NMED
New Mexico Environment Department
Protecting the Environment, Preserving the Enchantment

Exceptional Events Demonstration 2009

Particulate Matter Exceedances in Southern New Mexico due to Natural Events

Air Quality Bureau

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Table of Contents

1 INTRODUCTION 1
1.1 Purpose 1
2 BACKGROUND 2
2.1 Exceptional Events Rule 2
2.2 Geography, Topography, and Climate 2
2.3 Monitoring Network and Data Collection 3
2.4 History of PM_{10} Exceedances and Background Concentrations in Doña Ana County 4
2.5 Doña Ana and Luna Counties NEAPs 6
2.6 Sources of Windblown Dust 8
2.7 Meteorological Conditions for High Wind Blowing Dust Days 8
3 HIGH WIND EXCEPTIONAL EVENT: January 26, 2009 11
3.1 Summary of Event 11
3.2 Is Not Reasonably Controllable or Preventable 12
3.2.1 Suspected Source Areas and Categories Contributing to the Event 12
3.2.2 Sustained and Instantaneous Wind Speeds 12
3.2.3 Recurrence Frequency 13
3.2.4 Controls Analysis 14
3.4 Historical Fluctuations Analysis 15
3.4.1 Annual and Seasonal 24-hour Average Fluctuations 15
3.5 Clear Causal Relationship 18
3.6 Affects Air Quality 20
3.7 Natural Event 20
3.8 No Exceedance but for the Event 20
4 HIGH WIND EXCEPTIONAL EVENT: February 10, 2009 21
4.1 Summary of Event 21
4.2 Is Not Reasonably Controllable or Preventable 22
4.2.1 Suspected Source Areas and Categories Contributing to the Event 22
4.2.2 Sustained and Instantaneous Wind Speeds 22
4.2.3 Recurrence Frequency 23
4.2.4 Controls Analysis 24
4.4 Historical Fluctuations Analysis 25
4.4.1 Annual and Seasonal 24-hour Average Fluctuations 25
4.5 Clear Causal Relationship 31

4.6 Affects Air Quality 35
4.7 Natural Event 35
4.8 No Exceedance but for the Event 35
5 HIGH WIND EXCEPTIONAL EVENT: March 7, 2009 36
5.1 Summary of Event 36
5.2 Is Not Reasonably Controllable or Preventable 37
5.2.1 Suspected Source Areas and Categories Contributing to the Event 37
5.2.2 Sustained and Instantaneous Wind Speeds 37
5.2.3 Recurrence Frequency 38
5.2.4 Controls Analysis 39
5.4 Historical Fluctuations Analysis 40
5.4.1 Annual and Seasonal 24-hour Average Fluctuations 40
5.5 Clear Causal Relationship 46
5.6 Affects Air Quality 50
5.7 Natural Event 50
5.8 No Exceedance but for the Event 50
6 HIGH WIND EXCEPTIONAL EVENT: March 23, 2009 51
6.1 Summary of Event 51
6.2 Is Not Reasonably Controllable or Preventable 52
6.2.1 Suspected Source Areas and Categories Contributing to the Event 52
6.2.2 Sustained and Instantaneous Wind Speeds 52
6.2.3 Recurrence Frequency 53
6.2.4 Controls Analysis 54
6.4 Historical Fluctuations Analysis 55
6.4.1 Annual and Seasonal 24-hour Average Fluctuations 55
6.5 Clear Causal Relationship 58
6.6 Affects Air Quality 61
6.7 Natural Event 61
6.8 No Exceedance but for the Event 61
7 HIGH WIND EXCEPTIONAL EVENT: March 26, 2009 62
7.1 Summary of Event 62
7.2 Is Not Reasonably Controllable or Preventable 63
7.2.1 Suspected Source Areas and Categories Contributing to the Event 63
7.2.2 Sustained and Instantaneous Wind Speeds 63

7.2.3 Recurrence Frequency 64
7.2.4 Controls Analysis 65
7.4 Historical Fluctuations Analysis 66
7.4.1 Annual and Seasonal 24-hour Average Fluctuations 66
7.5 Clear Causal Relationship 70
7.6 Affects Air Quality 74
7.7 Natural Event 74
7.8 No Exceedance but for the Event 74
8 HIGH WIND EXCEPTIONAL EVENT: April 8, 2009 75
8.1 Summary of Event 75
8.2 Is Not Reasonably Controllable or Preventable 76
8.2.1 Suspected Source Areas and Categories Contributing to the Event 76
8.2.2 Sustained and Instantaneous Wind Speeds 76
8.2.3 Recurrence Frequency 77
8.2.4 Controls Analysis 78
8.4 Historical Fluctuations Analysis 79
8.4.1 Annual and Seasonal 24-hour Average Fluctuations 79
8.5 Clear Causal Relationship 83
8.6 Affects Air Quality 88
8.7 Natural Event 88
8.8 No Exceedance but for the Event 88
9 HIGH WIND EXCEPTIONAL EVENT: August 4, 2009 89
9.1 Summary of Event 89
9.2 Is Not Reasonably Controllable or Preventable 90
9.2.1 Suspected Source Areas and Categories Contributing to the Event 90
9.2.2 Sustained and Instantaneous Wind Speeds 90
9.2.3 Recurrence Frequency 91
9.2.4 Controls Analysis 92
9.4 Historical Fluctuations Analysis 93
9.4.1 Annual and Seasonal 24-hour Average Fluctuations 93
9.5 Clear Causal Relationship 96
9.6 Affects Air Quality 101
9.7 Natural Event 101
9.8 No Exceedance but for the Event 101

10 HIGH WIND EXCEPTIONAL EVENT: October 27, 2009 102
10.1 Summary of Event 102
10.2 Is Not Reasonably Controllable or Preventable 103
10.2.1 Suspected Source Areas and Categories Contributing to the Event 103
10.2.2 Sustained and Instantaneous Wind Speeds 103
10.2.3 Recurrence Frequency 104
10.2.4 Controls Analysis 105
10.4 Historical Fluctuations Analysis 106
10.4.1 Annual and Seasonal 24-hour Average Fluctuations 106
10.5 Clear Causal Relationship 109
10.6 Affects Air Quality 112
10.7 Natural Event 112
10.8 No Exceedance but for the Event 112
11 HIGH WIND EXCEPTIONAL EVENT: October 28, 2009 113
11.1 Summary of Event 113
11.2 Is Not Reasonably Controllable or Preventable 114
11.2.1 Suspected Source Areas and Categories Contributing to the Event 114
11.2.2 Sustained and Instantaneous Wind Speeds 114
11.2.3 Recurrence Frequency 115
11.2.4 Controls Analysis 116
11.4 Historical Fluctuations Analysis 117
11.4.1 Annual and Seasonal 24-hour Average Fluctuations 117
11.5 Clear Causal Relationship 120
11.7 Natural Event 123
11.8 No Exceedance but for the Event 123
12 HIGH WIND EXCEPTIONAL EVENT: December 8, 2009 124
12.1 Summary of Event 124
12.2 Is Not Reasonably Controllable or Preventable 125
12.2.1 Suspected Source Areas and Categories Contributing to the Event 125
12.2.2 Sustained and Instantaneous Wind Speeds 125
12.2.3 Recurrence Frequency 126
12.2.4 Controls Analysis 127
12.4 Historical Fluctuations Analysis 128
12.4.1 Annual and Seasonal 24-hour Average Fluctuations 128

12.5 Clear Causal Relationship 132
12.6 Affects Air Quality 136
12.7 Natural Event 136
12.8 No Exceedance but for the Event 136
13 REFRENCES 137
APPENDIX A 138
APPENDIX B 143
APPENDIX C 148

1 INTRODUCTION

1.1 Purpose

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

	6CM	6ZG	6ZK	6ZL	6WM	6ZM	7E
DATE	Anthony	SPCY	Chaparral	Holman	West Mesa	Desert View	Deming
1/26/2009	190	100	80	50	20	80	30
2/10/2009	250	190	170	140	50	90	10
3/7/2009	210	200	200	40	20	150*	20
3/23/2009	60	50	50	180	50	50	50
3/26/2009	120	210	70	190	50	120	80
4/8/2009	140	170	190	110	40	120	70
8/4/2009	50	60	190	30	30	80	30
10/27/2009	50	50	160	20	30	--	70
10/28/2009	40/30W	40/20W	60	80	90	40	240/20W†
12/8/2009	180	50	270	40	50	50	60

Table 1-1. 2009 PM10 exceedances caused by windblown dust are shaded orange. The 24-hour average values are rounded to the nearest 10 with units in µg/m^3. All values recorded by TEOM instruments unless followed by a W indicating a value recorded using Wedding instruments.
***Not an exceedance due to rounding conventions defined in the PM_{10} NAAQS at 40 CFR Part 50.**
†The Deming FRM Wedding monitor (7D) is not collocated with the Deming FEM TEOM (7E).

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 that are 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 are:

1. flagging of data in EPA's Air Quality System (AQS) database by air quality management agencies,
2. submission of 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, six technical elements must be met. 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 recorded in 2009 are natural events caused by high winds which entrain and transport dust from erodible areas to the monitoring sites. This report demonstrates that the procedural and technical requirements have been met for excluding data due to exceptional events in Doña Ana County for calendar year 2009.

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 the 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 spanning the eastern side of the county and separates 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 County along the international border in the northern Chihuahuan Desert 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 topography dictates wind flow patterns carrying air masses from El Paso and Ciudad Juarez into Sunland Park.

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. Most high wind events are driven by synoptic scale weather activity with much less frequent storms occurring due to mesoscale systems (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 are equipped with continuous FEM TEOM instruments while the Anthony and Sunland Park City Yards (SPCY) sites have collocated filter-based Federal Reference Method (FRM) Hi-Volume Wedding Monitors. The monitoring network in Doña Ana County can be split into the Las Cruces (northern) and Paso del Norte (southern) area. The West Mesa and Holman monitoring sites are in Las Cruces with the rest of the monitoring sites surrounding the borders with Texas and Mexico in the south (Figure 2-1). The FEM TEOM and FRM Wedding monitors are not collocated in Deming.

Site Name	AIRS Number	Latitude (d-m-s)	Longitude (d-m-s)
6ZL Holman	35-013-0019	32-25-29.69	106-40-26.62
6ZK Chaparral	35-013-0020	32-02-27.48	106-24-33.09
6CM Anthony	35-013-0016	32-00-11.54	106-35-57.67
6ZG SPCY	35-013-0017	31-47-49.91	106-33-24.17
6ZM Desert View	35-013-0021	31-47-46.32	106-35-02.13
6WM West Mesa	35-013-0024	32-16-39.9	106-51-49.68
7E Deming	35-029-0003	32-15-20.99	107-43-21.58
7D Deming	35-036-0001	32-16-7.86	107-45-29.32

Table 2-1. PM_{10} Monitoring sites with SLAMS designations in southern New Mexico.

Monitoring data is quality controlled and assured within the department and submitted to AQS by the end of the following quarter in which it was recorded. Flags are placed on exceedances of the NAAQS and reasons behind the monitored concentration are investigated to determine if it was caused by an exceptional event. If EPA concurs with a state's flag and subsequent demonstration of an exceptional event, that monitoring data is not used to determine attainment of the NAAQS for each criteria pollutant.

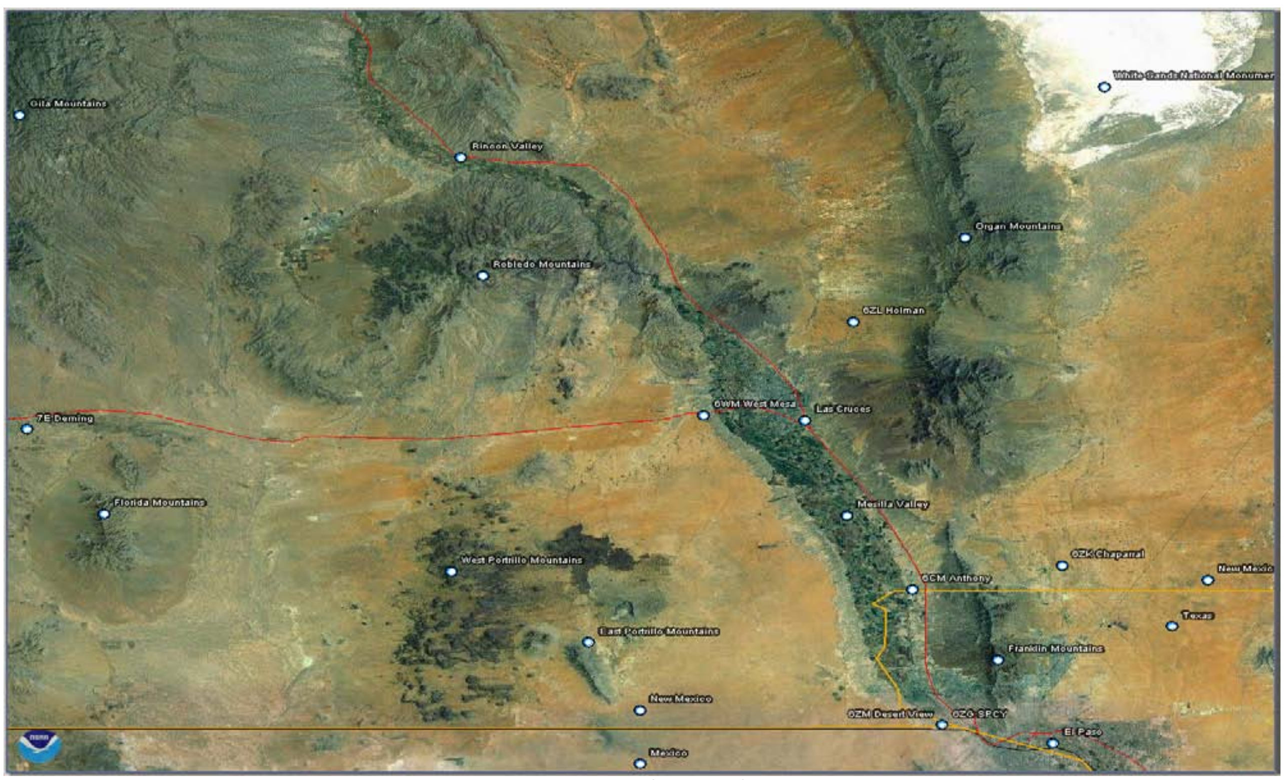

Figure 2-1. PM_{10} monitoring sites with topographical and geographical features of New Mexico's southern border.

2.4 History of PM_{10} Exceedances and Background Concentrations in Doña Ana County

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 southern Doña Ana County in Anthony, NM. 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 these exceedances were caused by uncontrollable windblown dust events, 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 but the majority of these events occur from late winter through early summer. From 2003-2008 the AQB recorded 255 high wind blowing dust PM_{10} exceedances on 107 days (Wedding and TEOM data). The majority of these exceedances occurred during the windy season from March to June (Figure 2-2). Averaged over 2003-2008, NMED monitored 42 exceedances on 18 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. This was by far the most exceedances recorded by the AQB in a single year.

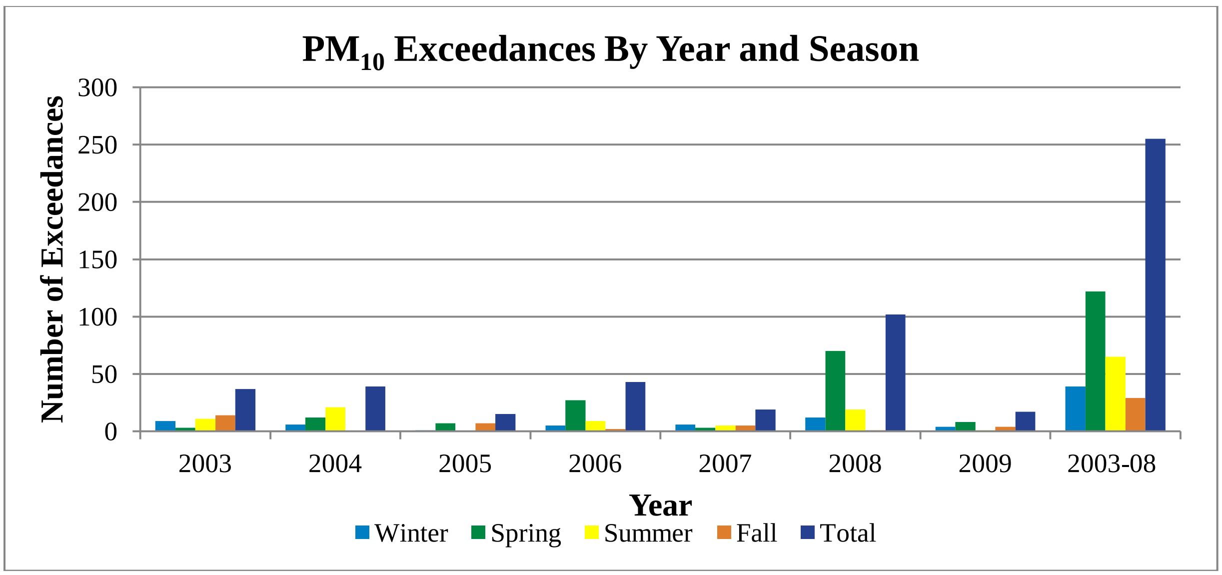

Figure 2-2. PM_{10} Exceedances by year and season. Data includes the Deming monitoring site in Luna County.

To establish normal historical fluctuations and background concentrations, the AQB conducted statistical analyses of 24-hour average PM_{10} concentrations, hourly PM_{10} concentrations, average hourly wind gust and speeds, as well as frequency distributions for suspected high wind blowing dust events for the six years preceding 2009 (2003-2008 when available). As used here normal historical fluctuations and background concentrations means days that did not have suspected natural events from 2003-2008. Suspected natural events are those days for which NMED submitted documentation and analysis to EPA under the NEAP or EER.

Table 2-2 shows that 99% percent of 24-hour average PM_{10} monitored concentrations in Doña Ana County fell below the corresponding NAAQS of 150 $\mu g/m^3$. 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 standard is at SPCY. NMED suspects that these elevated levels are caused by unpaved roads in Ciudad Juárez, Mexico (Claiborn et al., 2000;

DuBois et al., 2009; Li et al., 2005). Figure 2-3 shows that the exceedances recorded in 2009 are well above background levels.

	Anthony	Chaparral	Deming	Desert View	Holman	SPCY	West Mesa
Max	147	149	152	150	153	212	153
99th Percentile	123	118	96	121	121	146	88
95th Percentile	88	65	57	89	62	110	47
75th Percentile	56	35	29	48	35	61	23
50th Percentile	38	24	19	34	23	39	15
Mean	42	28	23	38	27	47	19
25th Percentile	24	15	12	21	14	24	10
5th Percentile	12	6	6	10	6	11	5

Table 2-2. 24-hour average data from 2003-2008 for monitoring sites in southern New Mexico. Data was downloaded from the AQS Data Mart. Desert View data is only for August 2007-2008.

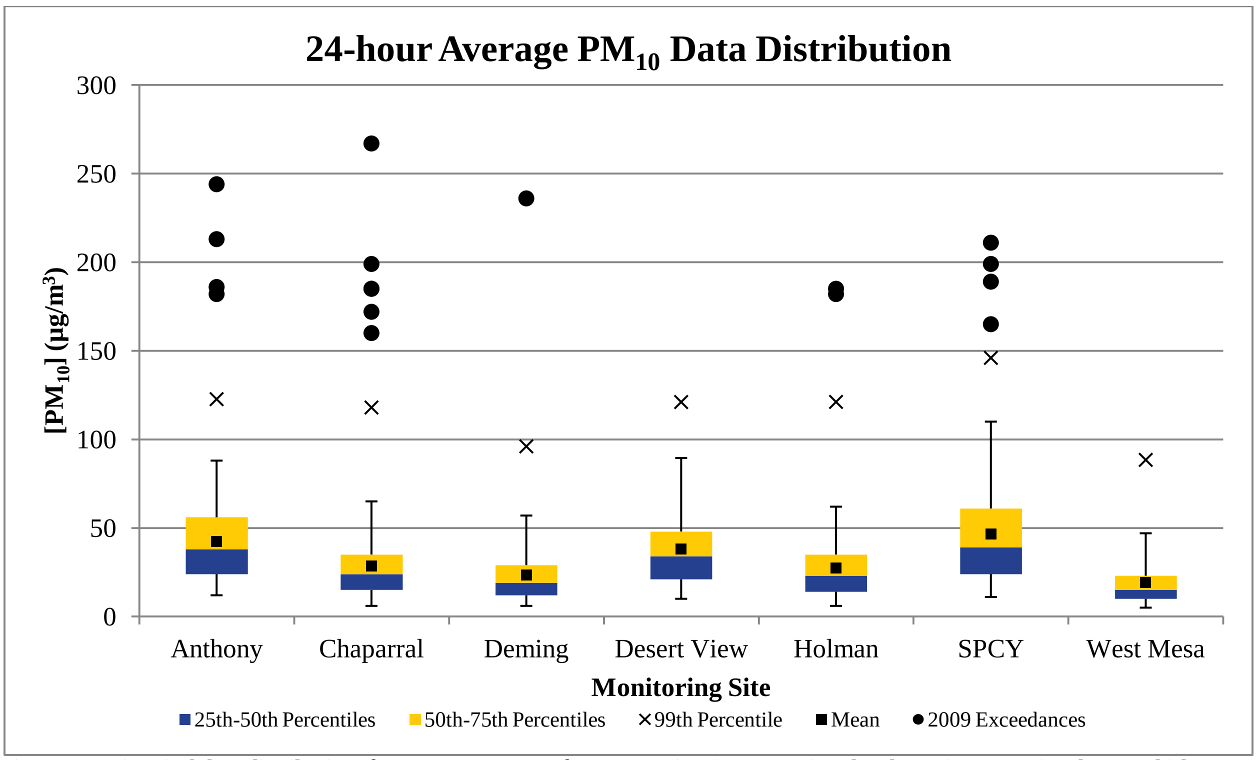

Figure 2-3. Historical data distributions for 2003-2008 except for Desert View (2007-2008) and Holman (2004-2008). The top whisker represents the 95th percentile of data.

2.5 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 PM_{10} NAAQS that are 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 the PM_{10} NAAQS may be violated due to uncontrollable natural events. The Luna and Doña Ana County NEAPs were developed 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.

The NEAPs for Doña Ana and Luna Counties were approved by EPA 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 that can be 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 must be 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 at dust control. 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 Luna and Doña Ana Counties' NEAPs, 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, Memorandums of Agreement (MOAs) or Memorandums of Understanding (MOUs) between the state and large land managers (New Mexico State University, WSMR, Ft. Bliss, etc.) were signed. The ordinances and MOUs adopted by each jurisdiction focused on the controllable anthropogenic sources identified in each BACM analysis. Luna and Doña Ana Counties' NEAPs were not adopted under New Mexico's 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. This wind gust criterion was determined by analysis of data for the 101 exceedances which occurred during the years 1999 and 2000, and which were shown by detailed analysis to have been caused by high wind (Aaboe et al., 1998-2007). For days when an exceedance was recorded at a monitoring site that did not have 18 m/s wind gusts, NMED created time series plots of wind data and PM_{10} to demonstrate that a natural event occurred and an exceedance was caused by high wind. Along with these time series plots, news reports, pictures, satellite images, and data from other jurisdictions (TCEQ-El Paso) that monitored exceedances on the same day were supplied 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 may be found on our website at www.nmenv.state.nm.us/aqb. Alternatively, requests for hard copies may be made to the AQB in Santa Fe.

2.6 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 lake beds) 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). An emissions inventory has not been conducted 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).

2.7 Meteorological Conditions for High Wind Blowing Dust Days

There are three weather systems which create wind storms capable of producing windblown dust in New Mexico (Comet, 2010; Novlan et al., 2007). Two of these are large scale or synoptic weather systems. These weather systems often affect entire states and can be large enough to cover multiple states. The other meteorological condition is called a small or mesoscale weather system. 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 2-4). 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. August 4, 2009 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 2009. The rest of the days had high winds caused by the passage of a Pacific cold front.

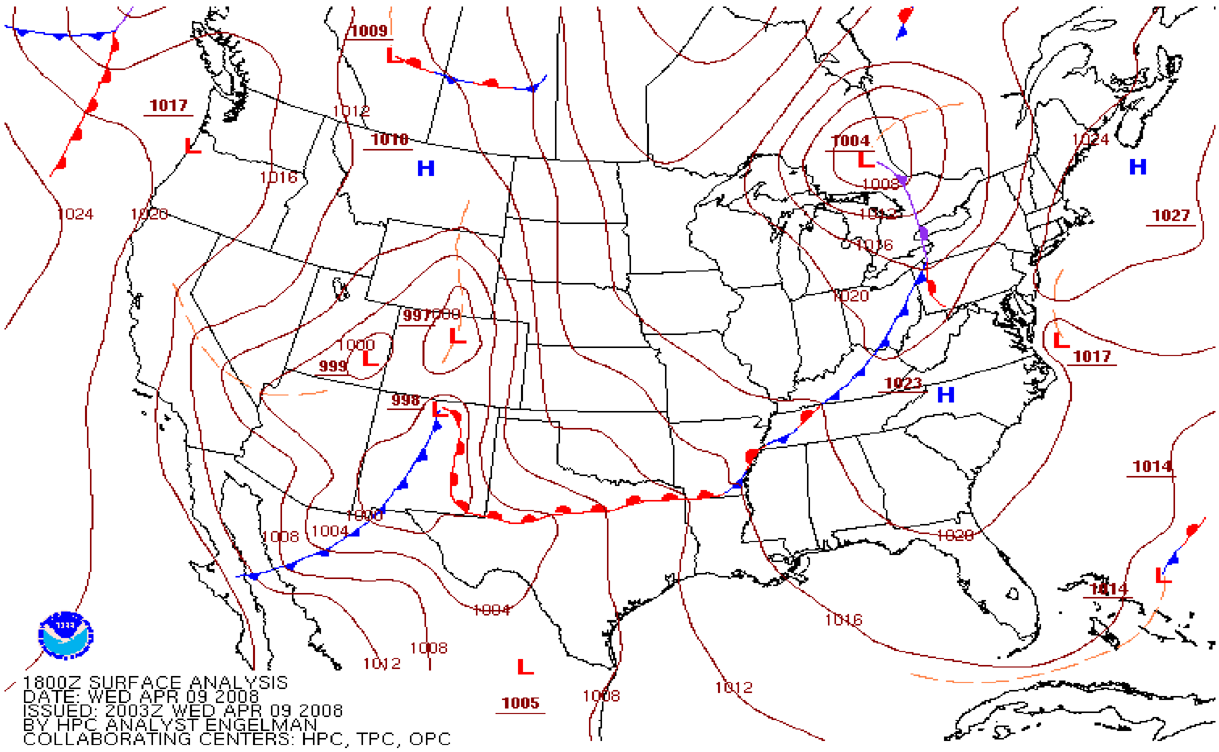

Figure 2-4. Surface weather map depicting the Pacific cold front that passed through New Mexico on April 9, 2008. Winds flow perpendicular to the isobars of constant pressure from high to low pressure on the map (red lines).

The optimal meteorological conditions for high wind blowing dust days in southern New Mexico occur when passage of an upper level trough of low pressure (Figure 2-5) and a Pacific cold front on the surface 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, further enhancing wind speeds at the surface. If the surface winds cross the vast sources of dust in the area with the right 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.

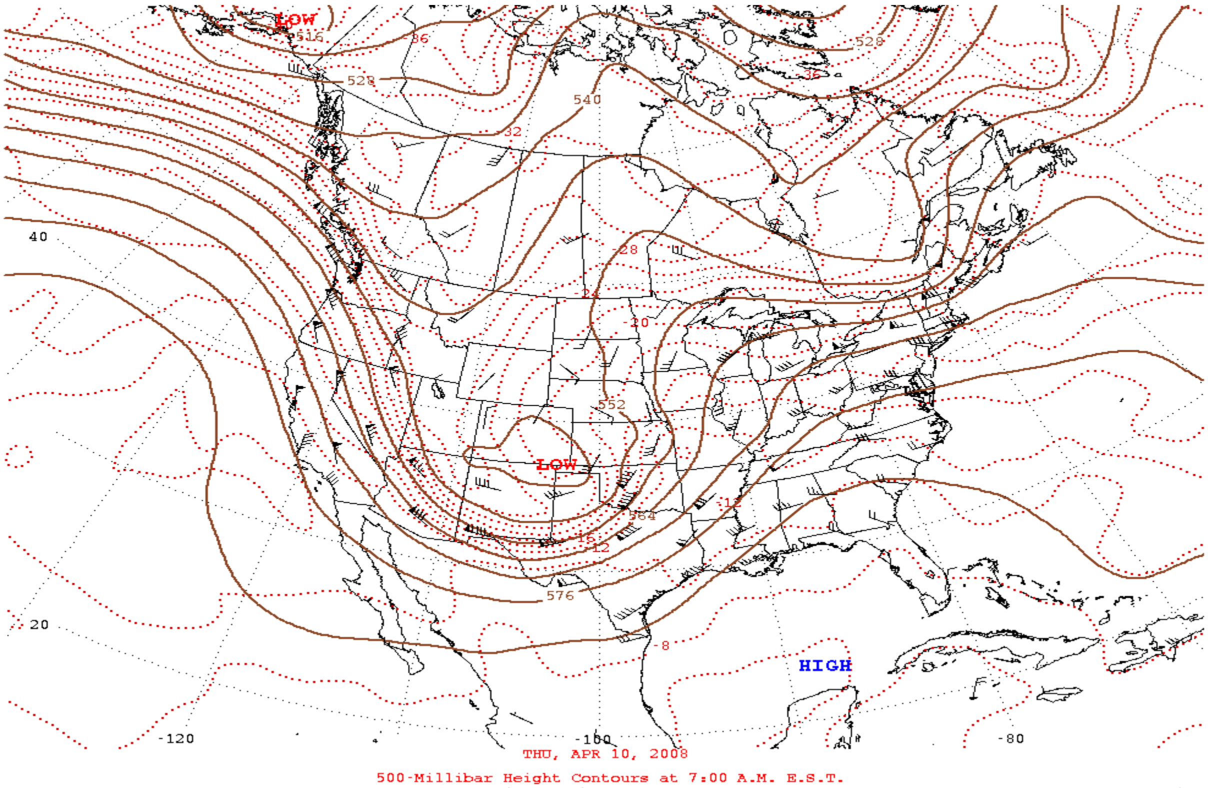

Figure 2-5. The upper air pattern associated with the Pacific cold front that passed through New Mexico on April 9, 2008. Winds flow parallel to the isobars on the upper air map (brown lines).

3 HIGH WIND EXCEPTIONAL EVENT: January 26, 2009

3.1 Summary of Event

High winds and blowing dust caused an exceedance of the PM_{10} NAAQS at the AQB's Anthony monitoring site on January 26, 2009. The 24-hour average was recorded by a FEM TEOM continuous monitor, with a midnight-to-midnight 24-hour average concentration of 190 $\mu g/m^3$, after rounding to the nearest 10 $\mu g/m^3$. This data has been submitted to AQS and flagged as a high wind natural event under the EER. Although no other monitoring site recorded an exceedance, elevated PM_{10} concentrations were measured at SPCY, Chaparral and Desert View monitoring sites (Figure 3-1).

The event that occurred on this day is unique as the weather conditions that caused high winds did not follow the typical passage of a Pacific cold front. The cold front passed through New Mexico and became a stationary front for several days. Winds blew from a predominantly southwesterly direction throughout the entire border region, crossing over desert and anthropogenic sources 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.

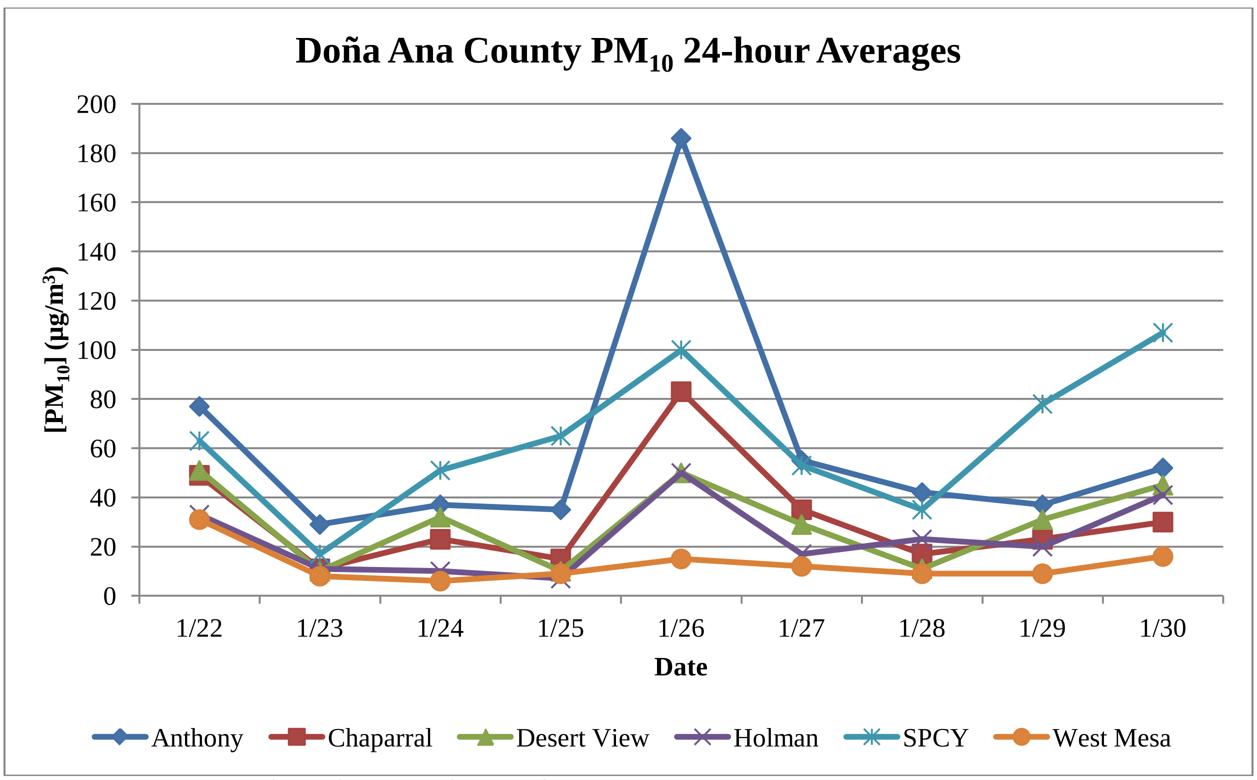

Figure 3-1. 24-hour averages for the four days before and after the suspected high wind event. Averages measured using TEOM instruments at monitoring sites in Doña Ana County.

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 undisturbed desert, agricultural lands and unpaved roads in Doña Ana County and northern Mexico. During January most agricultural lands have not been disturbed since the fall harvest. Much of the residential and commercial development in Doña Ana County has occurred in Las Cruces where city ordinance requires BACM.

3.2.2 Sustained and Instantaneous Wind Speeds

EPA has indicated that 11.2 m/s (25 mph) would be used as the default entrainment threshold for natural events caused by high wind and blowing dust (EPA, 2011). NMED has found that a sustained hourly wind speed lasting two hours or more of 6 m/s with instantaneous wind gusts of 12 m/s or more can create blowing dust in the border region (Aaboe et al., 1998-2007; Saxton et al., 2000). On January 26, wind speeds exceeded both of NMED's presumed threshold velocities for dust entrainment at all monitoring sites (Figures 3-2 & 3-3).

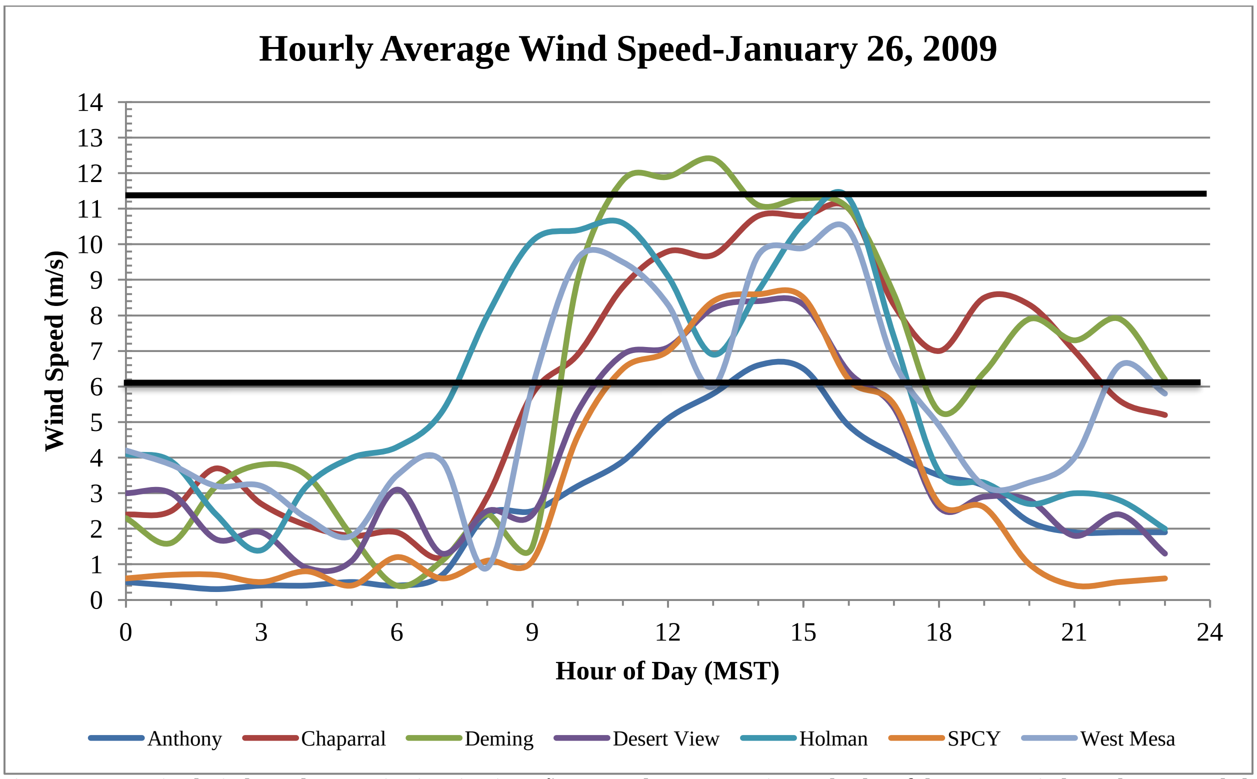

Figure 3-2. Sustained wind speeds at monitoring sites in Doña Ana and Luna Counties on the day of the event. Wind speeds are sampled every other second then averaged over an hour. The Anthony and West Mesa sites measure wind speed at 2 and 8 meters above grade respectively. All other sites measure wind speed at 10 meters above grade.

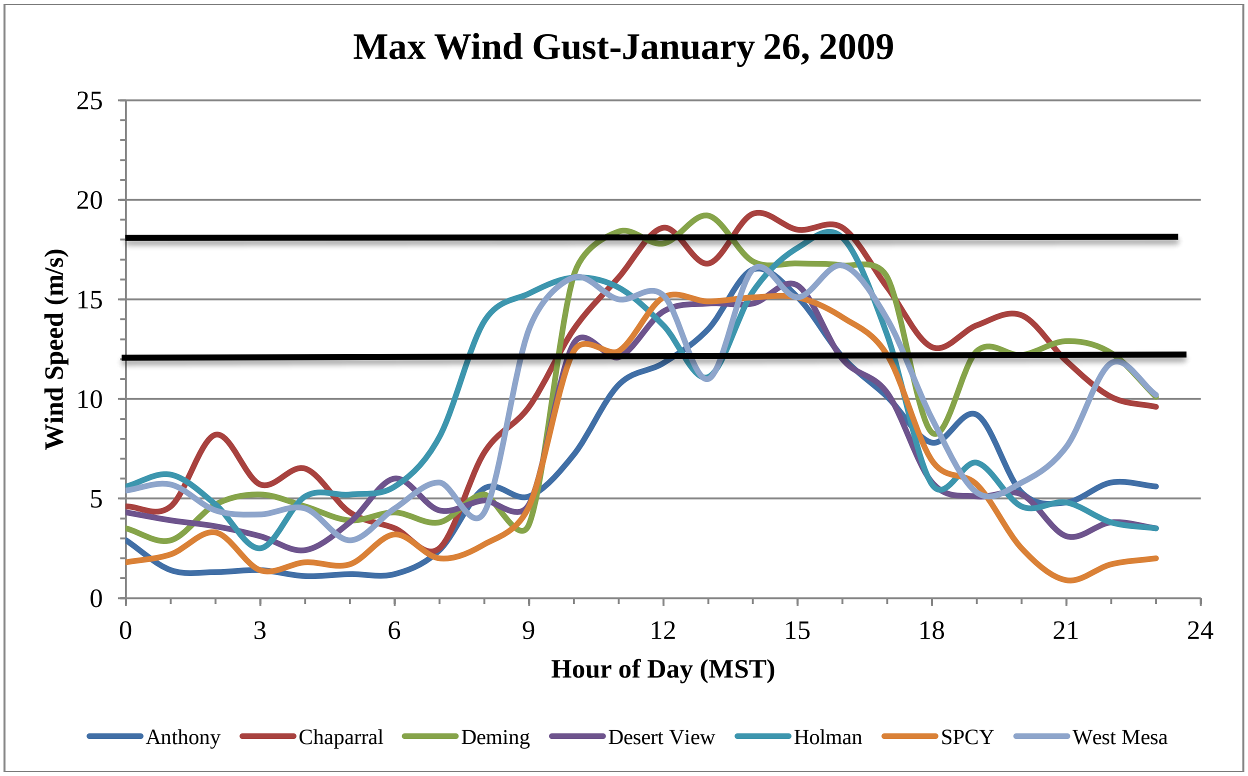

Figure 3-3. Maximum wind speeds at monitoring sites in Doña Ana and Luna Counties on the day of the event. Wind speeds are sampled every other second with the maximum of the hourly samples supplied here. The Anthony and West Mesa sites measure wind speed at 2 and 8 meters above grade respectively. All other sites measure wind speed at 10 meters above grade.

3.2.3 Recurrence Frequency

The Anthony monitoring station can record exceedances at any time of year. From 2003-2008, the FEM TEOM monitor has recorded 57 exceedances and the FRM Wedding monitor has recorded five exceedances (Figure 3-4). This disparity in monitored exceedances is due to the FRM Wedding monitor sampling schedule of 1-in-6 days. The Anthony site records an average of 9.5 exceedances per year, with a high of 16 in 2008 and a low of 4 in 2007 and 2005.

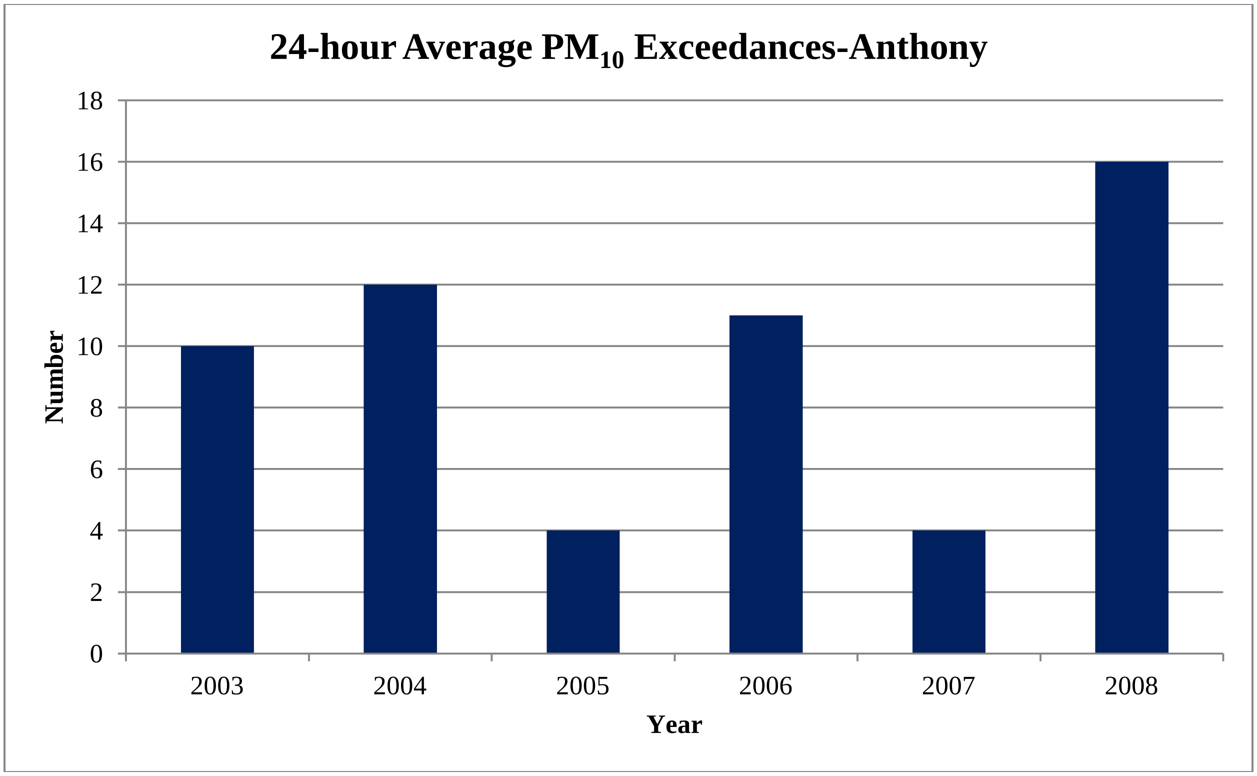

Figure 3-4. Exceedances recorded by the FEM TEOM instrument at Anthony. The FRM Wedding instrument recorded an additional five exceedances over the same time period.

3.2.4 Controls Analysis

Implementation of BACM in Doña Ana County has been carried out through the ordinances and MOUs adopted under the NEAP. The ordinances regulate disturbed lands, construction and demolition, vacant parking lots and materials handling and transportation. On this day no other unusual PM_{10} producing activities occurred 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 was run for the eight hours preceding the start of elevated PM_{10} concentrations during the event (Figure 3-5). Controlling dust from the natural desert terrain is cost prohibitive and falls outside NMED's jurisdiction when it is internationally transported. NMED concludes that the sources contributing to the event are not reasonably controllable.

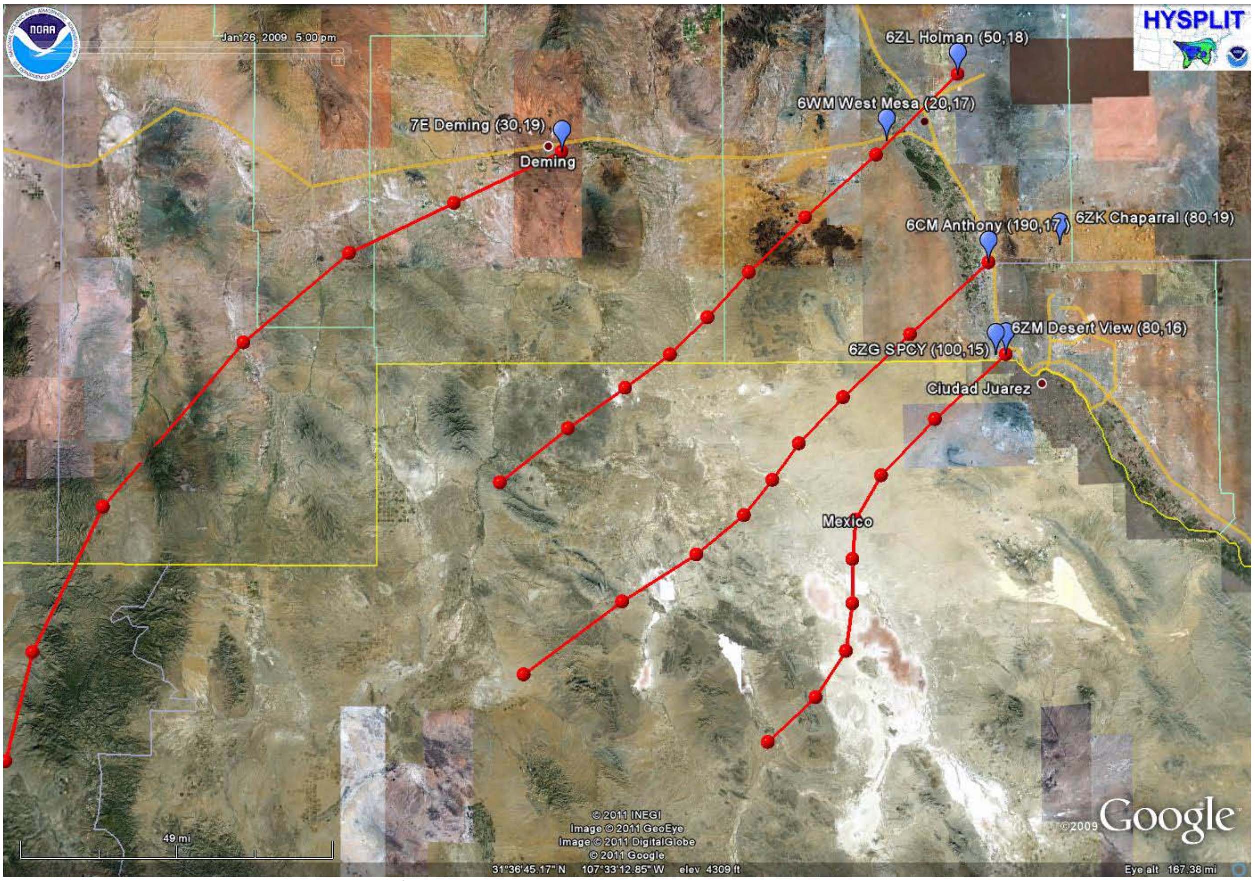

Figure 3-5. Back-trajectory model analysis for the event. The numbers in parenthesis are the 24-hour average PM_{10} concentration and max wind gust respectively. Each ball represents one hour in the past starting from the 1100 hour.

3.4 Historical Fluctuations Analysis

3.4.1 Annual and Seasonal 24-hour Average Fluctuations

The Anthony site has recorded PM_{10} exceedances since it was established in 1988. These exceedances can occur during any time of year and are caused by high winds (Figure 3-6). 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 403 µg/m^3 recorded in 2005. All exceedances have been caused by high winds and natural events demonstrations were submitted to EPA under the NEAP or EER.

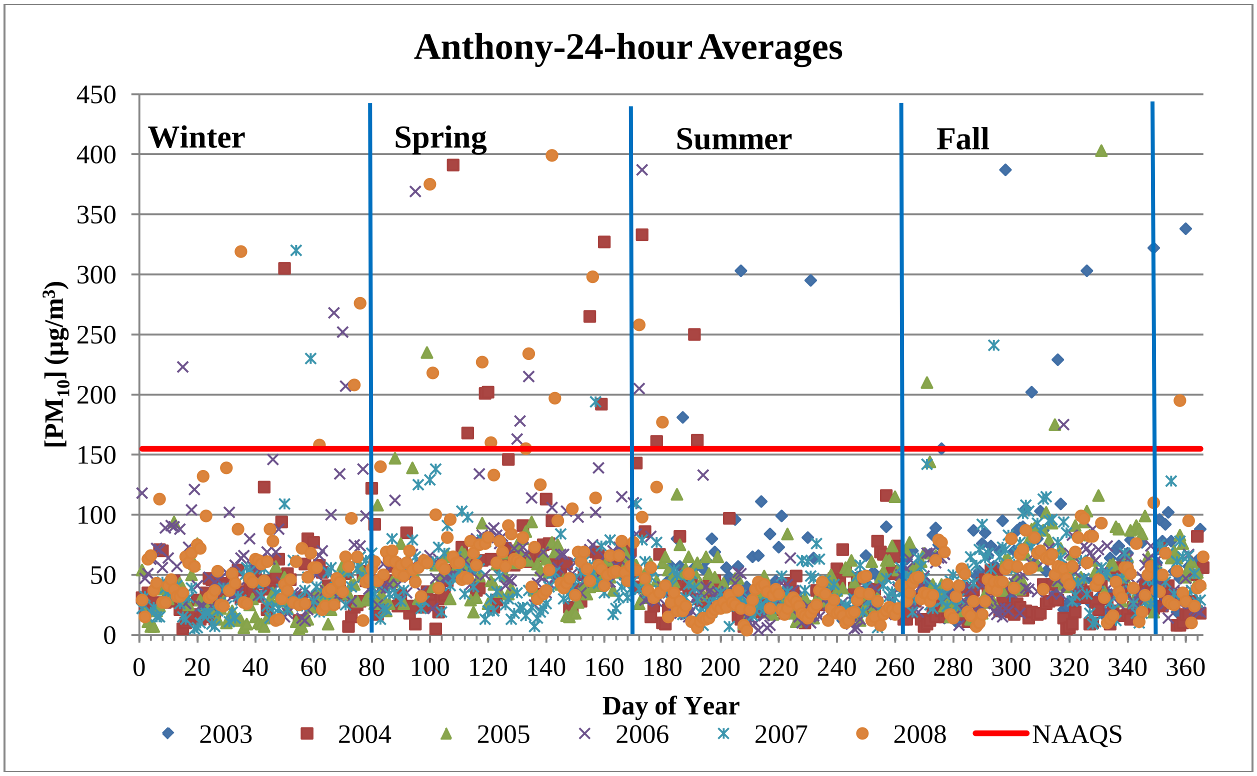

Figure 3-6. 24-hour average PM_{10} concentrations by day of year from 2003-2008. All averages collected using FEM TEOM instrument.

Table 3-1 shows normal historical fluctuations with and without high wind natural events that caused exceedances from 2003-2008. The recorded value for this day (188 µg/m^3) 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	123	88	56	38	42	24	12	4
Events	403	251	103	58	39	48	25	12	4

Table 3-1. 24-hour average PM_{10} data distribution with and without high wind events included. Only those high wind events that resulted in an exceedance were excluded from the analysis. Data includes FRM Wedding and FEM TEOM data from 2003-2008.

An hourly data distribution analysis was done for PM_{10} concentrations and wind gust speeds (Appendices A and B). When the hourly data for January 26 is overlaid on the hourly data distribution plots it shows that the values recorded during the high wind event exceed the 95th percentile for both PM_{10} and wind gusts (Figures 3-7 and 3-8). The hourly PM_{10} values during the high wind blowing dust storm far exceed the historical 95th percentile of data.

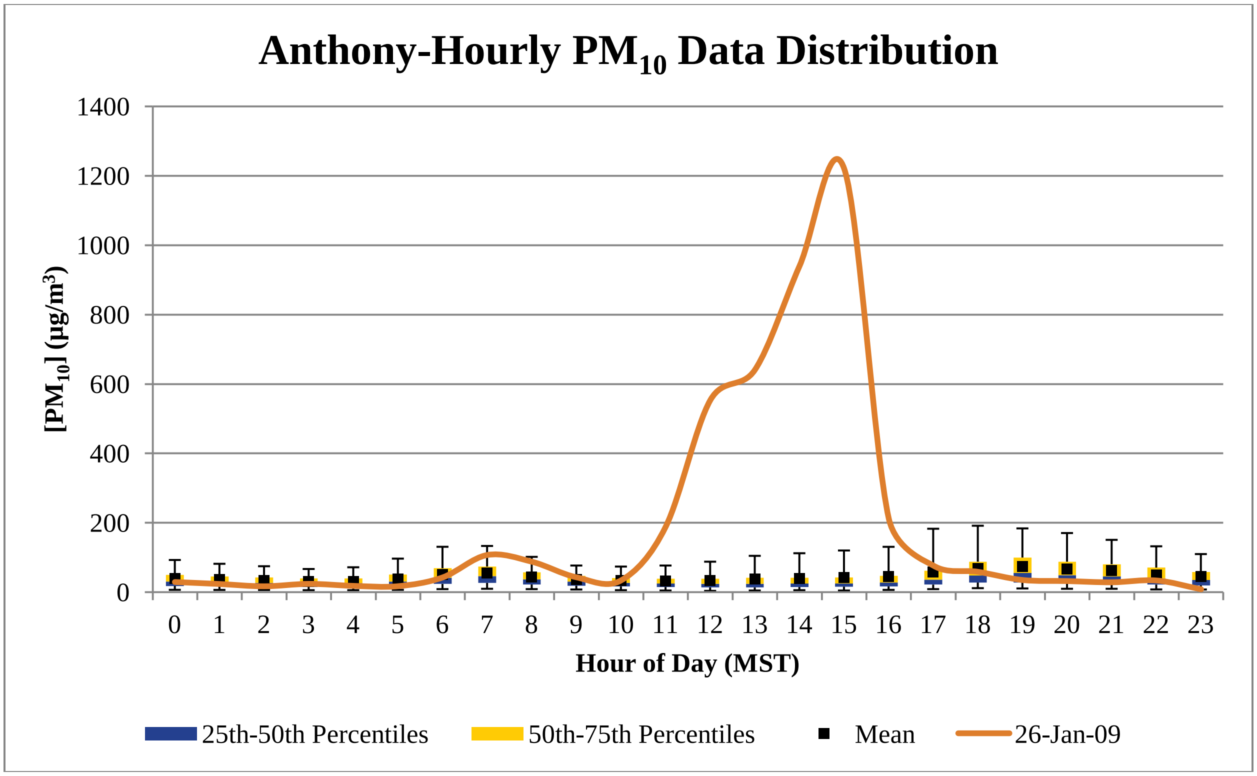

Figure 3-7. All data recorded using the FEM TEOM monitor. Data distribution is for hourly values from 2003-2008. The top whisker represents the 95th percentile of data.

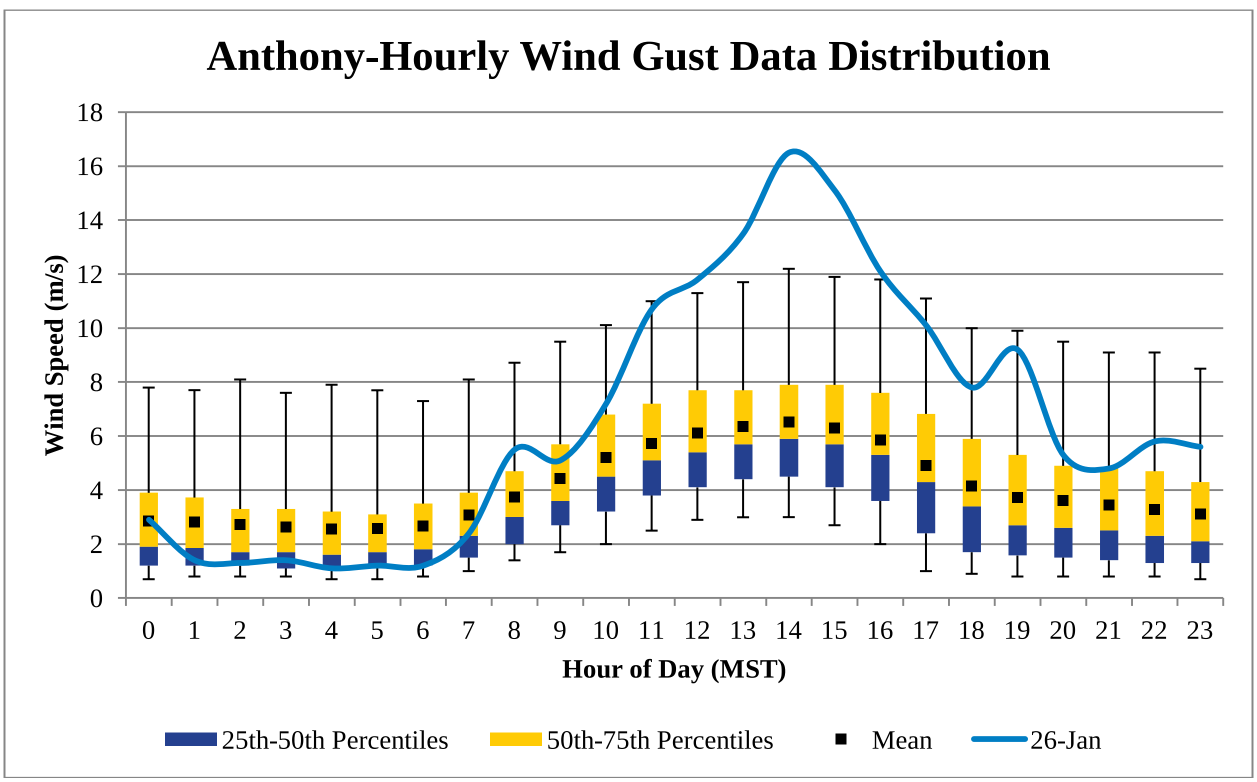

Figure 3-8. Wind speed data distribution from 2006-2008 measured at 2 meters. Data is for the maximum wind gust recorded during the hour.

3.5 Clear Causal Relationship

A Pacific cold front passed through New Mexico on January 24, 2009. This cold front turned into a stationary front covering the eastern half of the state, persisting through the early morning hours of January 28, 2009. On January 26 an area of low pressure and a surface level trough developed in central New Mexico, creating a weak pressure gradient over southeastern Arizona and northern Mexico (Figure 3-9). At the 500 hour an area of low pressure aloft was over the state of Nevada. As the day progressed this low pressure traveled east and aligned itself with New Mexico and the surface wind direction (Figure 3-10). Diurnal heating of the surface allowed winds aloft to mix down, increasing the surface wind velocities and provided the turbulence required for vertical mixing and entrainment of dust.

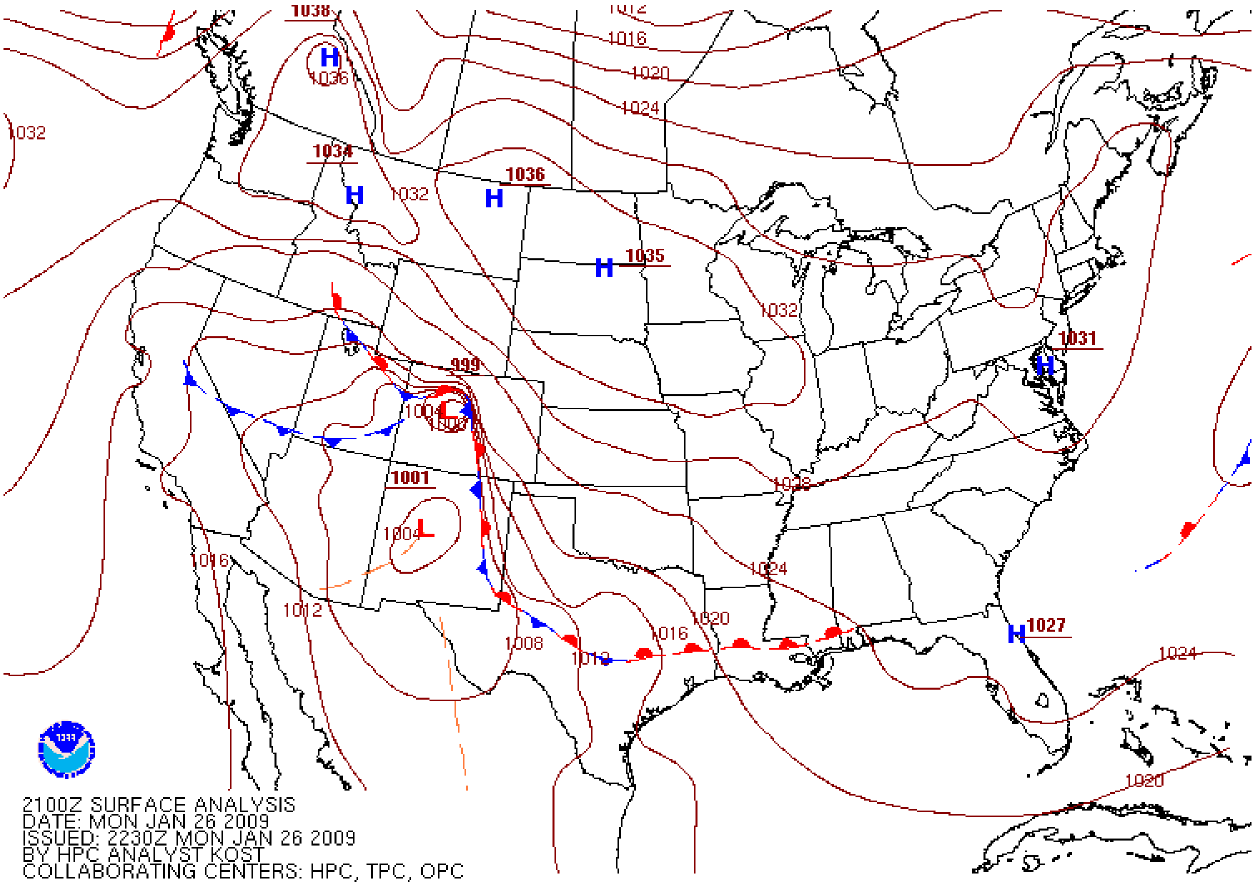

Figure 3-9. January 26, 2009 surface weather map depicting the frontal activity and isobars of constant pressure (red lines) for the 1300 hour MST. Surface winds flow perpendicular to the isobars from high to low pressure.

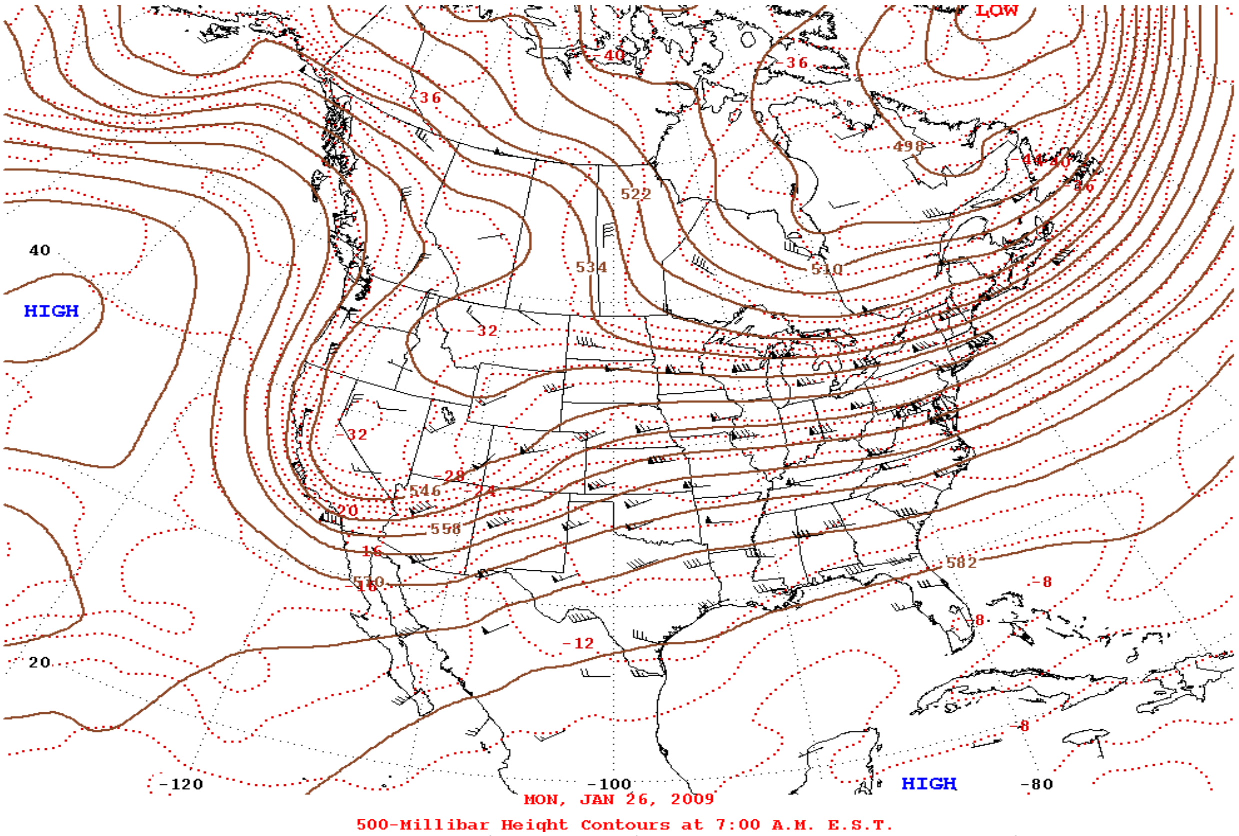

Figure 3-10. Upper Air weather map depicting winds aloft with isobars of constant pressure (brown lines). Winds flow parallel to the isobars.

The weather pattern described above generated strong southwesterly winds beginning at the 1100 hour and lasting through the 1600 hour. During this time frame wind gusts exceeded the historical 95th percentile of data as shown in Figure 3-8. Peak wind gusts ranged from 15 m/s at SPCY to 19 m/s at Chaparral and Deming (Figure 3-3). Sustained hourly average wind speeds of 6 m/s were recorded at Anthony during the peak PM_{10} concentrations of the event (Figure 3-2). Blowing dust caused elevated levels of PM_{10} during the same time frame as high winds as demonstrated by the time series plot in Figure 3-11. As wind gusts exceed the 95th percentile of historical data so do hourly PM_{10} concentrations on this date (1100-1600 hours).

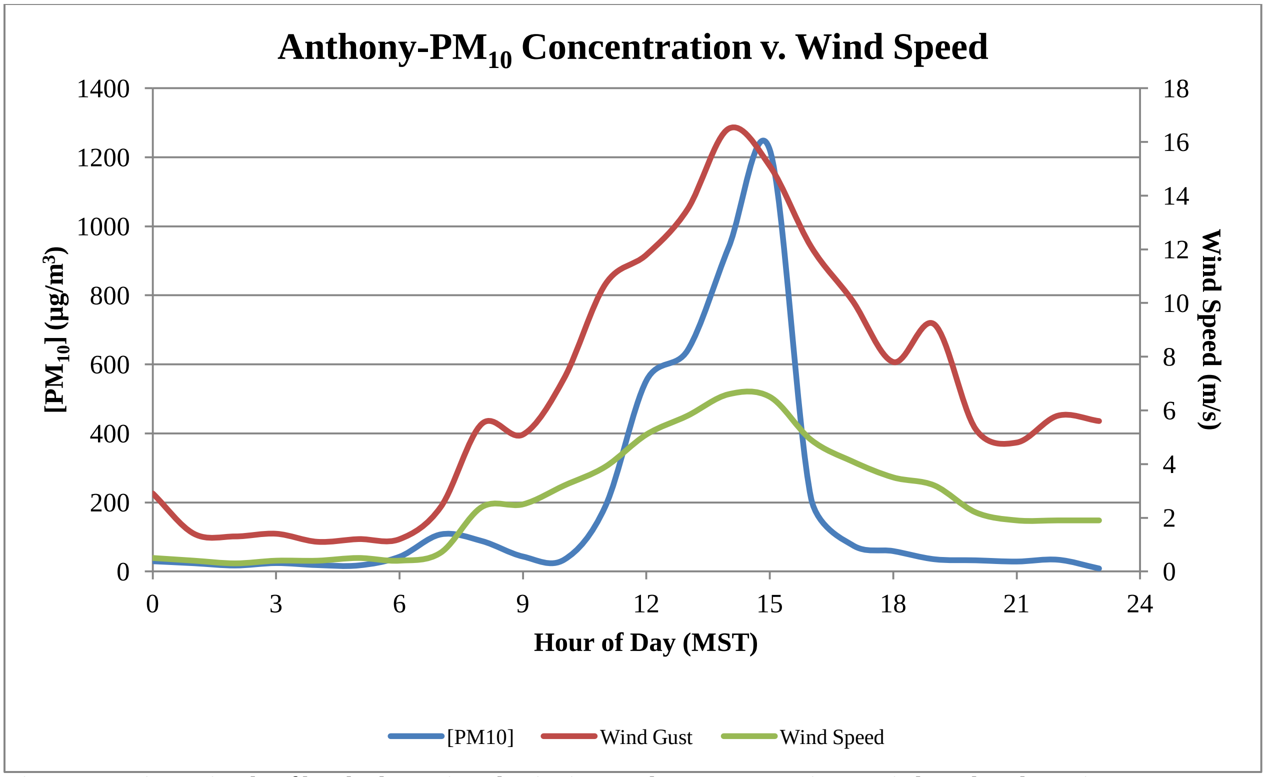

Figure 3-11. Time series plot of hourly observations showing increased PM_{10} concentrations as wind speeds and gusts increase.

3.6 Affects Air Quality

The historical fluctuations and clear causal relationship analyses prove that the event in question affected air quality on January 26, 2009.

3.7 Natural Event

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

3.8 No Exceedance but for the Event

The six hourly PM_{10} values from 1100-1600 hours exceed the 24-hour average standard at Anthony [(189 + 554 + 641 + 940 + 1220 + 212) µg/m^3 = 3756 µg/m^3; (3756 µg/m^3)/24 = 156 µg/m^3]. Without the high wind and blowing dust an exceedance would not have been recorded.

4 HIGH WIND EXCEPTIONAL EVENT: February 10, 2009

4.1 Summary of Event

High winds and blowing dust caused an exceedance of the PM_{10} NAAQS at the AQB's Anthony, SPCY, and Chaparral monitoring sites on February 10, 2009. The 24-hour averages were recorded by FEM TEOM continuous monitors. The midnight-to-midnight 24-hour average concentrations were 250 µg/m^3 at Anthony, 190 µg/m^3 at SPCY and 170 µg/m^3 at Chaparral. All averages were rounded to the nearest 10 µg/m^3. This data has been submitted to AQS and flagged as high wind natural events under the EER. Although no other monitoring site recorded an exceedance, elevated PM_{10} concentrations were measured at the Holman and Desert View monitoring sites (Figure 4-1).

The weather conditions that caused high winds follow the typical scenario with the passage of a Pacific cold front. Winds blew from a predominantly westerly direction throughout the entire border region, crossing over desert and anthropogenic sources within New 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.

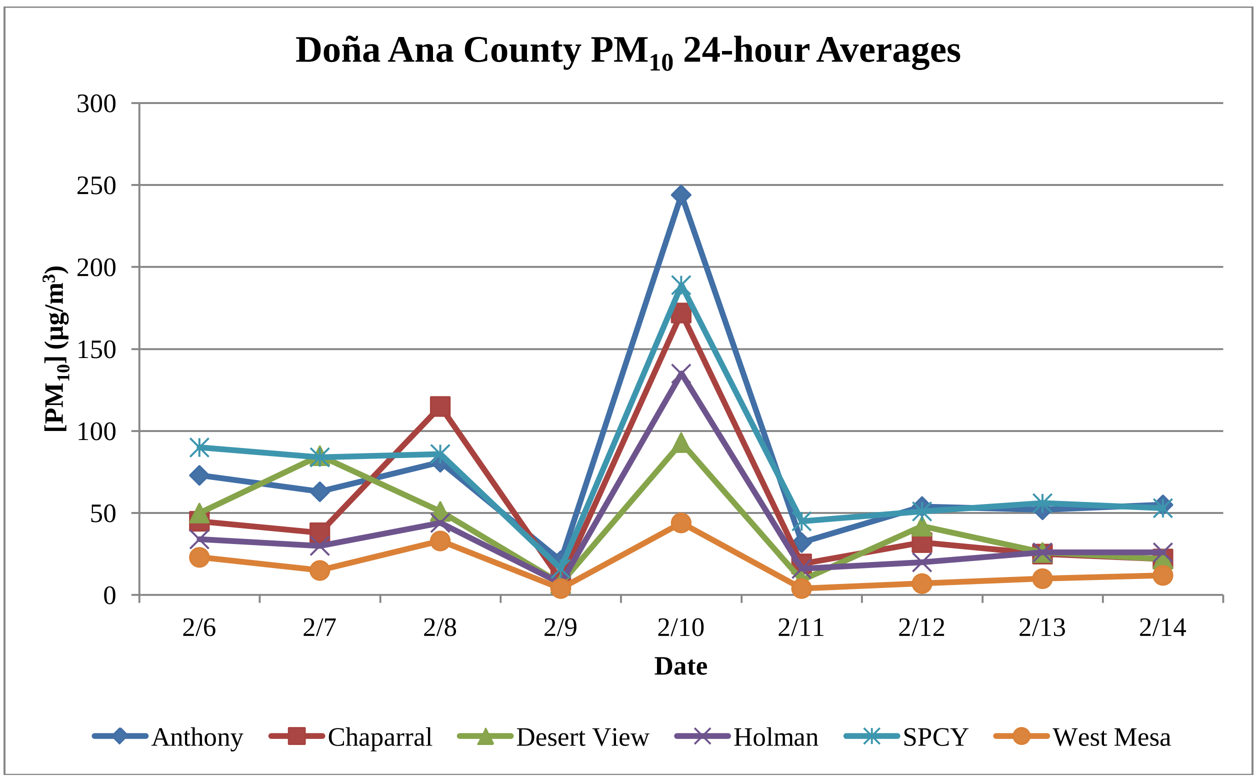

Figure 4-1. 24-hour averages for the four days before and after the suspected high wind event. Averages measured using TEOM instruments at monitoring sites in Doña Ana County.

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 these exceedances include the undisturbed desert, agricultural lands, residential lands and unpaved roads in Doña Ana and Luna Counties. During February most agricultural lands have not been disturbed since the fall harvest. Much of the development in Doña Ana County has occurred in the City of Las Cruces where city ordinance requires BACM.

4.2.2 Sustained and Instantaneous Wind Speeds

EPA has indicated that 11.2 m/s (25 mph) would be used as the default entrainment threshold for natural events caused by high wind and blowing dust (EPA, 2011). NMED has found that a sustained hourly wind speed lasting two hours or more of 6 m/s with instantaneous wind gusts of 12 m/s or more can create blowing dust in the border region (Aaboe et al., 1998-2007; Saxton et al., 2000). In the past, NMED used 18 m/s as the threshold wind gust where the best controlled sources will be overwhelmed and entrain dust. On February 10, wind speeds exceeded both of NMED's presumed threshold velocities for dust entrainment at all monitoring sites (Figures 4-2 & 4-3). The West Mesa, Holman, Chaparral and Deming sites recorded average hourly wind speeds exceeding 11.2 m/s for 4 to 8 hours.

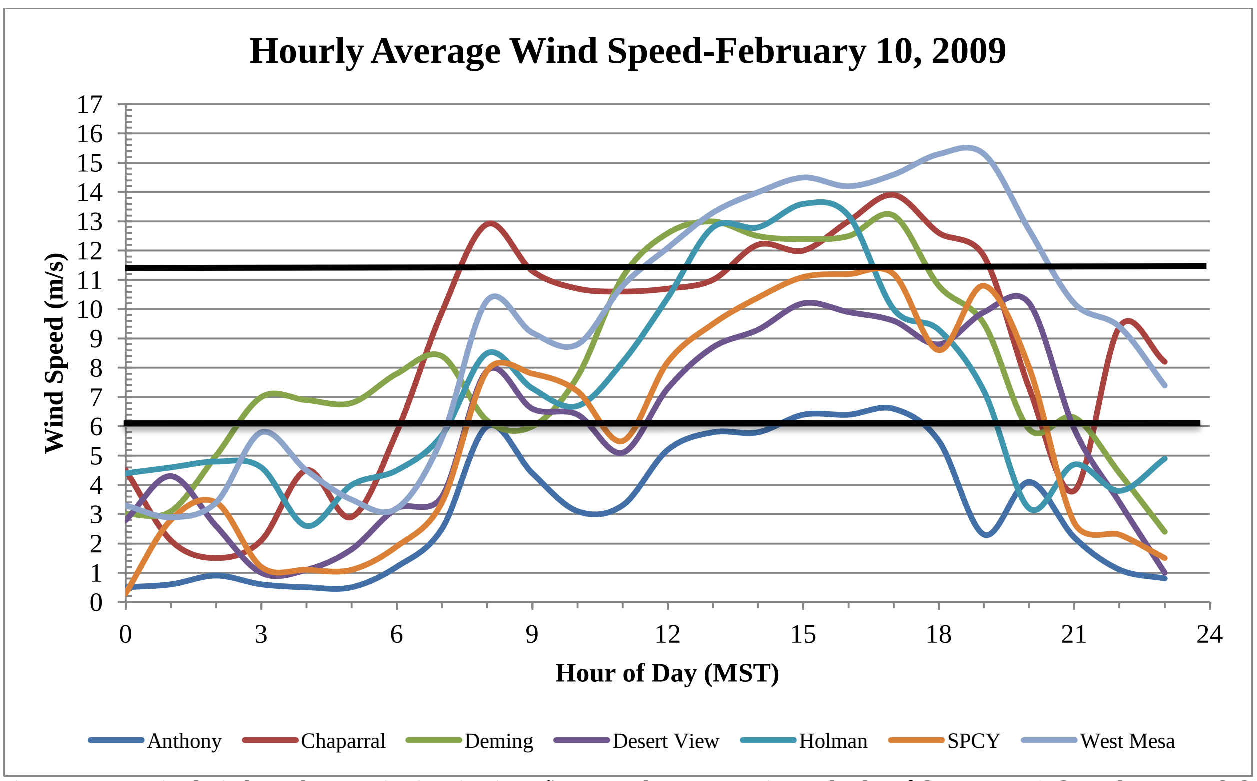

Figure 4-2. Sustained wind speeds at monitoring sites in Doña Ana and Luna Counties on the day of the event. Wind speeds are sampled every other second then averaged over an hour. The Anthony and West Mesa sites measure wind speed at 2 and 8 meters above grade respectively. All other sites measure wind speed at 10 meters above grade.

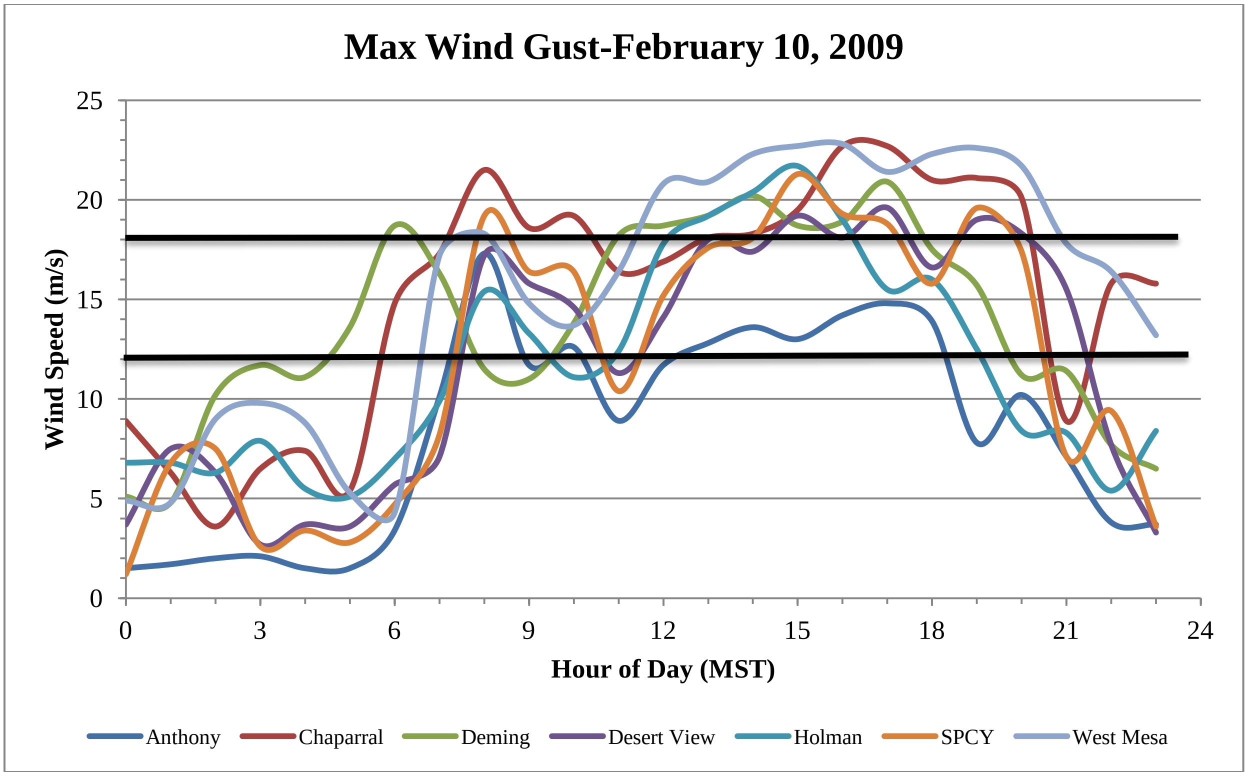

Figure 4-3. Maximum wind speeds at monitoring sites in Doña Ana and Luna Counties on the day of the event. Wind speeds are sampled every other second with the maximum of the hourly samples supplied here. The Anthony and West Mesa sites measure wind speed at 2 and 8 meters above grade respectively. All other sites measure wind speed at 10 meters above grade.

