20.

El Paso resident dressed for the extreme cold on Feb 3. (Mark Lambie /El Paso Times)

Feb 2 weather related traffic accident near Las Cruces. (Norm Dettlaff/Las Cruces Sun News)

In addition to the unusually severe winter weather conditions, residents across New Mexico and far western Texas had to contend with a loss of utilities. The extreme cold resulted in generator failures, equipment malfunctions, and fuel shortages. Thus electrical outages and rolling blackouts were common, especially around the El Paso and Las Cruces areas where thousands of people experienced a loss of electricity for periods lasting up to an hour. At least 1200 people also lost heat due to insufficient pressure in natural gas lines. With temperatures remaining well below freezing, numerous water pipes burst around El Paso and other locations causing streets to become flooded and icy. Many residents went without water due to broken pipes and shut-downs at pumping stations.

By the afternoon of February 4 temperatures finally climbed to near or a little above freezing across the lowlands and high temperatures rose into the 50s the following day. For the cold air outbreak period, Alamogordo went 103 consecutive hours at or below freezing with El Paso experiencing freezing temperatures 78 continuous hours. The prolonged exposure to cold air destroyed numerous palm trees and other vegetation.



Weather map for 6 AM Feb 1, 2011 showing the push of frigid Arctic air into New Mexico and far western Texas.

Weather Highlights Continued

Prolonged warm dry weather contributed to this wild fire near Silver City on March 7. (Kalen Severe/Silver City Sun-News)

February 16: Record heat across the area as El Paso reaches a high temperature of 80 with readings around 75 to 80 through most of the lowlands.

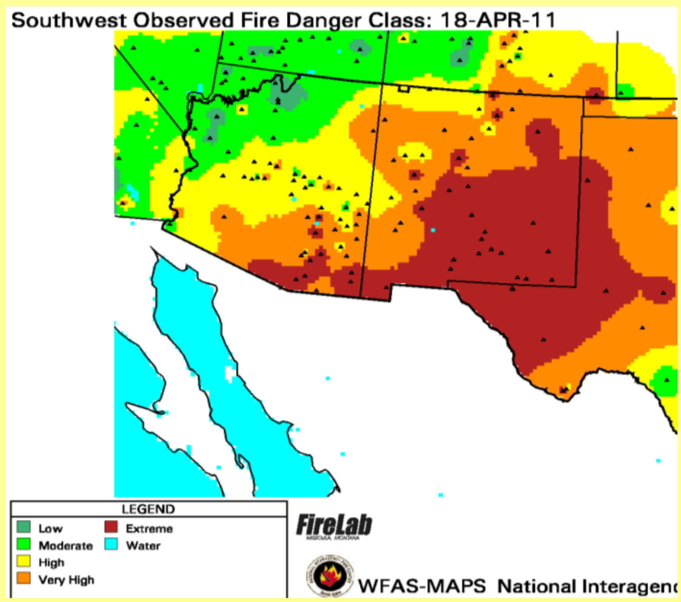
March 2011: An unusually warm and dry March across southern New Mexico and western Texas. For El Paso it was the warmest March on record with the average temperature 63.2 F which is 7.3 degrees above normal. Most of the region also had no measurable precipitation for the month.

March 7: Windy across the area with wind gusts to 70 mph over east El Paso and gusts around 50 mph elsewhere.

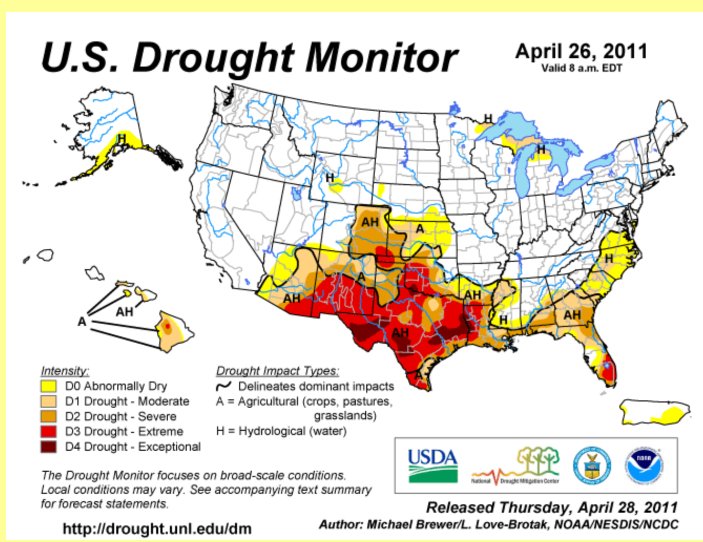
April 2011: Warmest and driest April on record for El Paso and other locations with no precipitation falling across the region.

