

**Documentation of Natural Events:  
Particulate Matter Exceedances Caused by High Winds  
Doña Ana County, New Mexico**

**Update for January 2002 – March 2002**

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## INTRODUCTION

In a memorandum dated May 30, 1996, the Environmental Protection Agency (EPA) issued the Natural Events Policy (NEP) concerning violations of the PM<sub>10</sub> ambient air quality standard that are caused by natural events such as high winds. This policy allows for ambient air quality monitoring data affected by natural events to be excluded from determinations of attainment status, if certain requirements are met.

One requirement of the NEP is that the state or local air quality agency provide adequate documentation to show that the exceedances were caused by natural events and are therefore to be noted as such in the EPA Aerometric Information Retrieval System (AIRS). The state or local air quality agency must also document that Best Available Control Measures (BACM) were required for anthropogenic sources of wind-generated dust, and that the sources were in compliance with BACM requirements at the time of the event. The purpose of this update is to meet these requirements for documentation of PM<sub>10</sub> exceedances which occurred during the current reporting period.

Particulate matter monitoring sites in Doña Ana County are listed in Table 1. Previous reports documenting natural events for the period 1995-2001 should be consulted for a map of monitoring site locations and other background information. These reports are available on the New Mexico Environment Department's web site ([www.nmenv.state.nm.us](http://www.nmenv.state.nm.us)).

Table 1. PM<sub>10</sub> and PM<sub>2.5</sub> monitoring sites in Doña Ana County; only Wedding monitor at Las Cruces, all others with continuous (TEOM) monitor. PM<sub>10</sub> monitoring at the Holman site was discontinued on March 2, 2002.

Site Name	PM <sub>10</sub>	PM <sub>2.5</sub>	AIRS Number	Lat (d-m-s)	Long (d-m-s)
Roadrunner	✓	...	35-013-0018	32-20-30.64	106-45-37.07
Holman*	✓	...	35-013-0019	32-25-29.69	106-40-26.62
Chaparral*	✓	...	35-013-0020	32-02-27.48	106.24-33.09
Anthony	✓	✓	35-013-0016	32-00-11.54	106-35-57.67
Sunland Park*	✓	...	35-013-0017	31-47-49.91	106-33-24.17
Desert View*	...	✓	35-013-0021	31-47-46.32	106-35-02.13
Santa Teresa*	...	✓	35-013-0022	31-47-15.77	106-40-58.36
La Union**	...	...	35-013-0008	31-55-06.03	106-37-58.99
West Mesa*	✓	...	35-013-0024	32-16-39.9	106-51-49.68
Las Cruces	✓	...	35-013-1006	32-19-08	106-46-16

\* meteorological monitoring at these sites

\*\* meteorological monitoring data from this site is used for comparison with Anthony PM<sub>10</sub>

## EXCEEDANCES CAUSED BY HIGH WIND

Table 2 lists the exceedances occurring during the current reporting period and which we have determined to have been caused by high wind.

Table 2. PM<sub>10</sub> and PM<sub>2.5</sub> exceedances documented in this report as resulting from high wind. PM<sub>10</sub> and PM<sub>2.5</sub> values are 24-hour average concentrations, at local temperature and pressure.

DATE	SITE	PM <sub>10</sub> ( $\mu\text{g}/\text{m}^3$ )	PM <sub>2.5</sub> ( $\mu\text{g}/\text{m}^3$ )	Peak Gust (m/s)	Gust $\geq$ 18
10-Jan-02	Anthony	223		12.2	
20-Jan-02	Chaparral	283		19.8	✓
9-Feb-02	Chaparral	167		18.4	✓
18-Feb-02	Anthony	288		20.4	✓
18-Feb-02	Sunland Park	368		19.6	✓
18-Feb-02	Chaparral	259		21.2	✓
21-Feb-02	Anthony	193		17.0	
26-Feb-02	Sunland Park	217		18.2	✓
1-Mar-02	Anthony	203		19.9	✓
1-Mar-02	Sunland Park	256		19.2	✓
1-Mar-02	Holman	226		20.7	✓
1-Mar-02	Chaparral	250		19.8	✓
8-Mar-02	Anthony	251		20.2	✓
8-Mar-02	Sunland Park	220		20.7	✓
8-Mar-02	Chaparral	272		22.3	✓
8-Mar-02	West Mesa	373		23.7	✓
14-Mar-02	Anthony	199		20.7	✓
14-Mar-02	Sunland Park	390	70	17.2	
14-Mar-02	Chaparral	226		19.3	✓
14-Mar-02	Desert View		82	18.1	✓
16-Mar-02	Sunland Park	290		19.8	✓
16-Mar-02	Chaparral	193		21.2	✓
21-Mar-02	Sunland Park	183		18.1	✓
21-Mar-02	Chaparral	225		14.2	
23-Mar-02	Anthony	218		18.0	✓
23-Mar-02	Sunland Park	256		18.6	✓
23-Mar-02	Chaparral	306		19.5	✓
24-Mar-02	Sunland Park	251		18.7	✓

We consider the occurrence of peak wind gusts greater than 18 meters per second (40 miles per hour) to be sufficient evidence 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. Approximately 90% of these exceedance days had peak wind gusts greater than 18 meters per second.

For those exceedances which do not meet the peak gust criterion of 18 meters per second, we provide additional evidence and analysis to document that they were caused by high wind. Such exceedances can result from wind events in which wind speeds are only moderate (8 to 18 meters

per second) but nevertheless strong enough to raise some dust, and which last for several hours. Others can result from localized high wind events that raise clouds of windblown dust which are then carried to the monitoring site by winds of lower speed.

