Texas Commission on Environmental Quality

El Paso 2010-2012 $PM_{2.5}$ and PM_{10} Exceptional Events Demonstration Addendum

Response to EPA Questions

8/19/2014

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Introduction

This document provides additional information in response to EPA comments and questions regarding the Texas Commission on Environmental Quality (TCEQ) El Paso 2010-2012 $PM_{2.5}$ and PM_{10} Exceptional Events Demonstration document (referred to as "demonstration document" herein). The sections in this document are organized to address each comment or question presented by EPA. The EPA's comments and questions are provided verbatim in italics for reference at the beginning of each TCEQ response. The page number references in the section titles refer to the demonstration document.

The preamble to EPA's Exceptional Events Rule (72 *Federal Register* 13569) states:

> For extremely high concentrations relative to historical values (e.g., concentrations greater than the 95th percentile), a lesser amount of documentation or evidence may be required to demonstrate that the event affected air quality.

The TCEQ's El Paso 2010-2012 $PM_{2.5}$ and PM_{10} Exceptional Events Demonstration clearly establishes that all of the proposed exceptional event measurements were above the 95th percentile of all measurements for the El Paso area. Given the unique nature of these events, evidence supporting their occurrence, and impact on the El Paso area, the TCEQ asserts that this type of exceptional event demonstration clearly meets the intent of the cited preamble language. The original demonstration document provided compelling evidence through satellite imagery and backward trajectories that the proposed exceptional events were the result of overwhelming transport of windblown dust originating outside the state of Texas. This evidence demonstrates that dust plumes predominately were from source areas in Mexico and that exceedances of the annual $PM_{2.5}$ and 24-hour $PM_{2.5}$ and PM_{10} national ambient air quality standard (NAAQS) would not have occurred but for the transported windblown dust.

EPA Comments and TCEQ Responses

1. EPA Comments Regarding Page 6

The text states: "All of the non-continuous and hourly continuous monitoring data used in this demonstration document are available in EPA's Air Quality Subsystem (AQS) database (EPA1, 2013) and meet EPA quality assurance requirements and guidelines." This statement may not be accurate. All the 2010-2012 data from the sites listed in Table 1 may not be in AQS or conform to EPA specifications. For example, according to GeoTAM, the Van Buren site (48-141-0693) has a $PM_{2.5}$ Tapered Element Oscillating Microbalance (TEOM) monitor, but the data is not in AQS. AQS indicates the Chamizal TEOM was shut-down as of November 16, 2010, but is identified in Table 1 as an acceptable continuous monitor. Please verify the accuracy of the text statement against the monitors listed in the table and correct as needed.

The quoted statement and Table 1 of the demonstration document are correct with one minor correction for Chamizal. All of the non-continuous and hourly continuous data used in the demonstration document are available in AQS. For the Van Buren site, a $PM_{2.5}$ TEOM was installed by the City of El Paso but never reported valid data; therefore no continuous $PM_{2.5}$ data for that site are available in AQS nor were any data used in the demonstration. The entry in Table 1 for the TEOM at Chamizal was incorrect since data from this monitor were not used in any of the analyses in the demonstration document. Table 1-1 below shows the corrected list of monitors used for the demonstration with the continuous $PM_{2.5}$ monitor at Chamizal removed.

Table 1-1. El Paso area $PM_{2.5}$ and PM_{10} monitors with data used for analyses.

Site Name	AQS Site Identifier	AQS Parameter Identifier	POC	Sampler Type
Tillman	481410002	81102	2	PM_{10} FRM non-continuous
Ivanhoe	481410029	81102	1	PM_{10} FRM non-continuous
UTEP	481410037	81102	4	PM_{10} continuous
UTEP	481410037	88101	1	$PM_{2.5}$ FRM non-continuous
UTEP	481410037	88502	3	$PM_{2.5}$ acceptable continuous
Riverside	481410038	81102	1	PM_{10} continuous
Chamizal	481410044	88101	1	$PM_{2.5}$ FRM non-continuous
Chamizal	481410044	88101	6	$PM_{2.5}$ FEM non-continuous
Chamizal	481410044	88502	5	$PM_{2.5}$ acceptable non-continuous speciated
Sun Metro	481410053	88502	3	$PM_{2.5}$ acceptable continuous
Ascarate	481410055	81102	4	PM_{10} continuous
Ascarate	481410055	88502	3	$PM_{2.5}$ acceptable continuous
Socorro	481410057	81102	1	PM_{10} FRM non-continuous
Socorro	481410057	81102	4	PM_{10} continuous
Clendenin	481410059	81102	1	PM_{10} FRM non-continuous
Van Buren	481410693	81102	1	PM_{10} FRM non-continuous
Advance*	800060004	81102	1	PM_{10} FRM non-continuous
Benito*	800060005	81102	1	PM_{10} FRM non-continuous
Club*	800060006	81102	1	PM_{10} FRM non-continuous
Delphi*	800060007	81102	1	PM_{10} FRM non-continuous
Delphi*	800060007	81102	2	PM_{10} FRM non-continuous
Ninez*	800060011	81102	1	PM_{10} FRM non-continuous

* site is in Ciudad Juarez, Mexico

Note: AQS stands for EPA's air quality system database.

POC stands for AQS parameter occurrence code to differentiate collocated monitors.

FRM stands for federal reference method.

FEM stands for federal equivalent method.

2. EPA Comment Regarding Page 9

There is missing data in Figure 4. Please explain why the University of Texas at El Paso (UTEP) and Chamizal Federal Reference Method (FRM) monitors were not operational from April 2003 through 2005.

The UTEP FRM $PM_{2.5}$ monitor was shut down after the last sample on April 13, 2003, and then re-started beginning with the first sample on January 16, 2005. Likewise the Chamizal $PM_{2.5}$ FRM was shut down after the last sample on April 13, 2003, and then re-started beginning with the first sample on December 18, 2005. Available records do not indicate the reason for the temporary shutdown of these two monitors.

3. EPA Comment Regarding Page 10

Figure 5: Please include all El Paso PM10 monitoring data in the graph i.e., Van Buren site monitor and the UTEP site monitor. Also, please explain the missing data at the Ivanhoe site monitor from mid-2001 to mid-2003.

Since the emphasis for Figure 5 in the demonstration document was to illustrate long-term trends, the Van Buren PM_{10} data was not included. The Van Buren site was deployed to replace the Clendenin site in 2010; therefore data from this site were only available for 2010-2012. However, since the Van Buren site was located close to the Clendenin site, the data has been added as "Clendenin/Van Buren" in Figure 3-1 below.

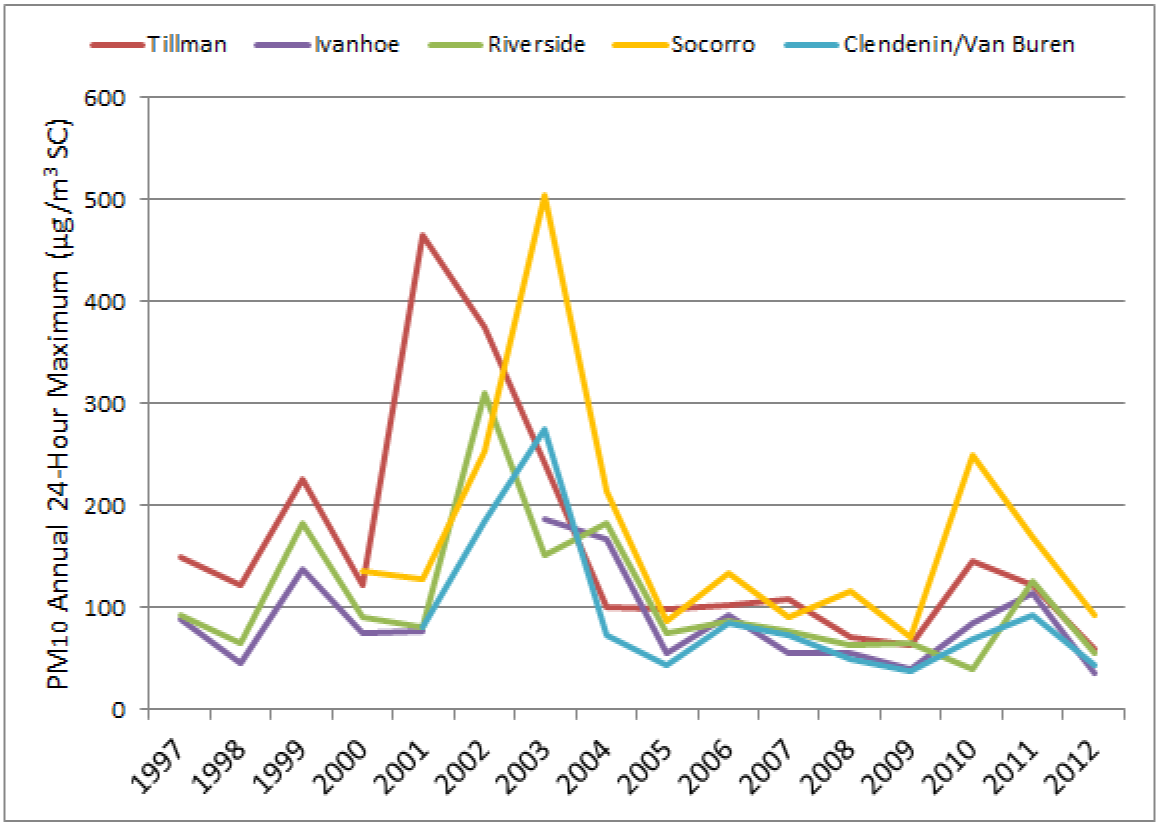

Figure 3-1. Trends of El Paso PM_{10} annual maximum 24-hour averages for FRM monitoring sites including exceptional event days.

Data from the UTEP monitor were excluded from both Figure 5 and Figure 3-1 because the sampler is not an FRM. The Ivanhoe PM_{10} records in AQS from January 2, 2002, through April 14, 2002, have a null code of AS, which indicates the measurements did not meet quality assurance requirements. This gap in the data caused the year to have less than 75% data return and, therefore, the year 2002 was incomplete. Based on 41 valid samples out of 61 scheduled sampling days, the PM_{10} annual maximum 24-hour average at Ivanhoe for 2002 was 226 $\mu g/m^3$. Ivanhoe data for 2001 and 2003 are included in Figure 5 of the demonstration document and are plotted at the mid-point of the corresponding years on that graph and in Figure 3-1.

4. EPA Comments Regarding Page 11

The text states: "In El Paso peak sustained wind measurements are only available from the NWS weather station at the El Paso Airport, providing a limited data set for analysis of the potential for wind generated dust across the El Paso area. Peak wind gust measurements, however, are available from most air quality *monitoring sites in El Paso." We do not understand why site-specific sustained wind speed data is not available from each site. Please explain why wind speed data from each site either is not available or was not used.*

Site-specific peak sustained wind speed data were not used due to averaging-time issues between what is outlined in EPA guidance and what is recorded at air quality monitoring sites. Peak sustained wind is defined in EPA guidance as a peak two-minute average wind speed while the shortest averaging time available at the TCEQ's monitoring sites is a peak five-minute average. Although the peak five-minute average wind speed may serve as a conservative indicator of the peak two-minute average wind speed, in most cases, the daily peak two-minute average wind speed will be substantially higher.

The only peak two-minute average wind data available for the El Paso area are from the El Paso Airport National Weather Service (NWS) automated weather station. The TCEQ's monitoring sites provide a five-minute average wind speed with the peak five-minute average for each hour representing the hourly peak wind gust that is reported to AQS. The highest hourly peak wind gust for each day then represents the daily peak wind gust. Accordingly, the daily peak wind gust was used as the primary reference based on the availability of measurements from each of the monitoring sites and its pertinence to blowing dust.

5. EPA Comments Regarding Pages 12-13

The text states: "the highest measured $PM_{2.5}$ and PM_{10} concentrations are experienced when wind gusts exceed 30 mph." Looking at Figure 7, there does not appear to be a clear correlation between gust events and elevated $PM_{2.5}$ at 30 miles per hour (mph). Concentration distinctions first appear at 45 mph. In the absence of additional definitive information, wind gust data below 45 mph is not supportive of a PM2.5 exceptional event claim. If there is information available to support lower wind gusts, please provide it.

While EPA's high winds guidance suggests the development of an area-specific high wind threshold at which a dust event will occur, it is important to recognize the unique transport component related to these events. All of these events were characterized by high winds over a very large area, not just in the immediate El Paso area. As documented by Prospero et al. (2002), Gill et al. (2007), Rivera Rivera et al. (2006) and Novlan et al. (2007), windblown dust source areas have been found to contribute to El Paso dust storm events from variably active natural sources just south of the U.S.-Mexico border. The application of an area-specific high wind threshold for these events would be much more relevant to source areas for these dust events, rather than the El Paso area itself. At best, the measurements from El Paso monitoring sites help to confirm the large scale nature of the dust event and characterize the event impacts on a localized scale immediately surrounding the monitoring site.

The contribution of Chihuahuan Desert sources in the primarily unpopulated areas of northern Chihuahua, Mexico, to dust events impacting El Paso has been well established in peer-reviewed literature. A study of significant dust events from over 1,000 dust events from 1932 through 2005 in El Paso conducted by Novlan et al. (2007) observed that advection of blowing dust into the El Paso area can occur at wind speeds of approximately 10 to 20 miles per hour. Rivera Rivera et al. (2006) examined 9 dust events from 2002 and 2003 with the National Oceanic and Atmospheric Administration (NOAA) HYSPLIT model and noted that source area wind speeds for periods associated with dust events were 10 m/s (22 mph) or higher compared to 4 m/s (9 mph) during non-dust events. These studies suggest windblown dust can occur and impact the El Paso area at wind speeds well below 45 mph.

In lieu of actual wind measurements in the dust source areas on the proposed event days, the TCEQ used the NOAA Air Resources Laboratory online tools to model wind speeds in the source areas on the event days. Using the highest resolution provided (12 km NAM), the model output provides hourly wind speeds and wind vectors at a 10 meter height. Figures 5-1 through 5-10 illustrate the predicted wind speeds in the dust source areas. When compared with satellite images provided in Appendix B through K of the demonstration document, these models support the occurrence of windblown dust from the source areas at wind speed averages in the 25 to 35 knots (29 to 40 mph) range.

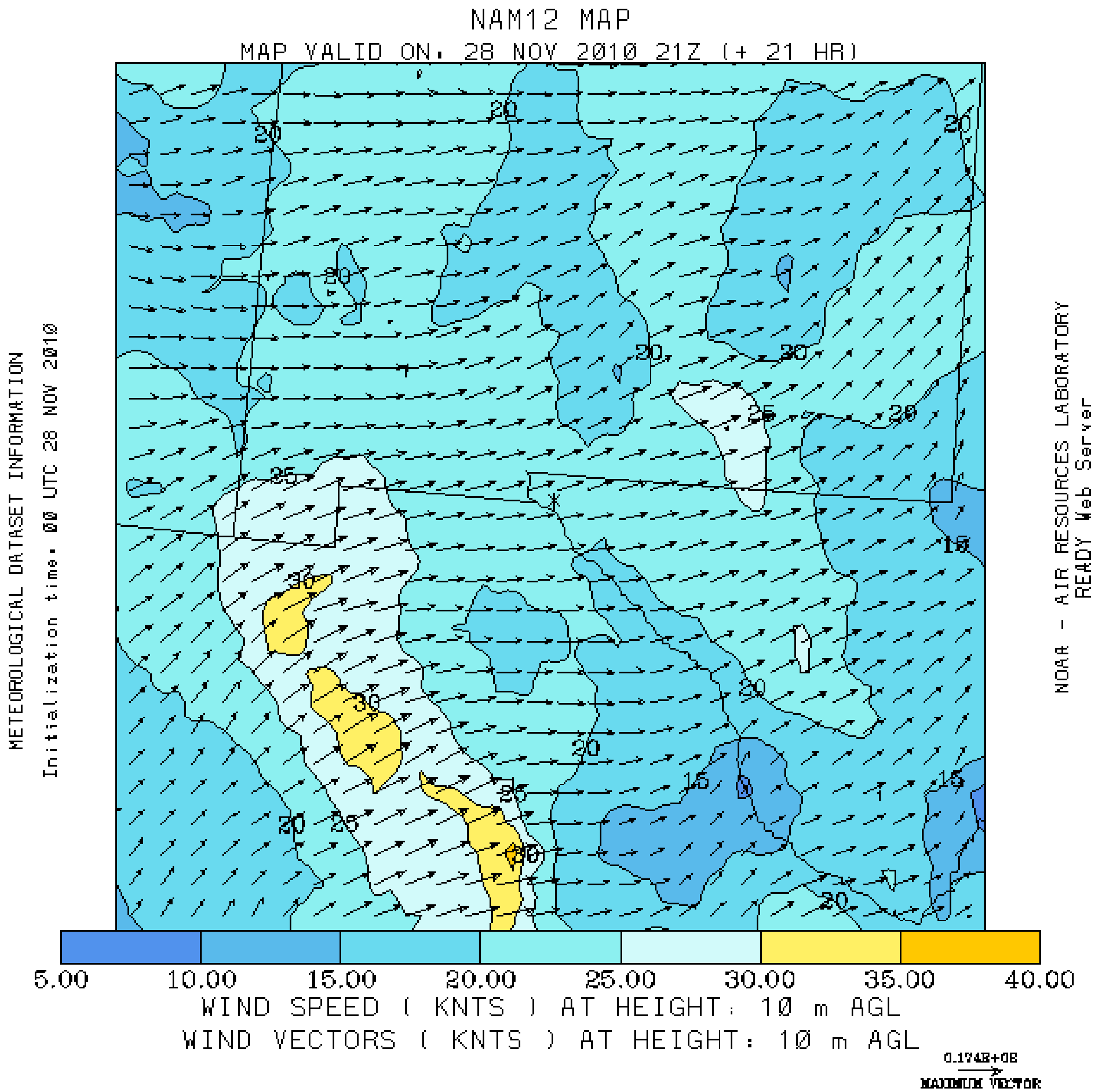

Figure 5-1. NOAA ARL model wind field in the El Paso area at 1400 MST on November 28, 2010. El Paso Airport is at the center and is marked with a black star.

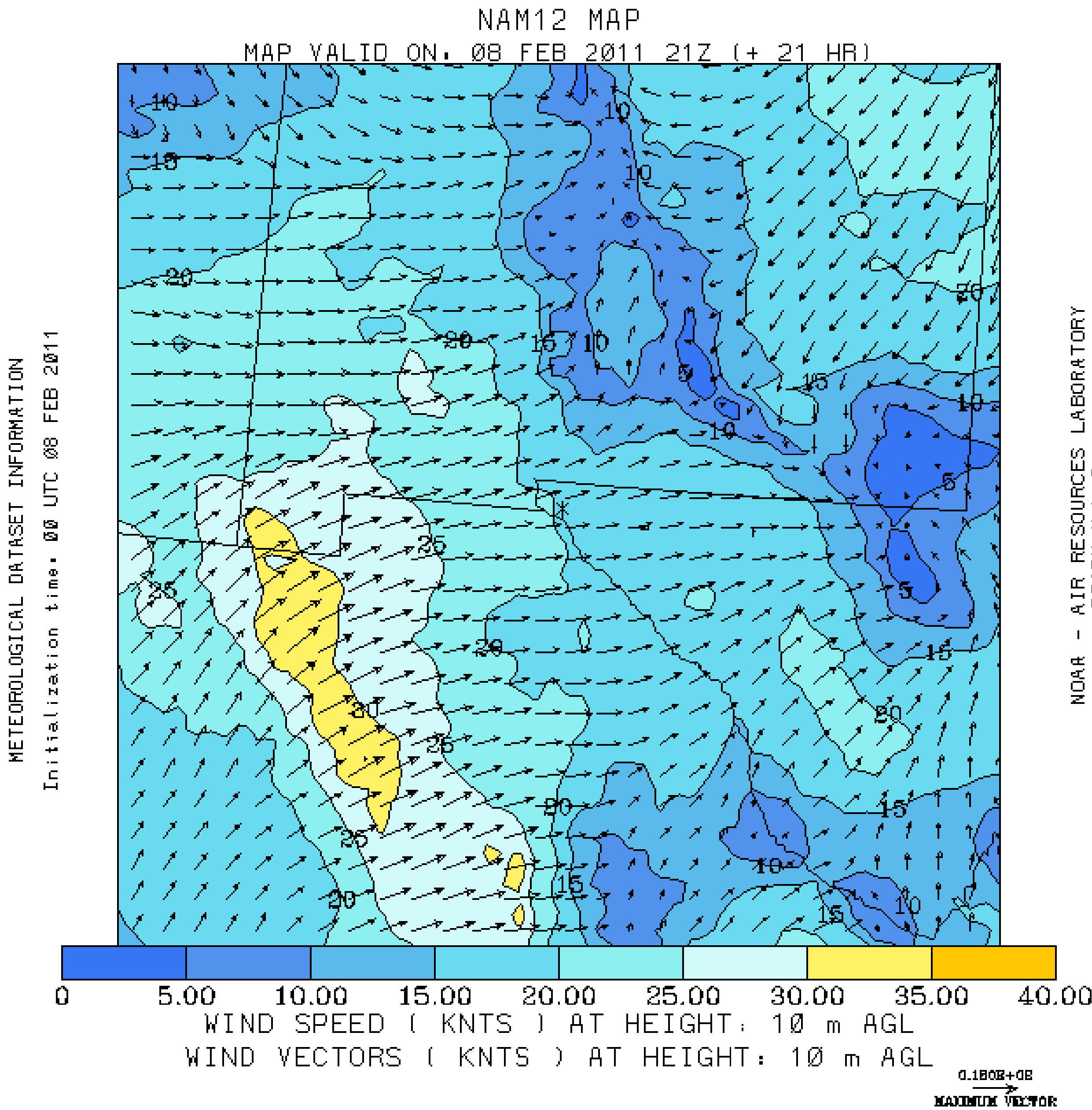

Figure 5-2. NOAA ARL model wind field in the El Paso area at 1400 MST on February 8, 2011. El Paso Airport is at the center and is marked with a black star.