April 2: Hot day with record heat. El Paso, sets a record by reaching 91 degrees with record high temperatures also occurring at Las Cruces (92), Deming (91), Truth or Consequences (90), Alamogordo (90), Silver City (82) and Cloudcroft (71).

April 3: Windy with blowing dust over the region. Winds gust to 79 mph at St. Augustine Pass in Dona Ana County with gusts around 50 to 60 mph elsewhere.



By mid April 2011 the fire danger was extreme across much of the area.



Extreme drought conditions develop in the spring.

Unusually dry conditions, above normal temperatures and occasionally strong winds contributed to a large wild fire which burned over 10,000 acres around Ruidoso NM in early April. (Harold Oakes Ruidoso News)

April 9: A deep low pressure system causes very strong winds across the Borderland with widespread blowing dust. On the higher elevations winds gust to 88 mph at Salinas Peak with gusts to 75 mph at San Augustine Pass. Over the lowlands winds gust around 60 to 70 mph over portions of northeast El Paso, and around Las Cruces, Silver City, Deming, White Sands Missile Range and Rodeo NM with gusts at least 50 mph most elsewhere. Blowing dust reduces visibilities to a quarter mile around Deming forcing the closure U.S. Highways 180, 11, and 26.

On April 26 high winds produced blowing dust and low visibilities over Santa Teresa NM and surrounding location. (John Fausett NWS/NOAA)

April 26: Very windy with gusts to 75 mph at McGregor Range in southern Otero County and gusts to 71 mph at El Paso Airport. Elsewhere wind gusts from 50 to 60 mph are common. Blowing dust is widespread with Highways 11 and 180 closed near Deming due to low visibilities.

April 29-30: Windy with gusts around 50 mph each afternoon along with a few areas of blowing dust.

Floods and Flash Floods

Although the southwestern United States is known for having a sunny dry climate, during the late spring and summer thunderstorms with heavy rains can develop across southern New Mexico and far western Texas. This is due to circulation changes taking place across the region. Usually in late June or early July the prevailing dry westerly flow retreats northward while a broad area of low pressure develops at the surface over western Arizona, southern California and northwestern Mexico. This feature, often referred to as a "***desert heat low***" , pulls moisture from the Gulf of Mexico and/or Gulf of California into the area. The inflow of moisture can combine with very warm surface temperatures to generate showers and thunderstorms.

By definition a flash flood is produced by heavy rains falling within a 6 hour period. So while floods can occur any time of the year, a study of flash floods across southern New Mexico and far western Texas reveals they are most frequent from the latter part of June through the middle of September. Most flash floods also occur during the late afternoon and evening hours, typically from 3 PM to midnight. However flash floods can still happen at any time of the day; for example the historic floods that inundated El Paso on August 1, 2006 mostly resulted from heavy rains falling between 5 AM and noon.

In most instances floods develop when and where there are abundant and above normal amounts of water vapor in both the lower and middle levels of the atmosphere. Surface dewpoints are typically in the 50's or even 60's during flash flood occurrences indicating a very humid air mass. Another factor conducive for heavy rains is weak wind speeds aloft; when cloud layer winds speeds are relatively light, thunderstorms will often move slowly allowing them to dump large amounts of rain over a given location.

