

NATURAL EVENTS ACTION PLAN
FOR PM10 EXCEEDANCES DUE TO HIGH WIND EVENTS
IN CHAVES COUNTY, NEW MEXICO

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EXECUTIVE SUMMARY

Purpose of this Report

During 2003, concentrations of airborne particulate matter during dust storms reached unhealthful levels in Chaves County. This report outlines a response to this issue that is appropriate for local environmental and economic conditions, and proposes a timeline for the response. Federal policy provides for the plan described here as an alternative to federally imposed requirements that may be unnecessarily restrictive and inappropriate for air quality issues resulting from natural forces and non-industrial sources.

Summary

Particulate matter less than 10 microns in diameter (PM10) is one of the air pollutants for which the Environmental Protection Agency (EPA) has set National Ambient Air Quality Standards (NAAQS) to protect human health and the environment. These standards limit the allowable concentration of the pollutant in the ambient air, which is the outside air near ground level that people breathe.

At a number of locations throughout New Mexico, the Air Quality Bureau of the New Mexico Environment Department (NMED) routinely monitors the ambient concentration of PM10 and other pollutants for which ambient standards have been set.

In most cases, violation of a federal air quality standard results in the area being classified as a “nonattainment area” for that pollutant. The State must then submit a plan for reducing pollution levels. Such plans must include stringent controls on industrial and other sources of the pollutant. During 2003, one exceedance of the standard for PM10 was measured at an NMED monitoring site in Chaves County. Although air quality was good on most days, the one exceedance was greater than the federal air quality standard allows.

The NMED Air Quality Bureau has analyzed conditions that caused the recent exceedance and determined that the exceedance resulted from high winds lifting dust into the air from areas of exposed soil (that is, from dust storms).

Federal law and policies recognize that declaring a nonattainment area and requiring stringent pollution controls on industrial sources is not an appropriate response when a standard is violated due to natural events such as blowing dust from high winds. EPA's Natural Events Policy describes alternative steps that States may take to avoid nonattainment status in such cases. The policy calls for States to develop a Natural Events Action Plan (NEAP) to protect public health by educating the public about the problem and what is being done to respond to it and taking reasonable measures to control sources of windblown dust that are the result of human activities and that contribute significantly to the problem.

This document outlines the Chaves County Natural Events Action Plan, the full development and implementation of which is an on-going process. Chaves County citizens, local governments, businesses and other parties have been and will continue to be involved in the Chaves County NEAP.

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ACRONYMS & ABBREVIATIONS

BACM	Best Available Control Measures
NMED	New Mexico Environment Department
EPA	U.S. Environmental Protection Agency
NAAQS	National Ambient Air Quality Standards
NEAP	Natural Events Action Plan
PM10	Particulate Matter less than 10 microns in diameter
SIP	State Implementation Plan
$\mu\text{g}/\text{m}^3$	micrograms per cubic meter

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ATTACHMENT 1: Analysis of PM10 Exceedance, 2003, Chaves County, New Mexico

ATTACHMENT 2: Excerpt from Chaves County Comprehensive Plan

FEDERAL AIR QUALITY STANDARDS FOR PM10

PM10 refers to suspended particles less than or equal to 10 microns in diameter. PM10 is a mixture of materials that can include dust, smoke, and soot. The size of PM10 creates health hazards; the particles are small enough to be inhaled deep into the lungs. High concentrations of PM10 can increase the number and severity of asthma attacks, cause or aggravate bronchitis and other lung diseases, trigger heart attacks and strokes, and reduce the body's ability to fight infections. People most vulnerable to these effects include infants and children, the elderly, adults who exercise (because they breathe in more air), and those suffering from asthma or bronchitis.

The Federal Clean Air Act provides for the establishment of National Ambient Air Quality Standards (NAAQS) to protect the public from harmful levels of the most common pollutants in the ambient air. Ambient air is the outside air near ground level that people breathe. State and local agencies regularly monitor concentrations of the pollutants for which NAAQS have been set.

In 1987, the federal Environmental Protection Agency (EPA) set standards for both short-term (24-hr) and long-term (annual) average concentration of PM10. Concentration of PM10 is measured in units of micrograms of particulate matter per cubic meter of air ($\mu\text{g}/\text{m}^3$). The PM10 standards are the following:

24-hour standard:

To attain this standard, the daily 24-hr concentration must not exceed **150 $\mu\text{g}/\text{m}^3$** more than once per year, averaged over three years.

Annual standard:

To attain this standard, the arithmetic average of the 24-hr samples for a period of 1 year, averaged over 3 consecutive years, must not exceed **50 $\mu\text{g}/\text{m}^3$** .

The distinction between an exceedance and a violation of a standard is important.