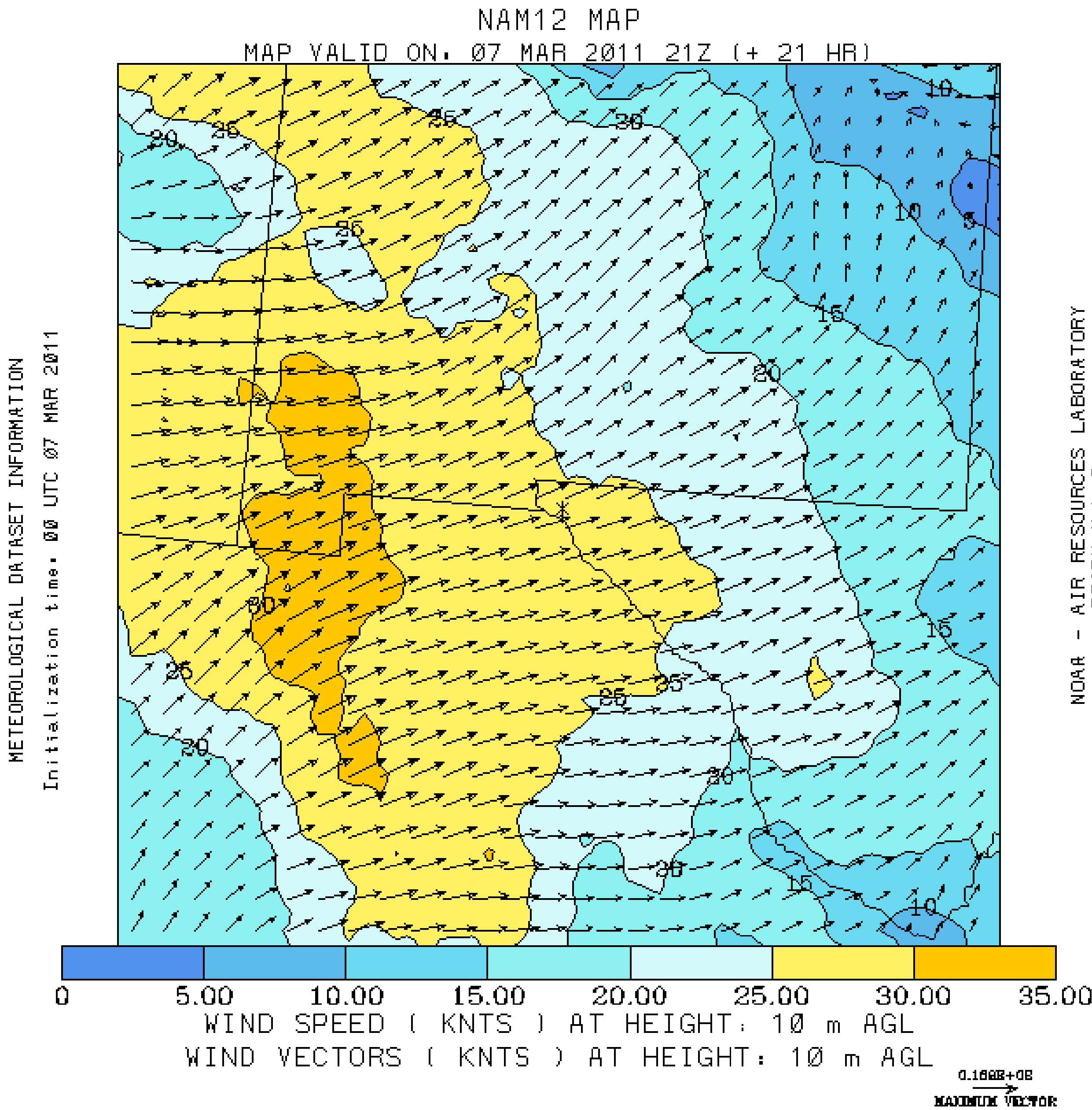

Figure 5-3. NOAA ARL model wind field in the El Paso area at 1400 MST on March 7, 2011. El Paso Airport is at the center and is marked with a black star.

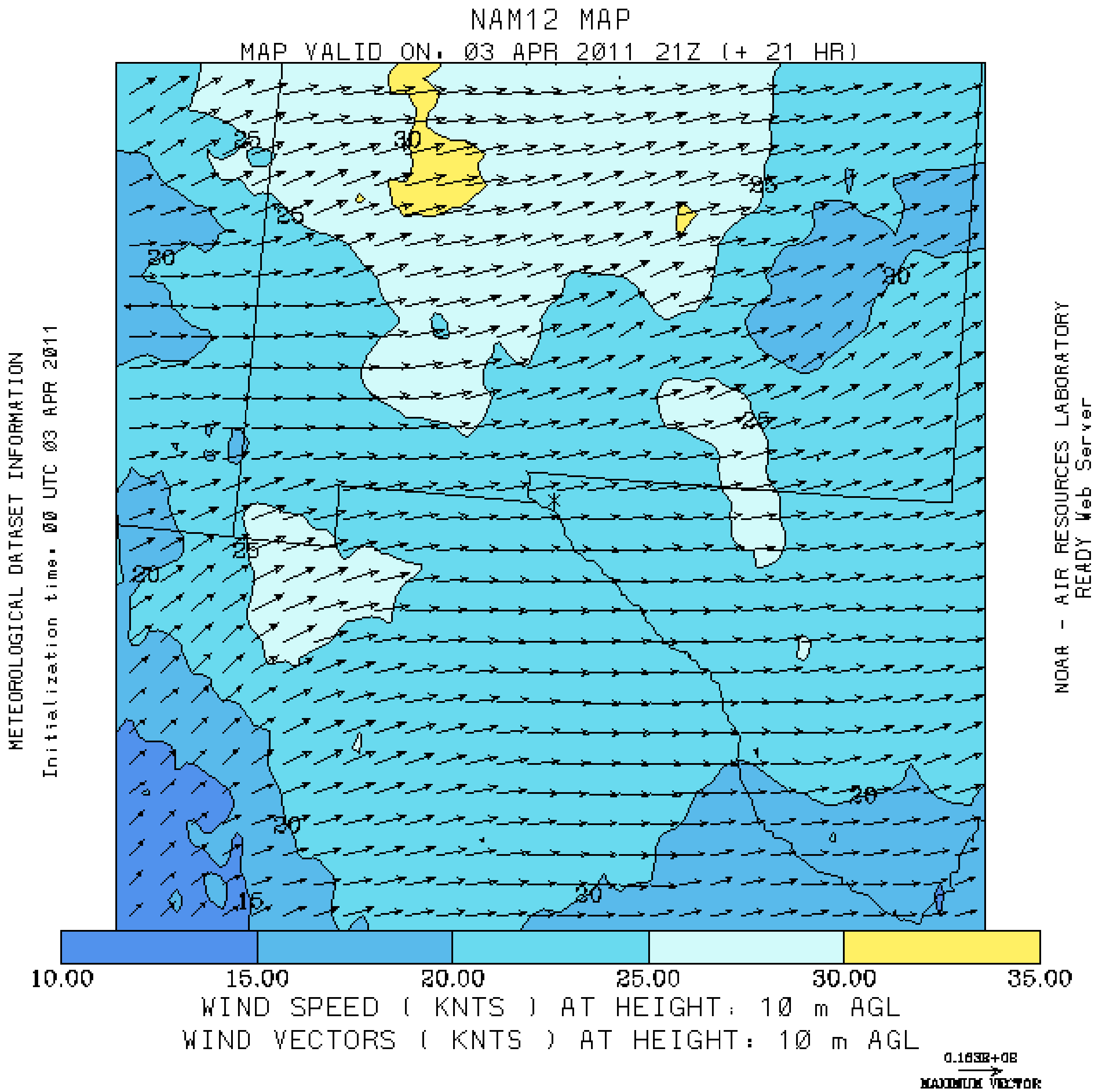

Figure 5-4. NOAA ARL model wind field in the El Paso area at 1400 MST on April 3, 2011. El Paso Airport is at the center and is marked with a black star.

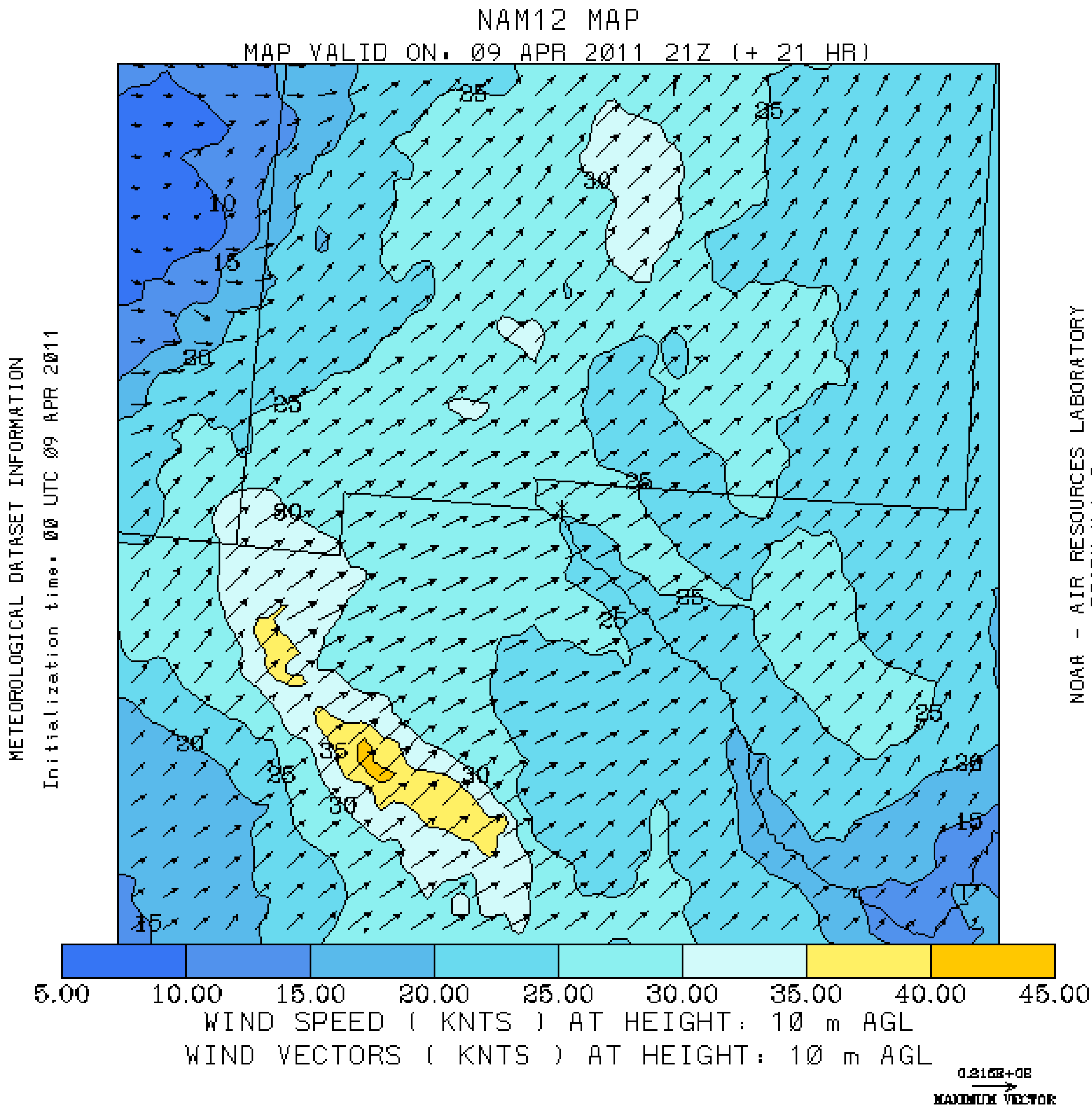

Figure 5-5. NOAA ARL model wind field in the El Paso area at 1400 MST on April 9, 2011. El Paso Airport is at the center and is marked with a black star.

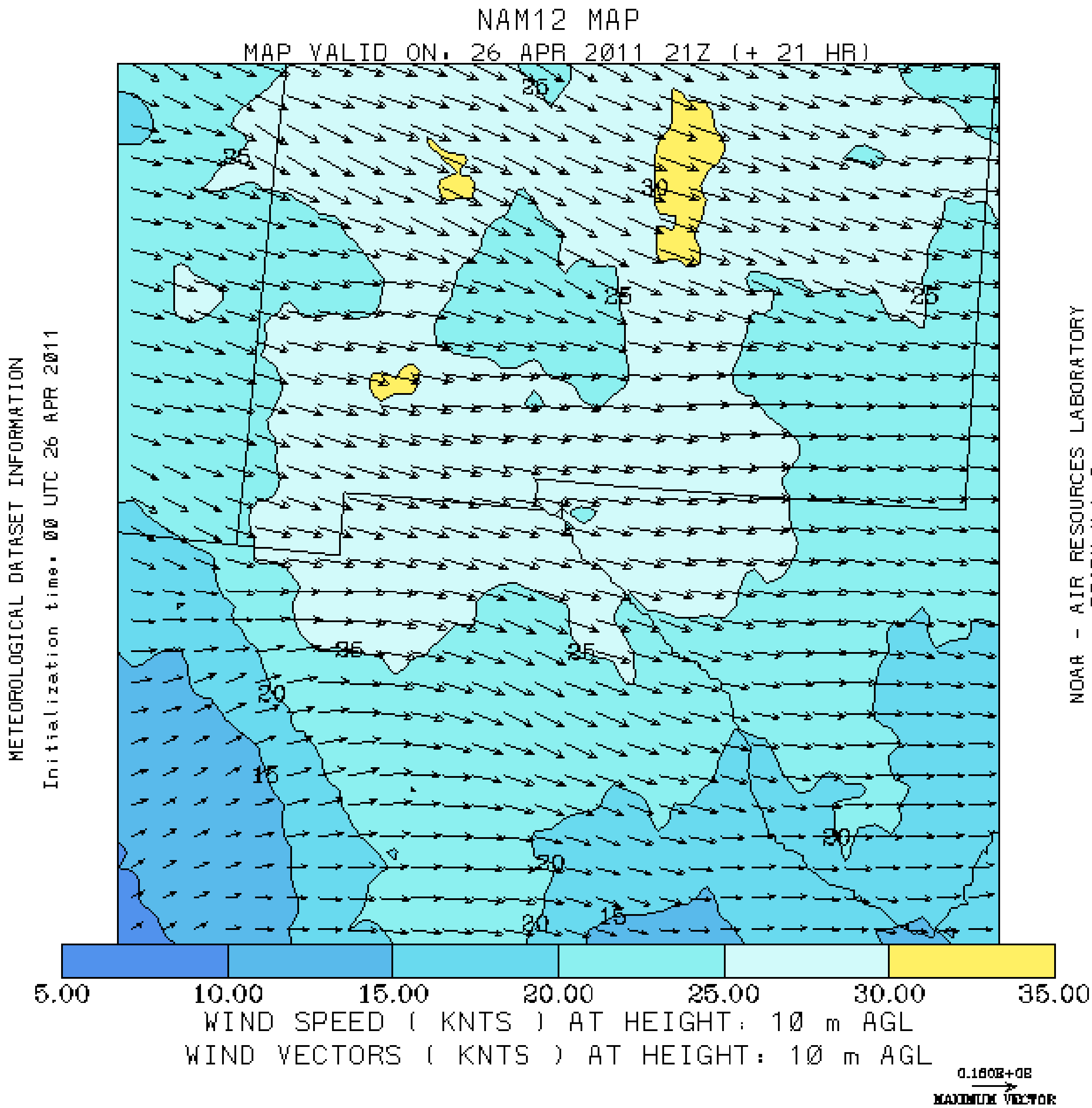

Figure 5-6. NOAA ARL model wind field in the El Paso area at 1400 MST on April 26, 2011. El Paso Airport is at the center and is marked with a black star.

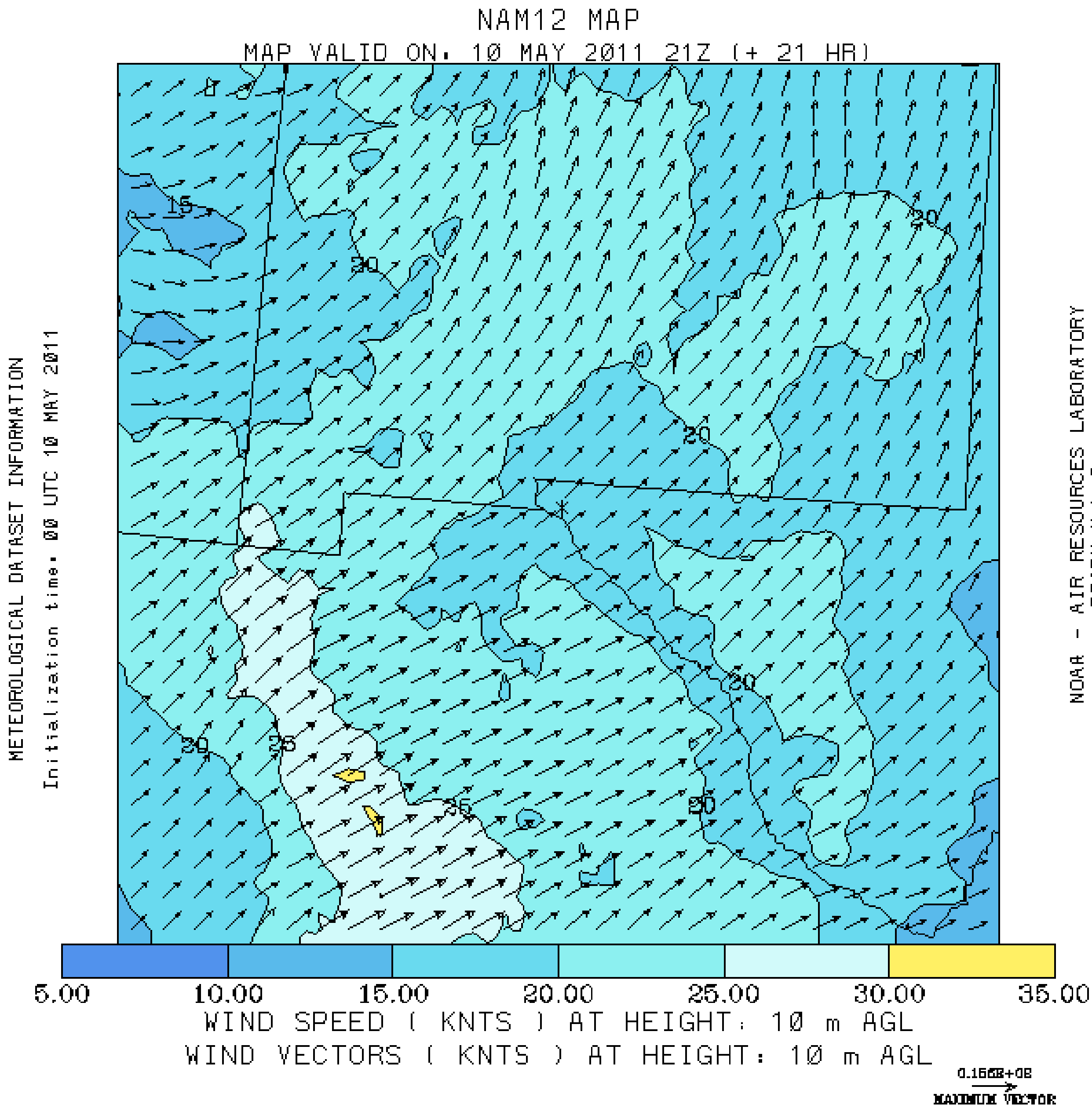

Figure 5-7. NOAA ARL model wind field in the El Paso area at 1400 MST on May 10, 2011. El Paso Airport is at the center and is marked with a black star.