Heavy rains caused flooding and evacuations across much of the El Paso area during the summer of 2006. (Victor Calzada/El Paso Times)

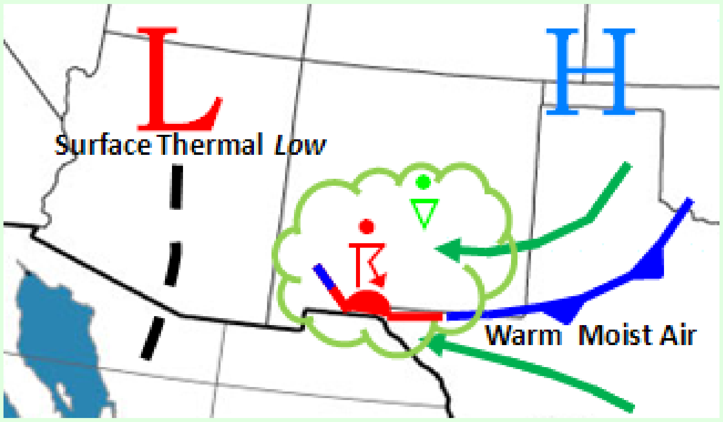
Water rescue in Canutillo during the 2006 floods.

Certain atmospheric circulation patterns are also more favorable for heavy rainfall. One particular pattern includes a cold front moving slowly into the region from the north or northeast before becoming stationary along the western mountains and Mexican border. East or southeast winds just behind or along the front will typically transport moist air into the Borderland so that lifting along the front or over the mountains will act to generate thunderstorms with heavy rains. On August 19, 1978 over 10 inches of rain fell at White Sands Missile Range near the mountains and along a slow moving cold front.

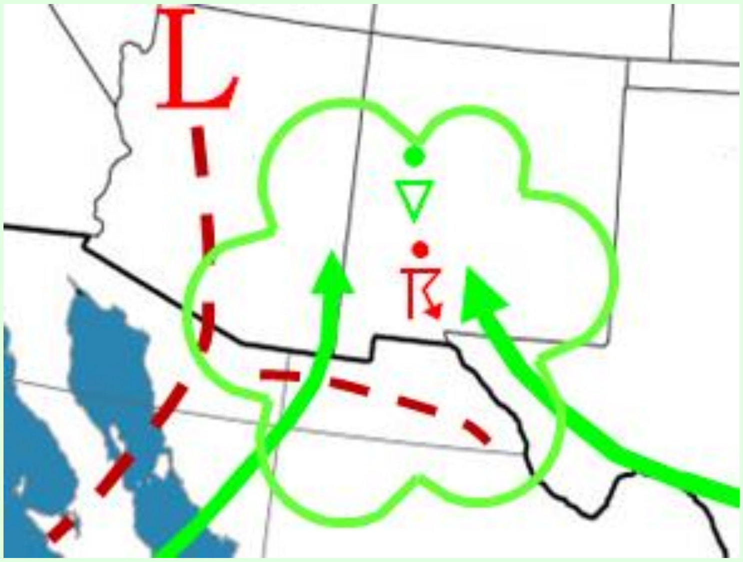
Another pattern associated with southern New Mexico and far western Texas flash floods includes a slow moving trough of low pressure drifting eastward across the southwestern United States. This pattern induces a deep southerly flow with copious amounts of tropical moisture streaming into the Borderland. Thunderstorms often develop and move repeatedly over a localized area when weak disturbances aloft move northward out of Mexico into the region. Much of the flooding occurring in 2006 was the result of low pressure aloft being located over the area.

Finally the remnants of hurricanes and tropical storms from either the eastern Pacific or the Gulf of Mexico can produce heavy rainfall. In September 2006, moisture from Hurricane John brought up to 7 inches of rain to the El Paso vicinity. In July 2008, Hurricane Dolly's circulation center moved northward over the area causing flooding rains and water damage from El Paso to Ruidoso NM.

The Santa Teresa- El Paso National Weather Service Forecast Office closely monitors atmospheric conditions to determine the flood threat across far western Texas and southwestern and south central New Mexico. When the environment is determined to be favorable for heavy rains and possible flooding within the next 12 to 36 hours or more, a ***Flood Watch*** is issued. When heavy rains are falling and flooding is imminent or occurring, the Weather Service will put out a ***Flood Warning***. Thus it is especially important for persons to get the latest weather forecast from NOAA Weather Radio or local media, especially if they are in areas susceptible to flooding.