4.2.3 Recurrence Frequency

The Anthony monitoring station can record exceedances at any time of year. From 2003-2008, the FEM TEOM monitor has recorded 57 exceedances and the FRM Wedding monitor has recorded five exceedances (Figure 4-4). The difference between the number of recorded exceedances is due to the FRM Wedding monitor sampling schedule of 1-in-6 days. The Anthony site records an average of 9.5 exceedances per year, with a high of 16 in 2008 and a low of 4 in 2007 and 2005.

The Chaparral monitoring station can record exceedances at any time of year. From 2003-2008, the FEM TEOM monitor has recorded 55 exceedances (Figure 4-4). There is no FRM Wedding monitor at the Chaparral site. The Chaparral site records an average of 9.2 exceedances per year, with a high of 18 in 2008 and a low of 3 in 2005.

The SPCY monitoring station can record exceedances at any time of year. From 2003-2008, the FEM TEOM monitor has recorded 61 high wind exceedances and the FRM Wedding monitor has recorded three (Figure 4-4). The difference between the number of recorded exceedances is due to the FRM Wedding monitor sampling schedule of 1-in-6 days. The SPCY site records an average of 10.2 exceedances per year, with a high of 14 in 2004 and 2008 and a low of 5 in 2007.

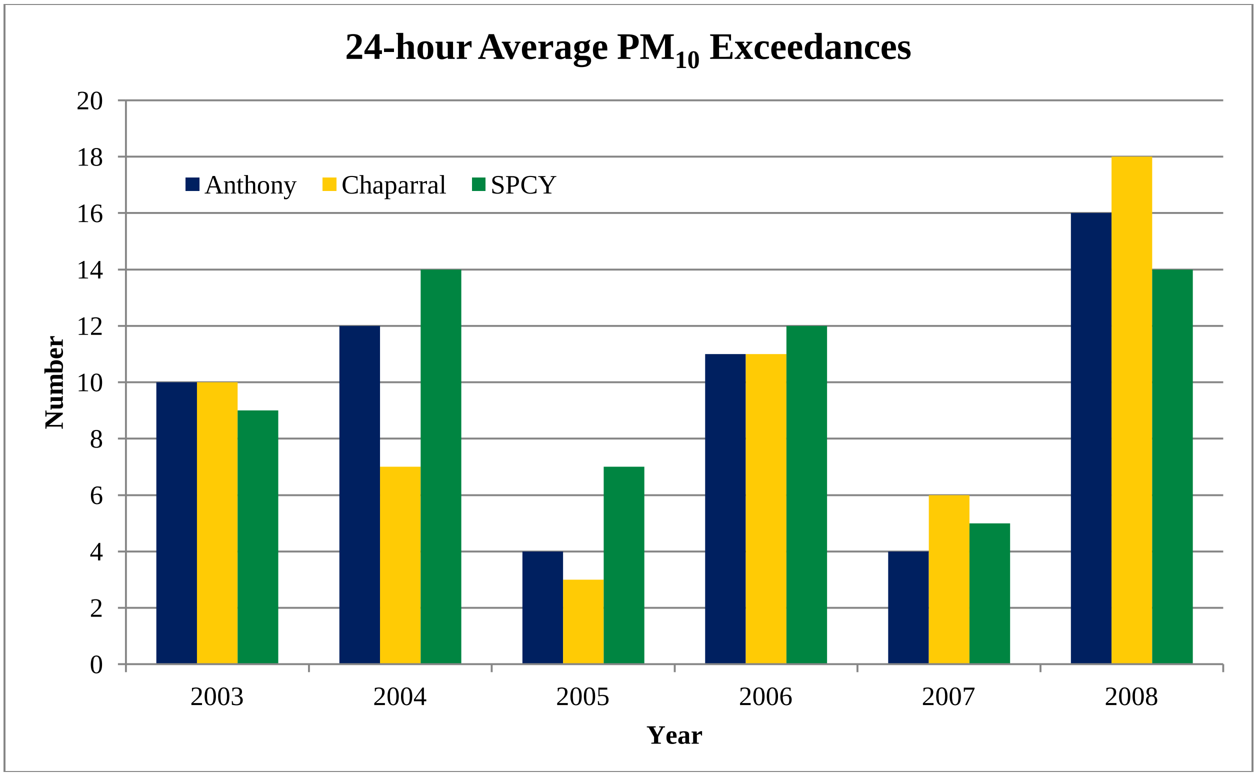

Figure 4-4. High wind blowing dust exceedances recorded by the FEM TEOM instruments. The FRM Wedding instruments recorded an additional five exceedances at Anthony and three at SPCY over the same time period.

4.2.4 Controls Analysis

Implementation of BACM in Doña Ana County has been carried out through the ordinances and MOUs adopted under the NEAP. The ordinances regulate disturbed lands, construction and demolition, vacant parking lots and materials handling and transportation. On this day no other unusual PM_{10} producing activities occurred and anthropogenic emissions remained constant before, during and after the event. The most likely sources contributing to the event are agricultural and residential properties in Doña Ana County as well as desert lands in Doña Ana and Luna Counties. The southern sites recorded the highest 24-hour averages in the monitoring network but the Holman site was also impacted by local sources. A back-trajectory analysis using the HYSPLIT (Draxler et al., 2011; Rolph, 2011) model shows that the air masses traveled from the boot-heel region in southwestern New Mexico through southern Hidalgo, Grant and Luna Counties to the monitors in southern Doña Ana County. The air masses that traveled to the Las Cruces monitors originated in northern Hidalgo and Luna Counties as well as central Grant County (Figure 4-5). The large difference between 24-hour averages at the Holman, West Mesa and Deming sites suggests that desert, agricultural and residential land in and around Las Cruces contributed to elevated levels at the Holman site. Without detailed emission inventories it is impossible to quantify the amount each source contributes to an exceedance. The back-trajectory model was run for the eight hours preceding the constant elevated concentrations of the event. Controlling dust from the natural desert terrain is cost prohibitive. NMED concludes that the sources contributing to the event are not reasonably controllable.

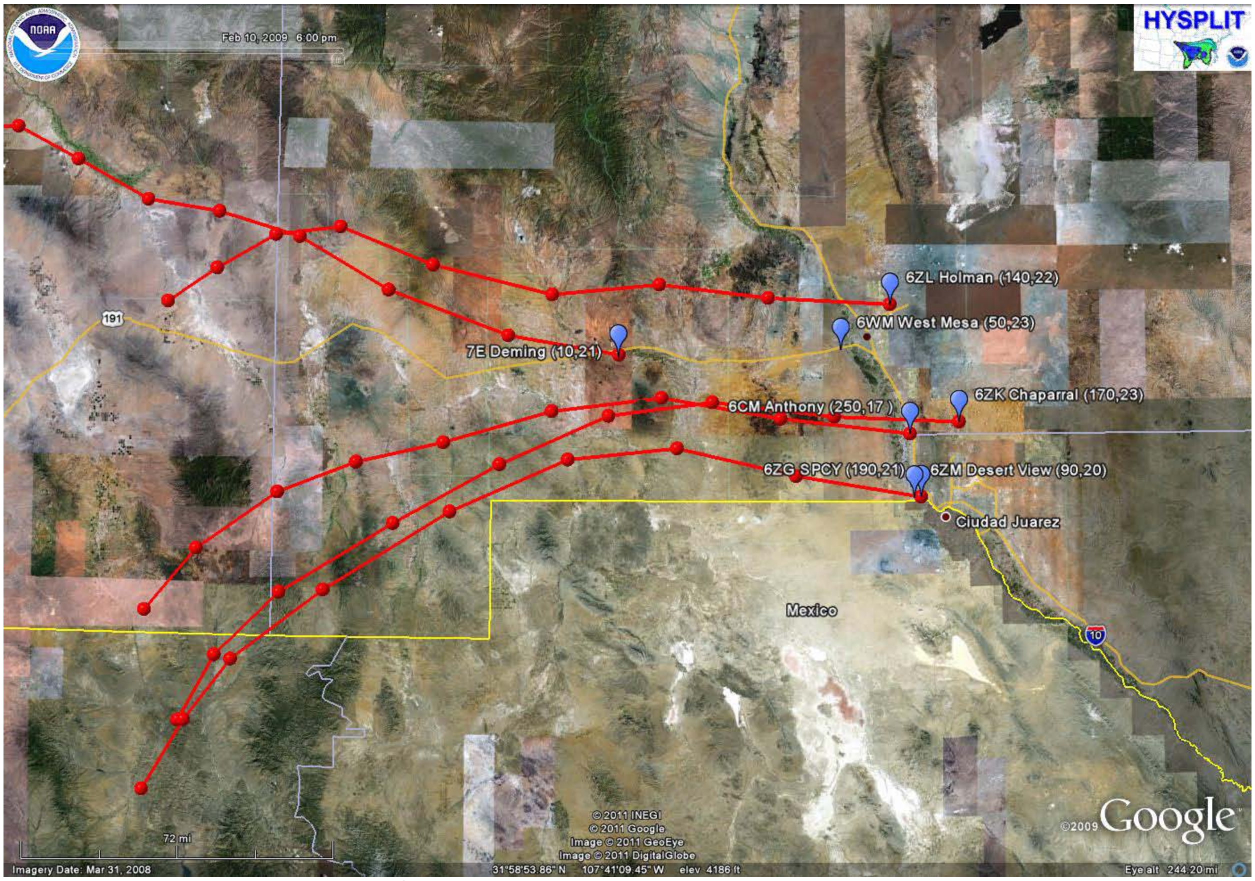

Figure 4-5. Back-trajectory model analysis for the event on February 10, 2009. The numbers in parenthesis are the 24-hour average PM_{10} concentration and max wind gust respectively. The model was run for the eight hours preceding the peak concentrations of the event starting from the 1200 hour. Each ball represents one hour in the past from the starting point of the model run.

4.4 Historical Fluctuations Analysis

<u>4.4.1 Annual and Seasonal 24-hour Average Fluctuations</u>

The Anthony, SPCY and Chaparral sites have recorded PM_{10} exceedances every year since continuous FEM TEOM monitoring was established. These exceedances can occur during any time of year and are caused by high winds (Figure 4-6, 4-7, 4-8). 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} concentrations were 403 µg/m^3 at Anthony, 1110 µg/m^3 at Chaparral and 1109 µg/m^3 at SPCY. All exceedances at Anthony and Chaparral have been caused by high winds and natural events demonstrations were submitted to EPA under the NEAP or EER.

SPCY is the only site in the network where low wind exceedances have been recorded. From 2003-2005 the FEM TEOM monitor recorded 14 low wind exceedances. No exceedances have been recorded since 2005 and NMED continues to research the reasons behind these low wind high PM_{10} concentrations. All other exceedances at SPCY have been caused by high winds and natural events demonstrations were submitted to EPA under the NEAP or EER.

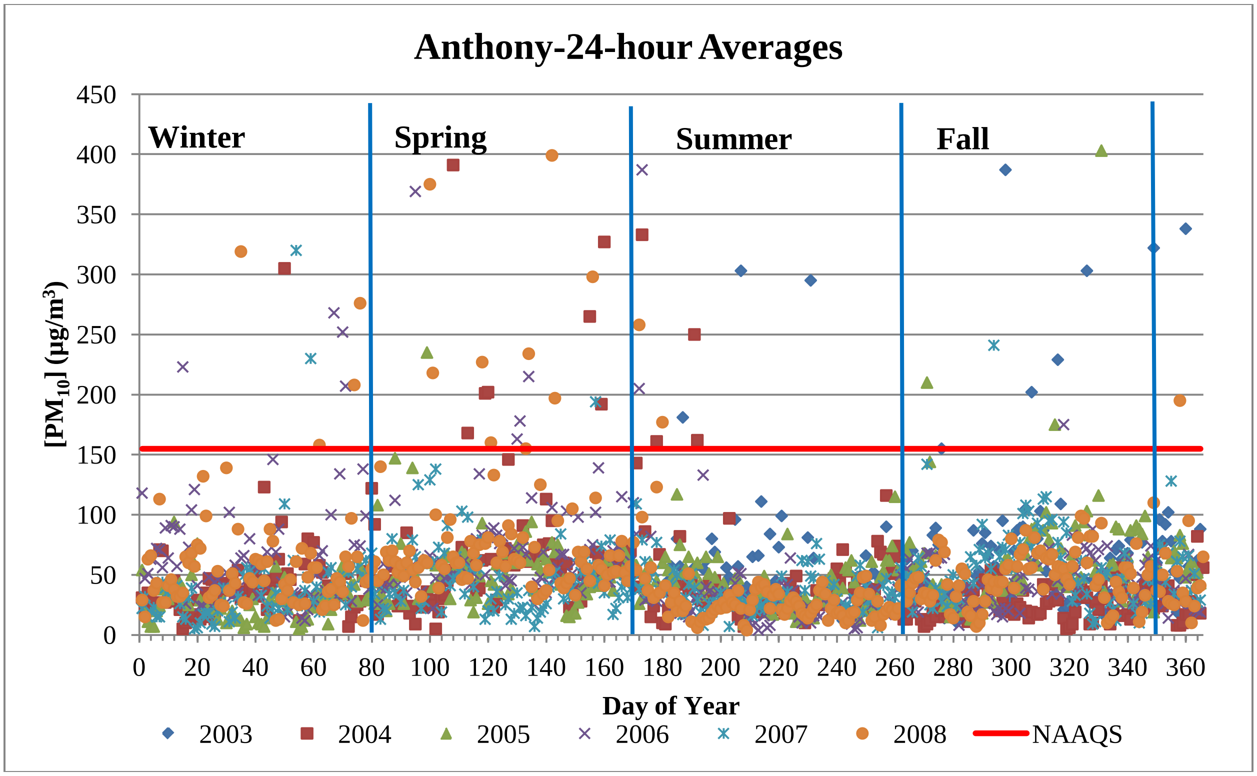

Figure 4-6. 24-hour average PM_{10} concentrations by day of year from 2003-2008. All averages collected using FEM TEOM instrument.

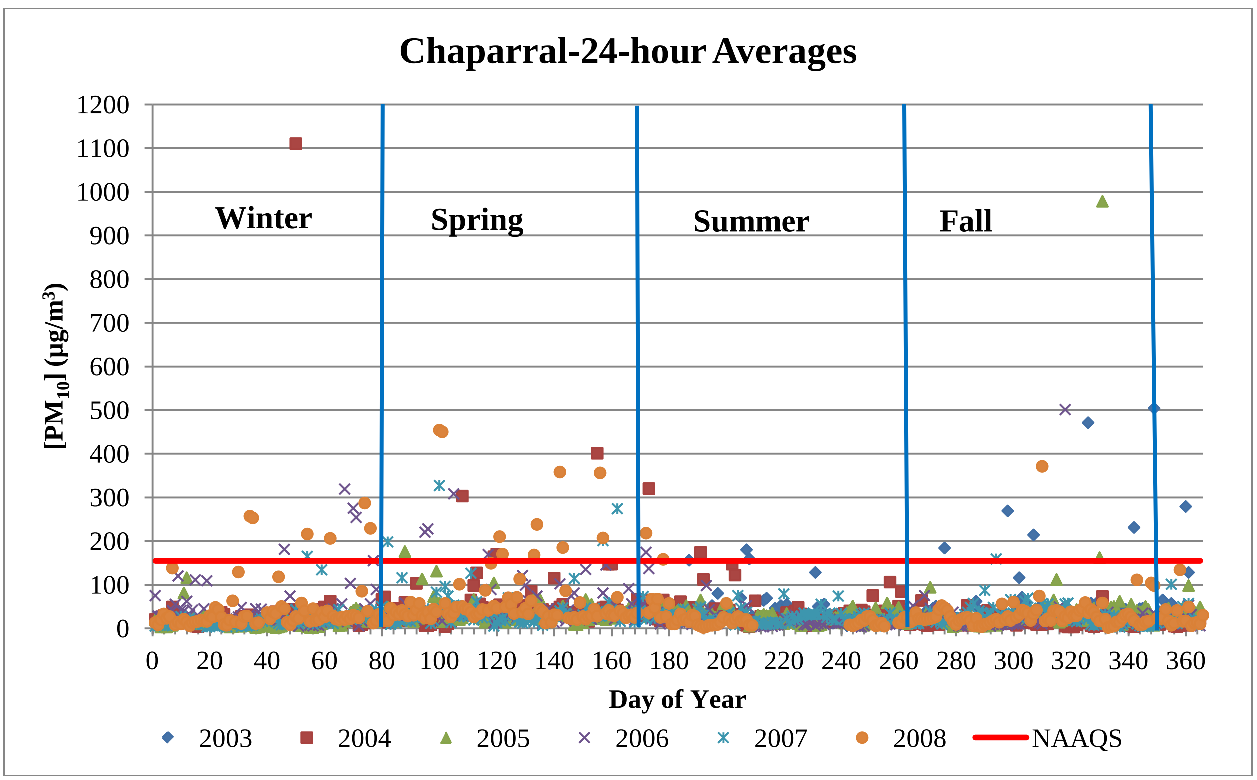

Figure 4-7. 24-hour average PM_{10} concentrations by day of year from 2003-2008. All averages collected using FEM TEOM instrument.

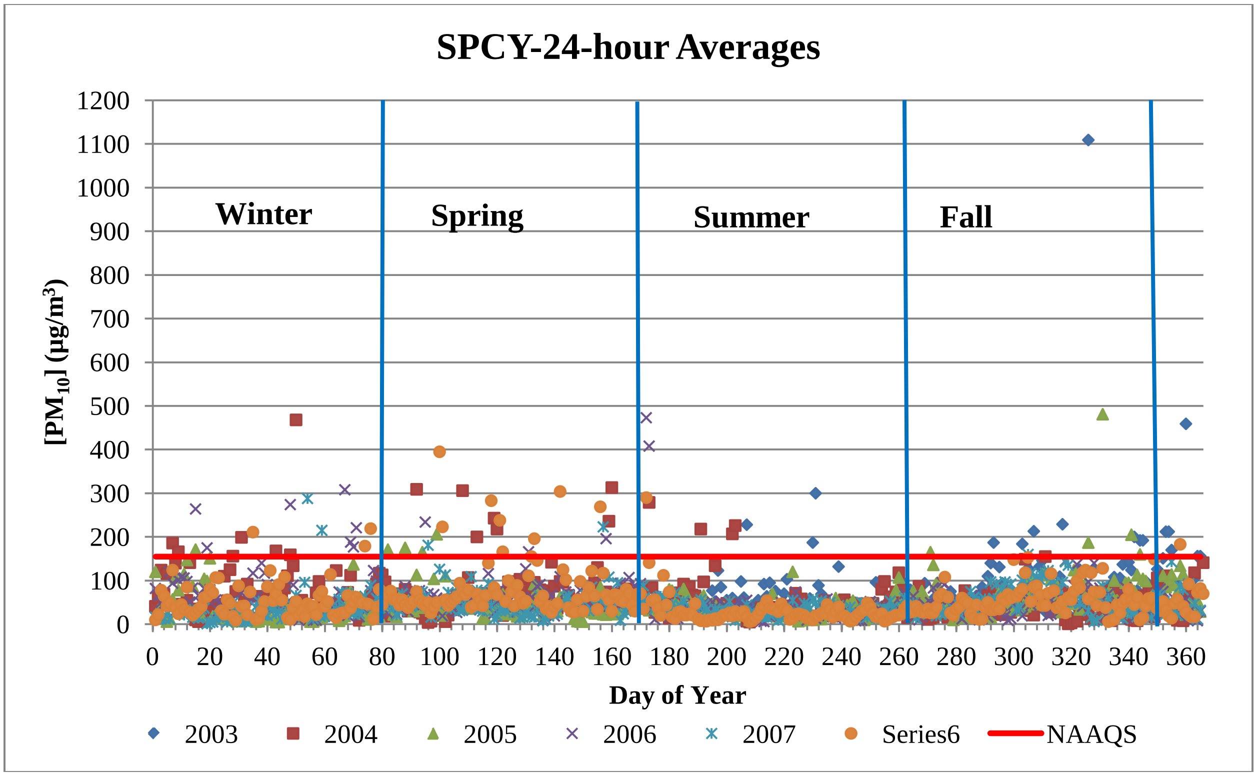

Figure 4-8. 24-hour average PM_{10} concentrations by day of year from 2003-2008. All averages collected using FEM TEOM instrument.

The recorded values for this day (244 µg/m^3 at Anthony, 172 µg/m^3 at Chaparral, and 189 µg/m^3 at SPCY) are above the 95th percentile of all 24-hour averages recorded at each respective site (Table 4-1).

Anthony	Max	99th	95th	75th	50th	Mean	25th	5th	Minimum
No Events	147	123	88	56	38	42	24	12	4
Events	403	251	103	58	39	48	25	12	4
Chaparral	**Max**	**99th**	**95th**	**75th**	**50th**	**Mean**	**25th**	**5th**	**Minimum**
No Events	149	118	65	35	24	28	15	6	2
Events	1110	271	98	37	25	36	15	6	2
SPCY	**Max**	**99th**	**95th**	**75th**	**50th**	**Mean**	**25th**	**5th**	**Minimum**
No Events	212	146	110	61	39	47	24	11	1
Events	1109	237	128	64	40	53	25	11	1

Table 4-1. 24-hour average PM_{10} data distribution with and without high wind events included. Only those high wind events that resulted in an exceedance were excluded from the analysis. Data for Anthony and SPCY includes FRM Wedding and FEM TEOM data from 2003-2008. Data for Chaparral only includes FEM TEOM data from 2003-2008.

An hourly data distribution analysis was done for PM_{10} concentrations and wind gust speeds (Appendices A and B). When the hourly data for February10 is overlaid on the hourly data distribution plots, it shows that the values recorded during the high wind event exceed the 95th percentile for both PM_{10} and wind gusts at all monitoring sites (Figures 4-9 through 4-14). The hourly PM_{10} values during the high wind blowing dust storm far exceed the historical 95th percentiles of hourly data.

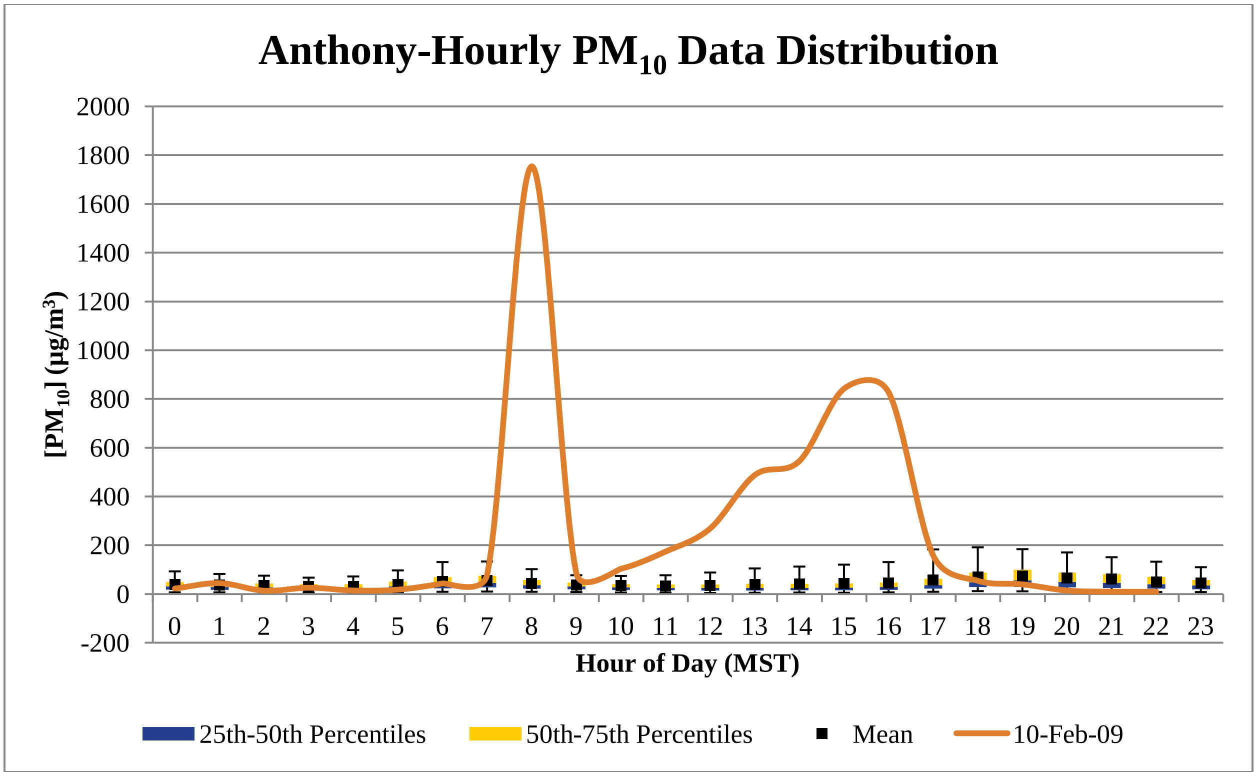

Figure 4-9. All data recorded using the FEM TEOM monitor. Data distribution is for hourly values from 2003-2008. The top whisker represents the 95th percentile of data.

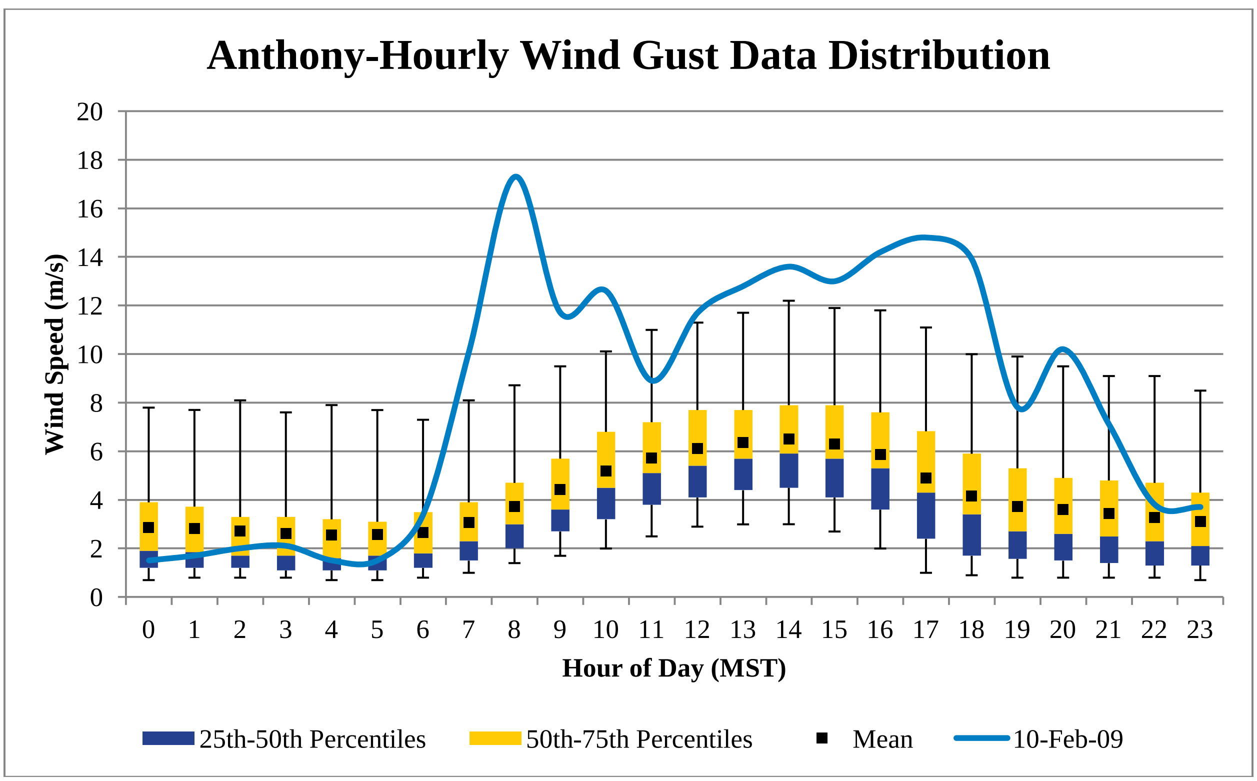

Figure 4-10. Wind speed data distribution from 2006-2008 measured at 2 meters. Data is for the maximum wind gust recorded during the hour.

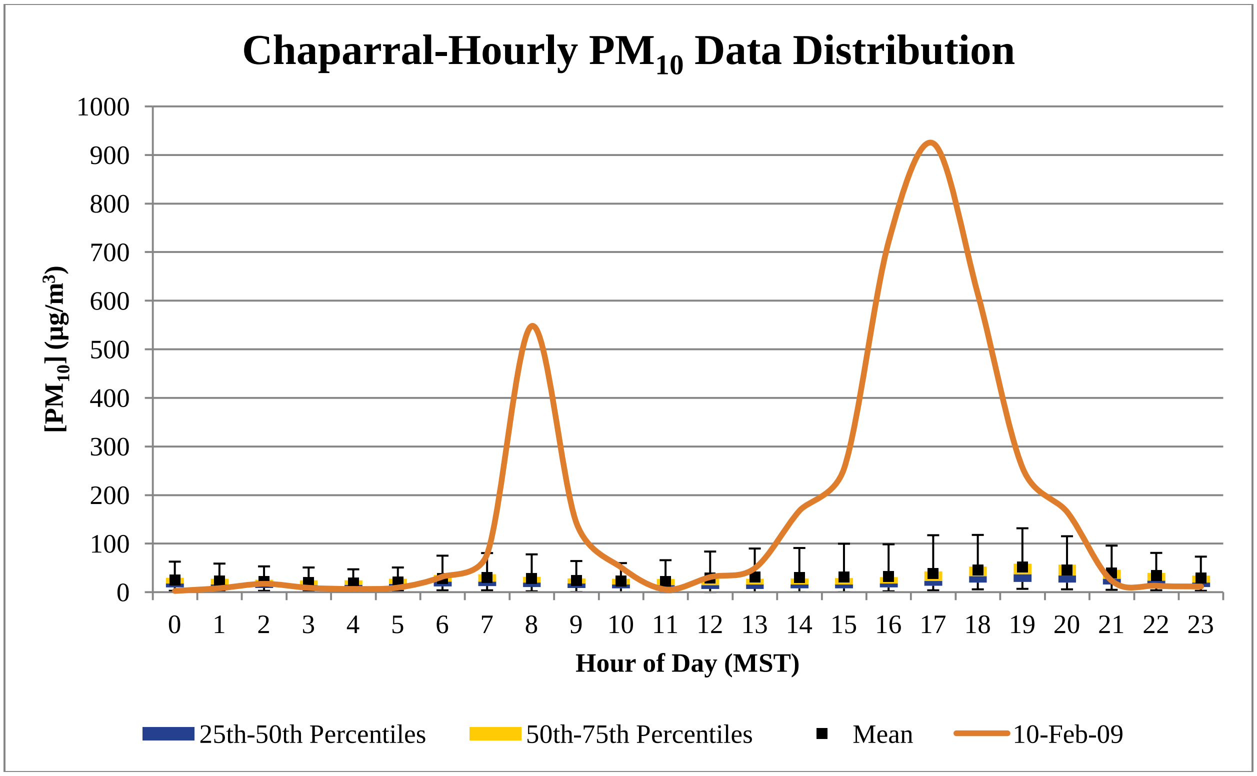

Figure 4-11. All data recorded using the FEM TEOM monitor. Data distribution is for hourly values from 2003-2008. The top whisker represents the 95th percentile of data.

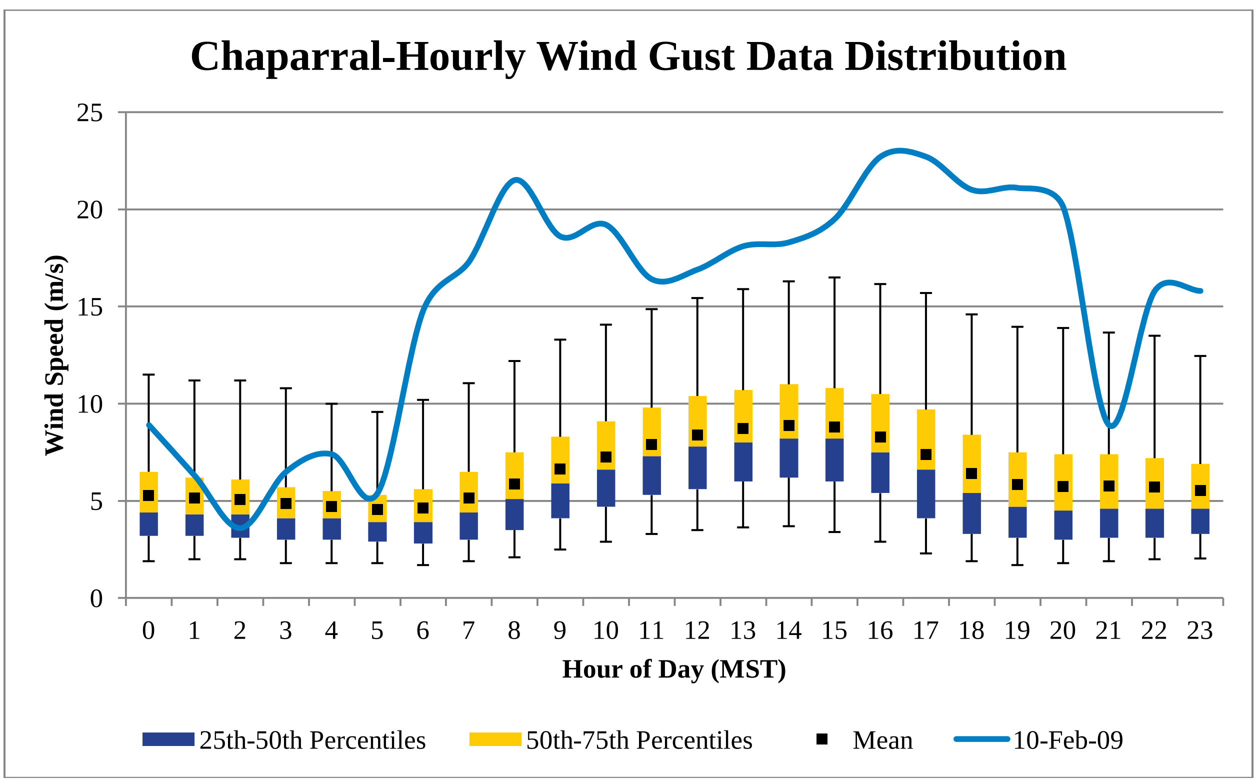

Figure 4-12. Wind speed data distribution from 2006-2008 measured at 10 meters. Data is for the maximum wind gust recorded during the hour.

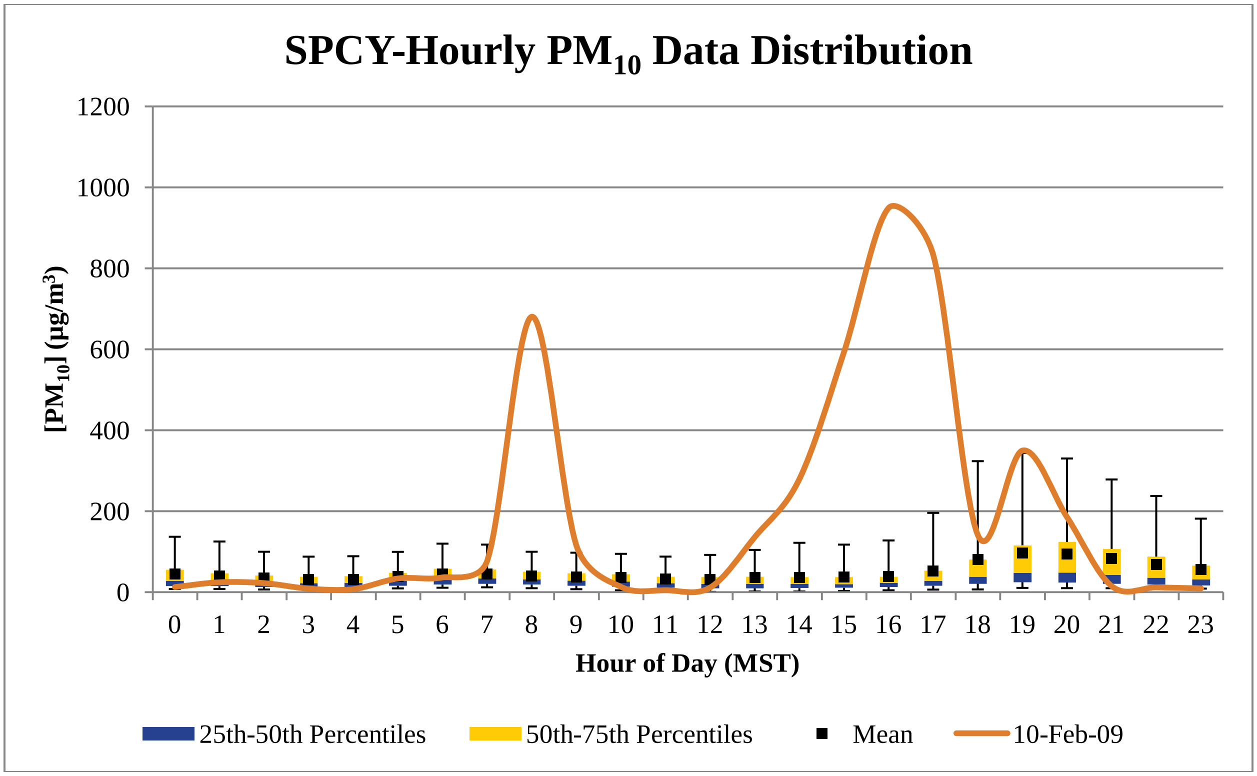

Figure 4-13. All data recorded using the FEM TEOM monitor. Data distribution is for hourly values from 2003-2008. The top whisker represents the 95th percentile of data.

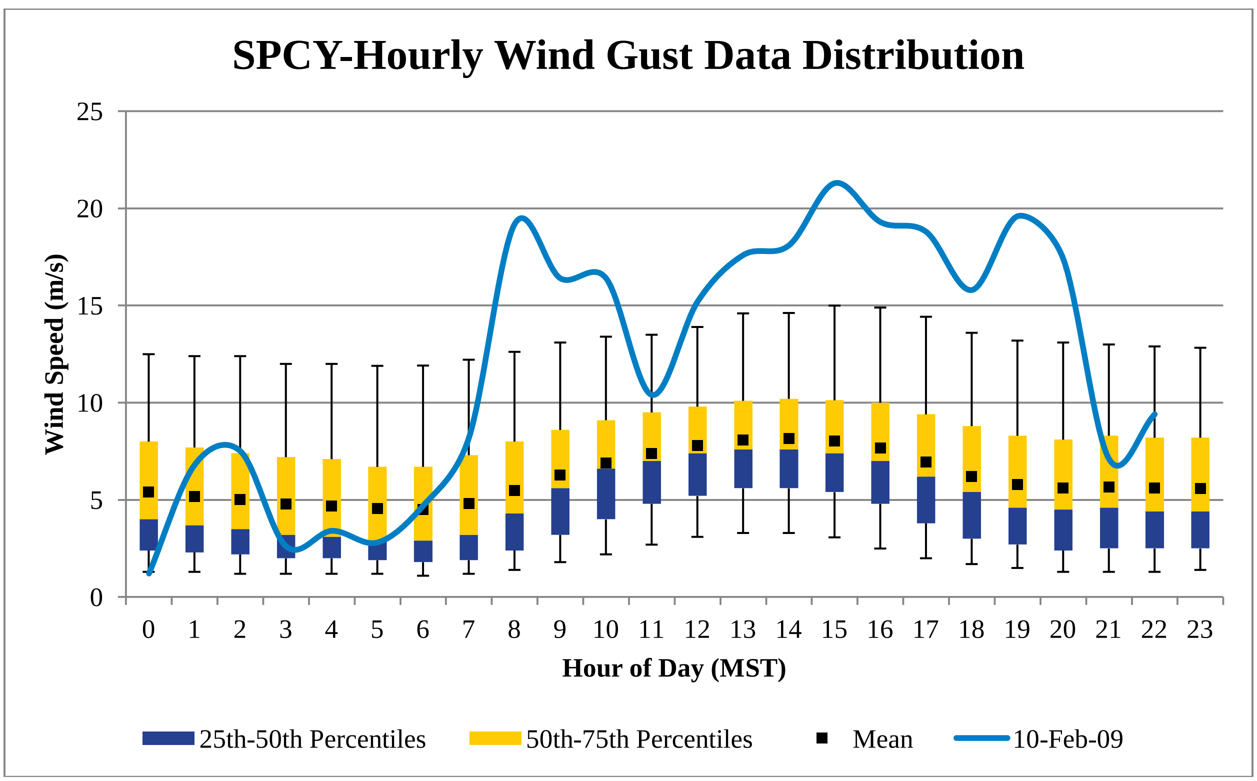

Figure 4-14. Wind speed data distribution from 2006-2008 measured at 10 meters. Data is for the maximum wind gust recorded during the hour.

4.5 Clear Causal Relationship

A Pacific cold front passed through New Mexico on February 10, 2009 with the center of low pressure traversing the New Mexico-Colorado border. Behind the cold front a strong pressure gradient formed over southeastern Arizona, southwestern New Mexico and northern Mexico (Figure 4-15). At the 500 hour an area of low pressure aloft was observed above the Arizona-Utah border. As the day progressed this low pressure traveled east and aligned itself the surface wind direction (Figure 4-16). Heating of the surface allowed winds aloft to mix down, increasing surface winds and providing the turbulence required for entrainment of dust.

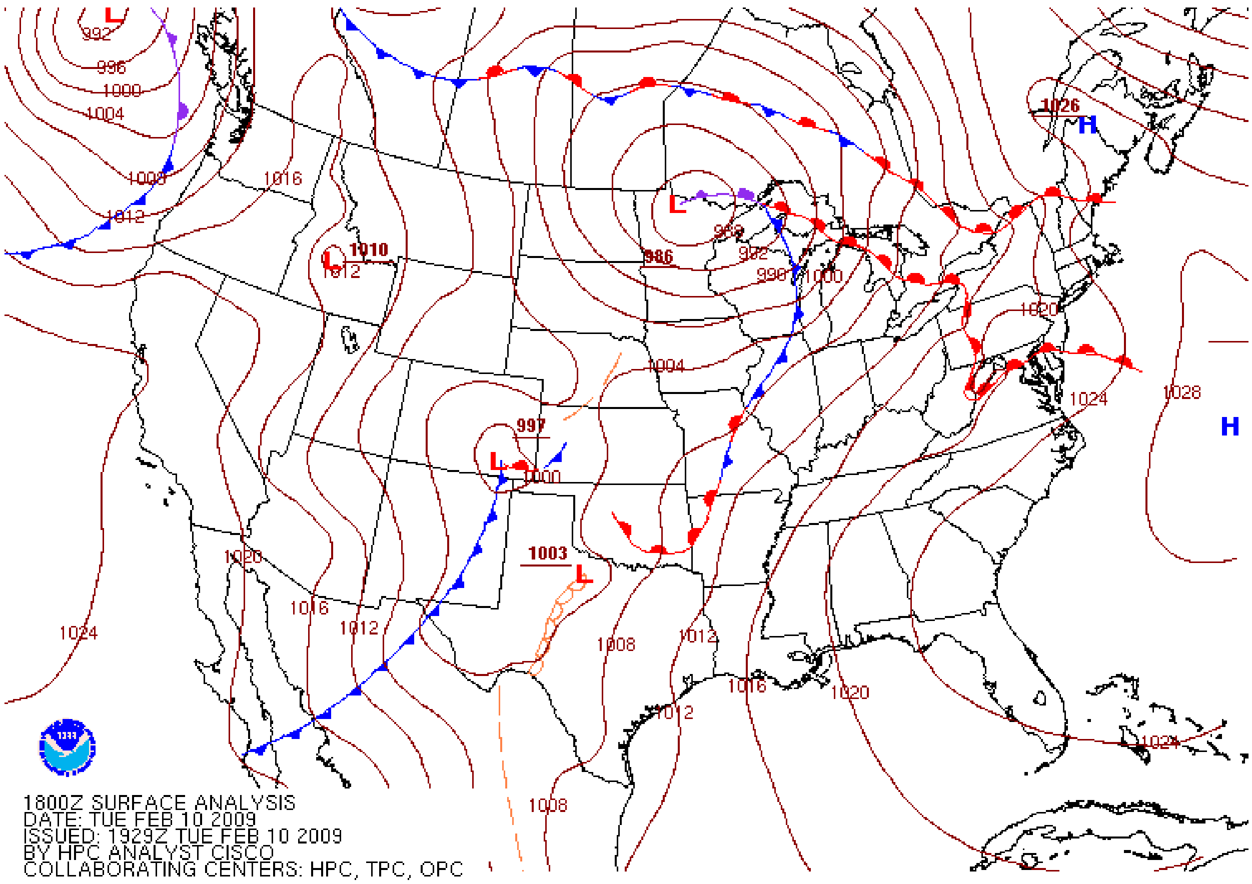

Figure 4-15. February 10, 2009 surface weather map depicting the frontal activity and isobars of constant pressure (red lines) for the 1100 hour MST. Surface winds flow perpendicular to the isobars from high to low pressure.

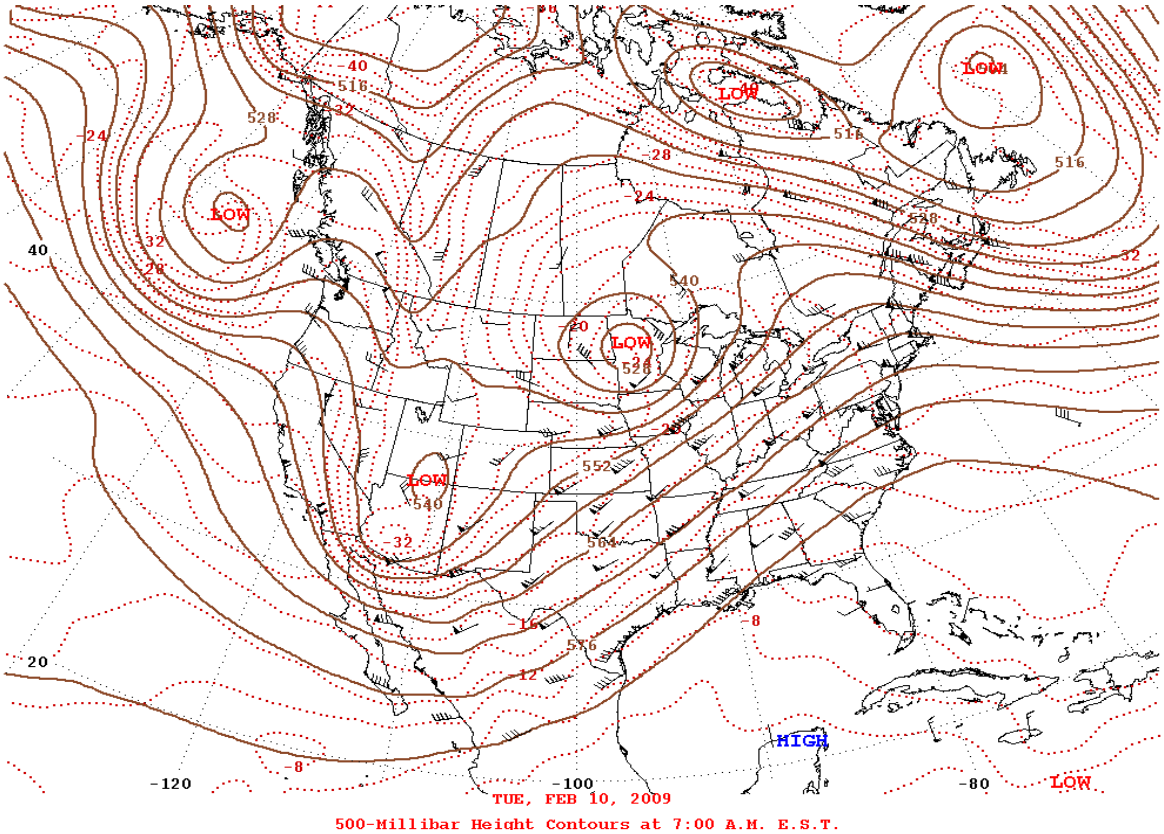

Figure 4-16. Upper air weather map depicting winds speeds aloft (wind barbs) and isobars of constant pressure (brown lines). Winds flow parallel to the isobars.

The weather pattern described above generated strong westerly winds beginning at the 800 hour and lasting through the 1900 hour. During this time frame wind gusts regularly exceeded the historical 95th percentiles of data as shown in Figures 4-10, 4-12, and 4-14. Peak wind gusts ranged from 17 m/s at Anthony to 23 m/s at Chaparral and Deming (Figure 4-3). Sustained hourly average wind speeds of 6 m/s or more and wind gusts of 12 m/s or more were recorded at all monitoring sites during elevated PM_{10} concentrations (Figure 4-2 and 4-3). Blowing dust caused elevated levels of PM_{10} during the same time frame as high winds (Figures 4-17 to 4-19). As wind gusts exceed the 95th percentile of historical data so do hourly PM_{10} concentrations on this date (800 hour and 1200-2000 hours). Hourly PM_{10} concentrations throughout the network exhibit the same pattern with a strong peak at the 800 hour followed by a drop in concentration until the 1200 hour. Elevated concentrations of PM_{10} were recorded throughout the network until the 2000 hour (Figure 4-20).

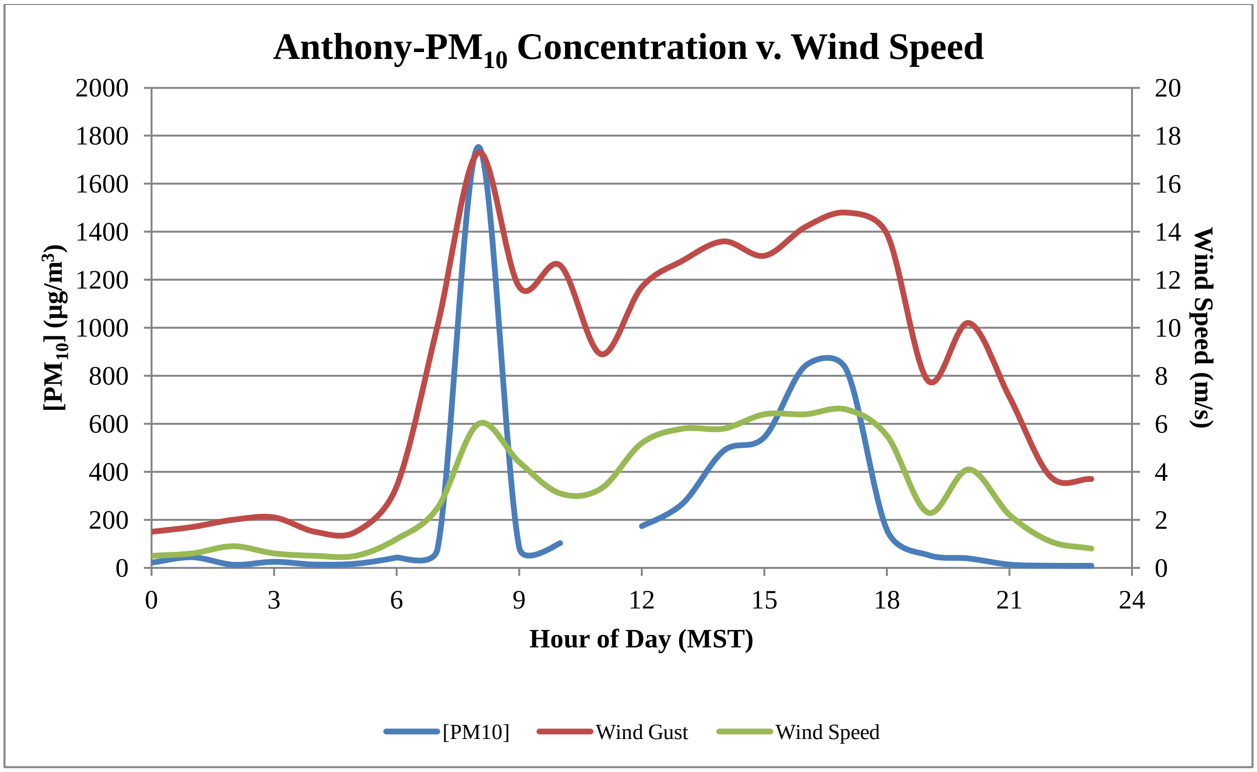

Figure 4-17. Time series plot of hourly observations showing increased PM_{10} concentrations as wind speeds and gusts increase.

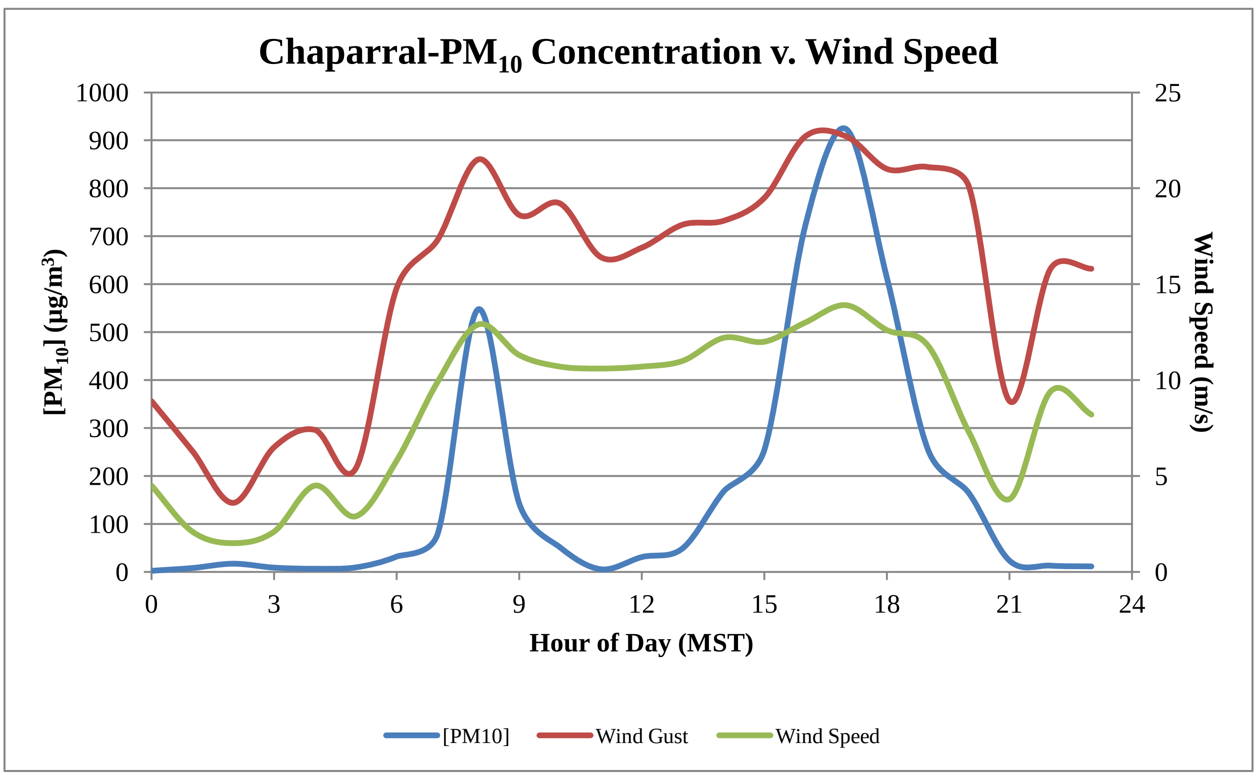

Figure 4-18. Time series plot of hourly observations showing increased PM_{10} concentrations as wind speeds and gusts increase.

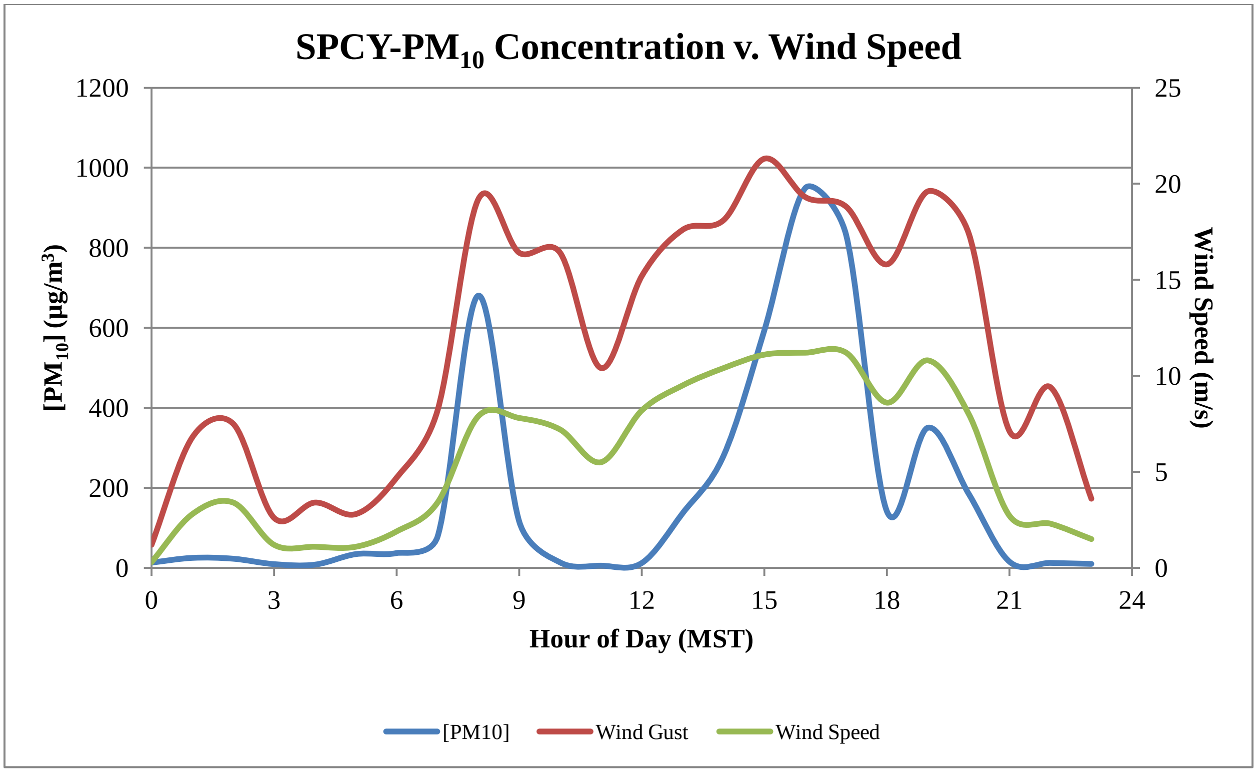

Figure 4-19. Time series plot of hourly observations showing increased PM$_{10}$ concentrations as wind speeds and gusts increase.

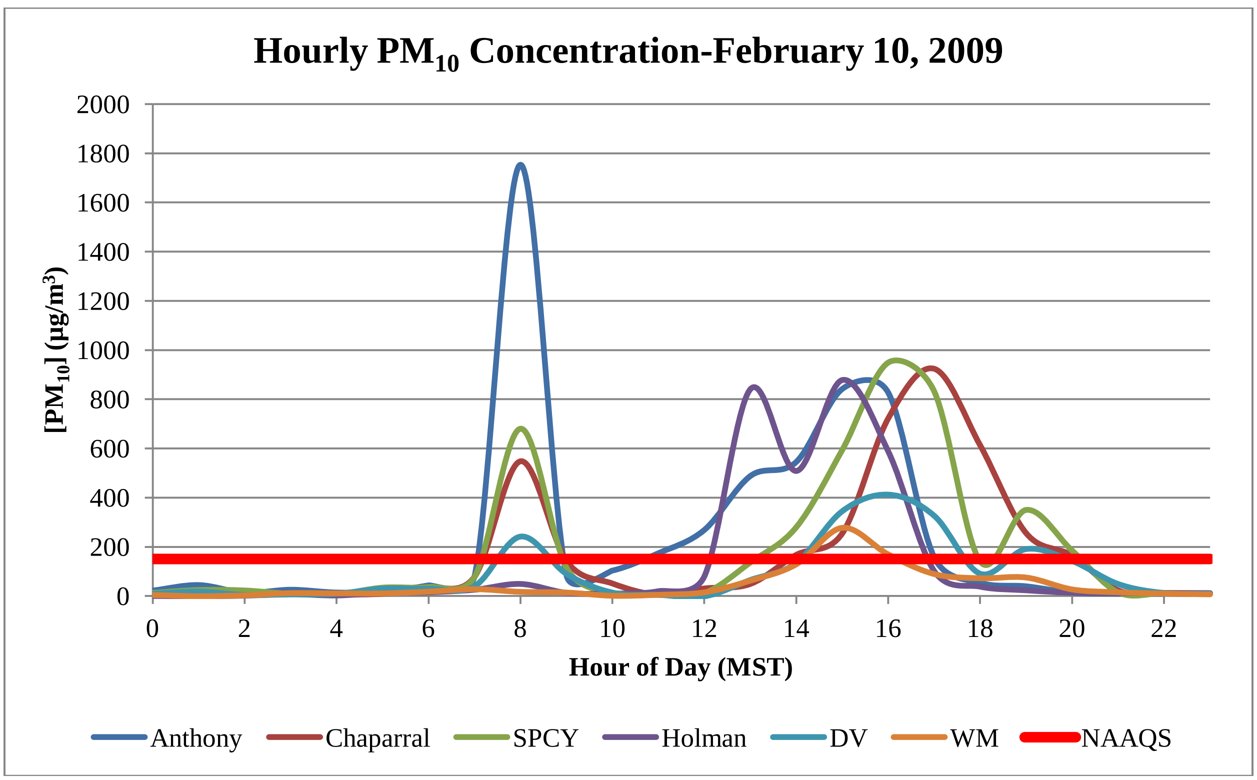

Figure 4-20. Time series plot of hourly observations showing increased PM$_{10}$ concentrations increasing at approximately the same time throughout the monitoring network.

4.6 Affects Air Quality

The historical fluctuations and clear causal relationship analyses prove that the event in question affected air quality on February 10, 2009.

4.7 Natural Event

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

4.8 No Exceedance but for the Event

Six hourly PM_{10} values (800 hour and 1300-1700 hours) exceed the 24-hour average standard at Anthony [(1754 + 269 + 488 + 545 + 842 + 827) μg/m^3 = 4725 μg/m^3; (4725 μg/m^3)/24 = 197 μg/m^3]. Without the high wind and blowing dust an exceedance would not have been recorded.

Nine hourly PM_{10} values (800-900 hours and 1400-2000 hours) exceed the 24-hour average standard at Chaparral [(548 + 142 + 168 + 255 + 723 + 924 + 612 + 256 + 165) μg/m^3 = 3793 μg/m^3; (3793 μg/m^3)/24 = 158 μg/m^3]. Without the high wind and blowing dust an exceedance would not have been recorded.

Seven hourly PM_{10} values (800 hour and 1400-1900 hours) exceed the 24-hour average standard at SPCY [(680 + 280 + 595 + 949 + 832 + 140 + 350) μg/m^3 = 3826 μg/m^3; (3826 μg/m^3)/24 = 159 μg/m^3]. Without the high wind and blowing dust an exceedance would not have been recorded.

5 HIGH WIND EXCEPTIONAL EVENT: March 7, 2009

5.1 Summary of Event

High winds and blowing dust caused an exceedance of the PM_{10} NAAQS at the AQB's Anthony, SPCY, and Chaparral monitoring sites on March 7, 2009. The 24-hour averages were recorded by FEM TEOM continuous monitors. The midnight-to-midnight 24-hour average concentrations were 210 $\mu g/m^3$ at Anthony, 200 $\mu g/m^3$ at SPCY and 200 $\mu g/m^3$ at Chaparral. All averages were rounded to the nearest 10 $\mu g/m^3$. This data has been submitted to AQS and flagged as high wind natural events under the EER. Although no other monitoring site recorded an exceedance, elevated PM_{10} concentrations were measured at the Desert View monitoring site (Figure 5-1). The 24-hour average of 150 $\mu g/m^3$ recorded at Desert View is not an exceedance due to rounding conventions in the NAAQS.

The weather conditions that caused high winds follow the typical scenario with the passage of a Pacific cold front. Winds blew from a predominantly southwesterly direction throughout the entire border region, crossing over desert and anthropogenic sources within New 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.

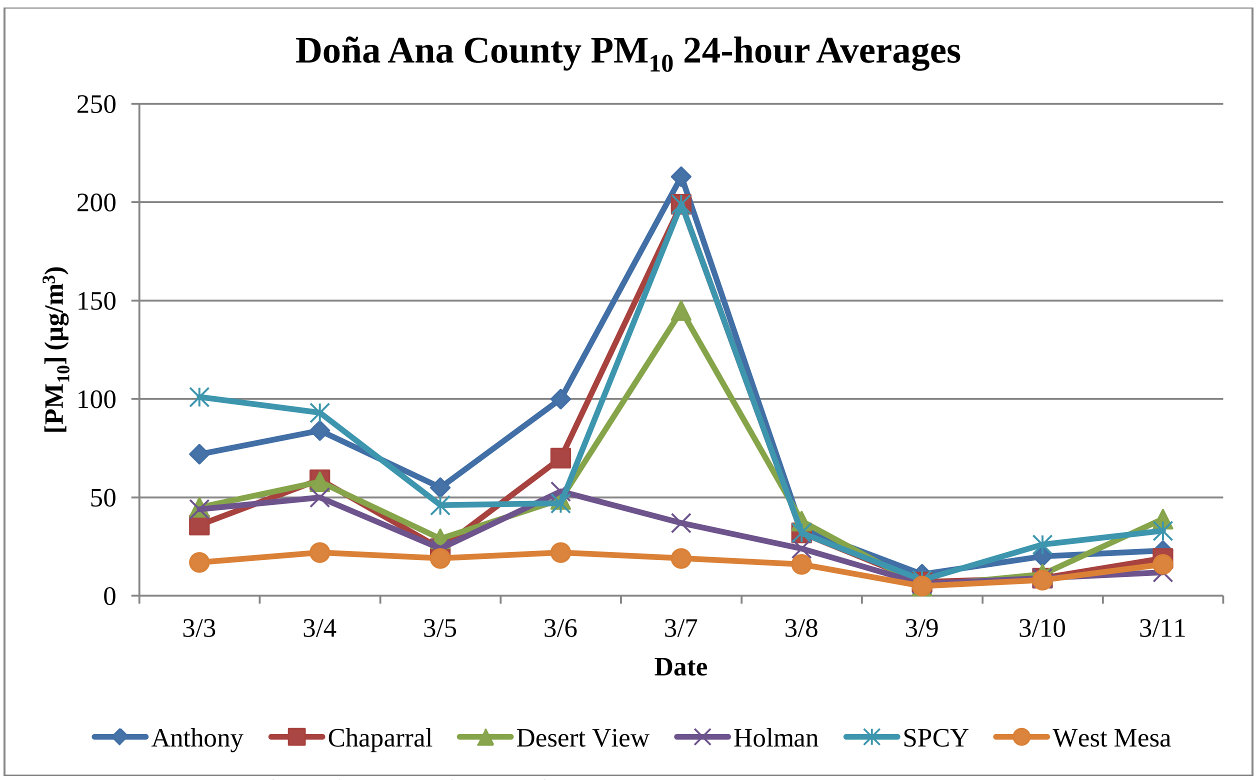

Figure 5-1. 24-hour averages for the four days before and after the suspected high wind event. Averages measured using TEOM instruments at monitoring sites in Doña Ana County.

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 these exceedances include the natural desert, residential properties, agricultural lands and unpaved roads in Doña Ana County. Agricultural tilling and crop planting are activities conducted during March and may have contributed to the event. Much of the development in Doña Ana County has occurred in the City of Las Cruces where city ordinance requires BACM. The largest and most likely sources of windblown dust are the playas of northern Mexico.

5.2.2 Sustained and Instantaneous Wind Speeds

EPA has indicated that 11.2 m/s (25 mph) would be used as the default entrainment threshold for natural events caused by high wind and blowing dust (EPA, 2011). NMED has found that a sustained hourly wind speed lasting two hours or more of 6 m/s with instantaneous wind gusts of 12 m/s or more can create blowing dust in the border region (Aaboe et al., 1998-2007; Saxton et al., 2000). In the past, NMED used 18 m/s as the threshold wind gust where the best controlled sources will be overwhelmed and entrain dust. On March 7, wind speeds exceeded both of NMED's presumed threshold velocities for dust entrainment at all monitoring sites (Figures 5-2 & 5-3). The Chaparral site recorded average hourly wind speeds exceeding 11.2 m/s from 900 to 1600 hours.

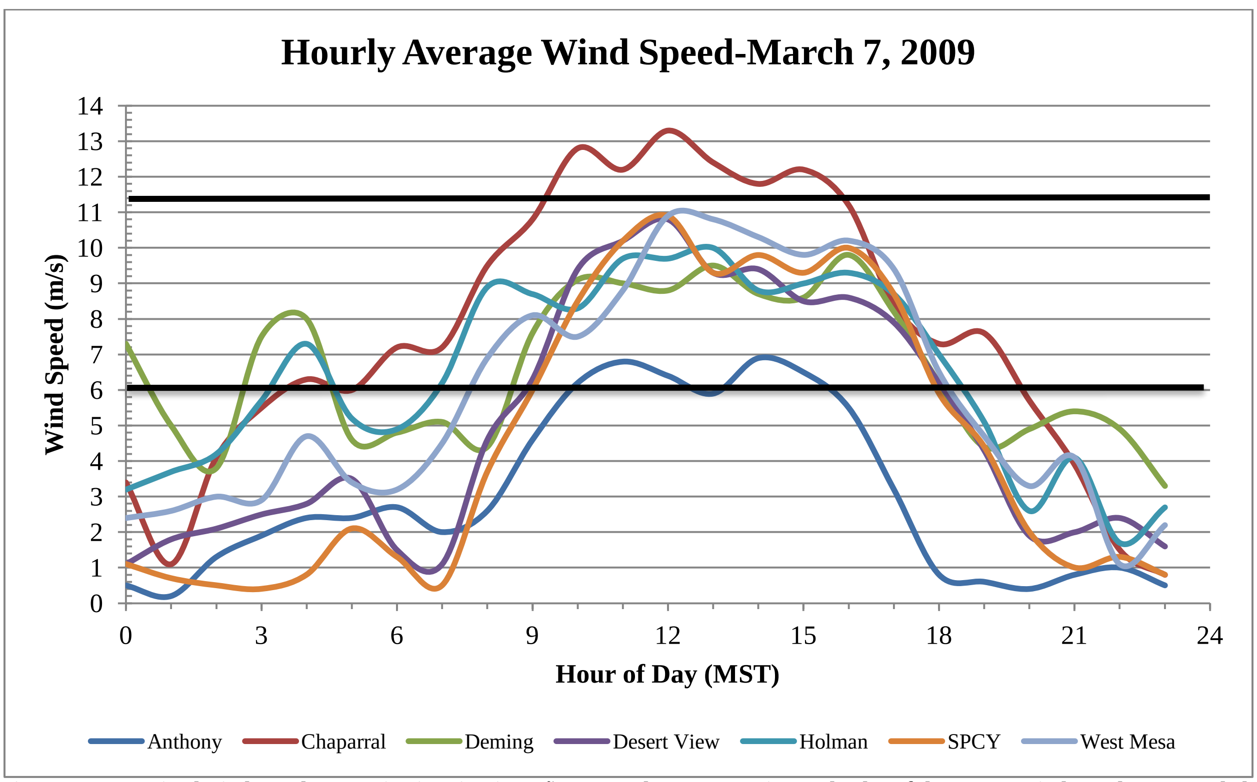

Figure 5-2. Sustained wind speeds at monitoring sites in Doña Ana and Luna Counties on the day of the event. Wind speeds are sampled every other second then averaged over an hour. The Anthony and West Mesa sites measure wind speed at 2 and 8 meters above grade respectively. All other sites measure wind speed at 10 meters above grade.

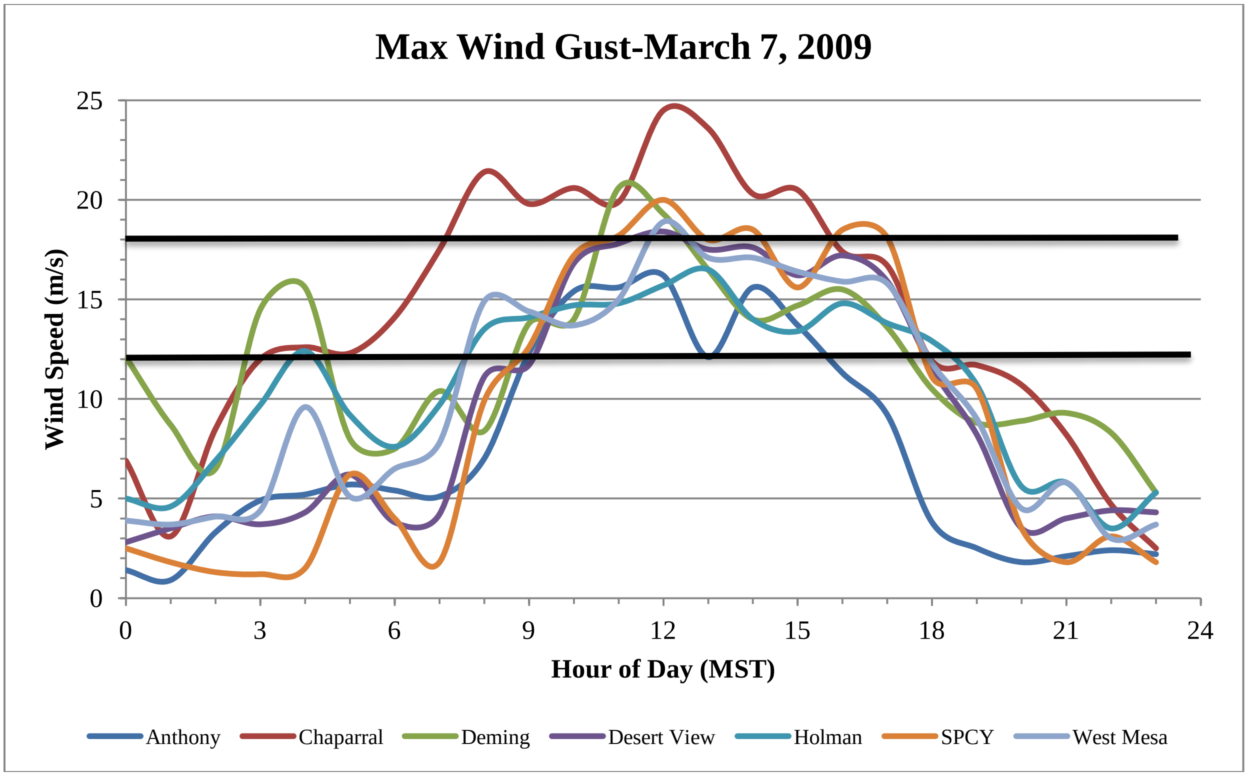

Figure 5-3. Maximum wind speeds at monitoring sites in Doña Ana and Luna Counties on the day of the event. Wind speeds are sampled every other second with the maximum of the hourly samples supplied here. The Anthony and West Mesa sites measure wind speed at 2 and 8 meters above grade respectively. All other sites measure wind speed at 10 meters above grade.

5.2.3 Recurrence Frequency

The Anthony monitoring station can record exceedances at any time of year. From 2003-2008, the FEM TEOM monitor has recorded 57 exceedances and the FRM Wedding monitor has recorded five exceedances (Figure 5-4). The difference between the number of recorded exceedances is due to the FRM Wedding monitor sampling schedule of 1-in-6 days. The Anthony site records an average of 9.5 exceedances per year, with a high of 16 in 2008 and a low of 4 in 2007 and 2005.

The Chaparral monitoring station can record exceedances at any time of year. From 2003-2008, the FEM TEOM monitor has recorded 55 exceedances (Figure 5-4). There is no FRM Wedding monitor at the Chaparral site. The Chaparral site records an average of 9.2 exceedances per year, with a high of 18 in 2008 and a low of 3 in 2005.

The SPCY monitoring station can record exceedances at any time of year. From 2003-2008, the FEM TEOM monitor has recorded 61 high wind exceedances and the FRM Wedding monitor has recorded three (Figure 5-4). The difference between the number of recorded exceedances is due to the FRM Wedding monitor sampling schedule of 1-in-6 days. The SPCY site records an average of 10.2 exceedances per year, with a high of 14 in 2004 and 2008 and a low of 5 in 2007.

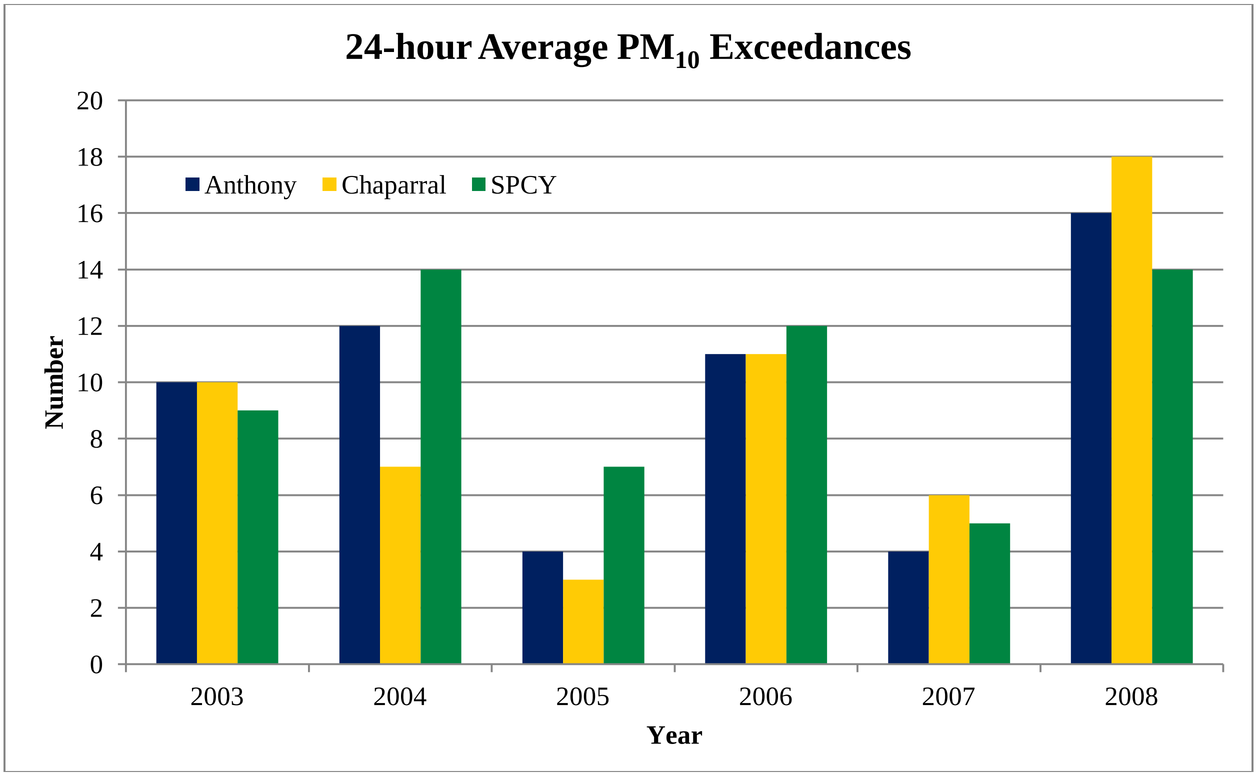

Figure 5-4. High wind blowing dust exceedances recorded by the FEM TEOM instruments. The FRM Wedding instruments recorded an additional five exceedances at Anthony and three at SPCY over the same time period.

5.2.4 Controls Analysis

Implementation of BACM in Doña Ana County has been carried out through the ordinances and MOUs adopted under the NEAP. The ordinances regulate disturbed lands, construction and demolition, vacant parking lots and materials handling and transportation. On this day no other unusual PM_{10} producing activities occurred and anthropogenic emissions remained constant before, during and after the event. The most likely sources contributing to the event are the playas of northern Mexico and desert lands in Doña Ana County. The southern sites recorded the highest 24-hour averages in the monitoring network with the northern and Deming sites recording normal averages. A back-trajectory analysis using the HYSPLIT (Draxler et al., 2011; Rolph, 2011) model shows that the air masses traveled from northern Mexico to the monitors in southern Doña Ana County (Figure 5-5). The large difference between 24-hour averages at the southern and northern Doña Ana County and Deming sites suggests that the natural desert and playas contributed heavily to the exceedances. The back-trajectory model was run for the eight hours preceding elevated PM_{10} concentrations during the event. Controlling dust from the natural desert terrain is cost prohibitive. NMED concludes that the sources contributing to the event are not reasonably controllable.

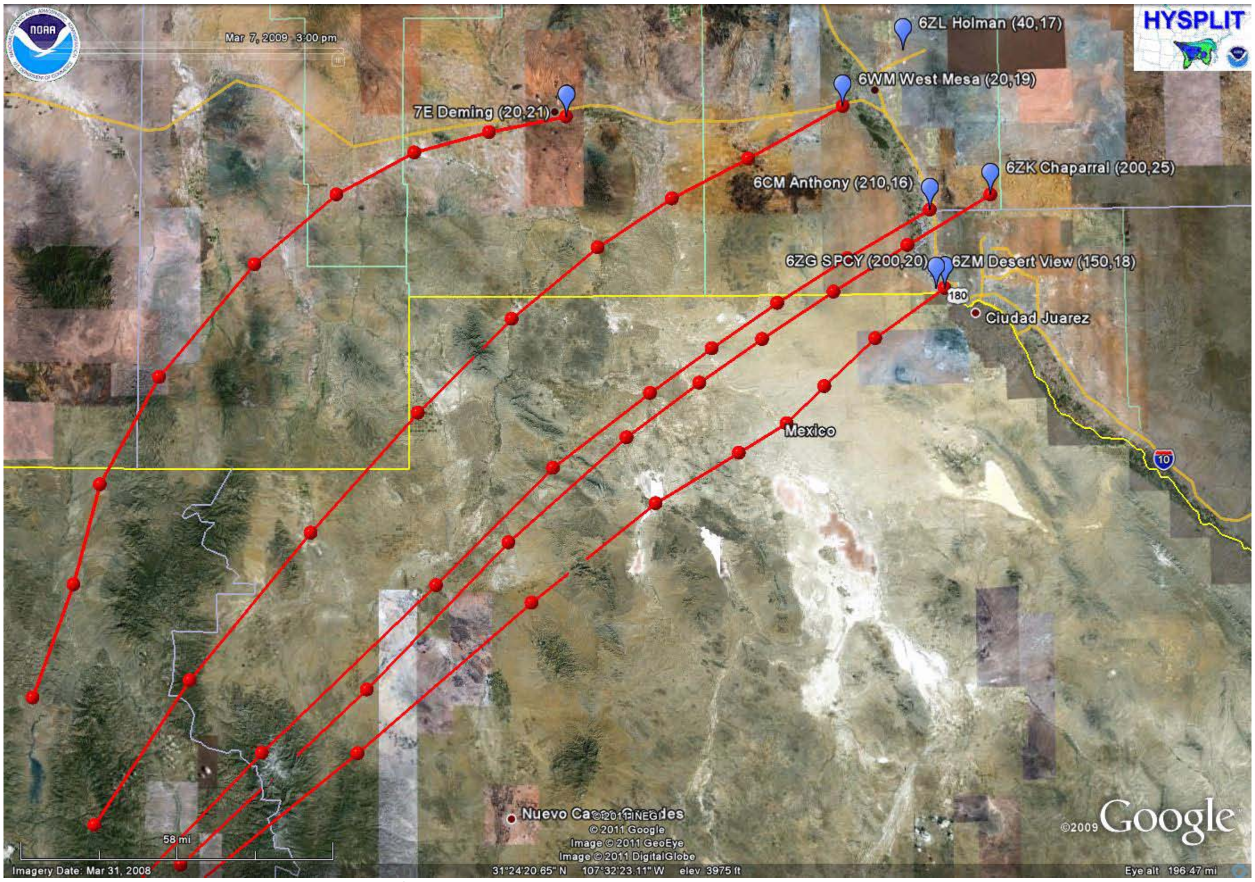

Figure 5-5. Back-trajectory model analysis for the event on March 7, 2009. The numbers in parenthesis are the 24-hour average PM_{10} concentration and max wind gust respectively. The model was run for the eight hours preceding the peak concentrations of the event starting from the 900 hour. Each ball represents one hour in the past from the starting point of the model run.