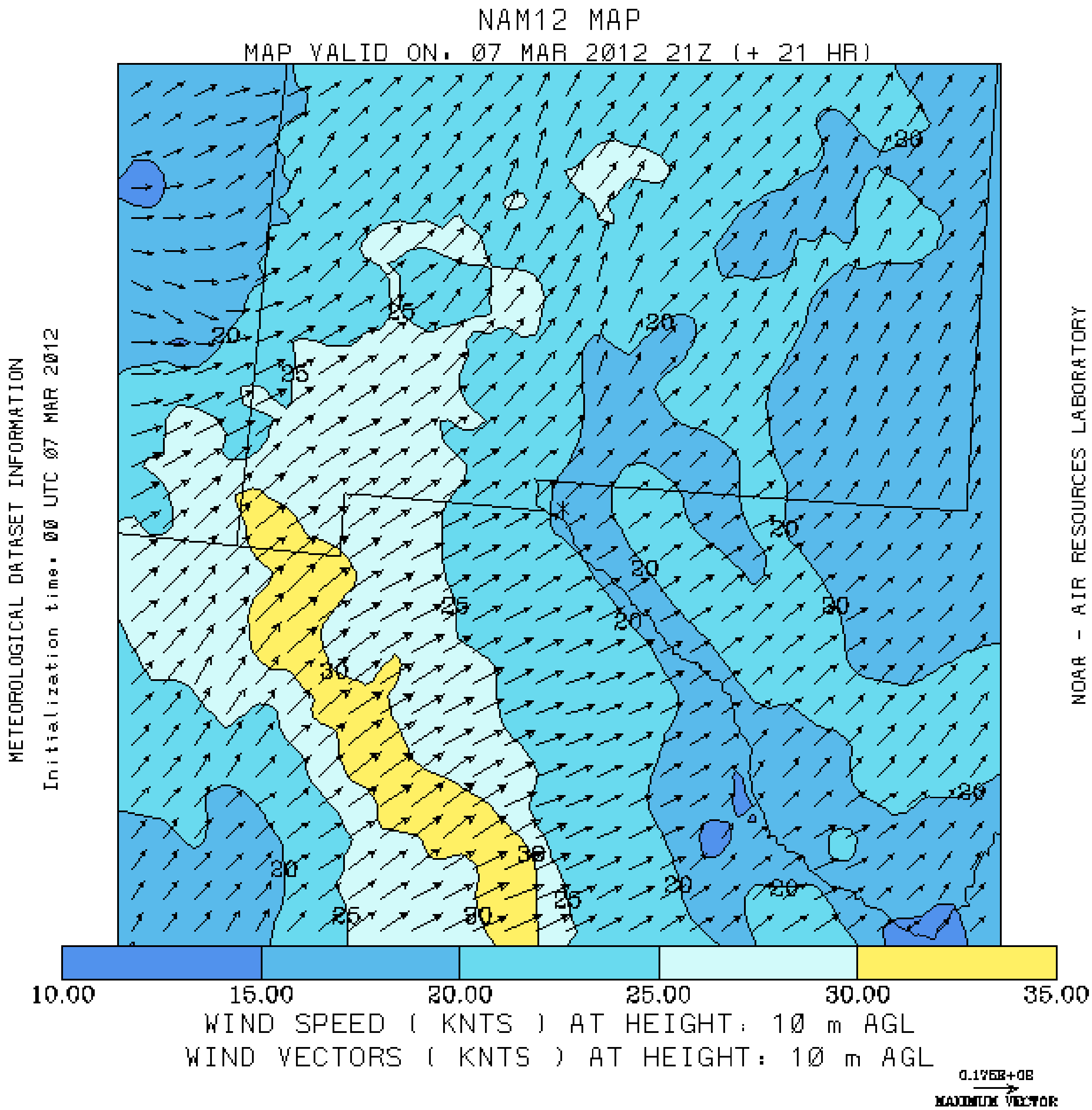

Figure 5-8. NOAA ARL model wind field in the El Paso area at 1400 MST on March 7, 2012. El Paso Airport is at the center and is marked with a black star.

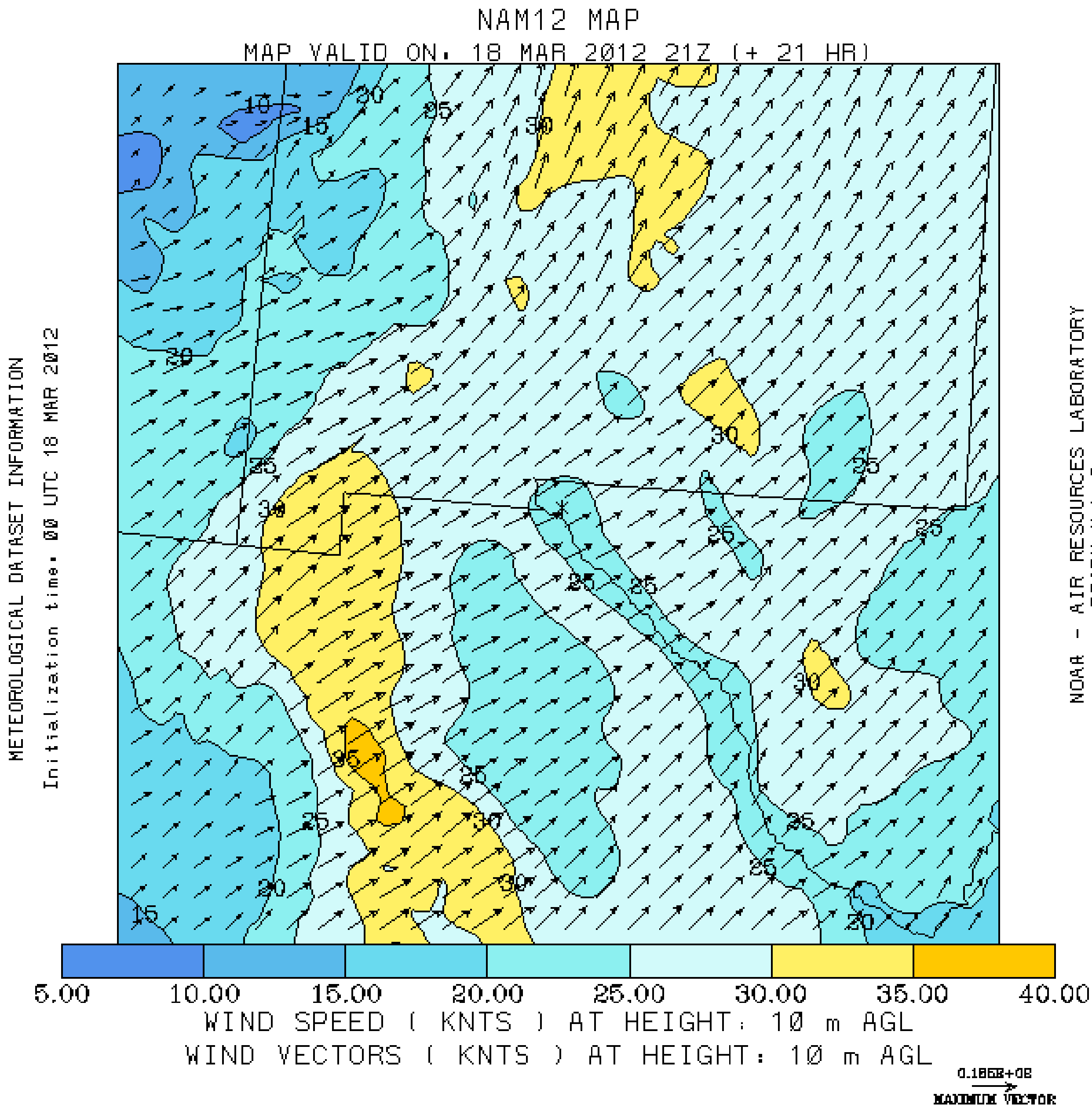

Figure 5-9. NOAA ARL model wind field in the El Paso area at 1400 MST on March 18, 2012. El Paso Airport is at the center and is marked with a black star.

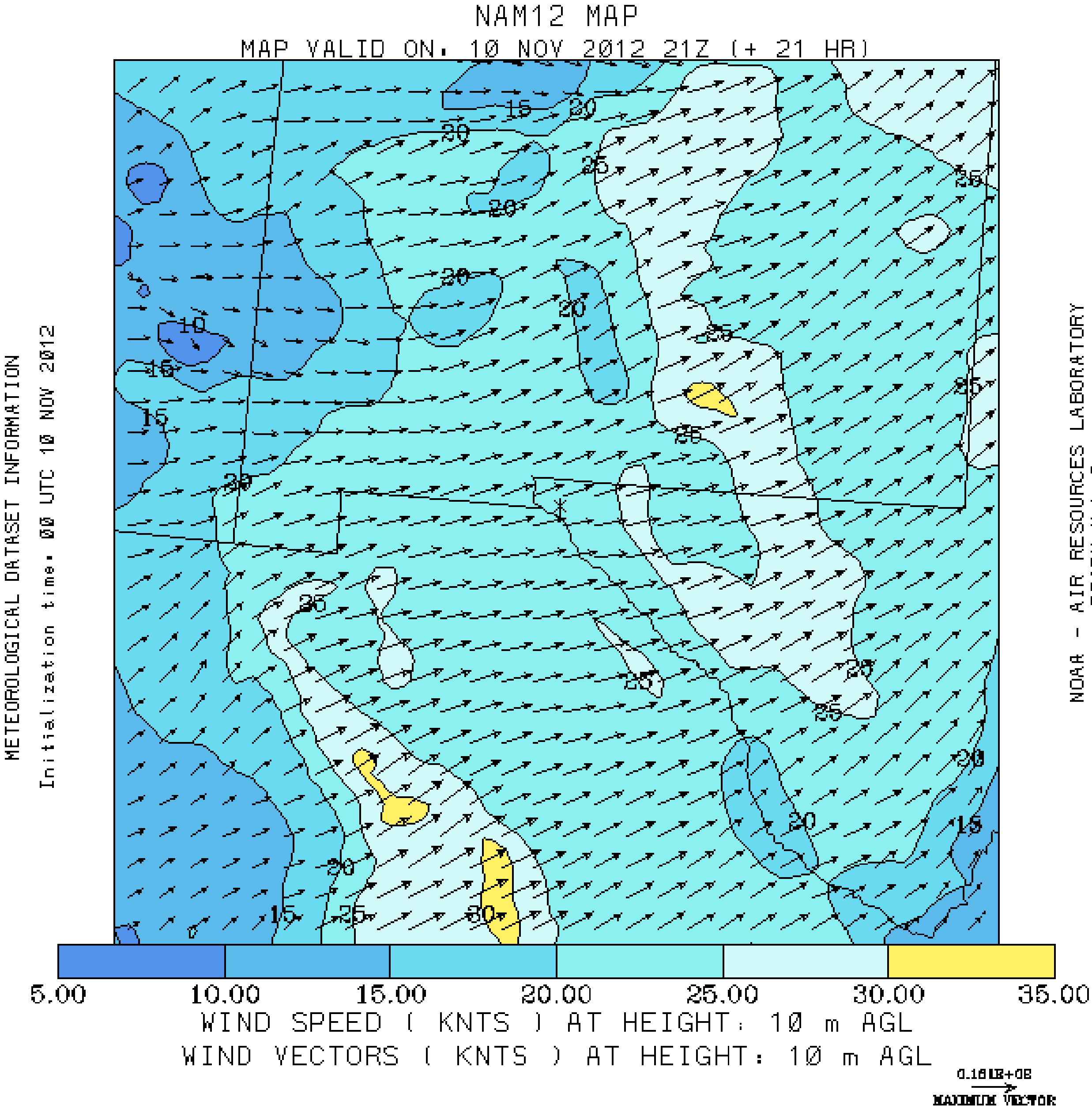

Figure 5-10. NOAA ARL model wind field in the El Paso area at 1400 MST on November 10, 2012. El Paso Airport is at the center and is marked with a black star.

As further evidence, Figure 5-11 shows the Chamizal hourly continuous FEM $PM_{2.5}$ concentrations versus hourly peak wind gust for 2011 and 2012. Note that all of the plotted $PM_{2.5}$ measurements above 150 µg/m^3 occur with hourly peak wind gusts of 35 mph or higher. For comparison, Figure 5-12 plots the hourly carbon monoxide concentrations at Chamizal over the same time period illustrating the impact to concentrations of more localized pollutants that begin to occur at higher wind speeds. The difference in the relationship with peak wind gust between these two pollutants is very pronounced with higher wind gusts.

Instead of tailing off to incoming background levels from the effects of dilution as with carbon monoxide, the $PM_{2.5}$ concentrations increase with higher wind gusts, indicating an impact from windblown dust at wind speeds above 30 mph, with the clearest influence at speeds above 35 mph.

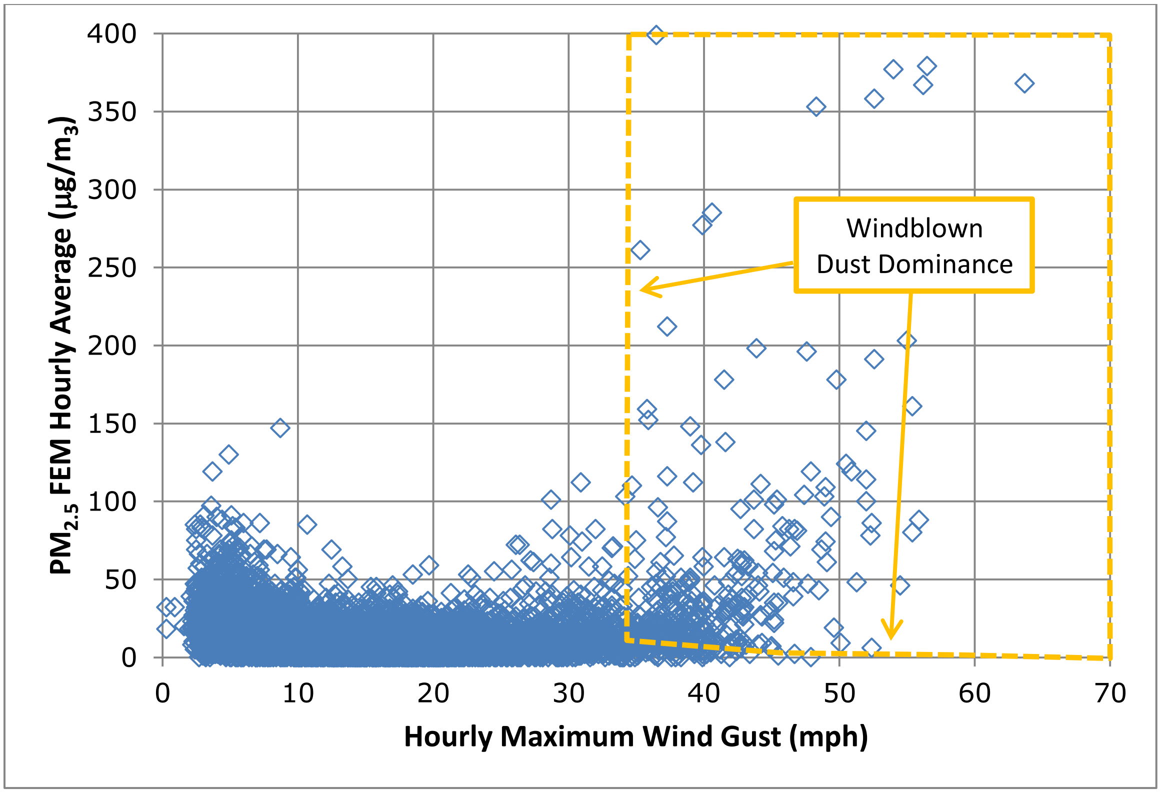

Figure 5-11. Chamizal hourly average $PM_{2.5}$ FEM concentration versus hourly peak wind gust for 2011 and 2012.

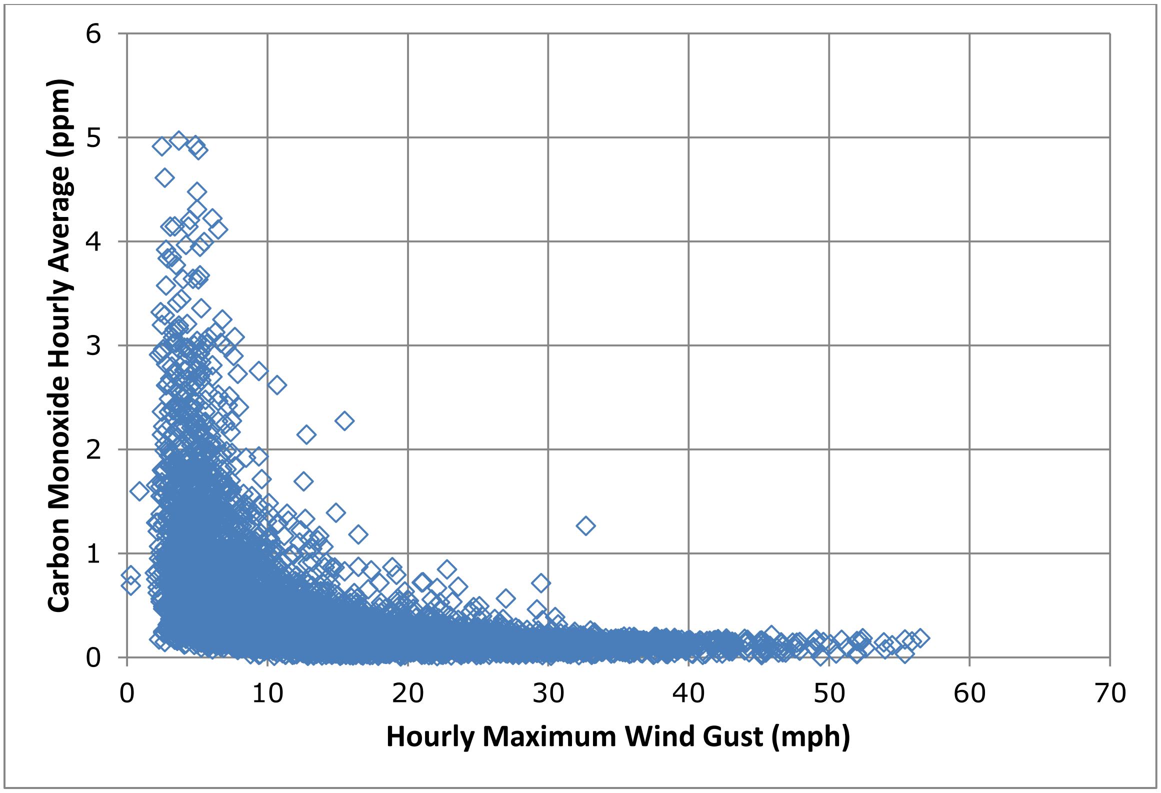

Figure 5-12. Chamizal hourly average carbon monoxide concentration versus hourly peak wind gust for 2011 and 2012.

Finally, an analysis of the speciated soil contribution at Chamizal provided in Figure 10 of the demonstration document validates the influence of windblown dust at wind speeds above 30 mph. For wind gusts below 30 mph, the highest speciated soil contribution measured at Chamizal during the period from 2001 through 2012 was 10.6 µg/m^3, with a daily peak wind gust of 14.2 mph. Alternatively, the first soil contribution measurement above 12.0 µg/m^3 occurs with a daily peak wind gust of 34.2 mph.

All of these analyses provide compelling evidence of windblown dust influence on the El Paso area at wind speeds in the range of 30 to 35 mph and indicate some windblown dust influence at wind speeds closer to 20 mph. For reference, Table 5-1 provides event wind summary information for each flagged event day. Note that recorded peak two-minute average wind speeds measured at the El Paso Airport and daily peak wind gusts measured at the individual monitoring sites were above 35 mph on each of the event days.

Table 5-1. Event wind information summary.

Site	Event Day	Daily Site Measurements						Site Peak Concentration				ELP NWS	
		PkG	Pk5m	Pk1hr	WSA	WSR	WDR	Start	Dur	WDA	WSA	PkG	PkS
UTEP	02/08/11	38.8	21.9	20.1	8.7	3.6	291	1500	4	266	16.5	61	46
UTEP	04/09/11	40.6	22.5	19.5	11.2	8.9	266	1400	6	267	15.0	47	38
Chamizal	02/08/11	46.7	29.5	26.1	11.1	5.7	280	1200	5	260	24.1	61	46
Chamizal	03/07/11	55.4	37.0	31.6	15.5	14.7	256	1200	5	253	29.0	66	53
Chamizal	04/09/11	46.3	31.6	26.7	16.1	13.7	254	1400	7	265	22.6	47	38
Chamizal	04/26/11	55.4	34.0	27.9	19.7	18.9	283	1300	8	286	24.5	70	48
Chamizal	05/10/11	47.4	28.6	25.1	15.2	12.9	265	1200	10	255	21.3	52	43
Chamizal	03/07/12	42.7	33.0	25.7	15.7	11.8	245	1200	8	251	21.8	46	38
Chamizal	03/18/12	63.7	39.1	31.9	17.7	14.3	244	1100	13	255	25.9	66	49
Chamizal	11/10/12	54.0	36.4	30.0	14.6	12.2	273	1100	5	267	24.8	52	43
Socorro	11/28/10	41.8	26.0	21.0	9.4	7.2	261	1300	7	260	18.7	54	44
Socorro	04/03/11	41.5	24.1	21.0	13.8	12.9	260	1000	9	254	17.2	53	44
Socorro	04/09/11	38.5	22.6	18.3	11.3	8.2	242	1100	10	251	15.8	47	38

Abbreviations:
Site Peak Concentration - period where hourly concentration exceeded the 24-hour NAAQS
ELP NWS - El Paso Airport National Weather Service automated weather station
PkG - Peak wind gust in mph
Pk5m - Peak five-minute average in mph
Pk1hr - Peak one-hour average in mph
WSA - Wind Speed Average in mph (arithmetic average)
WSR - Wind Speed Resultant (vector average)
WDR - Wind Direction Resultant (vector average) in degrees clockwise from true north
Start - Start of period with hourly particulate matter above the 24-hour NAAQS in LST
NAAQS - National Ambient Air Quality Standard
LST - Local Standard Time
Dur - Duration of period above 24-hour NAAQS in hours based on continuous measurements
PkS - Peak sustained wind (peak two-minute average) in mph

6. EPA Comments Regarding Figure 7

Figure 7 shows the Chamizal site monitor daily $PM_{2.5}$ average measurements versus El Paso area daily peak wind gust for 2008 through 2012. There is no such graph or data provided for UTEP. Without such information, we do not see how wind gust data, on its own, can be used as a wind threshold to support a $PM_{2.5}$ exceptional event claim at UTEP.