A favorable weather pattern for flash floods over the Borderland includes warm moist unstable air from the east flowing along a slow moving or stationary surface front.



Floods often occur over southern New Mexico, western Texas and eastern Arizona when an approaching low pressure system to the west pulls moist unstable air from the Gulf of Mexico and Gulf of California into the region.

Summer 2006 flooding at San Vicinte NM.

Tornadoes...They *CAN* and *DO* Happen Over the Borderland

In May 2007 this tornado moved across White Sands Missile Range for almost an hour. (Miriam Rodriguez)

This tornado moved across Luna County near Deming in October 2006. (Nick Margentina)

September 2006 tornado just west of Las Cruces. (Brandon Quinones)

Compared to the central and southeastern United States, tornadoes are relatively infrequent across southwestern and south central New Mexico and far western Texas. Only a few tornadoes are reported in the region each year and most Borderland tornadoes are short-lived, small and weak, typically lasting less than 5 minutes and having diameters under a 100 yards and wind speeds below 100 mph. Nevertheless over the past decade photographic evidence, radar data, and spotter reports suggest that tornado occurrences may be increasing across the area.

Stronger and more damaging tornadoes typically develop within a moderately to highly unstable air mass which includes warm moist air at low levels and cool dry conditions aloft. Another important ingredient for strong tornadoes is an environment where wind speeds increase and wind directions change with height. This allows the thunderstorm updrafts to interact with the environmental winds and induce the rotation necessary for tornadoes. Most thunderstorms producing stronger tornadoes occur ahead of a trough of low pressure aloft with tornado generation often ensuing when thunderstorms move along thermal boundaries such as stationary fronts or outflows.

In September 2006, a powerful supercell thunderstorm moving eastward along Interstate 10 produced a tornado just west of Las Cruces. In October 2006, radar wind and reflectivity data plus photographic evidence indicated a potentially destructive tornado developed in Luna County near Deming. In May 2007 a tornado up to 500 yards wide was on the ground for almost an hour as it tracked across White Sands Missile Range. In each case there were no injuries or significant damage because the tornado stayed in open desert away from populated areas. But these storms illustrate that the tornado danger is genuine across the Borderland.

The National Weather Service will issue a ***TORNADO WATCH*** for an area and time where strong and violent tornadoes are possible. A ***TORNADO WARNING*** is issued if it is determined a tornado is occurring or will likely develop within about 20 minutes in a specified area. Persons travelling should also remember that during the spring, the risk of destructive tornadoes greatly increases east of the Rockies in such areas as central and eastern Texas, Oklahoma, Kansas and even far eastern sections of New Mexico.

Borderland Hail Storms

During recent years evidence suggests large hail storms are becoming more common across the Borderland. Since 2004 there have been at least 32 thunderstorms which produced hail the size of golf balls or greater over south central and southwestern New Mexico and far western Texas. On September 16 2010, the mostly costly hailstorm ever to strike El Paso occurred when a supercell thunderstorm dropped tennis ball-sized hail on portions of the city, damaging buildings and motor vehicles. Damage for the storm was estimated at 150 million dollars. On September 13, 2006 golf ball-sized hail driven by strong winds damaged roofs and automobiles around Las Cruces. On May 28, 2008 golf ball to baseball-sized hail driven by high winds damaged over 500 homes in the Tularosa NM area.

Large hail is frequently produced within strong thunderstorm updrafts which occur where the air mass is rather unstable with warm temperatures and abundant moisture at low levels and cool dry conditions aloft. When the air mass is buoyant and subject to lift, updrafts with speeds in excess of 50 mph can rise to levels above 50,000 feet where the air is well below freezing. This results in the creation of supercooled water droplets and ice particles which subsequently interact and collide with one another to ultimately create larger hailstones. Low freezing levels are also important. If the freezing level is too high then even larger hail which forms aloft will melt before striking the ground. Rotating thunderstorms or supercells, which usually form in strong vertical wind shear, are especially conducive for the formation of large hail.

Large hail can fall any time across the borderland but is most common during the months of May, September and October. When weather radar or weather spotters provide information that hail at least one inch in diameter is falling, the National Weather Service will issue a Severe Thunderstorm Warning for the affected area.