An exceedance is when the measured concentration of the pollutant is greater than the concentration limit specified in the standard. A measurement of over 150 $\mu\text{g}/\text{m}^3$ in a 24-hr period is an exceedance of the 24-hr standard, and a measurement of over 50 $\mu\text{g}/\text{m}^3$ in any single year is an exceedance of the annual standard.

A violation of the 24-hr standard is when the average number of exceedances per year, averaged over three years, is greater than one. An example would be if there were four exceedances in one year, even if there were no exceedances in the preceding or following two years. If measurements are not taken daily, the observed number of exceedances is adjusted upwards to account for the possibility that exceedances may have occurred on days when no measurement was made. For example, if PM10 is monitored only every sixth day, as it is in New Mexico, then one measured exceedance would count as six exceedances occurring in the 365-day year. Under this monitoring protocol, a single exceedance is sufficient to qualify as a violation and require development of a NEAP.

Similarly, the annual standard level would be violated only if the average of three consecutive annual averages was greater than concentration limit of $50 \mu\text{g}/\text{m}^3$. Violation of a standard ordinarily results in the area being declared nonattainment and being required to take steps to reduce pollutant levels.

EPA NATURAL EVENTS POLICY

Background

By law, the usual consequence when pollutant levels in an area violate one of the NAAQS is that the area is declared nonattainment for that pollutant. The State must then develop and implement a plan for measures that will be taken to reduce emissions of the pollutant and bring the ambient levels of the pollutant back within the standards. Such plans must include stringent pollution control measures for new and existing industries and other sources of the pollutant.

Federal law and policies recognize that declaring an area nonattainment and requiring stringent controls on industrial sources is not an appropriate response where natural events contribute significantly to exceedances of the standard. EPA's Natural Events Policy, which was initially set forth in a 1996 memo, offers a more appropriate approach with a focus on protection of public health.

Guiding Principles

The guiding principles of the Natural Events Policy are:

1. Protection of public health is the highest priority of Federal, State, and local air pollution control agencies.
2. The public must be informed whenever the air quality in an area is unhealthy.
3. All valid ambient air quality data should be submitted to the EPA's national database and made available for public access.
4. State and local agencies must take appropriate reasonable measures to safeguard public health regardless of the source of PM10 emissions.
5. Emission controls should be applied to sources that contribute to exceedances of the PM10 NAAQS when those controls will result in fewer violations of the standards.

Definition of PM10 Natural Events

Three kinds of PM10 Natural Events are defined in the EPA policy memorandum: volcanic and seismic events, wildland fires, and high winds. Only high wind events will be discussed here, as these are kind of events relevant to the recent exceedance in Chaves County. The policy defines high wind events as follows:

"Ambient PM-10 concentrations due to dust raised by unusually high winds will be treated as due to uncontrollable natural events under the following conditions: (1) the dust originated from nonanthropogenic sources, or (2) the dust originated from anthropogenic sources controlled with best available control measures (BACM)."

The term "anthropogenic" means strongly influenced by the activities of humans. Examples of anthropogenic sources include vehicular traffic on or off roads, and construction activities. Best Available Control Measures (BACM) for PM10 are techniques that achieve the

maximum degree of emissions reduction from a source as determined on a case-by-case basis considering technological and economic feasibility.

Although dust storms are referred to as "natural events", it should be recognized that dust storms require not only high winds, but also areas of soil that can serve as sources of dust. Areas where the soil is loose, dry, and barren of rock, vegetation or other cover are highly susceptible to blowing. Some such susceptible areas exist naturally in the desert climate of southern New Mexico, but others may be created or made to emit more dust by human activities.

Documentation of Natural Events

In New Mexico, the Environment Department is responsible for identifying exceedances of the NAAQS caused by high winds. The Environment Department must first mark the exceedances due to high winds with a special notation (called a "flag") in EPA's national database of ambient monitoring data. The NMED must then prepare a document clearly showing, by analysis of weather data and other information, that the exceedances would not have occurred if not for the high wind events. The Environment Department's documentation of these high wind events and their impact on air quality must be made available to the public.

Attachment 1 includes the documentation prepared and submitted for the high wind event that occurred in Chaves County during 2003.

Natural Events Action Plan (NEAP)

If including ambient concentrations of PM10 during natural events in attainment determinations would result in a violation of a NAAQS, the State has a choice of allowing the area to be declared nonattainment or developing and submitting to EPA a Natural Events Action Plan (NEAP). The NEAP describes what will be done to address future events. This document is the initiation of a Natural Events Action Plan for Chaves County.