Figure 7 in the demonstration document was intended to serve as an example of the relationship between peak wind gusts and measured increases in $PM_{2.5}$ concentrations associated with high wind events in

El Paso. The events described in the demonstration document were wide-spread across the El Paso/Ciudad Juarez area, and did not have a singular impact on one monitoring site. In addition, neither the Exceptional Events rule, nor EPA guidance requires a site-specific wind threshold and the application of a site-specific threshold in support of an area-wide event would be inappropriate.

Figure 6-1 shows the UTEP daily $PM_{2.5}$ averages versus the El Paso area daily peak wind gust for 2008 through 2012. While the data pattern is similar to the graphed data for Chamizal presented in Figure 7 of the demonstration document, increases in measured $PM_{2.5}$ concentrations and peak wind gust do appear to be more positively correlated at a higher wind gusts. This difference in correlation is most likely due to the difference in terrain surrounding the UTEP site versus the other El Paso sites. Chamizal, Ascarate, and Socorro are located in flat, open areas of the city, while the terrain surrounding the UTEP site is dominated by larger structures associated with downtown buildings and the UTEP campus.

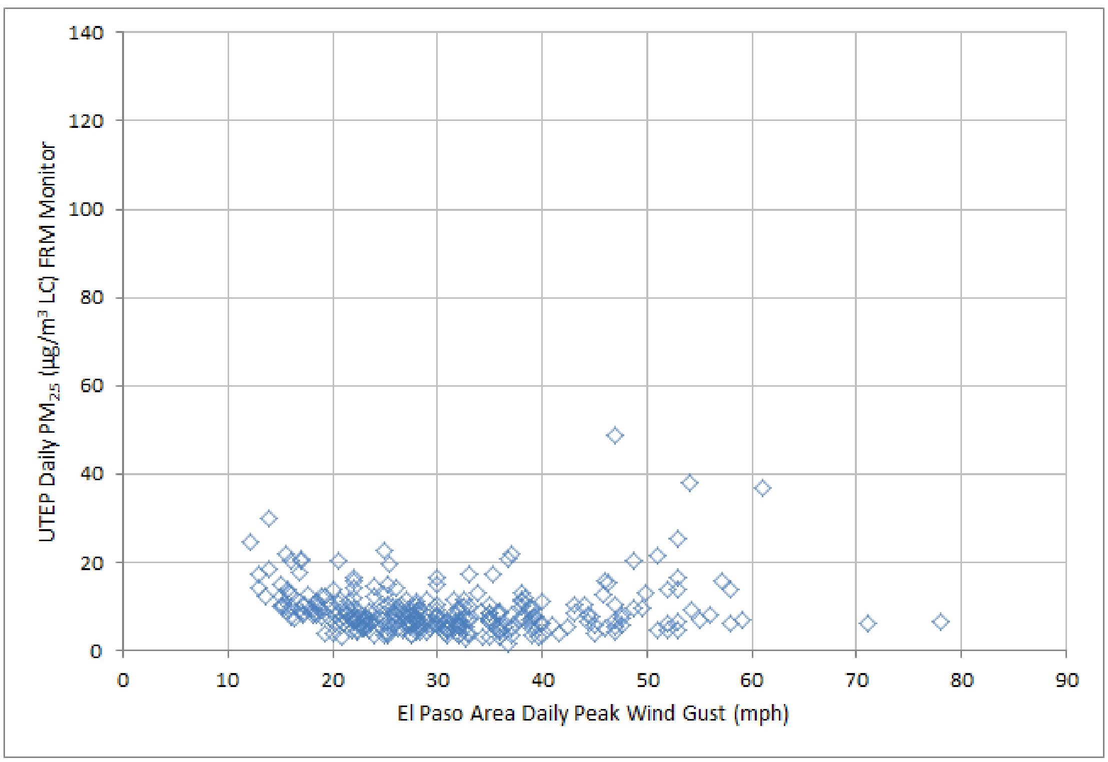

Figure 6-1. UTEP daily $PM_{2.5}$ average concentration for FRM measurements versus El Paso area daily peak wind gust for 2008 through 2012.

7. EPA Comments Regarding Pages 12-13

The text states: "the highest measured $PM_{2.5}$ and PM_{10} concentrations are experienced when wind gusts exceed 30 mph. In addition, Figure 7 illustrates the impact of local sources on $PM_{2.5}$ concentrations as evidenced by the elevated measurements when peak wind gusts are between 10 and 20 mph." Looking at Figures 7 and 8, there does not appear to be a clear separation between the contributions from local sources and high wind gust events, particularly for $PM_{2.5}$ and certainly not at 30 mph for both pollutants. The document will need to provide more supporting information that anthropogenic sources are not causing the flagged exceedances proposed as exceptional events, particularly for $PM_{2.5}$. Potential anthropogenic source contributions should be addressed for each specific event, not just generically, including routine and potentially non-routine PM emissions which may impact the affected monitor measurement. This is particularly critical for $PM_{2.5}$, where high wind speeds/gusts and elevated $PM_{2.5}$ concentrations may not occur at precisely the same time.

The demonstration should address the human activity component; at a minimum, by identifying PM sources upwind of the relevant monitors on each of the proposed PM exceptional event days, and conducting an evaluation of these sources' potential contribution to the relevant PM concentrations at the monitors on the proposed exceptional event days.

The document should also provide relevant PM data on days before and after the event. The document currently only seems to provide detailed PM data on event days.

Given that each of the event days measured concentrations well above the 95^{th} percentile of all measurements for El Paso, the TCEQ contends that a detailed local emissions assessment for each event day is unnecessary. A compelling weight of evidence was presented in the demonstration document that included satellite imagery, webcam imagery, and backward-in-time air parcel trajectories supporting a wide-spread transport event from outside of Texas. The transport of particulate matter from the northern Mexico area is further supported by the published research referenced above. Specifically, Gill et al. (2007) investigated dust source hot spots for multiple dust storm events from 2002 – 2006. Their work found that a huge playa complex within the Lake Palomas region of northern Chihuahua, Mexico, frequently contributed concentrated plumes of particulate matter that spread into the El Paso/Ciudad Juarez area. Particle size analyses of surface sediment samples from these playas revealed very fine clays and silts with grain sizes in the $PM_{2.5}$ and PM_{10} ranges, including particles as small as 0.2 microns.

An evaluation of the El Paso County particulate matter emissions inventory (EI) reveals the most significant contributions of anthropogenic particulate to be from unpaved roads, road construction, and commercial construction; not point sources with the potential for an emission event or drastic increases in emissions on a single day. Table 7-1 shows the area and mobile source particulate matter EI for El Paso County as reported for the 2011 National Emissions Inventory, as well as the 2010 to 2012 point-source EI. It is important to note that these inventories are representative of the entire county and not specific to just those areas upwind of area monitors on the event days. Given the proximity of the UTEP, Chamizal, and Socorro monitors to the international border and the wind direction on the flagged event days, impacts from major road construction or commercial construction projects are highly unlikely to have been a major contributor to the measured concentration values.

Table 7-1. El Paso County particulate matter emissions inventory in tons per year.

Category	**PM_{10}**	**$PM_{2.5}$**
2011 Area Source EI:		
Road construction	5,722.53	572.25
Unpaved roads	5,336.90	531.52
Commercial construction	1,757.49	175.75
Paved roads	793.11	198.28
Agricultural tilling	789.67	157.93
Residential construction	331.07	33.11
Mining and quarrying	328.48	41.06
All other area sources	489.26	418.24
2011 Mobile Source EI:		
On-road mobile sources	495.77	369.38
Off-road mobile sources	221.12	208.97
2010 Point Source EI	283.56	223.79
2011 Point Source EI	324.52	261.03
2012 Point Source EI	328.89	263.85

Figure 7-1 plots the location of point sources in the El Paso area reporting 2012 particulate matter emissions of 5 tons per year or greater relative to the three exceptional event monitoring sites. Note that each of these sources is located downwind of the monitors on the event days and would not be expected to significantly contribute to measured concentrations given the wind directions on the flagged event days. The number plotted by each point source circle is the PM_{10} annual emission rate in tons per year from the 2012 TCEQ emissions inventory. The blue shading in each point source circle indicates the fraction of the total PM_{10} emitted as $PM_{2.5}$ based on the 2012 $PM_{2.5}$ annual emission rate.

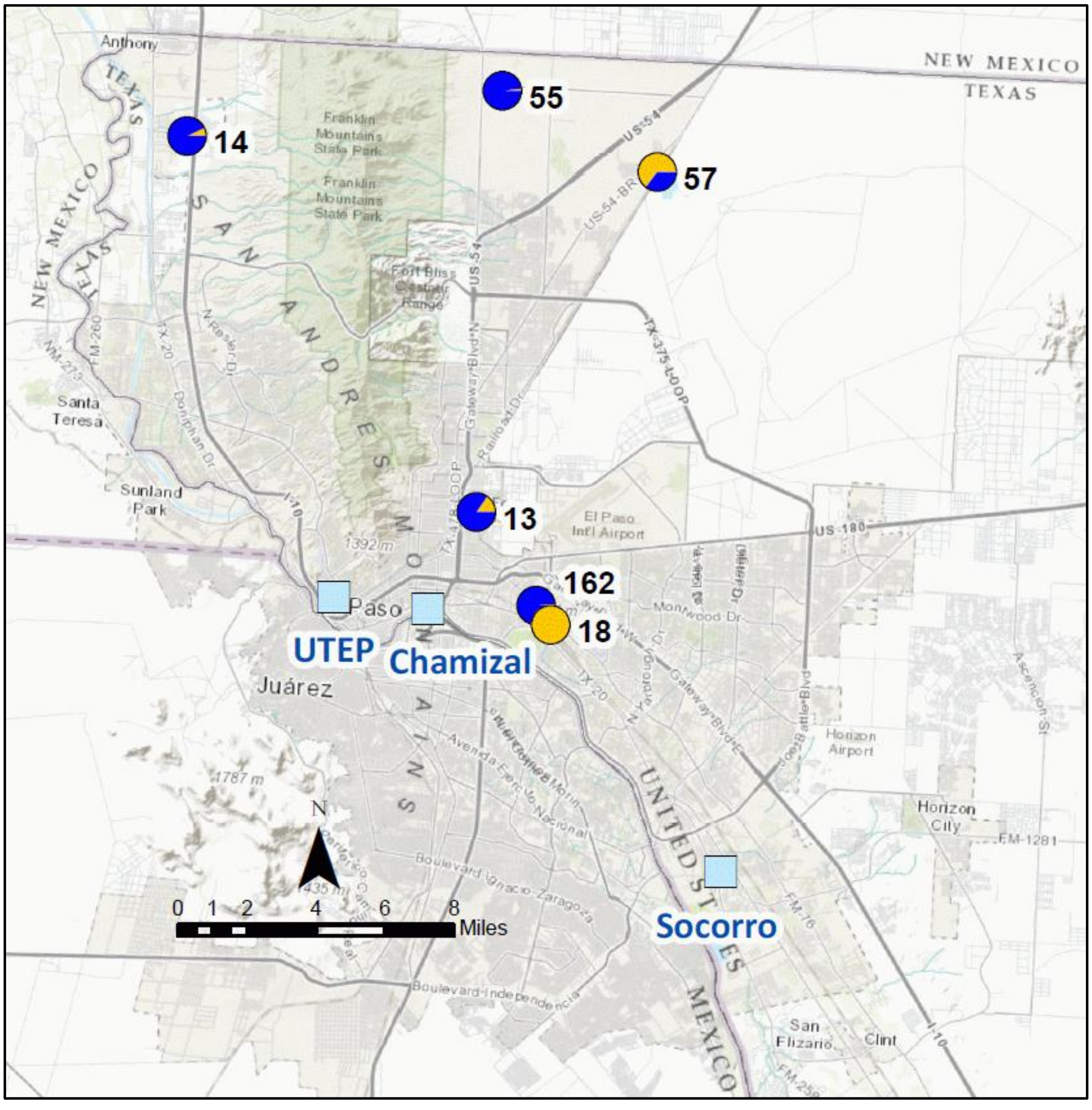

Figure 7-1. Map of El Paso area significant PM_{10} point source locations with emissions in tons per year, with fraction emitted as $PM_{2.5}$ shaded in blue and remainder of PM_{10} in gold. The exceptional event sites are shown with blue squares and labeled by name.

To further illustrate the impact these windblown dust events have on the El Paso area versus local anthropogenic dust, the TCEQ conducted a comparative analysis similar to the surrogate analysis in the demonstration document. Using data from the Chamizal site, this comparative analysis focused on identifying days with wind speed and wind direction measurements comparable to the event days, but without visible satellite evidence of windblown dust plumes. Days with peak wind gusts above 35 mph, peak 1-hour average wind speeds above 15 mph, and daily resultant wind directions representing a westerly flow were targeted for the analysis. Moderate Resolution Imaging Spectroradiometer (MODIS) sensor imagery from the Aqua satellite, recorded during the time period of measured peak wind gusts, was then reviewed for the presence of visible dust plumes. Daily average particulate matter measurements were then evaluated for those days without visible dust plumes in northern Mexico and southern New Mexico. Table 7-2 provides four representative days where wind speed and wind direction are comparable to the event days. Figures 7-2 through 7-5 provide the corresponding Aqua satellite images. On each of the identified days, the daily average $PM_{2.5}$ and PM_{10} measurements were significantly less than on each of the flagged event days when windblown dust plumes were advecting out of northern Mexico or southern New Mexico. This analysis, while rough, provides additional supporting evidence that measured concentrations on the flagged event days were not the result of anthropogenic sources in the El Paso area.

Table 7-2. Chamizal particulate matter and wind measurements on days with high winds but low particulate matter concentrations.

Day	$PM_{2.5}$	PM_{10}	WDR	Pk1	Gust	WDV	Prc3
03/08/11	6.9	48	292	26.1	44.3	0.89	0.00
04/07/11	9.2	56	262	21.9	36.8	0.95	0.00
05/17/11	10.2	68	270	23.1	46.6	0.95	0.00
02/19/12	8.9	61	257	22.4	38.6	0.68	0.00

Abbreviations:
$PM_{2.5}$ - FEM daily average μg/m^3 LC.
PM_{10} - continuous daily average in μg/m^3 LC.
WDR - daily wind direction resultant in degrees from north.
Pk1 - peak 1-hour average wind speed in mph.
Gust - peak wind gust in mph.
WDV - wind direction variability ratio.
Prc3 - El Paso Airport precipitation total over the most recent three days.

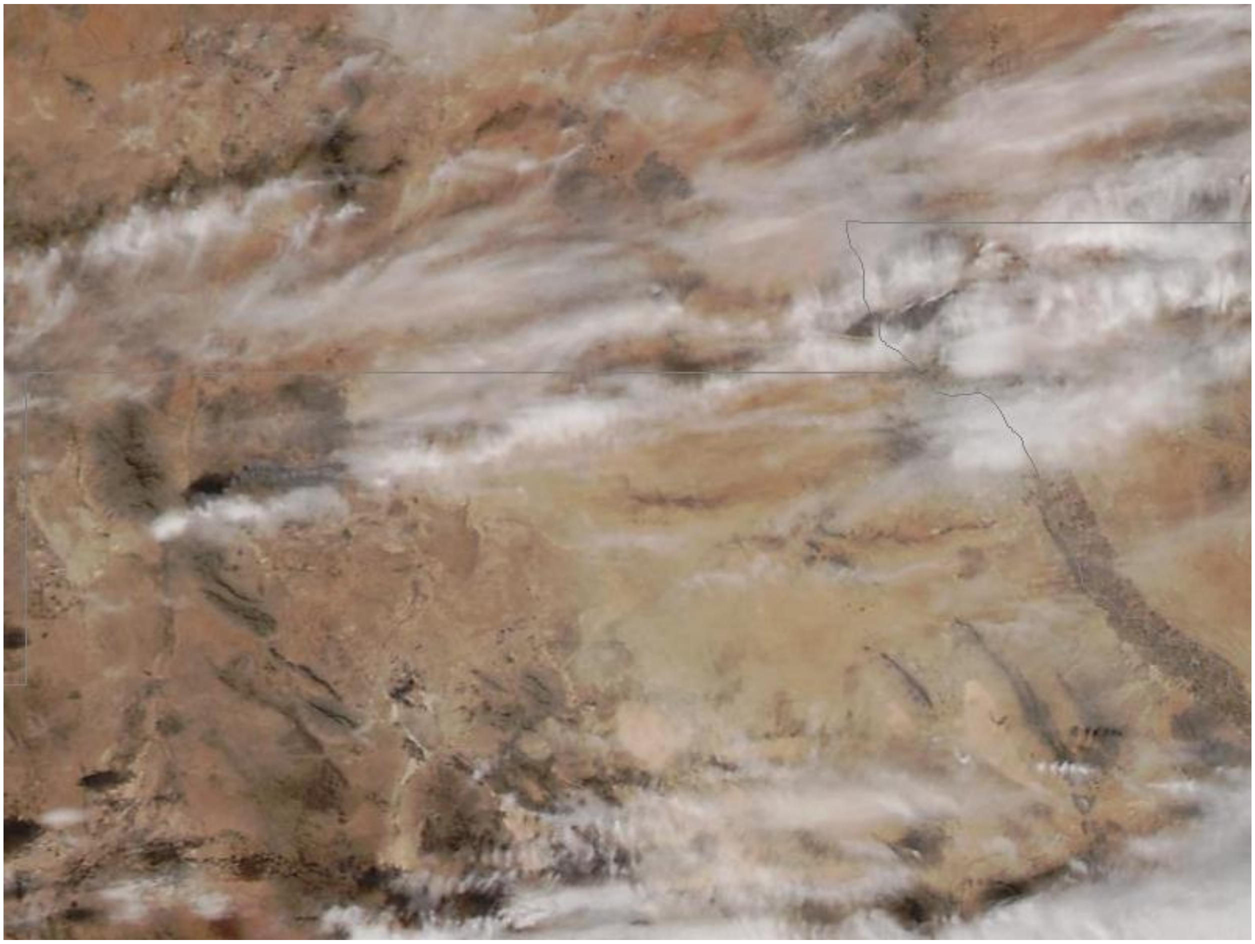

Figure 7-2. Aqua MODIS true color satellite image showing no evidence of dust plumes in the El Paso area at 1301 MST on March 8, 2011.

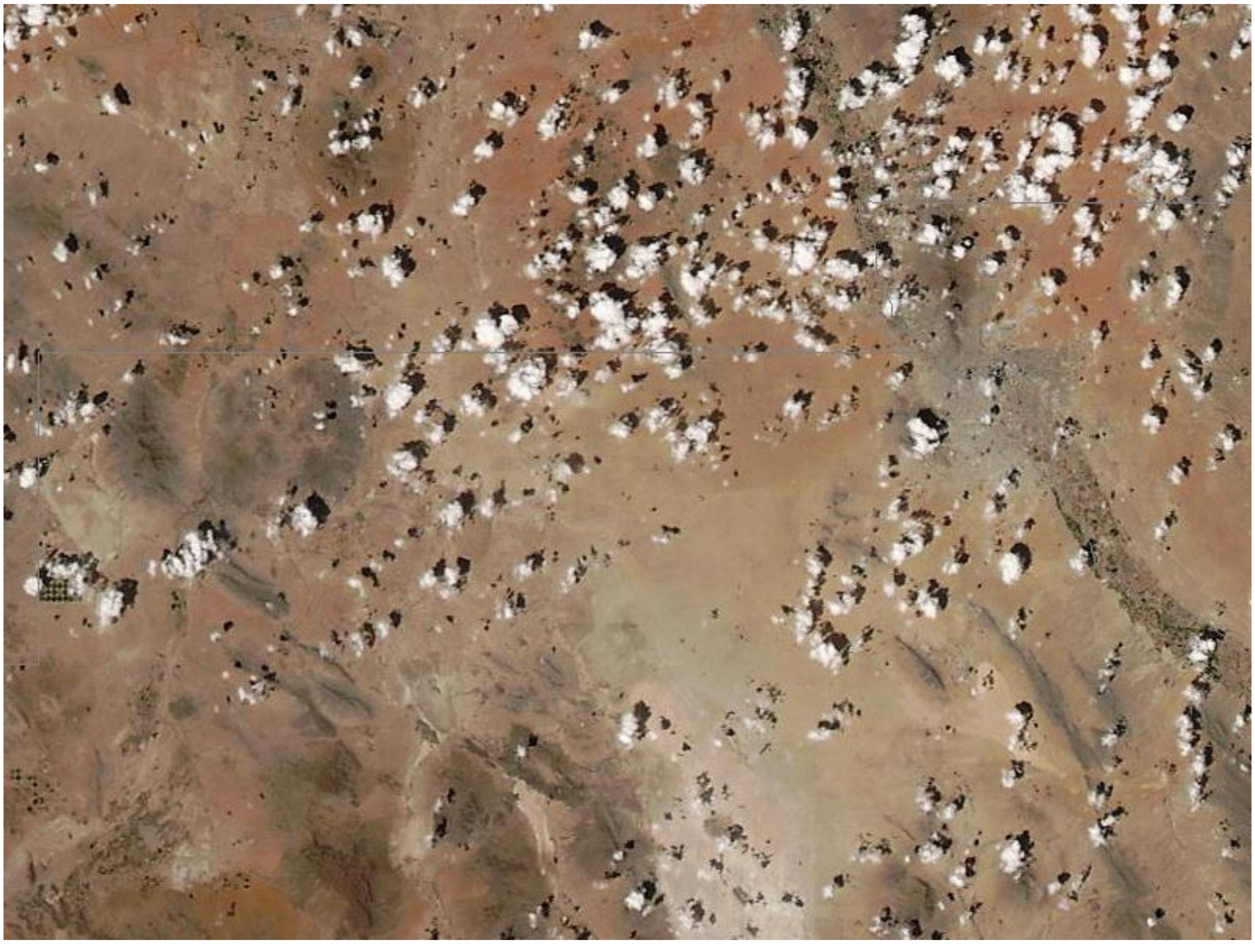

Figure 7-3. Aqua MODIS true color satellite image showing no evidence of dust plumes in the El Paso area at 1315 MST on April 7, 2011.