Tennis ball-sized hail caused widespread damage across El Paso in September 2009. (El Paso Times)

Large hail shattered windows at Tularosa in May 2008. (Karen Reyes)

This supercell thunderstorm dropped damaging egg-sized hail over Chaparall NM in April 2004. (Greg Lundeen NWS/NOAA)

By mid February, the lack of precipitation caused portions of the Rio Grande in El Paso to become completely dry. (Joe Rogash NWS/NOAA)

Spotters…Please call the National Weather Service If You Observe:

Tornado or Funnel Cloud…Report Time, Location and Movement

Hail…1/2 Inch or Larger

Damaging Winds…Damage To Buildings, Motor Vehicles, Trees, Power Lines And Other Structures

Flash Flooding…Flooding Of Streets and Buildings , Or If Rivers, Streams And Arroyos Flood Or Overflow

Heavy Rains…1/2 Inch of Rain In Less Than 30 Minutes Or At Least 1 Inch Of Rain In Less Than 2 Hours

Blowing Dust…Whenever Blowing Dust Reduces The Visibility To Less Than 2 Miles

APPENDIX F

Public Notice, Public Comments and NMED Responses

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 2010. This document demonstrates to the U.S. Environmental Protection Agency that 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 the federal standard 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 standard for particulate matter is protective of public health.

The New Mexico Environment Department is seeking public comment on the draft document. 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.

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Public Comment:

Thanks for this. I wonder what they do in Arizona when those huge dust storms arise?

NMED Response:

Air Quality management and planning agencies in Arizona have to do a similar demonstration to exclude data from attainment/nonattainment determinations. The level and depth of evidence submitted to EPA depends on the severity of event and the area's attainment status. For instance, Maricopa County is nonattainment for PM_{10} and they are required to conduct a more in depth source and controls analysis when dust storm occur. A copy of this demonstration and EPA's response can be found on the internet at www.epa.gov/ttn/analysis/exevents.htm. Please note that a submission of a demonstration does not automatically exclude the affected data. EPA has to concur with the demonstration and exclude the data in a final regulatory decision of attainment.

Public Comment:

The Environmental Department's draft on the causes of particulate matter in the air is certainly interesting. Indeed, high winds do cause dust to be in the air, especially if dust and particulate matter is available to be blown about by the wind. I would speculate that if high winds were blowing in an environment of cement and asphalt, there would be no particulate matter in the air, certainly no dust. It doesn't take a stretch of the imagination to envision high winds picking up available dust and putting it in the air. I guess there is a good case for anyone to scrape the crust off the desert soil and then say that the wind is at fault for picking up the loose sand and dust and putting it in the air.   This reminds me of circular reasoning, but then what would I know, I just see dust, breath dust, and sweep dust, and mostly in an area where there is dust on the ground to begin with. Hurray for the developers, they win again.

NMED Response:

This commenter speaks to ineffective dust control ordinances as the cause of exceedances in Luna and Doña Ana Counties. NMED acknowledges that anthropogenic sources of dust exist in Doña Ana and Luna Counties with the potential to contribute to exceedances of the NAAQS. However, NMED maintains that the days in question are exceptional events driven by high winds and emissions from natural sources.

Wind speeds as low as 4-7 m/s can cause windblown dust emissions of fine to medium sand in dune-covered areas (COMET, 2010). EPA uses 11.2 m/s (~25 mph) as the threshold wind speed that will cause windblown dust from a reasonably controlled source. Wind speeds of 18 m/s (~40 mph) provide enough energy to cause windblown dust from natural sources with well-developed desert pavement and from the best controlled anthropogenic sources (Countess Environmental, 2006; COMET, 2010). All of the exceedances in 2010 occurred on days when hourly average wind speeds exceeded 11.2 m/s with wind gusts above 18 m/s.

The most recent effort to quantify emissions from various sources in Doña Ana County indicates that development and construction contribute approximately 295 tons/year of PM_{10} emissions in the county. The biggest contributor identified in this emission inventory was wind erosion with approximately 49, 242 tons/year of PM_{10} emissions (See section 2.7). This represents two orders of magnitude greater than emissions from development and construction. In other words, construction and development emissions are only 0.5% of the total PM_{10} emissions in Doña Ana County.