Failure to Submit or Implement a Plan

If an adequate Natural Events Action Plan is not submitted or implemented, EPA will notify the Governor of the State that the area in question should be redesignated as nonattainment. This action would be authorized under the Clean Air Act based on the conclusion that the health of citizens affected by such events was not being protected by the State. As described earlier, the State would then be required to adopt a federally enforceable revision to its State Implementation Plan (SIP) to address the sources of PM10 emissions. The SIP revision would likely include the same mitigative measures that could have been included in a NEAP, in addition to new and burdensome federal requirements for local industries.

CHAVES COUNTY NATURAL EVENTS ACTION PLAN

Introduction

Chaves County is 6,026 square miles in southeastern New Mexico with a total population of near 61,000, of which approximately 45,000 are in Roswell. At an elevation of 3,649 feet, Chaves County has low humidity and average annual rainfall of about 12 inches. Prevailing winds come from the south. Late winter and spring are the seasons most closely associated with moderate to strong winds, which can bring blowing dust. The New Mexico Environment Department monitors concentrations of particulate matter at a monitoring station at the city offices in Roswell. In 2003, a violation of the federal standard for particulate matter occurred, requiring the creation of this Chaves County Natural Events Action Plan to avoid nonattainment.

Violation of the PM10 Standard in Chaves County

The 24-hr standard concentration of $150 \mu\text{g}/\text{m}^3$ was exceeded once in Chaves County in 2003. On April 15, 2003, the PM10 concentration was $235 \mu\text{g}/\text{m}^3$. Since PM10 is monitored only every sixth day, this one measured exceedances counts as 6 exceedances for the year.

No exceedances of the 24-hour PM10 standard were measured in 2001 or 2002. Therefore, the three-year average number of exceedances is $(0+0+6)/3$, which equals two. Since the standard is a three-year average number of exceedances no greater than one, the standard has been violated.

Causes of the Recent Exceedance

NMED Air Quality Bureau analyzed weather conditions and other circumstances associated with the exceedances and produced documentation of the high wind event, which is included as Attachment 1. Following is summary of that documentation.

In Chaves County at Roswell on April 15, 2003, wind speeds were sufficient to cause an exceedance of the PM₁₀ standard at $235 \mu\text{m}^3$. Wind speeds were in excess of 20 mph for 13 consecutive hourly measurements (10:00 AM through 10:00 PM), with wind speeds equal to or greater than 40 mph for 5 of those 13 hours.

NEAP and Stakeholders in Chaves County

In response to this exceedance of the PM10 standard, and to avoid a PM10 nonattainment designation, NMED has been working with local stakeholders in development of this Natural Events Action Plan, outlined below in NEAP Elements 1 through 5. Stakeholders include Chaves County, City of Roswell, Bureau of Land Management, State Land Office, Natural Resources Conservation Service, and the New Mexico Department of Transportation. Stakeholder agreements are being developed with several of these stakeholders. Attachment 2 is an excerpt from the Chaves County Comprehensive Plan, indicating the County's intent to be active in developing Best Available Control Measures for local sources of dust. Other stakeholders may be identified in the course of implementing the Chaves County NEAP, and if so, adjustments will be made accordingly during the periodic reevaluations described in NEAP

Element 5.

Below is a description of each of the elements of the Chaves County Natural Events Action Plan.

NEAP Element 1: Public Education Programs

One purpose of the Chaves County NEAP is to educate the public about the short-term and long-term harmful effects that high concentrations of PM10 could have on their health and inform the public that certain types of natural events affect the air quality of the area periodically and specific actions are being taken to minimize the health impacts of events.

Actions that have been taken to date to comprise the public education program include:

- Open Houses for the public have been held and will continue to be held in Chaves County, featuring informational posters and handouts.
- Handouts distributed include a “Dust Storms and Health” brochure in English and Spanish, a “Particle Pollution and Your Health” brochure, the “Air Quality Guide for Particle Pollution”, and the “Why is Dust a Public Health Issue?” fact sheet.
- Presentations and meetings have been held with Chaves County to explain the monitoring of PM10, violations of the federal standard, associated health risks, and the advantages of implementing a NEAP to avoid nonattainment.
- The local media has covered open houses and meetings.

NEAP Element 2: Minimize Public Exposure to High Concentrations of PM10 Due to Future Natural Events

The Natural Events Policy states that programs to minimize public exposure should: (a) identify the people most at risk, (b) notify the at-risk population that a natural event is imminent or currently taking place, (c) suggest actions to be taken by the public to minimize their exposure to high concentrations of PM10, and (d) suggest precautions to take if exposure cannot be avoided.

It should be noted that dust storms are readily observable by the public. Most people, in deciding whether they should take precautions to protect their health during dust storms, will base their actions on their own direct observations of dust conditions and will discount an official advisory if it is contradicted by their own observations.