5.4 Historical Fluctuations Analysis

5.4.1 Annual and Seasonal 24-hour Average Fluctuations

The Anthony, SPCY and Chaparral sites have recorded PM_{10} exceedances every year since continuous FEM TEOM monitoring was established. These exceedances can occur during any time of year and are caused by high winds (Figures 5-6, 5-7, 5-8). 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} concentrations were 403 µg/m^3 at Anthony, 1110 µg/m^3 at Chaparral and 1109 µg/m^3 at SPCY. All exceedances at Anthony and Chaparral have been caused by high winds and natural events demonstrations were submitted to EPA under the NEAP or EER. SPCY is the only site in the network where low wind exceedances have been recorded. From 2003-2005 the FEM TEOM monitor recorded 14 low wind exceedances. No exceedances have been recorded since 2005 and NMED continues to research the reasons behind these low wind high PM_{10} concentrations. All other exceedances at SPCY have been caused by high winds and natural events demonstrations were submitted to EPA under the NEAP or EER.

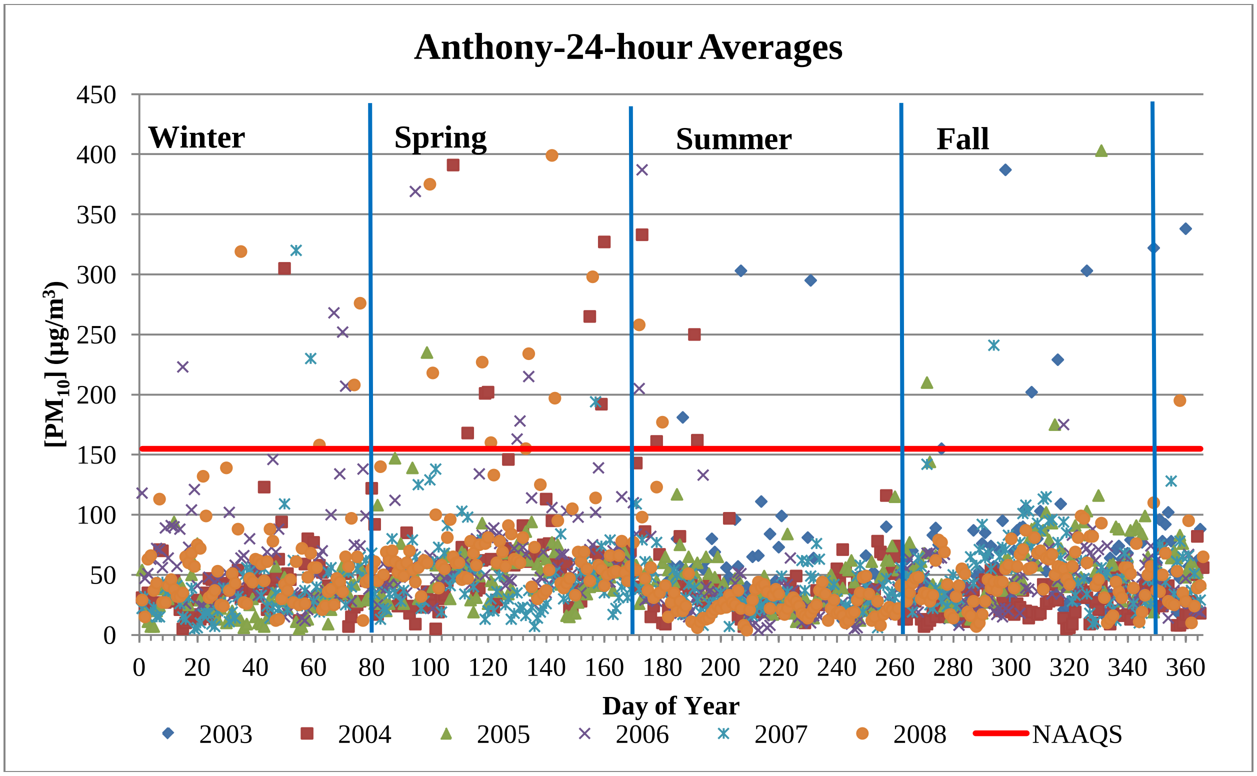

Figure 5-6. 24-hour average PM_{10} concentrations by day of year from 2003-2008. All averages collected using FEM TEOM instrument.

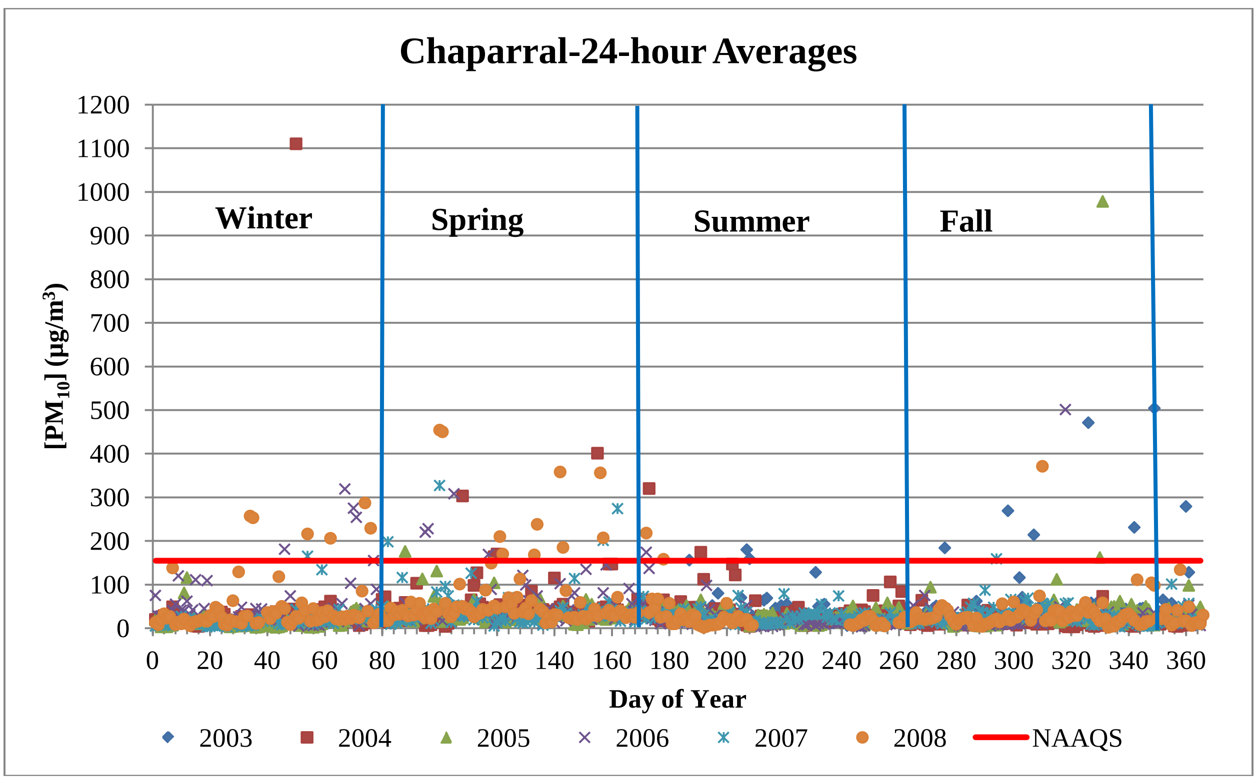

Figure 5-7. 24-hour average PM_{10} concentrations by day of year from 2003-2008. All averages collected using FEM TEOM instrument.

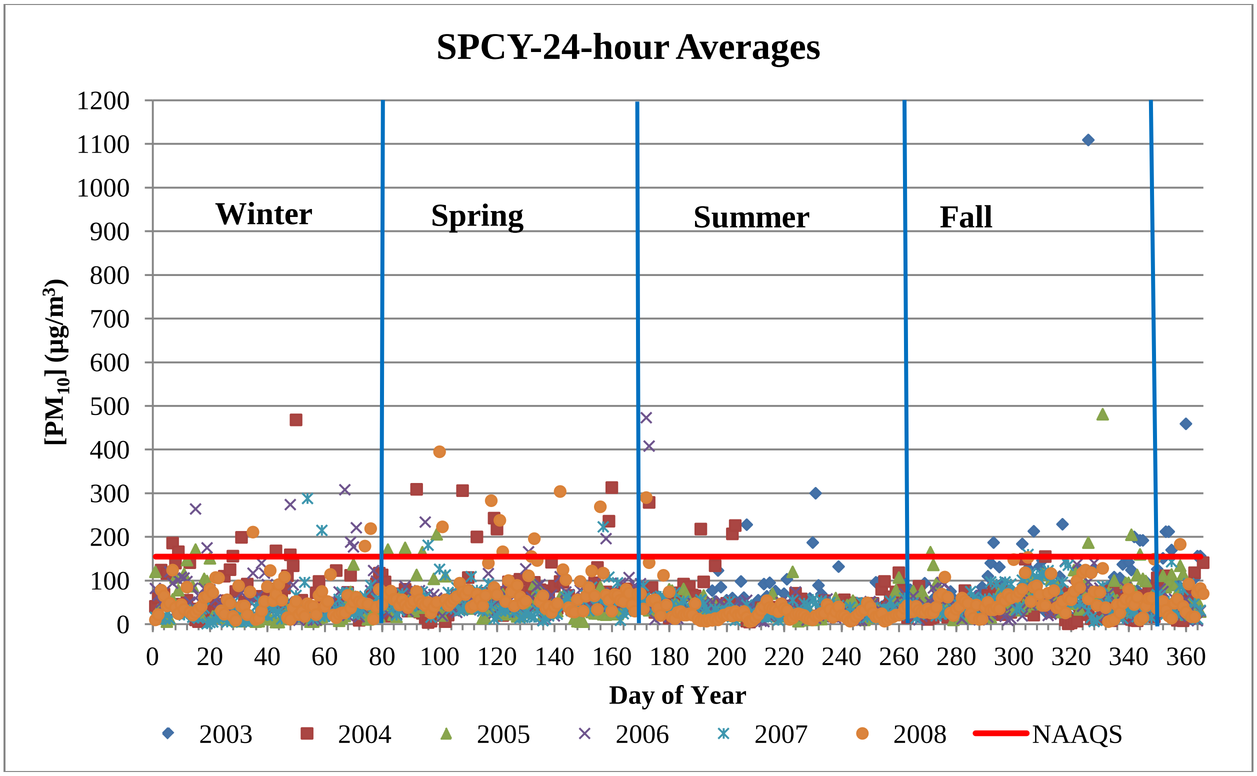

Figure 5-8. 24-hour average PM_{10} concentrations by day of year from 2003-2008. All averages collected using FEM TEOM instrument.

The recorded values for this day (213 µg/m^3 at Anthony, 199 µg/m^3 at SPCY and 199 µg/m^3 at Chaparral) are above the 95th percentile of all 24-hour averages recorded at each respective site.

Anthony	Max	99th	95th	75th	50th	Mean	25th	5th	Minimum
No Events	147	123	88	56	38	42	24	12	4
Events	403	251	103	58	39	48	25	12	4
Chaparral	**Max**	**99th**	**95th**	**75th**	**50th**	**Mean**	**25th**	**5th**	**Minimum**
No Events	149	118	65	35	24	28	15	6	2
Events	1110	271	98	37	25	36	15	6	2
SPCY	**Max**	**99th**	**95th**	**75th**	**50th**	**Mean**	**25th**	**5th**	**Minimum**
No Events	212	146	110	61	39	47	24	11	1
Events	1109	237	128	64	40	53	25	11	1

Table 5-1. 24-hour average PM_{10} data distribution with and without high wind events included. Only those high wind events that resulted in an exceedance were excluded from the analysis. Data for Anthony and SPCY includes FRM Wedding and FEM TEOM data from 2003-2008. Data for Chaparral only includes FEM TEOM data from 2003-2008.

An hourly data distribution analysis was done for PM_{10} concentrations and wind gust speeds (Appendices A & B). When the hourly data for March 7 is overlaid on the hourly data distribution plots, it shows that the values recorded during the high wind event exceed the 95th percentile for both PM_{10} and wind gusts at all monitoring sites (Figures 5-9 through 5-14). The hourly PM_{10} values during the high wind blowing dust storm far exceed the historical 95th percentiles of hourly data.

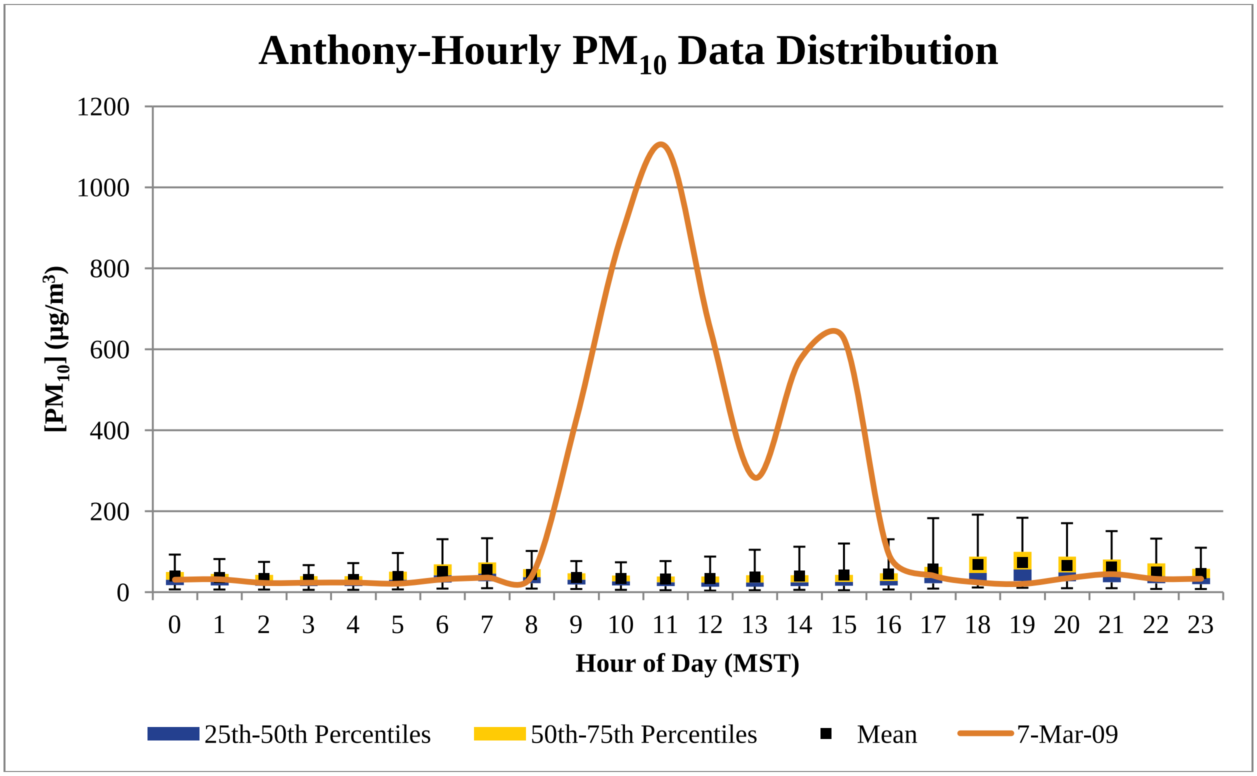

Figure 5-9. All data recorded using the FEM TEOM monitor. Data distribution is for hourly values from 2003-2008. The top whisker represents the 95th percentile of data.

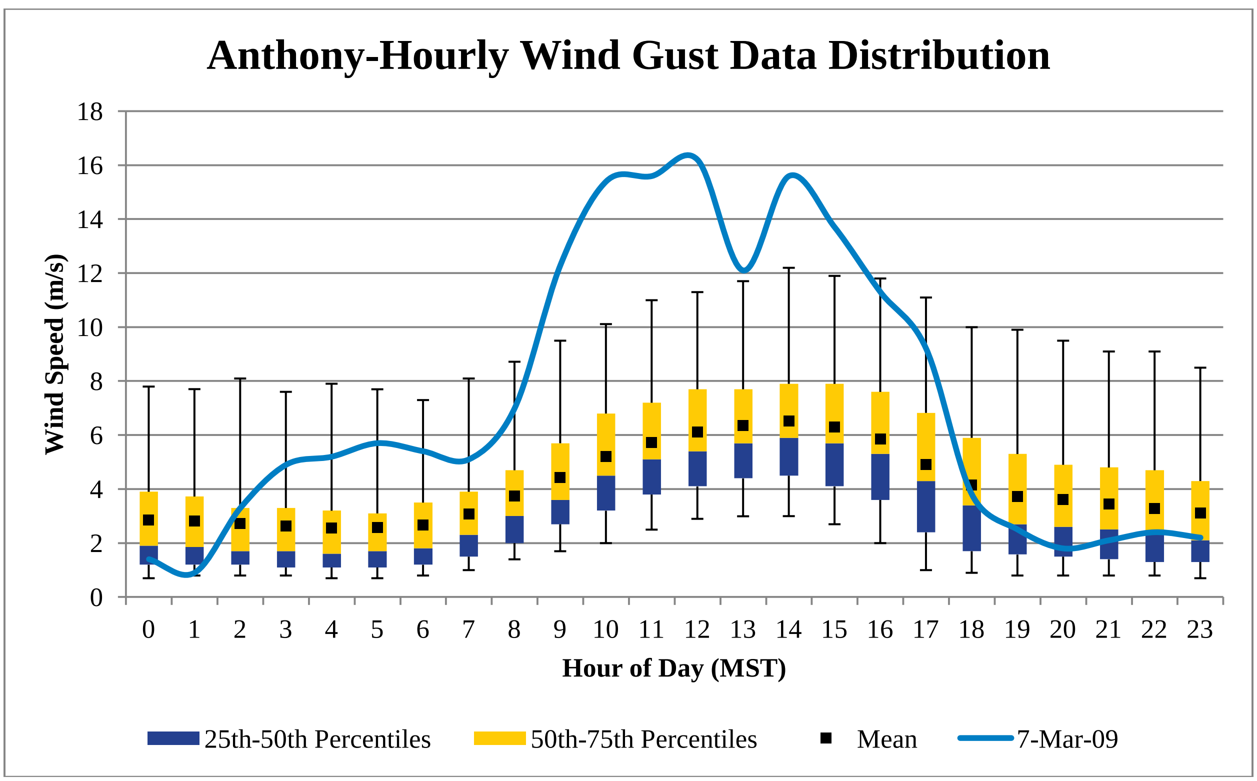

Figure 5-10. Wind speed data distribution from 2006-2008 measured at 2 meters. Data is for the maximum wind gust recorded during the hour.

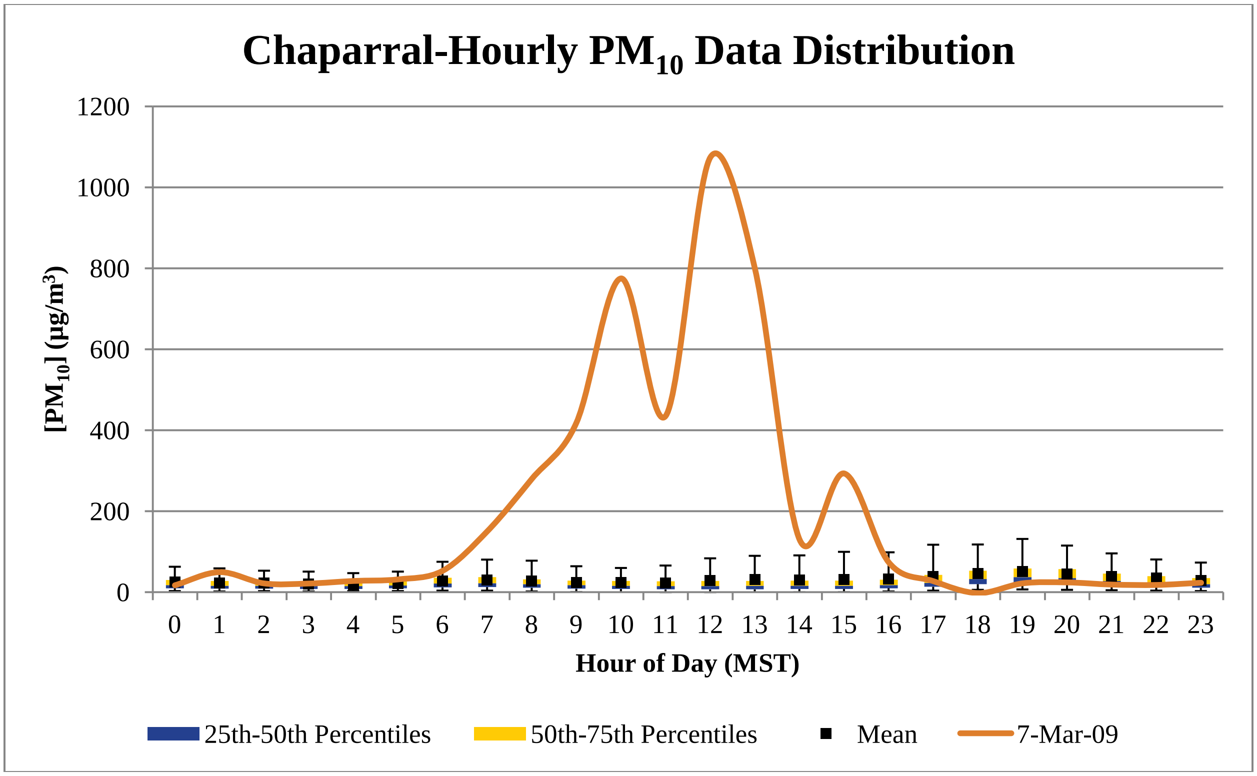

Figure 5-11. All data recorded using the FEM TEOM monitor. Data distribution is for hourly values from 2003-2008. The top whisker represents the 95th percentile of data.

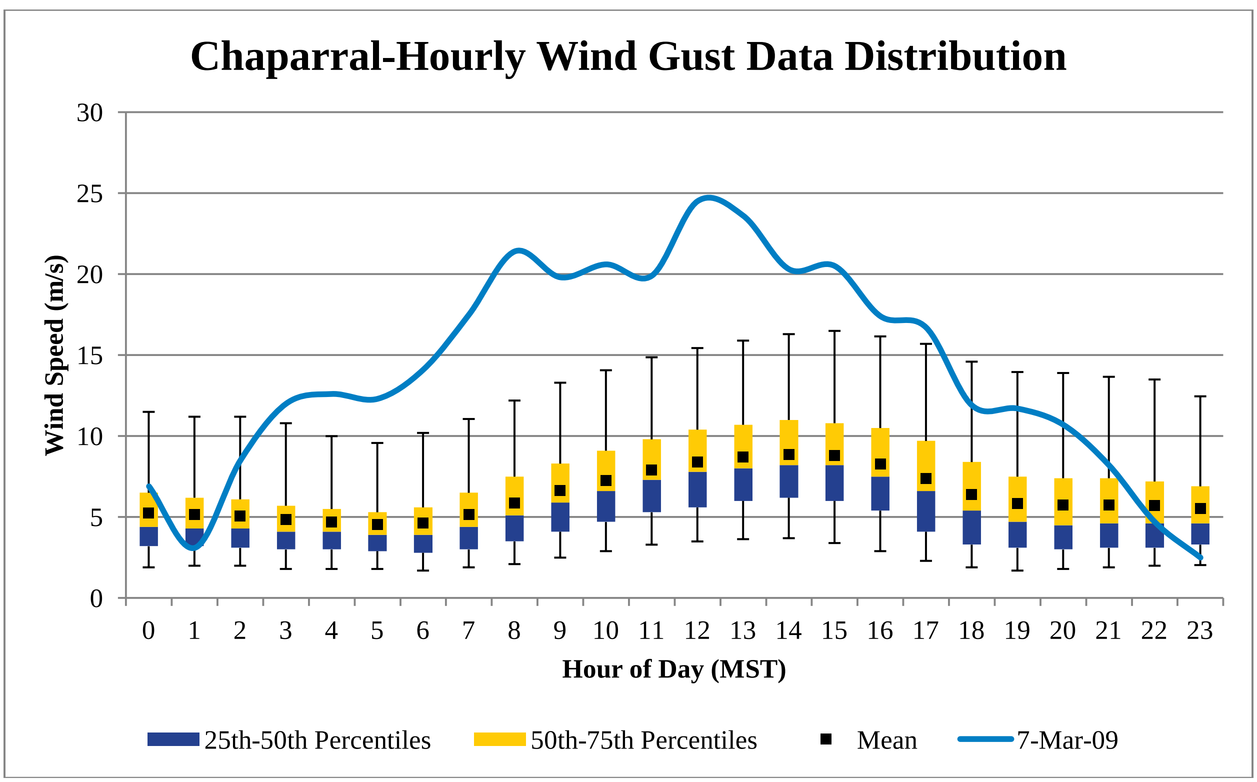

Figure 5-12. Wind speed data distribution from 2006-2008 measured at 10 meters. Data is for the maximum wind gust recorded during the hour.

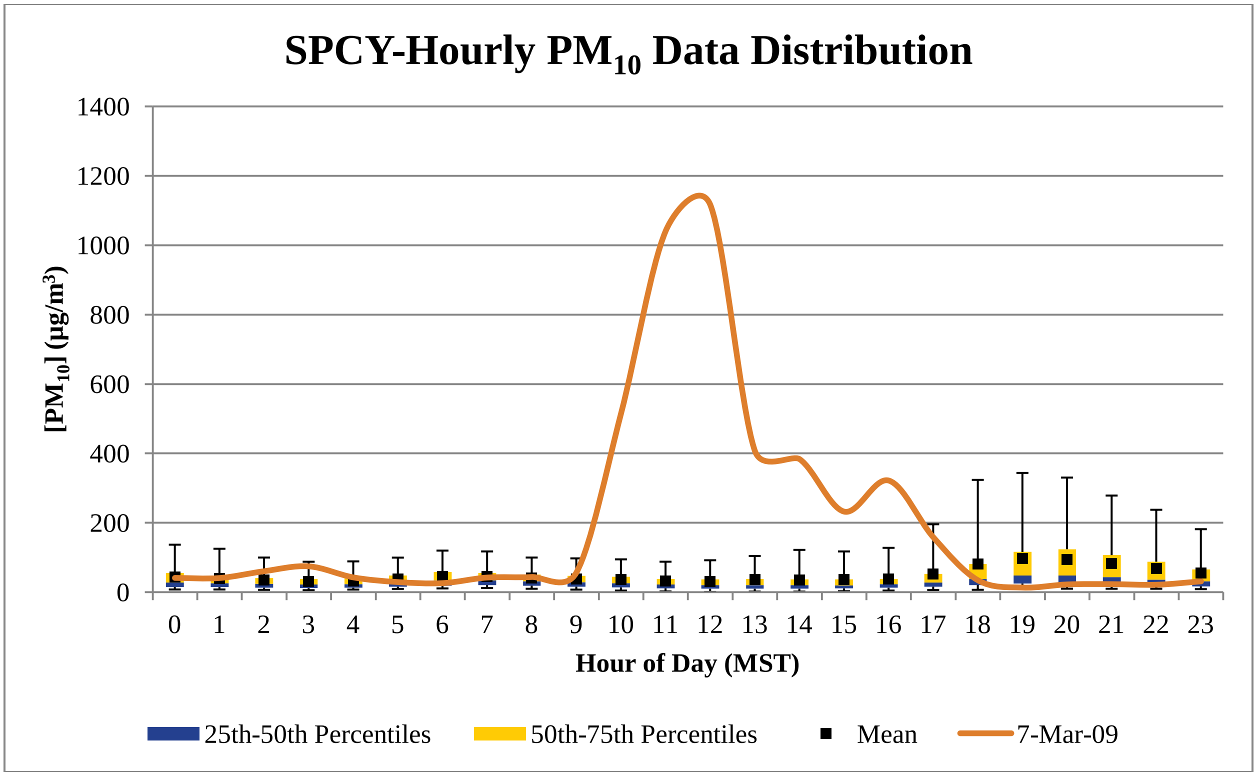

Figure 5-13. All data recorded using the FEM TEOM monitor. Data distribution is for hourly values from 2003-2008. The top whisker represents the 95th percentile of data.

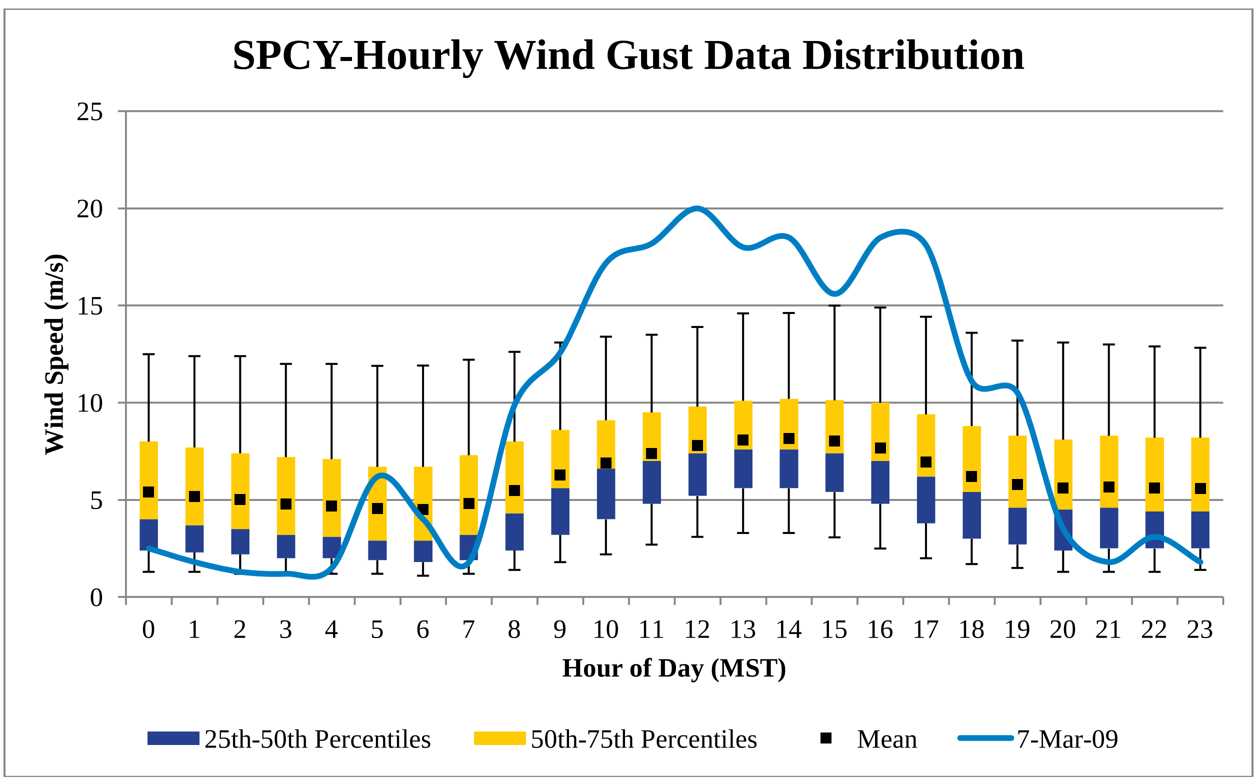

Figure 5-14. Wind speed data distribution from 2006-2008 measured at 10 meters. Data is for the maximum wind gust recorded during the hour.

5.5 Clear Causal Relationship

A Pacific cold front passed through New Mexico on March 7, 2009 with the center of low pressure traversing the New Mexico and Colorado border. In front of and behind the cold front a strong pressure gradient formed over southwestern New Mexico and northern Mexico (Figure 5-15). At the 500 hour an area of low pressure aloft was over the state of Utah. As the day progressed this low pressure traveled east and aligned itself with the surface wind direction (Figure 5-16). Heating of the surface allowed winds aloft to mix down increasing surface wind velocities and provided the turbulence required for vertical mixing and entrainment of dust.

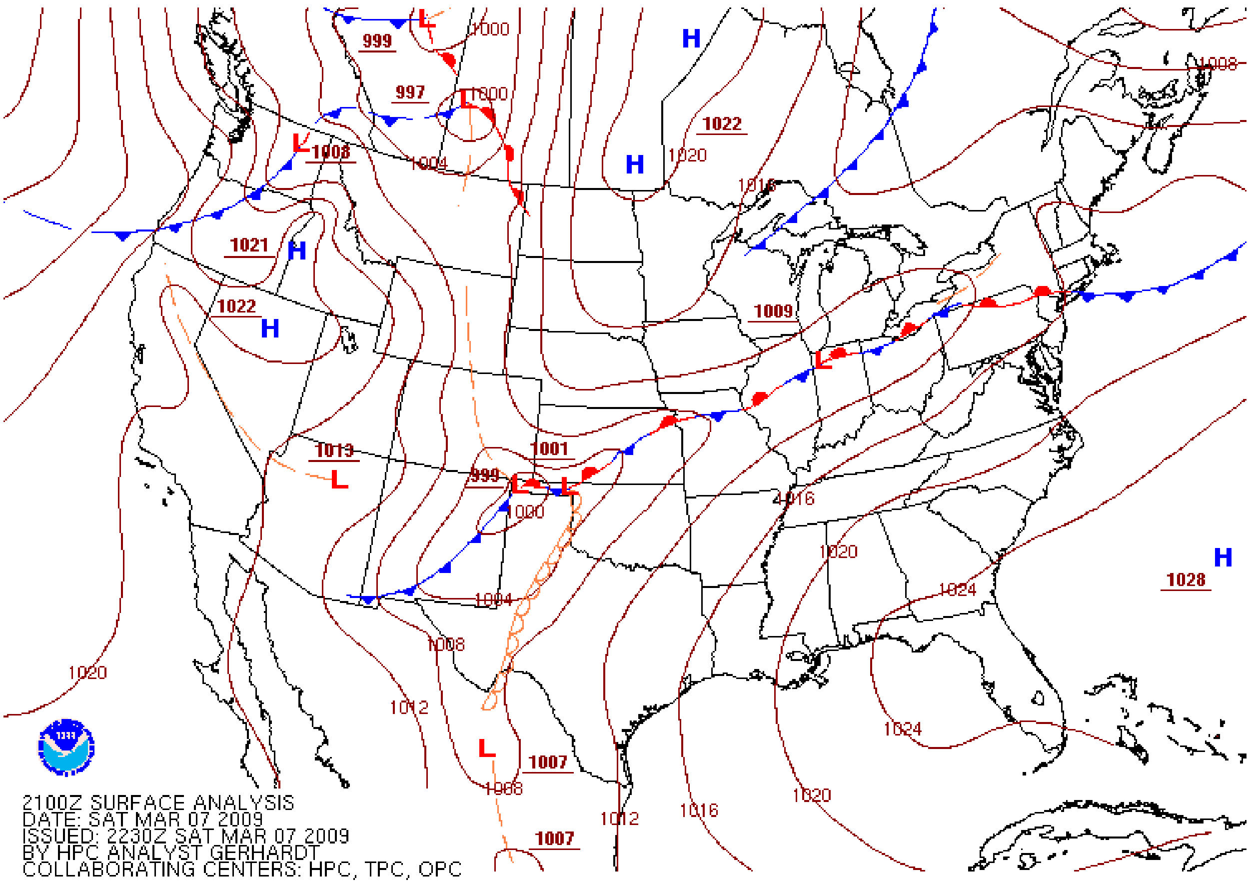

Figure 5-15. March 7, 2009 surface weather map depicting the frontal activity and isobars of constant pressure (red lines) for the 1300 hour MST. Surface winds flow perpendicular to the isobars from high to low pressure.

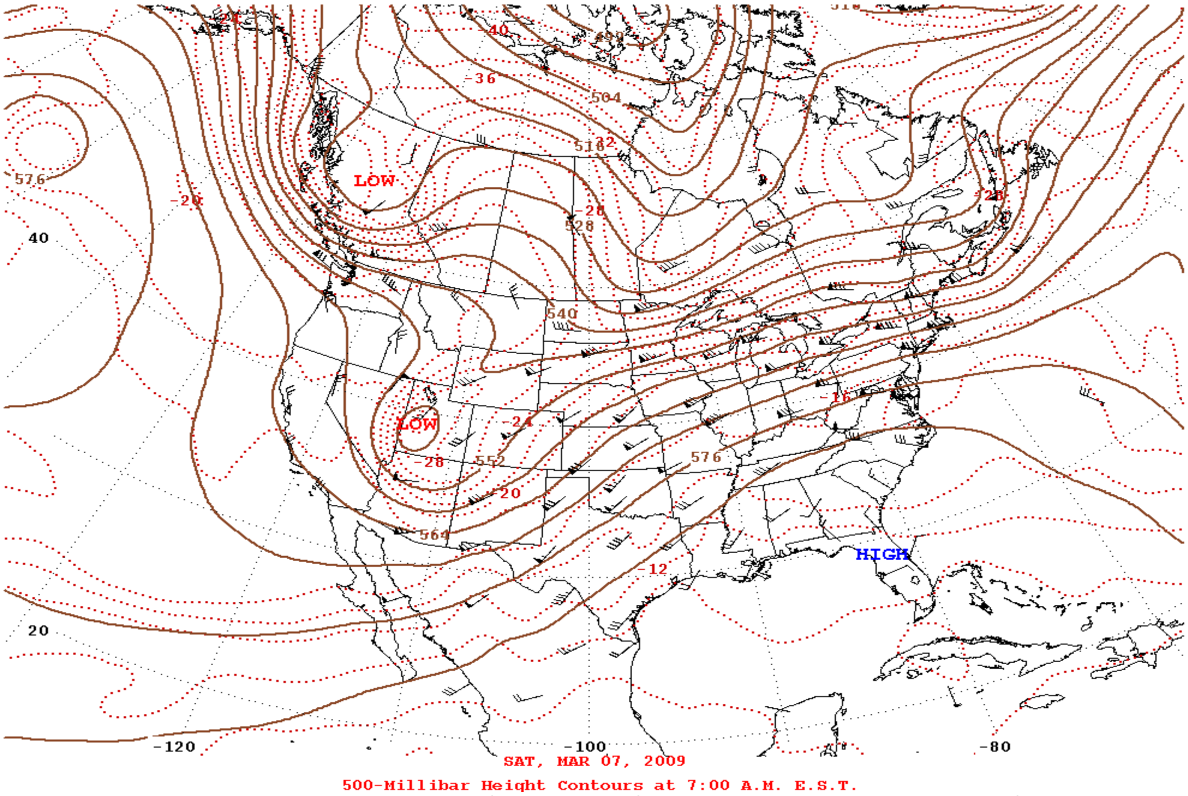

Figure 5-16. Upper Air weather map depicting winds aloft with isobars of constant pressure (brown lines). Winds flow parallel to the isobars.

The weather pattern described above generated strong southwesterly winds beginning at the 700 hour and lasting through the 1700 hour. During this time frame wind gusts regularly exceeded the historical 95th percentiles of data (Figures 5-10, 5-12, and 5-14). Peak wind gusts ranged from 16 m/s at Anthony to 25 m/s at Chaparral (Figure 5-3). Sustained hourly average wind speeds of 6 m/s or more and wind gusts of 12 m/s or more were recorded at all monitoring sites during elevated PM_{10} concentrations (Figure 5-2 and 5-3). Blowing dust caused elevated levels of PM_{10} during the same time frame as high winds (Figures 5-17 to 5-19). As wind gusts exceed the 95th percentile of historical data so do hourly PM_{10} concentrations on this date (700-1700 hours). Hourly PM_{10} concentrations throughout the network exhibit the same pattern with elevated concentrations of PM_{10} throughout the network until the evening hours (Figure 5-20).

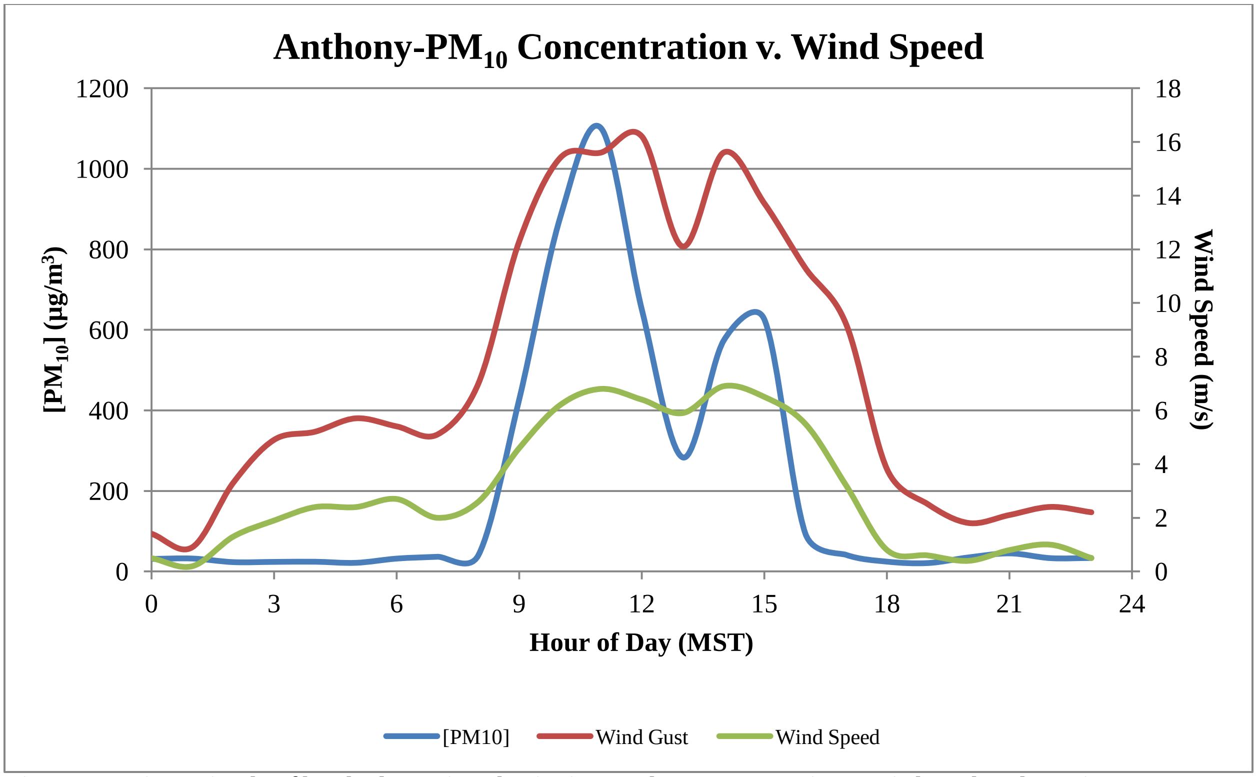

Figure 5-17. Time series plot of hourly observations showing increased PM_{10} concentrations as wind speeds and gusts increase.

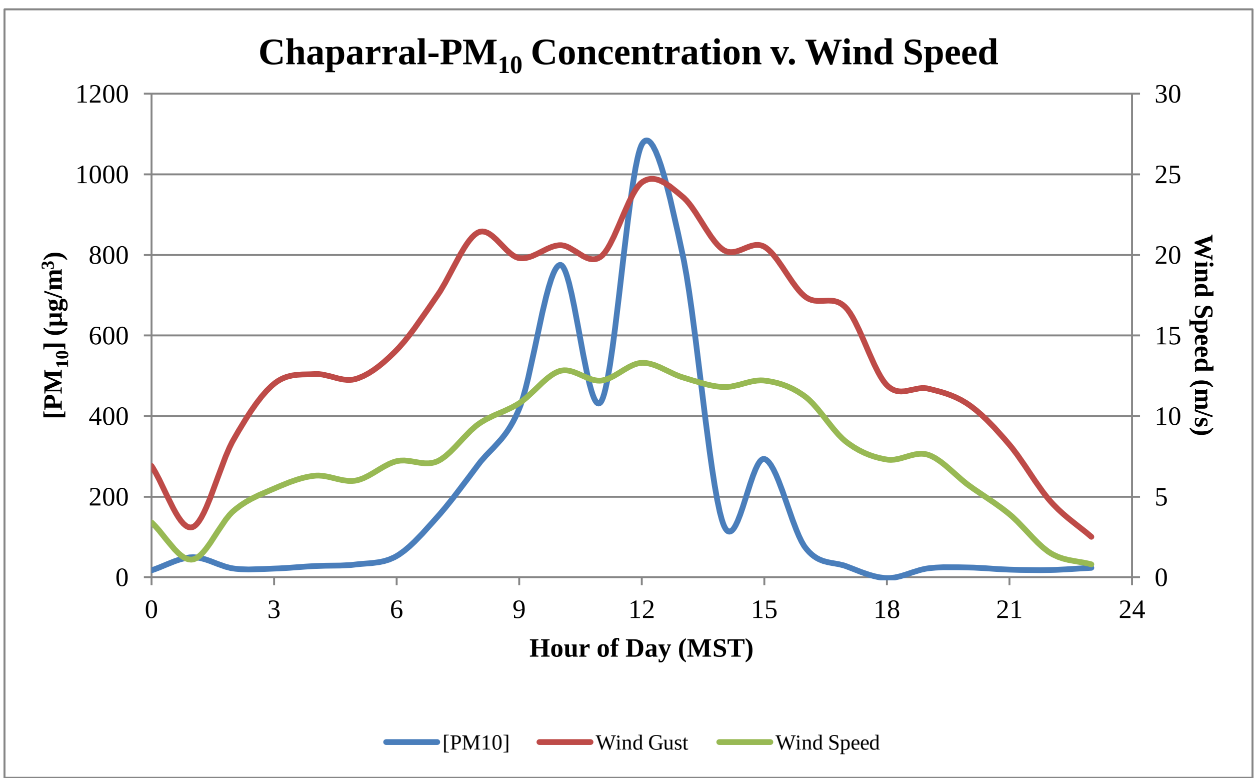

Figure 5-18. Time series plot of hourly observations showing increased PM_{10} concentrations as wind speeds and gusts increase.

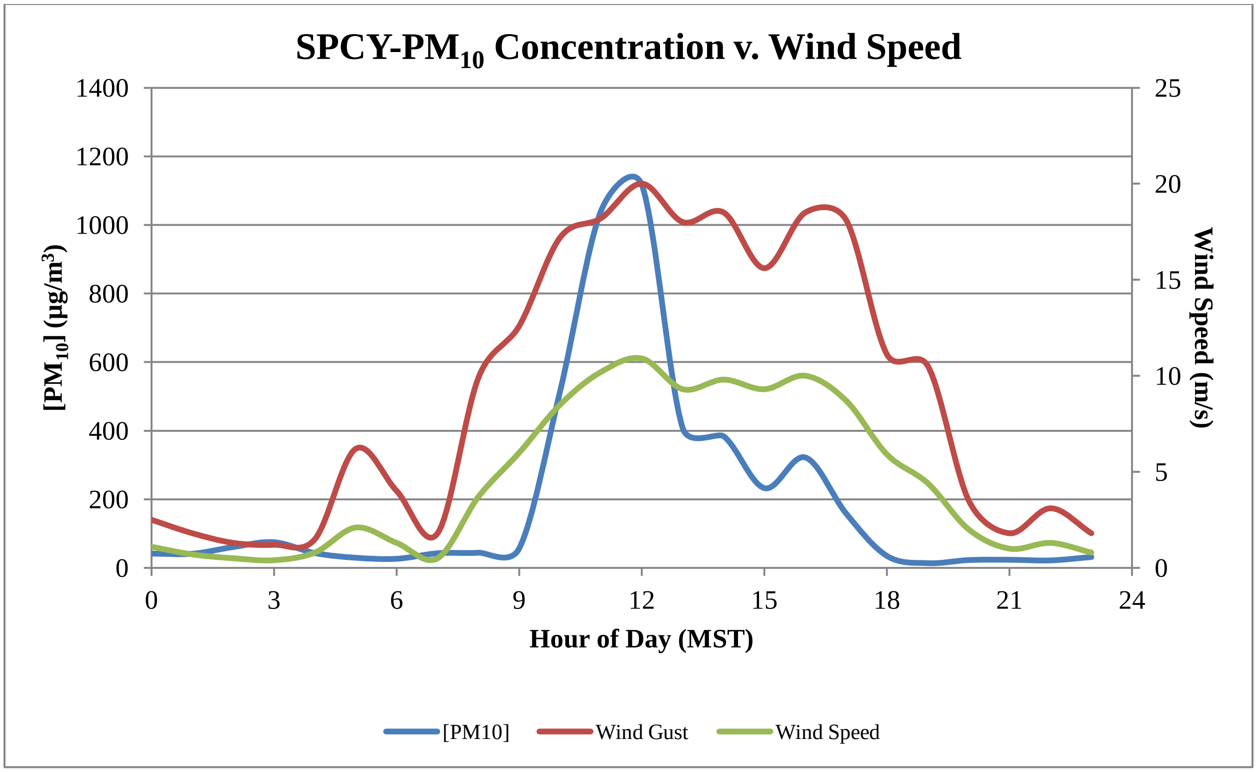

Figure 5-19. Time series plot of hourly observations showing increased PM_{10} concentrations as wind speeds and gusts increase.

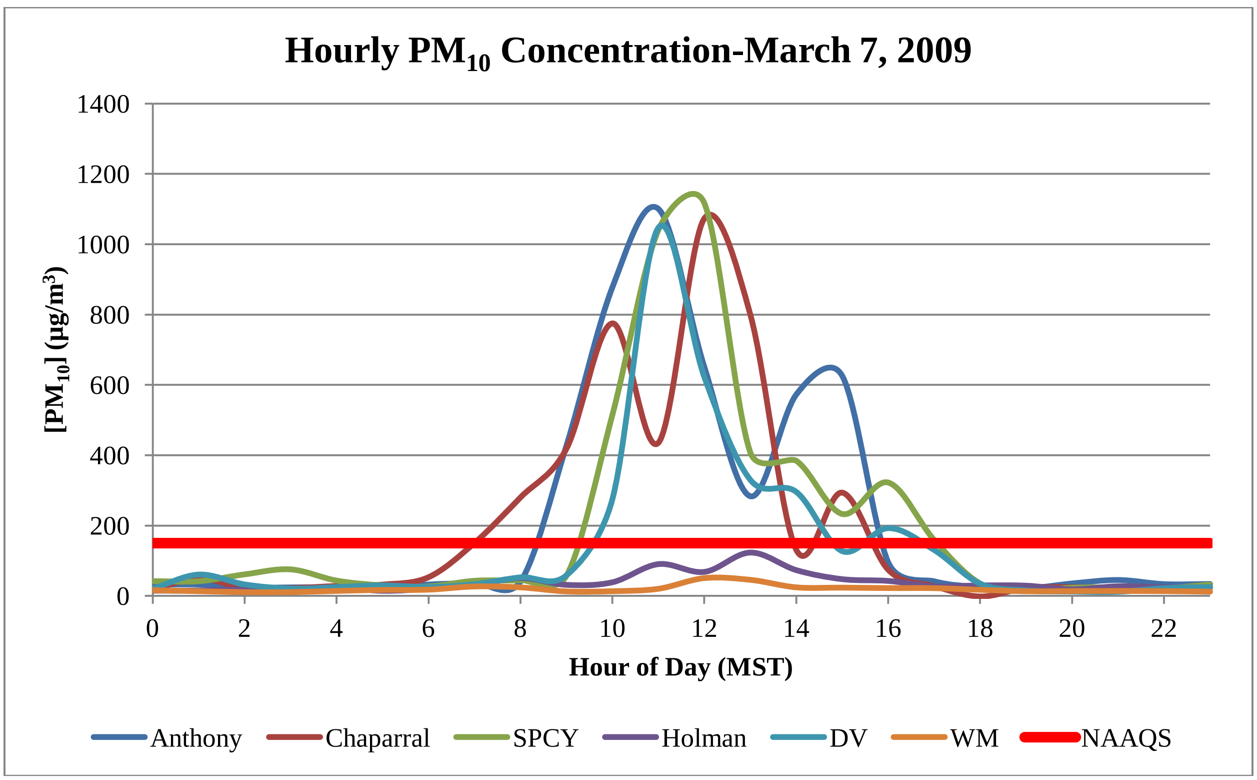

Figure 5-20. Time series plot of hourly observations showing increased PM_{10} concentrations increasing at approximately the same time throughout the monitoring network.

5.6 Affects Air Quality

The historical fluctuations and clear causal relationship analyses prove that the event in question affected air quality on March 7, 2009.

5.7 Natural Event

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

5.8 No Exceedance but for the Event

Six hourly PM_{10} values (1000-1500 hours) exceed the 24-hour average standard at Anthony [(879 + 1101 + 650 + 283 + 573 + 625) $\mu g/m^3$ = 4111 $\mu g/m^3$; (4111 $\mu g/m^3$)/24 = 171 $\mu g/m^3$]. Without the high wind and blowing dust an exceedance would not have been recorded.

Seven hourly PM_{10} values (900-1500 hours) exceed the 24-hour average standard at Chaparral [(419 + 775 + 436 + 1074 + 799 + 130 + 294) $\mu g/m^3$ = 3927 $\mu g/m^3$; (3927 $\mu g/m^3$)/24 = 164 $\mu g/m^3$]. Without the high wind and blowing dust an exceedance would not have been recorded.

Seven hourly PM_{10} values (1000-1600 hours) exceed the 24-hour average standard at SPCY [(516 + 1041 + 1116 + 407 + 384 + 233 + 322) $\mu g/m^3$ = 4019 $\mu g/m^3$ (4019 $\mu g/m^3$)/24 = 167 $\mu g/m^3$]. Without the high wind and blowing dust an exceedance would not have been recorded.

6 HIGH WIND EXCEPTIONAL EVENT: March 23, 2009

6.1 Summary of Event

High winds and blowing dust caused an exceedance of the PM_{10} NAAQS at the AQB's Holman monitoring site on March 23, 2009. The 24-hour average was recorded by a FEM TEOM continuous monitor, with a midnight-to-midnight 24-hour average concentration of 180 µg/m^3, after rounding to the nearest 10 µg/m^3. This data has been submitted to AQS and flagged as a high wind natural event under the EER. No other monitoring site recorded an exceedance on this day with 24-hour average PM_{10} concentrations at or above the 75th percentile at the other monitoring sites (Figure 6-1).

The event that occurred on this day is unique as the Pacific cold front traveled quickly through the state at night and slowed as the day progressed. The lack of sunlight did not allow for surface heating to create a mixing layer for dust to become entrained in. Winds blew from a predominantly westerly direction throughout the entire border region, crossing over desert and anthropogenic sources within New 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.

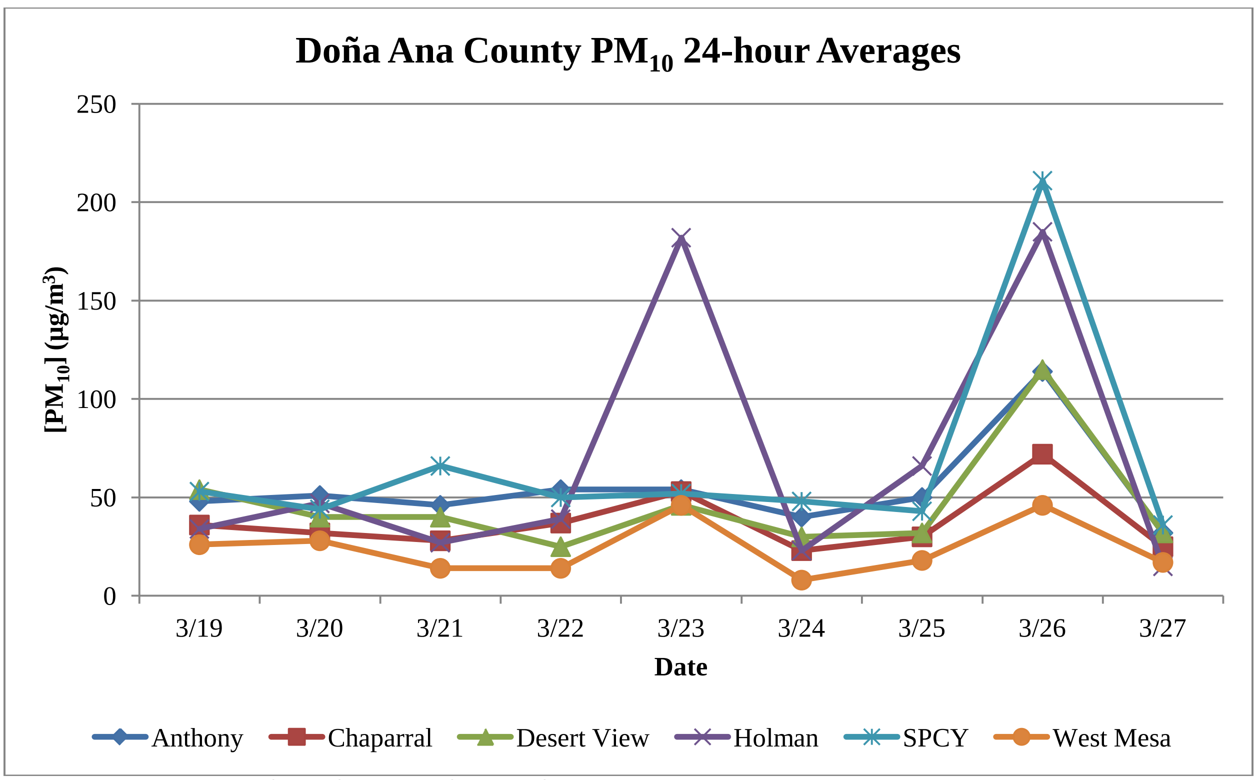

Figure 6-1. 24-hour averages for the four days before and after the suspected high wind event. Averages measured using TEOM instruments at monitoring sites in Doña Ana County.

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 undisturbed desert, agricultural lands, residential lands and unpaved roads in Doña Ana County and Las Cruces. Many agricultural operations till the land and plant crops during the month of March.

6.2.2 Sustained and Instantaneous Wind Speeds

EPA has indicated that 11.2 m/s (25 mph) would be used as the default entrainment threshold for natural events caused by high wind and blowing dust (EPA, 2011). NMED has found that a sustained hourly wind speed lasting two hours or more of 6 m/s with instantaneous wind gusts of 12 m/s or more can create blowing dust in the border region (Aaboe et al., 1998-2007; Saxton et al., 2000). On March 23, wind speeds exceeded both of NMED's presumed threshold velocities for dust entrainment at various monitoring sites (Figures 6-2 & 6-3).

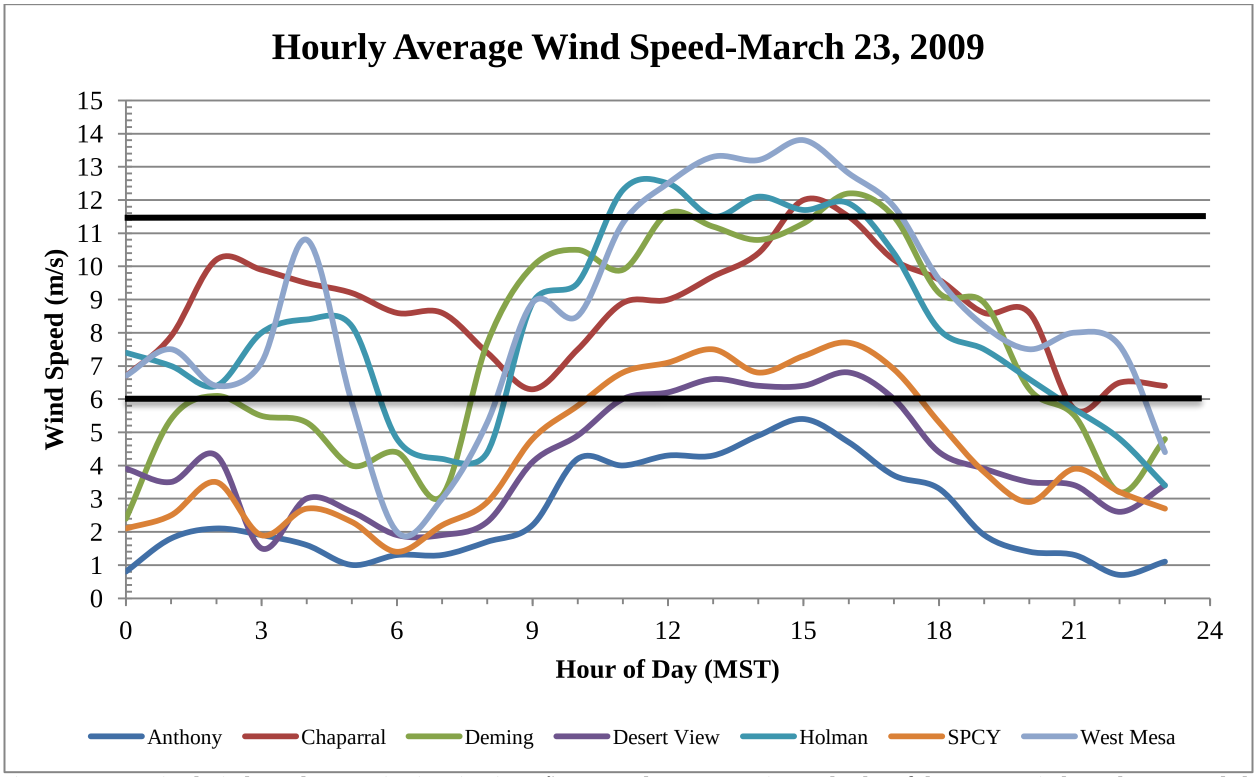

Figure 6-2. Sustained wind speeds at monitoring sites in Doña Ana and Luna Counties on the day of the event. Wind speeds are sampled every other second then averaged over an hour. The Anthony and West Mesa sites measure wind speed at 2 and 8 meters above grade respectively. All other sites measure wind speed at 10 meters above grade.

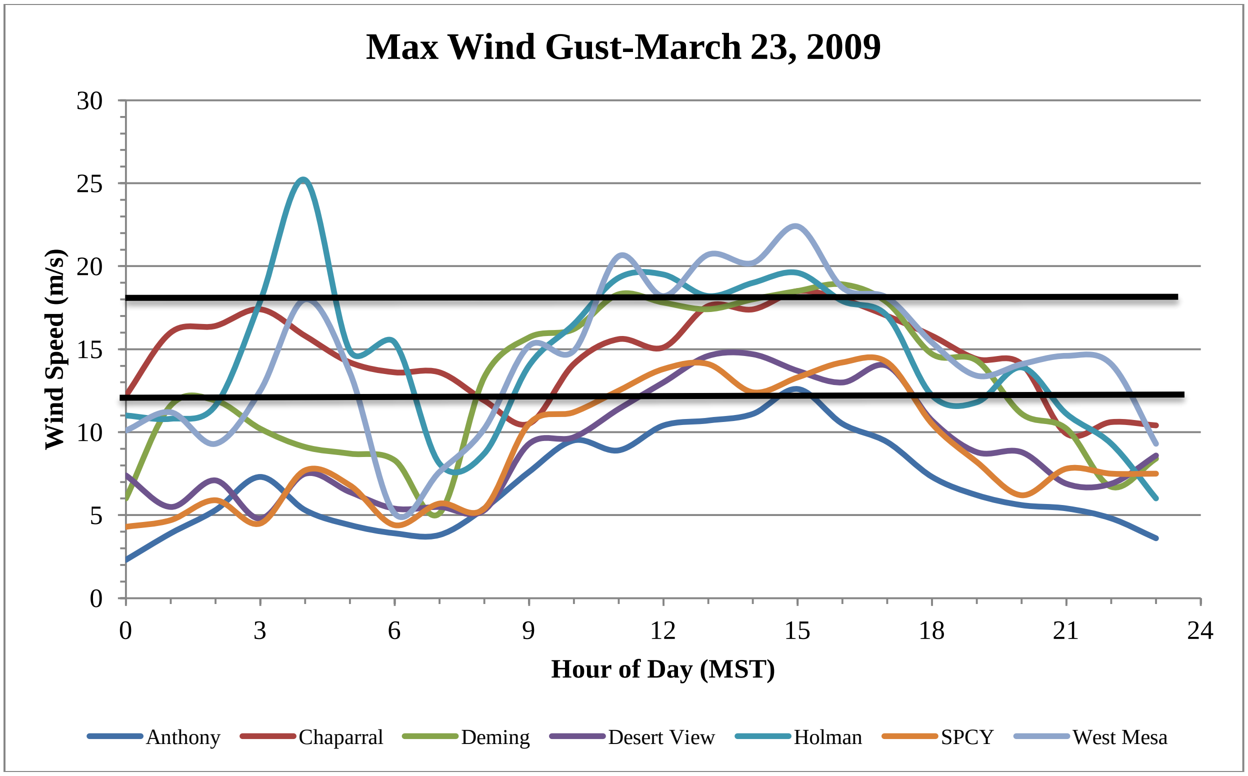

Figure 6-3. Maximum wind speeds at monitoring sites in Doña Ana and Luna Counties on the day of the event. Wind speeds are sampled every other second with the maximum of the hourly samples supplied here. The Anthony and West Mesa sites measure wind speed at 2 and 8 meters above grade respectively. All other sites measure wind speed at 10 meters above grade.

6.2.3 Recurrence Frequency

The Holman monitoring station can record exceedances at any time of year. From 2004-2008, the FEM TEOM monitor has recorded 24 exceedances of the standard (Figure 6-4). The Holman site records an average of 4.8 exceedances per year, with a high of 12 in 2008 and a low of 1 in 2005.

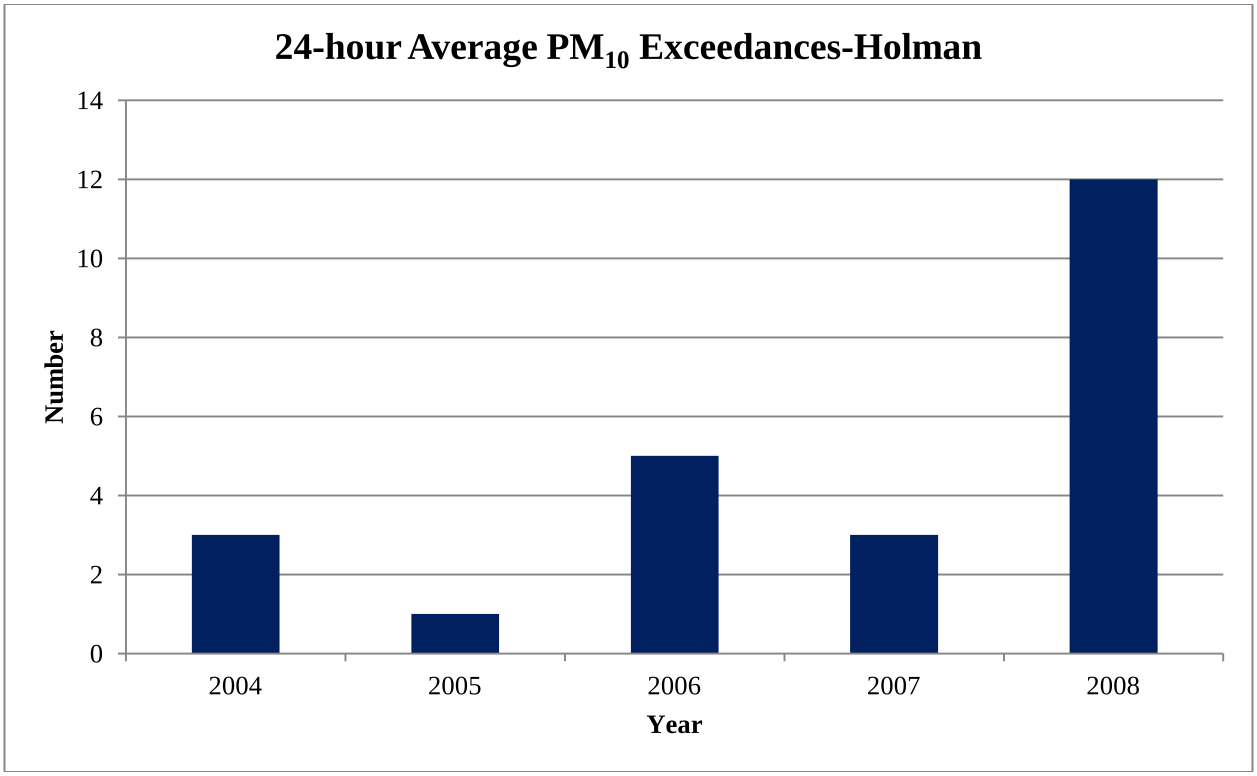

Figure 6-4. Exceedances recorded by the FEM TEOM instrument at Holman. Monitoring at this site began in July of 2004.

6.2.4 Controls Analysis

Implementation of BACM in Doña Ana County has been carried out through the ordinances and MOUs adopted under the NEAP. The ordinances regulate disturbed lands, construction and demolition, vacant parking lots and materials handling and transportation. On this day no other unusual PM_{10} producing activities occurred and anthropogenic emissions remained constant before, during and after the event. The most likely sources contributing to the event are undisturbed desert, agricultural lands, residential lands and unpaved roads. Holman is the only site to record an exceedance on this day and it is likely that sources in proximity to the monitor caused the exceedance. A back-trajectory analysis using the HYSPLIT (Draxler et al., 2011; Rolph, 2011) model shows that the air masses traveled from western New Mexico to the monitors in Doña Ana County. The model was run for the eight hours preceding the steady elevated concentrations of the event (Figure 6-5). Controlling dust from the natural desert terrain is cost prohibitive with the enforcement of dust control ordinances left up to the local governments. Due to the extreme level of wind, NMED concludes that the sources contributing to the event are not reasonably controllable.

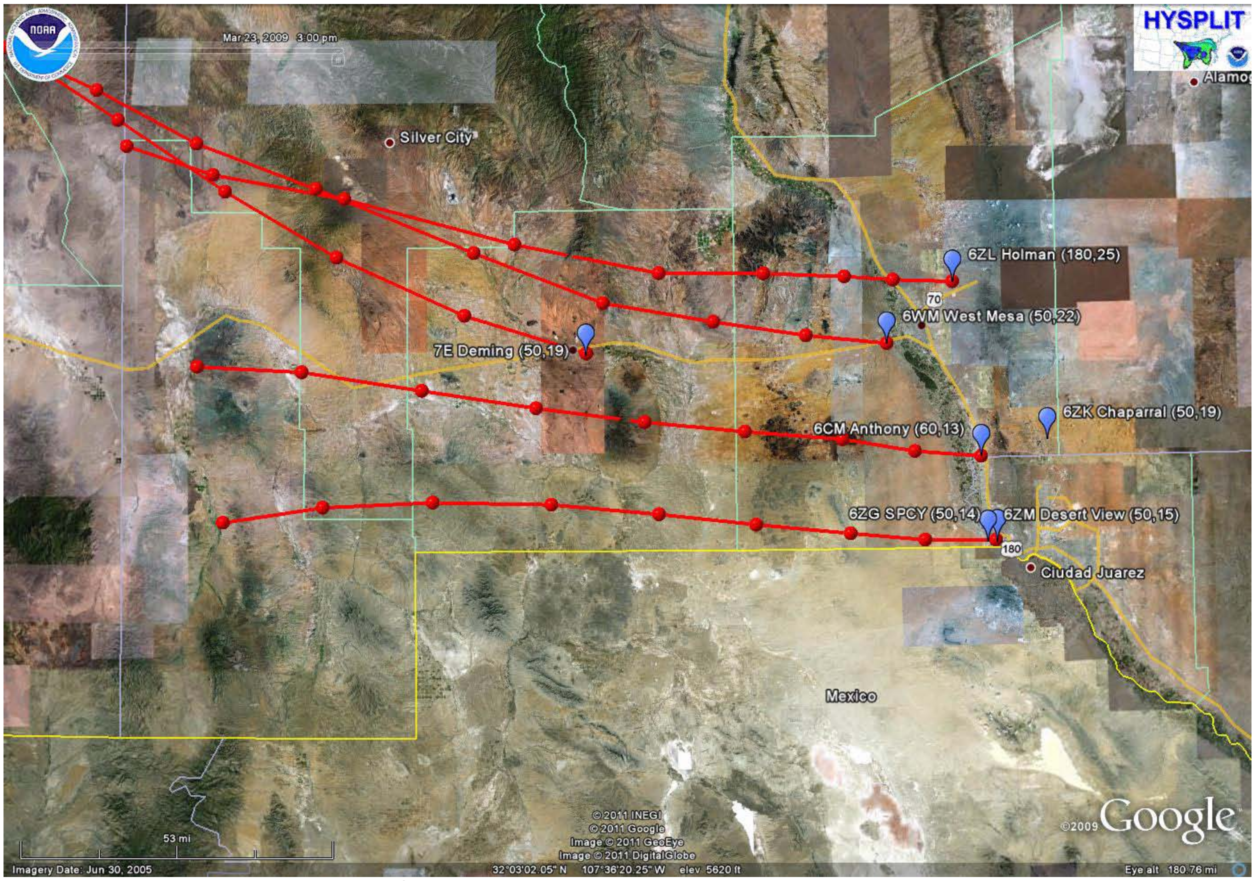

Figure 6-5. Back-trajectory model analysis for the event. The numbers in parenthesis are the 24-hour average PM_{10} concentration and max wind gust respectively. Each ball represents one hour in the past starting from the 1000 hour.

6.4 Historical Fluctuations Analysis

6.4.1 Annual and Seasonal 24-hour Average Fluctuations

The Holman site has recorded PM_{10} exceedances since it was established in 2004. These exceedances can occur during any time of year and are caused by high winds (Figure 6-6). 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 524 $\mu g/m^3$ recorded in 2008. All exceedances have been caused by high winds and natural events demonstrations were submitted to EPA under the NEAP or EER.

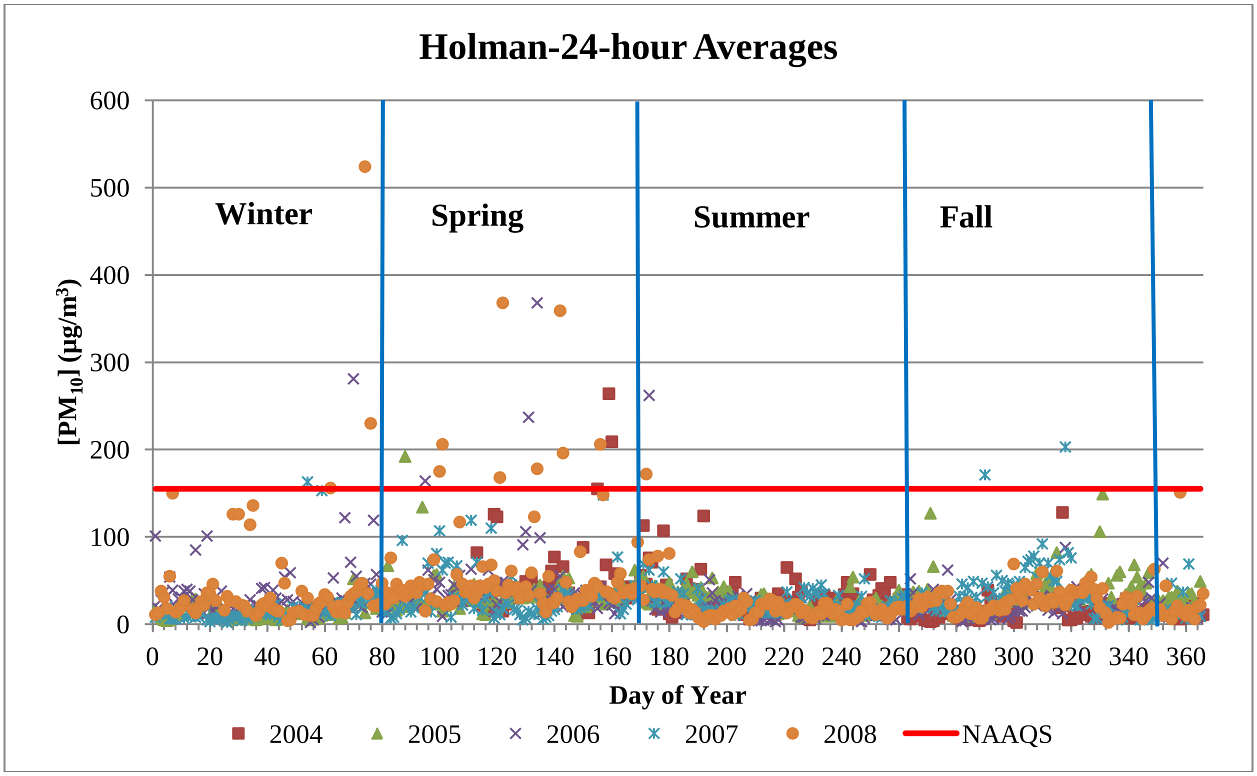

Figure 6-6. 24-hour average PM_{10} concentrations by day of year from 2004-2008. All averages collected using FEM TEOM instrument.

Table 6-1 shows normal historical fluctuations with and without high wind natural events that caused exceedances from 2003-2008. The recorded value for this day (182 µg/m^3) is above the maximum value recorded when no high wind exceedances are included and is above the 99th percentile of all 24-hour averages recorded.

Holman	Max	99th	95th	75th	50th	Mean	25th	5th	Minimum
No Events	153	121	62	35	23	27	14	6	2
Events	524	173	70	36	23	30	14	6	2

Table 6-1. 24-hour average PM_{10} data distribution with and without high wind events included. Only those high wind events that resulted in an exceedance were excluded from the analysis. Data includes FEM TEOM data from 2004-2008.

An hourly data distribution analysis was done for PM_{10} concentrations and wind gust speeds (Appendices A & B). When the hourly data for March 23 is overlaid on the hourly data distribution plots, it shows that the values recorded during the high wind event exceed the 95th percentile for both PM_{10} and wind gusts (Figures 6-7 and 6-8). The hourly PM_{10} values during the high wind blowing dust storm far exceed the 95th percentile of data.

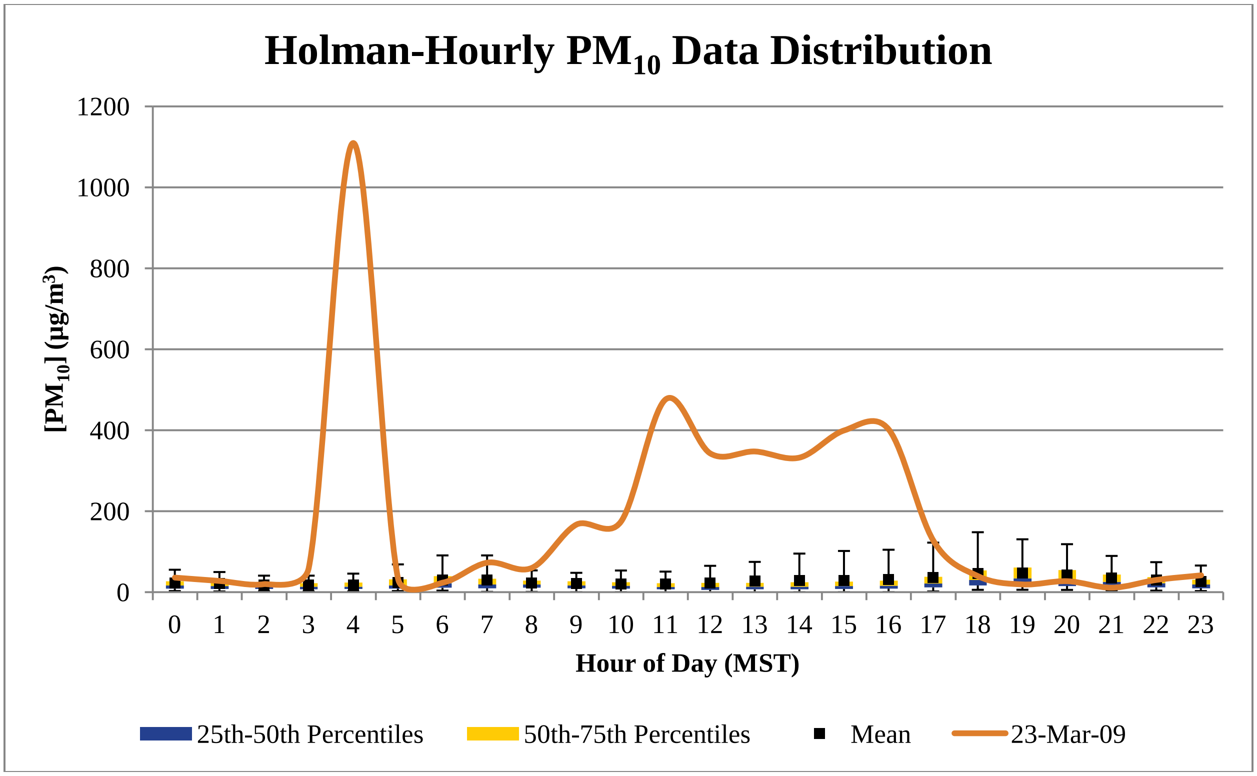

Figure 6-7. All data recorded using the FEM TEOM monitor. Data distribution is for hourly values from 2004-2008. The top whisker represents the 95^{th} percentile of data.