#### Additional documentation for exceedances with peak wind gusts < 18 m/s

##### 1) 10-Jan-02, Anthony

A plot of hourly values of PM<sub>10</sub> (at Anthony), and wind speed at La Union (App. 1A) shows that most of the PM<sub>10</sub> contributing to this exceedance was recorded during the evening hours (1500-2300 h). At La Union during these evening hours, hourly average wind speeds ranged from 3 to 8 m/s, and peak gusts from 6-12 m/s. Wind direction was predominantly from the east (approximately 90°) during these hours (App. 1B).

Stronger winds and blowing dust were recorded east of the Franklin Mountains during the evening hours. At the Chaparral monitoring site, evening winds were stronger than at La Union, with hourly averages exceeding 9 m/s for six consecutive hours and peak gusts reaching 16 m/s (App. 1C). PM<sub>10</sub> concentrations at Chaparral rose significantly when average wind speed exceeded 7 m/s, and peaked at near 500 µg/m<sup>3</sup>. We interpret these data to indicate that windblown dust was generated locally and in the vicinity of Chaparral. High winds and blowing dust are also indicated by records of the White Sands Missile Range meteorological station at "C-Station", which is at the foot of the eastern slope of the Franklin Mountains. On January 10, 2002, this station recorded showers in the area, only a trace of precipitation, dust, and a peak wind gust of 30 mph (13.4 m/s) (App. 1D).

Evening wind speeds at La Union were only marginally above the minimum threshold wind speed for soil erosion (about 7 m/s, according to Saxton et al., 2000, and others). Stronger easterly winds were recorded east of the Franklin Mountains at Chaparral and White Sands Missile Range. Because Anthony is located directly downwind (west) of a gap in the Franklin Mountains, but La Union is more sheltered by the mountains from easterly flow, it is likely that wind speeds at Anthony were stronger than at La Union and may have suspended substantial amounts of dust from local sources. Furthermore, the occurrence of high winds and blowing dust east of the mountains would have made it possible for sub-threshold winds to transport suspended dust to the Anthony site. We therefore conclude that this exceedance was a high-wind event.

##### 2) 21-Feb-02, Anthony

A plot of hourly PM<sub>10</sub> at Anthony and wind speed at La Union shows that this exceedance resulted from a brief but intense dust event during the 900-1000 hour (App. 2A). Winds peaked during this hour and were just below the 18 m/s peak gust criterion. The corresponding plot for Chaparral (App. 2B) shows an almost identical pattern, except that the PM<sub>10</sub> was lower than at

Anthony and therefore did not result in an exceedance for the 24-hour average. Other sites in the county also experienced a brief period of high wind and elevated PM<sub>10</sub> concentration in the morning hours. We conclude that this exceedance was a high-wind event, probably caused by a regional-scale weather condition such as passage of a front or squall line.

### 3) 14-Mar-02, Sunland Park

On this date, the entire Paso del Norte area experienced high winds and blowing dust. As noted in Table 2 above, our other monitoring sites in southern Doña Ana County recorded PM<sub>10</sub> exceedances and peak gusts greater than 18 m/s. A plot of PM<sub>10</sub> and wind speed at Sunland Park (App. 3A) shows that the peak PM<sub>10</sub> concentrations occurred during the hours with highest wind speeds, and that the hourly average wind speeds exceeded the 7 m/s minimum threshold wind speed for wind erosion (Saxton et al., 2000). Exceedances also occurred at El Paso monitoring sites, and documentation that these were high-wind events is published on the Texas Natural Resource Conservation Commission (now Texas Commission on Environmental Quality) web site ([www.tnrcc.state.tx.us/updated/air/monops/airpollevents/sigevents.html](http://www.tnrcc.state.tx.us/updated/air/monops/airpollevents/sigevents.html)). An article in the El Paso Times on the following day reported wind gusts of nearly 50 mph in the area, and "visibility reduced to 1 ½ miles at El Paso International Airport because of dry dust mixing in the air" (App. 3B). We conclude that this exceedance was a high-wind event.

### 4) 21-Mar-02, Chaparral

A plot of hourly PM<sub>10</sub> and wind speed values for this site shows that the high PM<sub>10</sub> values occurred during the last two hours of the day, after average wind speeds had fallen from an early-evening peak to below 5 m/s (App. 4A). Wind direction during the high-PM<sub>10</sub> values was from the southeast (App. 4B). Other sites within the area showed clear evidence of wind suspension of airborne dust. At the Sunland Park City Yards site, peak gusts exceeded the a priori criterion of 18 m/s and resulted in a PM<sub>10</sub> exceedance (App. 4C). At the El Paso UTEP (C12) and Ascarate Park Southeast (C37) sites, high winds and high hourly PM<sub>10</sub> values were recorded throughout the evening hours (App. 4D and 4E), although PM<sub>10</sub> values were not high enough to exceed the standard. We conclude that this exceedance was a high-wind event, most likely caused by sub-threshold winds transporting wind-generated dust from nearby areas.

## **BEST AVAILABLE CONTROL MEASURES (BACM)**

BACM was required and in place for anthropogenic sources during the recorded PM<sub>10</sub> exceedances from high-wind events during the current reporting period. Letters confirming control measure implementation by the City of Las Cruces, Doña Ana County, and other stakeholders are available in previous documentation for 1999-2001. These measures remain in place.

## **REFERENCE**

Saxton, K., D. Chandler, L. Stetler, B. Lamb, C. Claiborn, and B.-H. Lee. 2000. Wind erosion and fugitive dust fluxes on agricultural lands in the Pacific northwest. Transactions of the ASAE 43:623-630.