A public education campaign is the most effective means of heightening awareness of health hazards of high dust concentrations and informing susceptible individuals and their caregivers what precautions they should take when dust concentrations are high. To raise awareness and minimize public exposure, the actions outlined in the Public Education Programs (NEAP Element 1) will continue on a quarterly basis through the end of 2005 and on a less frequent basis afterwards. There will also be considerable outreach conducted through the process of working with local governments and stakeholders in accomplishing NEAP Elements 3 and 4.

NEAP Element 3: Abate or minimize appropriate contributing controllable sources of PM10.

There are several steps to determining which sources might need controls and in identifying appropriate control measures, or Best Available Control Measures (BACM):

- (a) Identify sources of fugitive dust that are the result of human activities;
- (b) For each type of source, determine whether it contributes significantly to the number or severity of PM10 exceedances during high wind episodes;
- (c) For sources that contribute significantly to exceedances, identify candidate control measures for which effectiveness and feasibility have been demonstrated (if no appropriate measure has previously been identified for a particular kind of source, step 4 below is required). Measures previously shown to be effective for reducing windblown dust include paving or application of chemical dust suppressants to unpaved roads, parking lots and open areas; dust suppression at construction sites; use of conservation farming practices on agricultural lands; tree rows and other physical wind breaks; restricting recreational off-road vehicle activities; and use of surface coverings.
- (d) Evaluate the effectiveness, technological feasibility, and cost of candidate control measures on a case-by-case basis and produce a rationale for selection of control measures;
- (e) Implement the selected control measures and monitor their effectiveness.

Sources, their contributions to PM10 exceedances, and BACM will be identified and analyzed through June 2005. BACM will then be fully implemented by mid-April 2006. The Natural Events Policy states that BACM must be implemented for those contributing sources for which it has been defined within 3 years after the first NAAQS violation attributed to high wind events. In Chaves County, this correlates to a BACM implementation date of April 15, 2006. The NMED anticipates that BACM requirements will most likely take the form of local ordinances. However, it should be noted that New Mexico is currently considering development of a dust control regulation that may apply statewide. If such a regulation is pursued, it will be considered and reported on during periodic reevaluations of the Chaves County NEAP that are completed in accordance with NEAP Element 5.

In considering what dust control measures are reasonable, both cost and effectiveness should be taken into consideration. Local stakeholders and the State have considerable freedom in deciding what measures are reasonable under the local environmental and economic conditions.

If exceedances of the PM10 standard occur after the NEAP has been fully implemented, the State's documentation of natural events must include evidence that BACM was being implemented when the exceedances occurred.

NEAP Element 4: Identify, study and implement practical mitigating measures as necessary.

In the course of its implementation, the Chaves County NEAP may include pilot tests of new emission reduction techniques to determine their effectiveness and technological and economic feasibility. As necessary, implementation of such techniques on sources will be as expeditious as practicable to most adequately protect public health.

NEAP Element 5: Periodically Reevaluate

Periodically reevaluation of the Chaves County NEAP will occur with attention paid to:

- (a) Conditions causing any exceedances of the PM10 standard in the area;
- (b) Status of implementation of the NEAP; and
- (c) Adequacy of the actions being implemented.

The State will reevaluate the Chaves County NEAP at least every 5 years and make appropriate changes. More frequent evaluations may be performed if necessary for proper implementation of the NEAP.

Timeline for Future Steps

Below is a 2004 through 2009 timeline outlining NMED’s commitments and future steps to achieve full implementation of the Chaves County Natural Events Action Plan.

Chaves County Natural Events Action Plan – Timeline to Full Implementation	
4th Quarter 2004	Public education programs (NEAP Elements 1, 2)
	Sources identified (NEAP Element 3)
	Contributions analyzed (NEAP Element 3)
	BACM identified (NEAP Elements 3, 4)
1st and 2nd Quarters 2005	Public education programs (NEAP Elements 1, 2)
	Sources identified (NEAP Element 3)
	Contributions analyzed (NEAP Element 3)
	BACM identified (NEAP Elements 3, 4)
3rd and 4th Quarters 2005	BACM implemented (NEAP Elements 3, 4)
	Public education programs (NEAP Elements 1, 2)
1st Quarter 2006 through 2008	BACM implemented (NEAP Elements 3, 4)
	Occasional public education programs (NEAP Elements 1, 2)
2009	First scheduled periodic reevaluation (NEAP Element 5), with reevaluations every 5 years thereafter

ATTACHMENT 1: Analysis of PM10 Exceedance, 2003, Chaves County, New Mexico

Documentation of Natural Events:
Particulate Matter Exceedances Caused by High Winds
Chaves, Lea, and Luna Counties, New Mexico

Update for April – June 2003

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April 2004

INTRODUCTION

In a memorandum dated May 30, 1996, the Environmental Protection Agency (EPA) issued the Natural Events Policy (NEP) concerning violations of the PM₁₀ 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 requirements 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 purpose of this update is to meet this requirement for documentation of PM₁₀ exceedances that occurred during the current reporting period.