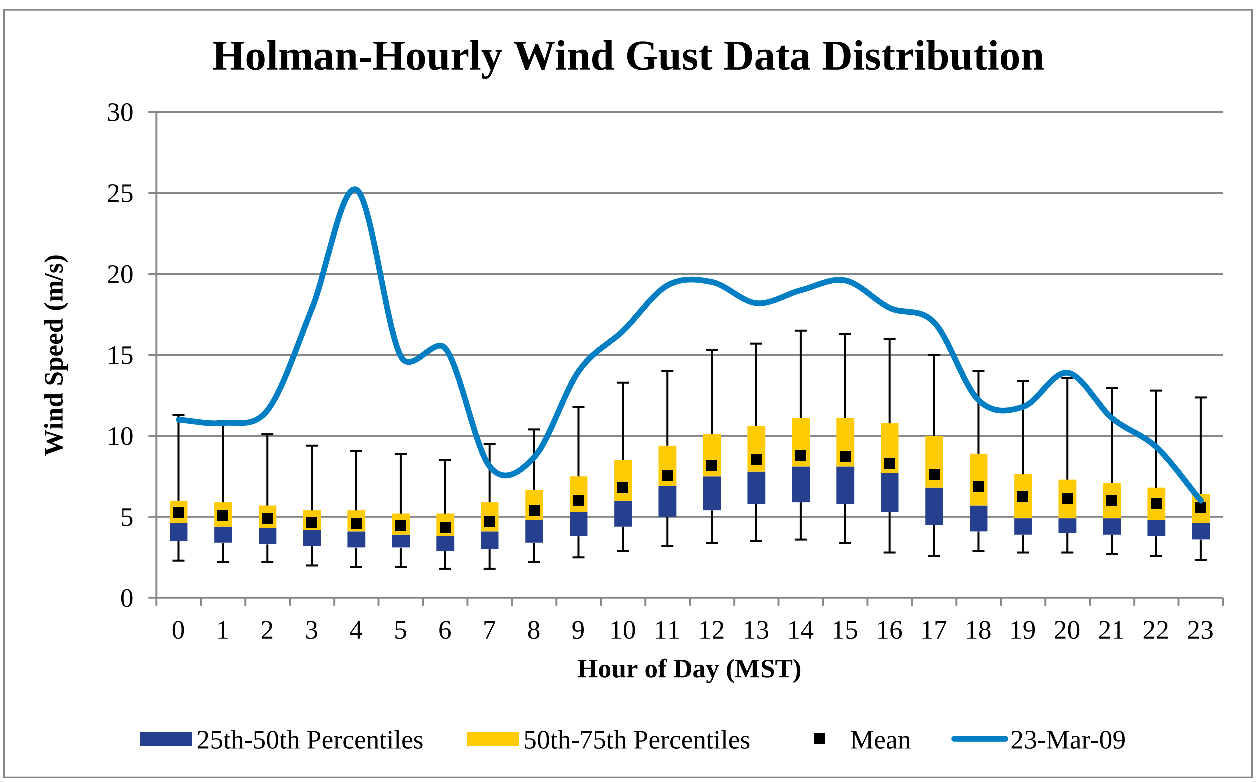

Figure 6-8. Wind speed data distribution from 2004-2008 measured at 10 meters. Data is for the maximum wind gust recorded during the hour.

6.5 Clear Causal Relationship

A Pacific cold front passed through New Mexico on March 23, 2009. An area of low pressure developed along Colorado's northern border creating a weak pressure gradient over Arizona, New Mexico and northern Mexico (Figure 6-9). At the 500 hour an area of low pressure aloft was observed over the state of Colorado (Figure 6-10). As the day progressed, heating of the surface allowed winds aloft to mix down increasing surface wind velocities and provided the turbulence required for vertical mixing and entrainment of dust.

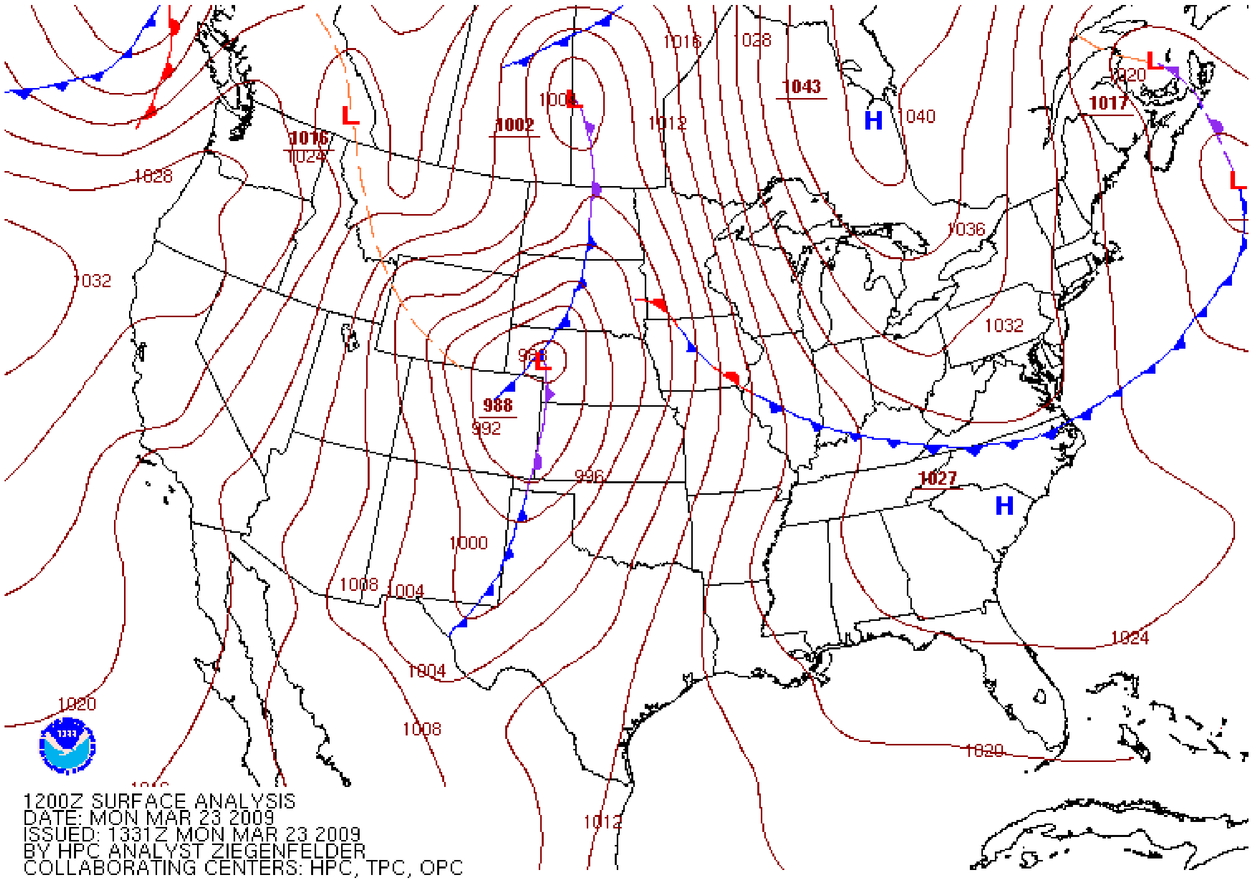

Figure 6-9. March 23, 2009 surface weather map depicting the frontal activity and isobars of constant pressure (red lines) for the 600 hour MST. Surface winds flow perpendicular to the isobars from high to low pressure.

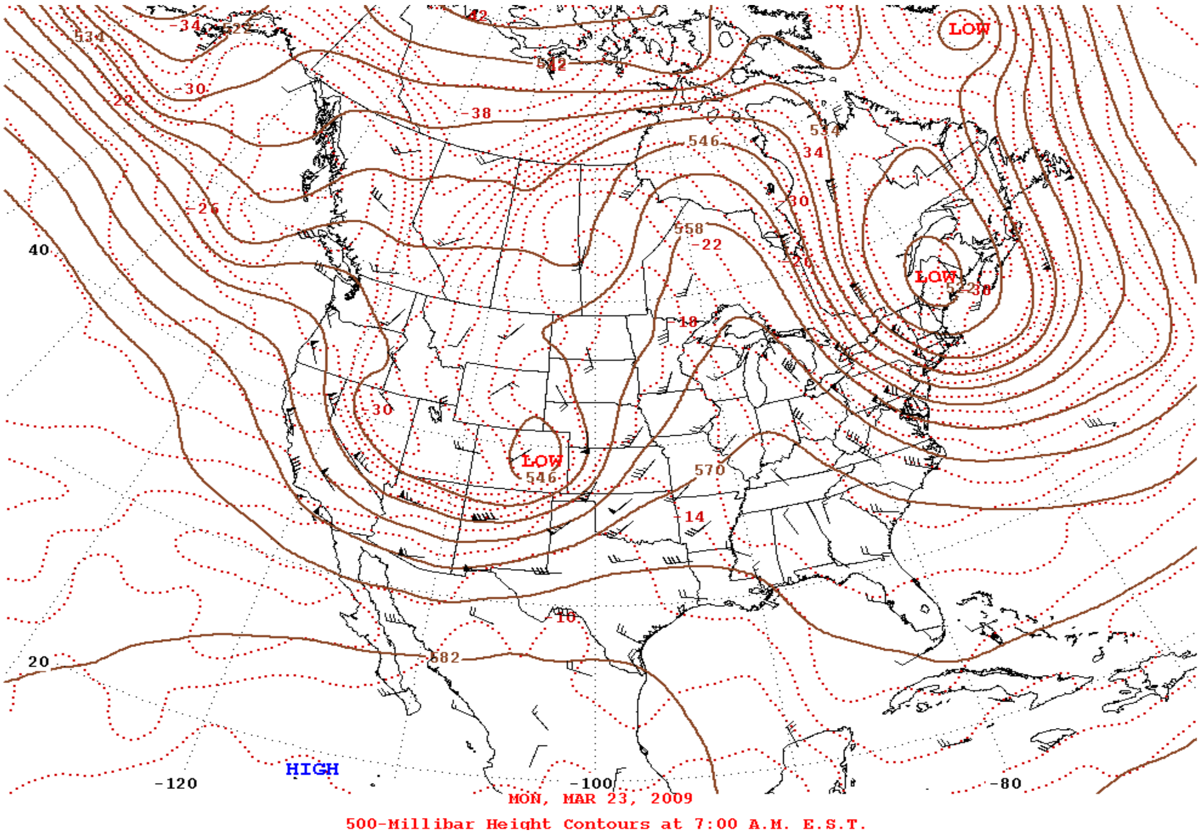

Figure 6-10. Upper Air weather map depicting winds aloft with isobars of constant pressure (brown lines). Winds flow parallel to the isobars.

Strong gusty winds were observed before and after the approaching cold front (400 hour and 900-1700 hours). Strong winds before the approaching cold front caused the PM_{10} spike at the Holman site due to highly localized source areas. The peaks from the 900-1700 hours were caused by entrained dust as daytime heating allowed for vertical mixing and transport. During this event wind gusts exceeded the 95^{th} percentile of data at the Holman site as shown in Figure 6-8. Peak wind gusts ranged from 13 m/s at Anthony to 25 m/s at Holman (Figure 6-3). Sustained hourly average wind speeds of 6 m/s or more were recorded at Holman during the peak PM_{10} concentrations (Figure 6-2). Blowing dust caused elevated levels of PM_{10} during the same time frame as high winds (Figure 6-11). As wind gusts exceed the 95^{th} percentile of historical data so do hourly PM_{10} concentrations on this date. Much smaller spikes in PM_{10} concentrations were observed at the other sites in the monitoring network at approximately the same time as the large spikes at Holman (Figure 6-12).

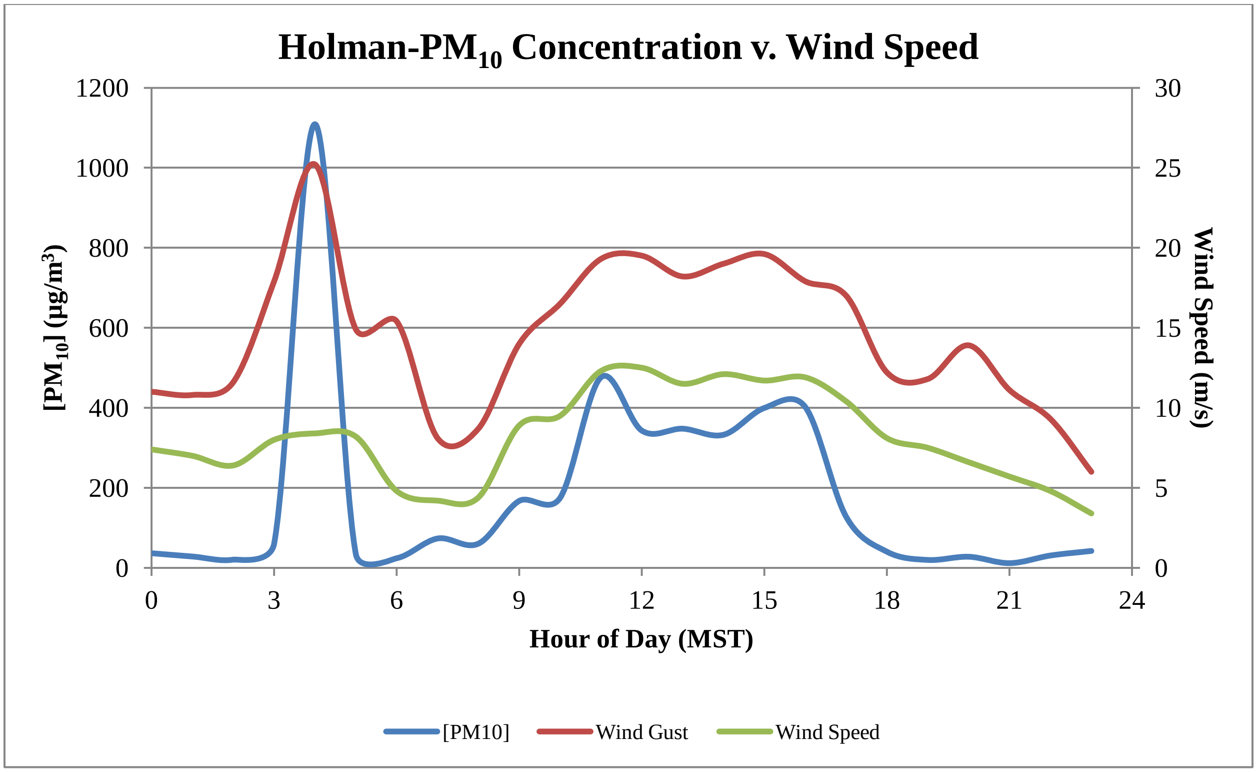

Figure 6-11. Time series plot of hourly observations showing increased PM_{10} concentrations as wind speeds and gusts increase.

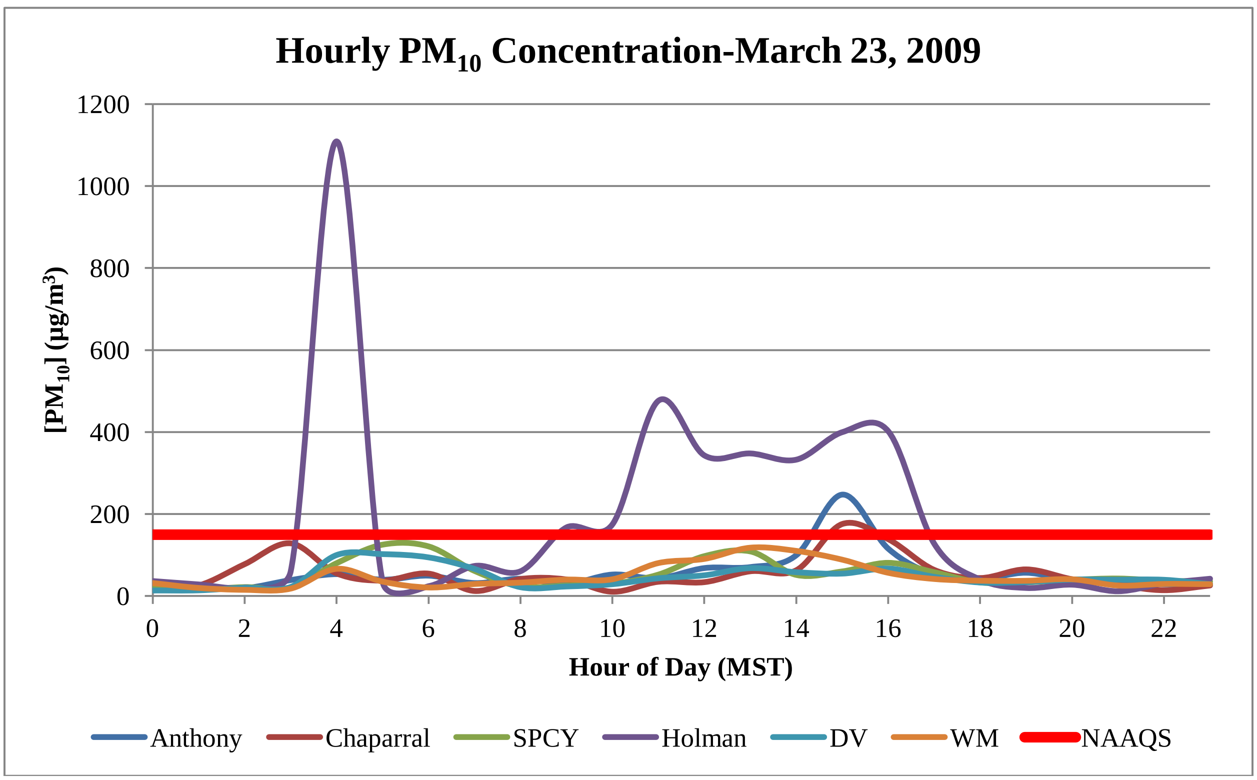

Figure 6-12. Time series plot of hourly observations showing increased PM_{10} concentrations at Holman.

6.6 Affects Air Quality

The historical fluctuations and clear causal relationship analyses prove that the event in question affected air quality on March 23, 2009.

6.7 Natural Event

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

6.8 No Exceedance but for the Event

Nine hourly PM_{10} values (400 hour and 900-1600 hours) exceed the 24-hour average standard at Holman [(1109 + 167 + 175 + 477 + 343 + 348 + 333 + 400 + 402) $\mu g/m^3$ = 3754 $\mu g/m^3$; (3754 $\mu g/m^3$)/24 = 156 $\mu g/m^3$]. Without the high wind and blowing dust an exceedance would not have been recorded.

7 HIGH WIND EXCEPTIONAL EVENT: March 26, 2009

7.1 Summary of Event

High winds and blowing dust caused an exceedance of the PM_{10} NAAQS at the AQB's SPCY and Holman monitoring sites on March 26, 2009. The 24-hour averages were recorded by FEM TEOM continuous monitors. The midnight-to-midnight 24-hour average concentrations were 210 µg/m^3 at SPCY and 190 µg/m^3 at Holman. All averages were rounded to the nearest 10 µg/m^3. This data has been submitted to AQS and flagged as high wind natural events under the EER. Although no other monitoring site recorded an exceedance, elevated PM_{10} concentrations were measured at all monitoring sites (Figure 7-1).

The weather conditions that caused high winds follow the typical scenario with the passage of a backdoor cold front. Winds blew from a predominantly west to southwesterly direction throughout the entire border region, crossing over desert and anthropogenic sources within New Mexico and northern 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.

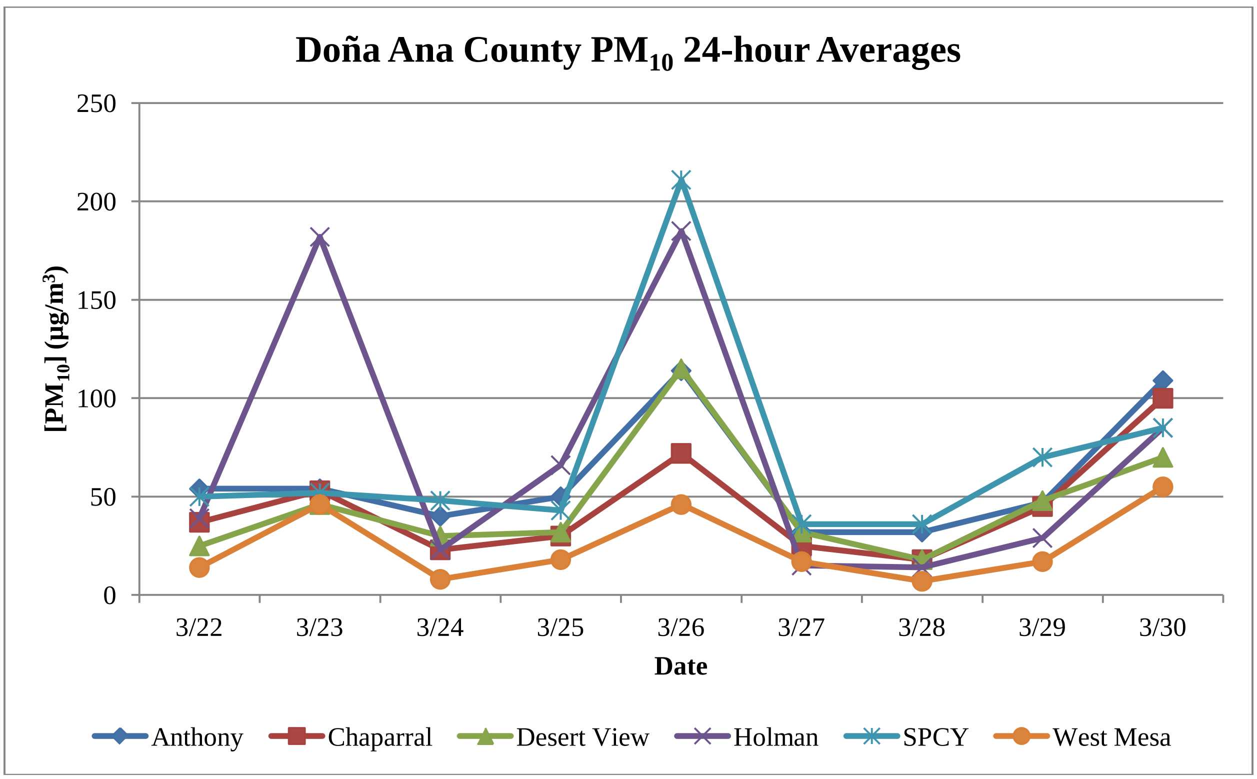

Figure 7-1. 24-hour Averages for the four days before and after the suspected high wind event. Averages measured using TEOM instruments at monitoring sites in Doña Ana County.

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 these exceedances include the undisturbed desert in Luna and Doña Ana Counties and Mexico as well as agricultural lands and unpaved roads in Doña Ana County. Agricultural tilling is possible in March and may have contributed to the event. Much of the development in Doña Ana County has occurred in the City of Las Cruces where city ordinance requires BACM. The largest and most likely source contributing to the exceedances are the playas of northern Mexico for the SPCY site and desert lands in Doña Ana and Luna Counties for the Holman site.

7.2.2 Sustained and Instantaneous Wind Speeds

EPA has indicated that 11.2 m/s (25 mph) would be used as the default entrainment threshold for natural events caused by high wind and blowing dust (EPA, 2011). NMED has found that a sustained hourly wind speed lasting two hours or more of 6 m/s with instantaneous wind gusts of 12 m/s or more can create blowing dust in the border region (Aaboe et al., 1998-2007; Saxton et al., 2000). In the past, NMED used 18 m/s as the threshold wind gust where the best controlled sources will be overwhelmed and entrain dust. On March 26, wind speeds exceeded both of NMED's presumed threshold velocities for dust entrainment at all monitoring sites (Figures 7-2 & 7-3). All monitoring sites recorded wind gust speeds exceeding 18 m/s from 1100 to 1700 hours.

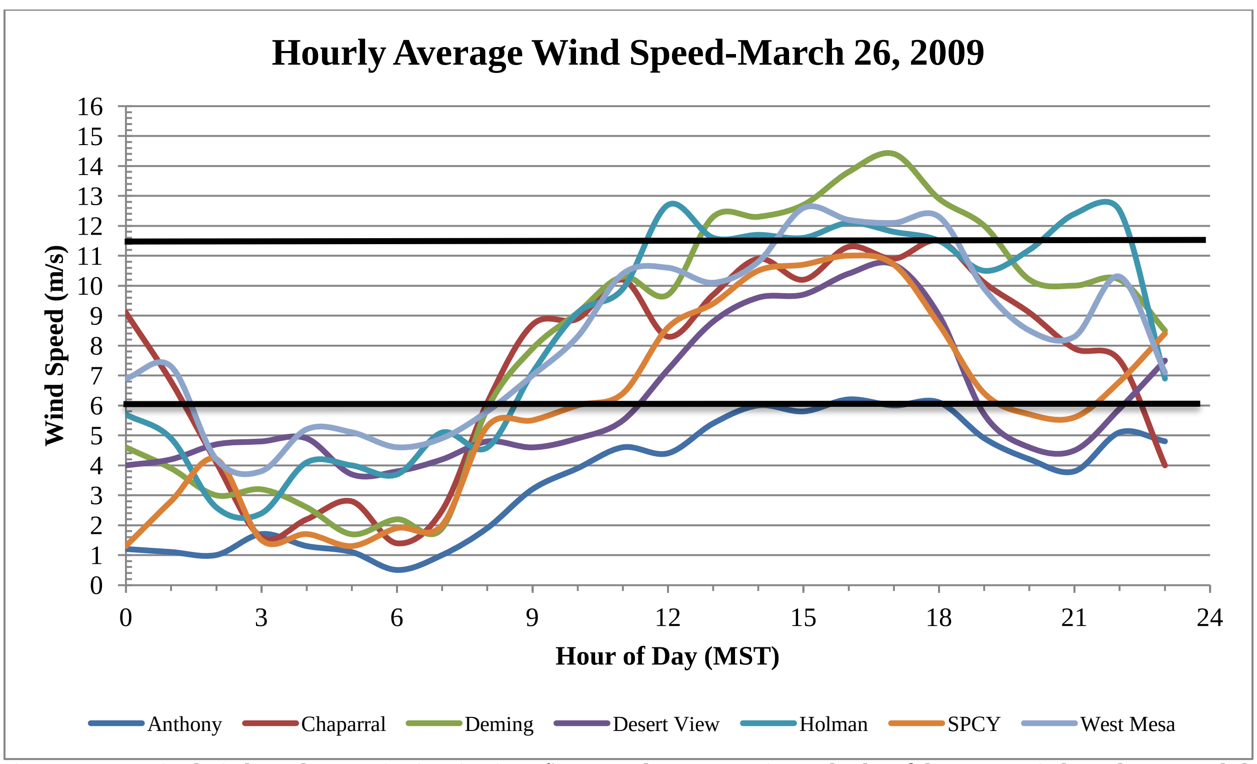

Figure 7-2. Sustained wind speeds at monitoring sites in Doña Ana and Luna Counties on the day of the event. Wind speeds are sampled every other second then averaged over an hour. The Anthony and West Mesa sites measure wind speed at 2 and 8 meters above grade respectively. All other sites measure wind speed at 10 meters above grade.

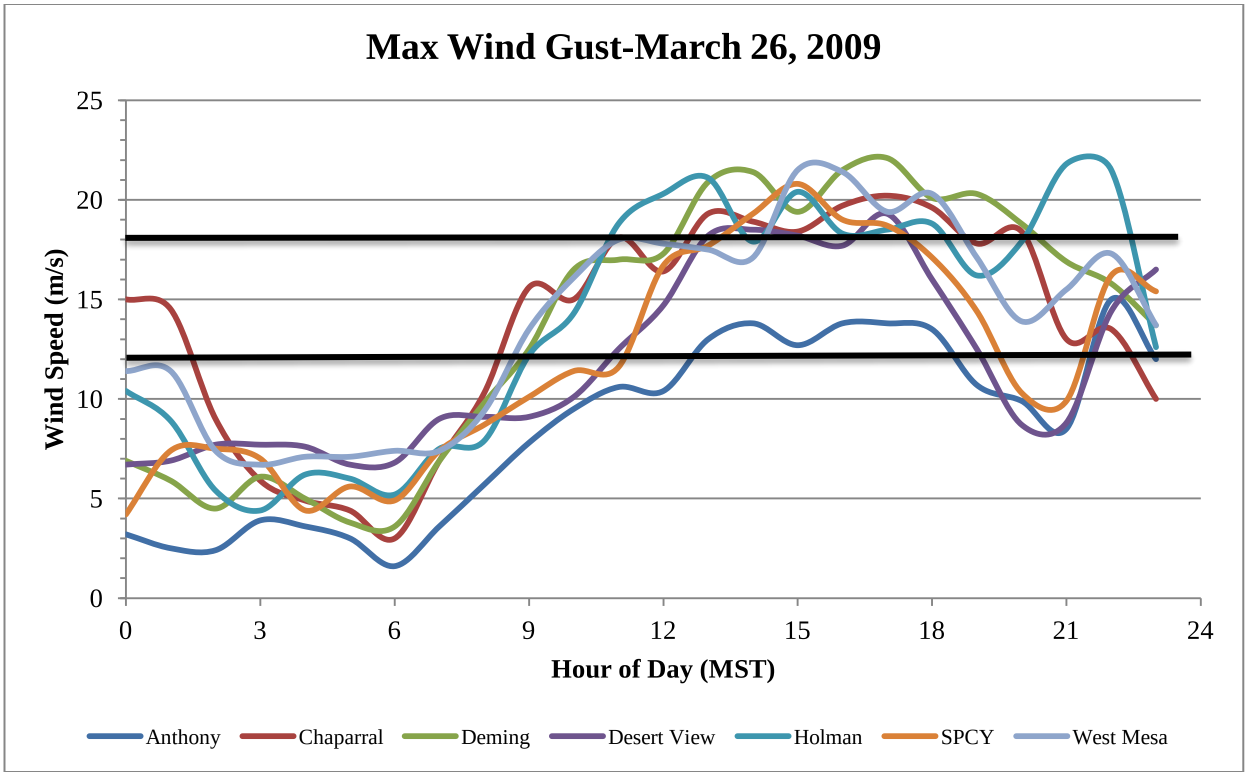

Figure 7-3. Maximum wind speeds at monitoring sites in Doña Ana and Luna Counties on the day of the event. Wind speeds are sampled every other second with the maximum of the hourly samples supplied here. The Anthony and West Mesa sites measure wind speed at 2 and 8 meters above grade respectively. All other sites measure wind speed at 10 meters above grade.

7.2.3 Recurrence Frequency

The SPCY monitoring station can record exceedances at any time of year. From 2003-2008, the FEM TEOM monitor has recorded 61 high wind exceedances and the FRM Wedding monitor has recorded three (Figure 7-4). The difference between the number of recorded exceedances is due to the FRM Wedding monitor sampling schedule of 1-in-6 days. The SPCY site records an average of 10.2 exceedances per year, with a high of 14 in 2004 and 2008 and a low of 5 in 2007.

The Holman monitoring station can record exceedances at any time of year. From 2004-2008, the FEM TEOM monitor has recorded 24 exceedances of the standard (Figure 7-4). The Holman site records an average of 4.8 exceedances per year, with a high of 12 in 2008 and a low of 1 in 2005.

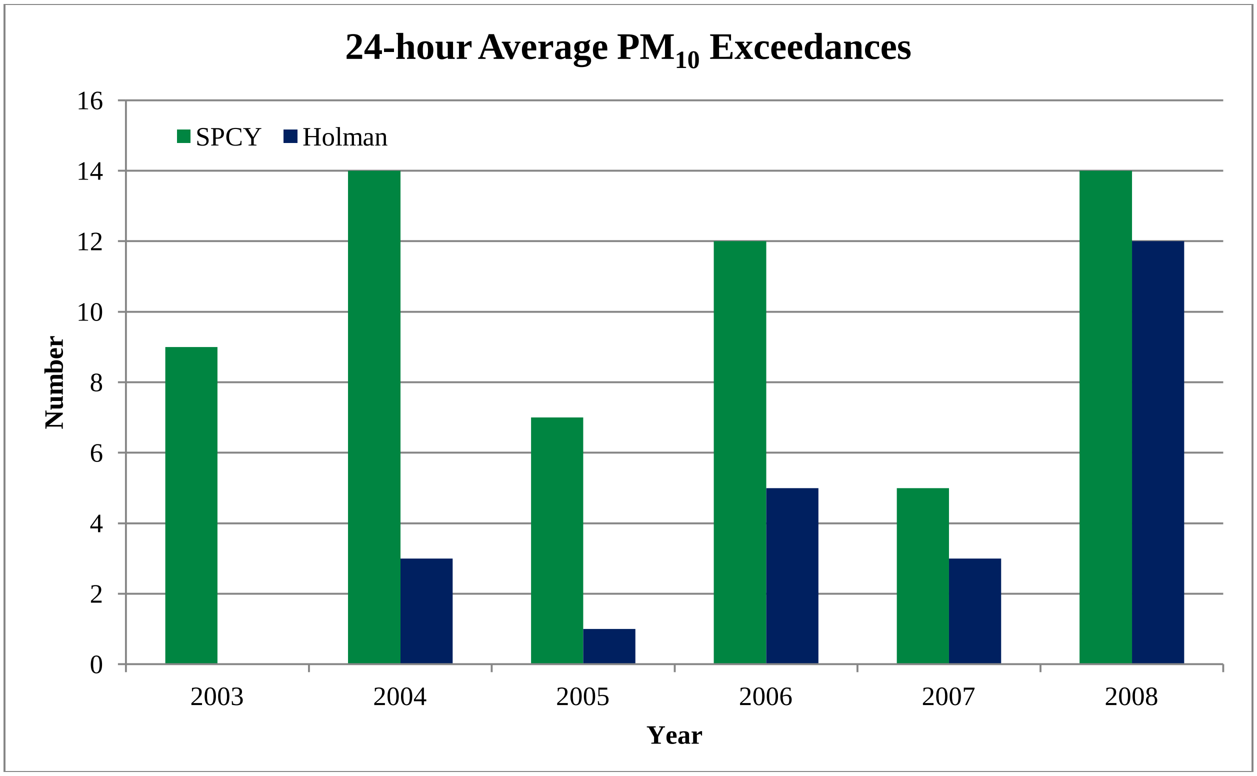

Figure 7-4. High wind blowing dust exceedances recorded by the FEM TEOM instruments. The FRM Wedding instrument recorded an additional three exceedances at SPCY over the same time period.

7.2.4 Controls Analysis

Implementation of BACM in Doña Ana County has been carried out through the ordinances and MOUs adopted under the NEAP. The ordinances regulate disturbed lands, construction and demolition, vacant parking lots and materials handling and transportation. On this day no other unusual PM_{10} producing activities occurred and anthropogenic emissions remained constant before, during and after the event. The most likely sources contributing to the event are the playas of northern Mexico and desert lands in Doña Ana County. A back-trajectory analysis using the HYSPLIT (Draxler et al., 2011; Rolph, 2011) model shows that the air masses traveled from central Luna and Doña Ana Counties to the northern monitors and from southern Luna and Doña Ana Counties and northern Mexico to the monitors in the southern half of the county (Figure 7-5). The model was run for the eight hours preceding the peak concentrations of the event. Controlling dust from the natural desert terrain is cost prohibitive. NMED concludes that the sources contributing to the event are not reasonably controllable.

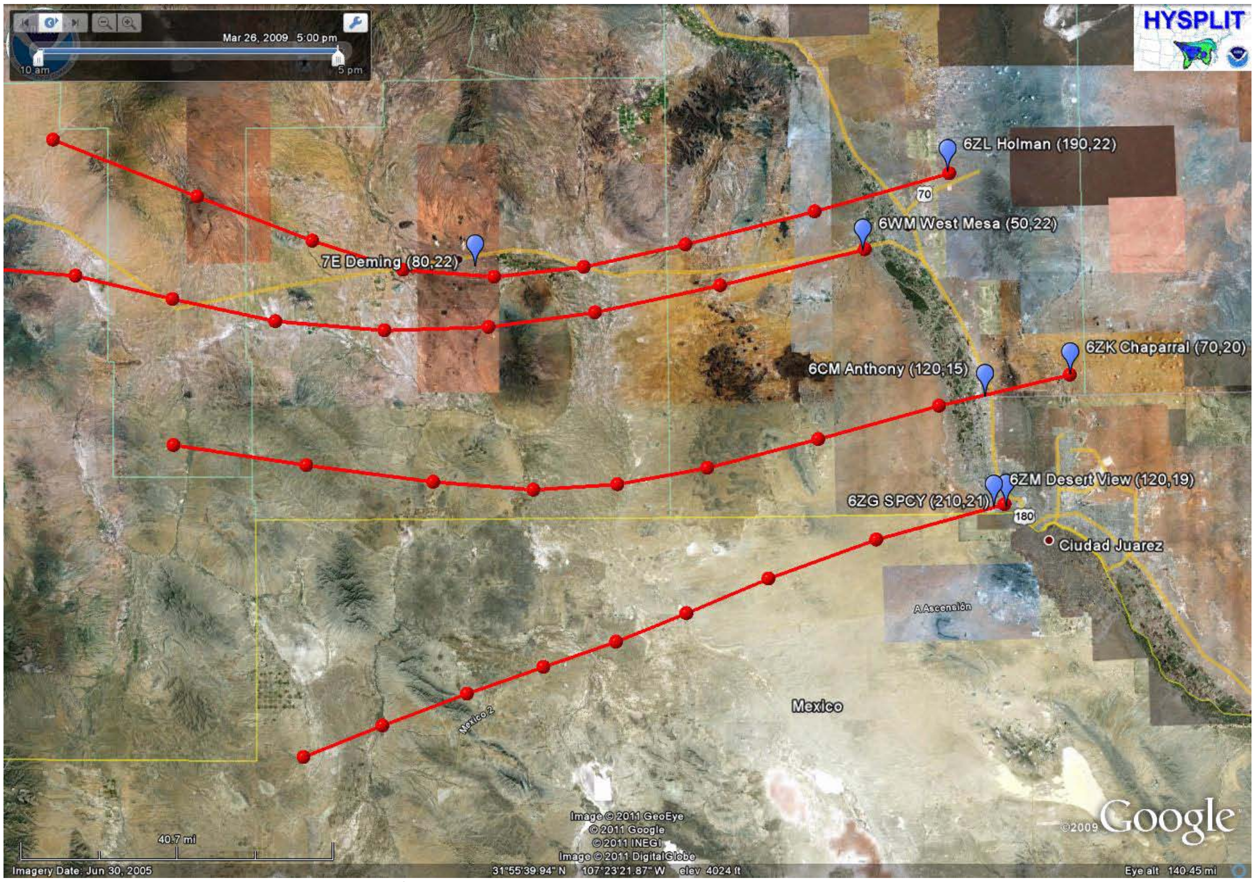

Figure 7-5. Back-trajectory model analysis for the event on March 26, 2009. The numbers in parenthesis are the 24-hour average PM_{10} concentration and max wind gust respectively. The model was run for the eight hours preceding the peak concentrations of the event starting from the 1200 hour. Each ball represents one hour in the past from the starting point of the model run.

7.4 Historical Fluctuations Analysis

7.4.1 Annual and Seasonal 24-hour Average Fluctuations

The SPCY and Holman sites have recorded PM_{10} exceedances every year since continuous FEM TEOM monitoring was established. These exceedances can occur during any time of year and are caused by high winds (Figures 7-6 and 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} concentrations were 524 µg/m^3 at Holman and 1109 µg/m^3 at SPCY. All exceedances at Holman have been caused by high winds and natural events demonstrations were submitted to EPA under the NEAP or EER. SPCY is the only site in the network where low wind exceedances have been recorded. From 2003-2005 the FEM TEOM monitor recorded 14 low wind exceedances. No exceedances have been recorded since 2005 and NMED continues to research the reasons behind these low wind high PM_{10} concentrations. All other exceedances at SPCY have been caused by high winds and natural events demonstrations were submitted to EPA under the NEAP or EER.

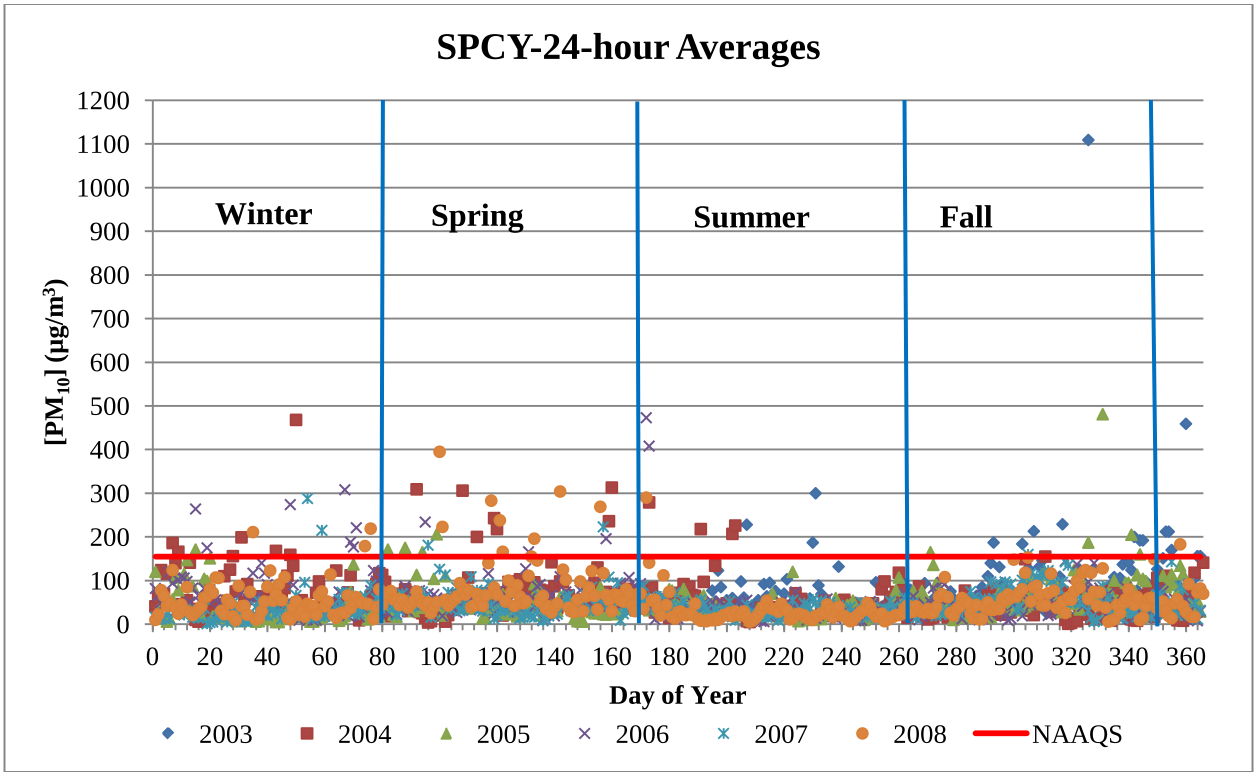

Figure 7-6. 24-hour average PM_{10} concentrations by day of year from 2003-2008. All averages collected using FEM TEOM instrument.

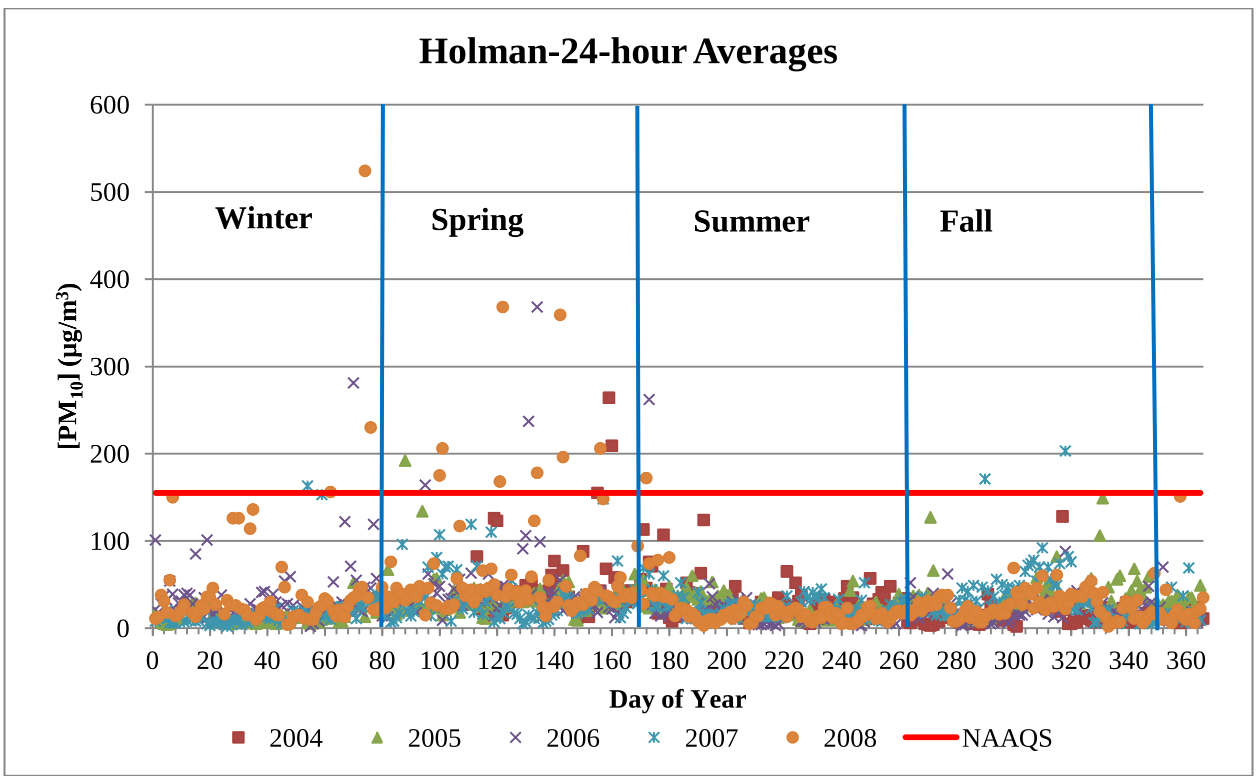

Figure 7-7. 24-hour average PM_{10} concentrations by day of year from 2004-2008. All averages collected using FEM TEOM instrument.

Table 7-1 shows normal historical fluctuations with and without high wind natural events that caused exceedances from 2003-2008. The recorded values for this day (211 μg/m^3 at SPCY and 185 μg/m^3 at Holman) are above the 95th percentile of all 24-hour averages recorded at each respective site.

Holman	Max	99th	95th	75th	50th	Mean	25th	5th	Minimum
No Events	153	121	62	35	23	27	14	6	2
Events	524	173	70	36	23	30	14	6	2
SPCY	**Max**	**99th**	**95th**	**75th**	**50th**	**Mean**	**25th**	**5th**	**Minimum**
No Events	212	146	110	61	39	47	24	11	1
Events	1109	237	128	64	40	53	25	11	1

Table 7-1. 24-hour average PM_{10} data distribution with and without high wind events included. Only those high wind events that resulted in an exceedance were excluded from the analysis. Data for SPCY includes FRM Wedding and FEM TEOM data from 2003-2008. Data for Holman only includes FEM TEOM data from 2004-2008.

An hourly data distribution analysis was done for PM_{10} concentrations and wind gust speeds (Appendices A and B). When the hourly data for March 26 is overlaid on the hourly data distribution plots, it shows that the values recorded during the high wind event exceed the 95th percentile for both PM_{10} and wind gusts (Figures 7-9 through 7-12) at the Holman and SPCY monitoring sites. The hourly PM_{10} values during the high wind blowing dust storm far exceed the 95th percentiles of hourly data.

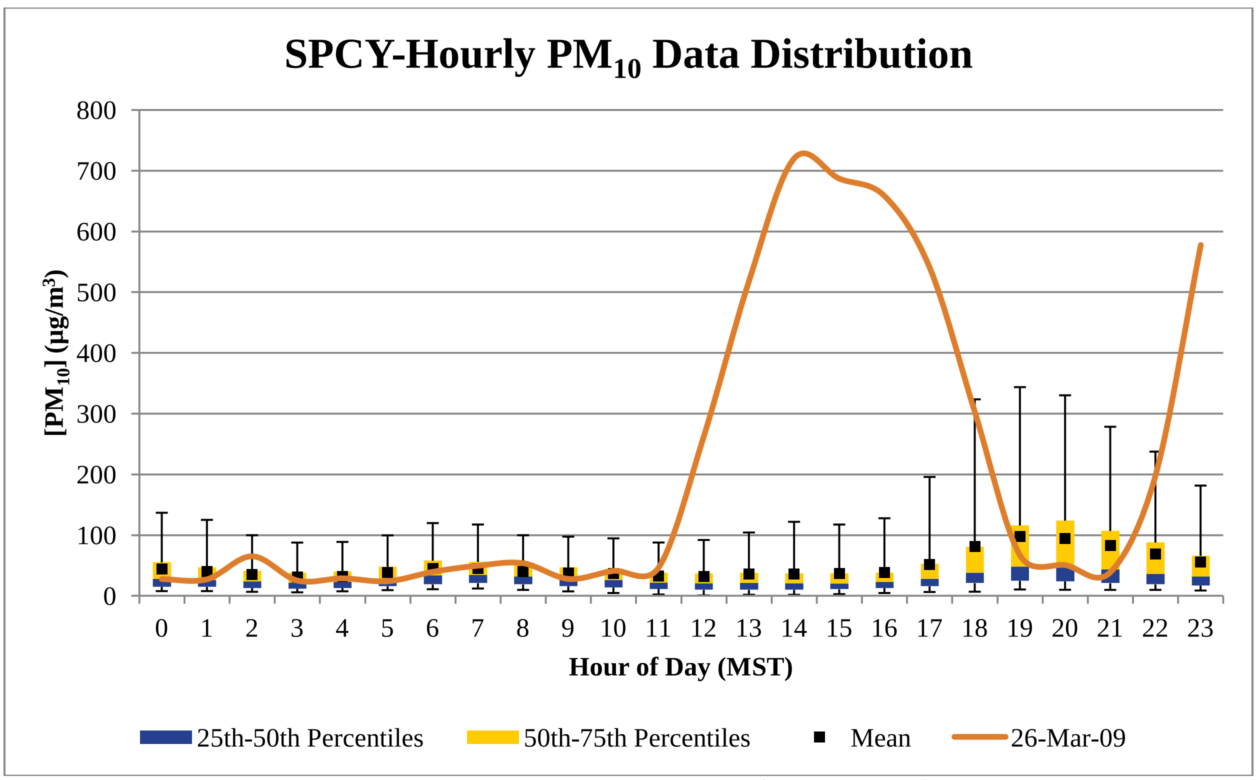

Figure 7-9. All data recorded using the FEM TEOM monitor. Data distribution is for hourly values from 2003-2008. The top whisker represents the 95th percentile of data.

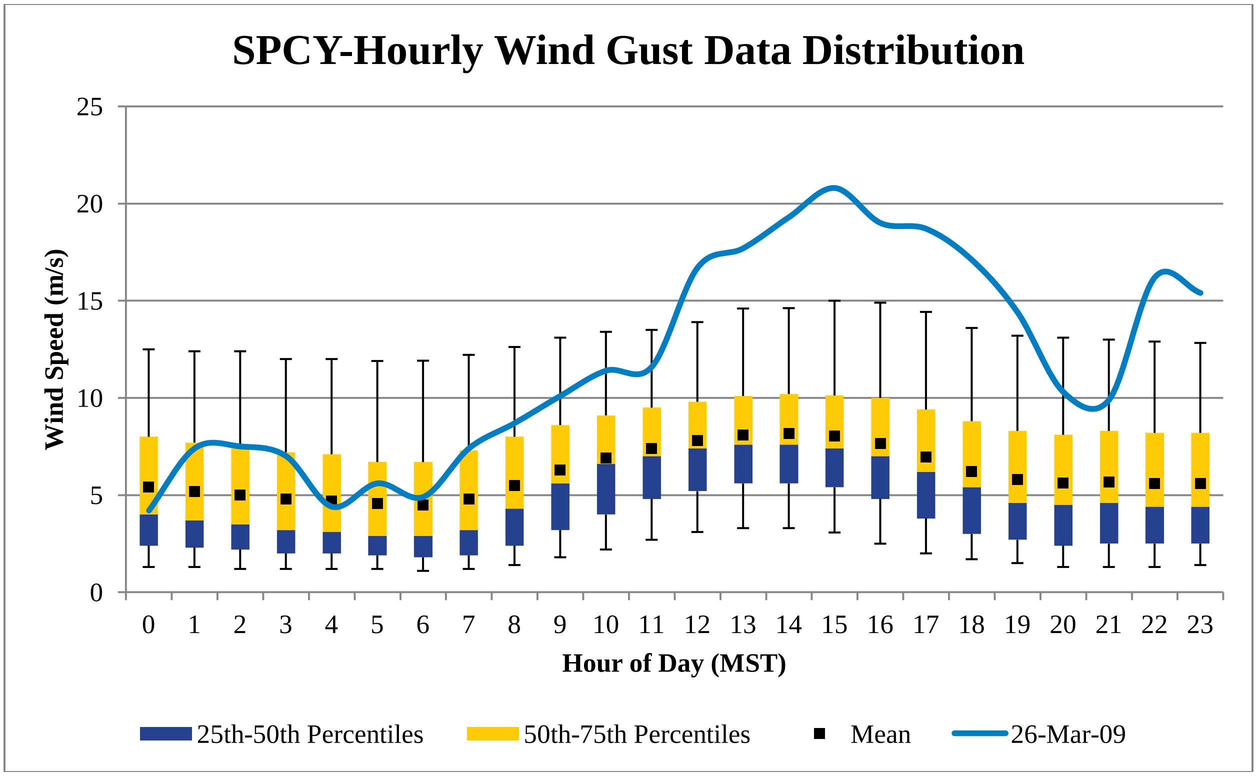

Figure 7-10. Wind speed data distribution from 2003-2008 measured at 10 meters. Data is for the maximum wind gust recorded during the hour.

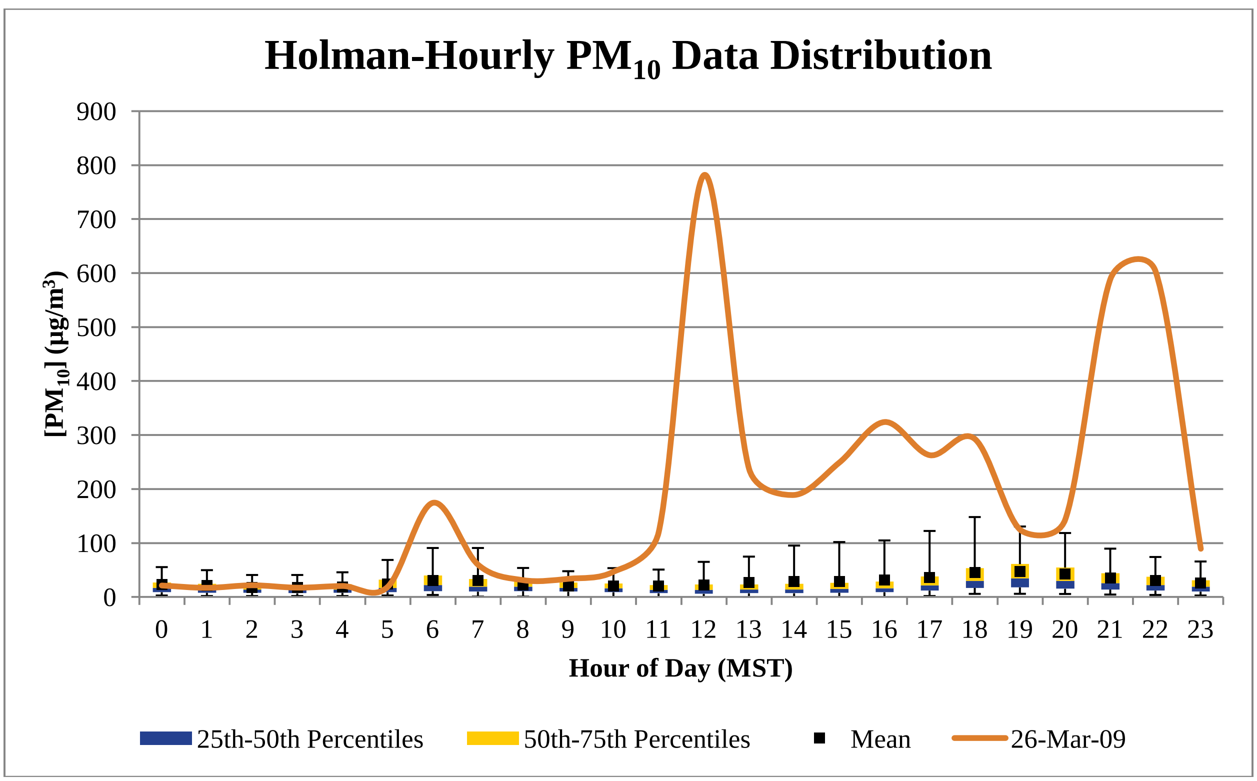

Figure 7-11. All data recorded using the FEM TEOM monitor. Data distribution is for hourly values from 2004-2008. The top whisker represents the 95th percentile of data.

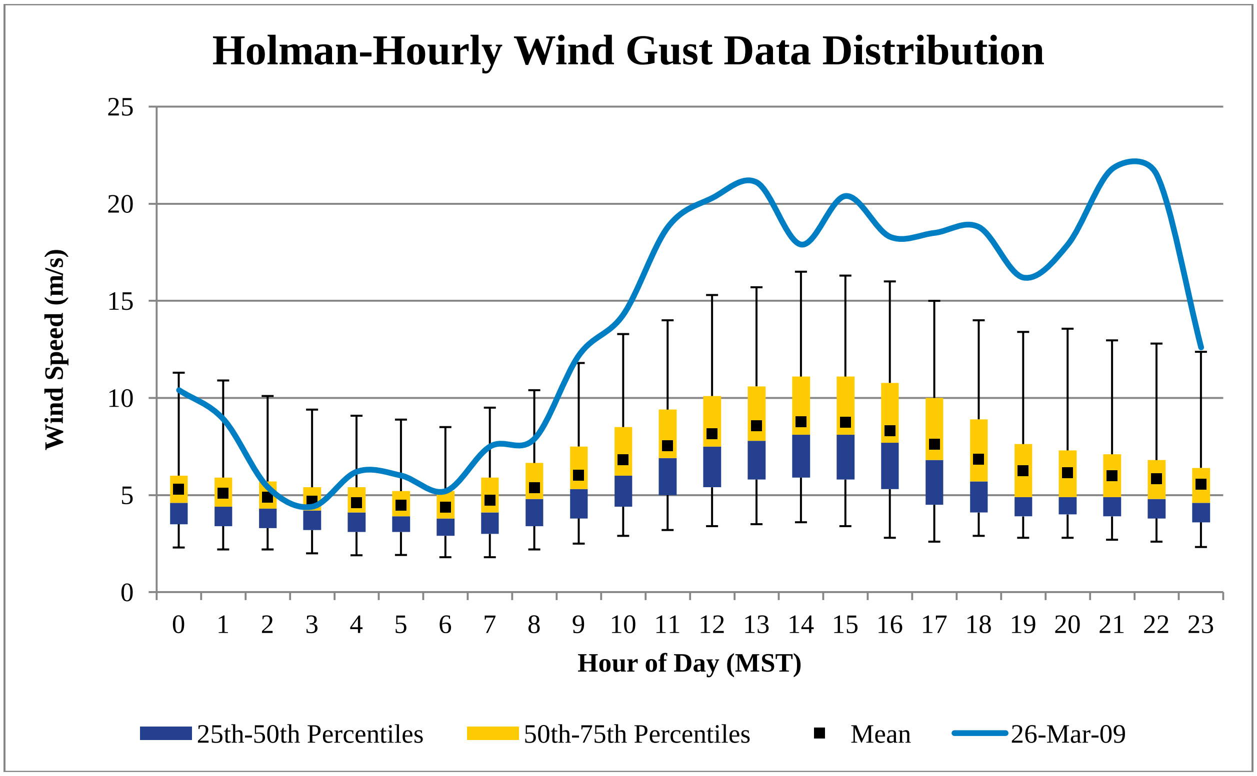

Figure 7-12. Wind speed data distribution from 2004-2008 measured at 10 meters. Data is for the maximum wind gust recorded during the hour.

7.5 Clear Causal Relationship

A Pacific cold front passed through New Mexico on March 26, 2009 with the center of low pressure traveling from southern Idaho along the Utah-Colorado border into New Mexico during the early morning hours. Ahead of the cold front a weak pressure gradient formed over southern Arizona, southwestern New Mexico and northern Mexico (Figure 7-13). At the 500 hour an area of low pressure aloft was observed over southern Wyoming. As the day progressed this low pressure traveled east and aligned itself with the surface wind direction (Figure 7-14). Heating of the surface allowed winds aloft to mix down, increasing the surface winds and provided the turbulence required for vertical mixing and entrainment of dust.

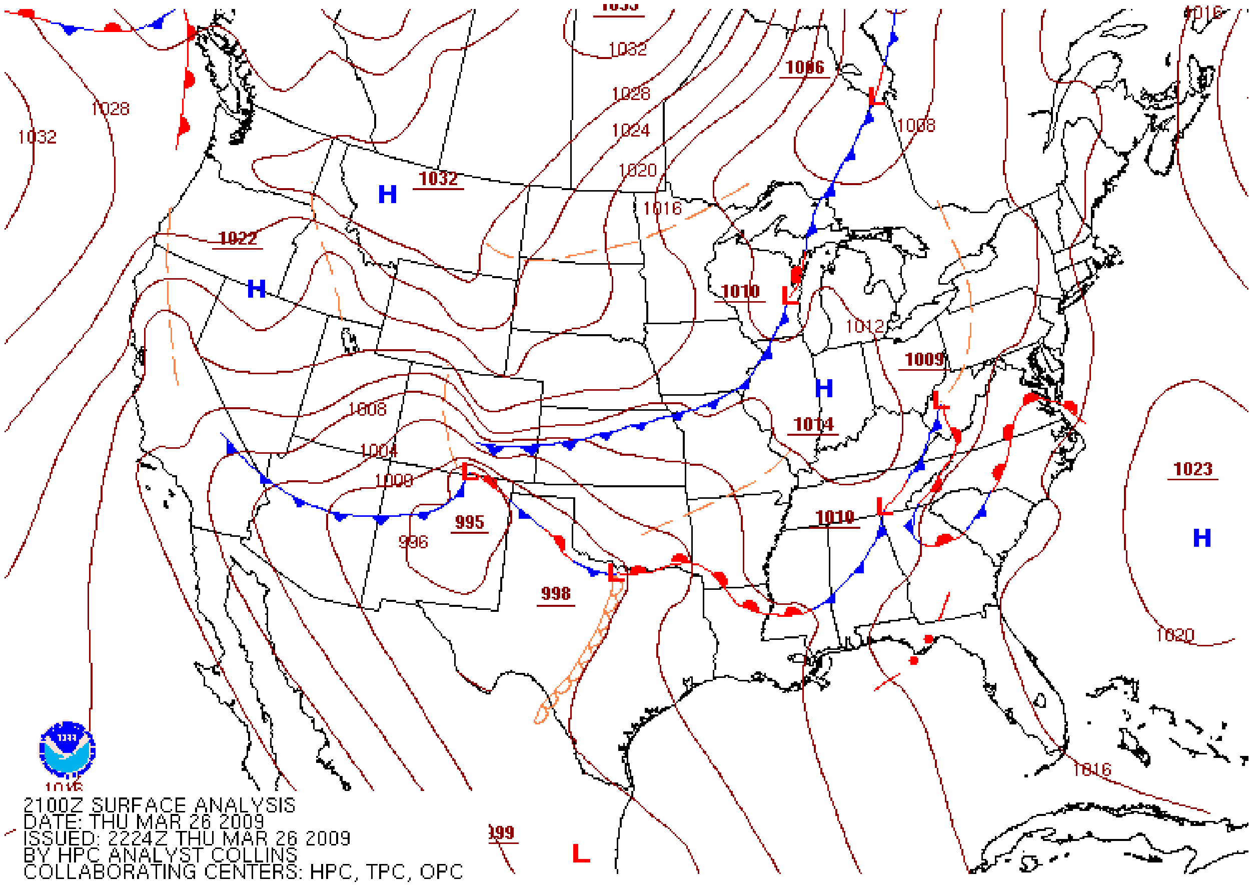

Figure 7-13. March 26, 2009 surface weather map depicting the frontal activity and isobars of constant pressure (red lines) for the 1100 hour MST. Surface winds flow perpendicular to the isobars from high to low pressure.

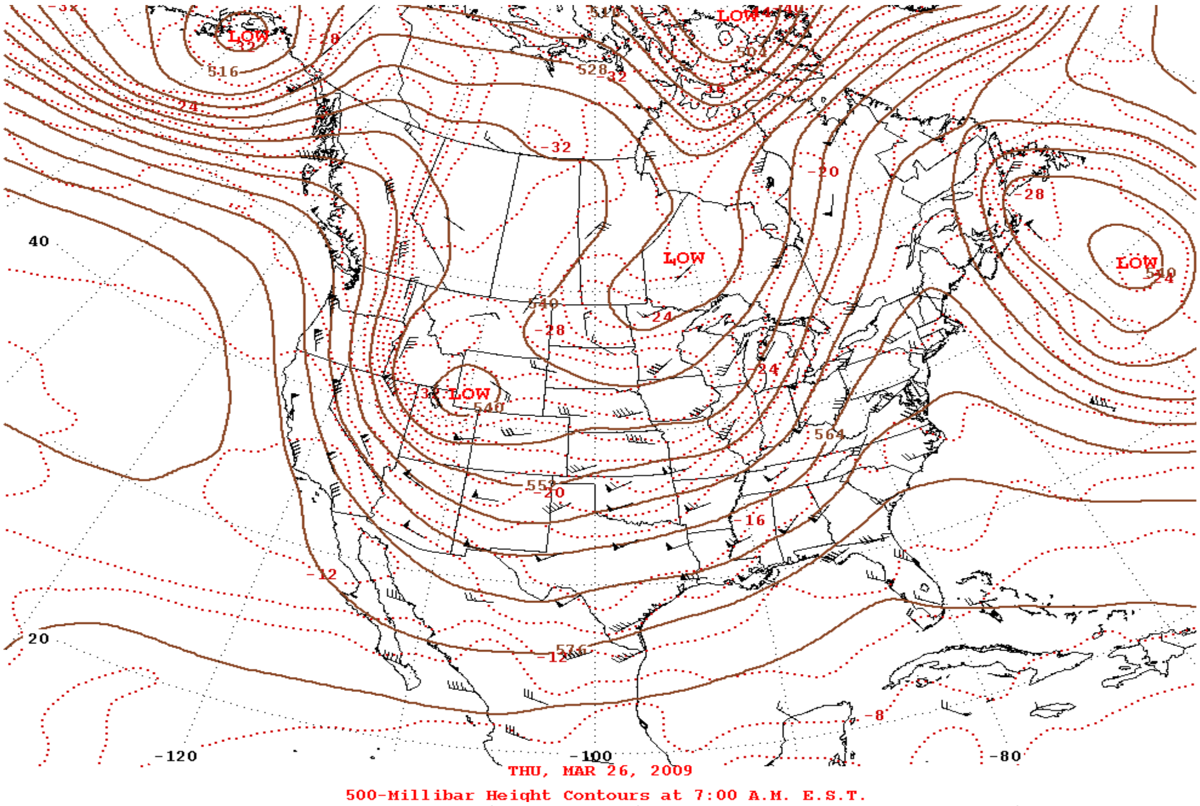

Figure 7-14. Upper Air weather map depicting winds aloft with isobars of constant pressure (brown lines). Winds flow parallel to the isobars.

This weather pattern generated strong west to southwesterly winds beginning at the 1200 hour and lasting through the early morning hours on March 27. During this time frame wind gusts regularly exceeded the 95th percentiles as shown in figures 7-10 and 7-12. Peak wind gusts ranged from 15 m/s at Anthony to 22 m/s at the northern sites (Figure 7-3). Sustained hourly average wind speeds of 6 m/s or more and wind gusts of 12 m/s or more were recorded at all monitoring sites during elevated PM_{10} concentrations (Figure 7-2 and 7-3). Blowing dust caused elevated levels of PM_{10} during the same time frame as high winds (Figures 7-15 to 7-16). As wind gusts exceed the 95th percentile of historical data so do hourly PM_{10} concentrations (1200-2300 hours) on this date. Hourly PM_{10} concentrations throughout the network exhibit the same pattern with elevated concentrations of PM_{10} throughout the network until the evening hours (Figure 7-17).

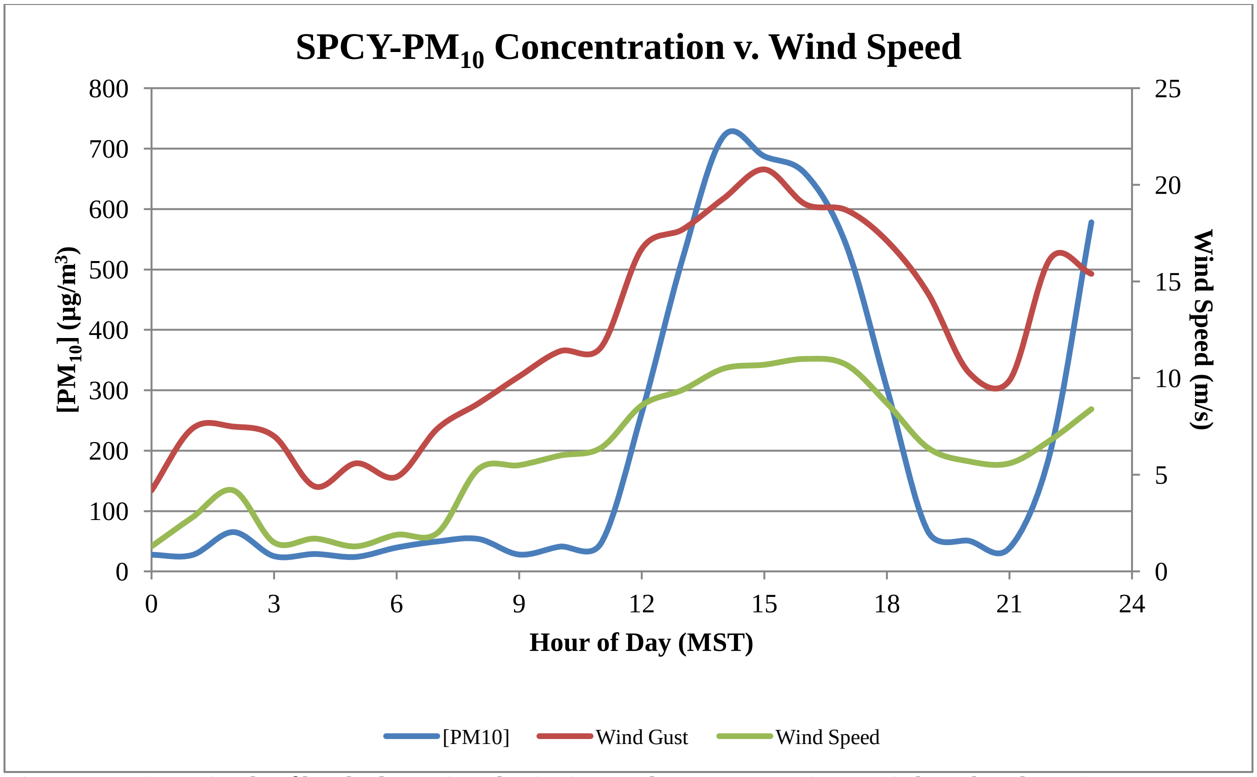

Figure 7-15. Time series plot of hourly observations showing increased PM_{10} concentrations as wind speeds and gusts increase.

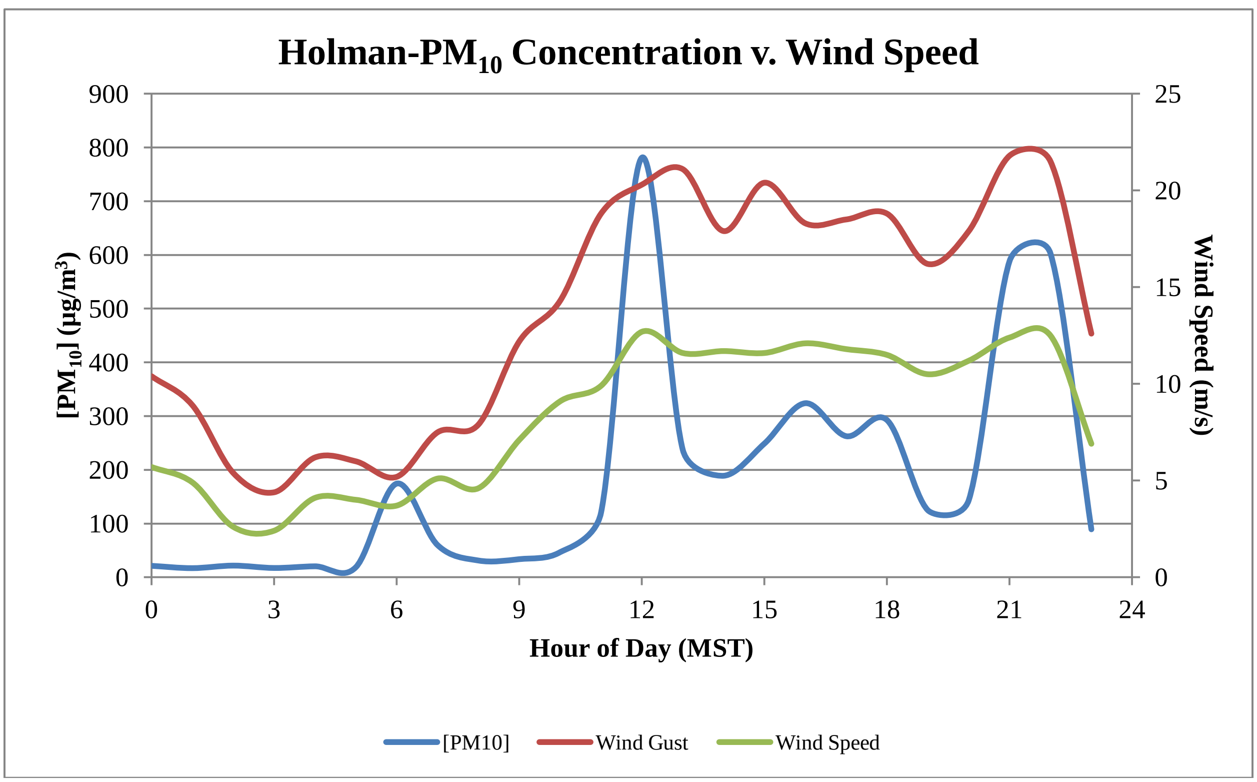

Figure 7-16. Time series plot of hourly observations showing increased PM_{10} concentrations as wind speeds and gusts increase.

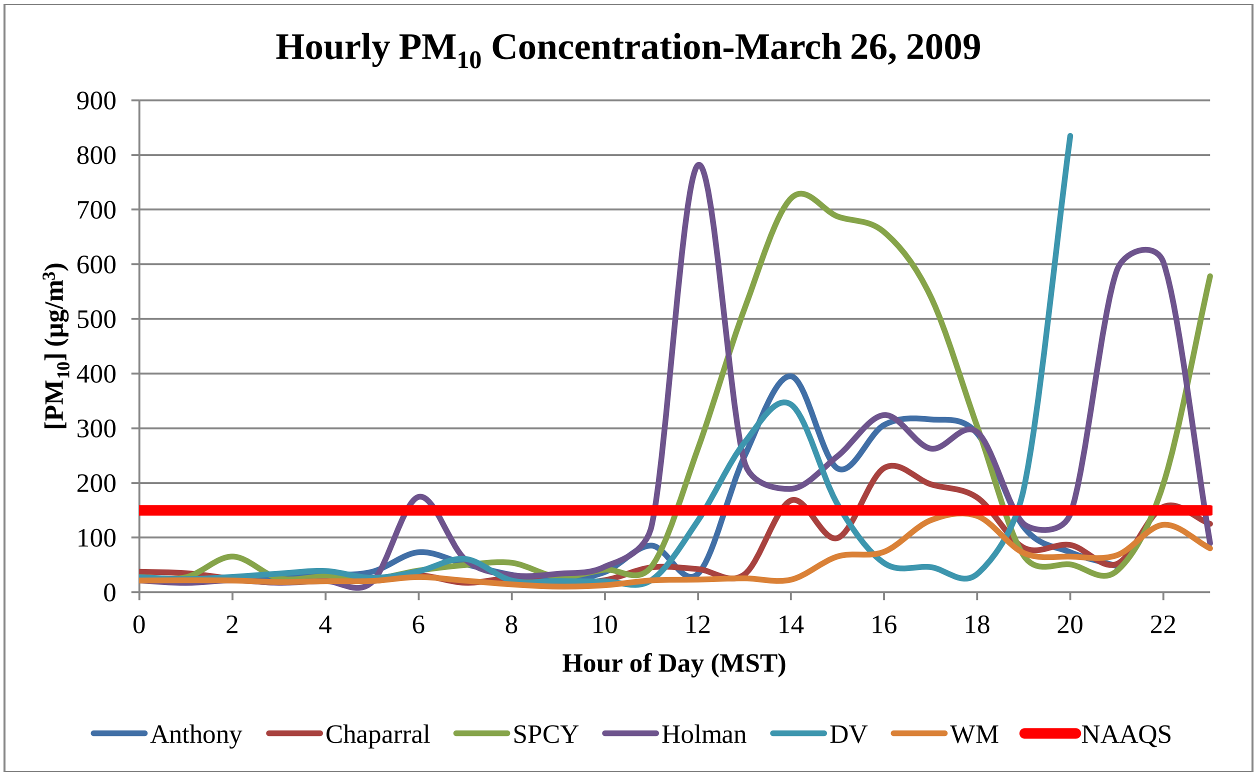

Figure 7-17. Time series plot of hourly observations showing increased PM_{10} concentrations at most monitoring sites.

7.6 Affects Air Quality

The historical fluctuations and clear causal relationship analyses prove that the event in question affected air quality on March 26, 2009.

7.7 Natural Event

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

7.8 No Exceedance but for the Event

Eleven hourly PM_{10} values (1200-2200 hours) exceed the 24-hour average standard at Holman [(781 + 238 + 189 + 249 + 324 + 263 + 293 + 125 + 144 + 589 + 603) µg/m^3 = 3798 µg/m^3; (3798 µg/m^3)/24 = 158 µg/m^3]. Without the high wind and blowing dust an exceedance would not have been recorded.

Eight hourly PM_{10} values (1200-1900 hours) exceed the 24-hour average standard at SPCY [(263 + 519 + 721 + 687 + 658 + 540 + 302 + 66) µg/m^3 = 3756 µg/m^3; (3756 µg/m^3)/24 = 157 µg/m^3]. Without the high wind and blowing dust an exceedance would not have been recorded.

8 HIGH WIND EXCEPTIONAL EVENT: April 8, 2009

8.1 Summary of Event

High winds and blowing dust caused an exceedance of the PM_{10} NAAQS at the AQB's SPCY and Chaparral monitoring sites on April 8, 2009. The 24-hour averages were recorded by FEM TEOM continuous monitors. The midnight-to-midnight 24-hour average concentrations were 170 $\mu g/m^3$ at SPCY and 190 $\mu g/m^3$ Chaparral. All averages were rounded to the nearest 10 $\mu g/m^3$. This data has been submitted to AQS and flagged as high wind natural events under the EER. Although no other monitoring site recorded an exceedance, elevated PM_{10} concentrations were measured at all monitoring sites except West Mesa (Figure 8-1).

The weather conditions that caused high winds follow the typical scenario with the passage of a Pacific cold front. Winds blew from a predominantly southwesterly direction throughout the entire border region, crossing over desert and anthropogenic sources within New Mexico and northern 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.

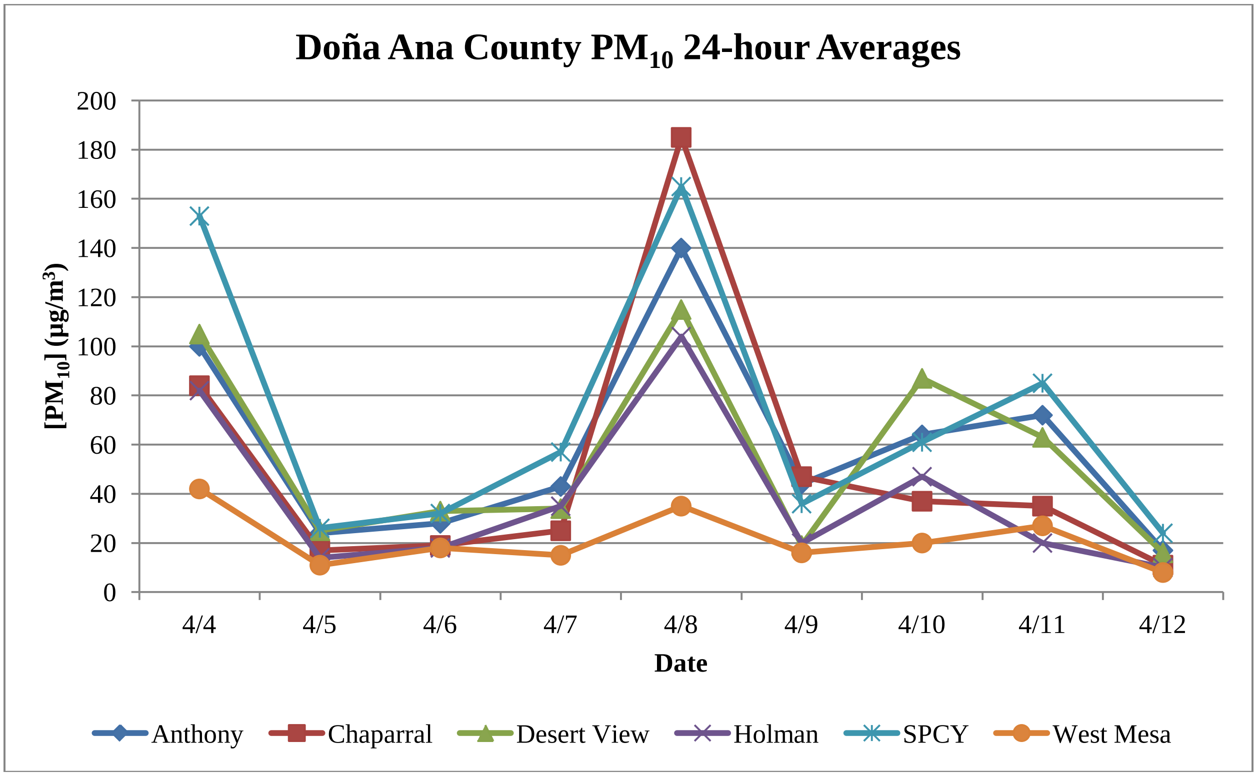

Figure 8-1. 24-hour Averages for the four days before and after the suspected high wind event. Averages measured using TEOM instruments at monitoring sites in Doña Ana County.

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 these exceedances include the undisturbed desert in Luna and Doña Ana Counties and Mexico as well as agricultural lands and unpaved roads in Doña Ana County. Agricultural tilling is possible in April and may have contributed to the event. Much of the development in Doña Ana County has occurred in the City of Las Cruces where city ordinance requires BACM. The largest and most likely sources contributing to the exceedances are the playas of northern Mexico.

8.2.2 Sustained and Instantaneous Wind Speeds

EPA has indicated that 11.2 m/s (25 mph) would be used as the default entrainment threshold for natural events caused by high wind and blowing dust (EPA, 2011). NMED has found that a sustained hourly wind speed lasting two hours or more of 6 m/s with instantaneous wind gusts of 12 m/s or more can create blowing dust in the border region (Aaboe et al., 1998-2007; Saxton et al., 2000). In the past, NMED used 18 m/s as the threshold wind gust where the best controlled sources will be overwhelmed and entrain dust. On April 8, wind speeds exceeded both of NMED's presumed threshold velocities for dust entrainment at all monitoring sites (Figures 8-2 & 8-3). All monitoring sites, excluding Anthony, recorded wind gust speeds exceeding 18 m/s from 1300 to 1700 hours.