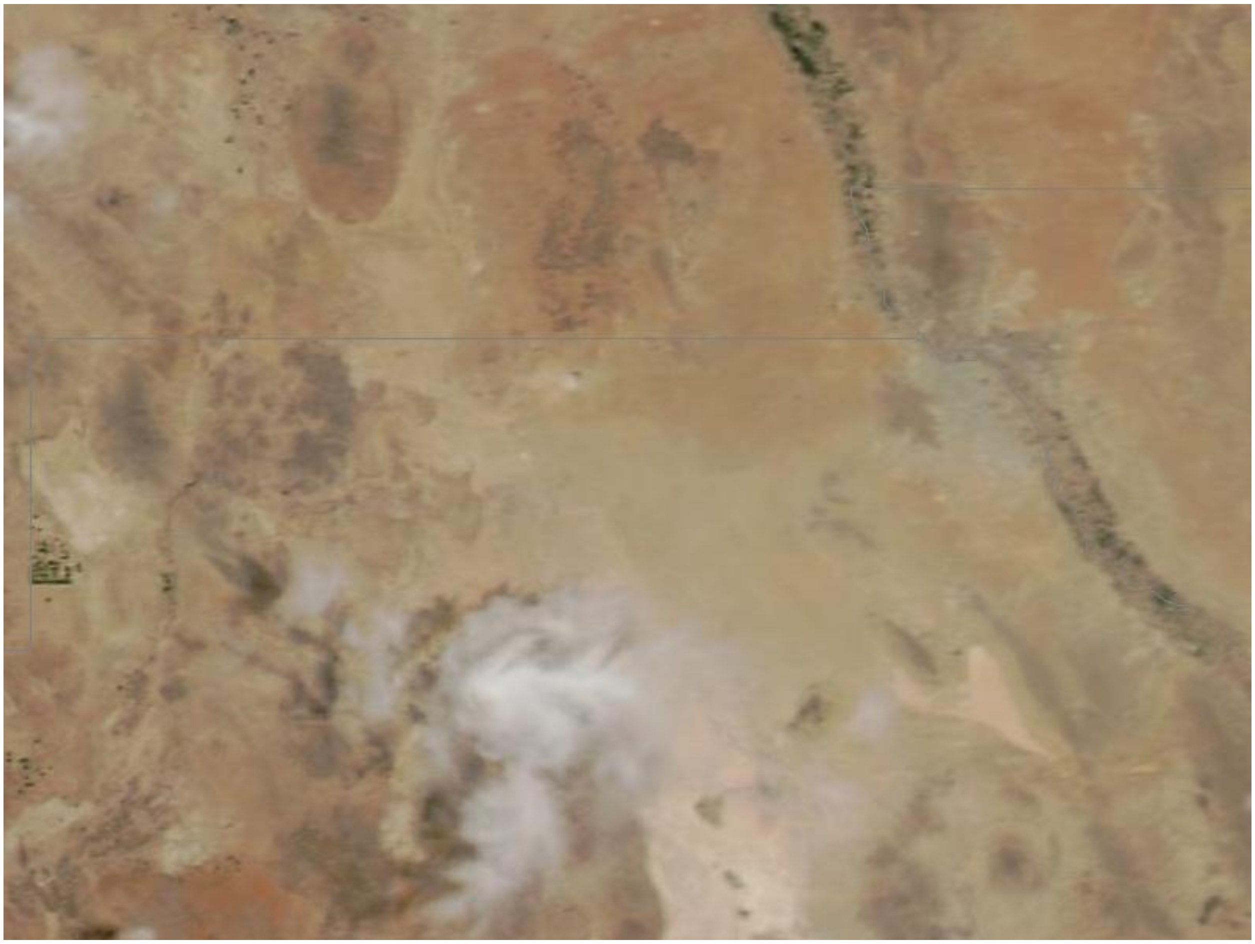

Figure 7-4. Aqua MODIS true color satellite image showing no evidence of dust plumes in the El Paso area at 1402 MST on May 17, 2011.

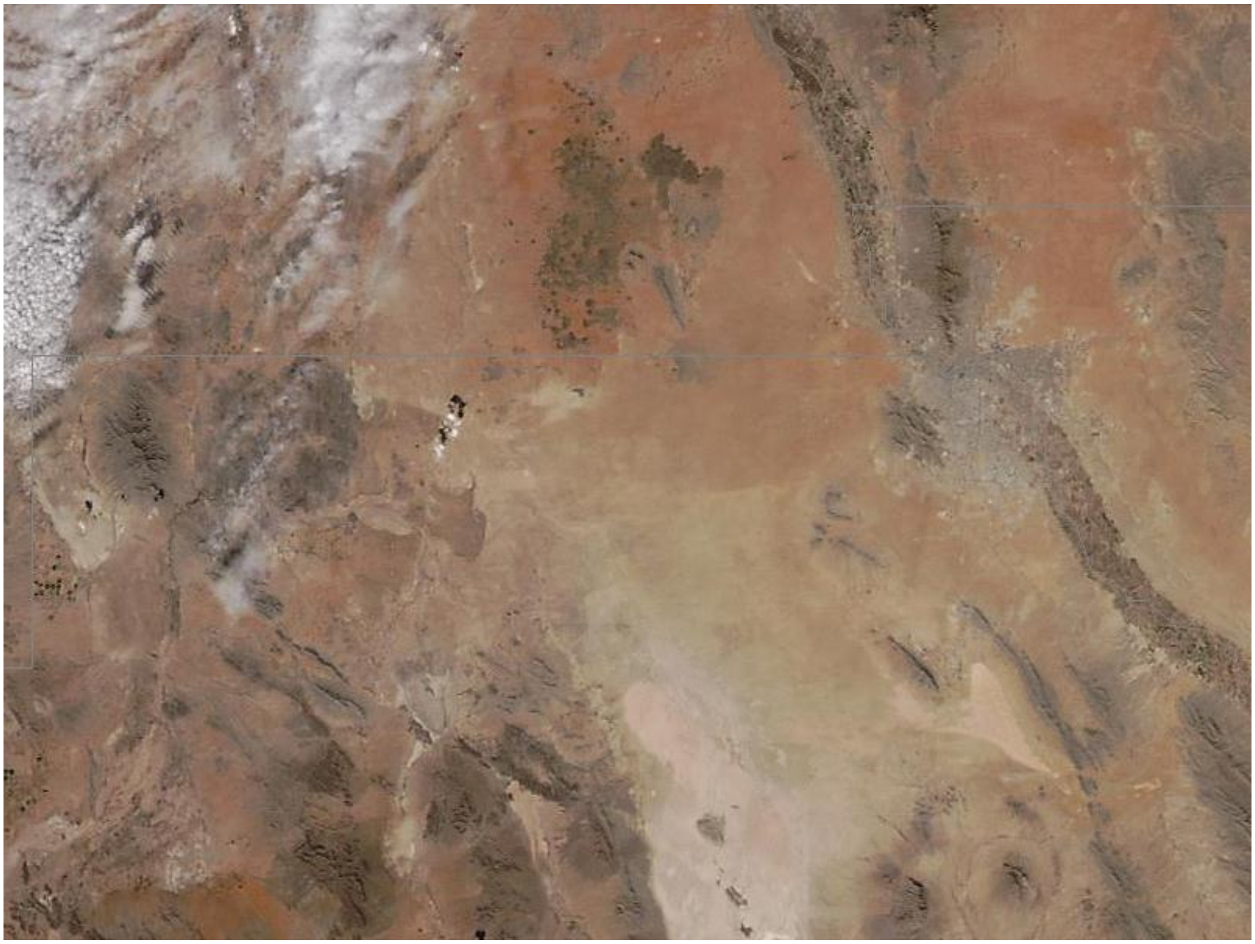

Figure 7-5. Aqua MODIS true color satellite image showing no evidence of dust plumes in the El Paso area at 1330 MST on February 19, 2012.

Additional $PM_{2.5}$ and PM_{10} data for days before and after each flagged event day are presented in Tables 7-3 through 7-11. This information highlights the significant impacts of windblown dust events associated with specific meteorological conditions on the flagged event days.

Table 7-3. Socorro PM_{10} daily average measurements (μg/m^3) before and after the November 28, 2010, proposed exceptional event day.

Date	FRM	C
11/22/10	25	*
11/23/10	--	43
11/24/10	--	38
11/25/10	--	33
11/26/10	--	34
11/27/10	--	47
11/28/10	**249**	**251**
11/29/10	--	32
11/30/10	--	33
12/01/10	--	50
12/02/10	--	65
12/03/10	--	81
12/04/10	52	48

Bold shading indicates proposed exceptional event day measurements.
* indicates missing data due to invalid measurement.
FRM - Federal Reference Method monitor PM_{10} concentration (μg/m^3).
C - continuous monitor PM_{10} concentration (μg/m^3).
-- - sample collection was not scheduled for listed day.

Table 7-4. UTEP and Chamizal $PM_{2.5}$ daily average measurements (μg/m^3) before and after the February 8, 2011, proposed exceptional event day.

	UTEP		Chamizal		
Date	FRM	AC	FRM	FEM	AS
02/02/11	7.6	4.4	*	7.8	*
02/03/11	--	5.4	--	*	--
02/04/11	--	6.7	--	9.2	--
02/05/11	--	6.9	--	6.8	*
02/06/11	--	6.6	--	4.2	--
02/07/11	--	12.5	--	19.2	--
02/08/11	**36.8**	**23.9**	**42.9**	**28.4**	*
02/09/11	--	6.6	--	4.6	--
02/10/11	--	15.5	--	7.3	--
02/11/11	--	15.1	--	17.7	13.1
02/12/11	--	16.4	--	19.9	--
02/13/11	--	9.9	--	17.3	--
02/14/11	20.4	11.9	26.9	*	13.5

Bold shading indicates proposed exceptional event day measurements.
* indicates missing data due to invalid measurement.
FRM - Federal Reference Method monitor $PM_{2.5}$ concentration (μg/m^3).
FEM - Federal Equivalent Method monitor $PM_{2.5}$ concentration (μg/m^3).
AC - acceptable continuous monitor $PM_{2.5}$ concentration (μg/m^3).
AS - acceptable speciation monitor $PM_{2.5}$ concentration (μg/m^3).
-- - sample collection was not scheduled for listed day.

Table 7-5. Chamizal $PM_{2.5}$ daily average measurements (μg/m^3) before and after the March 7, 2011, proposed exceptional event day.

	Chamizal		
Date	FRM	FEM	AS
03/01/11	--	11.9	9.7
03/02/11	--	13.0	--
03/03/11	--	3.8	--
03/04/11	8.7	9.6	8.4
03/05/11	--	6.0	--
03/06/11	--	9.7	--
03/07/11	--	**37.2**	**38.7**
03/08/11	--	6.9	--
03/09/11	--	9.2	--
03/10/11	*	10.4	12.1
03/11/11	--	12.4	--
03/12/11	--	7.0	--
03/13/11	--	6.7	9.0

Bold shading indicates proposed exceptional event day measurements.
* indicates missing data due to invalid measurement.
FRM - Federal Reference Method monitor $PM_{2.5}$ concentration (μg/m^3).
FEM - Federal Equivalent Method monitor $PM_{2.5}$ concentration (μg/m^3).
AC - acceptable continuous monitor $PM_{2.5}$ concentration (μg/m^3).
AS - acceptable speciation monitor $PM_{2.5}$ concentration (μg/m^3).
-- - sample collection was not scheduled for listed day.

Table 7-6. Socorro PM_{10} daily average measurements (μg/m^3) before and after the April 3, 2011, and April 9, 2011, proposed exceptional event days.

Date	FRM	C
03/28/11	35	35
03/29/11	--	30
03/30/11	--	41
03/31/11	--	32
04/01/11	--	56
04/02/11	--	46
04/03/11	**159**	**167**
04/04/11	--	127
04/05/11	--	49
04/06/11	--	54
04/07/11	--	40
04/08/11	--	34
04/09/11	**169**	**171**
04/10/11	--	22
04/11/11	--	20
04/12/11	--	40
04/13/11	--	45
04/14/11	--	65
04/15/11	50	45

Bold shading indicates proposed exceptional event day measurements.
FRM - Federal Reference Method monitor PM_{10} concentration (μg/m^3).
C - continuous monitor PM_{10} concentration (μg/m^3).
-- - sample collection was not scheduled for listed day.

Table 7-7.UTEP and Chamizal $PM_{2.5}$ daily average measurements (μg/m^3) before and after the April 9, 2011, proposed exceptional event day.

	UTEP		Chamizal		
Date	FRM	AC	FRM	FEM	AS
04/03/11	25.2	20.9	23.8	33.0	24.4
04/04/11	--	18.7	--	28.2	--
04/05/11	--	12.4	--	14.7	--
04/06/11	--	9.8	--	6.7	7.5
04/07/11	--	9.9	--	9.2	--
04/08/11	--	7.8	--	6.2	--
04/09/11	**48.7**	**28.5**	**38.5**	**33.8**	**26.8**
04/10/11	--	6.0	--	5.2	--
04/11/11	--	6.1	--	5.6	--
04/12/11	--	10.4	--	14.7	15.3
04/13/11	--	8.6	--	7.8	--
04/14/11	--	18.8	--	21.2	--
04/15/11	22.8	16.8	21.2	21.3	19.0

Bold shading indicates proposed exceptional event day measurements.
FRM - Federal Reference Method monitor $PM_{2.5}$ concentration (μg/m^3).
FEM - Federal Equivalent Method monitor $PM_{2.5}$ concentration (μg/m^3).
AC - acceptable continuous monitor $PM_{2.5}$ concentration (μg/m^3).
AS - acceptable speciation monitor $PM_{2.5}$ concentration (μg/m^3).
-- - sample collection was not scheduled for listed day.

Table 7-8. Chamizal $PM_{2.5}$ daily average measurements (μg/m^3) before and after the April 26, 2011, proposed exceptional event day.

Date	FRM	FEM	AS
04/20/11	--	11.3	--
04/21/11	11.1	8.5	6.3
04/22/11	--	5.7	--
04/23/11	--	5.9	--
04/24/11	--	12.5	11.2
04/25/11	--	8.9	--
04/26/11	--	**36.2**	--
04/27/11	18.6	12.3	15.8
04/28/11	--	8.0	--
04/29/11	--	22.2	--
04/30/11	--	12.9	11.7
05/01/11	--	10.5	--
05/02/11	--	6.2	--

Bold shading indicates proposed exceptional event measurement.
FRM - Federal Reference Method monitor $PM_{2.5}$ concentration (μg/m^3).
FEM - Federal Equivalent Method monitor $PM_{2.5}$ concentration (μg/m^3).
AC - acceptable continuous monitor $PM_{2.5}$ concentration (μg/m^3).
AS stands for acceptable speciation monitor $PM_{2.5}$ concentration (μg/m^3).
-- - sample collection was not scheduled for listed day.

Table 7-9. Chamizal $PM_{2.5}$ daily average measurements ($\mu g/m^3$) before and after the May 10, 2011, proposed exceptional event day.

Date	FRM	FEM	AS
05/04/11	--	14.1	--
05/05/11	--	15.2	--
05/06/11	--	16.5	14.7
05/07/11	--	8.2	--
05/08/11	--	11.2	--
05/09/11	18.7	14.3	14.1
05/10/11	--	**36.3**	--
05/11/11	--	7.8	--
05/12/11	--	3.8	5.3
05/13/11	--	9.2	--
05/14/11	--	11.3	--
05/15/11	21.7	9.0	8.7
05/16/11	--	12.0	--

Bold shading indicates proposed exceptional event measurement.
FRM - Federal Reference Method monitor $PM_{2.5}$ concentration ($\mu g/m^3$).
FEM - Federal Equivalent Method monitor $PM_{2.5}$ concentration ($\mu g/m^3$).
AC - acceptable continuous monitor $PM_{2.5}$ concentration ($\mu g/m^3$).
AS - acceptable speciation monitor $PM_{2.5}$ concentration ($\mu g/m^3$).
-- - sample collection was not scheduled for listed day.

Table 7-10. Chamizal $PM_{2.5}$ daily average measurements (μg/m^3) before and after the March 7 and March 18, 2012, proposed exceptional event days.

Date	FRM	FEM	AS
03/01/12	--	7.5	4.6
03/02/12	--	19.6	--
03/03/12	--	6.0	--
03/04/12	11.7	13.2	11.2
03/05/12	--	17.2	--
03/06/12	--	16.9	--
03/07/12	--	**85.0**	**69.1**
03/08/12	--	14.6	--
03/09/12	--	*	--
03/10/12	4.1	*	5.0
03/11/12	--	9.2	--
03/12/12	--	10.3	--
03/13/12	--	11.0	11.4
03/14/12	--	6.8	--
03/15/12	--	19.8	--
03/16/12	17.0	16.7	14.6
03/17/12	--	13.0	--
03/18/12	--	**130.4**	--
03/19/12	--	10.9	4.3
03/20/12	--	3.4	--
03/21/12	--	8.3	--
03/22/12	6.0	6.6	9.0
03/23/12	--	7.3	--
03/24/12	--	10.4	--

Bold shading indicates proposed exceptional event measurements.
* indicates missing data due to invalid measurement.
FRM - Federal Reference Method monitor $PM_{2.5}$ concentration (μg/m^3).
FEM - Federal Equivalent Method monitor $PM_{2.5}$ concentration (μg/m^3).
AC - acceptable continuous monitor $PM_{2.5}$ concentration (μg/m^3).
AS - acceptable speciation monitor $PM_{2.5}$ concentration (μg/m^3).
-- - sample collection was not scheduled for listed day.

Table 7-11. Chamizal $PM_{2.5}$ daily average measurements (µg/m^3) before and after the November 10, 2012, proposed exceptional event day.

Date	FRM	FEM	AS
11/04/12	--	18.4	--
11/05/12	16.4	22.2	25.2
11/06/12	--	26.3	--
11/07/12	--	22.1	--
11/08/12	--	19.3	15.0
11/09/12	--	8.1	--
11/10/12	--	**45.7**	--
11/11/12	4.0	7.4	6.0
11/12/12	--	7.5	--
11/13/12	--	8.8	--
11/14/12	--	15.1	24.0
11/15/12	--	14.8	--
11/16/12	--	14.0	--

Bold shading indicates proposed exceptional event measurement.
FRM - Federal Reference Method monitor $PM_{2.5}$ concentration (µg/m^3).
FEM - Federal Equivalent Method monitor $PM_{2.5}$ concentration (µg/m^3).
AC - acceptable continuous monitor $PM_{2.5}$ concentration (µg/m^3).
AS - acceptable speciation monitor $PM_{2.5}$ concentration (µg/m^3).
-- - sample collection was not scheduled for listed day.

8. EPA Comment Regarding Page 38

In Figure 26, it appears there is very little PM_{10} FRM data in 2012. Please provide an explanation or include the data.

The original Socorro site had to be unexpectedly relocated in early 2012. With little notice, the property owner terminated their site agreement and required the TCEQ to vacate the premises due to the sale of the property. The site was successfully relocated to the Hueco Elementary School and began operations in late 2012. Consequently, there are no PM_{10} FRM data available at Socorro from January 28 through December 23, 2012.

9. EPA Comments Regarding Pages 38-44

Page 38-44: Additional information is needed regarding the process to determine surrogate days for the Chamizal, UTEP and Socorro sites. There are questions and differences that need to be resolved.

a) Please provide the ranges for moderate vs. high vs. low winds. Please explain how "high wind days" are defined, i.e., by gusts, peak 1-hr averages, daily speeds, or daily resultant speeds.