Particulate matter monitoring sites in Chaves, Lea, and Luna Counties are listed in Table 1. Previous reports documenting natural events for the period 1995 through 2002 should be consulted for more background information on PM₁₀ exceedances in southern New Mexico caused by high winds. These reports are available on the New Mexico Environment Department's website at www.nmenv.state.nm.us.

Site (City)	County	Site ID (AIRS Number)	Latitude	Longitude
Roswell	Chaves	350050005	33.396944	-104.523611
Hobbs	Lea	350250007	32.724722	-103.128611
Deming	Luna	350290001	32.267222	-107.755278

EXCEEDANCES CAUSED BY HIGH WINDS

Table 2 lists the exceedances occurring during the current reporting period and which we have determined to be caused by high winds. We consider the occurrence of wind speed of at least than 18 meters per second (m/s), or 40 miles per hour (mph), to be sufficient for causing one or more exceedances. This wind speed criterion was determined by analysis of data for 101 exceedances that occurred during 1999 and 2000 and were caused by high winds. Approximately 90 percent of these exceedance days had wind speeds greater than 18 m/s. For the exceedances that do not meet the criterion of wind speeds of at least 18 m/s, we provide additional evidence and analysis to document that they were caused by high winds. Such exceedances can result from wind events in which wind speeds are moderate (8 to 18 m/s) but strong enough to raise dust and several hours in duration. Others can result from localized high winds that raise clouds of windblown dust, which are then carried to a monitoring site(s) by winds of lower speeds.

Table 2: PM₁₀ exceedances documented in this report as results of high winds.				
Date	Site	County	PM₁₀ (μm³)	Wind Speeds ≥ 18 m/s or 40 mph
15-Apr-2003	Roswell	Chaves	235	Yes
15-Apr-2003	Hobbs	Lea	387	Yes
15-Apr-2003	Deming	Luna	160	Yes
08-Jun-2003	Deming	Luna	181	See additional explanation.

In Chaves County at Roswell on April 15, 2003, wind speeds were sufficient to cause an exceedance of the PM₁₀ standard at 235 μm³. Wind speeds were in excess of 20 mph for 13 consecutive hourly measurements (10:00 AM through 10:00 PM), with wind speeds equal to or greater than 40 mph for 5 of those 13 hours. See Appendix A for supporting documents for this exceedance.

In Lea County at Hobbs on April 15, 2003, wind speeds were sufficient to cause an exceedance of the PM₁₀ standard at 387 μm³. Wind speeds were in excess of 20 mph for 13 consecutive hourly measurements (10:00 AM through 10:00 PM), with wind speeds equal to or greater than 40 mph for 2 of those 13 hours. See Appendix B for supporting documents for this exceedance.

In Luna County at Deming on April 15, 2003, wind speeds were sufficient to cause an exceedance of the PM₁₀ standard at 160 μm³. Wind speeds were in equal to or greater than 20 mph for at least 14 hours, with wind speed equal to 40 mph at 11:50 AM. See Appendix C for supporting documents for this exceedance.

See Appendix D for additional supporting documentation for the PM₁₀ exceedances on April 15, 2003.

ADDITIONAL EXPLANATION FOR EXCEEDANCE WITH WIND SPEEDS < 40 MPH

In Luna County at Deming on June 8, 2003, wind speeds were sufficient to cause an exceedance of the PM₁₀ standard, although winds measured at Deming did not exceed 40 mph. Wind speeds in Deming were equal to or greater than 10 mph for 6 hours, with wind speeds for 9 additional hours at 8 mph or 9 mph. Data from the National Weather Service indicate that there was “smoke or haze” in the area on June 8, 2003 (see <http://www.srh.noaa.gov/elp/climat/dmnnjun2003.shtml>), which can be a categorization of blowing dust. On June 8, 2003, winds in southern New Mexico were often from the east, south, or east-southeast; see the past weather conditions for Las Cruces Airport (LRU) and Dripping Springs (LOMN5) near Las Cruces in Appendix E for more information. This would indicate that much wind coming towards Deming on June 8, 2003 probably include dust from sources in Luna County, as well as other areas in southern New Mexico, west Texas, and Mexico. Winds ranging up to 29 mph were measured on June 8 at Las Cruces Airport (LRU) and winds ranging up to 37 mph were measured on June 8 at Dripping Springs (LOMN5). We conclude that the June 8, 2003 exceedance was caused

by high winds, with moderate winds in Deming fed by stronger winds from the east and south. See Appendix E for other supporting documentation.