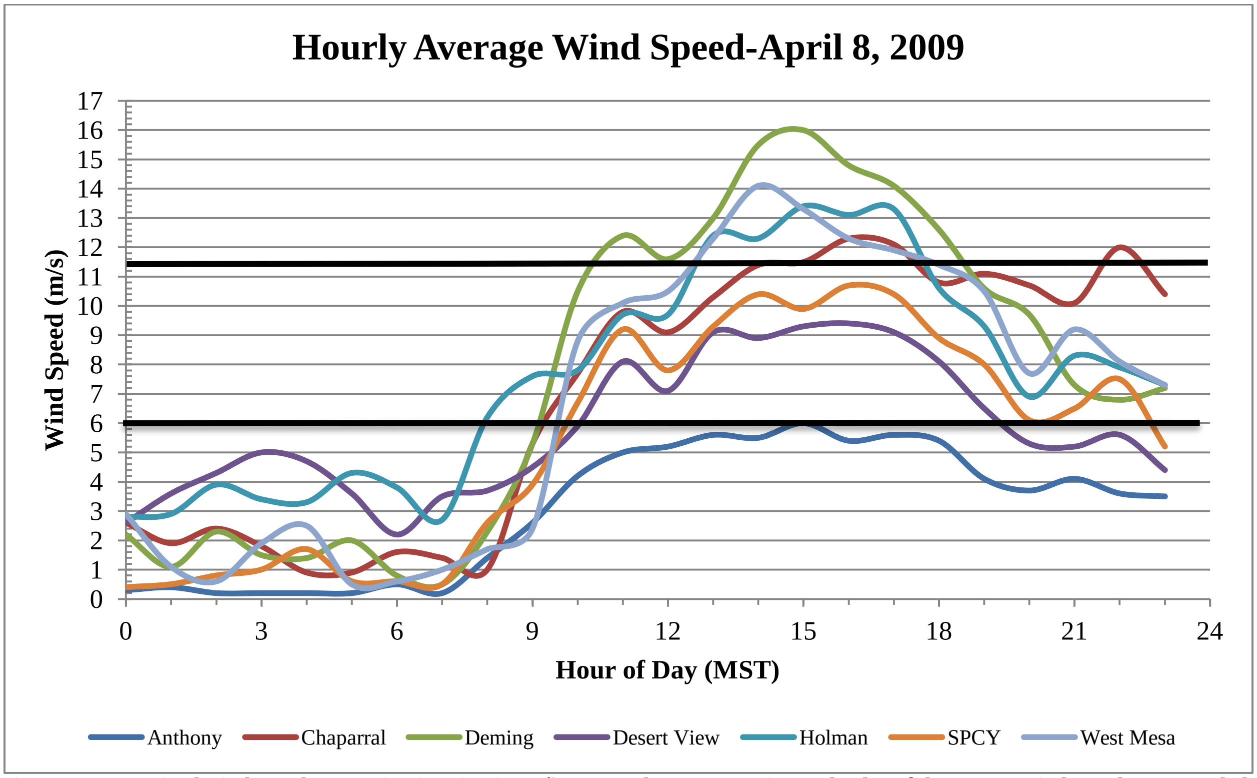

Figure 8-2. Sustained wind speeds at monitoring sites in Doña Ana and Luna Counties on the day of the event. Wind speeds are sampled every other second then averaged over an hour. The Anthony and West Mesa sites measure wind speed at 2 and 8 meters above grade respectively. All other sites measure wind speed at 10 meters above grade.

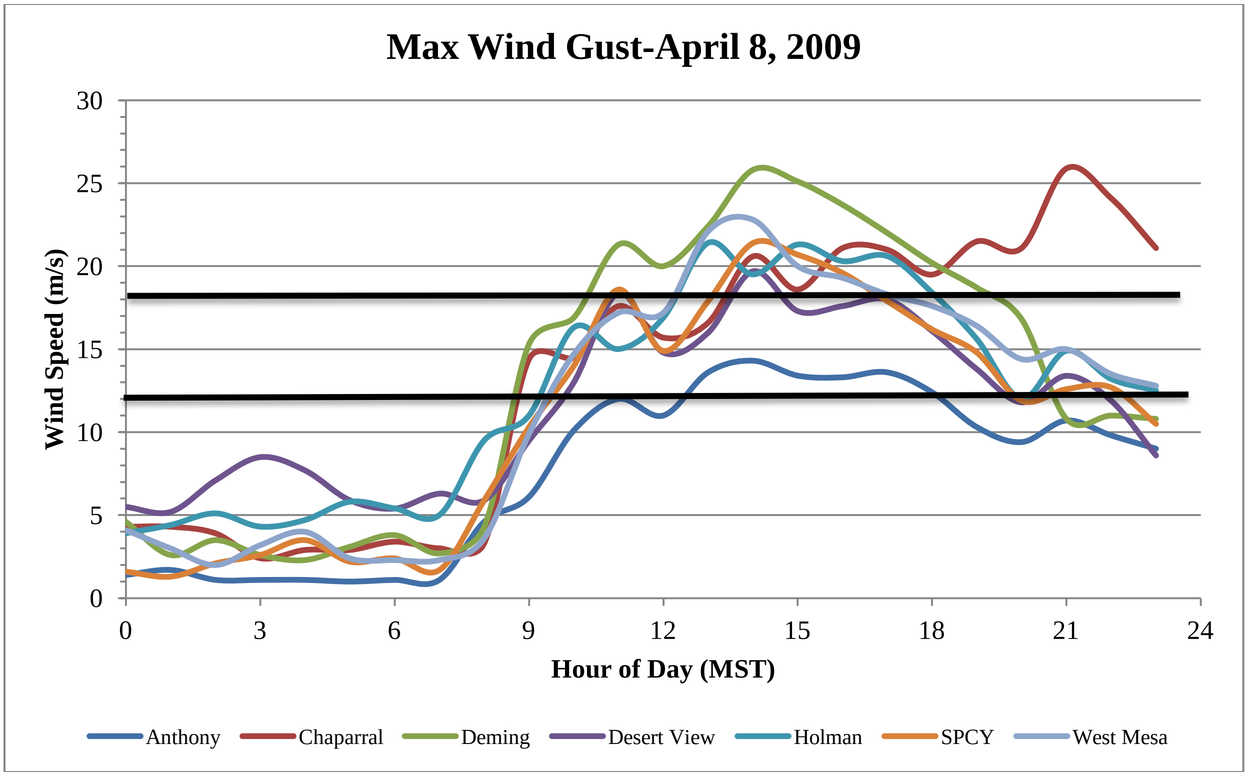

Figure 8-3. Maximum wind speeds at monitoring sites in Doña Ana and Luna Counties on the day of the event. Wind speeds are sampled every other second with the maximum of the hourly samples supplied here. The Anthony and West Mesa sites measure wind speed at 2 and 8 meters above grade respectively. All other sites measure wind speed at 10 meters above grade.

8.2.3 Recurrence Frequency

The SPCY monitoring station can record exceedances at any time of year. From 2003-2008, the FEM TEOM monitor has recorded 61 high wind exceedances and the FRM Wedding monitor has recorded three (Figure 8-4). The difference between the number of recorded exceedances is due to the FRM Wedding monitor sampling schedule of 1-in-6 days. The SPCY site records an average of 10.2 exceedances per year, with a high of 14 in 2004 and 2008 and a low of 5 in 2007.

The Chaparral monitoring station can record exceedances at any time of year. From 2003-2008, the FEM TEOM monitor has recorded 55 exceedances (Figure 8-4). There is no FRM Wedding monitor at the Chaparral site. The Chaparral site records an average of 9.2 exceedances per year, with a high of 18 in 2008 and a low of 3 in 2005.

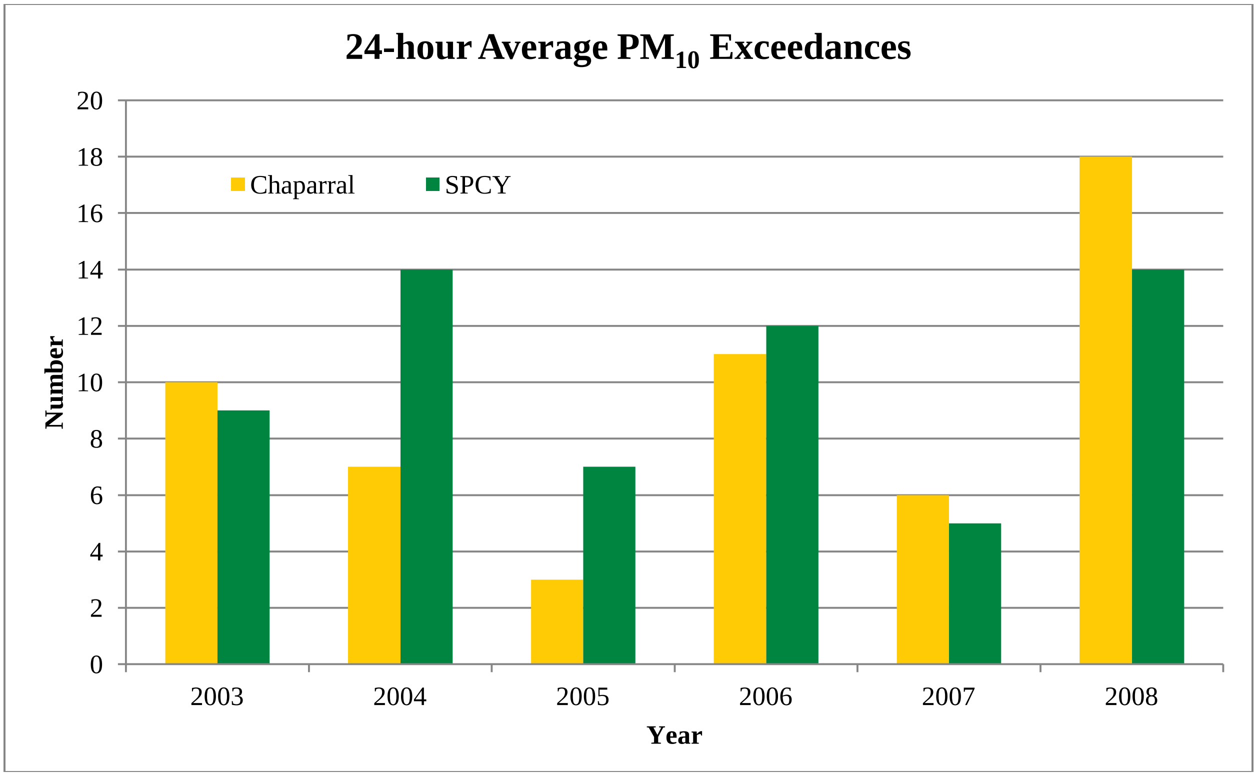

Figure 8-4. High wind blowing dust exceedances recorded by the FEM TEOM instruments. The FRM Wedding instrument recorded an additional three exceedances at SPCY over the same time period.

8.2.4 Controls Analysis

Implementation of BACM in Doña Ana County has been carried out through the ordinances and MOUs adopted under the NEAP. The ordinances regulate disturbed lands, construction and demolition, vacant parking lots and materials handling and transportation. On this day no other unusual PM_{10} producing activities occurred and anthropogenic emissions remained constant before, during and after the event. The most likely sources contributing to the event are the playas of northern Mexico and desert lands in Doña Ana County. A back-trajectory analysis using the HYSPLIT (Draxler et al., 2011; Rolph, 2011) model shows that the air masses traveled through southern Doña Ana County and northern Mexico to the SPCY and Chaparral monitors in the southern half of the county (Figure 8-5). The model was run for the eight hours preceding the elevated concentrations (1100 hour). Controlling dust from the natural desert terrain is cost prohibitive. NMED concludes that the sources contributing to the event are not reasonably controllable.

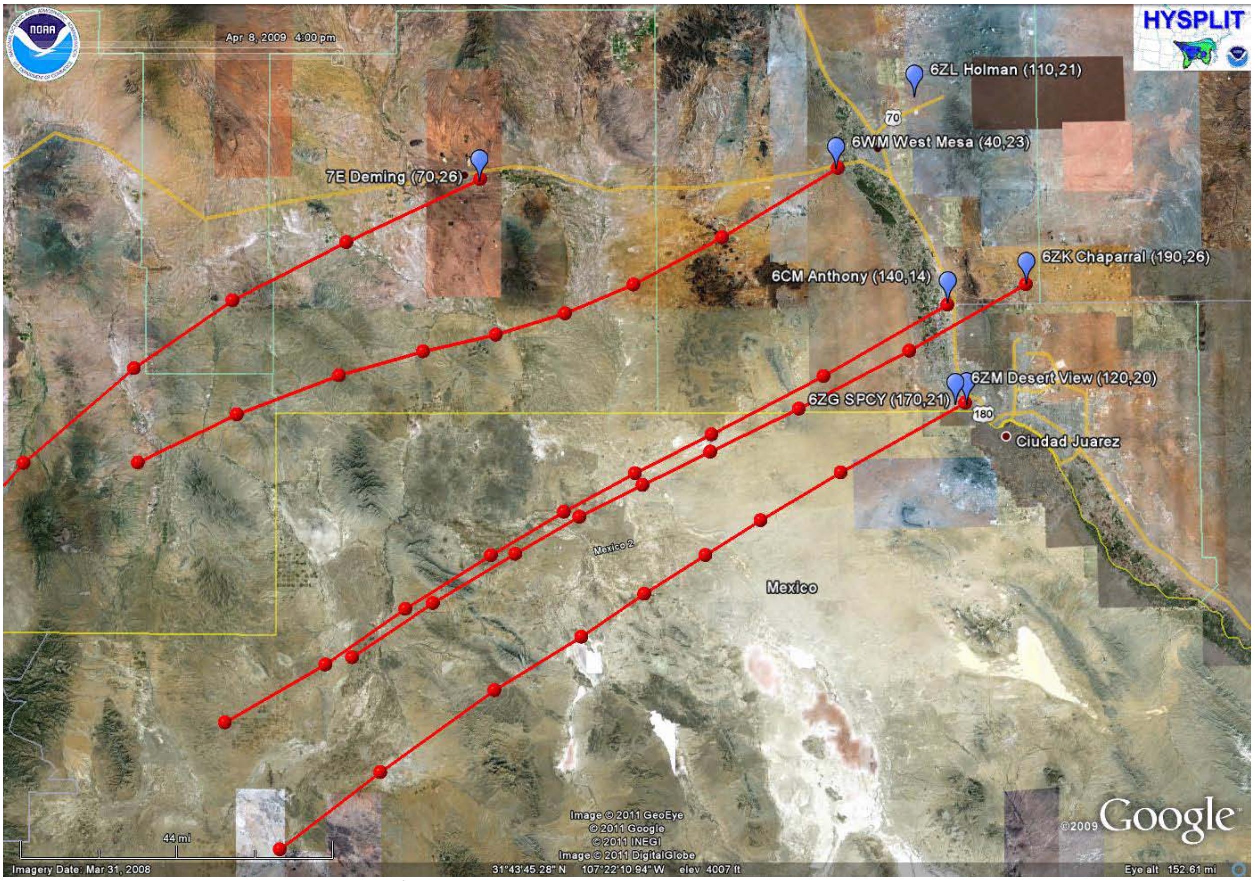

Figure 8-5. Back-trajectory model analysis for the event on April 8, 2009. The numbers in parenthesis are the 24-hour average PM_{10} concentration and max wind gust respectively. The model was run for the eight hours preceding the peak concentrations of the event starting from the 1200 hour. Each ball represents one hour in the past from the starting point of the model run.

8.4 Historical Fluctuations Analysis

8.4.1 Annual and Seasonal 24-hour Average Fluctuations

The SPCY and Chaparral sites have recorded PM_{10} exceedances every year since continuous FEM TEOM monitoring was established. These exceedances can occur during any time of year and are caused by high winds (Figures 8-6 and 8-7). 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} concentrations were 1110 µg/m^3 at Chaparral and 1109 µg/m^3 at SPCY. All exceedances at Chaparral have been caused by high winds and natural events demonstrations were submitted to EPA under the NEAP or EER. SPCY is the only site in the network where low wind exceedances have been recorded. From 2003-2005 the FEM TEOM monitor recorded 14 low wind exceedances. No exceedances have been recorded since 2005 and NMED continues to research the reasons behind these low wind high PM_{10} concentrations. All other exceedances at SPCY have been caused by high winds and natural events demonstrations were submitted to EPA under the NEAP or EER.

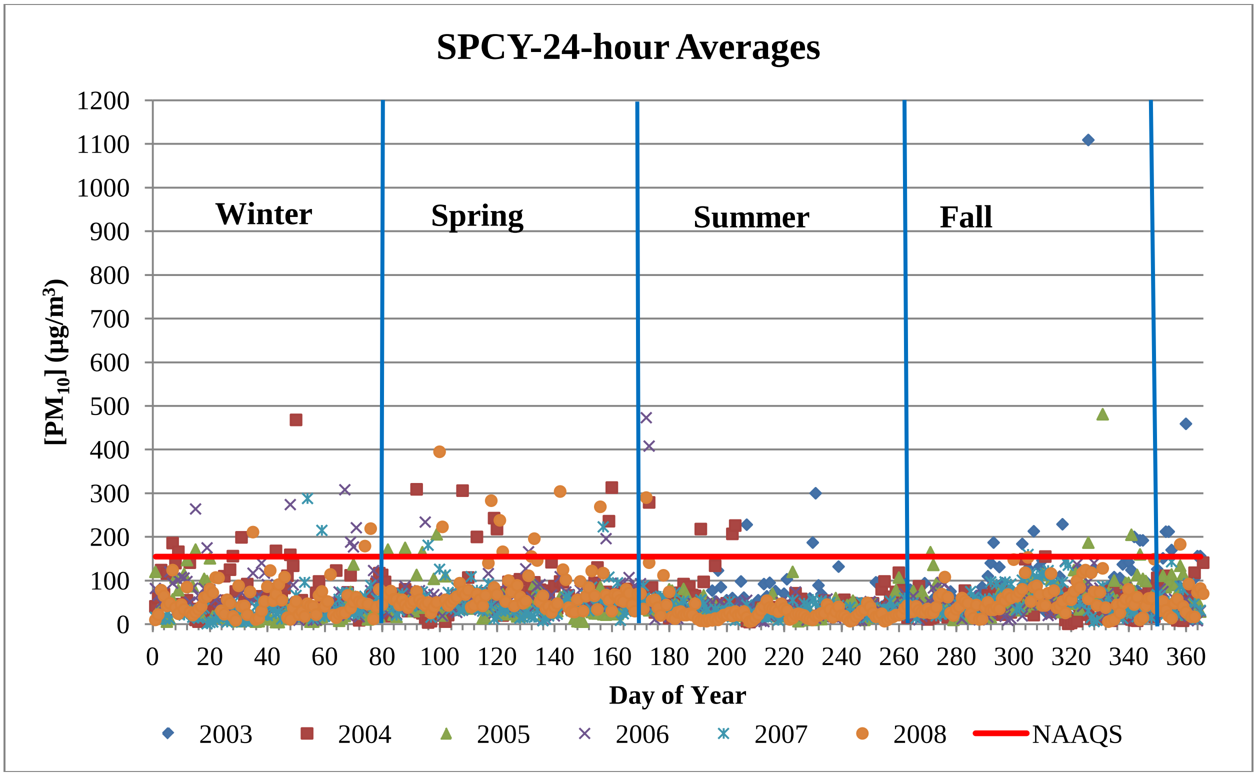

Figure 8-6. 24-hour average PM_{10} concentrations by day of year from 2003-2008. All averages collected using FEM TEOM instrument.

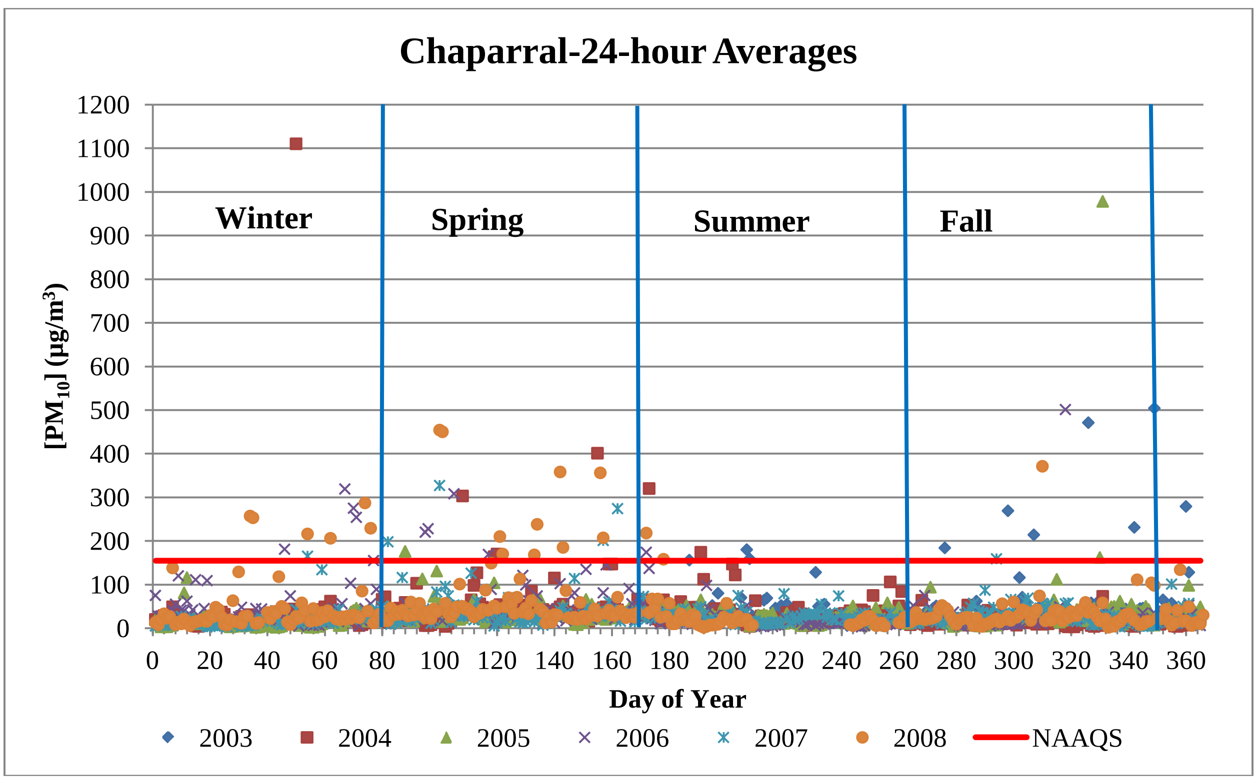

Figure 8-7. 24-hour average PM_{10} concentrations by day of year from 2003-2008. All averages collected using FEM TEOM instrument.

Table 8-1 shows normal historical fluctuations with and without high wind natural events that caused exceedances from 2003-2008. The recorded values for this day (165 µg/m^3 at SPCY and 185 µg/m^3 at Chaparral) are above the 95th percentile of all 24-hour averages recorded at each respective site.

Chaparral	Max	99th	95th	75th	50th	Mean	25th	5th	Minimum
No Events	149	118	65	35	24	28	15	6	2
Events	1110	271	98	37	25	36	15	6	2
SPCY	**Max**	**99th**	**95th**	**75th**	**50th**	**Mean**	**25th**	**5th**	**Minimum**
No Events	212	146	110	61	39	47	24	11	1
Events	1109	237	128	64	40	53	25	11	1

Table 8-1. 24-hour average PM_{10} data distribution with and without high wind events included. Only those high wind events that resulted in an exceedance were excluded from the analysis. Data for SPCY includes FRM Wedding and FEM TEOM data from 2003-2008. Data for Chaparral only includes FEM TEOM data from 2003-2008.

An hourly data distribution analysis was done for PM_{10} concentrations and wind gust speeds (Appendices A and B). When the hourly data for April 8 is overlaid on the hourly data distribution plots, it shows that the values recorded during the high wind event exceed the 95th percentile for both PM_{10} and wind gusts (Figures 8-8 through 8-11) at the Chaparral and SPCY monitoring sites. The hourly PM_{10} values during the high wind blowing dust storm far exceed the 95th percentiles of hourly data.

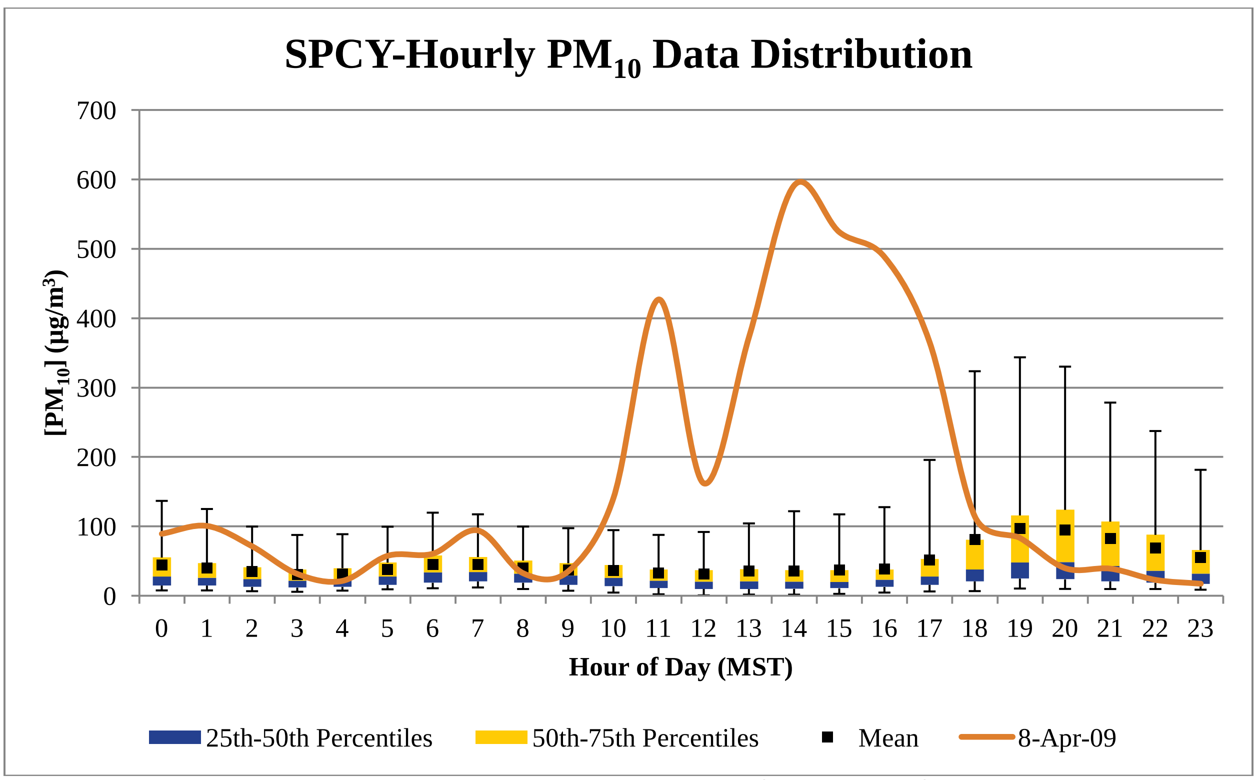

Figure 8-8. All data recorded using the FEM TEOM monitor. Data distribution is for hourly values from 2003-2008. The top whisker represents the 95th percentile of data.

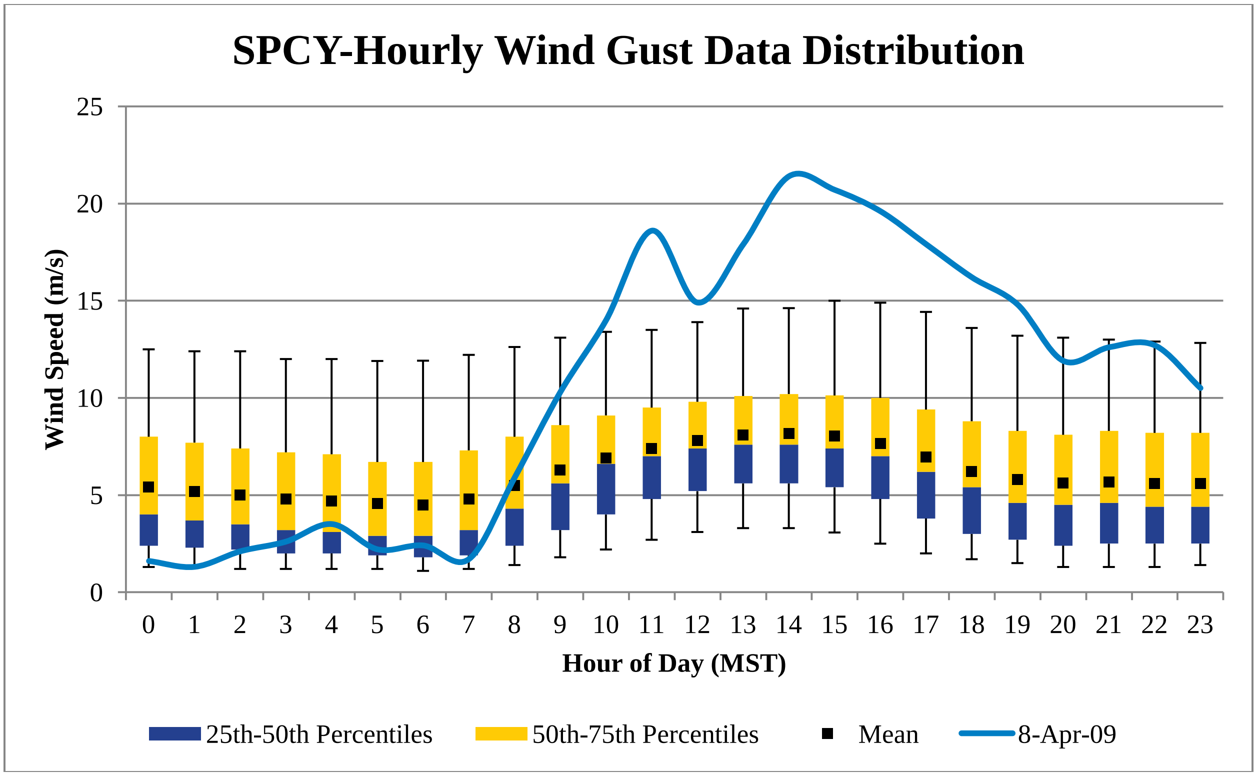

Figure 8-9. Wind speed data distribution from 2003-2008 measured at 10 meters. Data is for the maximum wind gust recorded during the hour.

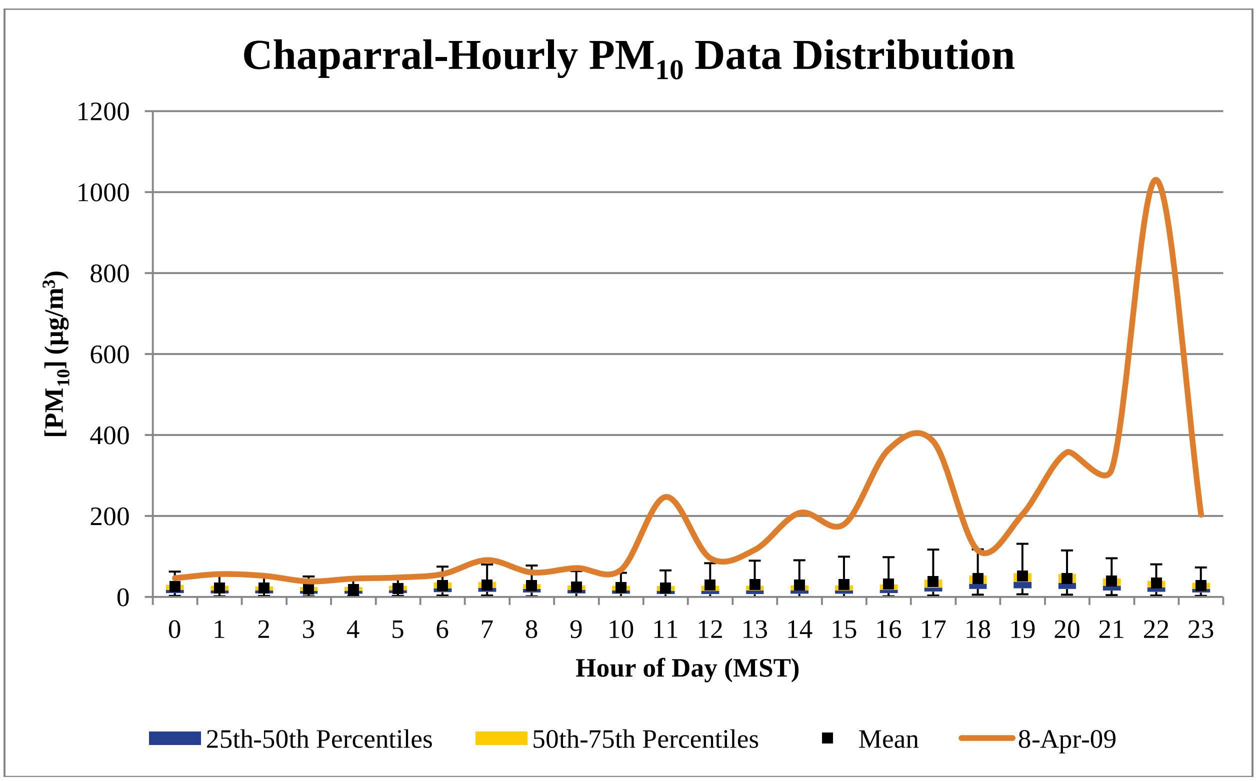

Figure 8-10. All data recorded using the FEM TEOM monitor. Data distribution is for hourly values from 2003-2008. The top whisker represents the 95th percentile of data.

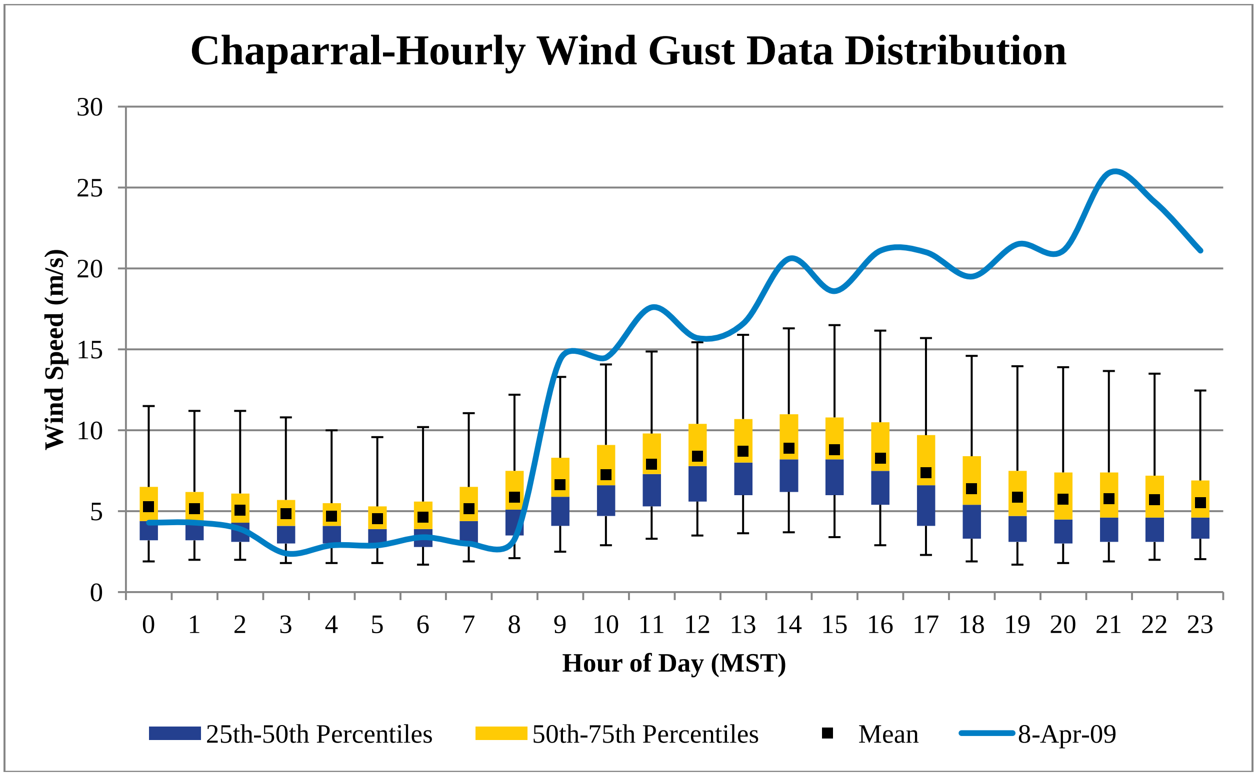

Figure 8-11. Wind speed data distribution from 2003-2008 measured at 10 meters. Data is for the maximum wind gust recorded during the hour.

8.5 Clear Causal Relationship

A Pacific cold front passed through New Mexico on April 8 and 9 2009 with the center of low pressure traveling along the Colorado-New Mexico border. As the cold front approached New Mexico a pressure gradient was created in southwestern New Mexico and northern Mexico (Figure 8-12). At the 500 hour an area of low pressure aloft was over Nevada (Figure 8-13). As the day progressed, this upper level low traveled east and by the 500 hour on April 9, it was centered on Colorado (Figure 8-14). Heating of the surface allowed winds aloft to mix down increasing surface wind velocities and provided the turbulence required for vertical mixing and entrainment of dust.

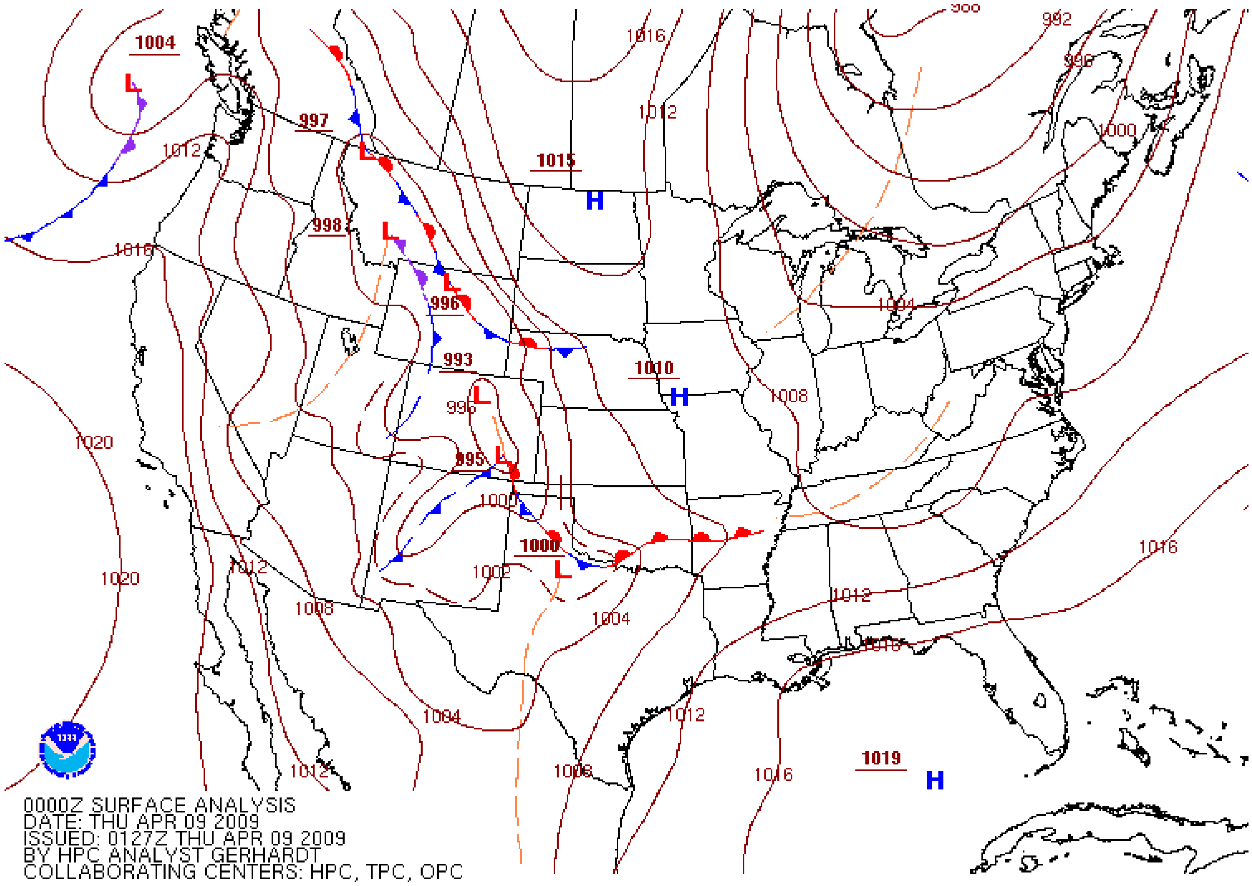

Figure 8-12. April 8, 2009 surface weather map depicting the frontal activity and isobars of constant pressure (red lines) for the 1800 hour MST. Surface winds flow perpendicular to the isobars from high to low pressure.

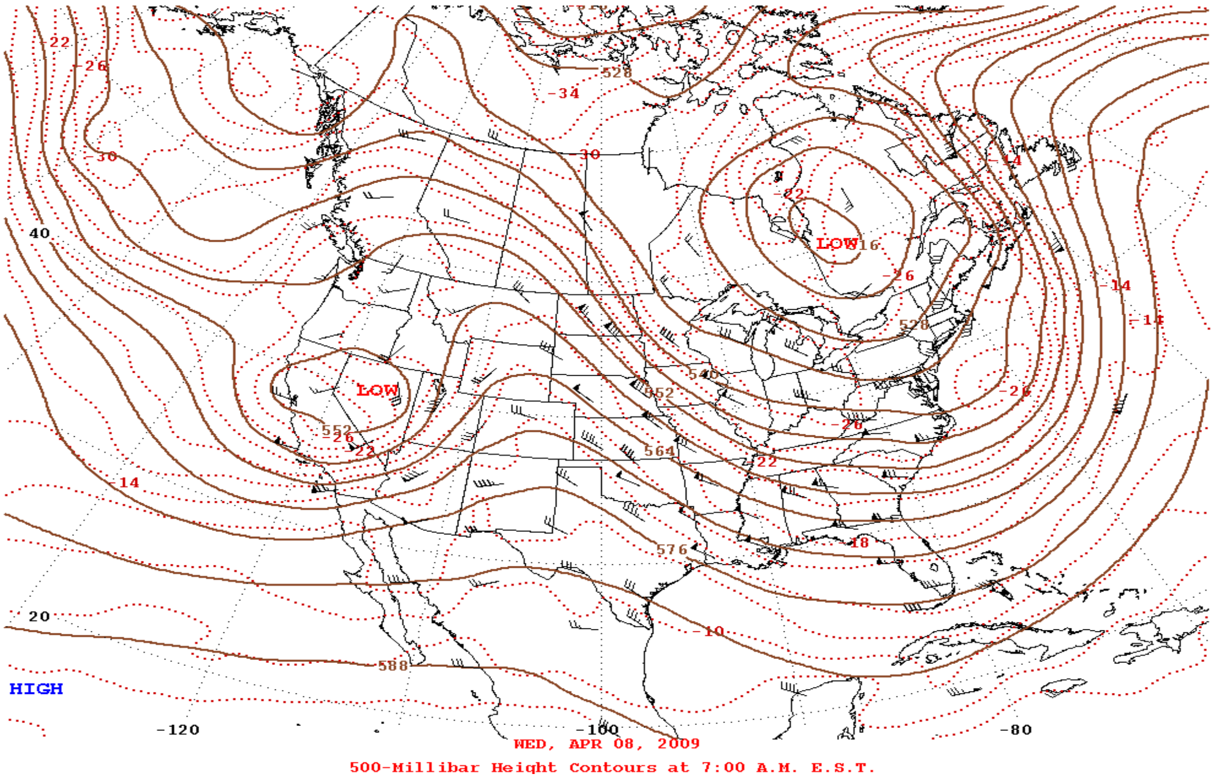

Figure 8-13. Upper Air weather map depicting winds aloft with isobars of constant pressure (brown lines). Winds flow parallel to the isobars.

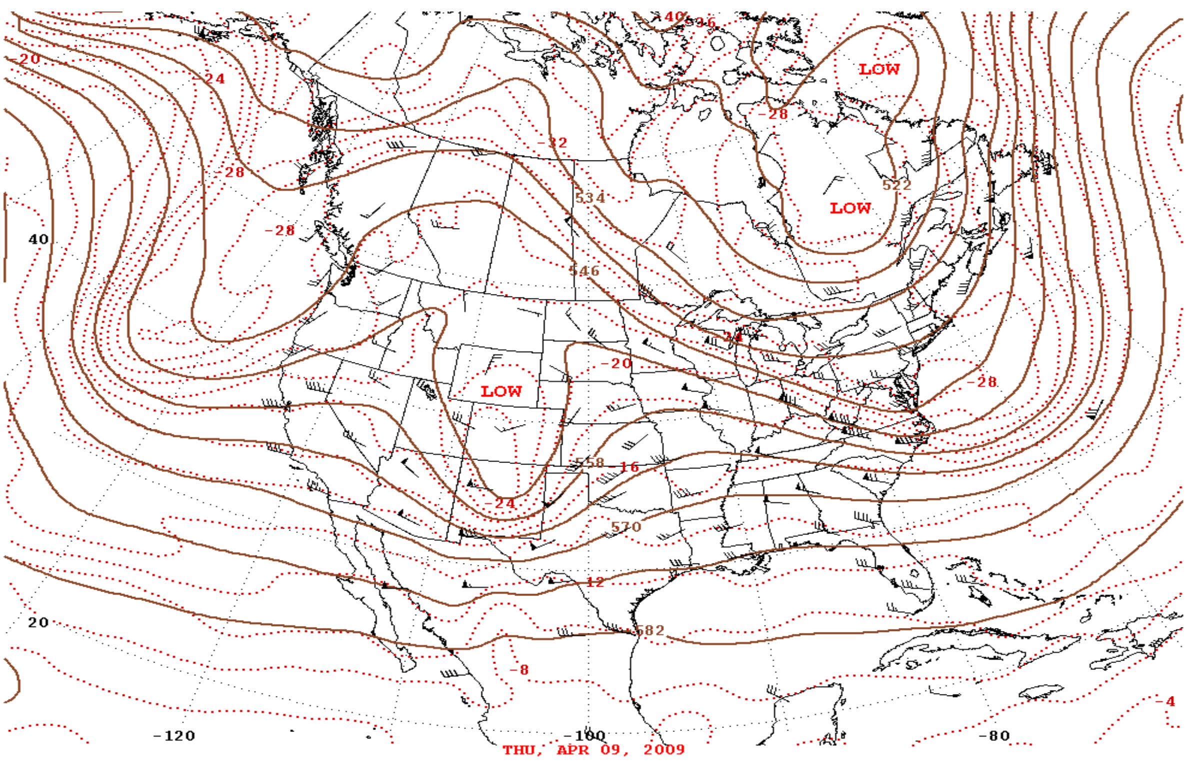

Figure 8-14. Upper Air weather map depicting winds aloft with isobars of constant pressure (brown lines). Winds flow parallel to the isobars.

This weather pattern generated strong southwesterly winds beginning at the 1100 hour and lasting through the day on April 9. During this time frame wind gusts regularly exceeded the 95th percentiles as shown in figures 8-10 and 8-12. Peak wind gusts ranged from 14 m/s at Anthony to 26 m/s at Chaparral (Figure 8-3). Sustained hourly average wind speeds of 6 m/s or more and wind gusts of 12 m/s or more were recorded at all monitoring sites during elevated PM_{10} concentrations (Figure 8-2 and 8-3). Blowing dust caused elevated levels of PM_{10} during the same time frame as high winds (Figures 8-15 to 8-16). As wind gusts exceed the 95th percentile of historical data so do hourly PM_{10} concentrations (1100-2300 hours) on this date. Hourly PM_{10} concentrations throughout the network exhibit the same pattern with elevated concentrations of PM_{10} throughout the network until the evening hours (Figure 8-17).

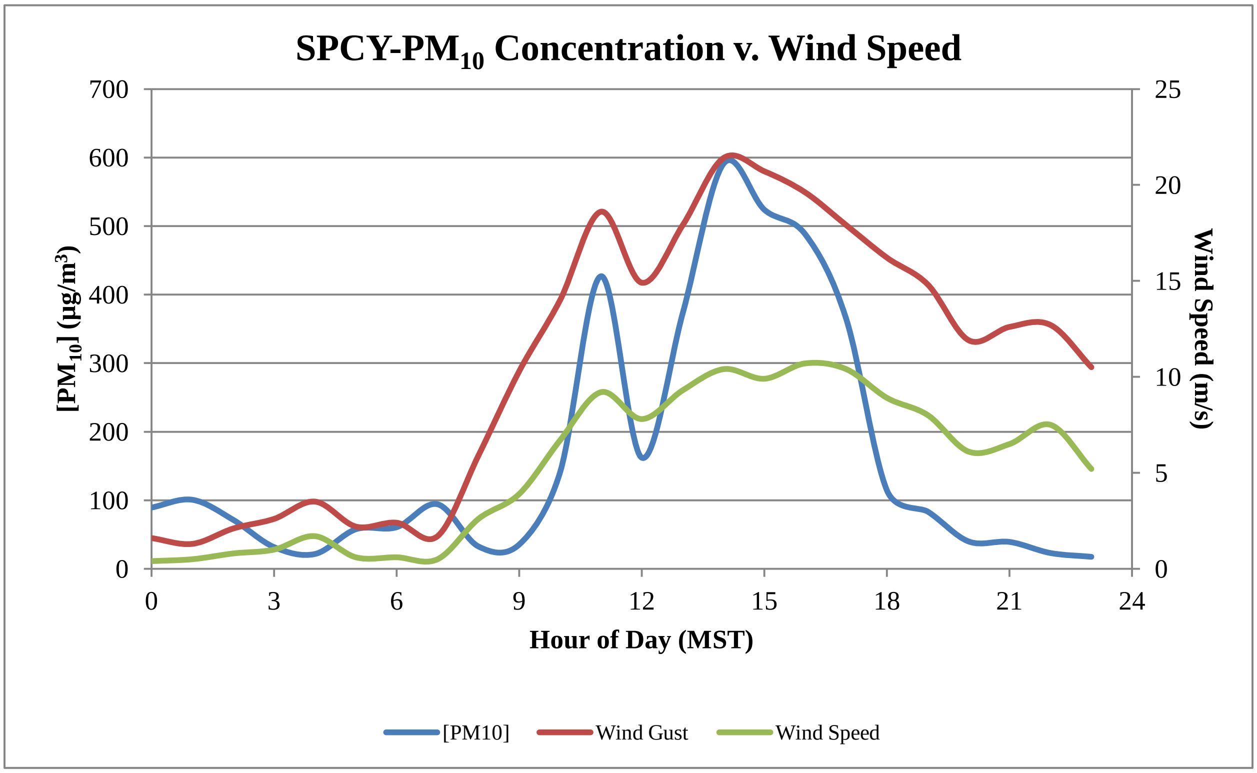

Figure 8-15. Time series plot of hourly observations showing increased PM_{10} concentrations as wind speeds and gusts increase.

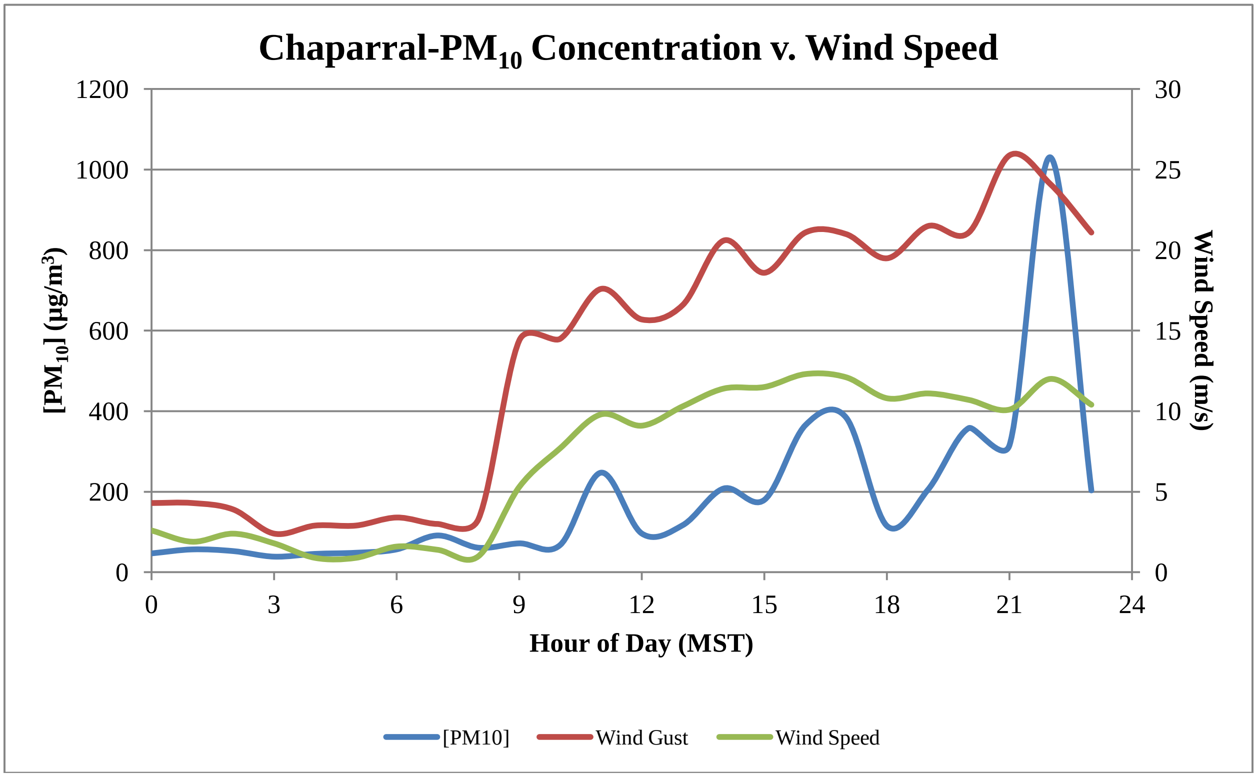

Figure 8-16. Time series plot of hourly observations showing increased PM_{10} concentrations as wind speeds and gusts increase.

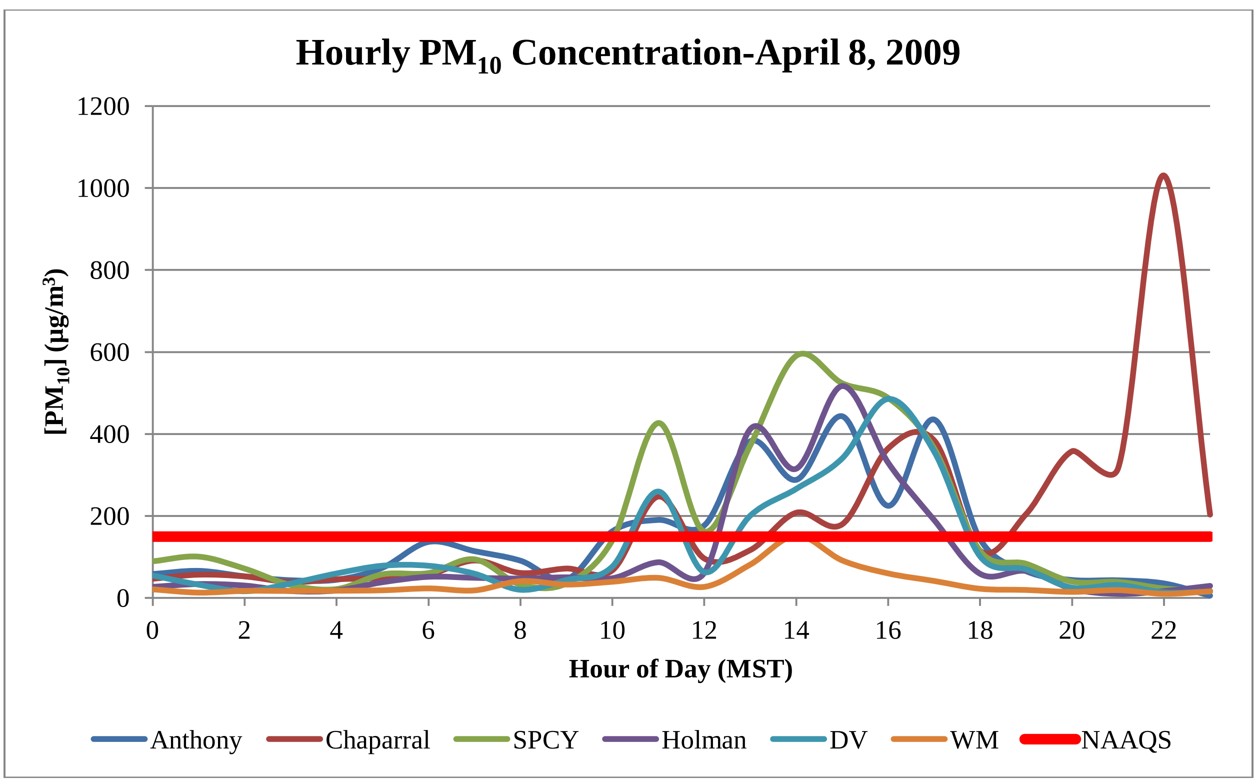

Figure 8-17. Time series plot of hourly observations showing increased PM_{10} concentrations at most monitoring sites.

8.6 Affects Air Quality

The historical fluctuations and clear causal relationship analyses prove that the event in question affected air quality on April 8, 2009.

8.7 Natural Event

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

8.8 No Exceedance but for the Event

Thirteen hourly PM_{10} values (1100-2300 hours) exceed the 24-hour average standard at Chaparral [(247 + 96 + 117 + 208 + 180 + 365 + 384 + 115 + 205 + 358 + 317 + 1030 + 203) = 3825 µg/m^3; (3825 µg/m^3)/24 = 159 µg/m^3]. Without the high wind and blowing dust an exceedance would not have been recorded.

Ten hourly PM_{10} values (1000-1900 hours) account for a large portion (~82 percent) of the 24-hour average at SPCY [(141 + 427 + 162 + 373 + 591 + 523 + 488 + 365 + 114 + 83) µg/m^3 = 3267 µg/m^3; (3267 µg/m^3)/24 = 136 µg/m^3; 136/165 = .824]. Also, the 24-hour average of these ten hourly values are nearly 91 percent of the NAAQS (136/150 = .906). Without the high wind and blowing dust an exceedance would not have been recorded.

9 HIGH WIND EXCEPTIONAL EVENT: August 4, 2009

9.1 Summary of Event

High winds and blowing dust caused an exceedance of the PM_{10} NAAQS at the AQB's Chaparral monitoring site on August 4, 2009. The 24-hour average was recorded by a FEM TEOM continuous monitor, with a midnight-to-midnight 24-hour average concentration of 190 $\mu g/m^3$, after rounding to the nearest 10 $\mu g/m^3$. This data has been submitted to AQS and flagged as a high wind natural event under the EER. No other monitoring site recorded an exceedance on this day but 24-hour average PM_{10} were elevated at the southern monitoring sites (Figure 9-1).

The event on this day is a rare occurrence as it was caused by mesoscale weather conditions. As thunderstorms developed throughout the region, downdrafts caused highly localized blowing dust. Winds blew from a predominantly southerly direction throughout the entire border region, crossing over desert and anthropogenic sources within New Mexico and Texas. 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.

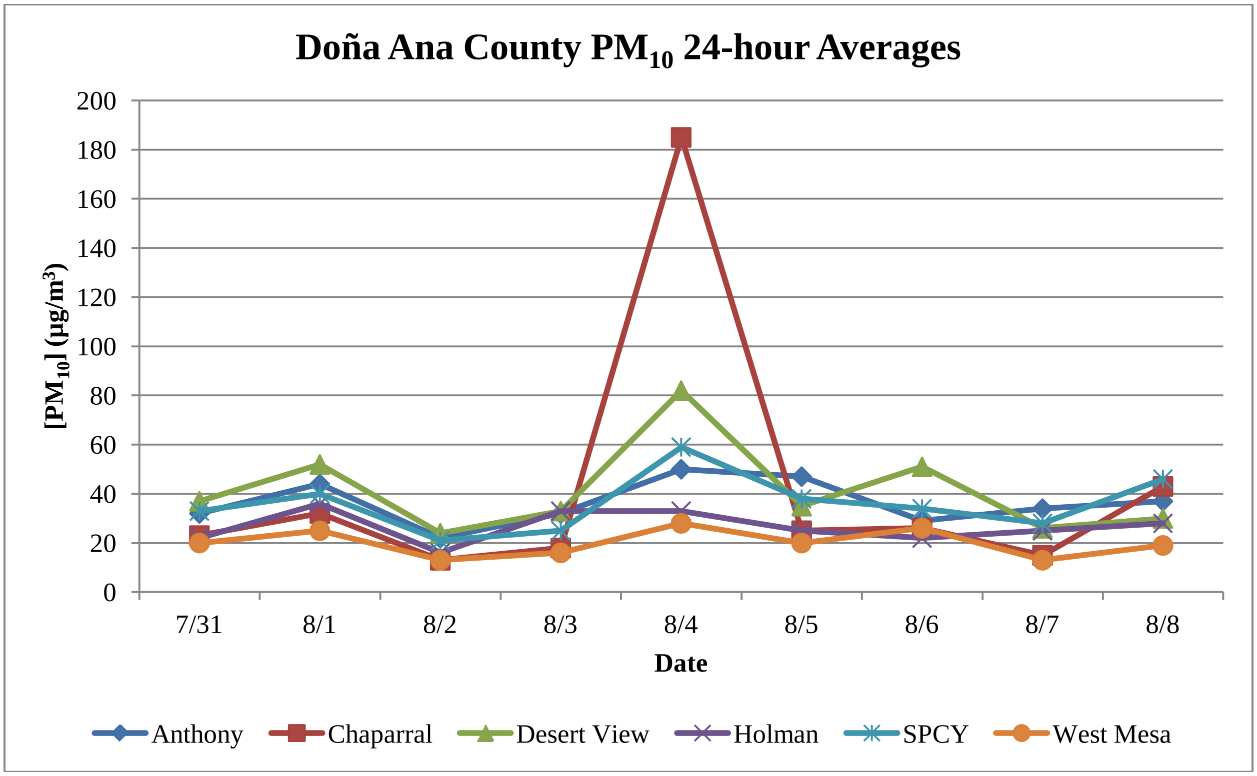

Figure 9-1. 24-hour Averages for the four days before and after the suspected high wind event. Averages measured using TEOM instruments at monitoring sites in Doña Ana County.

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 undisturbed desert, residential land and unpaved roads in Doña Ana County and Texas. Many agricultural operations till the land during the month of March.

9.2.2 Sustained and Instantaneous Wind Speeds

EPA has indicated that 11.2 m/s (25 mph) would be used as the default entrainment threshold for natural events caused by high wind and blowing dust (EPA, 2011). NMED has found that a sustained hourly wind speed lasting two hours or more of 6 m/s with instantaneous wind gusts of 12 m/s or more can create blowing dust in the border region (Aaboe et al., 1998-2007; Saxton et al., 2000). On August 4, wind speeds exceeded both of NMED's presumed threshold velocities for dust entrainment at various monitoring sites (Figures 9-2 & 9-3).

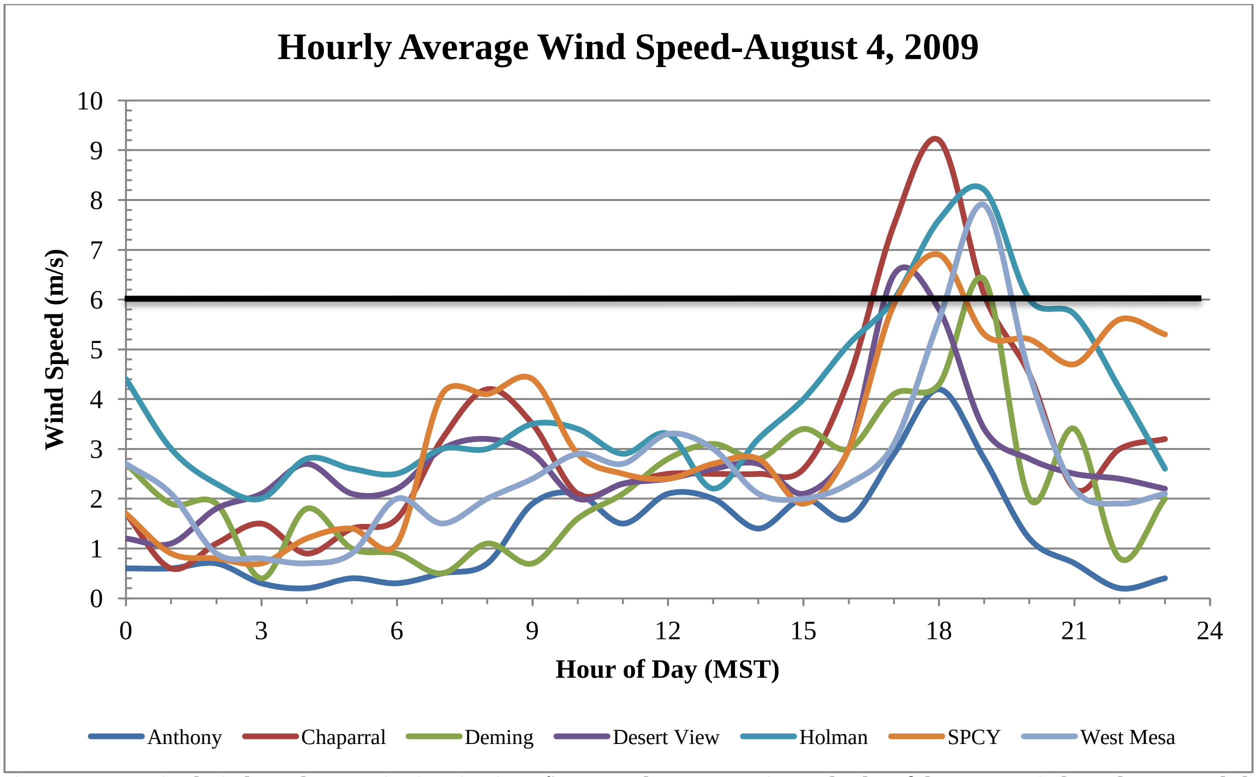

Figure 9-2. Sustained wind speeds at monitoring sites in Doña Ana and Luna Counties on the day of the event. Wind speeds are sampled every other second then averaged over an hour. The Anthony and West Mesa sites measure wind speed at 2 and 8 meters above grade respectively. All other sites measure wind speed at 10 meters above grade.

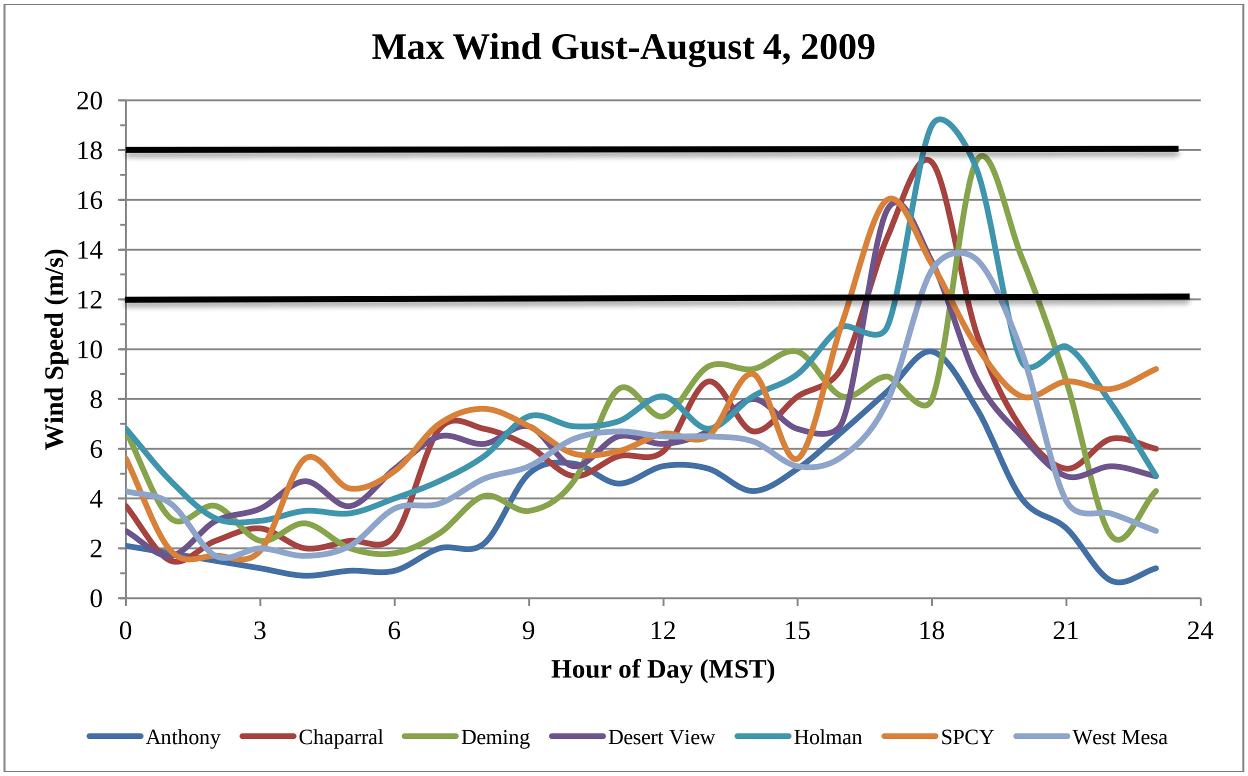

Figure 9-3. Maximum wind speeds at monitoring sites in Doña Ana and Luna Counties on the day of the event. Wind speeds are sampled every other second with the maximum of the hourly samples supplied here. The Anthony and West Mesa sites measure wind speed at 2 and 8 meters above grade respectively. All other sites measure wind speed at 10 meters above grade.

9.2.3 Recurrence Frequency

The Chaparral monitoring station can record exceedances at any time of year. From 2003-2008, the FEM TEOM monitor has recorded 55 exceedances (Figure 9-4). There is no FRM Wedding monitor at the Chaparral site. The Chaparral site records an average of 9.2 exceedances per year, with a high of 18 in 2008 and a low of 3 in 2005.

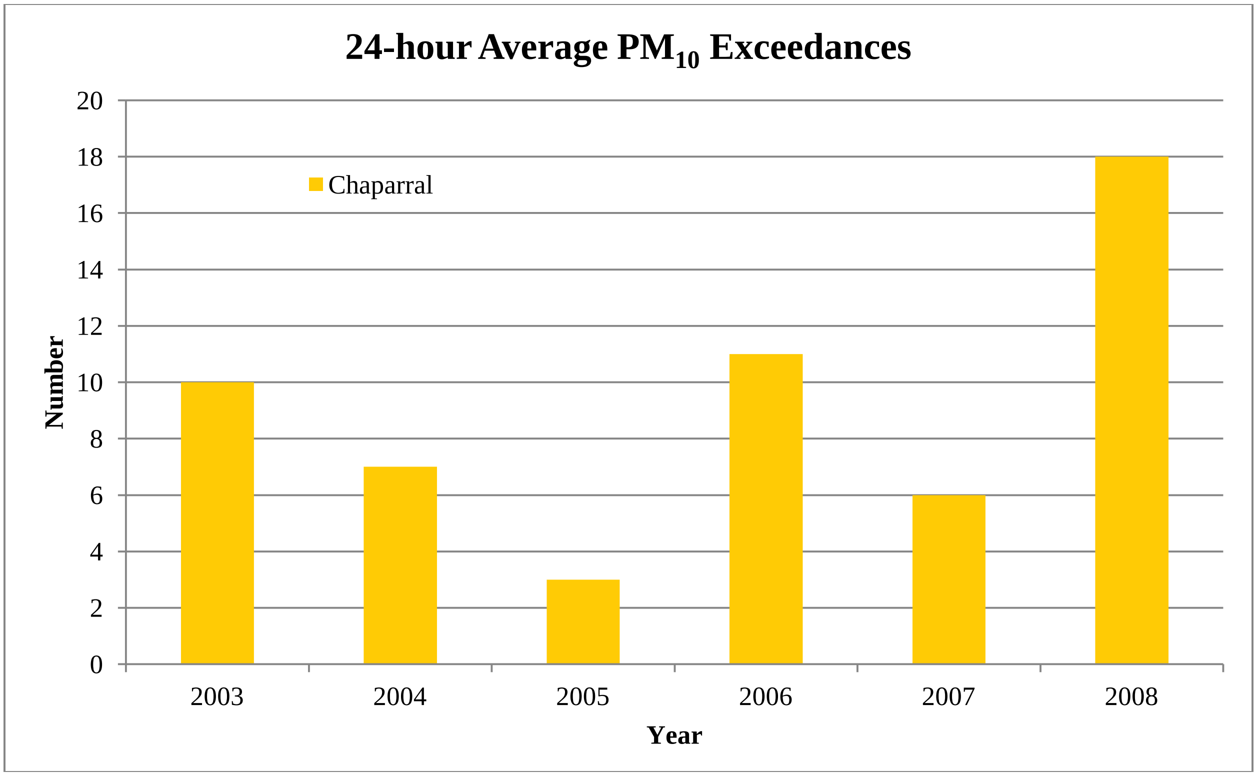

Figure 9-4. Exceedances recorded by the FEM TEOM instrument at Chaparral from 2003-2008.

9.2.4 Controls Analysis

Implementation of BACM in Doña Ana County has been carried out through the ordinances and MOUs adopted under the NEAP. The ordinances regulate disturbed lands, construction and demolition, vacant parking lots and materials handling and transportation. On this day no other unusual PM_{10} producing activities occurred and anthropogenic emissions remained constant before, during and after the event. The most likely sources contributing to the event are undisturbed desert, residential land and unpaved roads. Chaparral is the only site to record an exceedance on this day and it is likely that sources in proximity to the monitor and on the eastern slopes of the Franklin Mountains in New Mexico and Texas caused the exceedance. A back-trajectory analysis using the HYSPLIT (Draxler et al., 2011; Rolph, 2011) model shows that the air masses traveled from northeastern El Paso to the Chaparral monitors in Doña Ana County. The model was run for the three hours preceding the peak concentration of the event (Figure 9-5). The Texas Commission on Environmental Quality (TCEQ) does not have a PM_{10} monitor in this part of town. 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). Controlling dust from the natural desert terrain is cost prohibitive with the enforcement of dust control ordinances left up to the local governments. Due to the extreme level of wind, NMED concludes that the sources contributing to the event are not reasonably controllable.

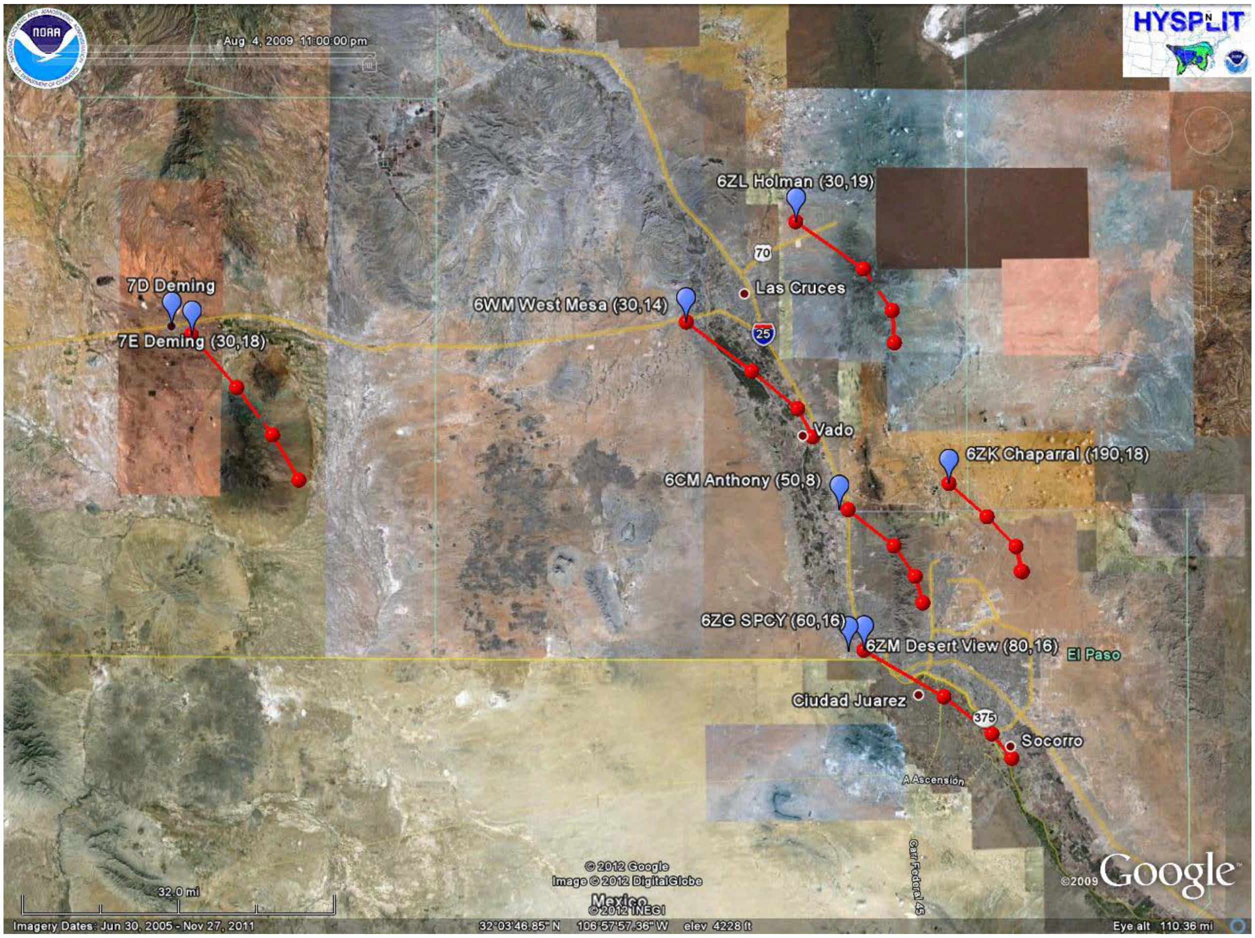

Figure 9-5. Back-trajectory model analysis for the event. The numbers in parenthesis are the 24-hour average PM_{10} concentration and max wind gust respectively. Each ball represents one hour in the past starting from the 1800 hour.

9.4 Historical Fluctuations Analysis

9.4.1 Annual and Seasonal 24-hour Average Fluctuations

The Chaparral site has recorded PM_{10} exceedances since it was established in 2003. These exceedances can occur during any time of year and are caused by high winds (Figure 9-6). 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 1110 µg/m^3 recorded in 2008. All exceedances have been caused by high winds and natural events demonstrations were submitted to EPA under the NEAP or EER.

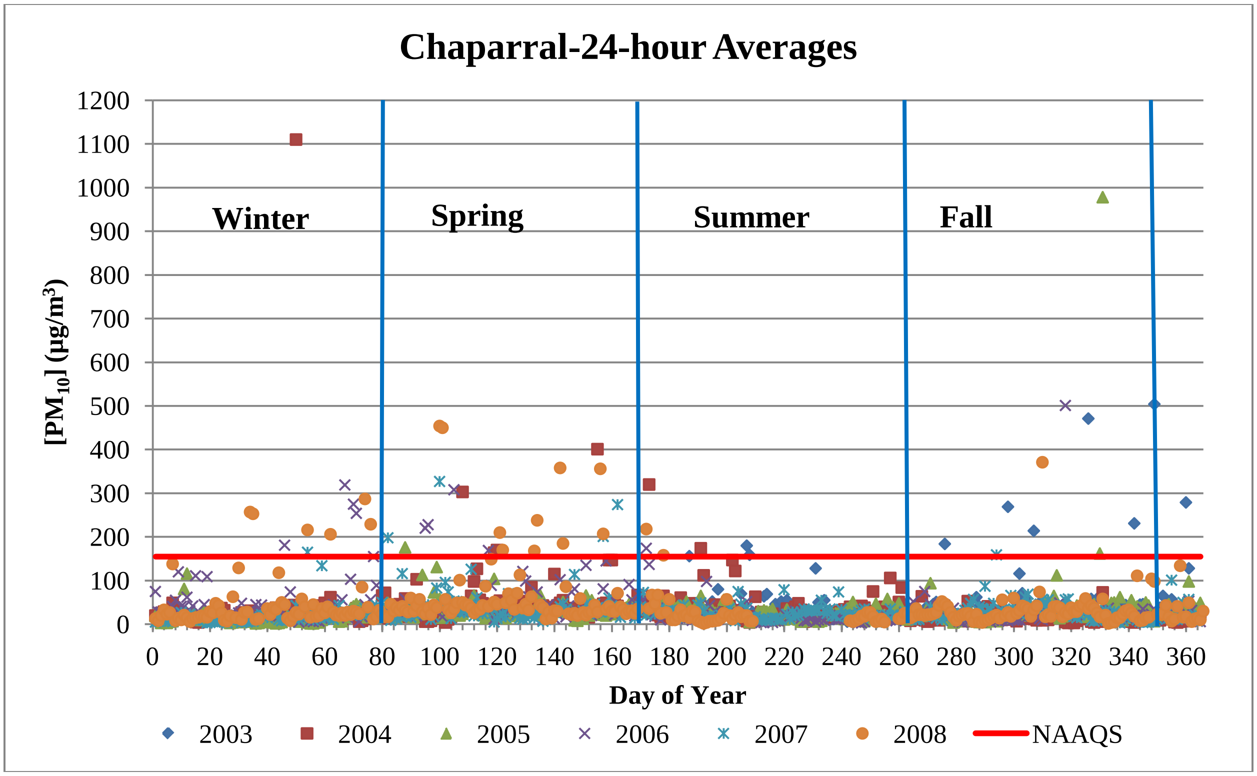

Figure 9-6. 24-hour average PM_{10} concentrations by day of year from 2003-2008. All averages collected using FEM TEOM instrument.

Table 9-1 shows normal historical fluctuations with and without high wind natural events that caused exceedances from 2003-2008. The recorded value for this day (185 µg/m^3) 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.

Chaparral	Max	99th	95th	75th	50th	Mean	25th	5th	Minimum
No Events	149	118	65	35	24	28	15	6	2
Events	1110	271	98	37	25	36	15	6	2

Table 9-1. 24-hour average PM_{10} data distribution with and without high wind events included. Only those high wind events that resulted in an exceedance were excluded from the analysis. Data includes FEM TEOM data from 2003-2008.

An hourly data distribution analysis was done for PM_{10} concentrations and wind gust speeds (Appendices A and B). When the hourly data for August 4 is overlaid on the hourly data distribution plots it shows that the four hourly values recorded on this day exceed the 95th percentile for PM_{10} and two hourly values exceed the 95th percentile for wind gusts (Figures 9-7 and 9-8). The hourly PM_{10} values during the high wind blowing dust storm far exceed the 95th percentiles.