The use of "low," "moderate," and "high" winds is intended to be general and not specific when describing concepts. Surrogate days were selected based on the best fit of multiple meteorological conditions, so a day with wind gusts and wind speed averages within the moderate range was not automatically selected as a surrogate. The criteria used to determine potential surrogate days were based on site-specific peak wind gusts and daily wind speed averages for the event days. Again, although the categories are intended to be general, the approximate wind categories for each site are provided in Table 9-1 below. Effectively, high wind days are those with a daily peak wind gust above the applicable peak wind gusts identified for each site in Table 9-1. Similarly, low wind days are those with daily average wind speeds below the applicable average wind speeds identified for each site.

Table 9-1. Characterization of wind day criteria.

Site	High		Moderate		Low	
	Gust	WSA	Gust	WSA	Gust	WSA
Chamizal	>24	>10	20-24	8-10	<20	<8
UTEP	>24	>10	20-24	5-10	<20	<5
Socorro	>32	>10	20-32	5-10	<20	<5

Gust - Daily peak wind gust in mph
WSA - Daily wind speed average in mph

b) Please explain in: more detail the differences in the wind gust and speed limits used to select potential surrogate days for Chamizal site monitor, the UTEP site monitor and the Socorro site monitor. Please explain why these parameters vary for the three sites and what makes them technically appropriate for each site.

Wind measurements across an urban area are never uniform near the surface and are highly influenced by local terrain and by highly localized wind flow obstructions such as nearby buildings and trees. Therefore, each monitoring site has its own unique representation of the wind flow in the area and will often differ significantly from site to site as was illustrated by the variability of the wind rose plots for each site in Figure 11 in the demonstration document (page 16). Further evidence of this variability can been seen in the annual average wind speed, which for 2011 was 8.6 mph at the El Paso Airport, 7.8 mph at Chamizal, 7.4 mph at UTEP, and 5.7 mph at Socorro. Therefore, the development of surrogate wind criteria for each individual site was deemed more technically appropriate than a single set of surrogate wind criteria.

c) The appropriateness of the use and range of daily resultant wind direction in the surrogate day selection process is not evident in the document. For example, the text states "The daily resultant wind direction was constrained to be between 240 and 295 degrees clockwise from true north to match the range of wind direction on the event days." In this instance, an explanation is needed on how a daily resultant wind direction range of 240 and 295 degrees addresses an apparent range of 230-280 degrees for wind direction on the event days.

The wind direction range of 230 to 280 degrees listed in Table 2 of the demonstration document represents the wind direction associated with the daily peak two-minute wind speed measured at the El Paso Airport for each event day. While these wind direction measurements indicate the direction the wind was blowing at the time of the measured peak sustained winds, they are not representative of the wind direction for the entire day. The daily wind direction resultant (WDR) takes into account the minor variability in wind direction over the course of each day and is a more appropriate representation of daily wind direction.

Tables 5, 7, and 9 in the demonstration document list the daily WDR and wind direction variability ratio as measured at each respective monitoring site. Based on these measurements, the event daily WDR ranged from 243 to 283 degrees for Chamizal, 242 to 261 degrees for Socorro, and 266 to 291 degrees for UTEP. Surrogate days were selected based on WDR ranges that encompassed the measured event daily WDR resulting in the use of 240 to 285 degrees for Chamizal and Socorro and 240 to 295 degrees for UTEP. For each site the initial range in WDR was set to the nearest five degree value just outside of the measured range to allow for some uncertainty in the measurement. The upper end of the range for Socorro was expanded slightly to match the upper end of the range for Chamizal, thus increasing the number of potential surrogate days at Socorro with FRM data. Likewise the lower end of the UTEP range was expanded to match the lower end of the range for Chamizal, thus increasing the number of potential surrogate days at UTEP with FRM data.

d) The text states: "only those days with WDV of 0.5 or higher were included" but it is not clear whether a lower/higher wind direction variability ratio (WDV) may have been more appropriate. For some of *the event days, a WDV of 0.5 does not seem to represent what occurred on those days. Please clarify this choice.*

The ratio of the vector wind magnitude to the scalar wind speed average (WDV) is a direct measure of the variability of the wind direction over the measurement period and ranges from extreme variability with a value of zero to a constant wind direction with a value of one. The selected 0.5 value for surrogate days is the midpoint of this range and separates the days with more variable wind directions (WDV less than 0.5) from those days with less variable wind directions (WDV great than 0.5).

The average WDV across all flagged event days proposed for Chamizal, UTEP, and Socorro was 0.82, 0.60, and 0.81, respectively. In addition, only one of the thirteen flagged event days, February 8, 2011, had a WDV less than 0.7 (WDV of 0.52 for Chamizal and 0.41 for UTEP). Based on this evaluation, the use of a WDV of 0.5 or higher as a criterion for potential surrogate days appears to very closely represent what occurred on the event days. Since the variability of the wind direction increases as the WDV decreases, the choice of 0.5 or higher was used to exclude days where the wind direction was more variable over the course of the day than what was seen on the event days.

e) For April 9, 2011, the wind direction resultant (WDR) indicates winds came from Mexico, but all surrogate days have a WDR indicating winds from New Mexico, which questions whether the surrogate days are appropriate and possibly whether using scalar wind directions may be more appropriate.

Potential surrogate days were identified based on a range of criteria including, but not limited to, daily WDR. For the daily WDR criteria, potential surrogate days were included if the daily WDR was within the full range of daily WDR measured during all of the actual events. For Chamizal, the daily WDR on all 10 surrogate days fell with the overall range of measured daily WDR on the event days. As indicated, two of the 10 surrogate days (March 13, 2011 and February 3, 2012) identified had a daily WDR suggesting particulate matter concentrations could have been influenced by natural sources in New Mexico. However, the inclusion of these days was appropriate because the source (the Chihuahuan desert) was the same regardless of the political boundary, as further described in the response to comment #13. In addition, one proposed exceptional event day (April 26, 2011) showed influences from desert sources in New Mexico and the inclusion of these two surrogate days ensured surrogate data were representative. Again, the surrogate approach involved matching days with similar overall characteristics, including wind direction, and this goal was accomplished with the identified surrogate days.

f) Ten surrogate days were chosen for the Chamizal site monitor, six for the UTEP site monitor and twelve for the Socorro site monitor. While it is understood that those were the number of days that met the respectively chosen selection criteria, perhaps other criteria may have resulted in a more consistent number of surrogate days per site.

The number of potential surrogate days for UTEP and Socorro were limited more by the sampling frequency of the FRMs than the chosen surrogate selection criteria. As described in the demonstration document on pages 39 through 42, there were 16 days meeting the surrogate criteria for Chamizal compared to 45 days for UTEP and 52 days for Socorro. However, FRM-FEM measurements were available on 10 of the potential surrogate days for Chamizal, while the sampling frequency only provided FRM data for 6 potential surrogate days at UTEP and 10 potential days at Socorro.

g) For the UTEP site monitor and the Socorro site monitor, the text states that a total number of days that met the criteria and some subset of those days had valid $PM_{2.5}$ FRM measurements, that could be used to evaluate the "but for" concentration. Please define "valid" in this context and what is considered invalid.

Valid data are data with measurements in AQS rather than null codes. AQS data records with a null code are invalid.

10. EPA Comments Regarding Appendices

In all appendices, please specify where the wind data in the hourly graphs comes from. In most cases PM concentrations from multiple sites are displayed in the graphs but it is not clear from which site the single plotted line of wind data originated. Wind gust data should be displayed from the specific site (or sites, if more than one) for which exceptional events that day are being claimed. If not, a defensible reason should be given.

Peak wind gust data specific to each exceptional event site was cited in the event summary narrative within each appendix. The wind gust measurements used in all of the Appendix graphs comparing five-minute peak wind gust to particulate matter concentrations are representative of the highest wind gust reported among the Sun Metro, UTEP, Chamizal, Ascarate, and Socorro sites for each five-minute period. These five sites all had continuous particulate matter monitors operational during the 2010-2012 period, thus allowing a comparison of peak wind gust to measured particulate matter concentrations, illustrating the daily trends. Because of site exposure variations and the regional aspect of the high wind events, the composite peak was used in the demonstration document as the best representation of the area peak wind for any given five-minute period. Figure 10-1 provides an example of how these measurements look plotted together.

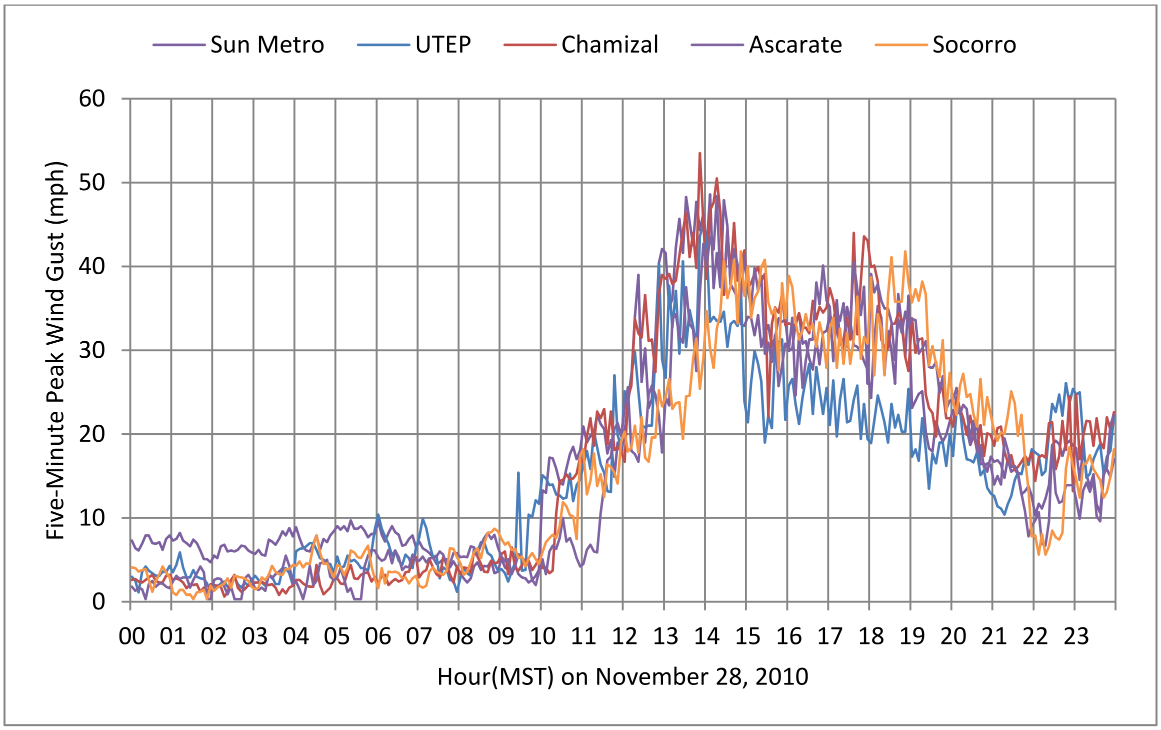

Figure 10-1. Five-minute peak wind gust measurements on November 28, 2010, from the five continuous particulate matter monitoring sites in the El Paso area.

Figures 10-2 through 10-14 provide time series graphs of continuous data for each of the thirteen flagged measurements that occurred on ten event days. Each graph shows collocated continuous particulate matter measurements ($PM_{2.5}$ or PM_{10}), along with the peak five-minute wind gust reported every five minutes at the same site. The $PM_{2.5}$ continuous acceptable (TEOM) measurements and continuous PM_{10} (TEOM) measurements are five-minute averages and the $PM_{2.5}$ FEM measurements are hourly averages.

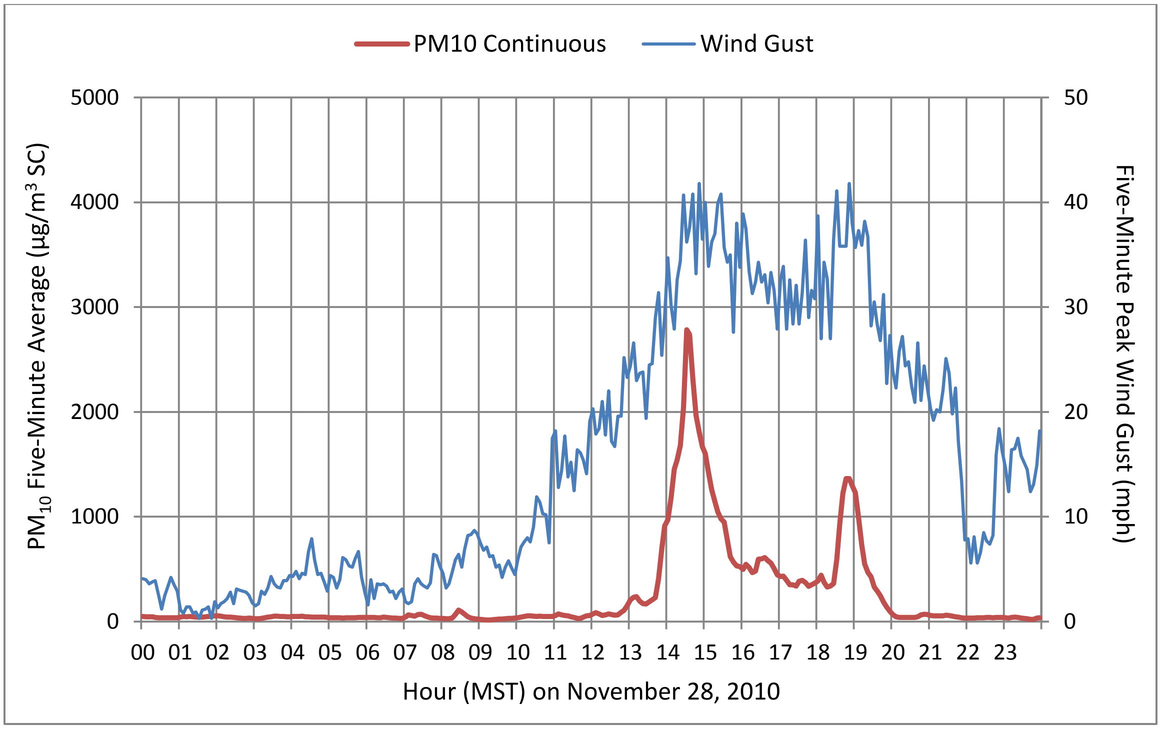

Figure 10-2. Socorro five-minute PM_{10} and peak wind gust measurements on November 28, 2010.

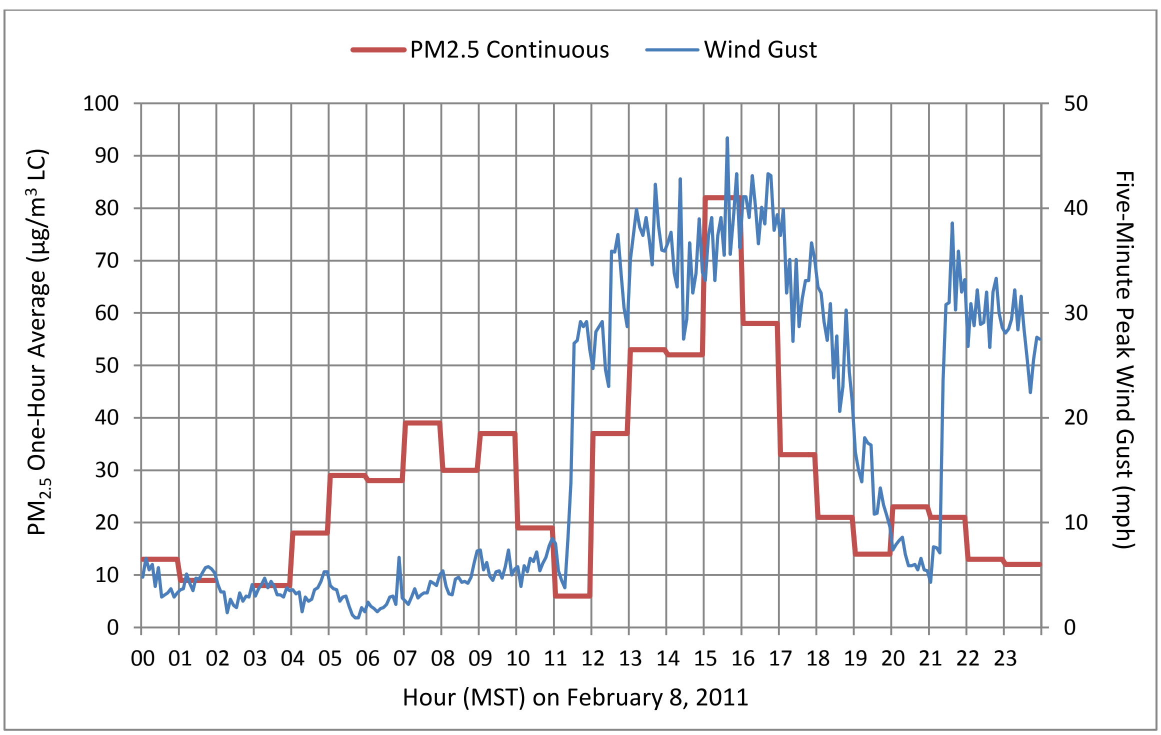

Figure 10-3. Chamizal hourly average $PM_{2.5}$ and five-minute peak wind gust measurements on February 8, 2011.

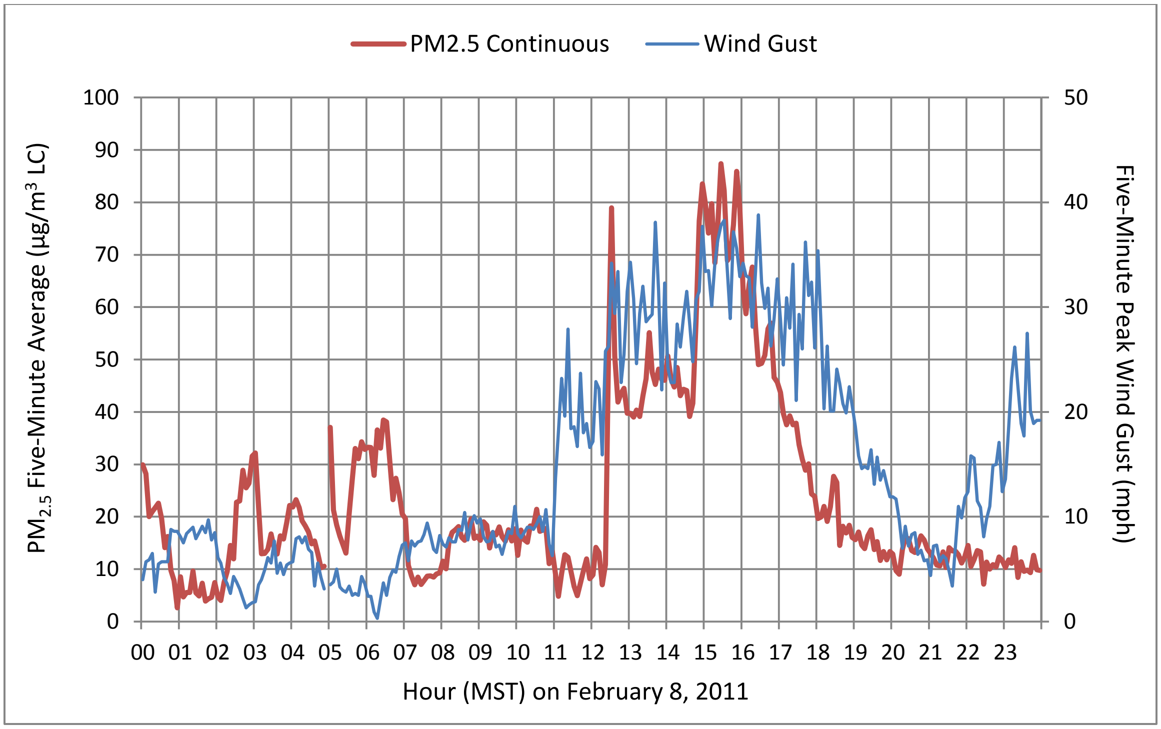

Figure 10-4. UTEP hourly average $PM_{2.5}$ and five-minute peak wind gust measurements on February 8, 2011.