APPENDIX A

Supporting documents for the April 15, 2003 PM₁₀ Exceedance at Roswell (ROW).

Past Weather Conditions for ROW

Observations prior to selected time: April 15, 2003 - 23:59 MDT

Weather Conditions at April 15, 2003 - 23:50 MDT

	23:50	24 Hour Max	24 Hour Min
Temperature	55.4° F	80.6 at 13:15	55.0 at 22:50
Dew Point	44.6° F	68.0 at 17:15	35.6 at 13:50
Relative Humidity	67%	100 at 17:15	21 at 13:50
Wind Speed	15 mph from W	51 at 15:45	3 at 4:50
Wind Gust	-	63 at 15:50	38 at 9:50
Sea level pressure	-	29.75 at 0:50	29.46 at 13:50
Altimeter	29.90 in	29.94 at 0:50	29.63 at 13:15
Weather conditions	blowing dust	-	-
Visibility	10.00 miles	10.00 at 0:50	0.50 at 16:35

Precipitation variable accumulated	Since Midnight	In 24 Hours
Precipitation 1hr	0.02"	0.02"
Precipitation 6hr	0.02"	0.02"

Tabular Listing: April 14, 2003 - 23:59 through April 15, 2003 - 23:59 MDT

Time (MDT)	Temperature °F	Dew Point °F	Relative Humidity %	Wind Speed mph	Wind Gust mph	Wind Direction	Sea level pressure in	Altimeter in	Pressure in	Pressure Tendency	Weather conditions	Visibility miles	Precipitation 1hr in	Precipitation 3hr in	Precipitation 6hr in
23:50	55.4	44.6	67	15		W	29.90				blowing dust	10.00			
22:50	55.0	46.0	72	14		NW	29.74	29.90			blowing dust	10.00			
21:50	57.0	46.9	69	20		WSW	29.72	29.87			blowing dust	10.00			
20:50	57.9	54.0	87	20		SW	29.70	29.85	-8.86		blowing dust	10.00			
19:50	60.8	55.4	82	22		WSW	29.68	29.82			blowing dust	10.00			
18:50	62.6	59.0	88	28	39	WSW	29.65	29.79			blowing dust	9.00			
18:00	66.2	62.6	88	29	45	WSW		29.77			blowing dust	5.00			
17:50	66.9	66.9	100	38	44	WSW	29.62	29.76			blowing dust	6.00			0.00
17:30	68.0	68.0	100	37	45	WSW		29.75			blowing dust	4.00			
17:15	68.0	68.0	100	39	48	WSW		29.74			blowing dust	2.50			
17:00	69.8	57.2	64	38	45	WSW		29.74			blowing dust	1.50			
16:50	69.8	57.2	64	33	48	W	29.59	29.74			blowing dust	1.00			
16:35	69.8	55.4	60	38	53	W		29.73			blowing dust	0.50			

16:30	69.8	55.4	60	45	54	W	29.74	blowing dust	1.50			
16:20	69.8	55.4	60	44	56	WSW	29.73	blowing dust	0.75			
16:15	69.8	55.4	60	46	59	WSW	29.72	blowing dust	0.75			
16:10	71.6	55.4	57	46	59	WSW	29.71	blowing dust	2.00			
16:00	71.6	55.4	57	46	58	WSW	29.70	blowing dust	0.75			
15:50	71.6	55.4	57	45	63	WSW	29.53	29.69	blowing dust	1.00		
15:45	73.4	55.4	53	51	56	WSW	29.69	blowing dust	1.25			
15:25	75.2	53.6	47	49	58	WSW	29.66	blowing dust	0.75			
14:50	78.1	51.1	39	41	58	SW	29.47	29.64	blowing dust	1.25	0.00	
14:00	78.8	39.2	24	44	52	SW	29.63	blowing dust	1.50			
13:50	78.8	35.6	21	45	51	SW	29.46	29.64	blowing dust	1.75		
13:25	80.6	37.4	21	45	55	SSW	29.64	mostly clear	3.00			
13:15	80.6	37.4	21	49	56	SW	29.63	haze	1.75			
12:50	78.8	41.0	26	33	47	SSW	29.49	29.67	lt rain	6.00	0.00	
11:50	80.1	41.0	25	40	52	S	29.52	29.70	clear	9.00		
10:50	78.8	41.0	26	40	49	SSW	29.55	29.75	clear	9.00		
9:50	75.2	42.8	31	28	38	SSW	29.61	29.79	clear	10.00		
8:50	71.1	46.9	42	17		S	29.63	29.81	clear	10.00		
7:50	64.4	48.2	56	17		S	29.66	29.84	clear	10.00		
6:50	60.8	48.2	63	18		S	29.65	29.83	clear	10.00		
5:50	57.9	48.0	70	9		S	29.66	29.83	clear	10.00	0.02	
4:50	59.0	48.9	69	3		S	29.67	29.86	clear	10.00		
3:50	61.0	48.9	64	10		SSE	29.69	29.88	clear	10.00		
2:50	60.1	51.1	72	9		ESE	29.69	29.88	23.62	clear	10.00	0.02
1:50	64.9	46.9	52	6		W	29.73	29.92	mostly cloudy	10.00		
0:50	66.9	48.9	52	9		WNW	29.75	29.94	overcast	10.00	0.02	