Currently, NMED is unable to quantify the amount of emissions from each source for any given event. In order to address this lack of information, the department is initiating a GIS based particulate matter emission inventory of the border area to include Doña Ana, Luna, Grant and Hidalgo Counties in New Mexico and the state of Chihuahua in Mexico. This project will attempt to identify soil characteristics, land use and vegetative cover to develop emission factors and identify large active dust sources. A GIS database will be developed from this information and will be used to estimate annual emissions as well as event specific emissions.

The City of Las Cruces convened an ad-hoc committee in 2011 to study the need to modify their dust control ordinance. The ad-hoc committee comprised various city departments, academia, the regulated community, citizens and NMED that worked to modify the ordinance to address programmatic deficiencies and the concerns of the public. Based on this effort, the committee drafted a report to the city council outlining common themes and areas in need of improvement. Based on this report, city staff drafted a revised ordinance that incorporated the ideas generated by the ad-hoc committee. The city council approved the revised ordinance in 2012 and NMED will discuss these efforts in detail in the 2011 and 2012 demonstrations.

Based on available PM_{10} emissions data and back trajectory model runs, NMED infers that emissions from wind erosion are the largest contributor to exceedances, far outweighing any anthropogenic contribution. Furthermore, the emissions from all sources were not reasonably controllable or preventable due to high-speed winds that caused natural source emissions and overwhelmed any human attempts to control emissions.

Public Comment:

After some difficulty I was able to download the electronic version of the New Mexico Environment Department's Draft Exceptional Event Demonstration for 2010 which I have attached for persons copied on this e-mail. These individuals have been interested in the dust problem we have in Las Cruces.   Although your document purportedly demonstrates to the EPA that " dust storms generated by high winds, rather than man-made sources, caused exceedances of the national standard for particulate matter in the air," the findings of American Lung Association in its State of the Air 2012 report relate more to the actual lived experience of persons residing in Las Cruces and Dona Ana County. (See attached report.)   The Association's "Short-term Particle Pollution Data Analysis" was derived from EPA data for 2008, 2009, and 2010 and ranked Las Cruces as 16th among "25 U.S. Cities Most Polluted by Short-term Particle Pollution (24-hour PM2.5) and Dona Ana County as 21st among "25 Counties Most Polluted by Short-term Particle Pollution (24-hour PM2.5)" The report estimated that out of a population of 209,233 persons in the area, 77,646 persons had been diagnosed with asthma, chronic bronchitis, emphysema, and cardio-vascular disease--all of whom were deemed to be people at risk from dust pollution.

Also of interest were the Association's findings regarding 78 cities deemed to be the "Cleanest U.S. Cities for Short-term Particle Pollution (24-hour PM2.5). Albuquerque, Farmington, Santa Fe-Espanola all made it on the "Cleanest" list. Four cities in Arizona were also cited as among the "cleanest": Flagstaff, Prescott, Tucson, and Yuma. The latter two cities have desert environments and winds comparable to those of Las Cruces and Dona Ana County.

An estimated 38% of the people living in Las Cruces and Dona Ana County are negatively impacted by so-called fugitive dust. Because Las Cruces and Dona Ana County have historically manifested exceedances of the national standard for particulate matter in the air, dust ordinances were enacted in order to avoid being in noncompliance with EPA policy regarding reasonable measures that need to be in place to mitigate the negative impact of high wind events on public health.

Your report fails to take into account fact that Dust Ordinances have not been enforced and good faith efforts to mitigate manmade sources of dust have been lacking. In addition, it is not altogether clear that the methodology used in collecting data regarding exceedances is adequate for the problem of site-specific fugitive dust in Las Cruces and Dona Ana County. Furthermore, the lengthy delay in providing the information contained in your report (the data is now two to three years old) makes it difficult to take timely pro-active steps in response to the information provided.

I would hope that the concerns reflected in this e-mail would be forwarded to all appropriate parties and would appreciate confirmation via documentation that public input is indeed being considered.