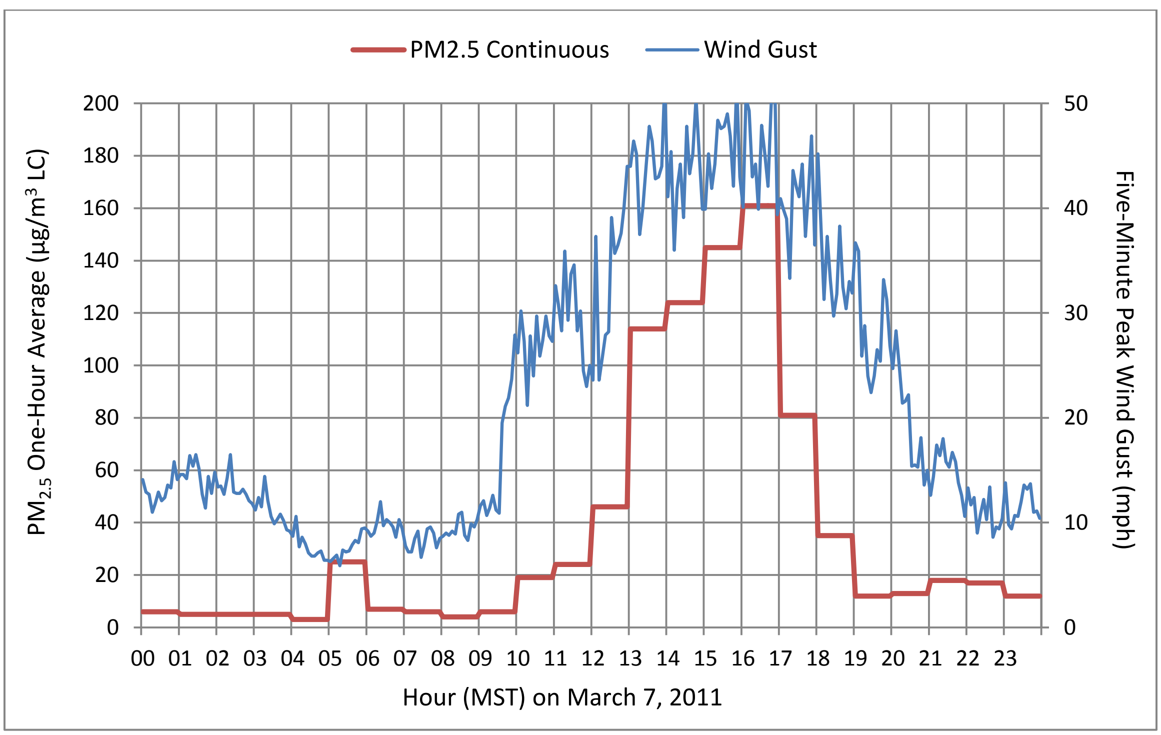

Figure 10-5. Chamizal hourly average $PM_{2.5}$ and five-minute peak wind gust measurements on March 7, 2011.

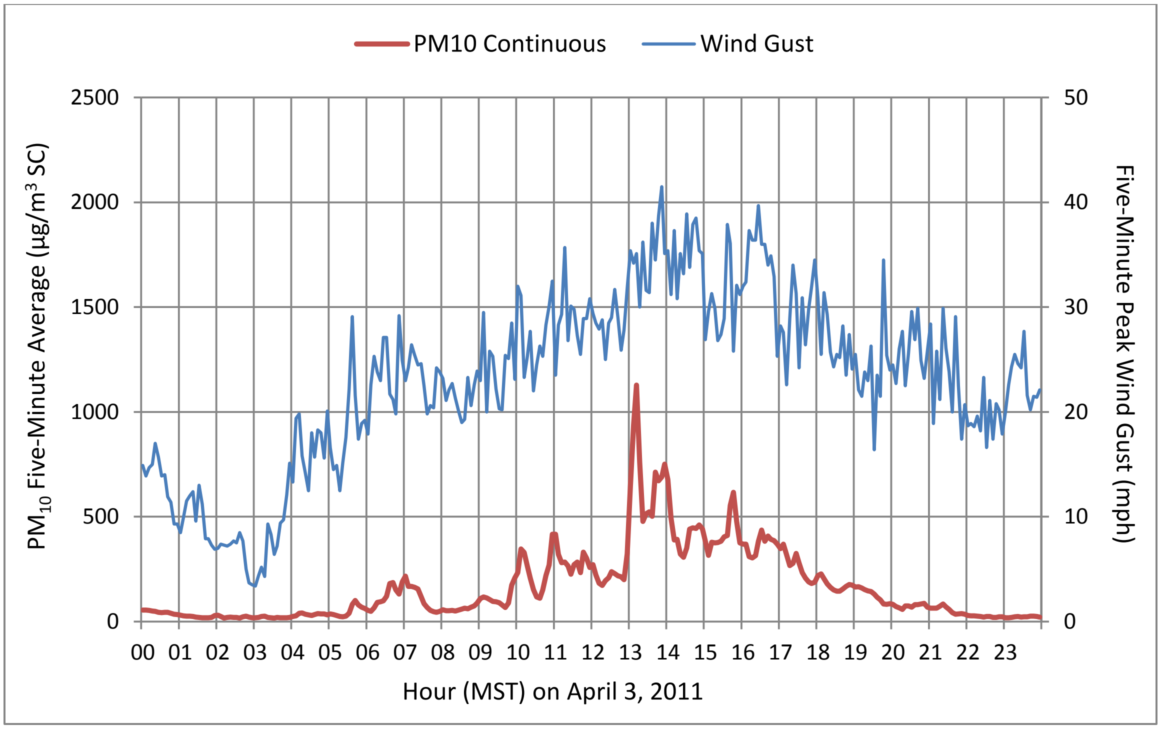

Figure 10-6. Socorro five-minute PM_{10} and wind gust measurements on April 3, 2011.

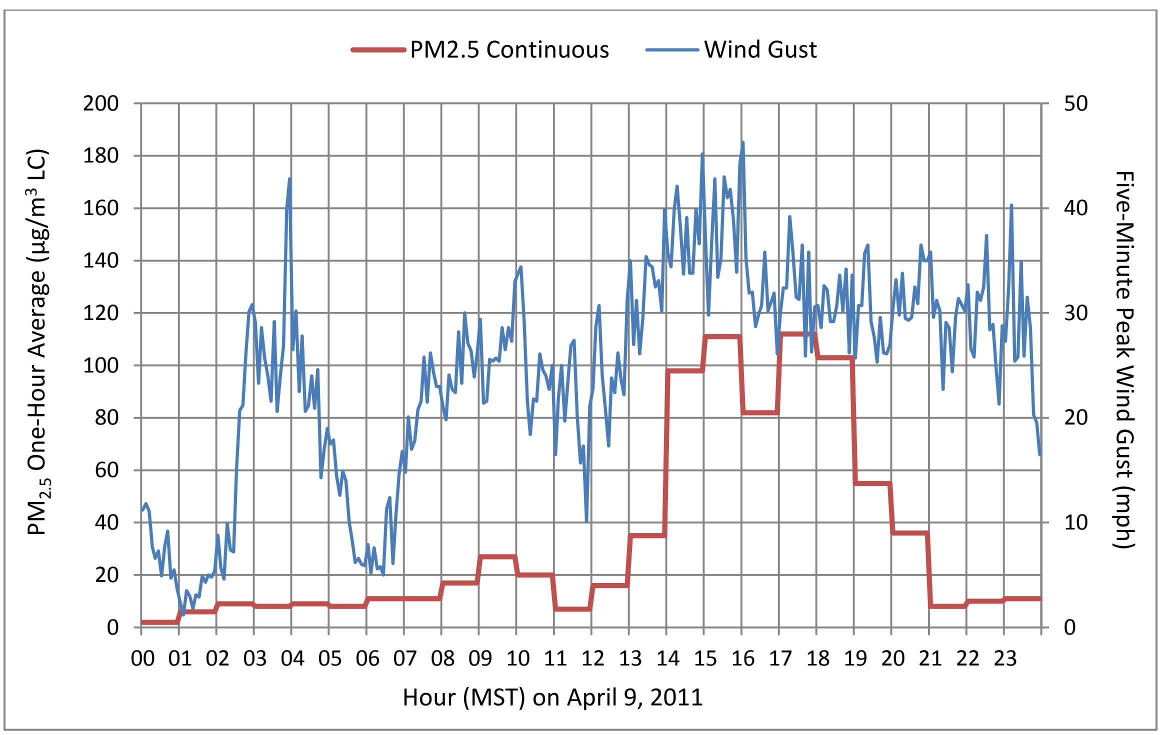

Figure 10-7. Chamizal hourly average $PM_{2.5}$ and five-minute peak wind gust measurements on April 9, 2011.

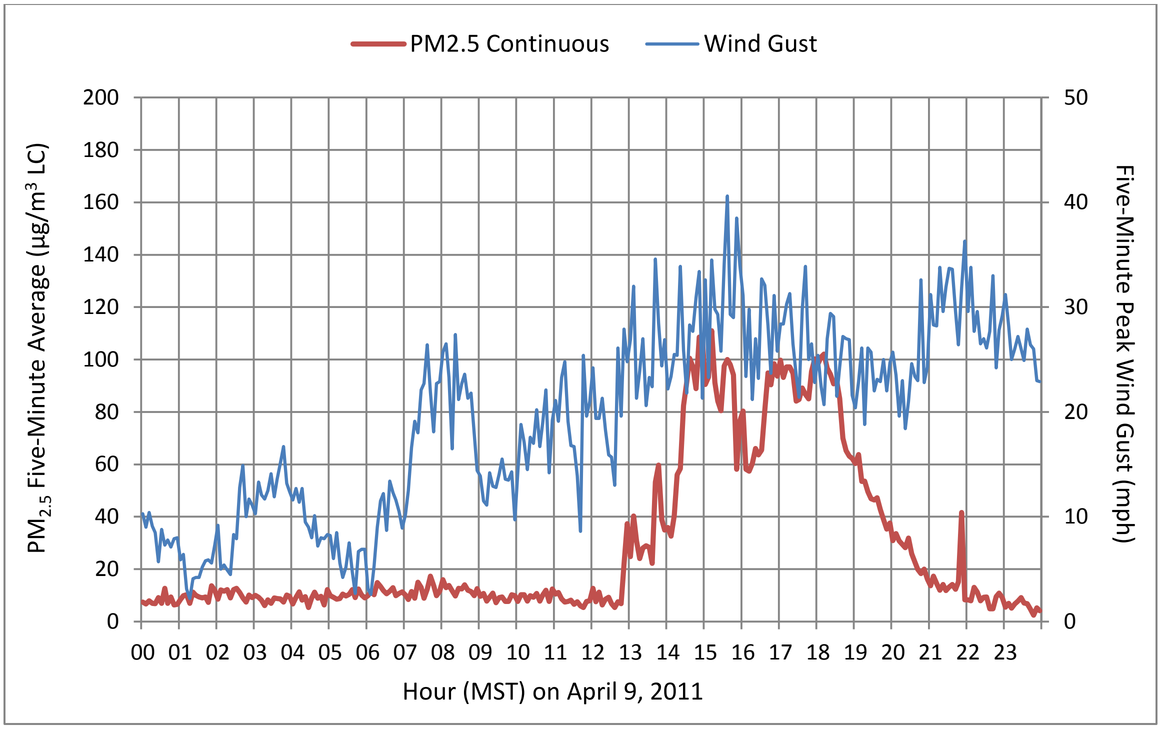

Figure 10-8. UTEP five-minute $PM_{2.5}$ and wind gust measurements on April 9, 2011.

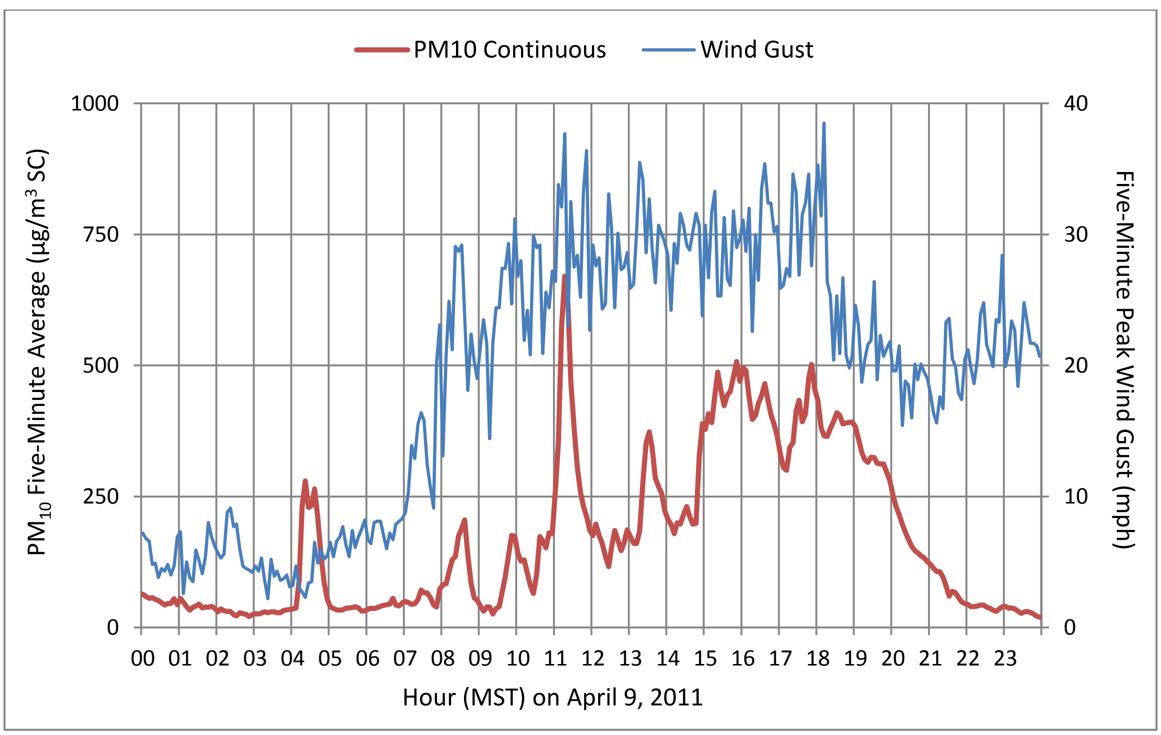

Figure 10-9. Socorro five-minute PM_{10} and wind gust measurements on April 9, 2011.

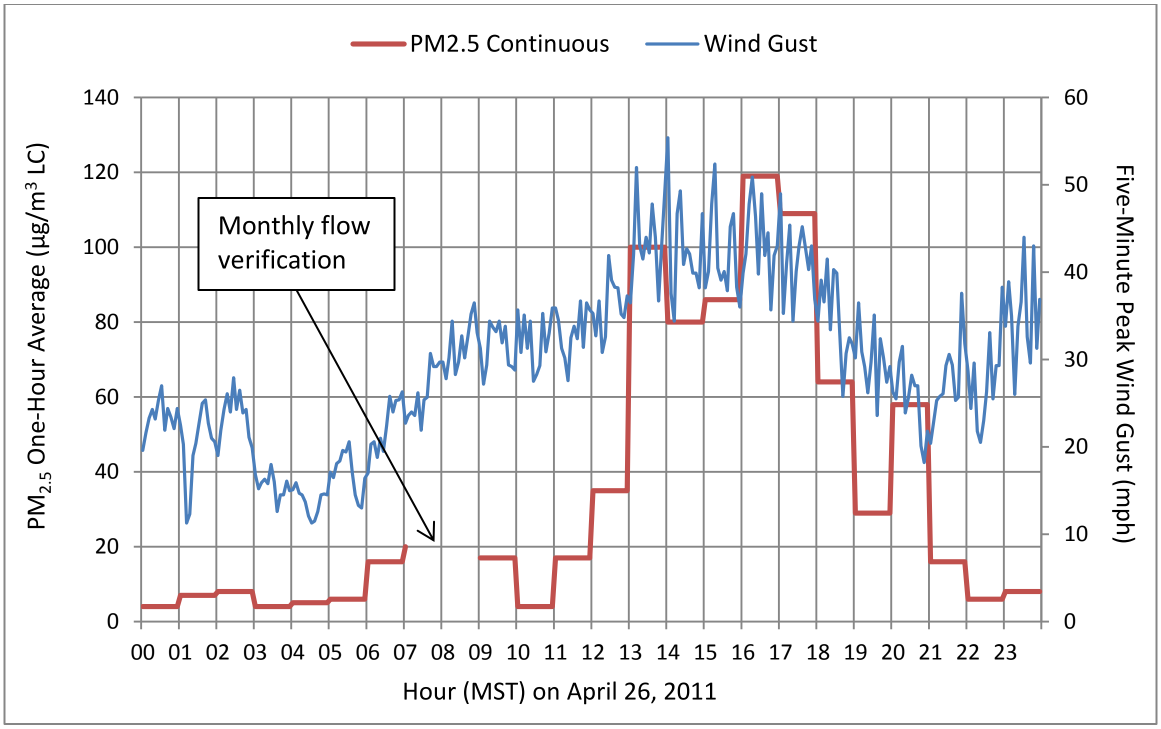

Figure 10-10. Chamizal hourly average $PM_{2.5}$ and five-minute peak wind gust measurements on April 26, 2011.

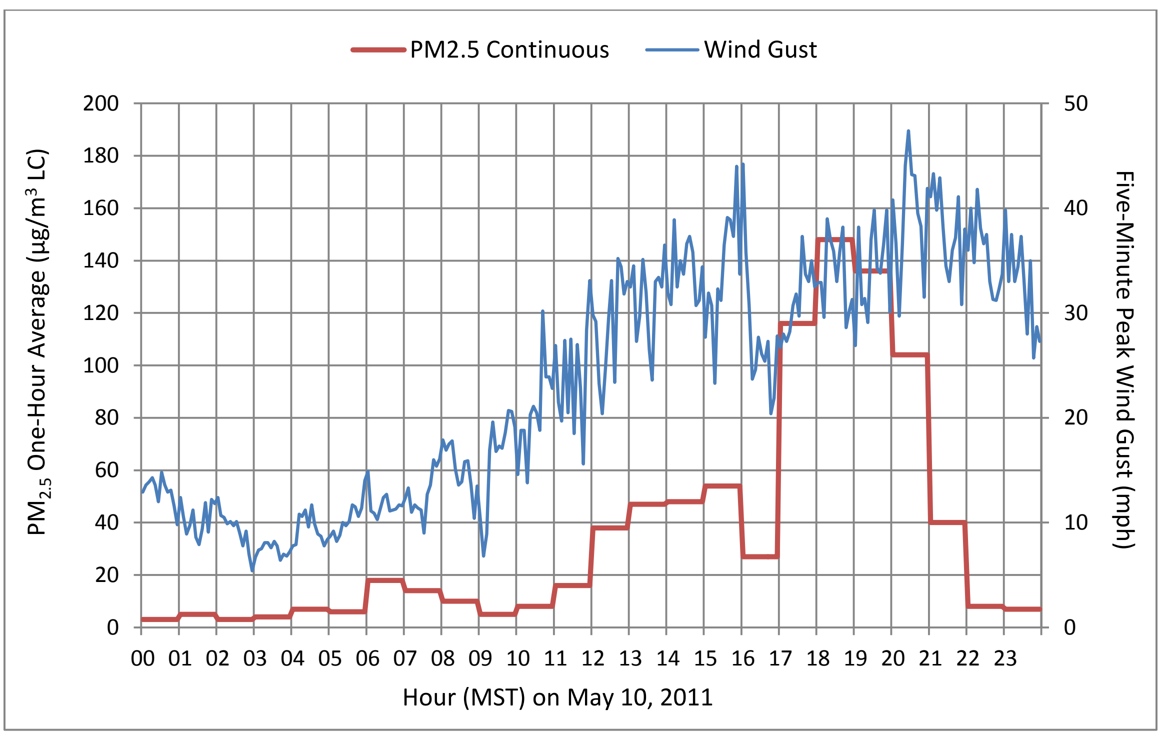

Figure 10-11. Chamizal hourly average $PM_{2.5}$ and five-minute peak wind gust measurements on May 10, 2011.

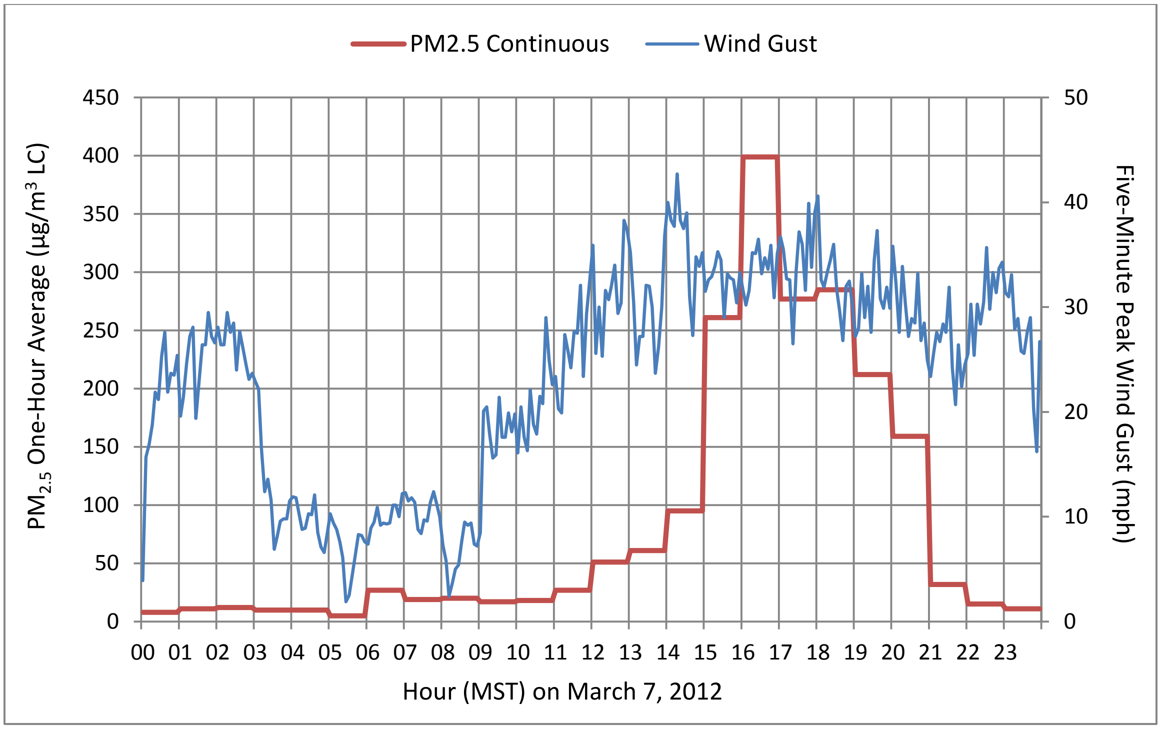

Figure 10-12. Chamizal hourly average $PM_{2.5}$ and five-minute peak wind gust measurements on March 7, 2012.