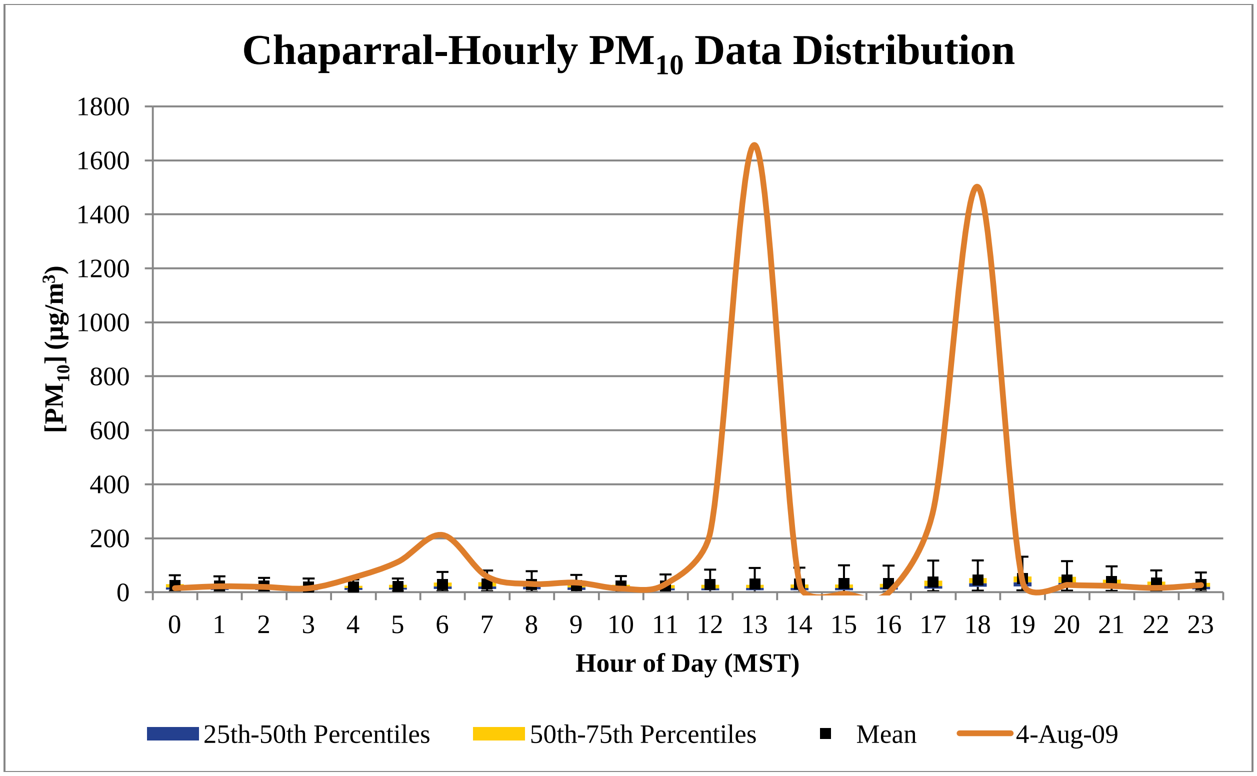

Figure 9-7. All data recorded using the FEM TEOM monitor. Data distribution is for hourly values from 2003-2008. The top whisker represents the 95th percentile of data.

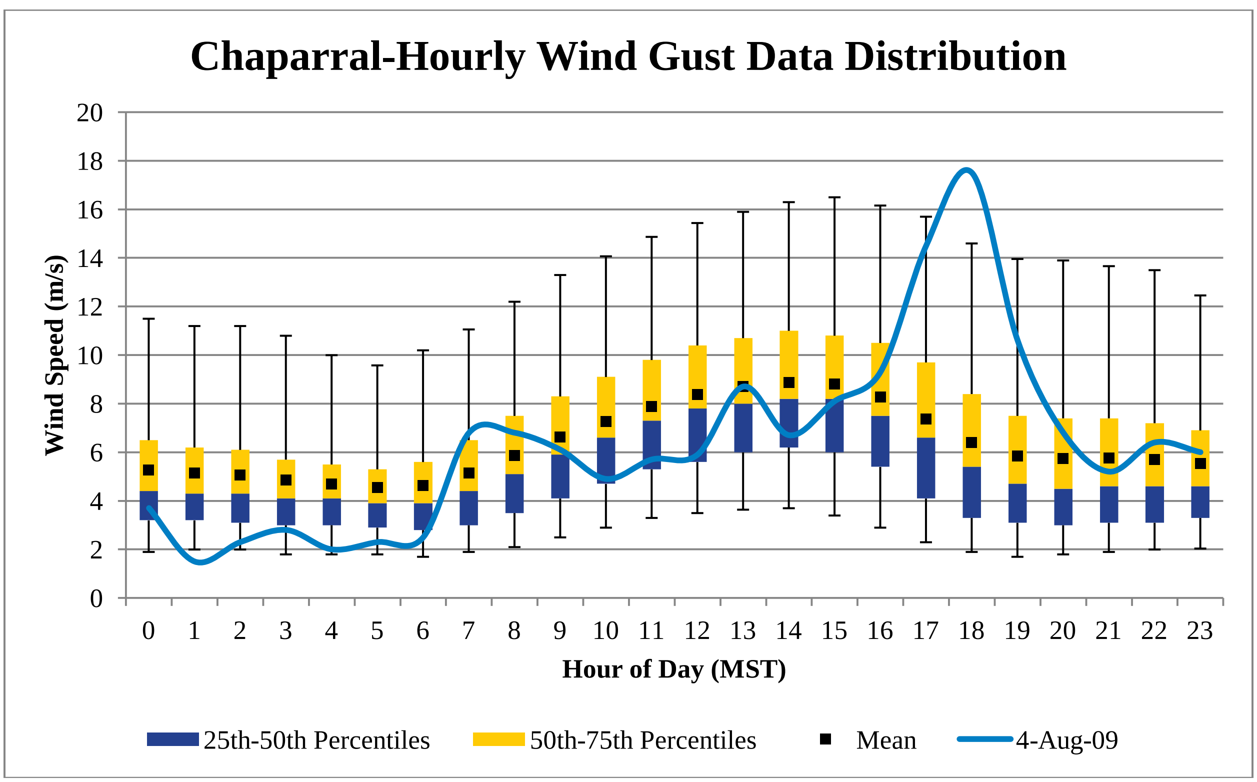

Figure 9-8. Wind speed data distribution from 2003-2008 measured at 10 meters. Data is for the maximum wind gust recorded during the hour.

9.5 Clear Causal Relationship

There were numerous thunderstorms throughout the border region on August 4. The radar image below shows small amounts of precipitation falling along the I-10 corridor and in El Paso at the time of high PM_{10} concentrations at Chaparral (Figure 9-9). The Infrared satellite image shows that large high level thunderstorms were present along the southern New Mexico border (Figure 9-10).

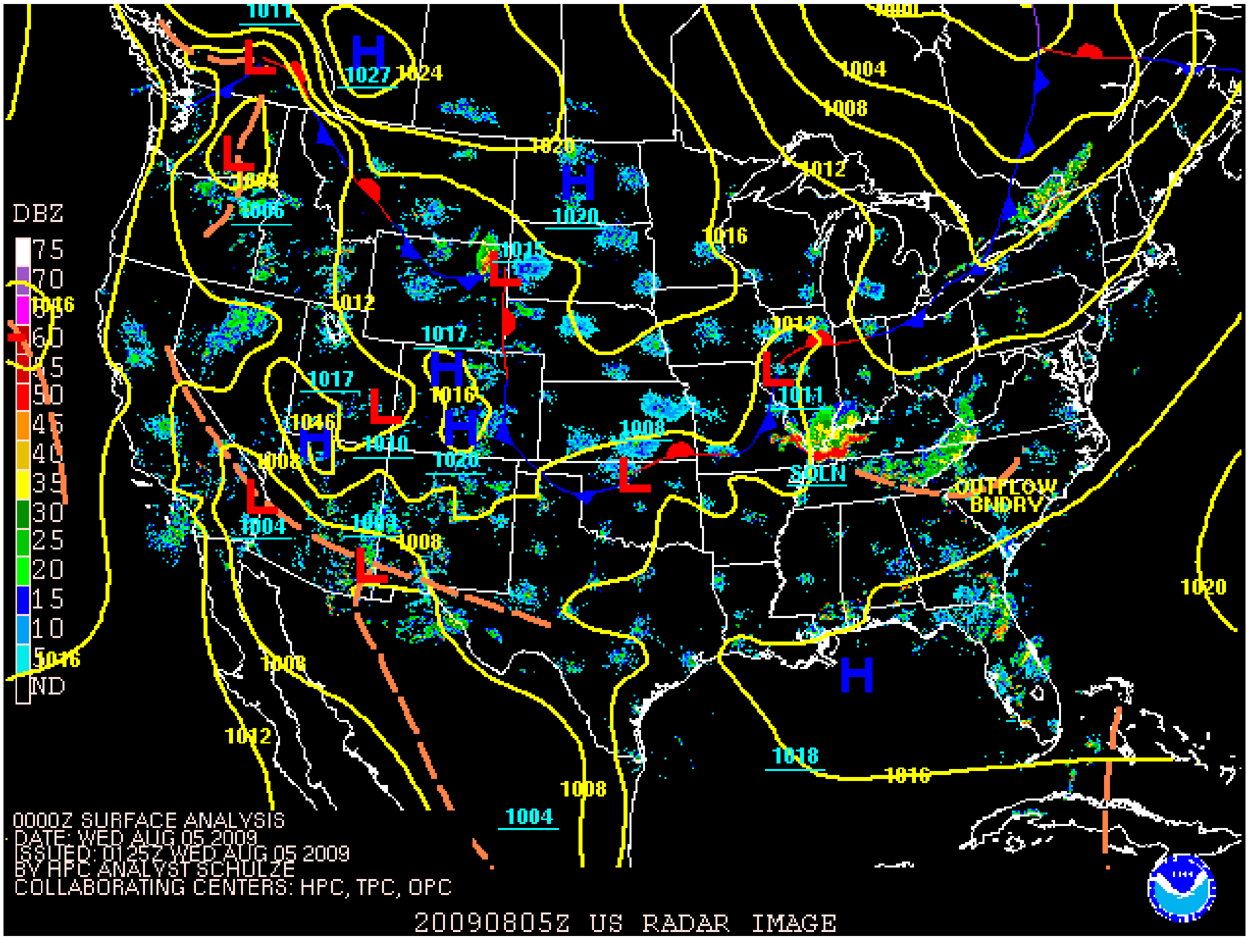

Figure 9-9. August 4 surface weather map with radar image overlapped depicting the thunderstorm activity for the 1800 hour MST.

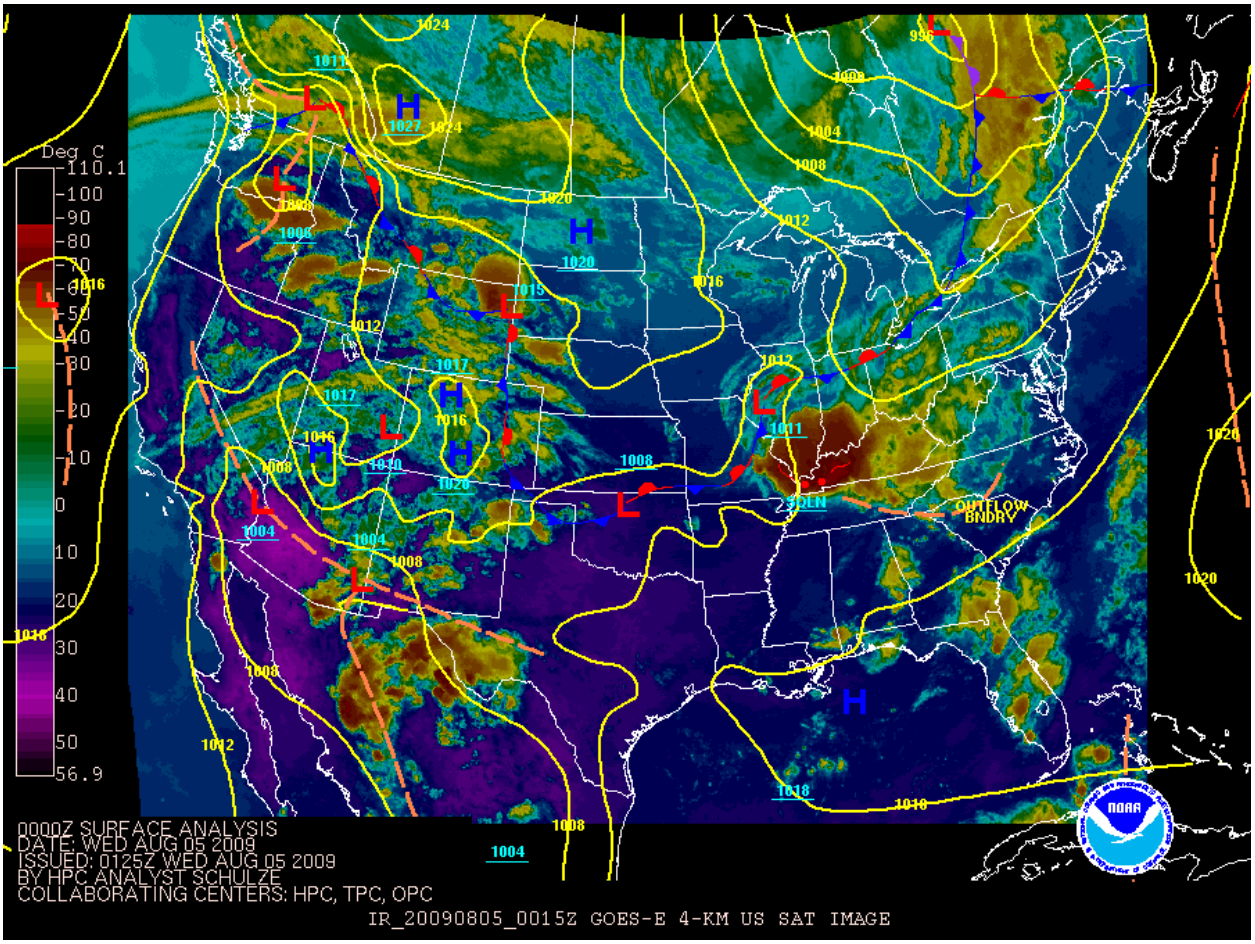

Figure 9-10. August 4 surface weather map with Infrared satellite image overlapped depicting the thunderstorm activity for the 1800 hour MST.

The most likely cause of this windblown dust exceedance is a dry microburst. The localized and short lived nature of the high PM_{10} concentrations supports this assertion. Convective weather cells (i.e. thunderstorms) with high moisture levels aloft and low moisture levels below cause dry microbursts. As rain begins to fall it is evaporated in the lower levels and turned into wind energy. The sounding from Santa Teresa at the 1800 hour shows that large amounts of moisture were at the 500 to 400 mb level (5950-7670 m) whereas low levels of moisture were present from the 850 to 550 mb altitude (1514-5193 m).

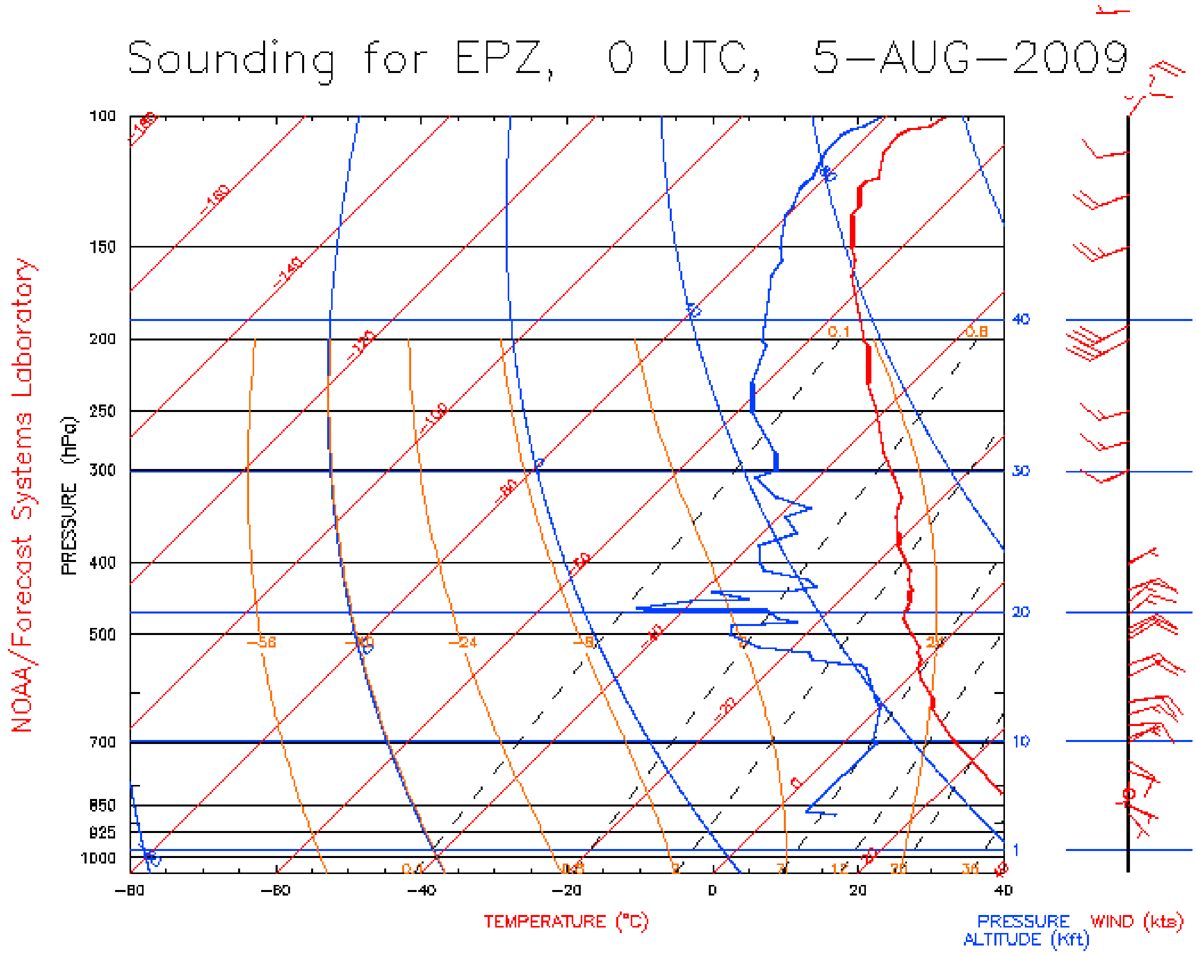

Figure 9-11. Skew-T plot for the sounding at the 1800 hour on August 4 from the El Paso Weather Service in Santa Teresa, NM. The blue line depicts relative humidity and the red line shows the environmental adiabatic lapse rate.

This weather pattern generated strong southerly winds from the 1700 to 1800 hours. During these hours wind gusts approached and then exceeded the 90th percentile of data at the Chaparral site as shown in Figure 9-8. Peak wind gusts reached 18 m/s at the Chaparral site (Figure 9-3). Peak wind gusts and concentrations of PM_{10} occurred during the 1700 to 1800 hours (Figure 9-12). As wind gusts approach the 95th percentile of historical data so do hourly PM_{10} concentrations on this date. Much smaller spikes in PM_{10} concentrations were observed at the other sites in the monitoring network at approximately the same time as the large spikes at Chaparral (Figure 9-13).

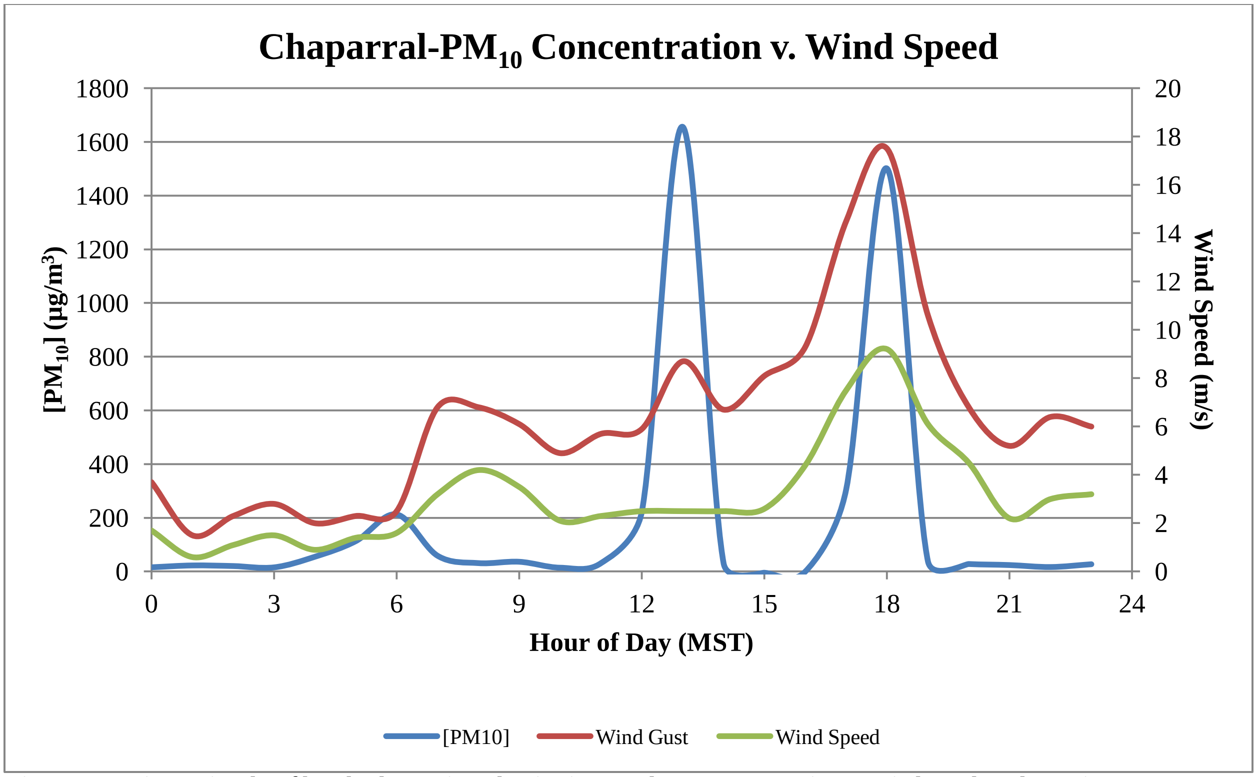

Figure 9-12. Time series plot of hourly observations showing increased PM_{10} concentrations as wind speeds and gusts increase.

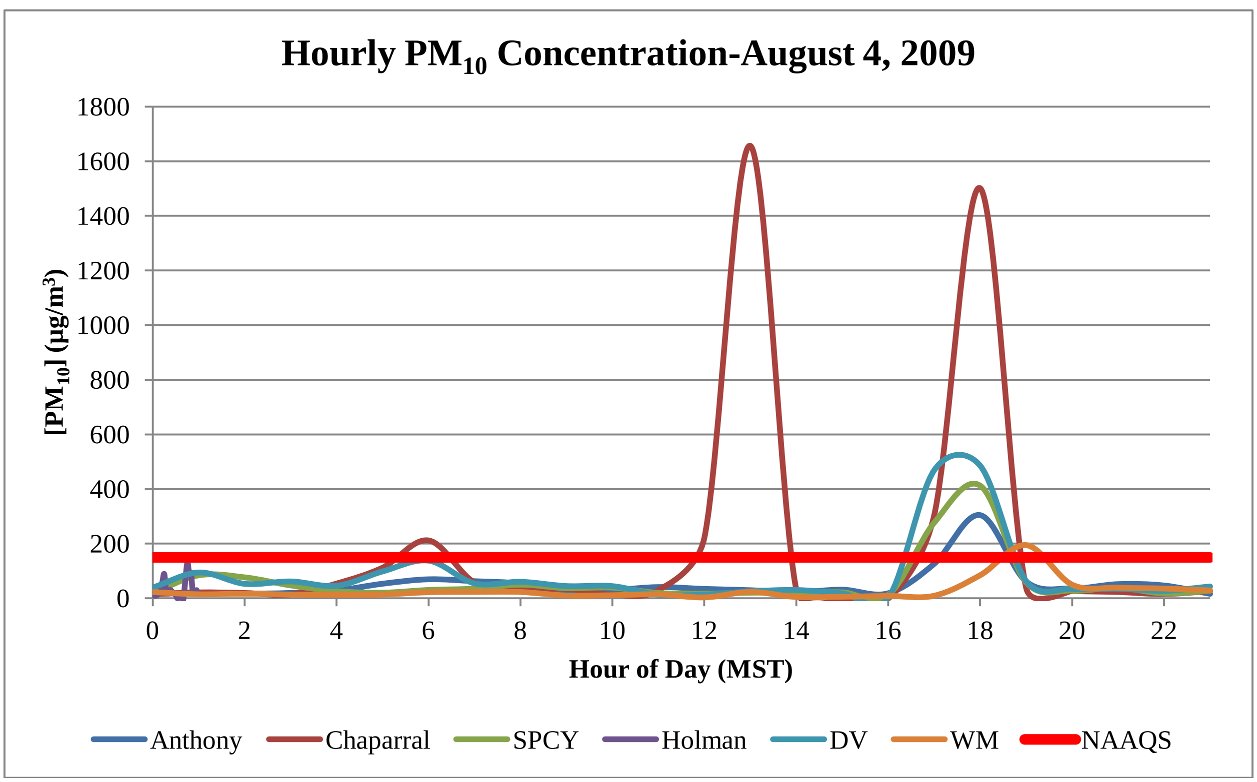

Figure 9-13. Time series plot of hourly observations showing increased PM_{10} concentrations at Chaparral.

Earlier in the day large spikes in PM_{10} concentrations were recorded during the 1200 to 1300 hour. NMED could not find meteorological evidence or evidence of unusual anthropogenic activity to explain why this spike occurred. Winds were from a southerly direction with relatively low wind speeds and gusts. One plausible explanation is the passage of a dust devil directly over the monitoring site. Dust devils are dust-filled vortices similar to small tornados and are formed by strong surface heating. As hot air rises through the cooler air above, air rushes inward to the bottom of the forming vortex. Rotation of the vortex is intensified as more hot air rushes inward to replace the rising column of air. As this vortex begins to move across desert land, dust is picked up and travels across the terrain in the resultant funnel (Figure 9-11).

Figure 9-11. A dust devil traveling across the southern Arizona desert. Image courtesy of NASA.

9.6 Affects Air Quality

The historical fluctuations and clear causal relationship analyses prove that the event in question affected air quality on August 4, 2009.

9.7 Natural Event

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

9.8 No Exceedance but for the Event

Four hourly PM_{10} values (1200-1300 and 1700-1800 hours) exceed the 24-hour average standard at Chaparral [(223 + 1657 + 306 + 1501) µg/m^3 = 3687 µg/m^3; (3687 µg/m^3)/24 = 154 µg/m^3].

When the high hourly PM_{10} concentration caused by the dry microburst (1800 hour = 1501 µg/m^3) is replaced by the 99th percentile of data for this hour (247 µg/m^3), no exceedance of the 24-hour standard occurs [i.e. (4462 µg/m^3)/24 = 186 µg/m^3 compared to (3208 µg/m^3)/24 = 134 µg/m^3].

NMED concludes that without high wind and blowing dust an exceedance would not have been recorded.

10 HIGH WIND EXCEPTIONAL EVENT: October 27, 2009

10.1 Summary of Event

High winds and blowing dust caused an exceedance of the PM_{10} NAAQS at the AQB's Chaparral monitoring site on October 27, 2009. The 24-hour average was recorded by a FEM TEOM continuous monitor, with a midnight-to-midnight 24-hour average concentration of 160 µg/m^3, after rounding to the nearest 10 µg/m^3. This data has been submitted to AQS and flagged as a high wind natural event under the EER. No other monitoring site recorded an exceedance on this day but 24-hour average PM_{10} concentrations were elevated at the Deming and southern monitoring sites (Figure 10-1). Desert View did not collect seventy five percent of data (18 hours) required to compute a 24-hour average for this day.

The weather conditions that caused high winds follow the typical scenario with the passage of a Pacific cold front. Winds blew from a predominantly south to southwesterly direction throughout the entire border region, crossing over desert and anthropogenic sources within New 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.

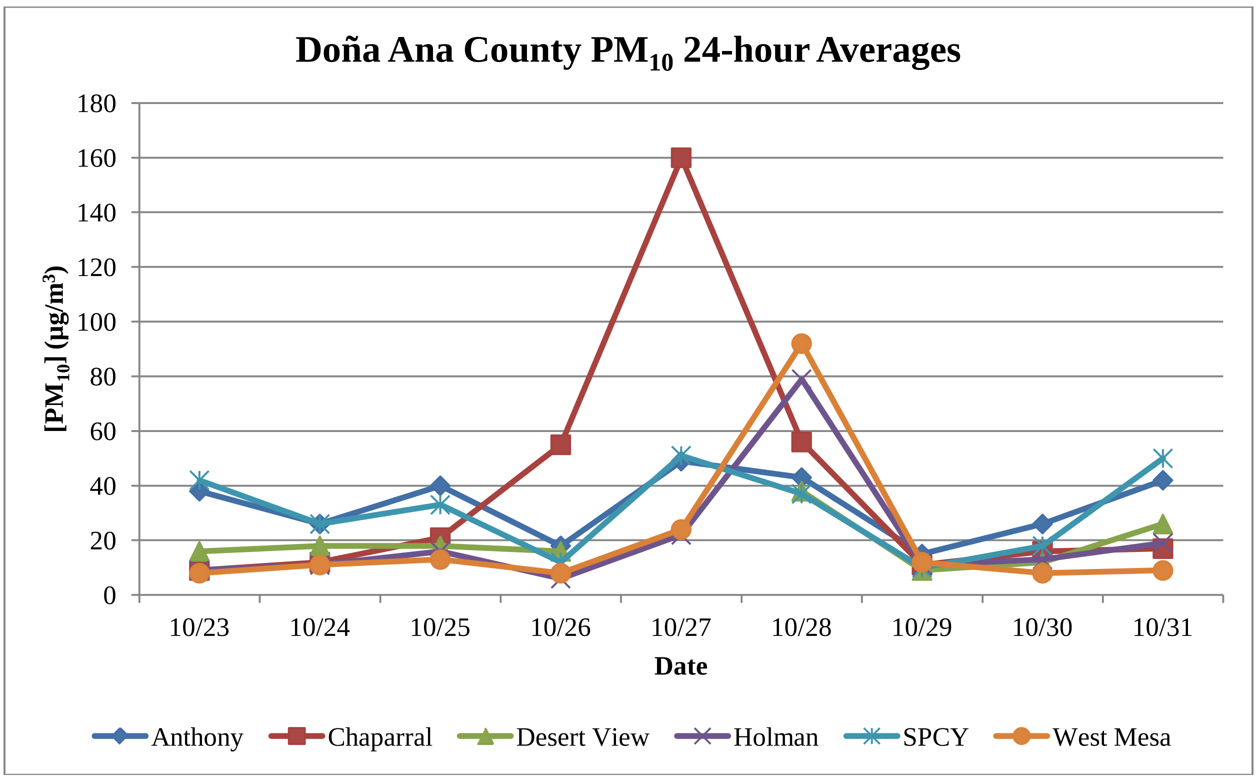

Figure 10-1. 24-hour Averages for the four days before and after the suspected high wind event. Averages measured using TEOM instruments at monitoring sites in Doña Ana County.

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 undisturbed desert, agricultural lands, residential lands and unpaved roads in Doña Ana County, northern Mexico, and west Texas. Harvesting by agricultural operations is possible during this time.

10.2.2 Sustained and Instantaneous Wind Speeds

EPA has indicated that 11.2 m/s (25 mph) would be used as the default entrainment threshold for natural events caused by high wind and blowing dust (EPA, 2011). NMED has found that a sustained hourly wind speed lasting two hours or more of 6 m/s with instantaneous wind gusts of 12 m/s or more can create blowing dust in the border region (Aaboe et al., 1998-2007; Saxton et al., 2000). On October 27, wind speeds exceeded both of NMED's presumed threshold velocities for dust entrainment at various monitoring sites (Figures 10-2 & 10-3).

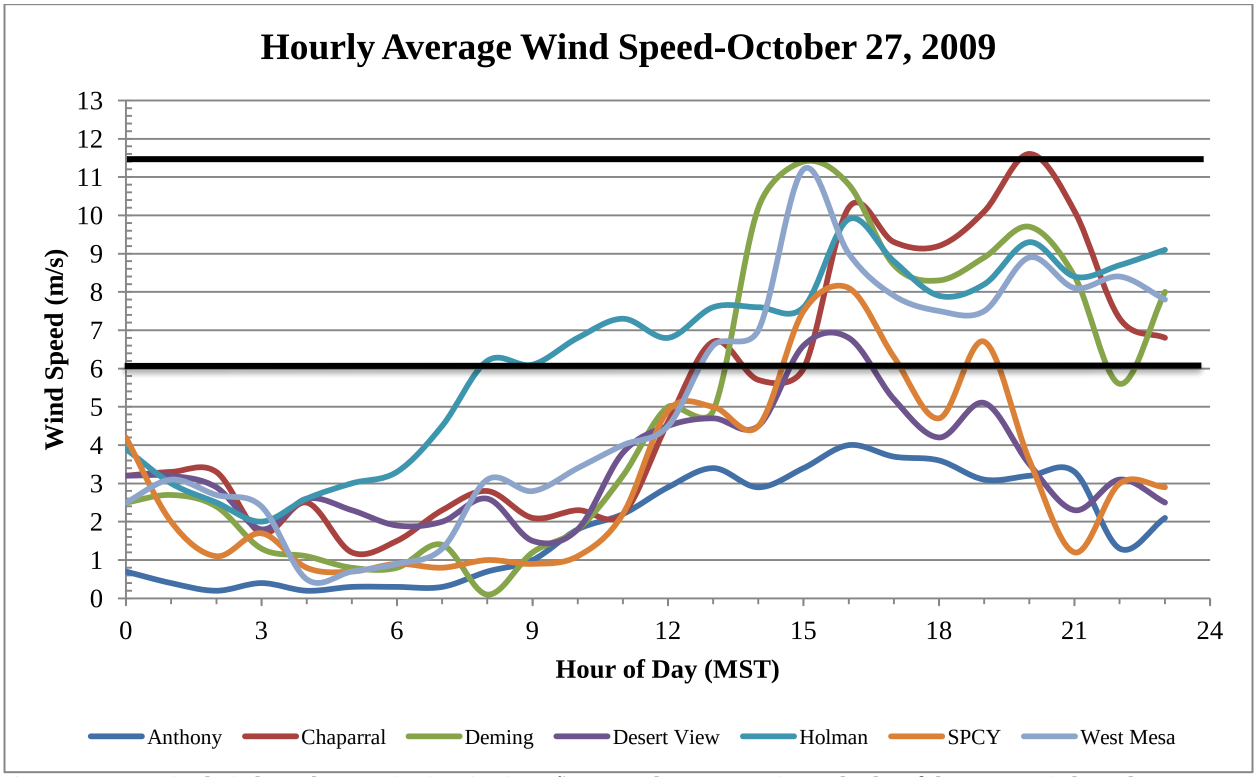

Figure 10-2. Sustained wind speeds at monitoring sites in Doña Ana and Luna Counties on the day of the event. Wind speeds are sampled every other second then averaged over an hour. The Anthony and West Mesa sites measure wind speed at 2 and 8 meters above grade respectively. All other sites measure wind speed at 10 meters above grade.

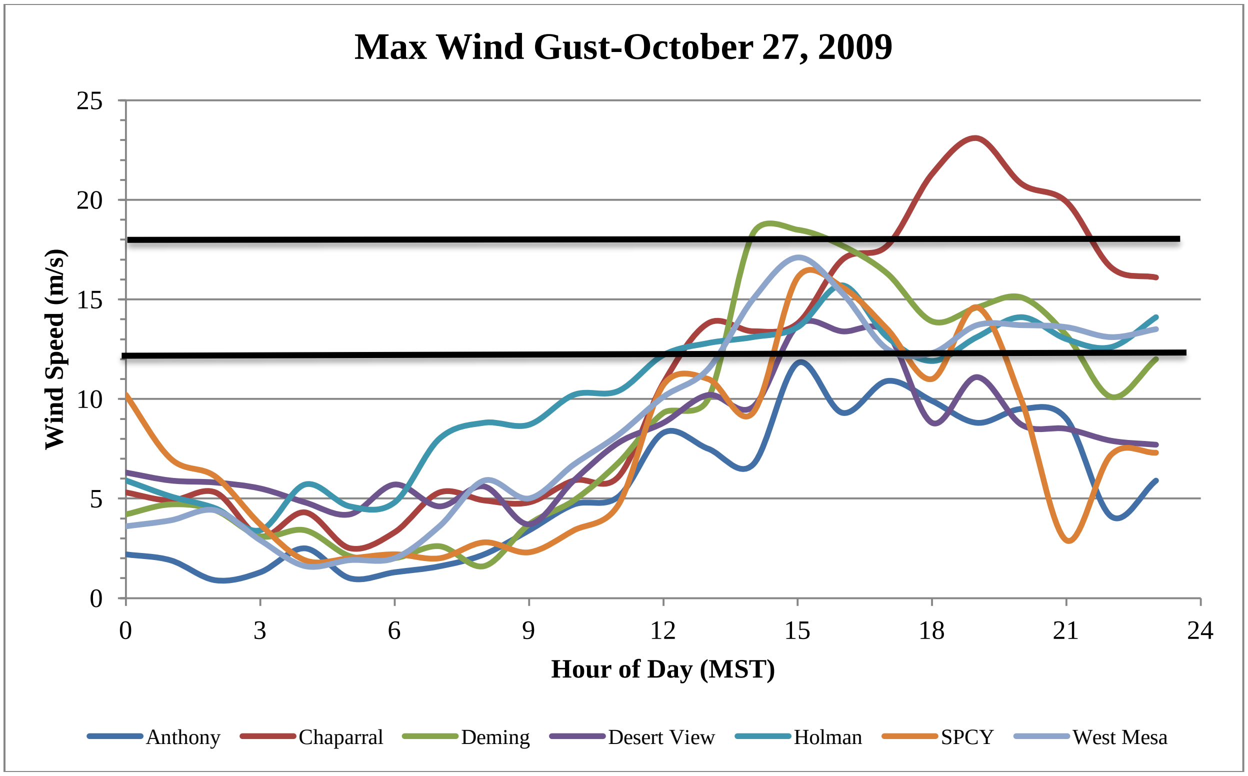

Figure 10-3. Maximum wind speeds at monitoring sites in Doña Ana and Luna Counties on the day of the event. Wind speeds are sampled every other second with the maximum of the hourly samples supplied here. The Anthony and West Mesa sites measure wind speed at 2 and 8 meters above grade respectively. All other sites measure wind speed at 10 meters above grade.

10.2.3 Recurrence Frequency

The Chaparral monitoring station can record exceedances at any time of year. From 2003-2008, the FEM TEOM monitor has recorded 55 exceedances (Figure 10-4). There is no FRM Wedding monitor at the Chaparral site. The Chaparral site records an average of 9.2 exceedances per year, with a high of 18 in 2008 and a low of 3 in 2005.

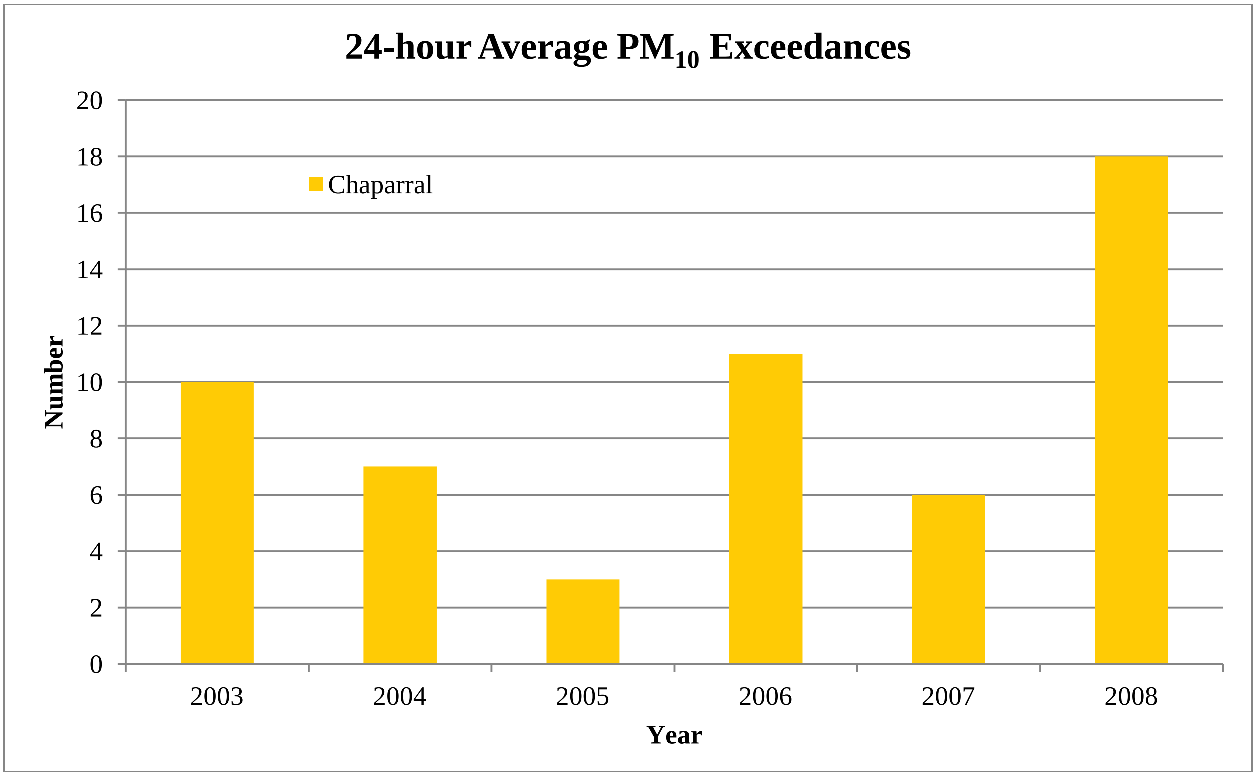

Figure 10-4. Exceedances recorded by the FEM TEOM instrument at Chaparral from 2003-2008.

10.2.4 Controls Analysis

Implementation of BACM in Doña Ana County has been carried out through the ordinances and MOUs adopted under the NEAP. The ordinances regulate disturbed lands, construction and demolition, vacant parking lots and materials handling and transportation. On this day no other unusual PM_{10} producing activities occurred and anthropogenic emissions remained constant before, during and after the event. The most likely sources contributing to the event are undisturbed desert, agricultural lands, residential lands and unpaved roads. Chaparral is the only site to record an exceedance on this day and it is likely that sources in proximity to the monitor caused a large portion of the monitored concentrations. A back-trajectory analysis using the HYSPLIT (Draxler et al., 2011; Rolph, 2011) model shows that the air masses traveled from northern Mexico to the monitoring sites. The model was run for the eight hours preceding the start of elevated concentrations of the event (Figure 10-5). Controlling dust from the natural desert terrain is cost prohibitive with the enforcement of dust control ordinances left up to the local governments. Due to the extreme level of wind, NMED concludes that the sources contributing to the event are not reasonably controllable.

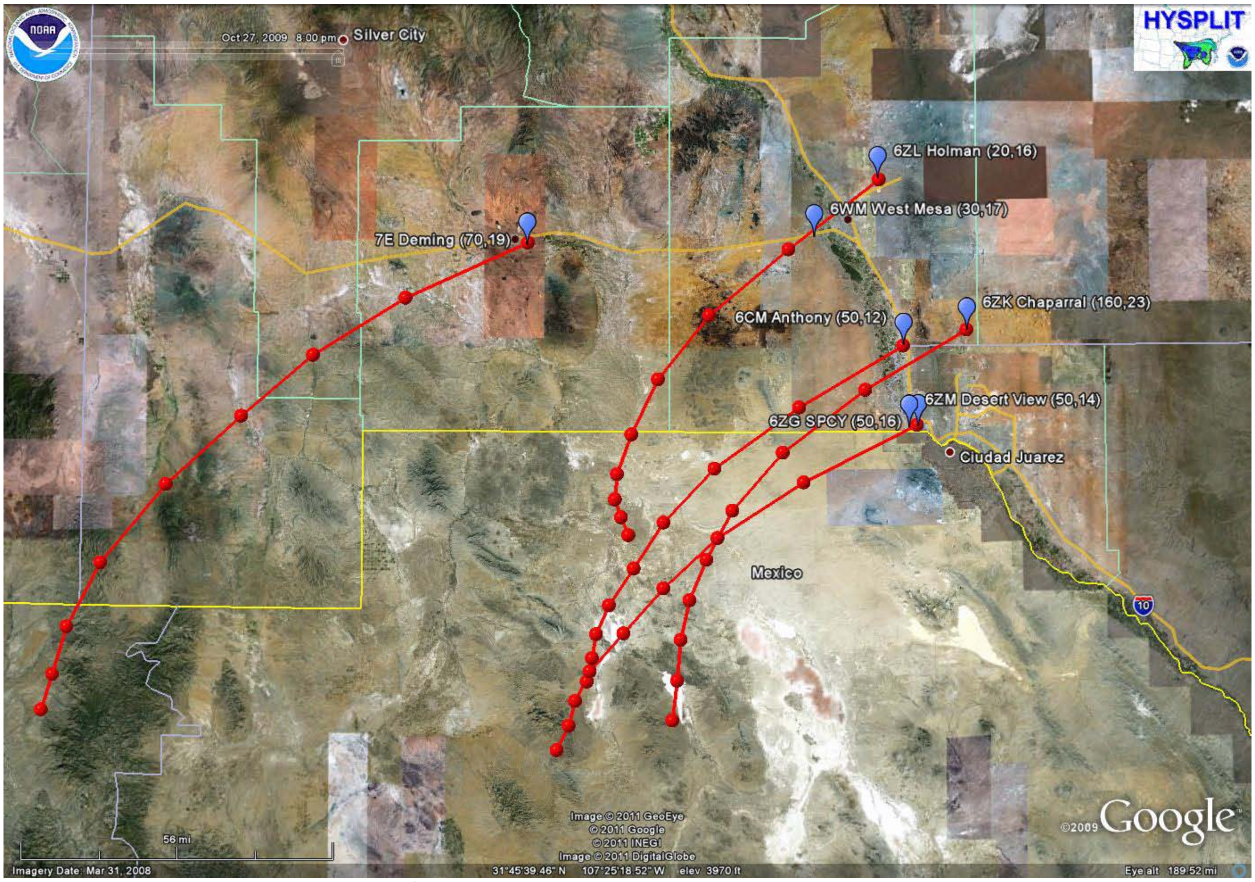

Figure 10-5. Back-trajectory model analysis for the event on October 27, 2009. The numbers in parenthesis are the 24-hour average PM_{10} concentration and max wind gust respectively. Each ball represents one hour in the past starting from the 1500 hour.

10.4 Historical Fluctuations Analysis

10.4.1 Annual and Seasonal 24-hour Average Fluctuations

The Chaparral site has recorded PM_{10} exceedances since it was established in 2003. These exceedances can occur during any time of year and are caused by high winds (Figure 10-6). 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 1110 µg/m^3 recorded in 2004. All exceedances have been caused by high winds and natural events demonstrations were submitted to EPA under the NEAP or EER.

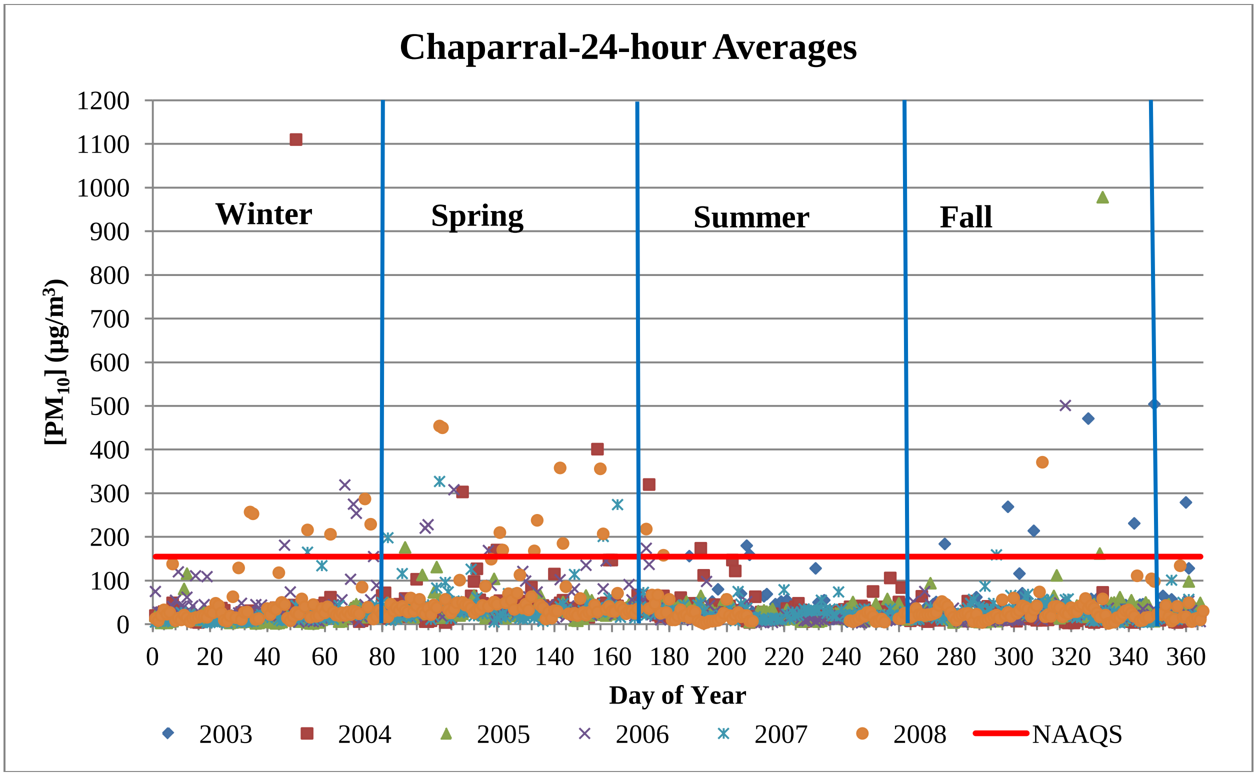

Figure 10-6. 24-hour average PM_{10} concentrations by day of year from 2003-2008. All averages collected using FEM TEOM instrument.

Table 10-1 shows normal historical fluctuations with and without high wind natural events that caused exceedances from 2003-2008. The recorded value for this day (165 µg/m^3) 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.

Chaparral	Max	99th	95th	75th	50th	Mean	25th	5th	Minimum
No Events	149	118	65	35	24	28	15	6	2
Events	1110	271	98	37	25	36	15	6	2

Table 10-1. 24-hour average PM_{10} data distribution with and without high wind events included. Only those high wind events that resulted in an exceedance were excluded from the analysis. Data includes FEM TEOM data from 2003-2008.

An hourly data distribution analysis was done for PM_{10} concentrations and wind gust speeds (Appendices A and B). When the hourly data for October 27 is overlaid on the hourly data distribution plots it shows that the values recorded during the high wind event exceed the 95th percentile for both PM_{10} and wind gusts (Figures 10-7 and 10-8). The hourly PM_{10} values during the high wind blowing dust storm far exceed the 95th percentiles.

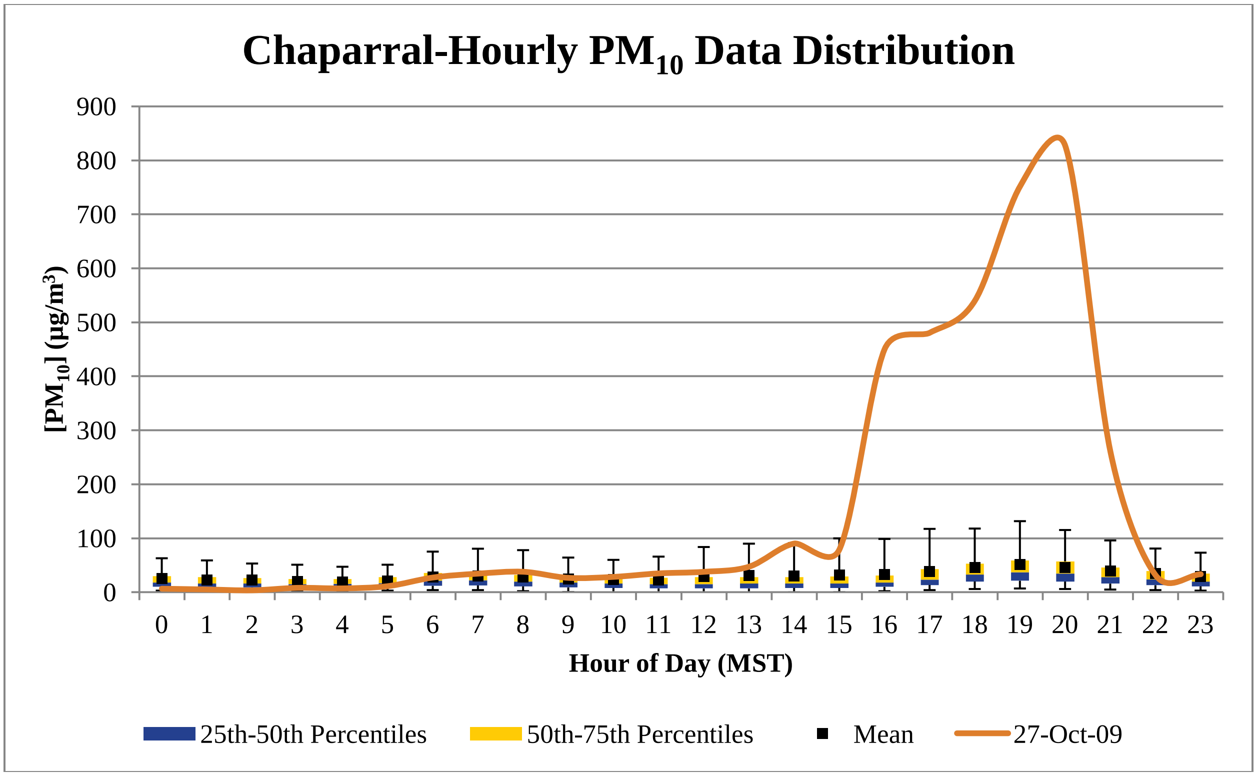

Figure 10-7. All data recorded using the FEM TEOM monitor. Data distribution is for hourly values from 2003-2008. The top whisker represents the 95th percentile of data.

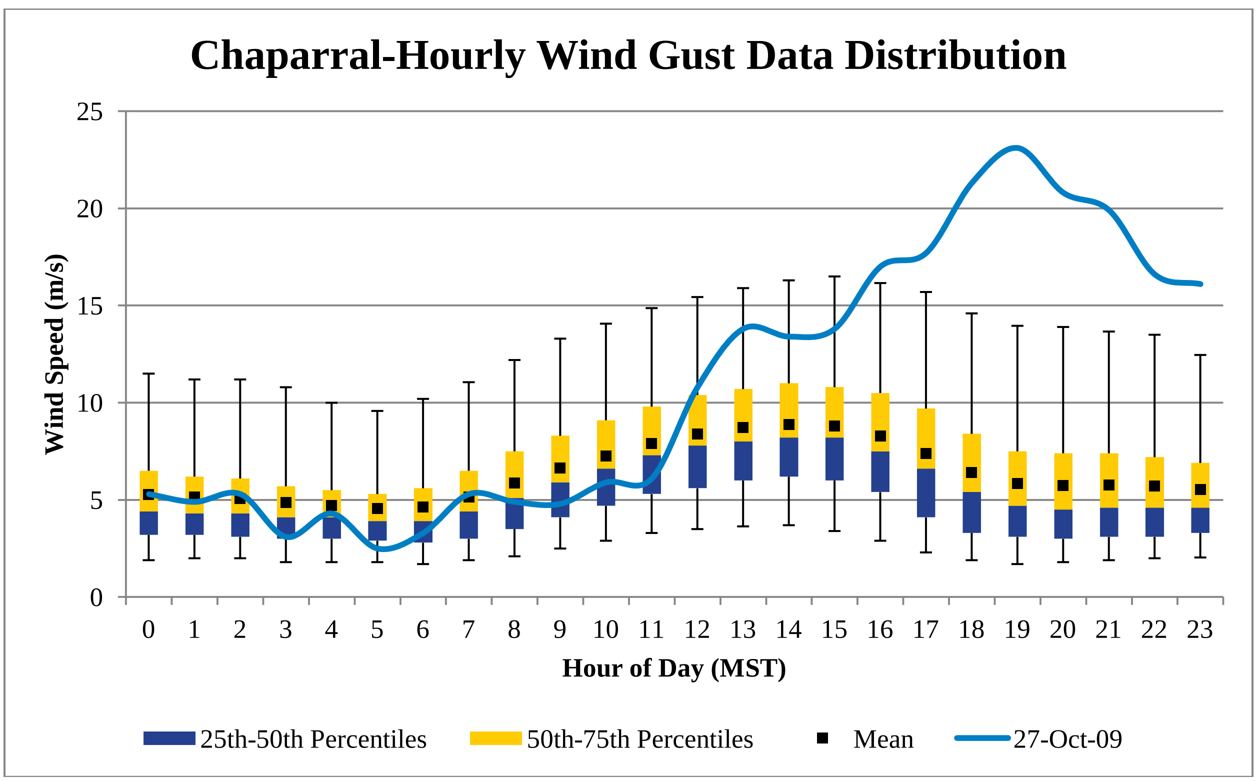

Figure 10-8. Wind speed data distribution from 2003-2008 measured at 10 meters. Data is for the maximum wind gust recorded during the hour.

10.5 Clear Causal Relationship

A Pacific cold front passed through New Mexico on October 27, 2009. An area of low pressure developed in central Arizona creating a weak pressure gradient in southwestern New Mexico and northern Mexico (Figure 10-9). An approaching area of low pressure aloft at the 500 hour was observed over the state of Montana but little mixing of higher level winds occurred on this day (Figure 10-10).

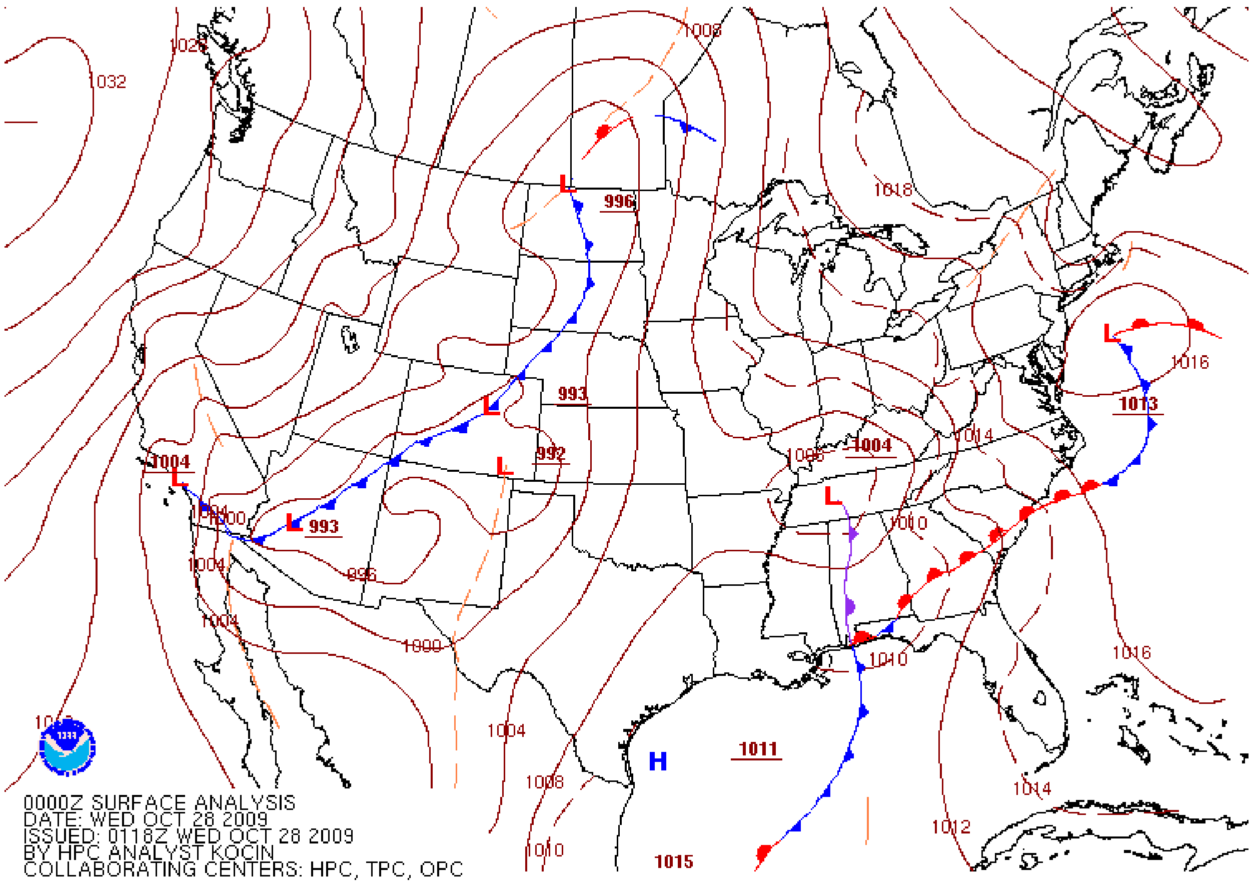

Figure 10-9. October 27, 2009 surface weather map depicting the frontal activity and isobars of constant pressure (red lines) for the 1800 hour MST. Surface winds flow perpendicular to the isobars from high to low pressure.

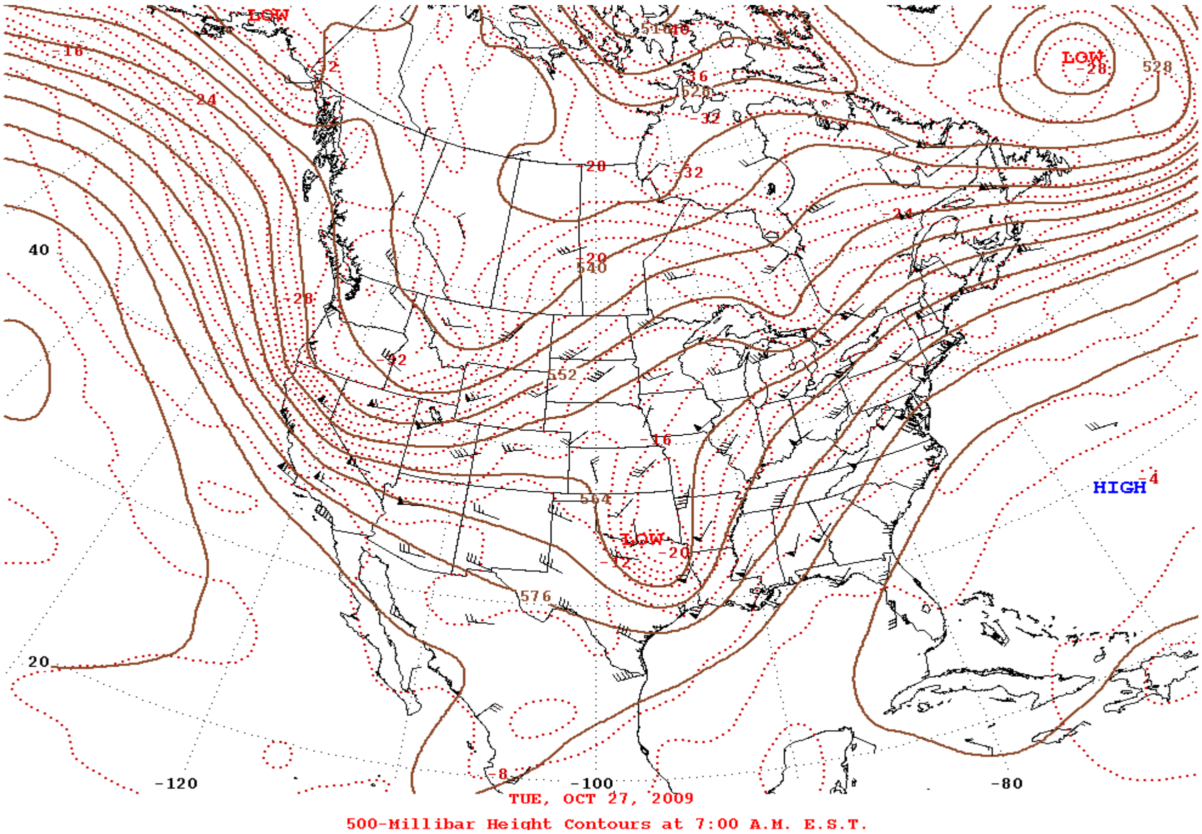

Figure 10-10. Upper Air weather map depicting winds aloft with isobars of constant pressure (brown lines). Winds flow parallel to the isobars.

The weather pattern described above generated south to southwesterly winds beginning in the afternoon hours and lasted throughout the next day. On October 27 strong gusty winds were observed before the approaching cold front. During this event wind gusts exceeded the 95th percentile of data at the Chaparral site as shown in Figure 10-8. Peak wind gusts ranged from 12 m/s at Anthony to 23 m/s at Chaparral (Figure 10-3). Sustained hourly average wind speeds of 6 m/s or more were recorded at Chaparral from the 1500 hour through the night (Figure 10-2). Blowing dust caused elevated levels of PM_{10} during the same time frame as high winds (Figure 10-11). As wind gusts exceed the 95th percentile of historical data so do hourly PM_{10} concentrations on this date. Much smaller spikes in PM_{10} concentrations were observed at the other sites in the monitoring network at approximately the same time as the large spike at Chaparral (Figure 10-12).

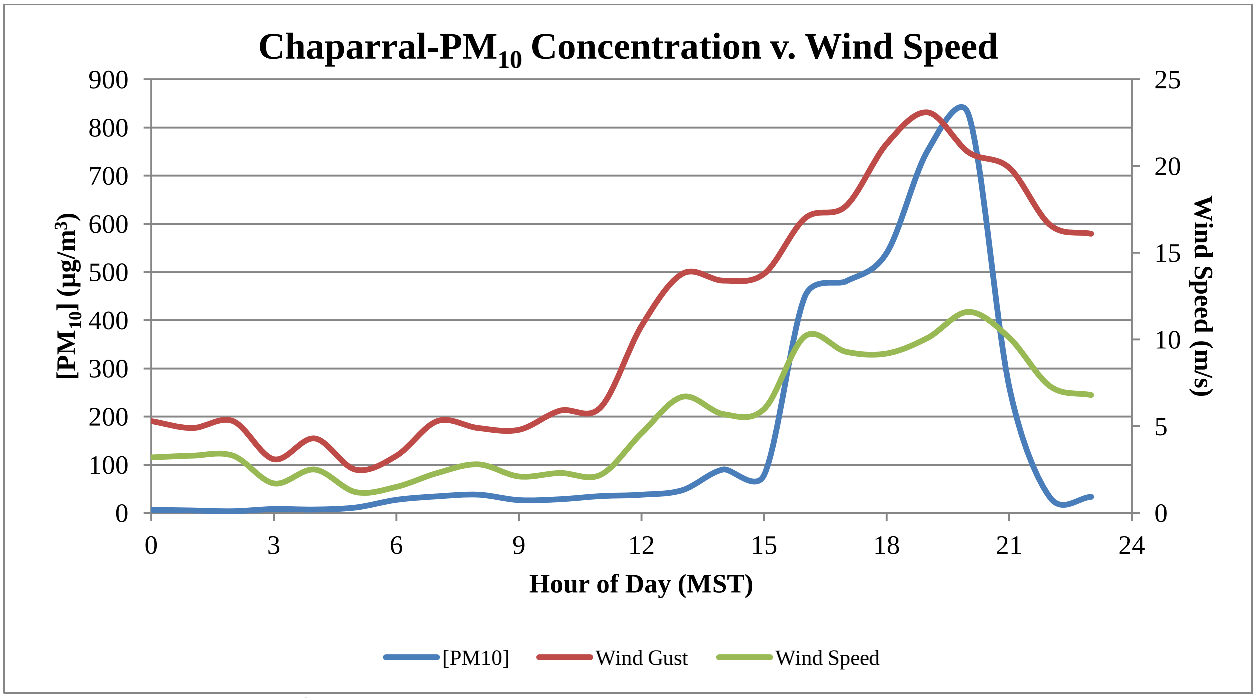

Figure 10-11. Time series plot of hourly observations showing increased PM_{10} concentrations as wind speeds and gusts increase.

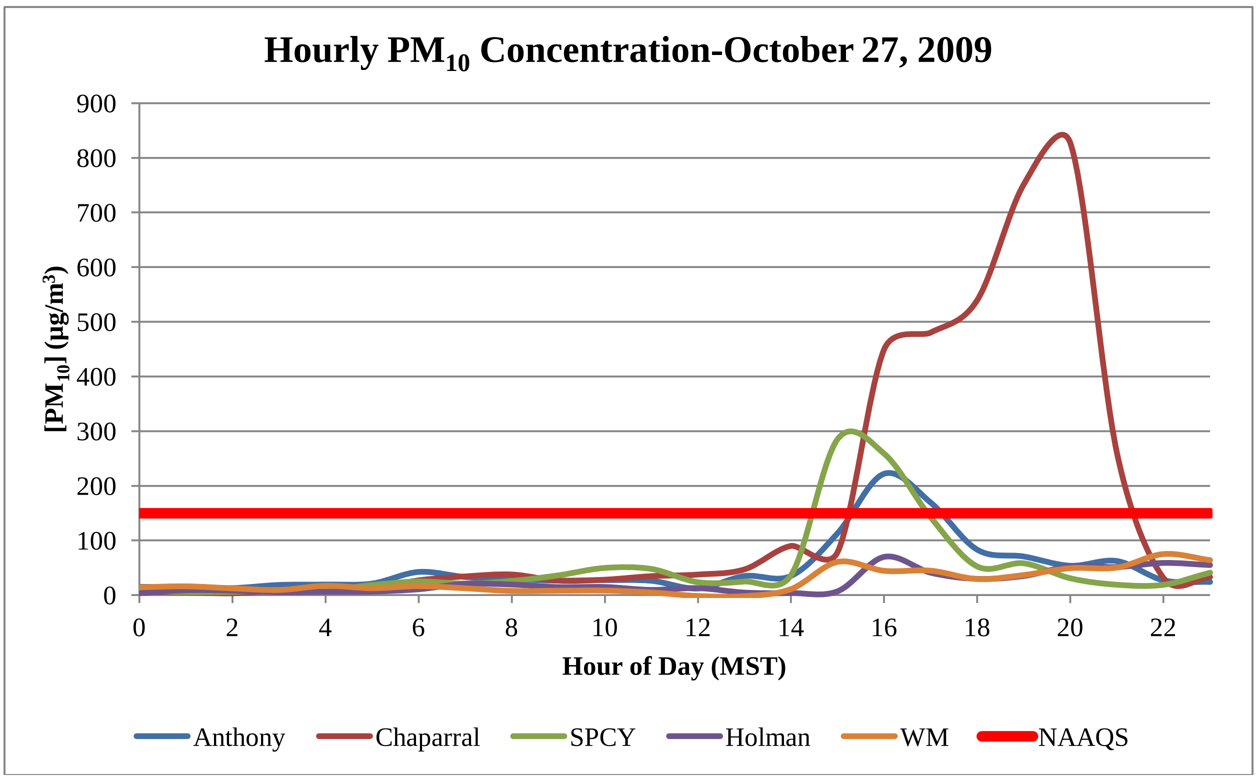

Figure 10-12. Time series plot of hourly observations showing increased PM_{10} concentrations at the southern monitoring sites.

10.6 Affects Air Quality

The historical fluctuations and clear causal relationship analyses prove that the event in question affected air quality on October 27, 2009.

10.7 Natural Event

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

10.8 No Exceedance but for the Event

Eight hourly PM_{10} values (1400-2100 hours) account for approximately 91 percent of the 24-hour average at Chaparral [(90 + 79 + 450 + 481 + 540 + 752 + 827 + 260) µg/m^3 = 3479 µg/m^3; (3479 µg/m^3)/24 = 145 µg/m^3; 145/165 = .906]. Also, the 24-hour average of these eight hourly values are nearly 97 percent of the NAAQS (145/150 = .966). Without the high wind and blowing dust an exceedance would not have been recorded.

11 HIGH WIND EXCEPTIONAL EVENT: October 28, 2009

11.1 Summary of Event

High winds and blowing dust caused an exceedance of the PM_{10} NAAQS at the AQB's Deming monitoring site on October 28, 2009. The 24-hour average was recorded by a FEM TEOM continuous monitor, with a midnight-to-midnight 24-hour average concentration of 240 µg/m^3, after rounding to the nearest 10 µg/m^3. This data has been submitted to AQS and flagged as a high wind natural event under the EER. No other monitoring site recorded an exceedance on this day but 24-hour average PM_{10} concentrations were elevated at the northern monitoring sites (Figure 11-1). A FRM Wedding monitor is in Deming but it is not collocated with the FEM TEOM and did not record a high 24-hour average on this day (20 µg/m^3).

The weather conditions that caused high winds follow the typical scenario with the passage of a Pacific cold front. This cold front caused an exceedance at Chaparral on the previous day. Winds blew from a predominantly southwesterly direction throughout the entire border region, crossing over desert and anthropogenic sources 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.

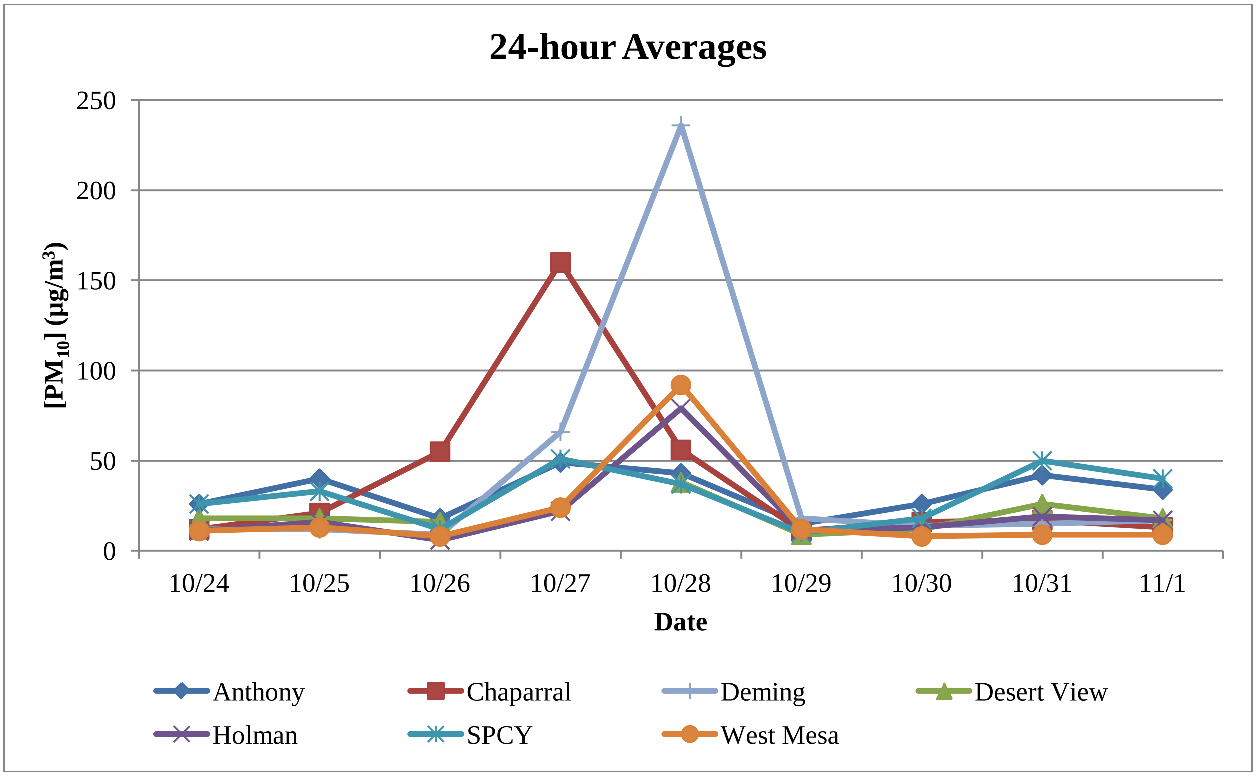

Figure 11-1. 24-hour Averages for the four days before and after the suspected high wind event. Averages measured using TEOM instruments at all monitoring sites.

11.2 Is Not Reasonably Controllable or Preventable

11.2.1 Suspected Source Areas and Categories Contributing to the Event

Sources of windblown dust contributing to this exceedance include the undisturbed desert, agricultural lands, residential lands and unpaved roads in Doña Ana and Luna Counties as well as northern Mexico. Harvesting by agricultural operations is possible during this time.

11.2.2 Sustained and Instantaneous Wind Speeds

EPA has indicated that 11.2 m/s (25 mph) would be used as the default entrainment threshold for natural events caused by high wind and blowing dust (EPA, 2011). NMED has found that a sustained hourly wind speed lasting two hours or more of 6 m/s with instantaneous wind gusts of 12 m/s or more can create blowing dust in the border region (Aaboe et al., 1998-2007; Saxton et al., 2000). On October 28, wind speeds exceeded both of NMED's presumed threshold velocities for dust entrainment at various monitoring sites (Figures 11-2 & 11-3).

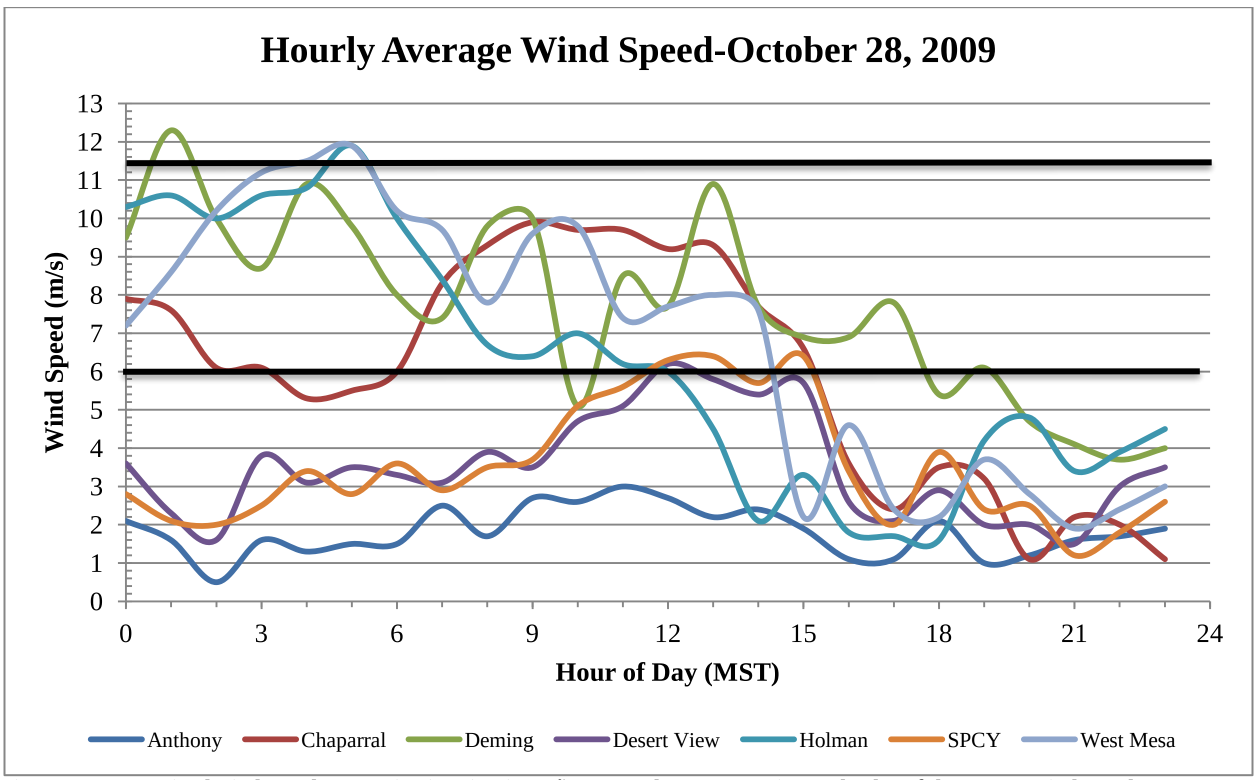

Figure 11-2. Sustained wind speeds at monitoring sites in Doña Ana and Luna Counties on the day of the event. Wind speeds are sampled every other second then averaged over an hour. The Anthony and West Mesa sites measure wind speed at 2 and 8 meters above grade respectively. All other sites measure wind speed at 10 meters above grade.

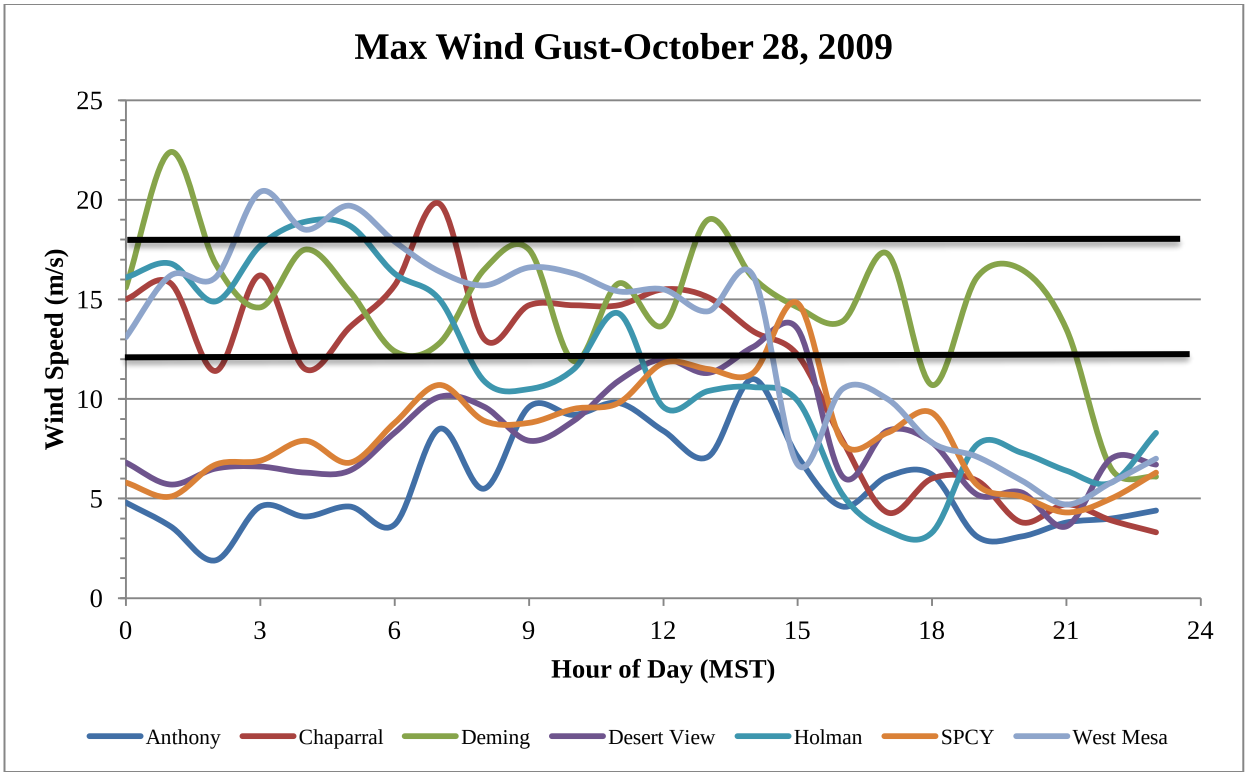

Figure 11-3. Maximum wind speeds at monitoring sites in Doña Ana and Luna Counties on the day of the event. Wind speeds are sampled every other second with the maximum of the hourly samples supplied here. The Anthony and West Mesa sites measure wind speed at 2 and 8 meters above grade respectively. All other sites measure wind speed at 10 meters above grade.

11.2.3 Recurrence Frequency

The Deming monitoring station can record exceedances at any time of year. From 2006-2008, the FEM TEOM monitor has recorded 25 exceedances (Figure 10-4). The FRM Wedding monitor at the Deming site recorded two exceedances in 2003 and none since. Continuous FEM TEOM monitoring did not begin in Deming until July of 2006. The Deming site records an average of 4.2 exceedances per year, with a high of 24 in 2008 with no exceedances recorded from 2004-2006.