NMED Response:

The main themes addressed by this commenter include ineffective dust ordinances, data collection methodology, delay in submitting the demonstration and other resources characterizing air quality in Doña Ana County. NMED addresses ineffective dust ordinances in the response above and will focus on the other themes of the comment.

According to the provisions of the Exceptional Events Rule, an air quality management agency has three years or one year before a regulatory decision to submit a demonstration, whichever comes first. This schedule reflects the amount of time needed for data collection and reporting requirements as well as the amount of agency resources needed to support data analyses for demonstrations. The scientific facts and analyses used in the demonstration remain the same regardless of time and can be supported or refuted by additional information or analysis.

NMED operates a State and Local Air Monitoring Stations (SLAMS) network in compliance with the federal regulations found in 40 CFR Part 50, 53 and 58. The rigorous site location, quality assurance, quality control, data capture and data reporting requirements are designed to provide the highest quality of data with the available resources of an air management agency. The purpose of operating these stations is to characterize ambient air quality and not emissions of a specific source. NMED submits all of the data collected to EPA and certifies the data as valid by July 1 of the year following data collection. Air quality data submitted to EPA can be downloaded from the internet at www.epa.gov/airdata.

The American Lung Association's State of the Air 2012 report uses data from the monitors operated by NMED and whose methodology was earlier questioned by the commenter. This report provides a view of air quality from a health perspective as opposed to an environmental and regulatory standpoint. The methodology does not reflect the form of the National Ambient Air Quality Standards and many inferences and assumptions were made to draw conclusions that may be misleading. For instance, the rankings are based on Metropolitan Statistical Areas or Combined Statistical Areas which can include multiple cities and/or counties. This is convenient for characterizing air quality in large urban areas (e.g. Houston, Los Angeles, New York, etc.) but can be misleading for more rural areas with large counties (e.g. Doña Ana County). The Las Cruces MSA is defined by the boundaries of Doña Ana County and includes the incorporated cities of Las Cruces, Mesilla, Hatch, Anthony and Sunland Park. The commenter points out that "Las Cruces" ranked 16^{th} on the 25 most polluted (24-hour $PM_{2.5}$) cities. This ranking is based on data from the Sunland Park City Yard (SPCY) monitor located approximately 40 miles south of Las Cruces. By looking at the 2008 to 2011 data from the Las Cruces $PM_{2.5}$ monitor only, Las Cruces would receive an A grade for short term particle pollution and be tied for fourth with Tucson, AZ for annual particle pollution by the methodology used in the report. That means that Las Cruces had no days with a 24-Hour $PM_{2.5}$ concentration above 35 $\mu g/m^3$ and its annual design value equaled 5.4 $\mu g/m^3$. Therefore, it is inaccurate to say that air quality in Sunland Park reflects air quality throughout the rest of the county.

Numerous studies have shown that border cities (i.e. Sunland Park, NM, Nogales, AZ, Yuma, AZ and Imperial, CA) suffer from increased levels of particulate matter due to high wind events, agricultural burning and lack of infrastructure such as unpaved roads and inadequate fuel supply. NMED has monitored high levels of particulate matter ($PM_{2.5}$ and PM_{10}) on low wind days at the SPCY site since the late 1990's (Kelly et.al., 2007; Pierre et. al., 2007; Pardyjak et. al., 2008). Sunland Park, NM is situated near the large urban areas of Ciudad Juárez, MX and El Paso, TX. In essence, Sunland Park, NM is a suburb of El Paso, TX that shares an international border with Cd. Juárez. The presence of Mount Cristo Rey at the point where New Mexico, Texas, and Chihuahua meet plays an important role in the transport of pollutants into Sunland Park. In 2009, NMED and the Cd. Juárez Department of Ecology and Civil Protection deployed a saturation network of thirteen $PM_{2.5}$ monitors in Sunland Park and Cd. Juárez to study the low wind high $PM_{2.5}$ concentrations observed on both sides of the border. The study found that the most probable source areas lie 3-4 km south of Sunland Park in Cd. Juárez (DuBois et. al., 2009). Other studies have found that the composition of particulate matter in the area consists mostly of crustal material with small signatures of combustion (Li et. al., 2005). The results of this research warrant further study of the problem, NMED is committed to investigating this issue as the opportunity and funding arises.