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ROSWELL INDUSTRIAL ROW

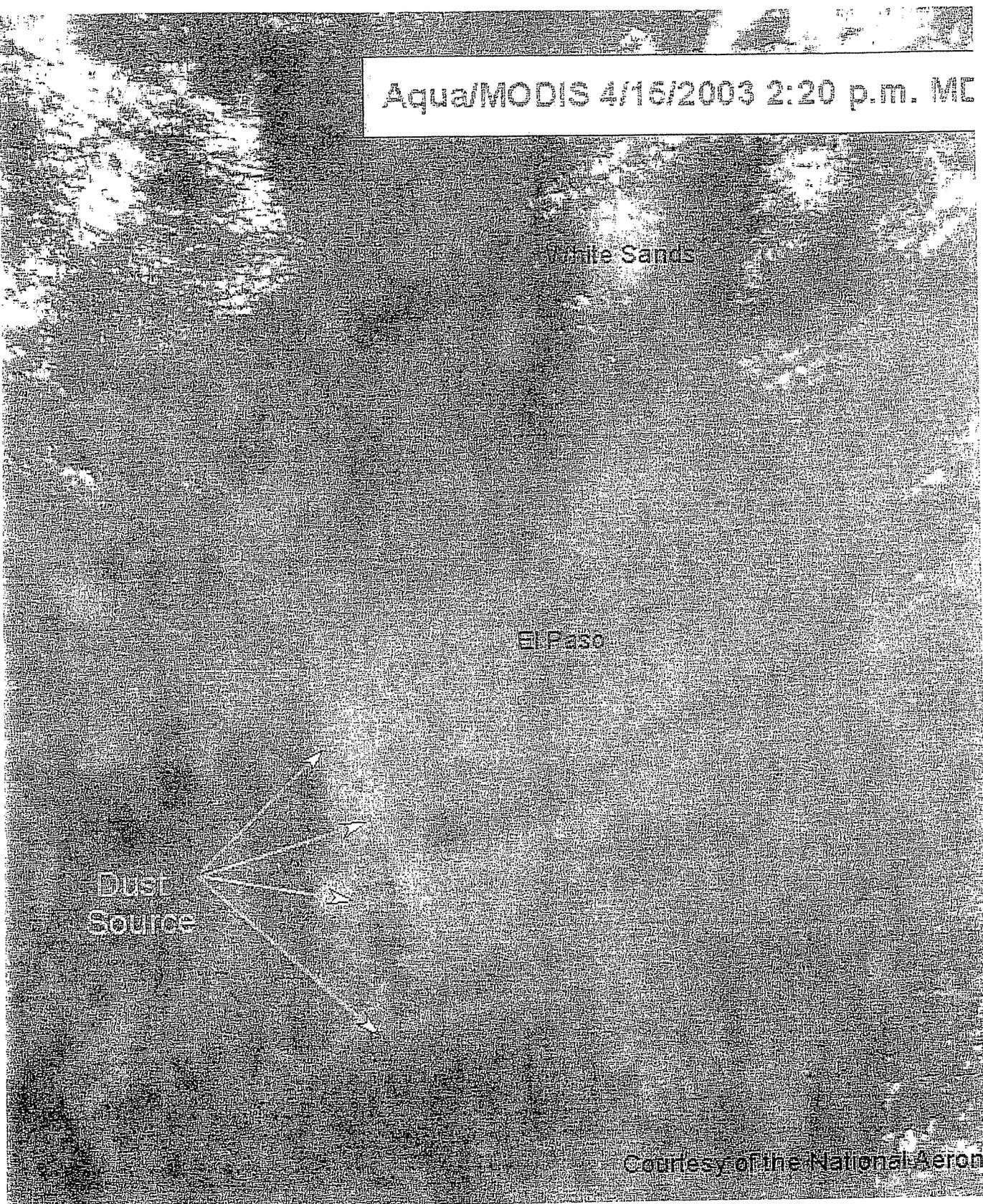
Wind Speed in mph & Wind Direction for 14 days // Apr 5, 2003 - Apr 18, 2003