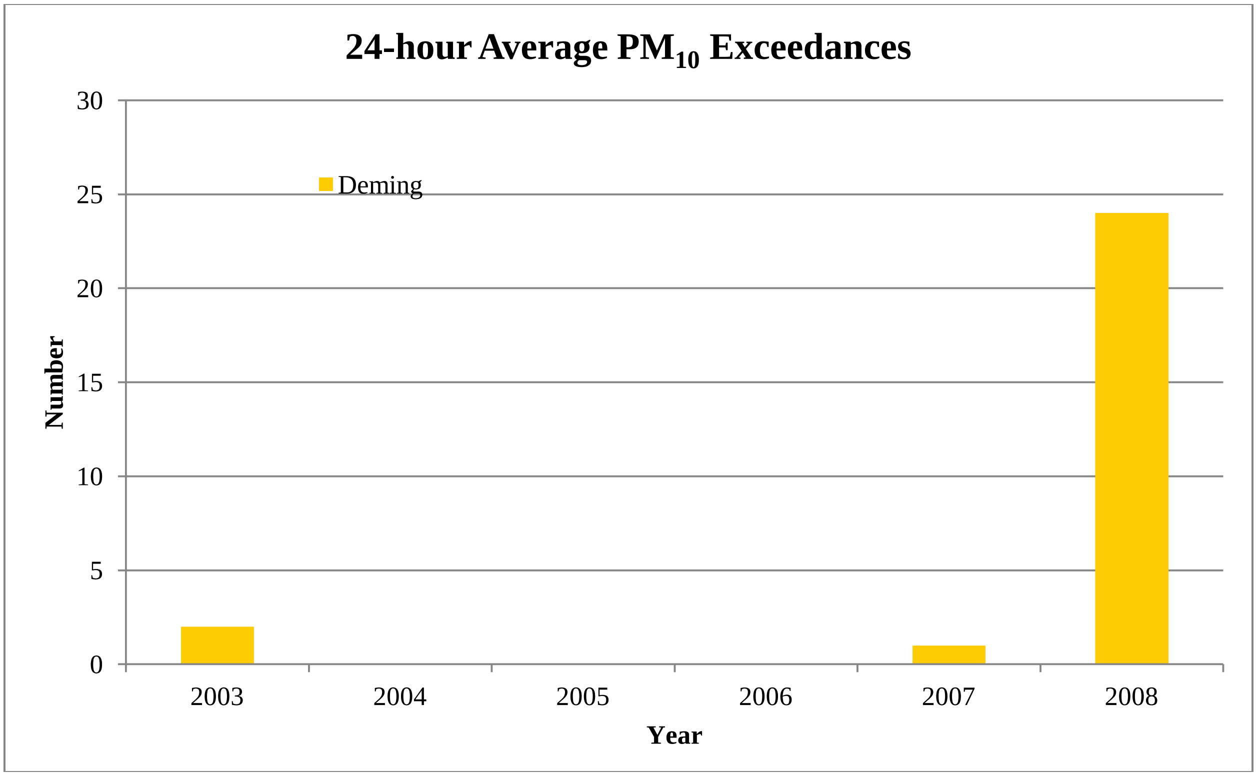

Figure 11-4. Exceedances recorded by the FRM Wedding and FEM TEOM instrument at Deming from 2003-2008.

11.2.4 Controls Analysis

Implementation of BACM in Luna County has been carried out through the ordinances adopted under the NEAP. The ordinances regulate disturbed lands and construction. On this day no other unusual PM_{10} producing activities occurred and anthropogenic emissions remained constant before, during and after the event. The most likely sources contributing to the event are undisturbed desert, agricultural lands and unpaved roads. A back-trajectory analysis using the HYSPLIT (Draxler et al., 2011; Rolph, 2011) model shows that the air masses traveled from northern Mexico through the boot heel region of New Mexico to the Deming site. The model was run for the eight hours preceding the start of elevated concentrations of the event (Figure 11-5). Controlling dust from the natural desert terrain is cost prohibitive with the enforcement of dust control ordinances left up to the local governments. Due to the extreme level of wind, NMED concludes that the sources contributing to the event are not reasonably controllable.

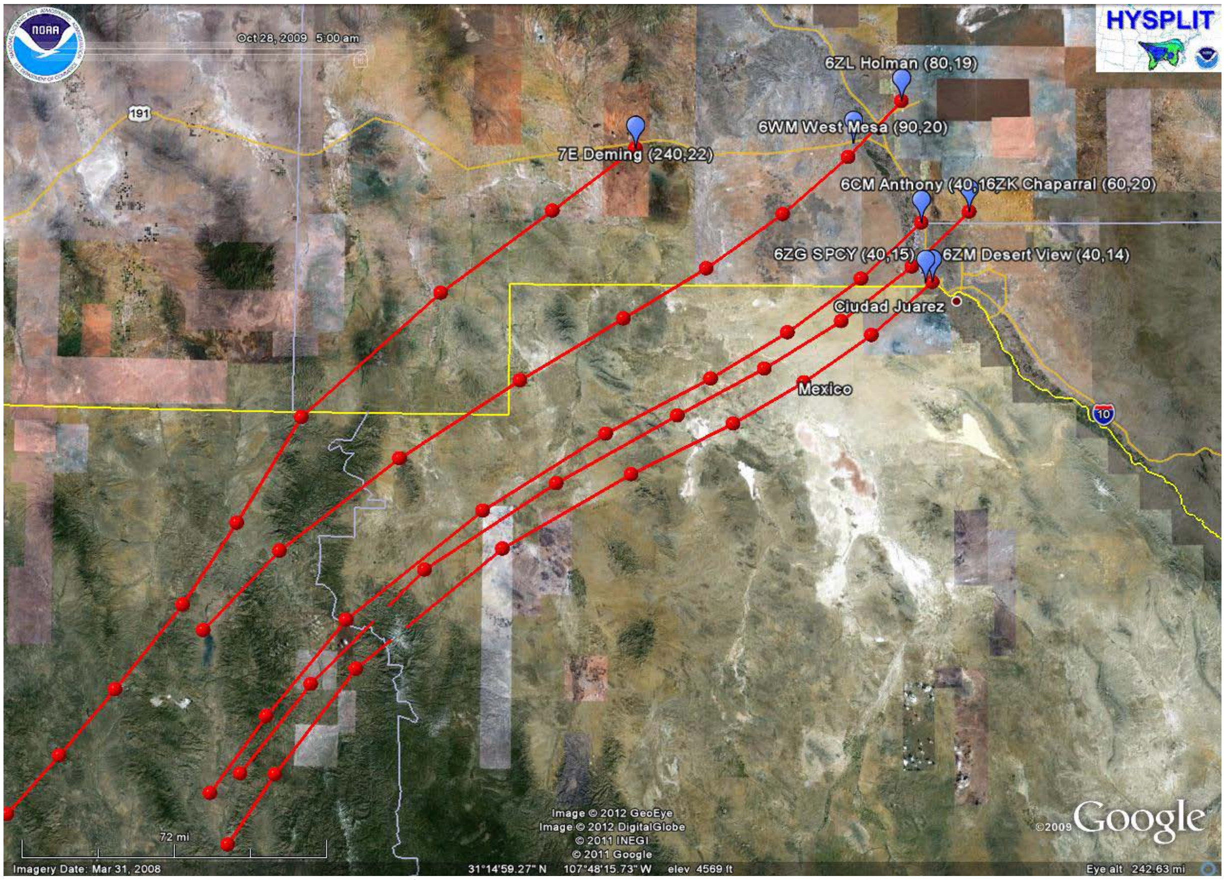

Figure 11-5. Back-trajectory model analysis for the event on October 28, 2009. The numbers in parenthesis are the 24-hour average PM_{10} concentration and max wind gust respectively. Each ball represents one hour in the past starting from the 600 hour MST.

11.4 Historical Fluctuations Analysis

11.4.1 Annual and Seasonal 24-hour Average Fluctuations

The Deming FEM TEOM site has recorded PM_{10} exceedances since it was established in July of 2006. These exceedances occur from winter through summer and are caused by high winds (Figure 11-6). Most exceedances occur from late winter through early summer (February-June) and are usually associated with the passage of Pacific cold fronts. NMED suspects that exceedances can occur during any time of year but did not start continuous monitoring until July of 2006. The maximum 24-hour average PM_{10} concentration was 1033 µg/m^3 recorded in 2008. All exceedances have been caused by high winds and natural events demonstrations were submitted to EPA under the NEAP or EER.

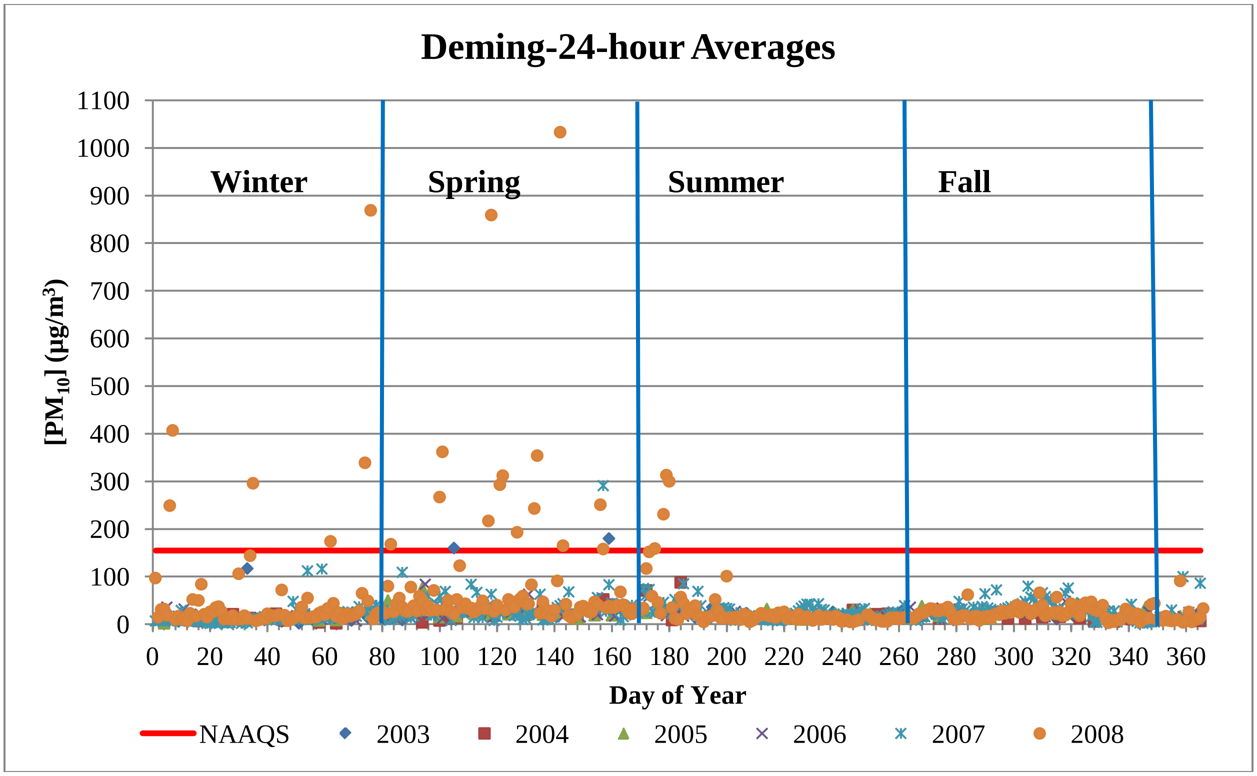

Figure 11-6. 24-hour average PM_{10} concentrations by day of year from 2003-2008. Data from 2003-2006 collected using the FRM Wedding. Data for 2007-2008 collected using the continuous FEM TEOM instrument.

Table 11-1 shows normal historical fluctuations with and without high wind natural events that caused exceedances from 2003-2008. The recorded value for this day (240 µg/m^3) 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.

Deming	Max	99th	95th	75th	50th	Mean	25th	5th	Minimum
No Events	152	96	57	29	19	23	12	6	2
Events	1033	281	70	30	19	30	12	6	2

Table 11-1. 24-hour average PM_{10} data distribution with and without high wind events included. Only those high wind events that resulted in an exceedance were excluded from the analysis. Data includes FRM Wedding data from 2003-2008 and FEM TEOM data from 2006-2008.

An hourly data distribution analysis was done for PM_{10} concentrations and wind gust speeds (Appendices A and B). When the hourly data for October 28 is overlaid on the hourly data distribution plots it shows that the values recorded during the high wind event exceed the 95th percentile for both PM_{10} and wind gusts (Figures 11-7 and 11-8). The hourly PM_{10} values during the high wind blowing dust storm far exceed the 95th percentiles.

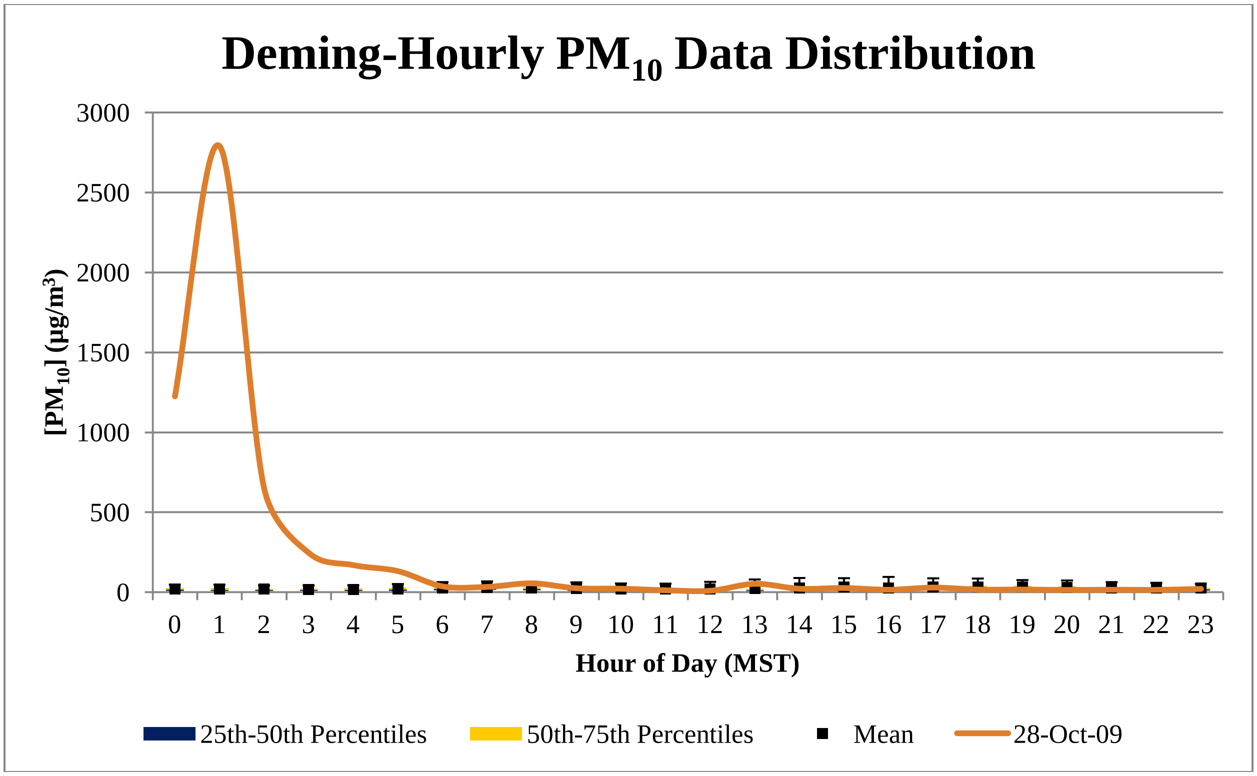

Figure 11-7. All data recorded using the FEM TEOM monitor. Data distribution is for hourly values from 2006-2008. The top whisker represents the 95th percentile of data.

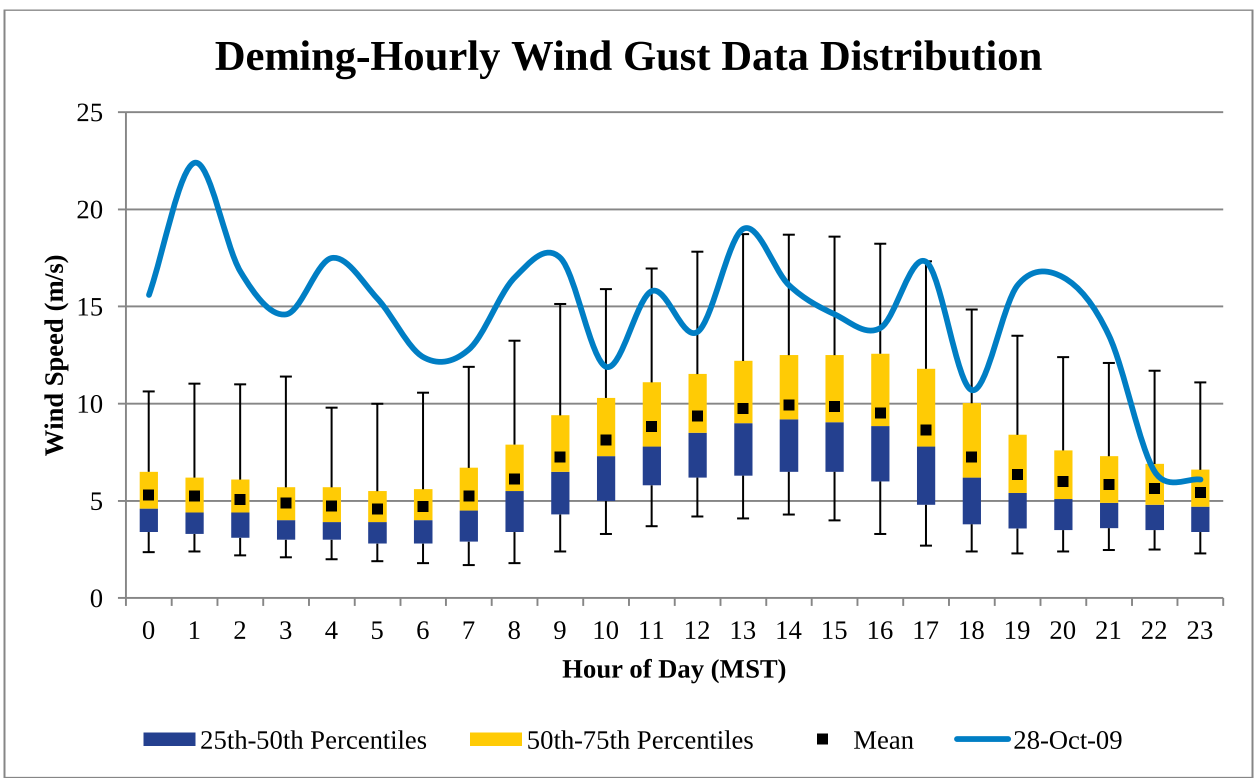

Figure 11-8. Wind speed data distribution from 2006-2008 measured at 10 meters. Data is for the maximum wind gust recorded during the hour.

11.5 Clear Causal Relationship

A Pacific cold front passed through New Mexico on October 28, 2009. An area of low pressure developed in central New Mexico creating a strong pressure gradient in southeastern Arizona, southwestern New Mexico and northern Mexico (Figure 11-9). The upper air masses did not have much of an effect on the event as little mixing occurred due to the passage of the front at night time (Figure 11-10).

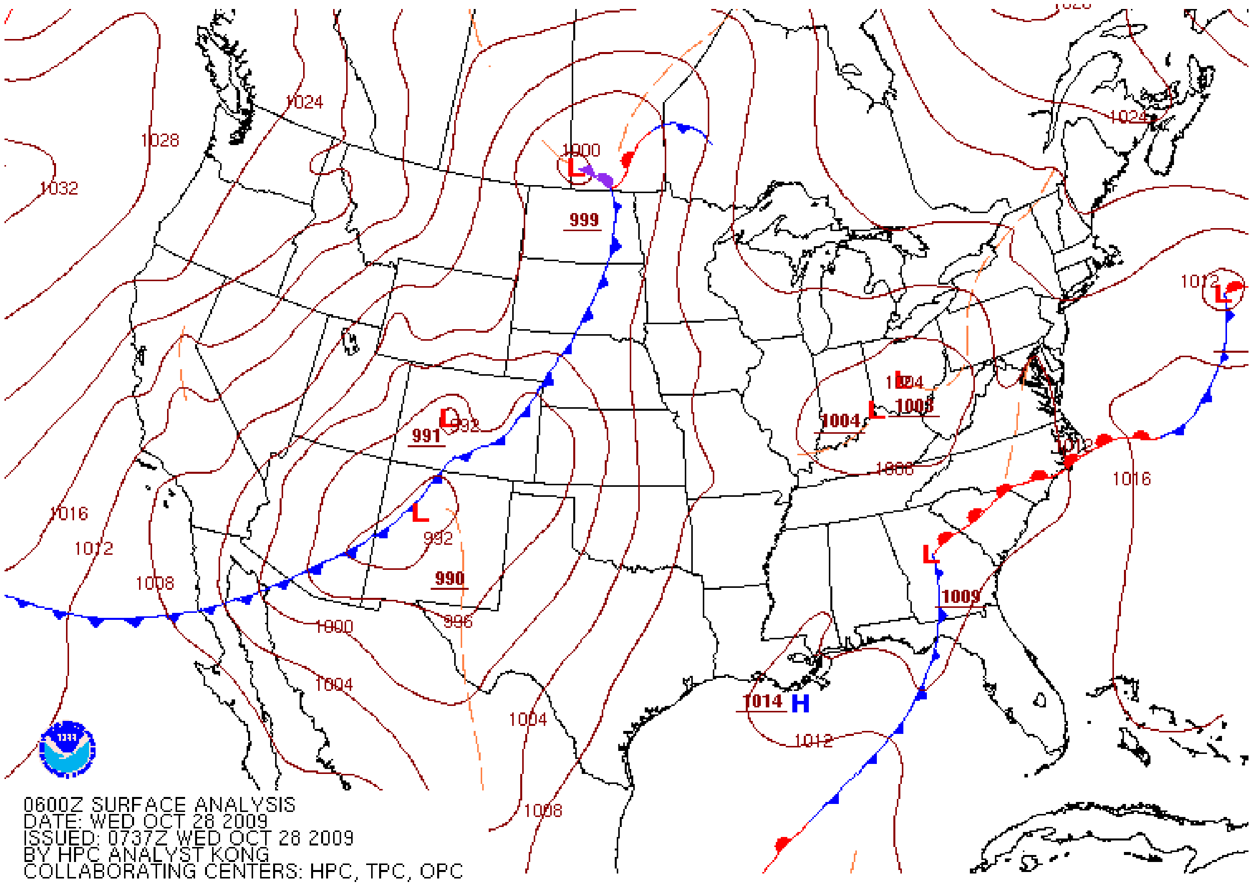

Figure 11-9. October 28, 2009 surface weather map depicting the frontal activity and isobars of constant pressure (red lines) for the midnight hour MST. Surface winds flow perpendicular to the isobars from high to low pressure.

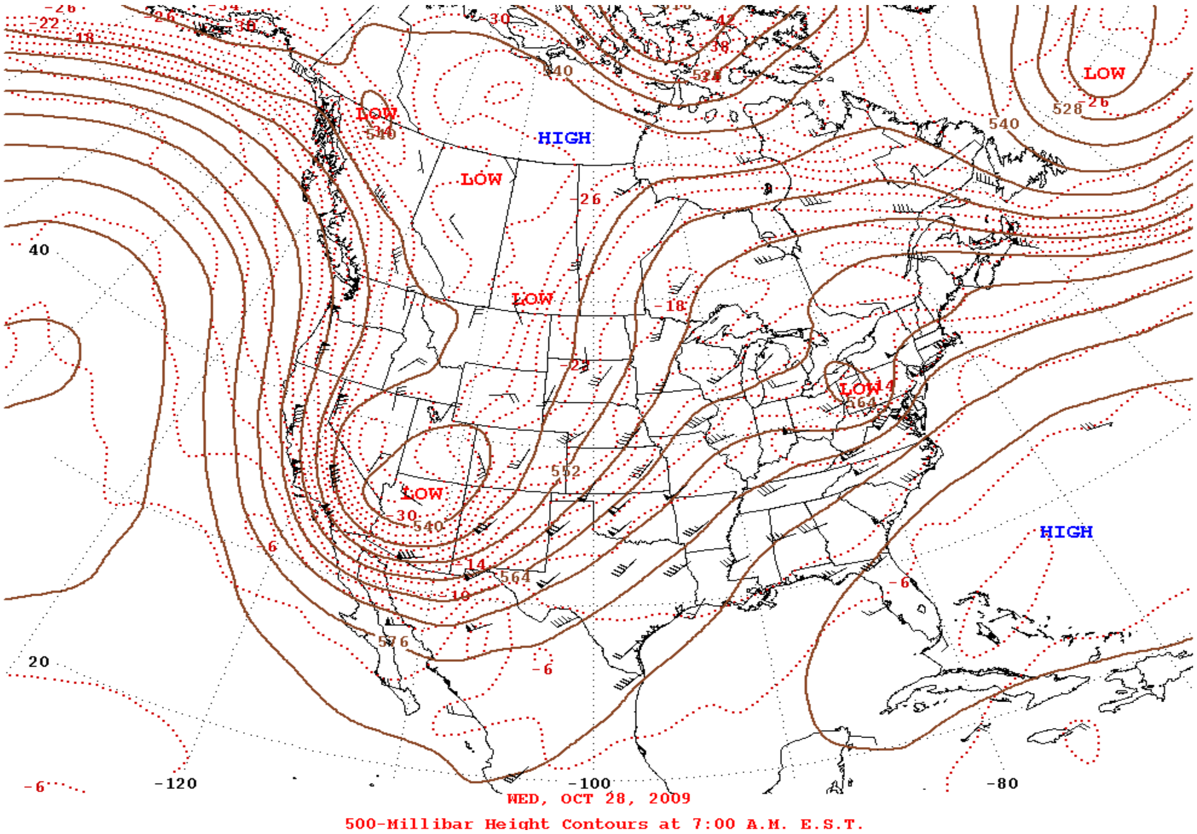

Figure 11-10. Upper Air weather map depicting winds aloft with isobars of constant pressure (brown lines). Winds flow parallel to the isobars.

The weather pattern described above generated southwesterly winds beginning in the afternoon hours of October 27 and lasted throughout the next day. On October 28 strong gusty winds were observed before the approaching cold front. During this event wind gusts exceeded the 95th percentile of data at the Deming site as shown in Figure 11-8. Peak wind gusts ranged from 14 m/s at Desert View to 22 m/s at Deming (Figure 11-3). Sustained hourly average wind speeds of 6 m/s or more or more were recorded at Deming from the midnight hour through the day (Figure 11-2). Blowing dust caused elevated levels of PM_{10} during the same time frame as high winds (Figure 11-11). As wind gusts exceed the 95th percentile of historical data so do hourly PM_{10} concentrations on this date. Much smaller spikes in PM_{10} concentrations were observed at the Holman and West Mesa sites shortly after the large spike at Deming (Figure 11-12).

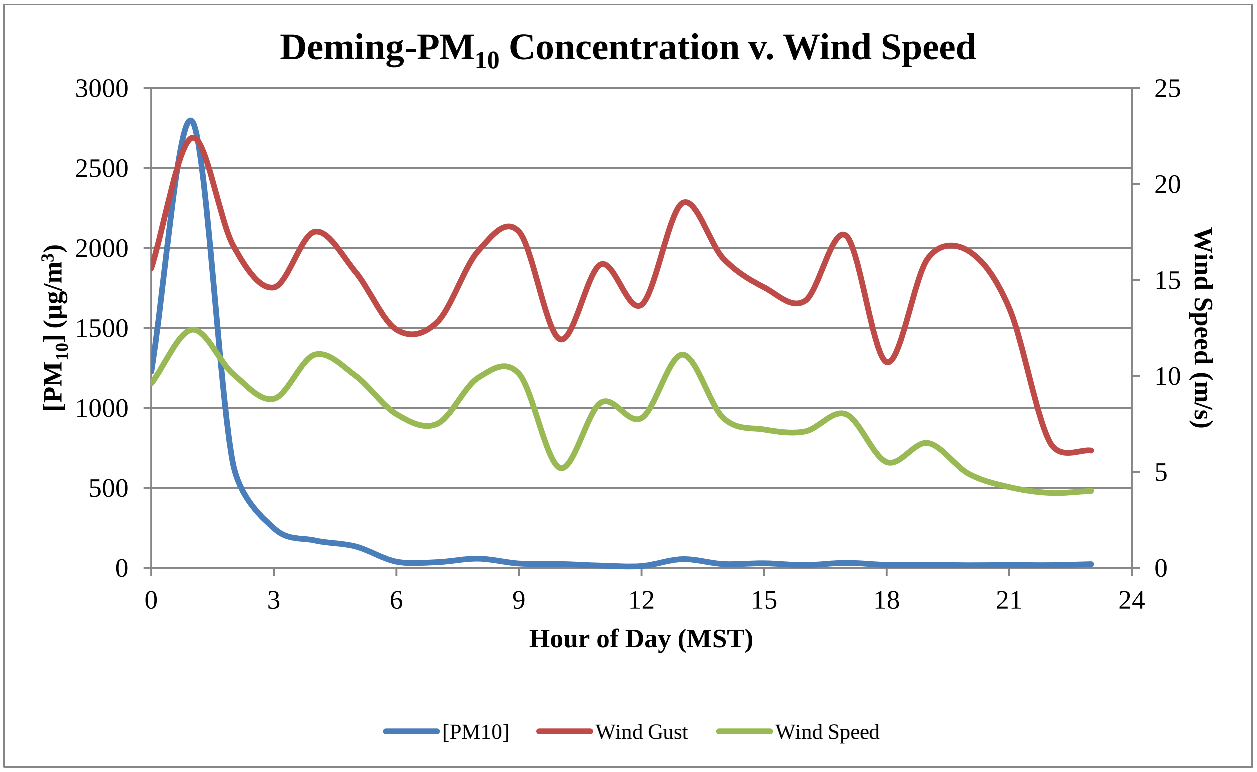

Figure 11-11. Time series plot of hourly observations showing increased PM_{10} concentrations as wind speeds and gusts increase.

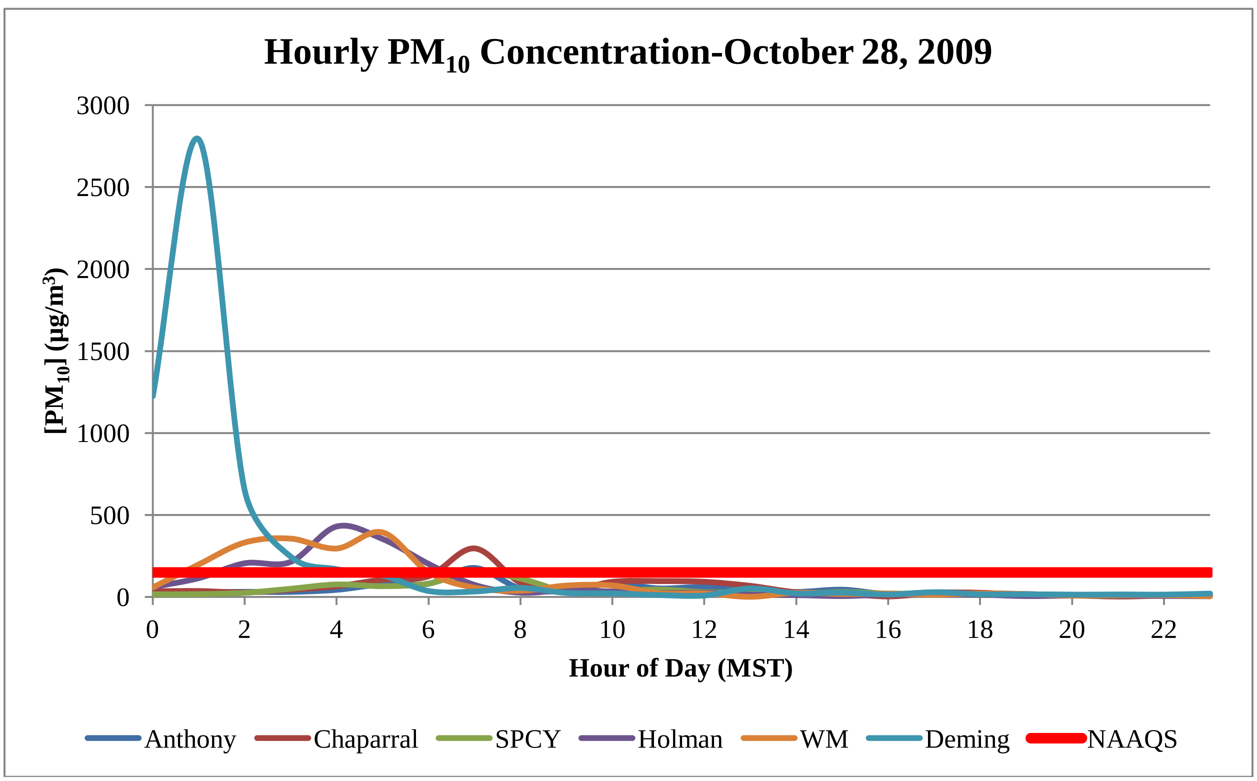

Figure 11-12. Time series plot of hourly observations showing increased PM_{10} concentrations at the southern monitoring sites.

11.6 Affects Air Quality

The historical fluctuations and clear causal relationship analyses prove that the event in question affected air quality on October 28, 2009.

11.7 Natural Event

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

11.8 No Exceedance but for the Event

Two hourly PM_{10} values (000-100 hours) exceed the 24-hour average standard at Deming [(1226 + 2791) $\mu g/m^3$ = 4017 $\mu g/m^3$; (4017 $\mu g/m^3$)/24 = 167 $\mu g/m^3$]. Without the high wind and blowing dust an exceedance would not have been recorded.

12 HIGH WIND EXCEPTIONAL EVENT: December 8, 2009

12.1 Summary of Event

High winds and blowing dust caused an exceedance of the PM_{10} NAAQS at the AQB's Anthony and Chaparral monitoring sites on December 8, 2009. The 24-hour averages were recorded by FEM TEOM continuous monitors. The midnight-to-midnight 24-hour average concentrations were 180 µg/m^3 at Anthony and 270 µg/m^3 at Chaparral. All averages were rounded to the nearest 10 µg/m^3. This data has been submitted to AQS and flagged as high wind natural events under the EER. Although no other monitoring site recorded an exceedance, elevated PM_{10} concentrations were measured at all monitoring sites (Figure 12-1).

The weather conditions that caused high winds follow the typical scenario with the passage of a Pacific cold front. Winds blew from a predominantly southwesterly direction throughout the entire border region, crossing over desert and anthropogenic sources within New Mexico and northern 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.

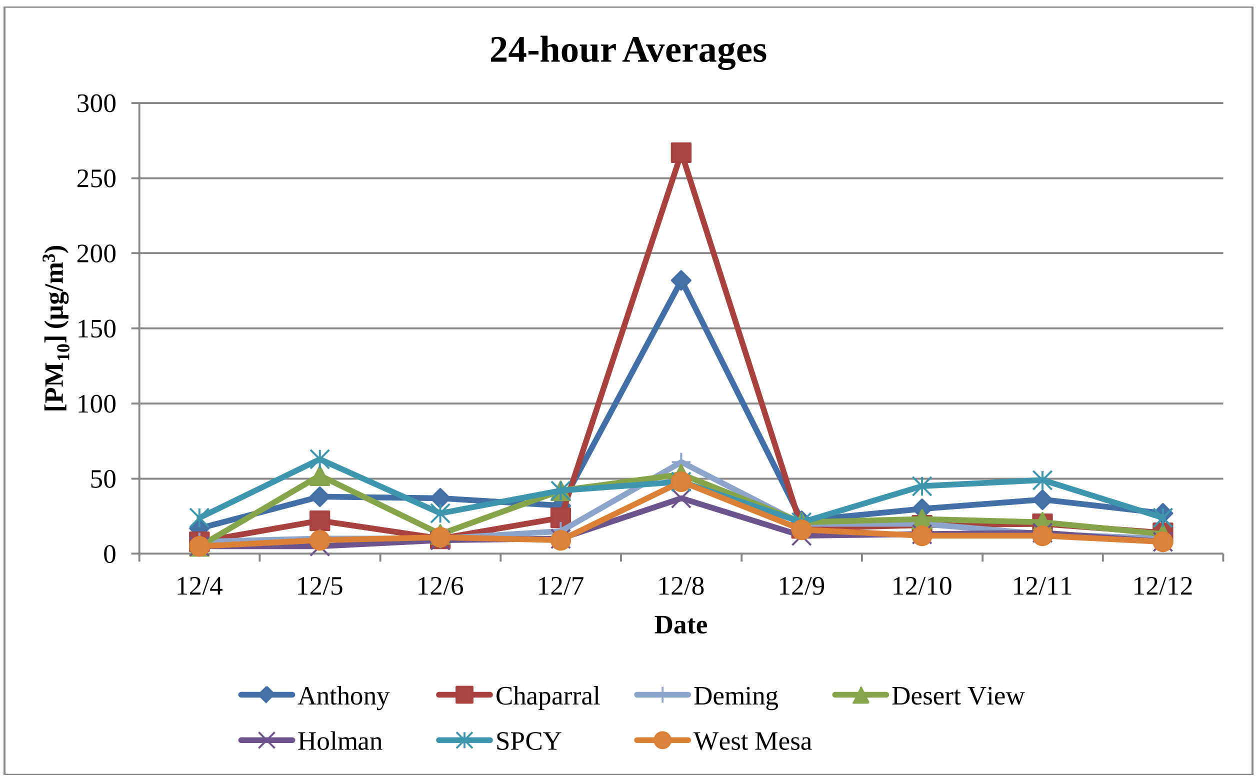

Figure 12-1. 24-hour Averages for the four days before and after the suspected high wind event. Averages measured using TEOM instruments at monitoring sites in Doña Ana County.

12.2 Is Not Reasonably Controllable or Preventable

12.2.1 Suspected Source Areas and Categories Contributing to the Event

Sources of windblown dust contributing to these exceedances include the undisturbed desert in Doña Ana County and Mexico as well as agricultural land, residential land and unpaved roads in Doña Ana County. Much of the development in Doña Ana County has occurred in the City of Las Cruces where city ordinance requires BACM. The largest and most likely sources contributing to the exceedances are the playas of northern Mexico.

12.2.2 Sustained and Instantaneous Wind Speeds

EPA has indicated that 11.2 m/s (25 mph) would be used as the default entrainment threshold for natural events caused by high wind and blowing dust (EPA, 2011). NMED has found that a sustained hourly wind speed lasting two hours or more of 6 m/s with instantaneous wind gusts of 12 m/s or more can create blowing dust in the border region (Aaboe et al., 1998-2007; Saxton et al., 2000). In the past, NMED used 18 m/s as the threshold wind gust where the best controlled sources will be overwhelmed and entrain dust. On December 8, wind speeds exceeded both of NMED's presumed threshold velocities for dust entrainment at all monitoring sites (Figures 12-2 & 12-3). All monitoring sites recorded wind gust speeds exceeding 18 m/s.

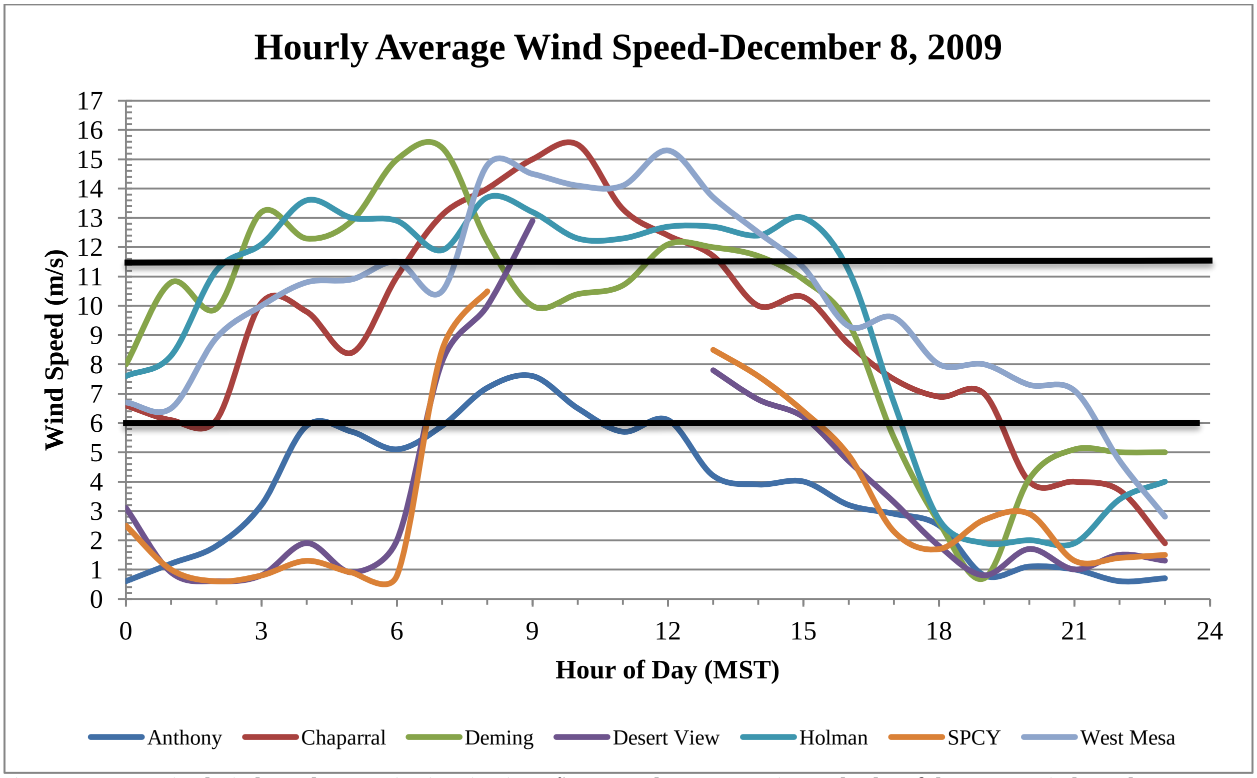

Figure 12-2. Sustained wind speeds at monitoring sites in Doña Ana and Luna Counties on the day of the event. Wind speeds are sampled every other second then averaged over an hour. The Anthony and West Mesa sites measure wind speed at 2 and 8 meters above grade respectively. All other sites measure wind speed at 10 meters above grade.

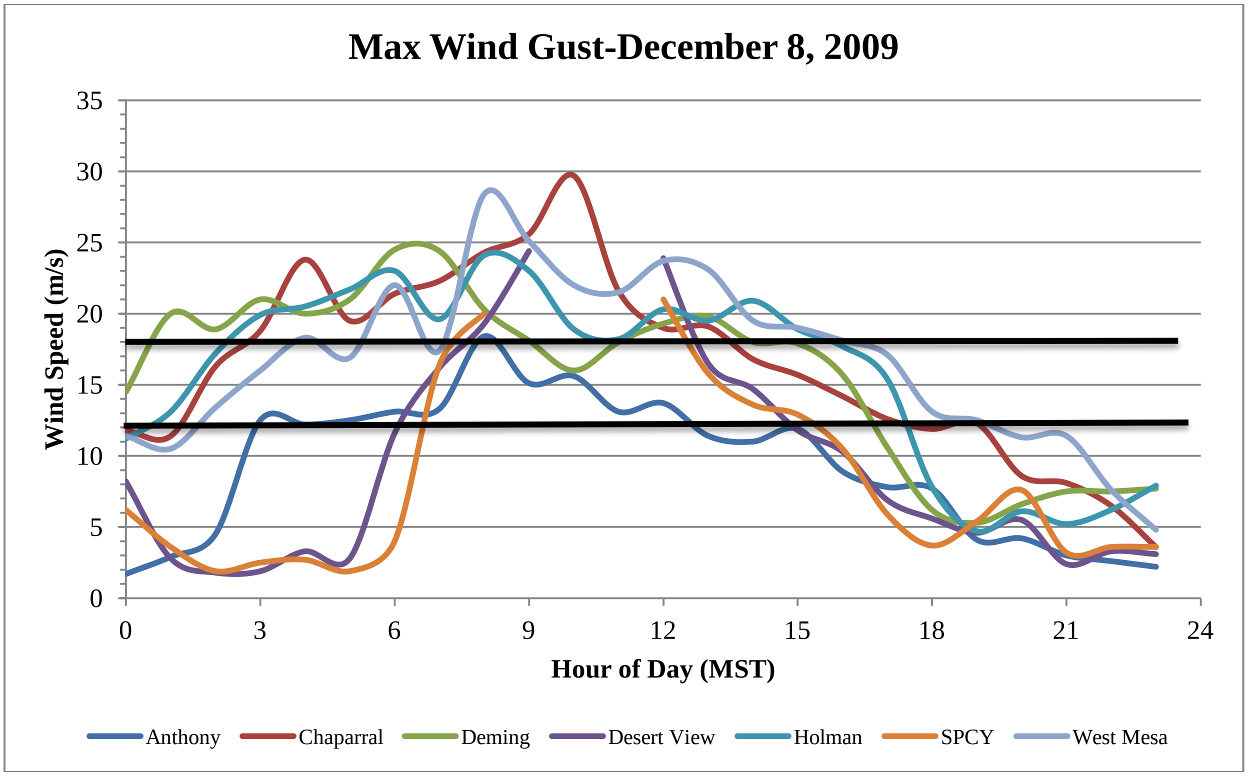

Figure 12-3. Maximum wind speeds at monitoring sites in Doña Ana and Luna Counties on the day of the event. Wind speeds are sampled every other second with the maximum of the hourly samples supplied here. The Anthony and West Mesa sites measure wind speed at 2 and 8 meters above grade respectively. All other sites measure wind speed at 10 meters above grade.

12.2.3 Recurrence Frequency

The Anthony monitoring station can record exceedances at any time of year. From 2003-2008, the FEM TEOM monitor has recorded 57 exceedances and the FRM Wedding monitor has recorded five exceedances (Figure 12-4). The difference between the number of recorded exceedances is due to the FRM Wedding monitor sampling schedule of 1-in-6 days. The Anthony site records an average of 9.5 exceedances per year, with a high of 16 in 2008 and a low of 4 in 2007 and 2005.

The Chaparral monitoring station can record exceedances at any time of year. From 2003-2008, the FEM TEOM monitor has recorded 55 exceedances (Figure 12-4). There is no FRM Wedding monitor at the Chaparral site. The Chaparral site records an average of 9.2 exceedances per year, with a high of 18 in 2008 and a low of 3 in 2005.

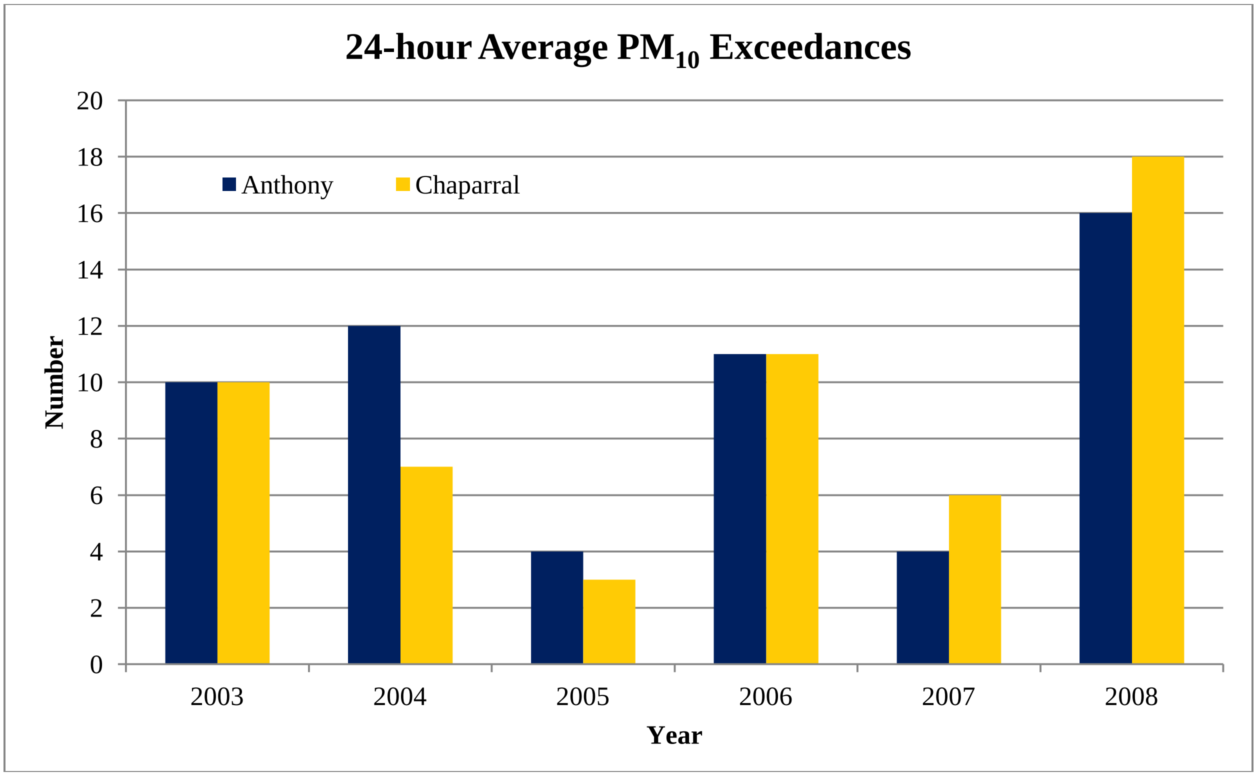

Figure 12-4. High wind blowing dust exceedances recorded by the FEM TEOM instruments. The FRM Wedding instrument recorded an additional five exceedances at Anthony over the same time period.

12.2.4 Controls Analysis

Implementation of BACM in Doña Ana County has been carried out through the ordinances and MOUs adopted under the NEAP. The ordinances regulate disturbed lands, construction and demolition, vacant parking lots and materials handling and transportation. On this day no other unusual PM_{10} producing activities occurred and anthropogenic emissions remained constant before, during and after the event. The most likely sources contributing to the event are the playas of northern Mexico and desert lands in Doña Ana County. A back-trajectory analysis using the HYSPLIT (Draxler et al., 2011; Rolph, 2011) model shows that the air masses traveled through northern Mexico and southern Doña Ana County to the Anthony and Chaparral monitors (Figure 12-5). The model was run for the eight hours preceding the beginning of elevated concentrations (300 hour). Controlling dust from the natural desert terrain is cost prohibitive. NMED concludes that the sources contributing to the event are not reasonably controllable.

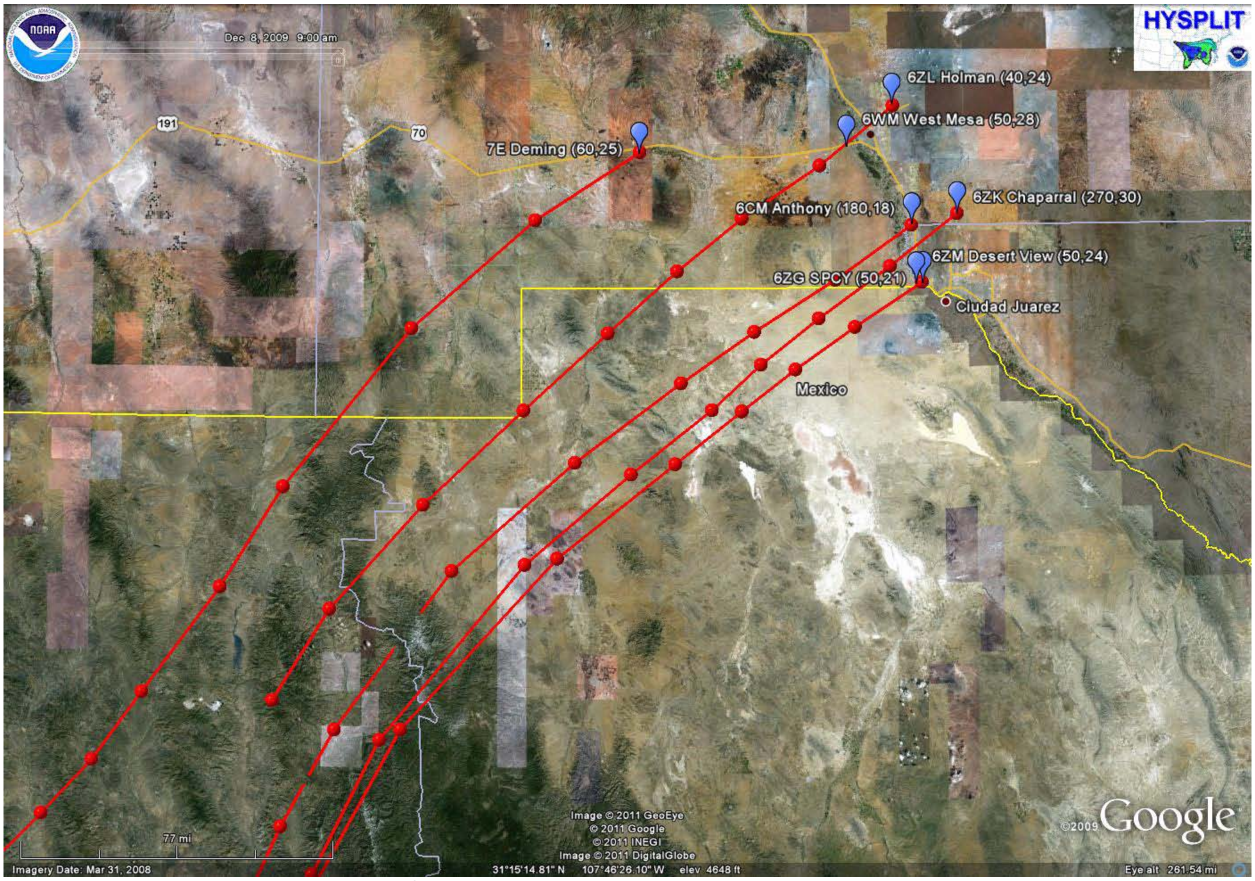

Figure 12-5. Back-trajectory model analysis for the event on December 8, 2009. The numbers in parenthesis are the 24-hour average PM_{10} concentration and max wind gust respectively. The model was run for the eight hours preceding the peak concentrations of the event starting from the 400 hour. Each ball represents one hour in the past from the starting point of the model run.

12.4 Historical Fluctuations Analysis

12.4.1 Annual and Seasonal 24-hour Average Fluctuations

The Anthony and Chaparral sites have recorded PM_{10} exceedances every year since continuous FEM TEOM monitoring was established. These exceedances can occur during any time of year and are caused by high winds (Figures 12-6 and 12-7). 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} concentrations were 1110 µg/m^3 at Chaparral and 403 µg/m^3 at Anthony. All exceedances at Chaparral and Anthony have been caused by high winds and natural events demonstrations were submitted to EPA under the NEAP or EER.

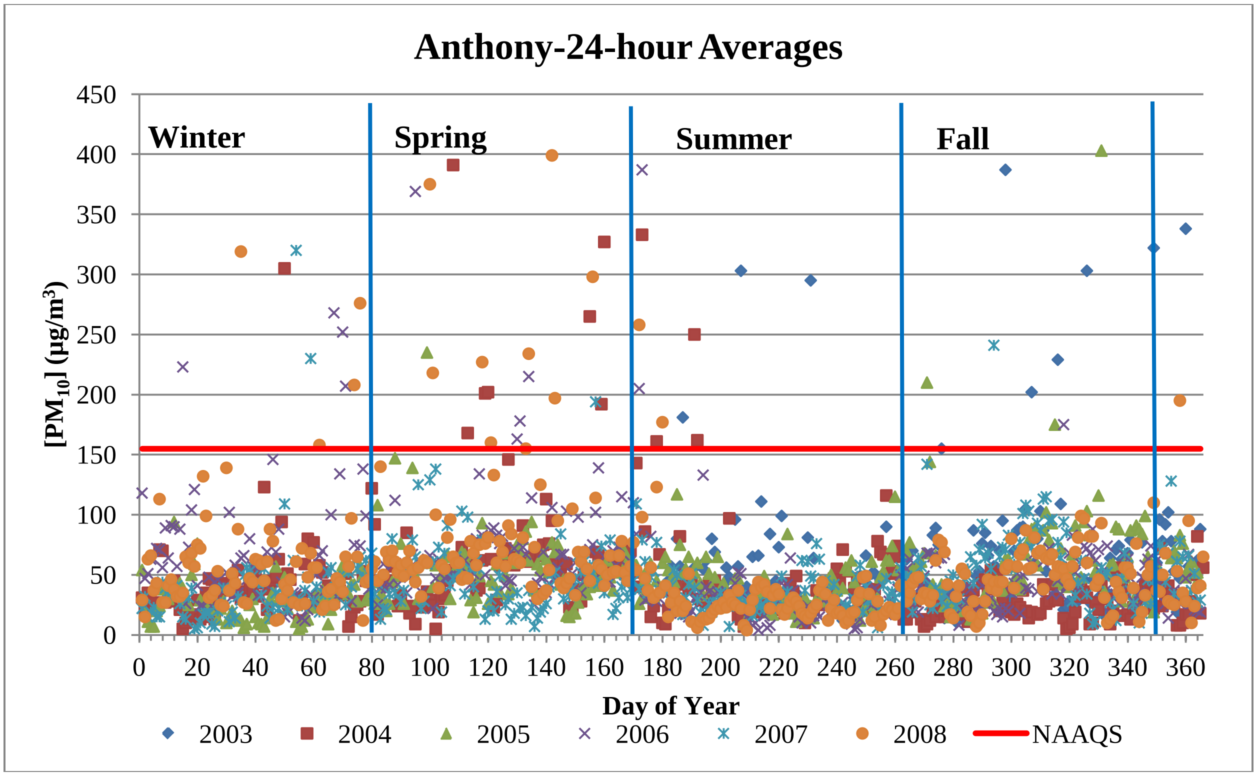

Figure 12-6. 24-hour average PM_{10} concentrations by day of year from 2003-2008. All averages collected using FEM TEOM instrument.

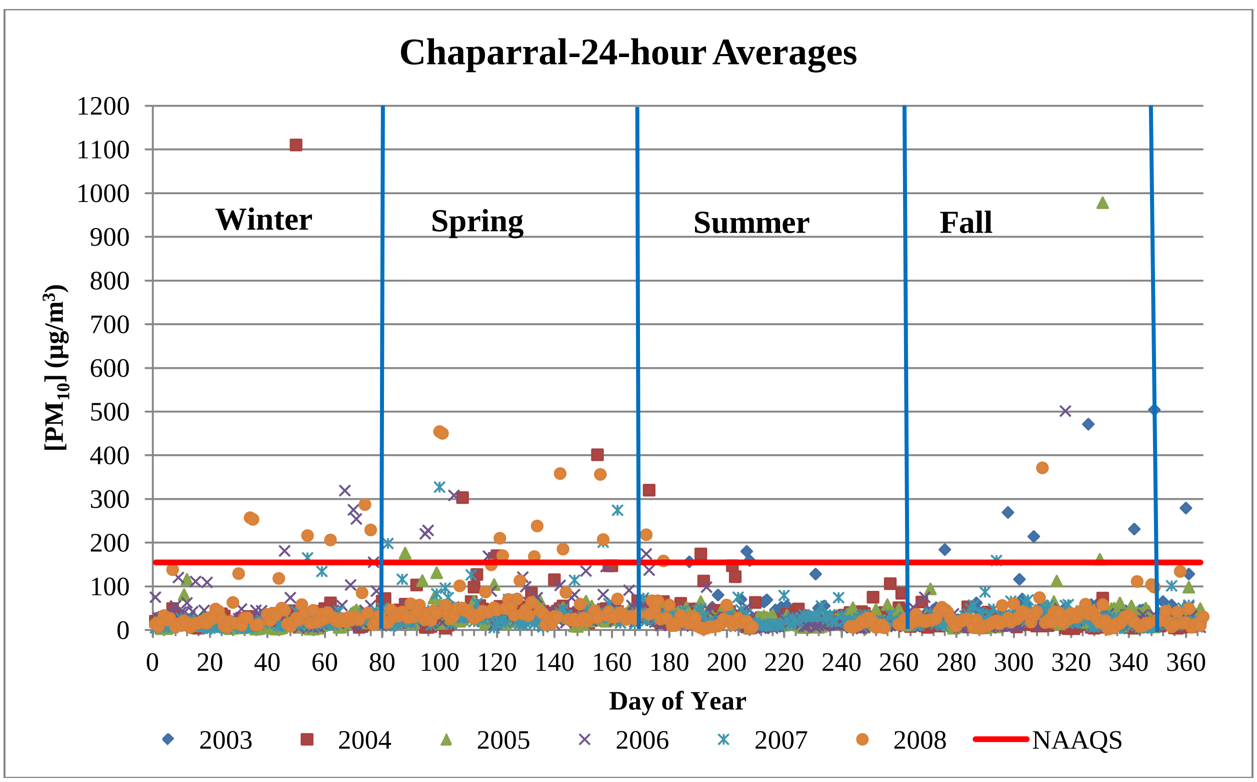

Figure 12-7. 24-hour average PM_{10} concentrations by day of year from 2003-2008. All averages collected using FEM TEOM instrument.

Table 8-1 shows normal historical fluctuations with and without high wind natural events that caused exceedances from 2003-2008. The recorded values for this day (182 µg/m^3 at Anthony and 267 µg/m^3 at Chaparral) are above the 95th percentile of all 24-hour averages recorded at each respective site.

Chaparral	Max	99th	95th	75th	50th	Mean	25th	5th	Minimum
No Events	149	118	65	35	24	28	15	6	2
Events	1110	271	98	37	25	36	15	6	2
Anthony	**Max**	**99th**	**95th**	**75th**	**50th**	**Mean**	**25th**	**5th**	**Minimum**
No Events	147	123	88	56	38	42	24	12	4
Events	403	251	103	58	39	48	25	12	4

Table 12-1. 24-hour average PM_{10} data distribution with and without high wind events included. Only those high wind events that resulted in an exceedance were excluded from the analysis. Data for Anthony includes FRM Wedding and FEM TEOM data from 2003-2008. Data for Chaparral only includes FEM TEOM data from 2003-2008.

An hourly data distribution analysis was done for PM_{10} concentrations and wind gust speeds (Appendices A and B). When the hourly data for December 8 is overlaid on the hourly data distribution plots, it shows that the values recorded during the high wind event exceed the 95th percentile for both PM_{10} and wind gusts (Figures 12-9 through 12-12) at the Chaparral and Anthony monitoring sites. The hourly PM_{10} values during the high wind blowing dust storm far exceed the 95th percentiles of hourly data.

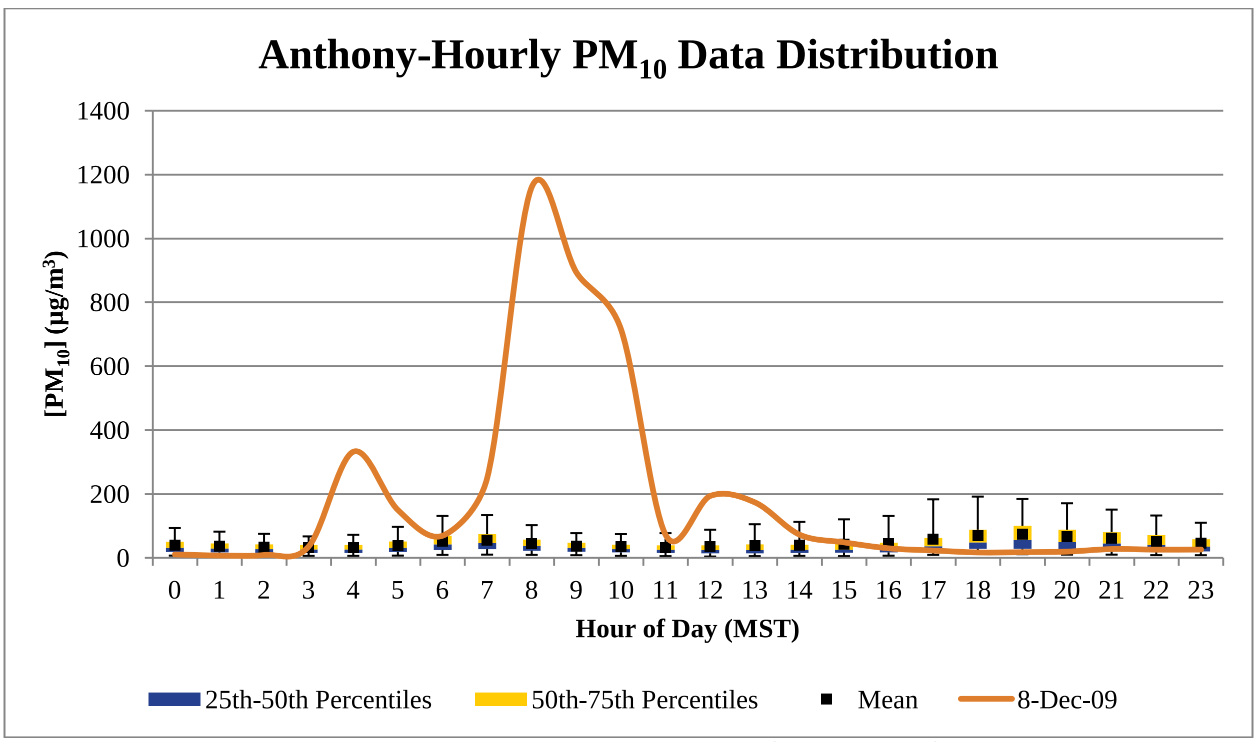

Figure 12-9. All data recorded using the FEM TEOM monitor. Data distribution is for hourly values from 2003-2008. The top whisker represents the 95th percentile of data.

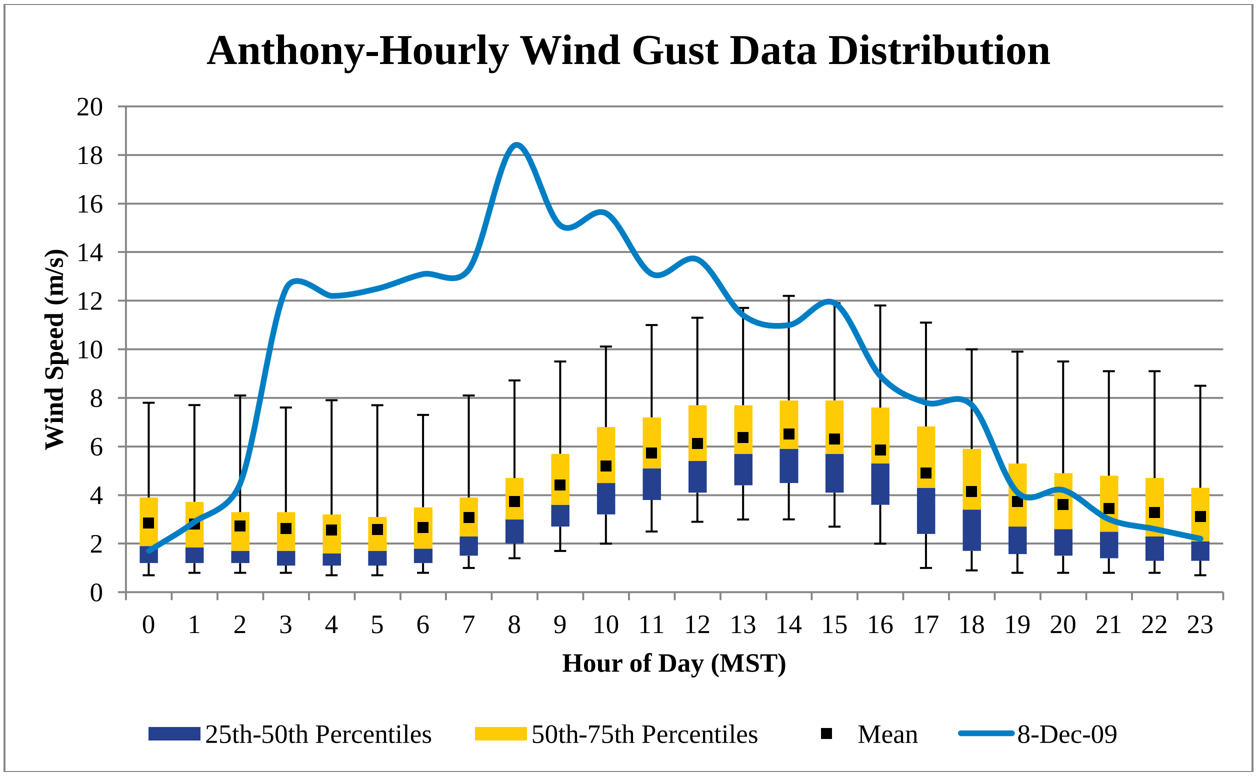

Figure 12-10. Wind speed data distribution from 2006-2008 measured at 2 meters. Data is for the maximum wind gust recorded during the hour.

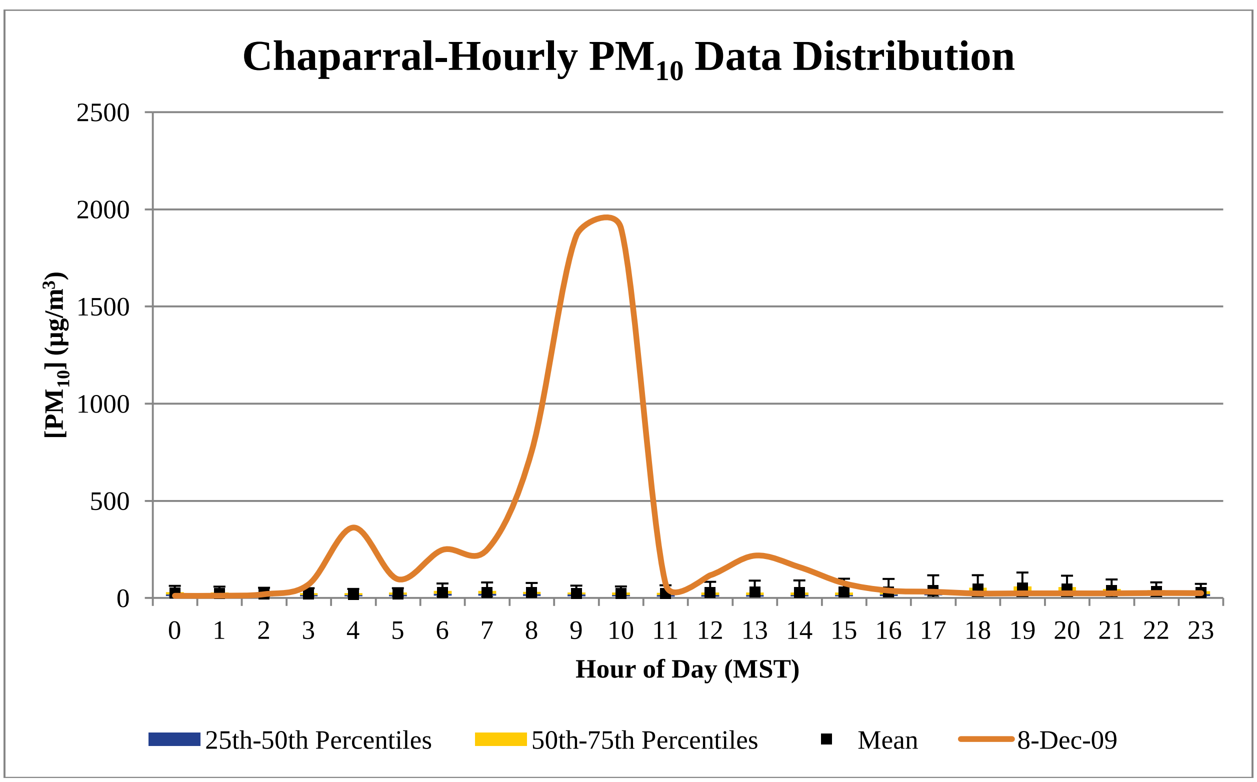

Figure 12-11. All data recorded using the FEM TEOM monitor. Data distribution is for hourly values from 2003-2008. The top whisker represents the 95th percentile of data.

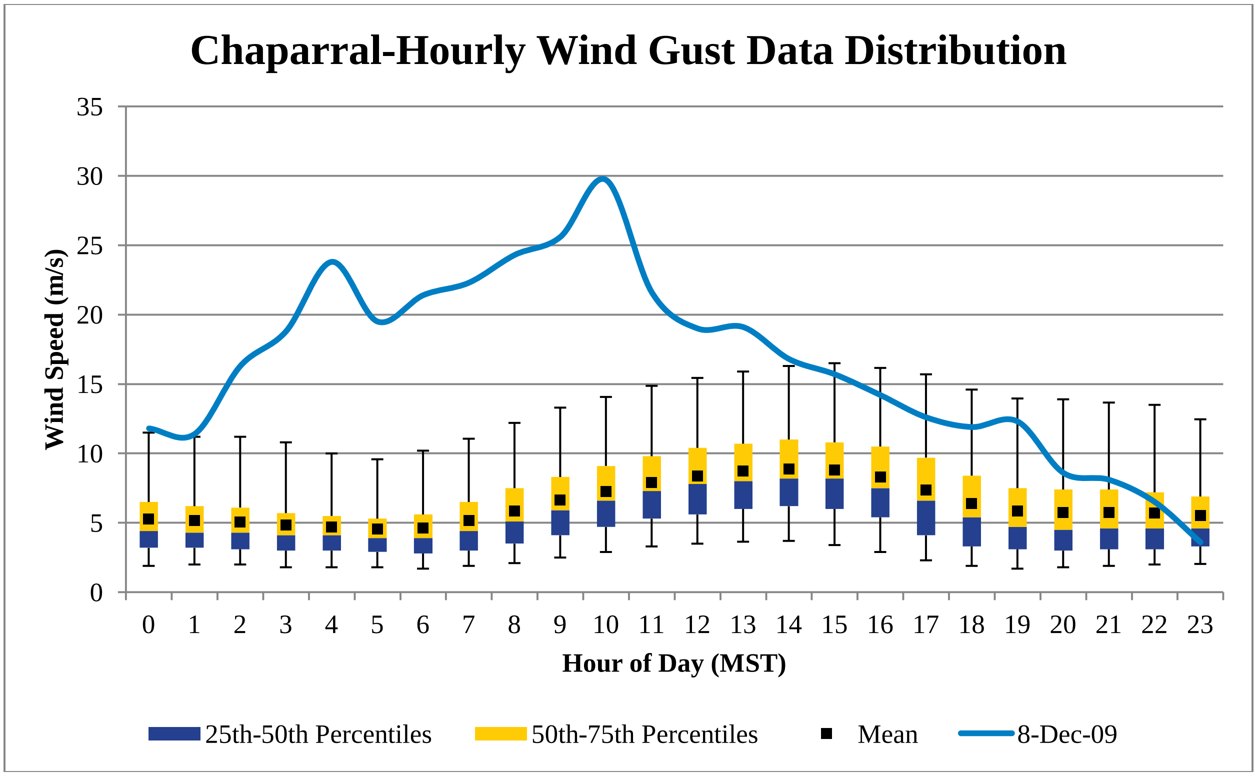

Figure 12-12. Wind speed data distribution from 2003-2008 measured at 10 meters. Data is for the maximum wind gust recorded during the hour.

12.5 Clear Causal Relationship

A Pacific cold front passed through New Mexico on December 8, 2009 with the center of low pressure traveling along the Colorado-New Mexico border. As the cold front approached New Mexico a strong pressure gradient was created in southwestern New Mexico and northern Mexico (Figure 12-13). At the 500 hour an area of low pressure aloft on December 9 was observed over the Utah-Colorado border with isobars aligning above the southern half of the state (Figure 12-14). As the day progressed, heating of the surface allowed winds aloft to mix down increasing the surface winds and providing the turbulence required for entrainment of dust.

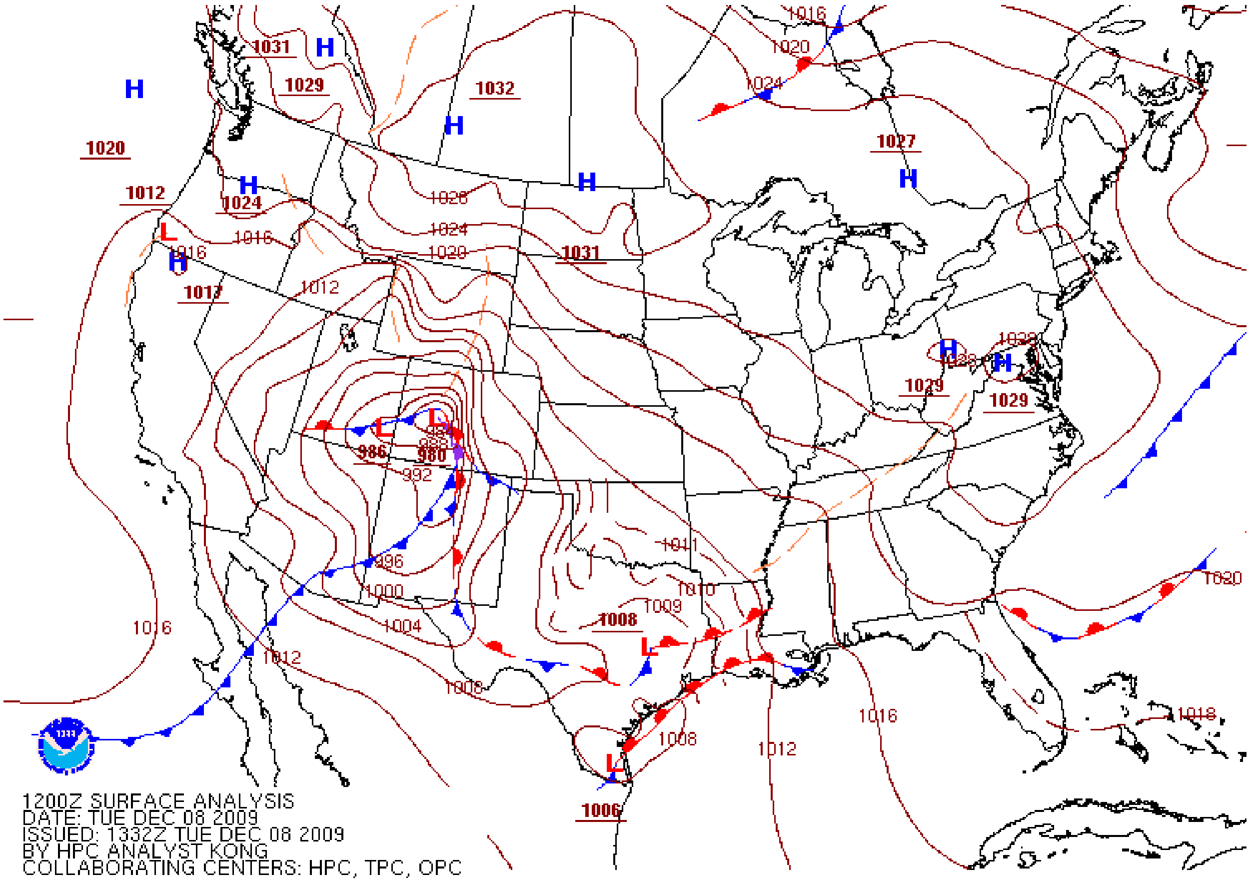

Figure 12-13. December 8, 2009 surface weather map depicting the frontal activity and isobars of constant pressure (red lines) for the 500 hour MST. Surface winds flow perpendicular to the isobars from high to low pressure.

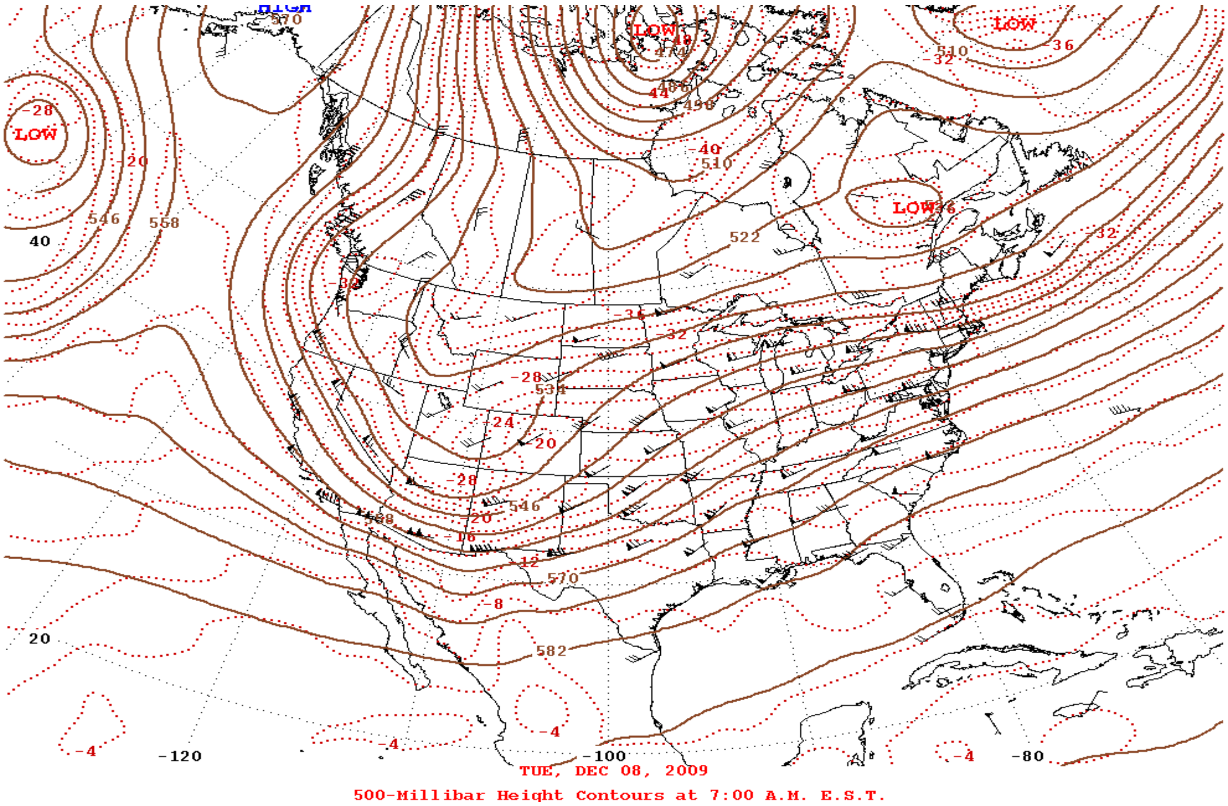

Figure 12-14. Upper Air weather map depicting winds aloft with isobars of constant pressure (brown lines). Winds flow parallel to the isobars.

This weather pattern generated strong southwesterly winds beginning at the 400 hour and lasting through the day on December 9. During this time frame wind gusts regularly exceeded the 95^{th} percentiles as shown in Figures 12-10 and 12-12. Peak wind gusts ranged from 18 m/s at Anthony to 30 m/s at Chaparral (Figure 12-3). Sustained hourly average wind speeds of 6 m/s or more and wind gusts of 12 m/s or more were recorded at all monitoring sites during elevated PM_{10} concentrations (Figure 12-2 and 12-3). Blowing dust caused elevated levels of PM_{10} during the same time frame as high winds (Figures 12-15 and 12-16). As wind gusts exceed the 95^{th} percentile of historical data so do hourly PM_{10} concentrations (400-1300 hours) on this date. Hourly PM_{10} concentrations throughout the network exhibit the same pattern with elevated concentrations of PM_{10} throughout the network until the afternoon (Figure 12-17).