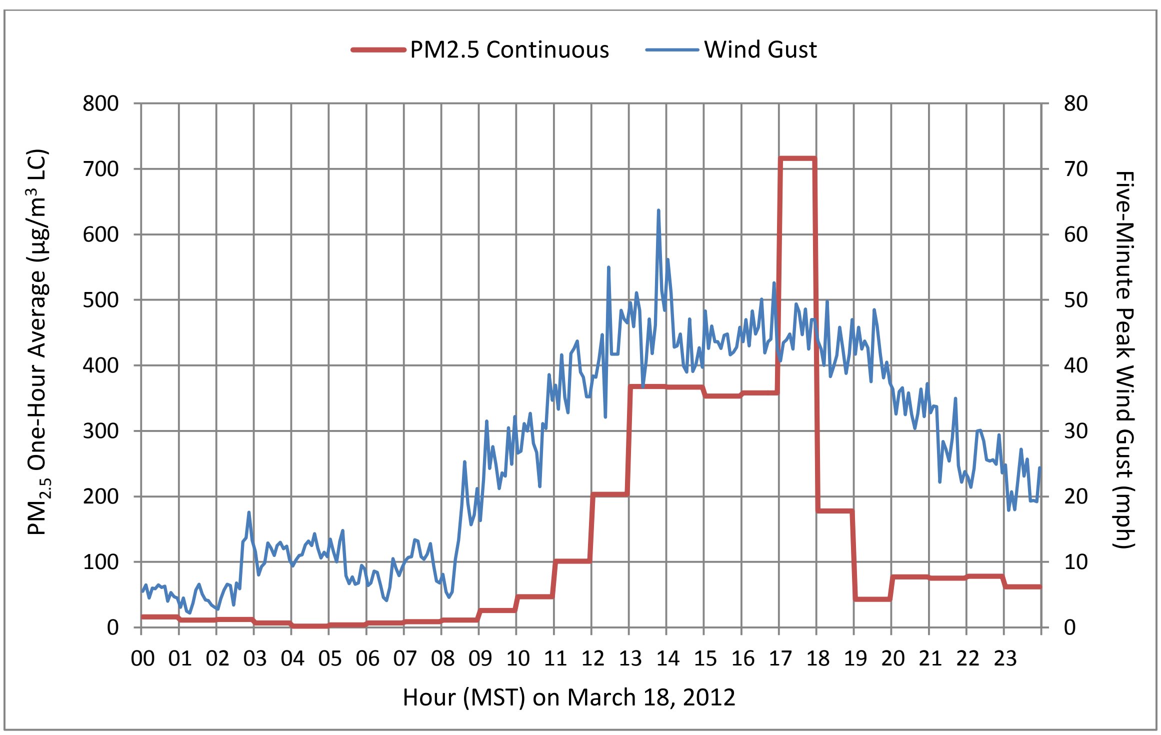

Figure 10-13. Chamizal hourly average $PM_{2.5}$ and five-minute peak wind gust measurements on March 18, 2012.

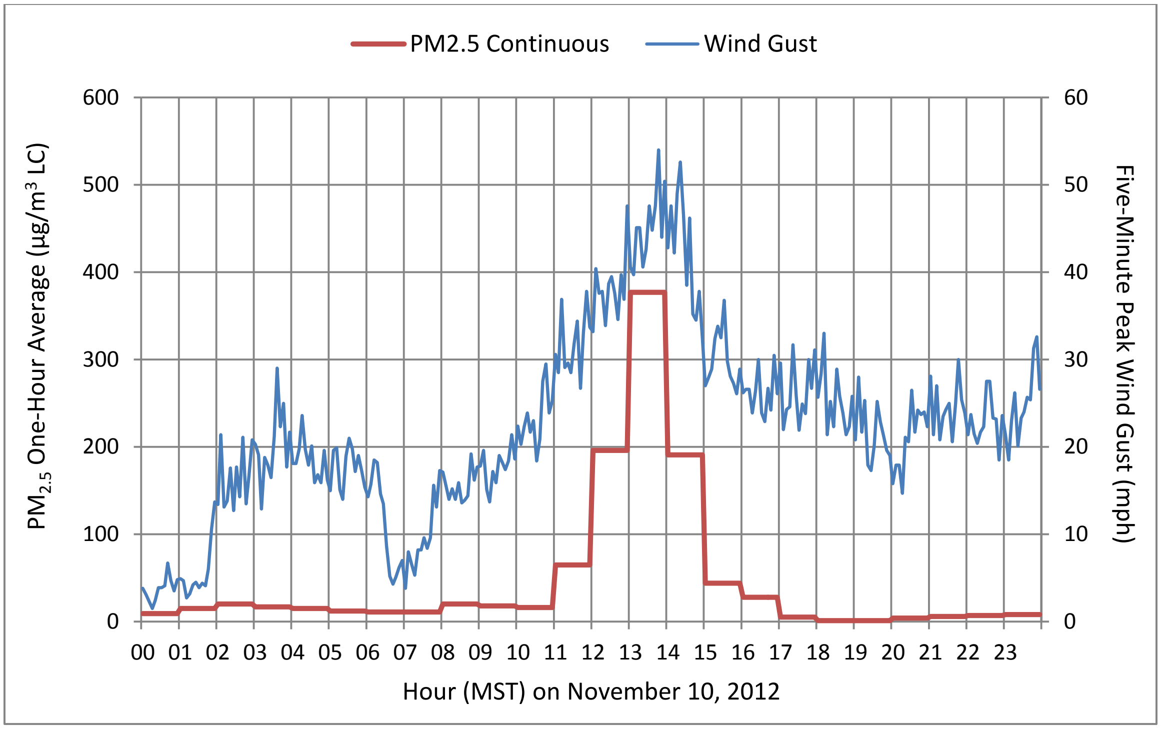

Figure 10-14. Chamizal hourly average $PM_{2.5}$ and five-minute peak wind gust measurements on November 10, 2012.

11. EPA Comment Regarding Page F-2

The text states: "The peak measured wind gust at UTEP was 40.6 mph and the highest five-minute average wind speed was 22.5 mph." Given the wind gust/$PM_{2.5}$ correlation data provided, it is not clear how these wind speeds sufficiently support this day as a $PM_{2.5}$ exceptional event. In the absence of additional definitive information, wind gust data below 45 mph does not support a $PM_{2.5}$ exceptional event claim. Without wind gust/$PM_{2.5}$ correlation data specifically for the UTEP site monitor, wind gust data, on its own, cannot be used as a wind threshold to support a $PM_{2.5}$ exceptional event claim at the UTEP site monitor.

While EPA's high winds guidance suggests the development of an area-specific high wind threshold at which a dust event will occur, it does not suggest the need to develop a monitor-specific threshold. These events were characterized by high winds over a very large area that resulted in a windblown dust impact across the entire El Paso area. As stated in response to comment #5 above, the application of a high wind threshold for these events would be much more relevant to the source areas for these dust events. The wind gust/$PM_{2.5}$ measurements from El Paso monitoring sites help to confirm the large scale nature of these dust events and characterize the impacts on a localized scale.

On the specific event day referenced in the comment (April 9, 2011), $PM_{2.5}$ measurements were flagged for both Chamizal and UTEP, while measured PM_{10} was flagged for Socorro. Satellite, webcam, and trajectory information support the occurrence of a wide-spread dust event originating in northern Mexico and impacting the El Paso area. Based on this overwhelming evidence, the additional application of a specific wind gust threshold for each monitor site in support of such an area-wide event not only seems unnecessary but technically inappropriate.

12. EPA Comment Regarding Page F-2

The text states: "An exceptional event flag is also proposed for the UTEP FRM $PM_{2.5}$ measurement of 48.7 μg/m^3 on this day. The collocated continuous acceptable $PM_{2.5}$ monitor measured a daily average of 28.5 μg/m^3 and a peak one-hour average of 92.3 μg/m^3 for the hour beginning at 1700 MST." The substantial difference between the FRM $PM_{2.5}$ measurement and the continuous monitor daily average $PM_{2.5}$ concentration on this day brings to question the accuracy of the continuous $PM_{2.5}$ data. Please provide a rationale for this significant difference and provide additional supporting information for the use of the UTEP site continuous $PM_{2.5}$ data on this day to support an exceptional event claim.

It is not unusual to find substantial differences among collocated measurements using different methods during high concentration dust storm events. In this case, both instruments met all of their required quality assurance checks and thus the data are considered valid. Heavy dust loading situations pose a difficult challenge for all measurement methods and especially for the size selection inlets that can sometimes be overwhelmed by the high dust loading and not perform properly. This problem can affect all types of measurement methods, including the FRM. For example, the $PM_{2.5}$ FRM and collocated $PM_{2.5}$ acceptable speciation monitors measured 38.5 μg/m^3 and 26.8 μg/m^3, respectively, on April 9, 2011. Likewise, the Chamizal measurements for April 3, 2011 were 33.0 μg/m^3 from the FEM and 23.8 μg/m^3 from the FRM.

Regardless of the accuracy of the associated daily average, the continuous measurements at the very least provide an assessment of the timing and general concentration trends during the day that cannot be inferred from daily FRM samples.

13. EPA Comments Regarding Pages G-2 and G-11

The text on page G-2 states that the average wind direction during this period was from 286 degrees (west-northwest) and the HYSPLIT back-trajectories on page G-11 indicate the air arriving at the Chamizal site at the time of highest $PM_{2.5}$ levels on April 26, 2011, came from southern New Mexico and originated in southern Arizona. Unlike the other proposed El Paso exceptional events, the air mass in this case appears to have originated strictly in the United States. Potential $PM_{2.5}$ impacts on the Chamizal monitor from domestic anthropogenic sources on this day were not evaluated. Please include such an evaluation in the document including routine and non-routine emissions.

While the HYSPLIT back-trajectory does indicate the air parcel came from southern New Mexico and Arizona, the trajectory path also included northern portions of Juarez where there are extensive unpaved roadways that are common sources of windblown dust. Satellite imagery indicated visible blowing dust plumes from rural areas in southern New Mexico; however no visible plumes were seen coming from southern Arizona. Thus, impacts from Arizona sources should be insignificant considering the large distance involved along with the lack of evidence of visible dust plumes.

Southern New Mexico is dominated by the same Chihuahuan Desert landscape found in northern Chihuahua, Mexico, and susceptible to contributing to major windblown dust events. The New Mexico Environment Department (NMED) exceptional event demonstrations provide an inventory for particulate matter emissions in Dona Ana County, adjacently west of El Paso, and estimate that nearly 85% of windblown dust is contributed from desert land. In addition, EPA's concurrence with NMED's 2009 exceptional event demonstration for Dona Ana and Luna Counties states:

> The largest source of windblown dust in Dona Ana County is the natural desert where areas of loose, dry, and/or barren soil are highly susceptible to wind erosion. The Atlas Project indicated that wind erosion contributes to 85% of emissions in the area.

Given EPA's acceptance of New Mexico's emissions data, the TCEQ contends that an in-depth analysis of anthropogenic sources in Dona Ana County, New Mexico, is unwarranted.

14. EPA Comment Regarding Page H-12

Figure H-12 shows the peak dust event occurring between 1700 MST and 2100 MST. It would be beneficial if the satellite photos could be provided that correspond with this timeframe.

Satellite images for 1745 and 1845 Mountain Standard Time (MST) on May 10, 2011, are provided below in Figures 14-1 and 14-2. These images show large and intense dust plumes originating in northern Mexico and blowing into the El Paso area from the southwest as was also shown in Figures H-5 through H-8 for earlier in the day in the demonstration document. Satellite images after the hour beginning at 1800 MST are not included since these images would have been collected after sunset and would not have yielded any visible information.

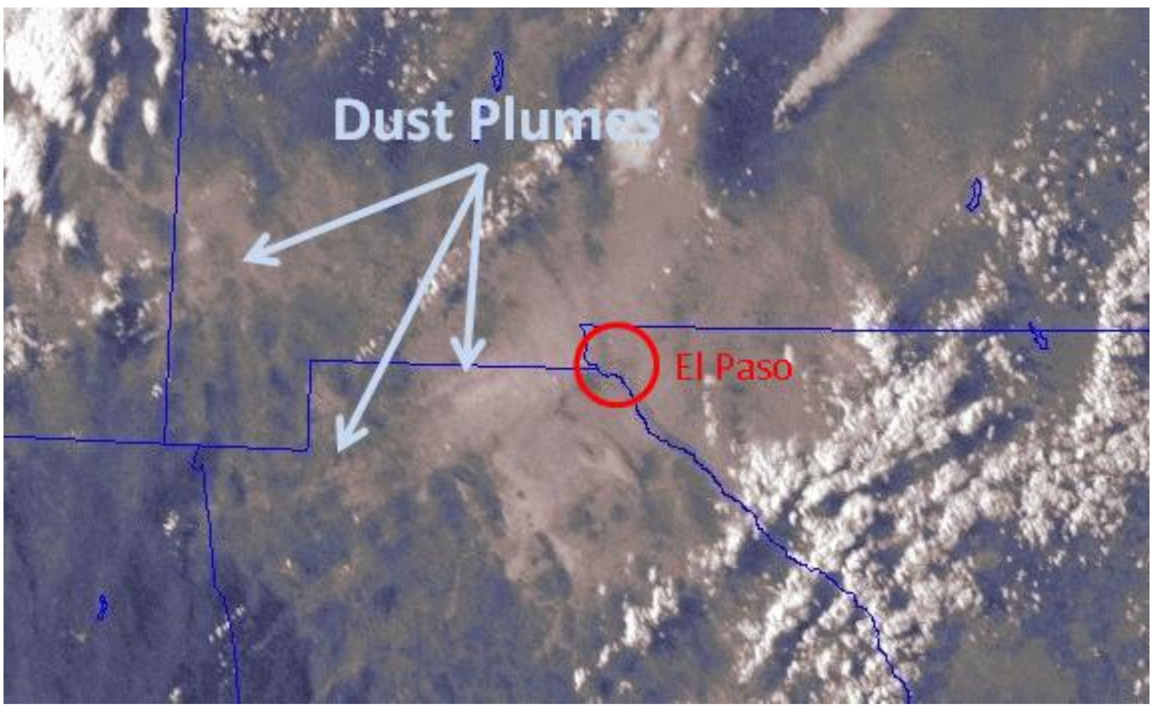

Figure 14-1. GOES image for 1745 MST on May 10, 2011.

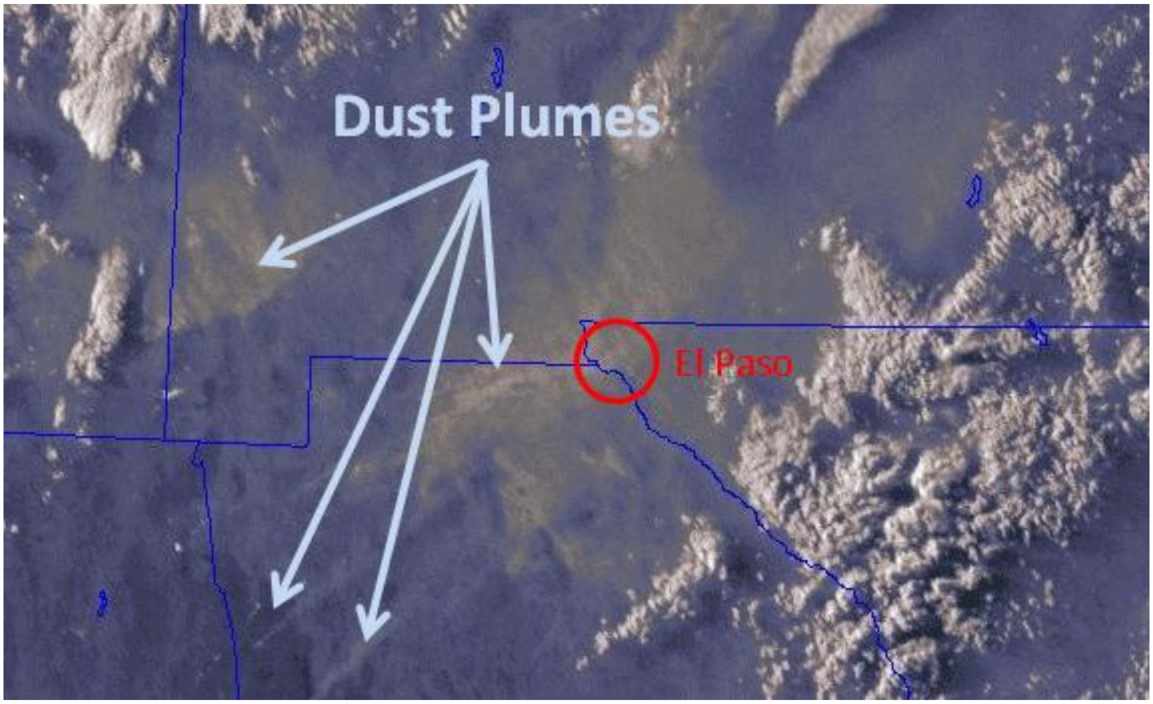

Figure 14-2. GOES image for 1845 MST on May 10, 2011.

15. EPA Comments Regarding Page H-12

The text states: "the changes in concentration do not immediately correspond with the increase in peak wind gust and are more consistent with large transported dust plumes affecting the entire area." We find the last part of this statement to not be supported by the information in the document. When concentrations do not immediately correspond with the increase in winds, it raises questions on both to the cause of the increased concentrations (i.e., as possibly anthropogenic) and the level of proof provided to support a claimed exceptional event under these circumstances. See Comment #7 and provide information to sufficiently support the statement regarding consistency with large transported plumes.

As previously stated, strong evidence in the form of satellite imagery and backward-in-time trajectories supports a wide-spread transport event from over 50 miles away in northern Chihuahua, Mexico, and the desert lands of extreme southern New Mexico. This unique dust transport has also been established in peer-reviewed literature. As noted in Novlan et al. (2007), "if the area of maximum winds is outside of the dust source, or the wind direction makes too large an angle of attack with the source, the blowing dust can advect into El Paso rather than be directly transported downstream. These advective type storms have more of a diffuse appearance and can occur with wind velocities of only 15 – 30 kph.” Therefore, the lack of immediate response to particulate matter concentrations with increased wind speeds does not limit potential sources to the immediate El Paso proximity.

Specifically with regard to the May 10, 2011, event presented in Appendix H of the demonstration document, particulate matter concentrations initially increased when wind gusts reached the 30 to 40 mph range around 1200 MST. However the particulate matter concentrations more than doubled suddenly at about 1700 MST even though there was no increase in the wind gusts. This sudden increase in concentration was consistent with the arrival of a more dense transported dust plume. If local sources were primarily responsible for the high concentrations, then levels should not have increased suddenly unless the wind speed increased dramatically at the same time.

Finally, the comparative analysis provided in response to comment #7 demonstrates that on days with similar wind speeds but absent transported windblown dust, particulate matter measurements are significantly less than those observed on the event days. This strongly suggests that local anthropogenic sources are not major contributors to the concentrations measured on the flagged event days.

Conclusion

This addendum and the original demonstration document provide a variety of strong evidence that, when considered together as a weight-of-the-evidence approach, provide justification for classifying the 13 flagged particulate matter measurements as exceptional events. The evidence demonstrates that all of the flagged measurements were above the 95th percentile of measurements and that transport of windblown dust caused the exceedances of the 24-hour $PM_{2.5}$ and PM_{10} NAAQS and the annual $PM_{2.5}$ NAAQS that would not have otherwise have occurred. The evidence also demonstrates that these events affected air quality and were natural events that were not reasonably controllable or preventable.

References

Gill, Thomas E., Miguel Domínguez Acosta, Nancy I. Rivera Rivera, and Adriana E. Perez. "Investigation of Dust Emission Hotspots in Chihuahuan Desert Playa Basins Project Number: A-05-03."

Prospero, Joseph M., Paul Ginoux, Omar Torres, Sharon E. Nicholson, and Thomas E. Gill. "Environmental characterization of global sources of atmospheric soil dust identified with the Nimbus 7 Total Ozone Mapping Spectrometer (TOMS) absorbing aerosol product." Reviews of Geophysics 40, No. 1 (2002): 2-1.

Novlan, David J., M. Hardiman, and T. E. Gill. "A synoptic climatology of blowing dust events in El Paso, Texas from 1932-2005." In Preprints, 16th Conference on Applied Climatology, American Meteorological Society J, vol. 3. 2007.

Rivera Rivera, N.I., 2006: Meteorological conditions of extreme dust events in the Chihuahuan desert region of the United States and Mexico. (unpublished manuscript)

Csavina, Janae, Jason Field, Omar Félix, Alba Y. Corral-Avitia, A. Eduardo Sáez, and Eric A. Betterton. "Effect of wind speed and relative humidity on atmospheric dust concentrations in semi-arid climates." Science of the Total Environment 487 (2014): 82-90.