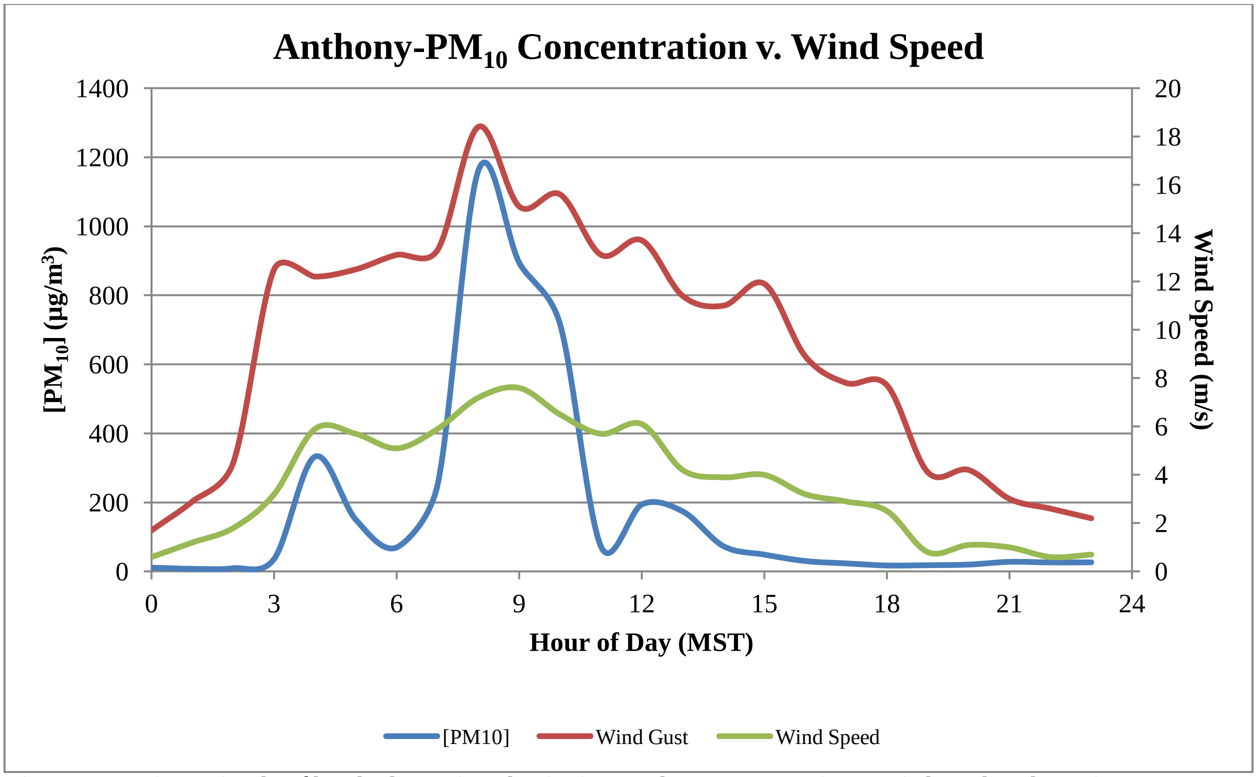

Figure 12-15. Time series plot of hourly observations showing increased PM_{10} concentrations as wind speeds and gusts increase.

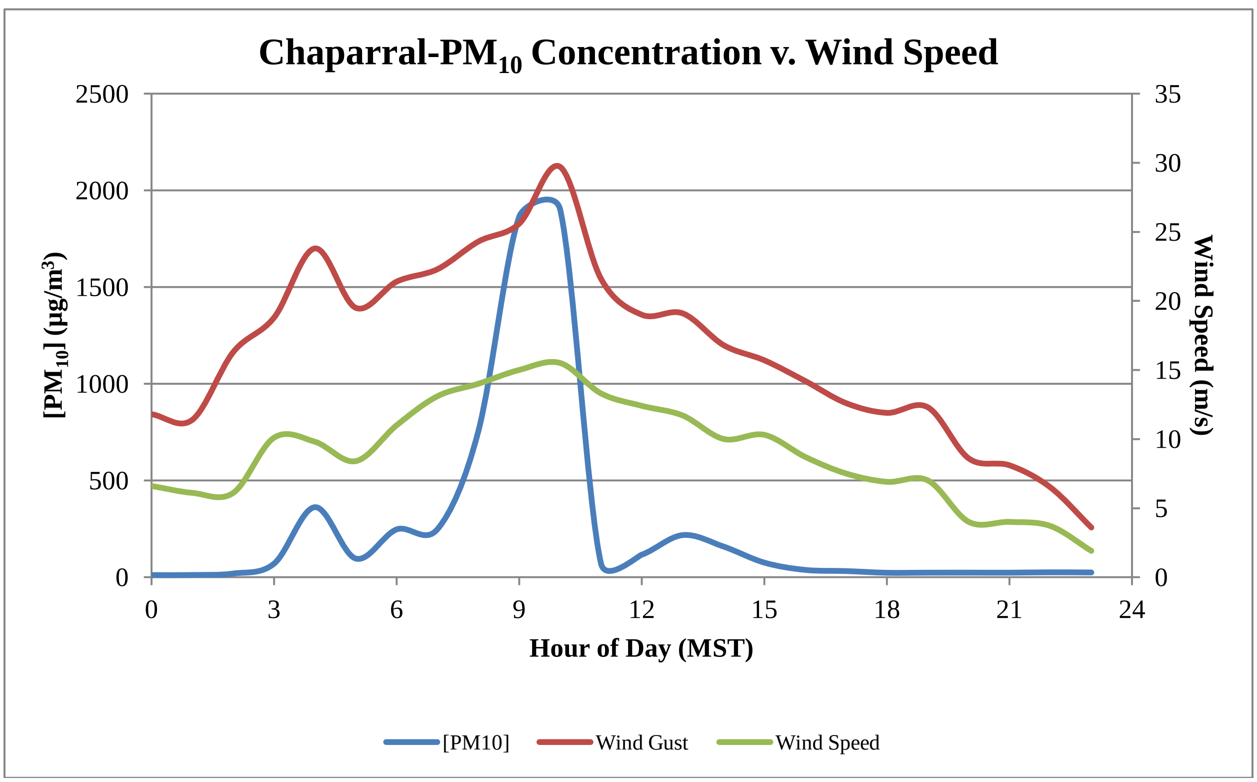

Figure 12-16. Time series plot of hourly observations showing increased PM_{10} concentrations as wind speeds and gusts increase.

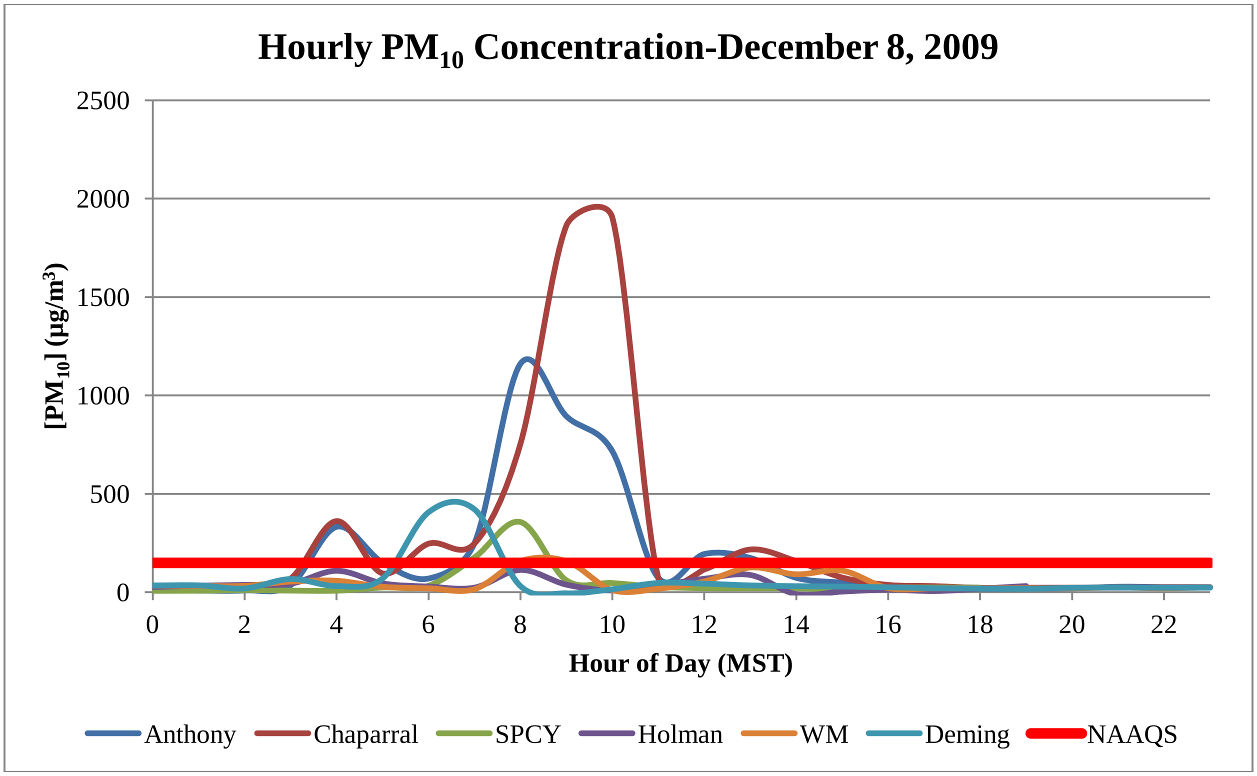

Figure 12-17. Time series plot of hourly observations showing increased PM_{10} concentrations at most monitoring sites.

12.6 Affects Air Quality

The historical fluctuations and clear causal relationship analyses prove that the event in question affected air quality on December 8, 2009.

12.7 Natural Event

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

12.8 No Exceedance but for the Event

Two hourly PM_{10} values (900-1000 hours) exceed the 24-hour average standard at Chaparral [(1865 + 1901) µg/m^3 = 3766 µg/m^3; (3766 µg/m^3)/24 = 157 µg/m^3]. Without the high wind and blowing dust an exceedance would not have been recorded.

Nine hourly PM_{10} values (400-1200 hours) exceed the 24-hour average standard at Anthony [(333 + 150 + 70 + 251 + 1162 + 894 + 715 + 72 + 194) µg/m^3 = 3841 µg/m^3; (3841 µg/m^3)/24 = 160 µg/m^3]. Without the high wind and blowing dust an exceedance would not have been recorded.

13 REFRENCES

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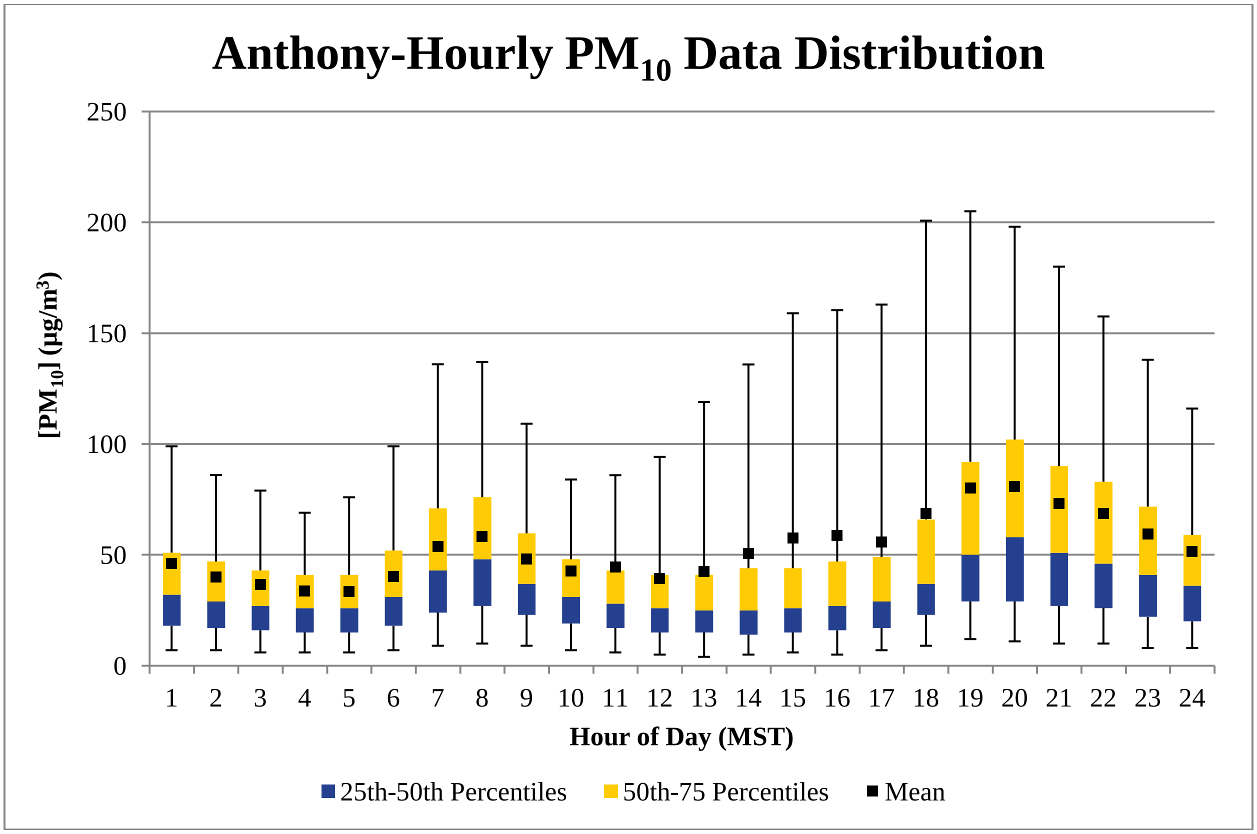
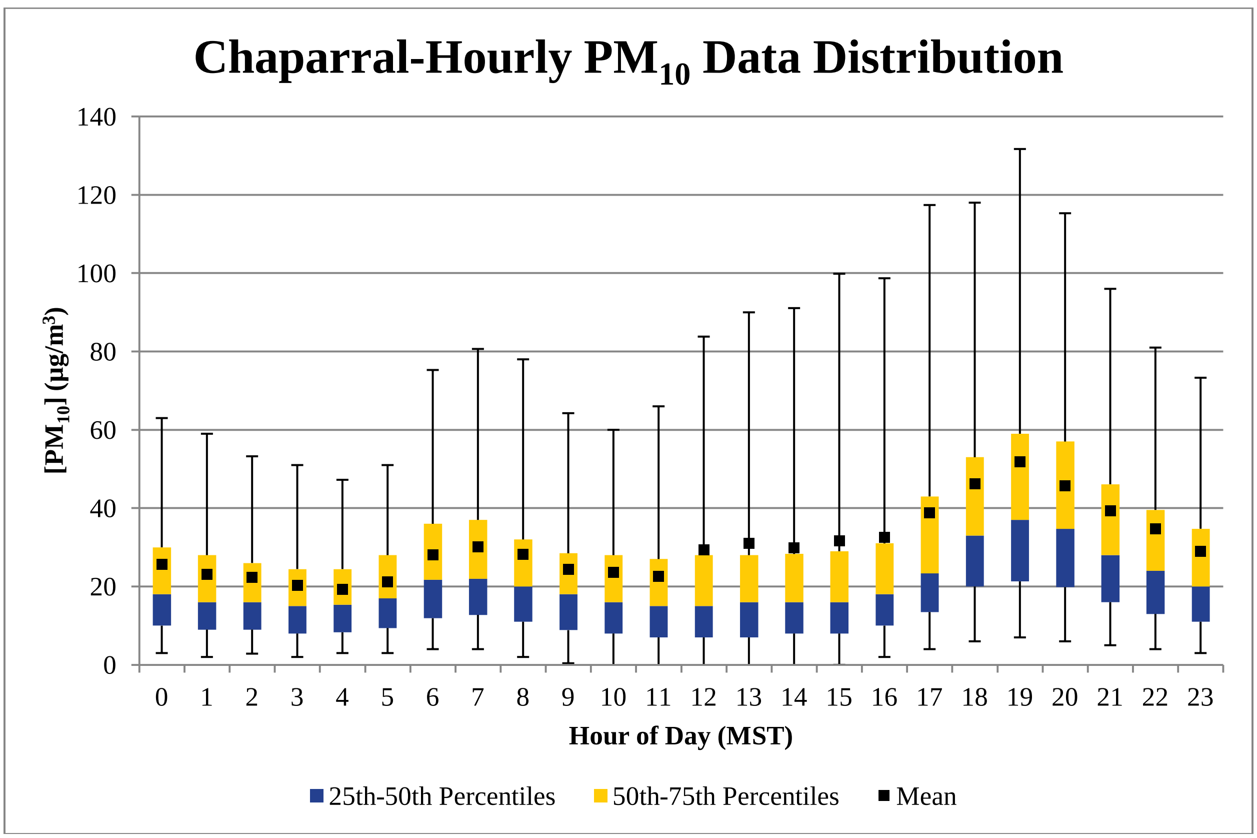
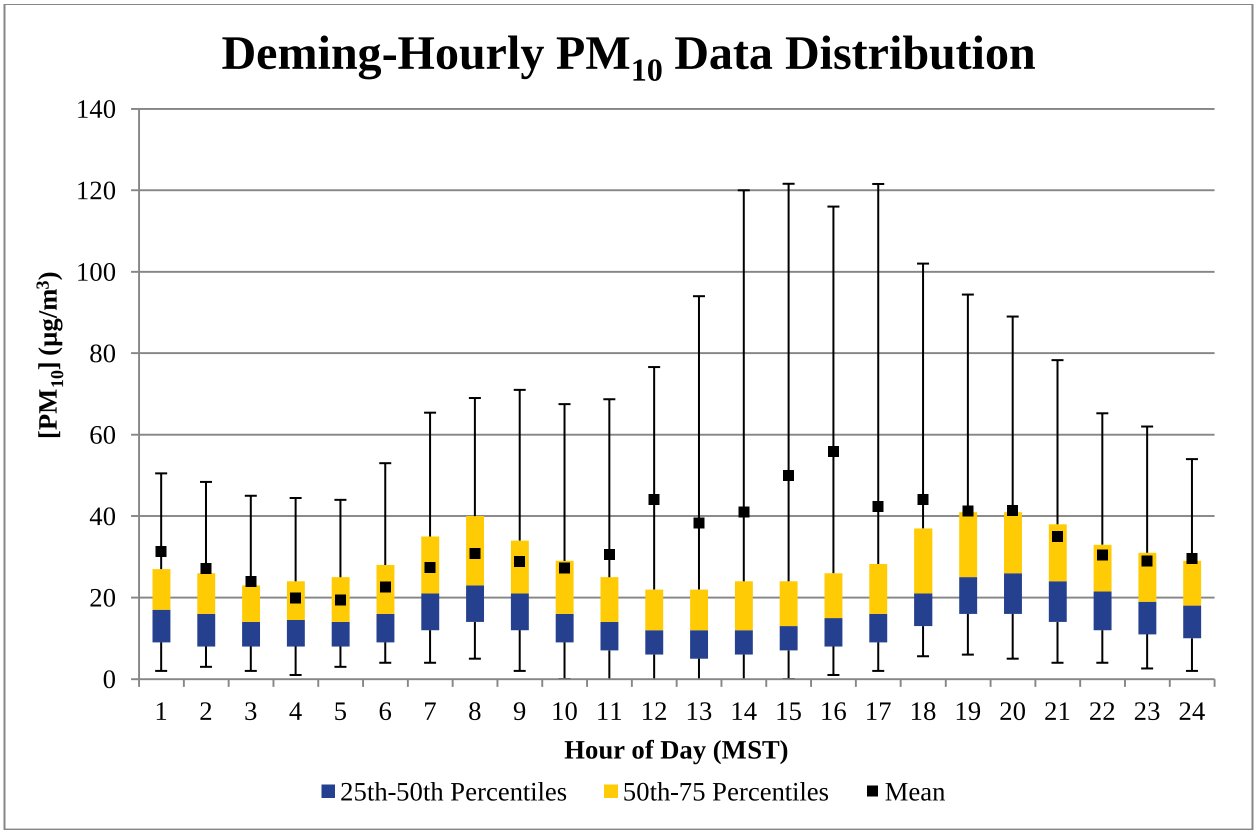
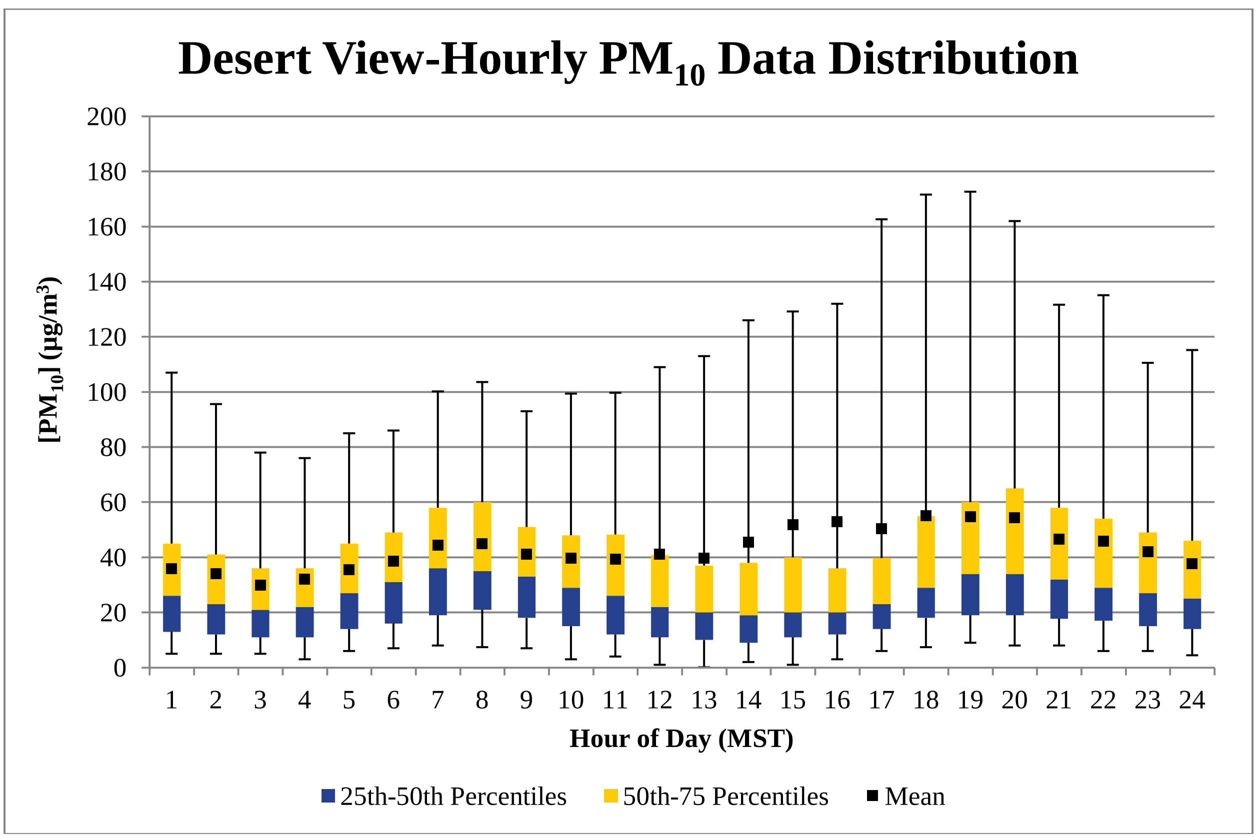
APPENDIX A

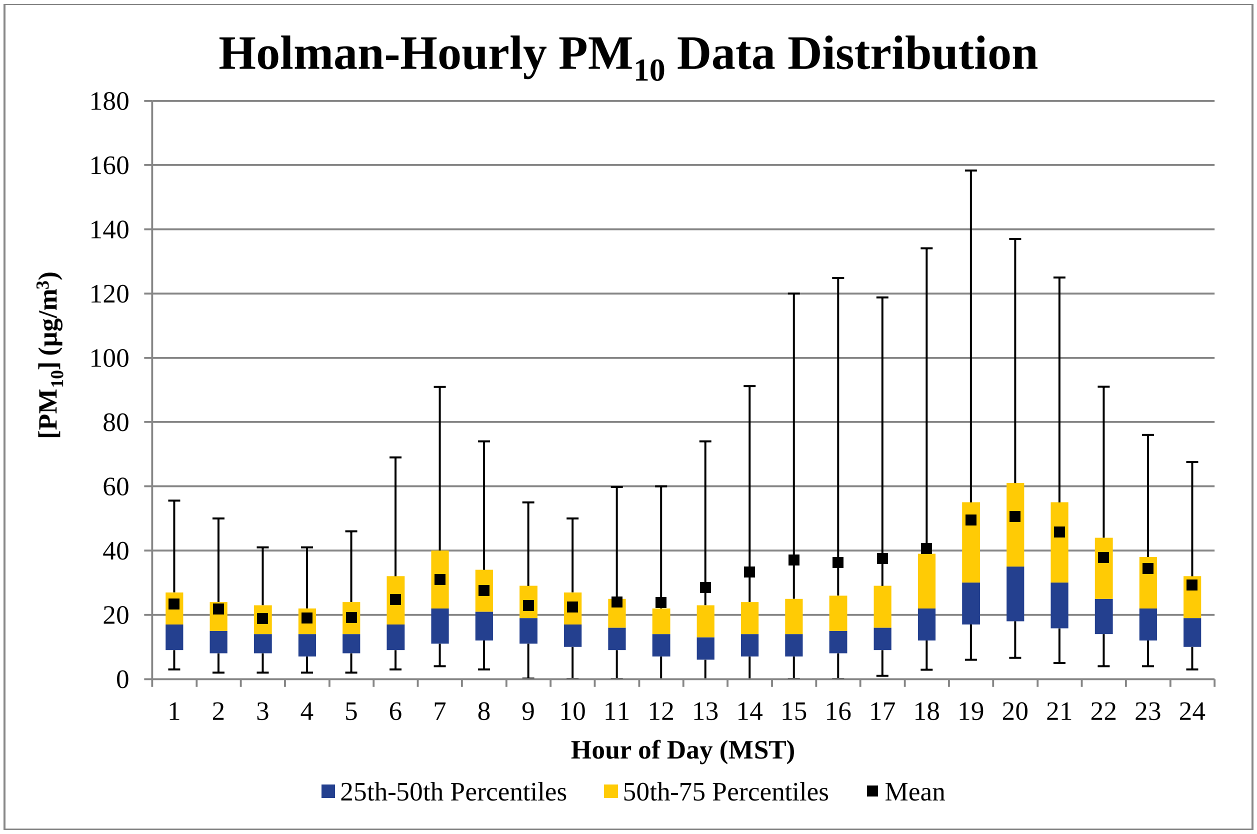
Hourly PM_{10} Data Distribution Charts

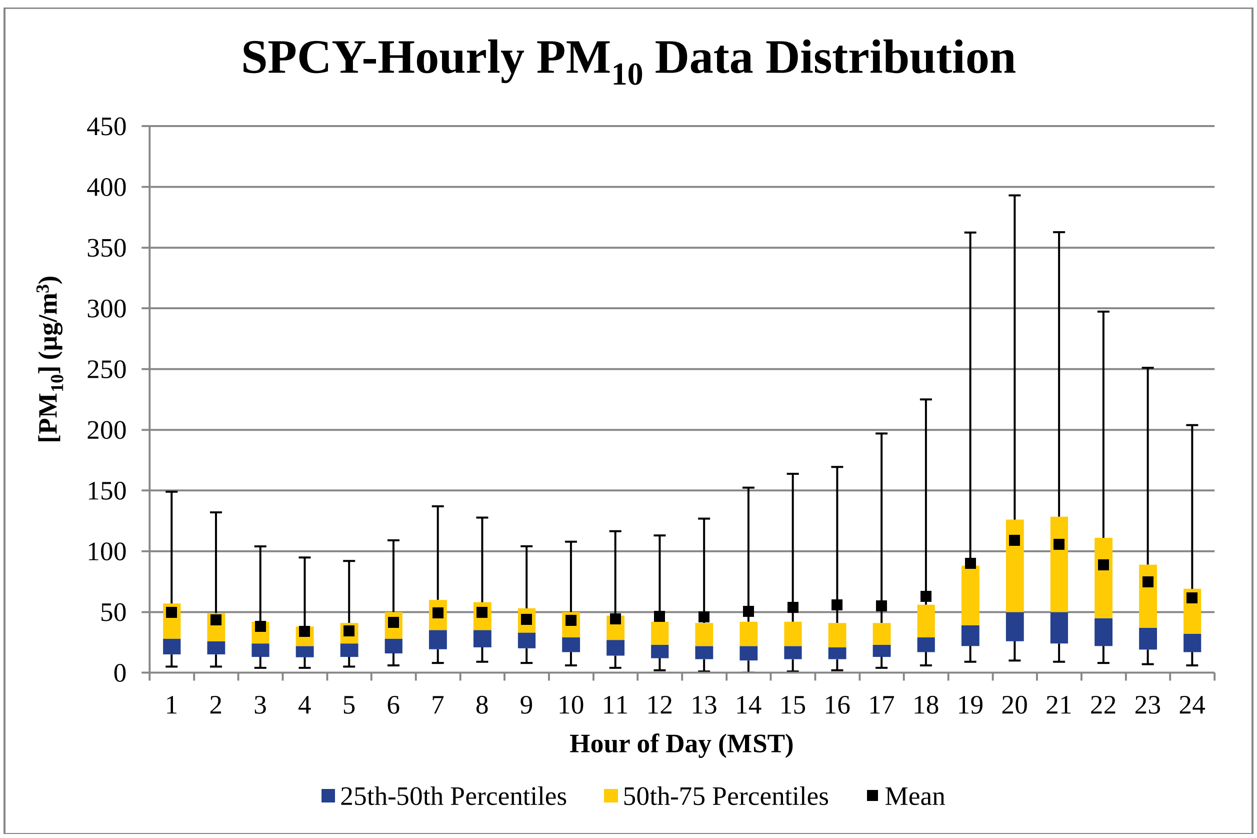

Anthony-Hourly PM10 Data Distribution
250
200
150
100
50
0
[PM10] (µg/m3)
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
Hour of Day (MST)
25th-50th Percentiles
50th-75 Percentiles
Mean

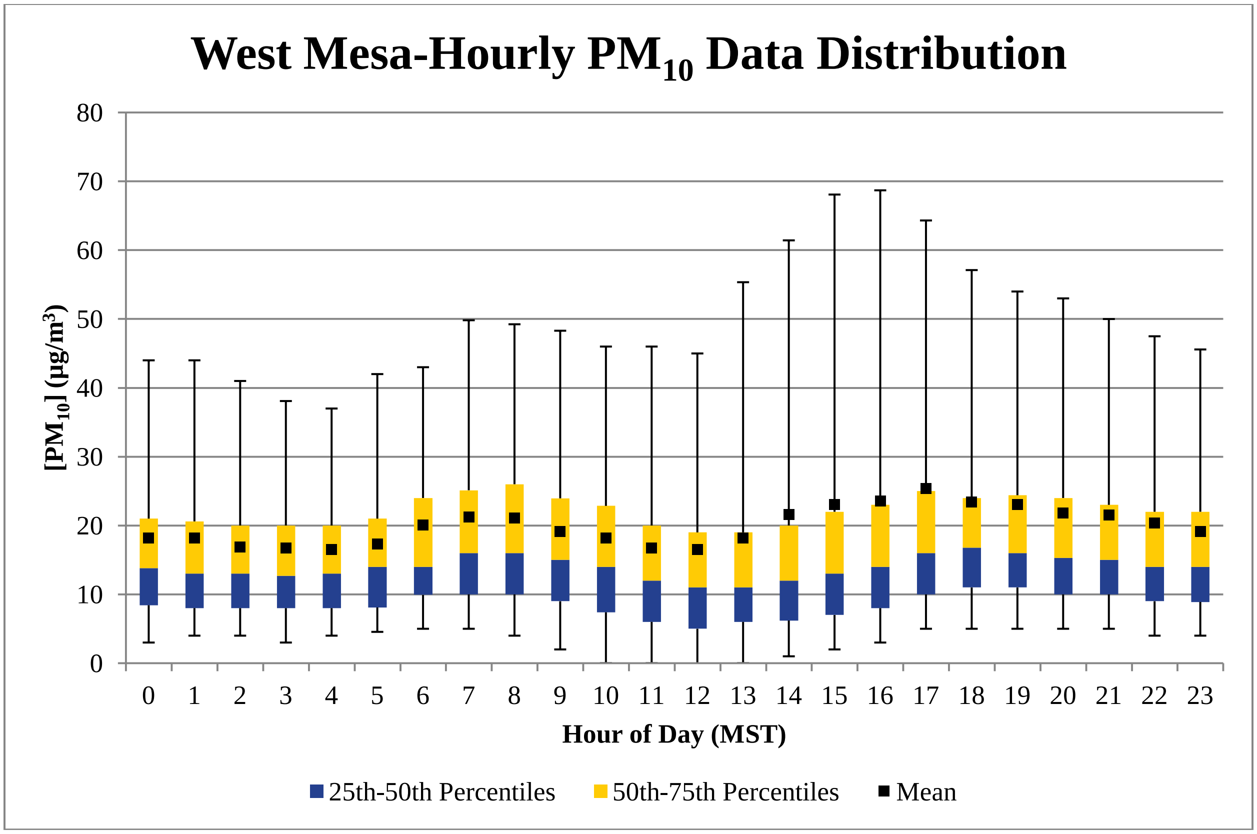

Chaparral-Hourly PM10 Data Distribution
140
120
100
80
60
40
20
0
[PM10] (µg/m3)
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23
Hour of Day (MST)
25th-50th Percentiles
50th-75th Percentiles
Mean


Deming-Hourly PM10 Data Distribution
[PM10] (µg/m3)
Hour of Day (MST)
25th-50th Percentiles
50th-75 Percentiles
Mean


Desert View-Hourly PM10 Data Distribution
[PM10] (µg/m3)
Hour of Day (MST)
25th-50th Percentiles
50th-75 Percentiles
Mean

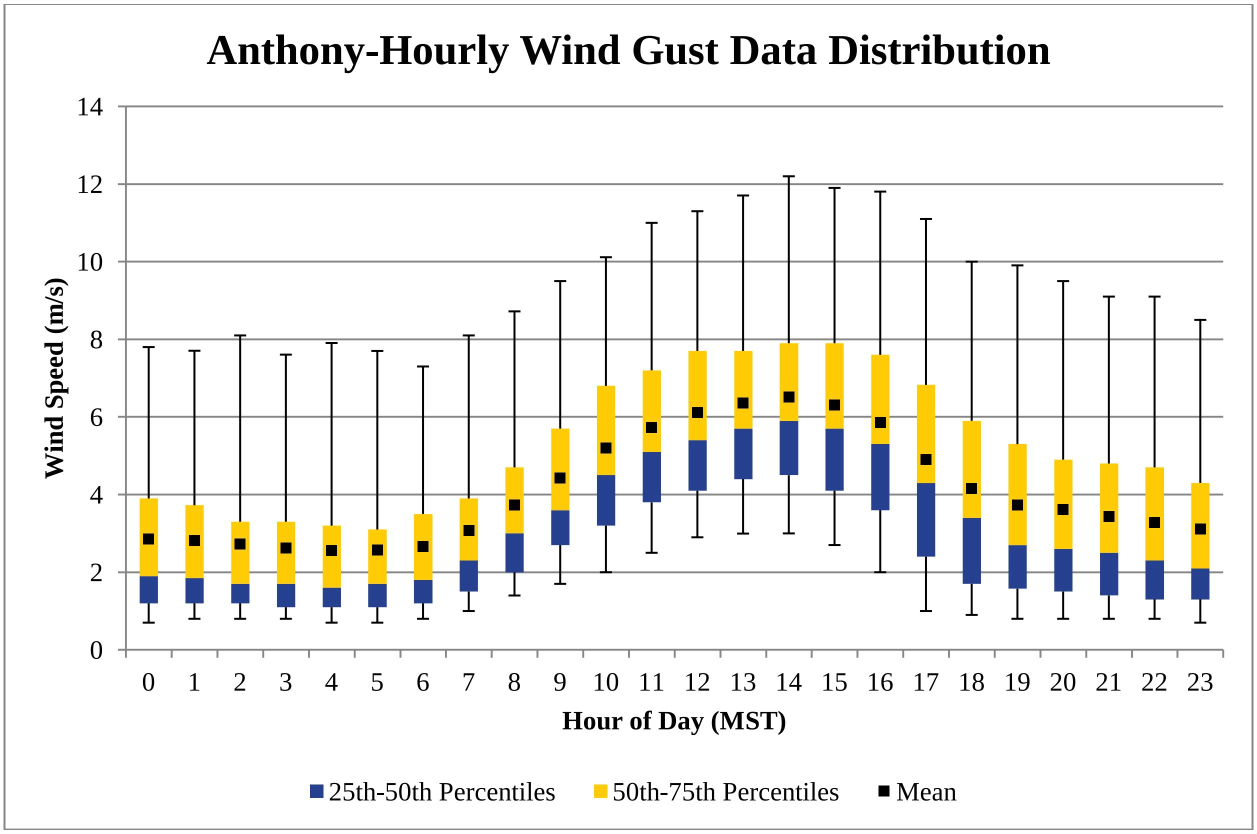

Holman-Hourly PM_{10} Data Distribution
180
160
140
120
100
80
60
40
20
0
$[PM_{10}]$ (µg/m^3)
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
Hour of Day (MST)
25th-50th Percentiles
50th-75 Percentiles
Mean

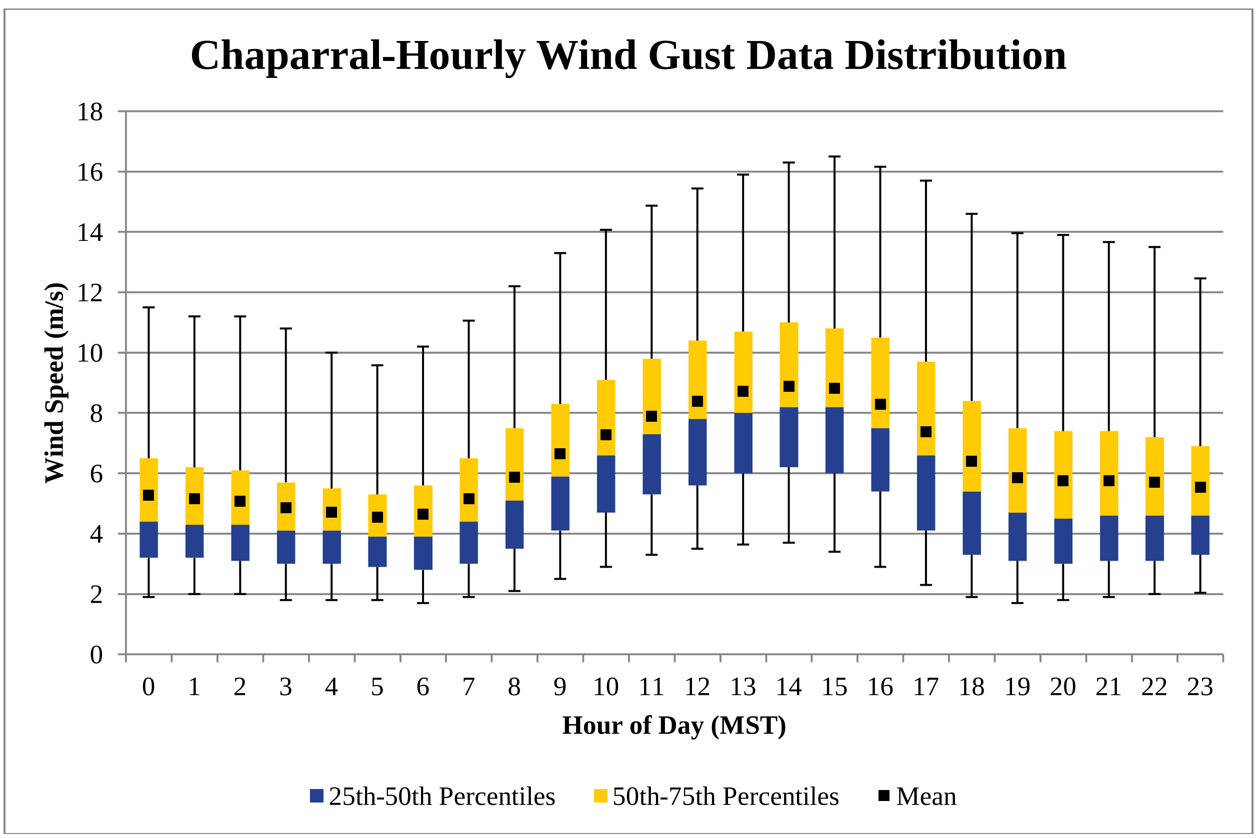

SPCY-Hourly PM_{10} Data Distribution
450
400
350
300
250
200
150
100
50
0
$[PM_{10}]$ (µg/m^3)
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
Hour of Day (MST)
25th-50th Percentiles
50th-75 Percentiles
Mean

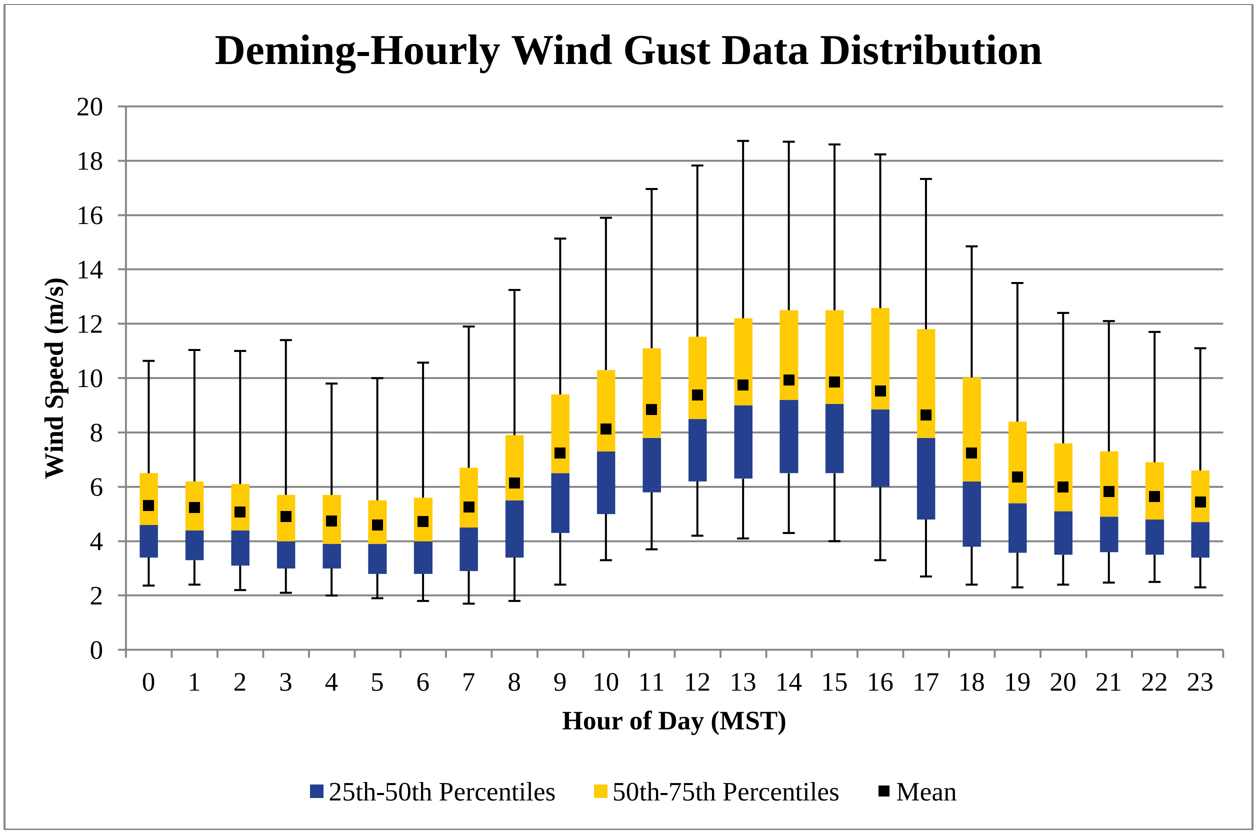

West Mesa-Hourly PM10 Data Distribution
[PM10] (µg/m3)
0
10
20
30
40
50
60
70
80
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23
Hour of Day (MST)
25th-50th Percentiles
50th-75th Percentiles
Mean

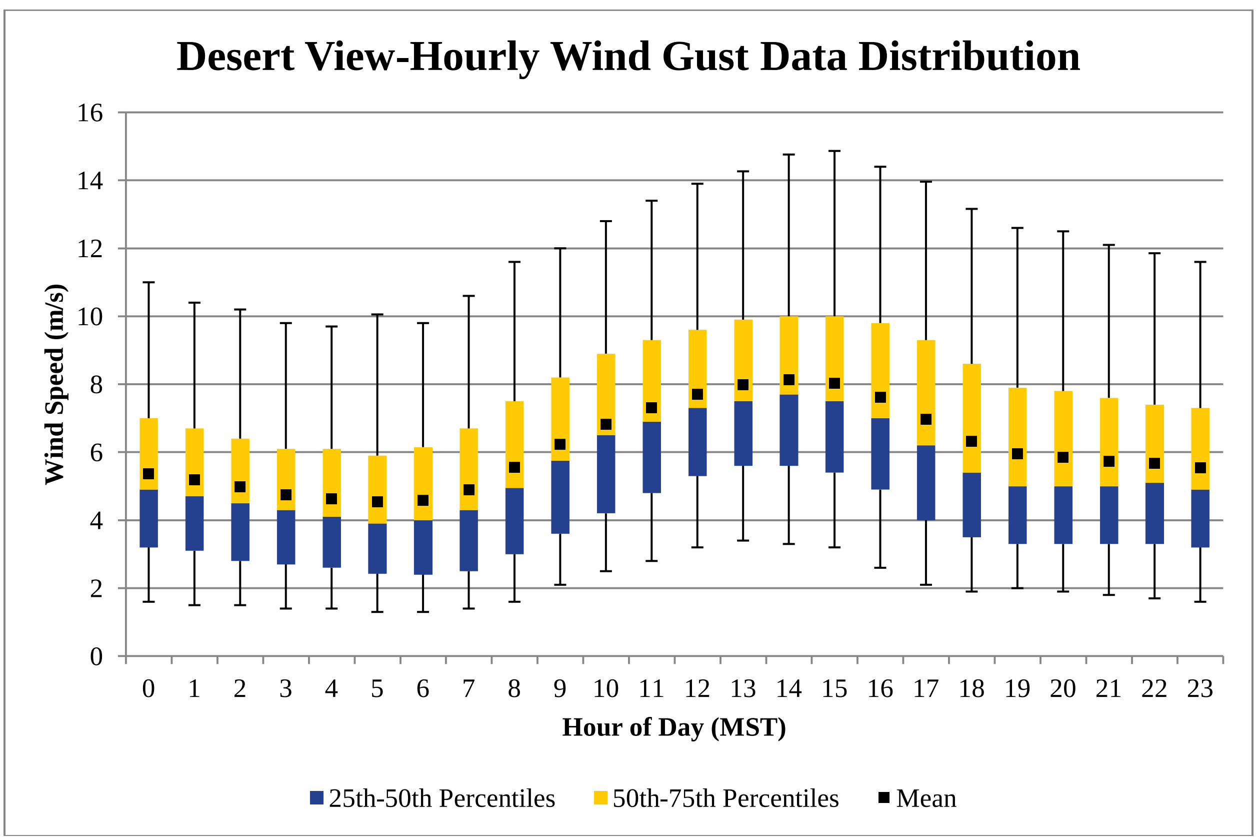
APPENDIX B

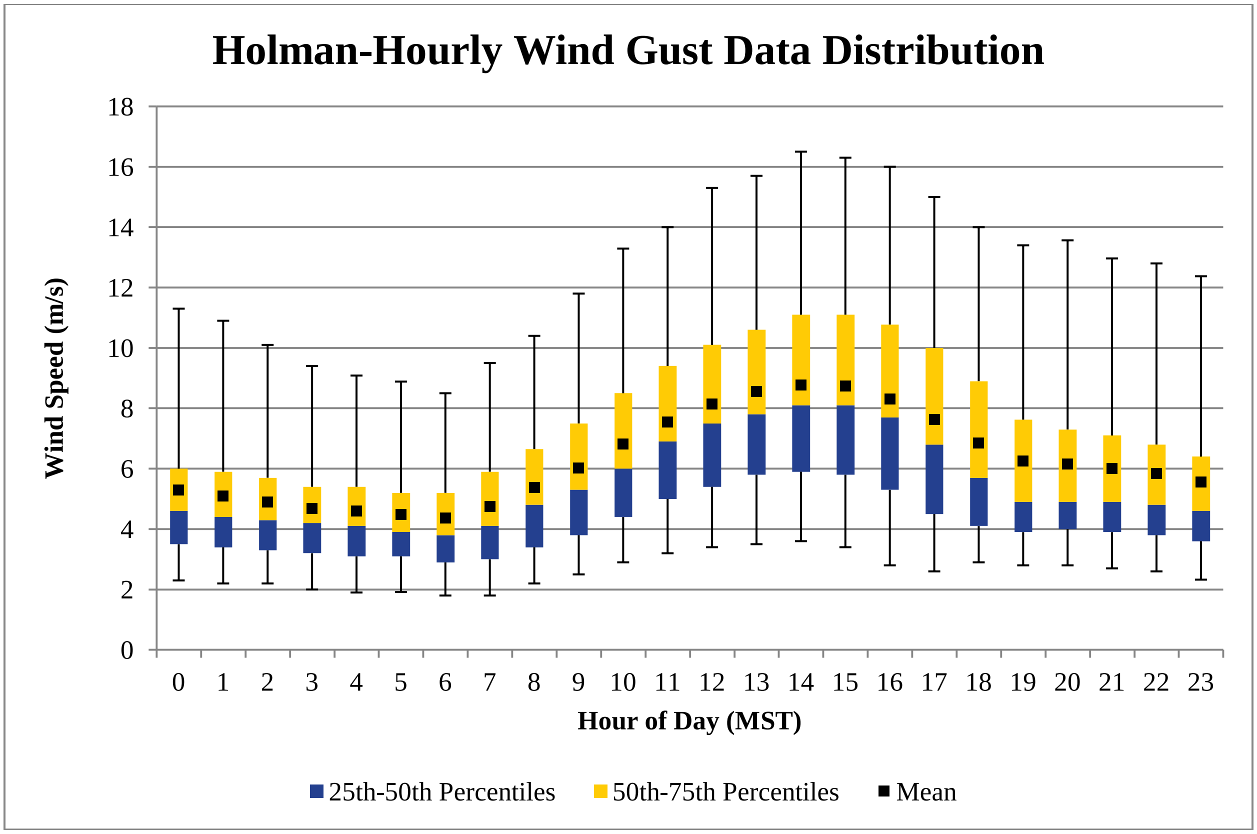
Hourly Wind Gust Data Distribution Charts


Anthony-Hourly Wind Gust Data Distribution
Wind Speed (m/s)
0
2
4
6
8
10
12
14
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

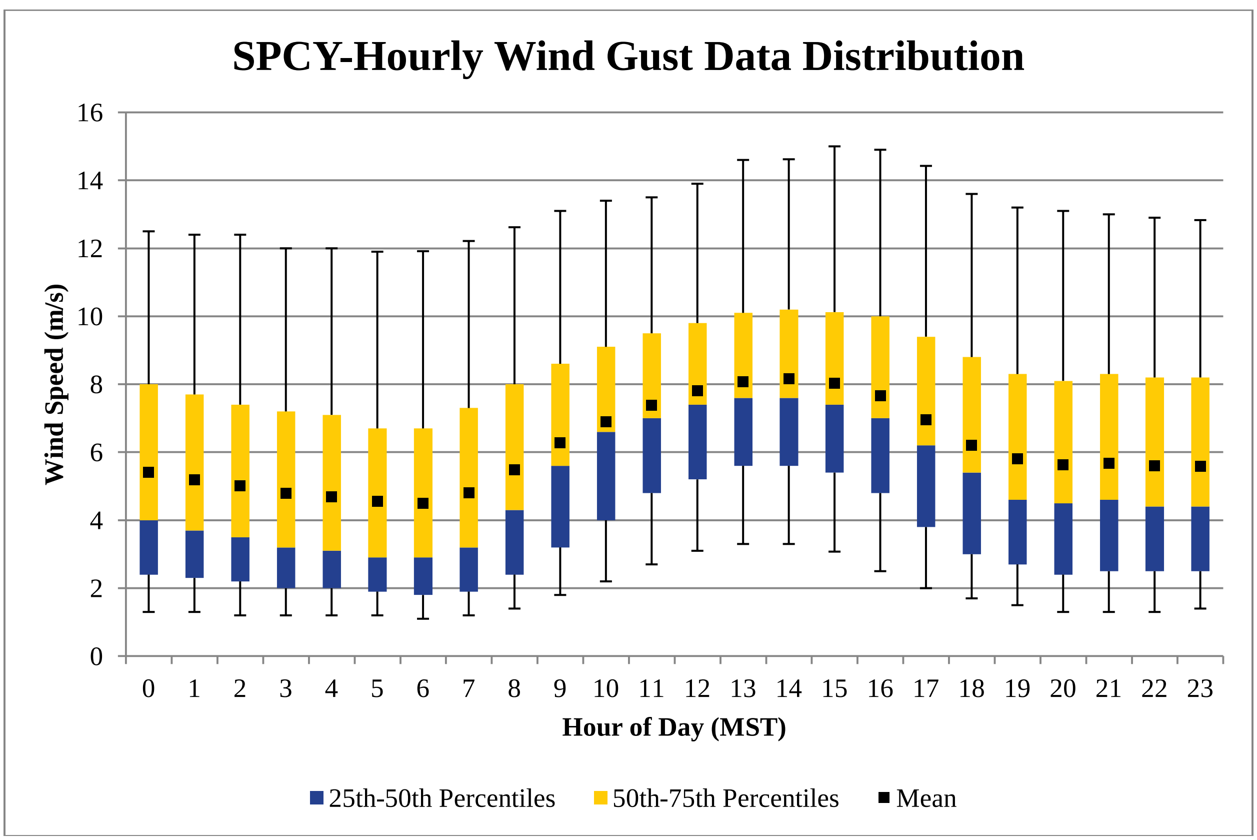

Chaparral-Hourly Wind Gust Data Distribution
Wind Speed (m/s)
0
2
4
6
8
10
12
14
16
18
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23
Hour of Day (MST)
25th-50th Percentiles
50th-75th Percentiles
Mean


Deming-Hourly Wind Gust Data Distribution
Wind Speed (m/s)
0
2
4
6
8
10
12
14
16
18
20
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

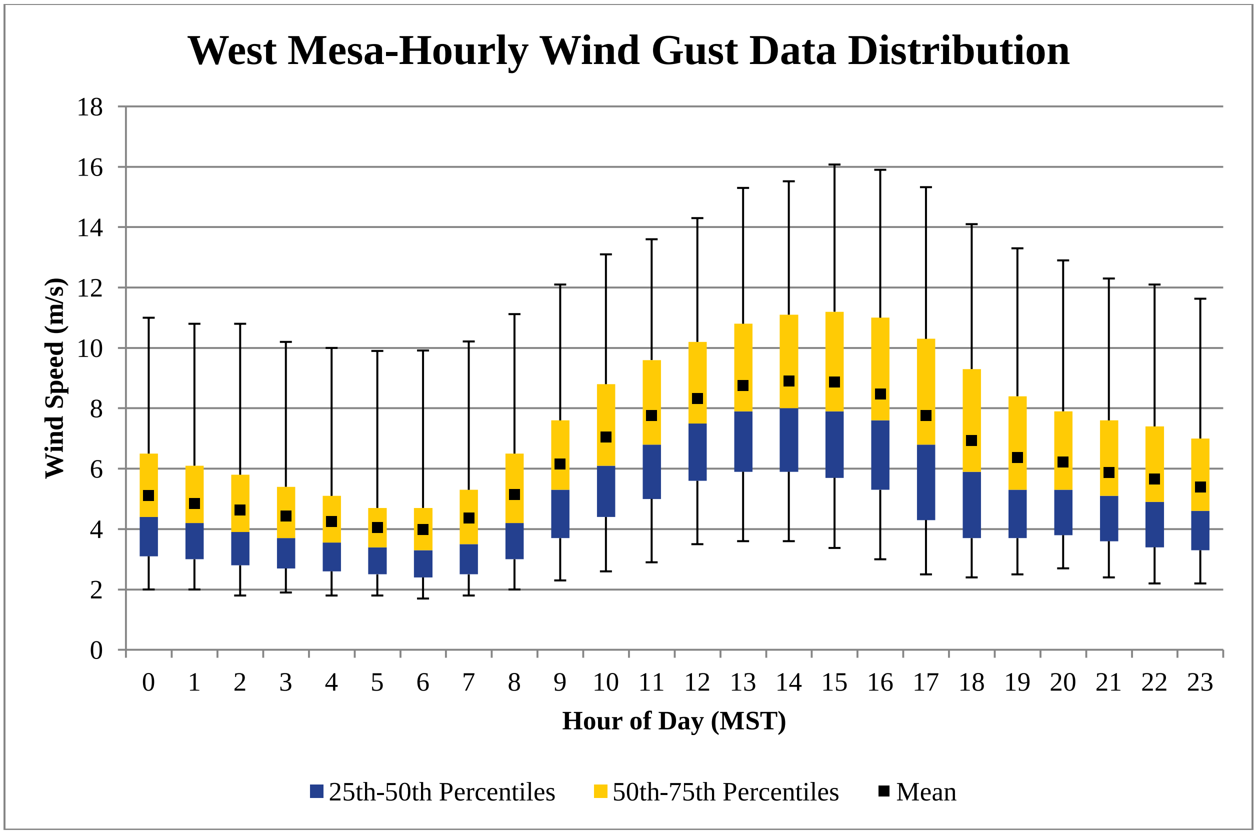

Desert View-Hourly Wind Gust Data Distribution
Wind Speed (m/s)
0
2
4
6
8
10
12
14
16
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23
Hour of Day (MST)
25th-50th Percentiles
50th-75th Percentiles
Mean



Holman-Hourly Wind Gust Data Distribution
Wind Speed (m/s)
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



SPCY-Hourly Wind Gust Data Distribution
Wind Speed (m/s)
0
2
4
6
8
10
12
14
16
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)
18
16
14
12
10
8
6
4
2
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 C

Public Notices

No public comments were received by NMED.

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LAS CRUCES SUN-NEWS

PROOF OF PUBLICATION

I, being duly sworn, Frank Leto deposes and says that he is the Publisher of the Las Cruces Sun -News, a newspaper published daily in the county of Dona Ana, State of New Mexico; that the notice 50138 is an exact duplicate of the notice that was published once a week/day in regular and entire issue of The Las Cruces Sun-News and The Deming Headlight newspapers and not in any supplement thereof for 1 consecutive week(s)/day(s), the first publication was in the issue dated January 31, 2012 and the last publication was January 31, 2012

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

Signed F. Leto

Publisher
Official Position

STATE OF NEW MEXICO
ss.
County of Dona Ana
Subscribed and sworn before me this

1st **day of** February 2012

Judy M. Luna
Notary Public in and for
Dona Ana County, New Mexico

March 29, 2015
My Term Expires

OFFICIAL SEAL JUDY M. LUNA NOTARY PUBLIC - STATE OF NEW MEXICO 3/29/2015

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 2009. 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.

Publication # 50138
Publication Date: Jan 31, 2012.

Order Confirmation

Ad Order Number	Customer	Customer Account	Ordered By	PO Number
0000640135	AIR QUALITY BUREAU-C/O NM ENV	39598	Julie Chambers	
Sales Rep.	**Customer Address**	**Customer Phone #1**	**Customer Phone #2**	
sharris	PO BOX 26110	505-827-1032		
Order Taker	SANTA FE, NM, USA 87502	**Customer Fax**	**Customer EMail**	
sharris				
Order Source	**Payor Customer**	**Payor Account**	**Special Pricing**	
	AIR QUALITY BUREAU-C/O NM ENV	39598	None	

Tear Sheets	Proofs	Affidavits	Blind Box	Promo Type	Materials
1	0	0			

Invoice Text **Ad Order Notes**

Net Amount	Tax Amount	Total Amount	Payment Method	Payment Amount	Amount Due
$93.60	$7.05	$100.65		$0.00	$100.65

Ad Number	Ad Type	Ad Size	Color	Production	Production Notes
0000640135-01	CLS Legal liner	1.0 X 80 Li	<NONE>	AdBooker	Pub # 50138
Ad Attributes		**Ad Released**	**Pick Up**		
		No			

Product Information	Placement/Classification	Run Dates	# Inserts	Cost
LC Sun-News-Sun-News::	Legal	1/31/2012	1	$48.19
Run Schedule Invoice Text	**Sort Text**			
STATE ENVIRONMENT DEPARTMENT	STATEENVIRONMENTDEPARTMENTSEEKSPUBLICC			

Product Information	Placement/Classification	Run Dates	# Inserts	Cost
LC Online-Las Cruces Online::	Legal	1/31/2012	1	$4.30
Run Schedule Invoice Text	**Sort Text**			
STATE ENVIRONMENT DEPARTMENT	STATEENVIRONMENTDEPARTMENTSEEKSPUBLICC			

Order Confirmation

Ad Order Number	Customer	Customer Account	Ordered By	PO Number
0000640135	AIR QUALITY BUREAU-C/O NM ENV	39598	Julie Chambers	
Sales Rep.	**Customer Address**	**Customer Phone #1**	**Customer Phone #2**	
sharris	PO BOX 26110	505-827-1032		
Order Taker	SANTA FE, NM, USA 87502	**Customer Fax**	**Customer EMail**	
sharris				
Order Source	**Payor Customer**	**Payor Account**	**Special Pricing**	
	AIR QUALITY BUREAU-C/O NM ENV	39598	None	

Ad Number	Ad Type	Ad Size	Color	Production	Production Notes
0000640135-02	CLS Legal liner	1.0 X 80 Li	<NONE>	AdBooker	Pub 50138
Ad Attributes		**Ad Released**	**Pick Up**		
		No			

Product Information	Placement/Classification	Run Dates	# Inserts	Cost
DM Headlight-Deming Headlight::	Legal	1/31/2012	1	$48.16
Run Schedule Invoice Text	**Sort Text**			
STATE ENVIRONMENT DEPARTMENT	STATEENVIRONMENTDEPARTMENTSEEKSPUBLICC			

-04262 EV21446
UNK 2
ONEER SPEAKERS, 1
ONEER CAR STEREO, 1
IRE CONNECTOR, 1 CAR
ART, 1 HONDA WATER
VER FLOW RESEVOIR, 1
ONDA FILTECH PART, 1
ONDA TRUNK LATCH
OVER, 1 HONDA TAIL
AMP
07-04262 EV21594
UNK 1
ONDA WHEEL COVER, 1
RACKED HONDA WHEEL
OVER
07-04262 EV21592
GERONIMO
ERNANDEZ 1
LK CAR ALARM
/SPEAKER AND WIR-
G, 1 AUTOMOTIVE
ECTRONIC BOX
07-07486 EV21786
ELIAS
ALENZUELA 1
STANLEY RACHET
/5/16 SOCKET
08004 EV22434
DANIELLE
ENSON 1 VERIZON
ELL PHONE
08-03752 EV22567
FOUND
ROPERTY 1 ATV FRAME
08-07085
EV22955
UNK 1
RG DRILL W/BATTERY, 1
RG EXTENSION CORD, 1
R PRUNING SHEARS
08-10901 EV23282
SERGIO SOLIS
1 BRO/SILV
OCKET KNIFE
09-00115 EV23399
RANDY
ROWN 1 SILV WIN
HESTER POCKET KNIFE
09-
189 EV24384
JOE
ERNANDEZ 1
ED/CHROME MOTOR
COOTER, 1 HANDLE BAR,
BACKREST
10-02075
EV24712
UNK 1
RY RING W/BLU STONE,
GRY RING W/CLEAR
TONE, 1 GRY RING W/SM
NK STONES, 1 GRY RING
/WHT STONE, 1 GRY
ROSS, 1 YEL RING
/RED/CLEAR STONES, 1
EL RING W/CLEAR
TONE, 1 WHT WATCH, 1
HT CHAIN, 1 WHT
EKLACE, 1 GRY CROSS
/CLEAR STONES
10-04675 EV24990
SCOTT LYDICK
1 BLU SYLVA
IA PORTABLE DVD
LAYER, 1 RED/GRY MON-
OOSE MOUNTAIN BIKE
11-07208 EV26667
JAMES
ORDOVA 1 MOTOROLA
ROID 2 GLOBAL
/BATTERY
11-09310 EV26858
CHRISTOPHER
ROSS 1 GRY POCKET
NIFE

BRO TOOL BAG
W/SCREWS, DRILL BITS
AND 2 PENCILS, 1 KOBALT
HACK SAW, 1 SPOOL OF
WIRE, 1 BUNGEE CORD, 1
ROLL BLK TAPE, 2 BLU
PRY BARS, 1 SWANSON
SPEED SQUARE, 1 BOTTLE
MARKING CHALK, 1
BLU/YEL HAMMER, 3
GROUNDING ADAPTERS, 1
BOX OF SCREWS, 2 TOR-
PEDO LEVELS, 1 25' TAPE
MEASURE, 1 BRO BAG OF
SCREWS, 1 HACK SAW
BLADE, 6 HOLE SAWS, 1
BLK DRILL BIT SET, 1
BLK/ORG BAG, 1 UTILITY
KNIFE W/O BLADE
211-11090 EV27049
UNK 1
LG CELL PHONE
211-11275 EV27078
PHILIP BACA
1 BLK KNIFE
208-08477 EV23078
UNK 1
SAMSUNG MODEL
HPT5034 FLAT SCREEN
TV, 1 RCA TV, 1 ROCK
BAND FENDER
STRATOASTER GUITAR
AND ADAPTER, 1
GAMESTOP BAG
W/NINTENDO CHARGER,
10 NINTENDO DS GAMES
IN 3 CARRY CASES, 1 YEL
BRACELET, 1 SONY PS3
W/CORDS, 1 XBOX 36
W/AC ADAPTER AND
COMPONENT, 2 XBOX RE-
MOTES, 1 CASE LOGIC CD
HOLDER W/89 DVDS AND
GAMES, 1 CD PROJECTS
CD HOLDER W/117 DVDS
AND GAMES, 1 XBOX RE-
MOTE, 1 ROCK BAND MI-
CROPHONE, 1 SONY PS
REMOTE CONTROL, 1
XBOX MEDIA REMOTE, 1
SAMSUNG REMOTE, 1 BLK
CD HOLDER W/27 DVDS
AND GAMES, 16 DVDS
AND GAMES, 1 BRO JEW-
ELRY BOX, 1 WHT COTE
D'AZUR WATCH, 1
VERSALES WATCH, 1
WHT/PNK ARMITRON
NOW WATCH, 1 WHT
W/PURP STONES VANITY
FAIR WATCH, 1 YEL BRA-
CELET, 1 RED BRACELET,
2 WHT CROSS PENDENTS,
1 PNK HEART PENDENT, 1
YEL RING, 1 YEL RING
W/WHT STONES, 1 WHT
RING, 1 YEL RING W/4
LEAVES, 1 WHT RING, 1
WHT RING W/GRN FLOW-
ER, 1 YEL NECKLACE
W/HEART PENDENT, 1
YEL RING W/YEL MEDAL-
LION, 1 YEL NECKLACE
W/YEL HEARTS, 1 WHT
NECKLACE
208-08477 EV23078
UNK 1
YEL NECKLACE
W/WHT/YEL HEART, 1
WHT NECKLACE, 1 WHT
NECKLACE, 2 WHT LOOP
EARRINGS, 4 WHT LOOP
EARRINGS, 1 BLK LOOP
EARRING, 2 YEL
EARRINGS, 2
WHT/PNK/PURP

STONES, 1 WHT NECK-
LACE, 1 YEL NECKLACE
W/MEDALLION, 1 BRO
IPOD, 1 GRY NINTENDO
GAMECUBE, 1 BLK
NINTENDO GAMECUBE
PLAYER, 2 GAMECUBE
CONTROLS AND ADAPT-
ER, 1 GRY EMERSON VCR
W/CHICKEN RUN VIDEO, 1
GRY SANYO PROGRES-
SIVE SCAN DVD PLAYER,
2 YEL VTECH OUTDOOR
TREKKER, 1 NAMCO PLUG
& PLAY TV GAME, 1
NAMCO MS PACMAN TV
GAME, 1 JAKKS PACIFIC
BATMAN TV GAME, 12
DVD MOVIES, 21 VHS
VIDEOTAPES, 1 ICE AGE
DVD, 2 VIDEO CABLES
208-08477 EV23079
UNK 1
32" ILO FLAT SCREEN LCD
TV MODEL ILO32HD, 1 SO-
NY CYBERSHOT DIGITAL
CAMERA, 1 CAMERA
CASE W/POWERCORDS
AND 9 MEMORY CARDS, 1
POLAROID DIGITAL CAM-
CORDER MODEL
CAA03040S, 1 VERIZON
KYOCERA AIR CARD
MODEL XPC650, 2 SE-
CURITY CAMERA
W/CABLES, 1 PSP POKER
2 GAME, 1 MAGNAVOX
15" LCD TV W/POWER
CORD, 1 PHILIPS DVD
HOME THEATER SYSTEM
W/6 SPEAKERS MODEL
HTS3410D37, 1 SONY
DVD PLAYER MODEL
DVPNS775V W/POWER
CORDS, 1 EUROPRO SEW-
ING MACHINE W/POWER
CORDS MODEL 998A, 1
EMERSON 13"TV/VHS
COMBO MODEL
REWC0902, 1 BLK
SAMSONITE SUITCASE
W/47 DVDS AND 1 AC
ADAPTER
208-08477 EV23086
UNK 1
SONY BRAVIA FLAT
SCREEN TV, 1 SONY DVD
REMOTE, 1 VIZIO HD FLAT
SCREEN HD TV, 1 VIZIO
REMOTE CONTROL, 1
BOSE HEAD PHONES
208-08477 EV23141
UNK 51
RINGS, 17 BRACELETS, 17
EARRINGS, 10 EARRINGS,
5 EARRINGS, 2 NECKLA-
CES, 7 BRACELETS, 3
NECKLACES, 4 WATCHES,
10 EARRINGS, 11
BRACELETS, 18 MISC
BRACELETS AND NECKLA-
CES, 25 EARRINGS,
TOOTH, NECKLACES, USA
PIN, 2 GRN STONES, 24
EARRINGS
208-08477
EV23143
UNK 1
PHILLIPS DVD PLAYER
MODEL DVD39637, 1
LEXMARK PRINTER MOD-
EL 4775017, 3
PANASONIC SOUND SYS-
TEM SPEAKERS, 3
SAMSUNG SPEAKERS, 1
SKAGEN WATCH, 1 WHT

SHACK 2WAY RADIO, 1
NINTENDO GAMECUBE, 1
LOGITECH MOUSE MODEL
MBJ49, 1 CARD READER
W/2 USB CABLES, 1 BLU
TREMON VIDEO GAME
CONTROLLER, 28 DVDS,
36 DVDS, 37 DVDS, 24
NINTENDO GAME CUBE
GAMES, 3 PAINTBALL
HOPPERS, 1 PAINTBALL
GUN BARREL, 1 GRIP, 1
PAINTBALL MASK, 10
GAMEBOY GAMES, 1
GAMEBOY ADVANCE IN
BLK CASE, 2 COBRA
MICROTALK 2WAY RA-
DIOS, 2 MOTOROLA
2WAY RADIOS W/BASE
CHARGER, 4 CO2
CANNISTERS, 1 BLK
BUSHNELL BINOCULARS,
113 CDS/DVDS IN ICON
CASE, 142 DVDS IN LOGIC
CASE, 1 TIPMANN 98
CUSTOM PAINTBALL GUN

Publication # 50109
Publication Dates: Jan 24, 31, 2012.

STATE ENVIRONMENT DEPARTMENT SEEKS PUBLIC COMMENT ON EXCEPTIONAL EVENTS DEMONSTRATION

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Publication # 50138
Publication Date: Jan. 31, 2012.

Order Confirmation

Ad Order Number	Customer	Payor Customer
0000640181	NEW MEXICO ENVIROMENTAL	NEW MEXICO ENVIROMENT
Sales Rep.	**Customer Account**	**Payor Account**
bduenes	27652	27652
	Customer Address	**Payor Address**
PO Number	PO BOX 5469	PO BOX 5469
0000015581	SANTA FE NM 87502 USA	SANTA FE NM 87502 USA
Orered By	**Customer Phone**	**Payor Phone**
julie chambers	505-827-2425	505-827-2425

Net Amount	Tax Amount	Total Amount	Payment Method	Payment Amount	Amount Due
$206.75	$0.00	$206.75		$0.00	$206.75

Ad Type	Ad Size	Color
CLS Legal liner	: 1.0 X 75 Li	<NONE>

STATE ENVIRONMENT DEPARTMENT SEEKS PUBLIC COMMENT ON EXCEPTIONAL EVENTS DEMONSTRATION

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Run Dates 1/30/2012

EP Times-El Paso Times::	Legal	1

Run Dates 1/30/2012

EP Online-El Paso Online::	Legal	1

General
Bi-Lingual (English/Spanish) Landscaping and Construction Foremen for seasonal work in Philadelphia , PA. Workers must have valid US work authorization, valid US drivers license, read and write both languages, 12 month verifiable employment at landscaping/ construction company, must pass a pre-employment criminal background check and drug test, willing to relocate for 10 months a year to Philadelphia. Only reliable and responsible applicants need apply. Send resumes to: MJC Labor Solutions LLC , ATTN: Carl to carlhemphillmjc@yahoo.com. Interviews will be held on Feb. 2-3. See this ad on your mobile phone at m.eptjobs.com

Drivers
MUNOZ TRUCKING, INC.
Over The Road Driver s & Safety/ Human Resources
$500 Sign on Bonus. Vacations paid. Good miles. DOT inspections Bonus, GPS, New Equipment, Home Time, Weekly settlements, Weekly bonuses, 6 Holidays paid, Ride along program after 3 months, Please call SAFETY
915-852-7722 and 915-852-77 20
See this ad on your mobile phone at m.eptjobs.com

The more you tell, The more you sell!

Ads with a price **ALWAYS** generate more qualified calls.

NM STATE
Director of Student Accessibility Services Requisition #0600269
Bachelor's degree in related field. Minimum eight (8) years of increasingly progressive management experience in one or more areas that report to this position. For additional information, please visit the New Mexico State University website at http://jobs.nmsu.edu. Employment contingent upon verification of individual's eligibility for employment in the United States. All offers of employment, oral and written, are contingent on the university's verification of credentials and other information required by federal law, state law, and NMSU policies/procedures, and may include the completion of a criminal history check.

See this ad on your mobile phone at m.eptjobs.com

MESILLA VALLEY TRANSPORTATION
In-house corporate legal department is seeking an experienced Legal Secretary or Paralegal to join our team. The responsibilities will primarily consist of administering routine contracts and matters, assist in litigation mgmt., conducting research and prepare and review routine documents. Paralegal degree/certification & bachelor's degree pref. Requires 5-10 yrs progressive exp and corporate exp pref. Extremely organized and detail-oriented. Ability to multitask with strong desire to learn. Good communication and computer skills a must. Fax resume to (575) 541-1597

Sales
Contemporary Market Representative in EP market. Servicing current accounts, handling promotions/special events. Must possess good communication skills, be self-motivated and have strong work ethics. Bachelor's Degree preferred, but will consider combo of education/related work experience Age required: 21+. Apply at L&F, 6949 Market St. before Feb. 3, 2012. No Phone Calls. Must pass MVR, physical, drug/background check.
EOE
See this ad on your mobile phone at m.eptjobs.com

MESILLA VALLEY TRANSPORTATION
SAFETY COORDINATOR NEEDED:
Position requires at least 4 yrs managing experience with DOT rules/regs & driver logs. Duties will include maintaining safety documentation, analyzing reports & DOT compliance. Bilingual (Eng/Span.) a must. BA degree preferred. Motivated and experienced individuals send resume to (915) 791-4057

Employment 204

Drivers
DANNY HERMAN TRUCKING
800-331-3725
See this ad on your mobile phone at m.eptjobs.com

Drivers
SKY TRANSPORTATION
$250 Sign On Bonus
Hiring CDL Drivers
CALL 915-726 1081

General
Drivers. Local. Clean record a must. Must be over 21. Please call between 1pm- 4pm. Call 915-533-1083. See this ad on your mobile phone at m.eptjobs.com

Employment 204

JOBE Concrete Mixer Truck Drivers
Jobe Materials, L.P. is accepting applications for Concrete Mixer Truck Drivers. Training Provided. Minimum of 3 years driving experience. Excellent pay and benefits, including health insurance, 401K, holiday and vacation pay.

Apply at: Jobe Materials, L. P. 1150 Southview Dr., El Paso, TX 79928 (915) 298-9900. Office hours 8-5 EOE Employer

1C1032394

Employment 204

Restaurant/Club
DANCERS!
(No licesnse needed) Cash Daily, 18 & older Call 915-598-3772

CABLE TECHS
Need 20 drug-free cable installers now! Long-term jobs offer great $$ & Bnfts 1 yr exper qualifies. Call Charlie at 532-9400 ASAP!

General
Mid-West Textile Co. seeks **Quality & Engineering Supvr.** in El Paso. MS in Industrial, Mfg or Quality Engineering. Reqs include 24 mos. developing production layouts using AutoCAD; MS Project Mgr. Send Resumes to: H.R. Department **Mid-West Textile Co. 1600 E. San Antonio, El Paso, TX 79901 (915) 533-9811 (915) 542-0747** See this ad on your mobile phone at m.eptjobs.com

General
Cake Decorator in Las Cruces Pro's Ranch Markets
Apply in person at 320 Wyatt St, Las Cruces, NM Call 575-647-1669 for more info. EOE/M/F/D/V

Tropicana PROPERTIES is hiring an
ASSISTANT PROPERTY MANAGER.
Must be bilingual and have knowledge in Microsoft Office programs. Experience is a plus.
Please fax your resume to 915-755-9116 or call 915-755-9113.

Employment 204

General
EL PASO COMMUNITY COLLEGE
CERTIFICATION SPECIALIST (Financial Aid)
Application Deadline: 02/03/2012

PHARMACY TECHNOLOGY INSTRUCTOR (Part-time position)
Application Deadline: 06/30/2012

Please visit our website and apply on-line at: http://jobs.epcc.edu

Jobline: (915) 831-6378 TDD: (915) 831-6364 EEO/AA
See this ad on your mobile phone at m.eptjobs.com

Healthcare
Med Time Pharmacy Pharmacy Tech
2 yr exp (915)584-6340 fax resume
See this ad on your mobile phone at m.eptjobs.com

Healthcare
University Medical Center of El Paso HR Dept. www.umcelpaso.org

Healthcare
THE MONTEVISTA A Senior Living Community 915-833-2229

Healthcare
Our Angel Home Health, Inc. Hiring RN/LVNs
-Full Time/Part Time
-Preferably Kinnser Software knowledgeable
-Pay rate will be discussed upon hire
Email: info@ourangelhomehealth.com

The more you tell, The more you sell!

NOTICES

Employment 204

Administrative
eliminating racism empowering women
ywca
Fitness & Aquatics Director: oversee fitness and pools at the YWCA Bartlett branch. Apply online @ www.ywcaelpaso.org Job line 577-9922, ext 555 EEO m/f See this ad on your mobile phone at m.eptjobs.com

Restaurants
WING DADDY'S is hiring COOKS-2 yrs exp. WAITRESSES/ BARTENDERS email mariosouthern @yahoo.com See this ad on your mobile phone at m.eptjobs.com

Restaurants / Clubs
Looking 4 Work Apply now! Waitress/Hostess Must be 18yrs &older Call 915-598-1260 Mon-Sat 11am-7pm

Sales
REAL ESTATE License Needed century21apd.com **915.779.5611**

Trade
Forklift Mechanic Pay up to $30.00 per hr. 4 day work week Housing Available. Can commute. Work is in Odessa, Texas. www.medleyco.com Call 405-887-0872 for details. See this ad on your mobile phone at m.eptjobs.com

Trades
QC Inspector Use of calipers, micrometers, and calibration. 5 yrs exp. $9 per hour 915-598-2330 See this ad on your mobile phone at m.eptjobs.com

Trade
PLUMBERS, PIPE FITTE,RS AND HELPERS Commercial Work Top Pay & Benefits (800) 763-6317 See this ad on your mobile phone at m.eptjobs.com

Employment Wanted 261

Be Junk Free! MAKE MONEY! Sell your stuff, name your prices, stay home, I'll do the work! 915-227-7454.

Child Care Provide 263

Need someone to care for 2 girls with special disabilities. These are the tasks: bathing, cooking, transporta - tion, cleaning area, assistance going to bathroom , re - quired to be strong, bilingual, available to work on week - ends. Please call Maria Garcia 915-778-3585

Elderly Care Provided 265

Elderly & Children Care Giver/ Housekeeping. Experienced! Anytime. 915-843-5958

Elderly Care Provided 265

Experienced home caregiver I am honest, reliable and professional. Reasonable cost. 915-538-6599

I am a caregiver w/20 yrs experience. Will care for the elderly in their home. Leave msg 859-9790

I will care for your loved 1 in your home. Experience, Ref, TLC. Elderly, illness, disabled. 915-449-3019

I will provide pri - vate Nursing care Adults & chilidren 915-248-7927

Quality Foster Home in business 25 years! Private room for one adult female. Choice of meals. Excellent care! Information 533-7953

Domestic 266

Busco trabajo domestico de limpieza. Tengo ref. 915-694-5906

Legal Notices 152

NOTICE OF PUBLIC SALE
Rhino Self Storage will conduct an Auction Sale for cash, without reserve, on the facilities located at 1631 Joe Battle, 2250 Joe Battle, 6047 Woodrow Bean, and 9191 Dyer Street, El Paso, Texas on the 15th of February, 2012. The sales are being held to satisfy a Landlord's lien under Chapter 59 of the Texas Property Code. Seller reserves the right to withdraw property from the sale. Property includes contents of spaces of the following tenants:
At 1631 Joe Battle (9:30 AM) Michael A. Marcel: baby chair, couch, chairs, boxes and totes w/contents. **Shannon C. Johnson:** dresser, fan, boxes and bags w/contents, cabinet, tires, shelves. **Nicole King:** furniture dresser, boxes w/contents, lamps, washer/dryer, mattresses, headboard, loveseat, chairs.
At 2250 Joe Battle (10:00 AM) Priscilla Ortega: sofa & loveseat, boxes w/contents; **Jose G. Gonzalez:** washer, printer, 2 vending machines, copy machine, juke box; **Raul Rivas:** speaker box, nails, compressor, tires, construction tools, truck tool box, helmet; **Rafael A. Nigaglioni:** clothing, boxes w/contents; **Shari L. Croom:** baker's rack, entertainment center, dresser, boxes w/contents; **Jose Gutierrez:** washer, dryer, ice chest, fishing rods, file cabinet, clock cabinet, boxes w/contents; **Ricardo Cavazos:** table w/chairs, china cabinet, stereo w/speakers, painting, Christmas decorations, boxes w/contents.
At 9191 Dyer (11:00 AM): Melissa O. Campos: chairs, shelves, bar, vacuum, boxes & totes w/contents, **Brian L. Sullivan:** TV, fence post, space heater, rods & reels, boxes & bags w/contents **Oscar Deharo Jr.** wicker chair, table, shelves, picture frames, boxes w/contents, **Patricia A. Blocker:** dresser, Christmas decorations, chairs, boxes w/contents; **Maria I Reyes:** mattress, lamp, speaker, dresser, TV, washer, dryer, wall pictures, boxes, bags & totes w/contents; **James Bryon Branham:** wheels w/tires, chest of drawers, BBQ grill, computer desk, stereo, boxes & totes with contents; **David A. Hernandez:** pallet lift, window a/c, safe, ladder, power tools, file cabinet, refrigerator, computer desk, generator, lights, boxes w/contents.

STATE ENVIRON - MENT DEPART - MENT SEEKS PUB - LIC COMMENT ON EXCEPTIONAL EVENTS DEMON - STRATION
(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 2009. 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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STATE ENVIRONMENT DEPARTMENT SEEKS PUBLIC COMMENT ON EXCEPTIONAL EVENTS DEMONSTRATION

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