Local Hour of Day	Apr 05	Apr 06	Apr 07	Apr 08	Apr 09	Apr 10	Apr 11	Apr 12	Apr 13	Apr 14	Apr 15	Apr 16	Apr 17	Apr 18	Apr 19
00	8/SE	18/SW 0	10/NW 6/SW 0	10/NW 5/S 0	10/S 0	3/S	10/SE	9/SW	13/W	15/W	3/NW	17/SW	6/SW		
01	7/S	17/SW 0	10/NW 5/S 0	10/NW 5/S 0	6/SW 0	7/W	12/S	12/S	9/NW	16/W	0	13/W	-		
02	8/SW	-	8/N 8/NW 6/SW 7/S	8/NW 6/SW 7/S	7/S	7/W	12/S	15/S	6/W	17/W	3/N	17/W	-		
03	9/S	13/W	5/N 3/SE 13/S	12/N 3/SE 13/S	7/W	7/W	6/S	13/S	9/SE	22/W	6/S	17/W	-		
04	7/SW	16/NW 3/N	3/SW 0	9/N 3/SW 0	5/W	6/SW	0	0	10/S	15/W	0	12/W	-		
05	3/NW	15/N	6/N 6/SW 0	6/N 6/SW 0	7/NW	6/W	5/SW	5/SW	3/S	16/NW	12/NW	10/W	-		
06	0	21/NW 8/N	7/N 6/SW 3/NE	7/N 6/SW 3/NE	-	5/NE	0	0	9/S	14/NW	7/NW	12/W	-		
07	6/NW	14/NW 10/N	5/N 6/W 6/N	5/N 6/W 6/N	6/NW	0	5/S	6/NW	18/S	12/NW	5/NE	3/N	-		
08	-	14/N	10/N 5/N	10/N 5/N	0	6/NW	3/E	3/NW	17/S	13/N	0	13/N	-		
09	5/NE	9/W 9/N	6/N 0	6/N 0	0	6/N	7/SE	5/N	17/S	10/N	6/N	9/N	-		
10	3/N	-	13/N 7/S 0	-	7/S 0	3/N	0	0	12/SE	28/SW	10/NW	7/NW	9/N	-	
11	10/SW 10/N	-	9/S 0	0	9/S 0	8/NE	8/SE	0	40/SW	5/N	6/NW	9/NE	-		
12	16/SW 9/SW	14/N	15/S 5/S	-	15/S 5/S	-	13/SE	8/S	7/SE	40/S	8/W	0	13/NE	-	
13	21/S	-	9/S 10/SE	-	9/S 10/SE	10/N	17/S	10/SE	8/E	33/S	9/NW	7/S	9/NE	-	
14	21/S	-	17/S 8/SE 9/NE	7/NE 17/S	17/S	17/S	10/SE	10/SE	-	44/SW	8/SW	13/S	-		
15	29/S	-	8/NE 14/S	8/NE 14/S	13/E 13/S	13/N	13/S	15/SW	14/SW	41/SW	-	17/SE	24/S	-	
16	26/S	12/SE	-	-	20/SE 12/SE 9/NE	12/SE 9/NE	17/S	18/S	30/SW	46/W	0	23/S	28/S	-	
17	26/SW 8/SE	7/E 9/N	17/SE 13/S	9/N 17/S	17/S	17/S	23/SW	22/S	38/W	12/SE	22/S	22/SW	-		
18	17/SW 10/SE	13/N 6/E	20/S 14/S	13/NE 18/SE 20/S	20/S 14/S	13/NE	18/SE	20/S	25/SW	29/SW	14/SE	25/S	25/S	-	
19	10/S	7/E	18/N 0	16/SE 14/S	16/SE 14/S	9/NE	16/SE	14/S	18/SW	28/SW	9/SE	24/S	20/SW	-	
20	7/SW 3/S	22/N 5/S	13/SE 9/S	13/SE 9/S	9/NE 9/NE	9/NE	12/SE	8/S	12/SW	22/SW	6/SE	13/S	12/S	-	
21	12/SW 0	21/N 5/S	10/SE 16/S	10/SE 16/S	8/E 9/S	8/E 9/S	8/S	8/S	16/W	20/SW	8/SE	8/S	6/SW	-	
22	12/SW 7/SW	17/N 5/W	10/S 10/S	10/S 10/S	8/E 8/E	8/E 8/E	9/SW	9/SW	9/SW	20/SW	0	12/S	12/W	-	
23	14/SW 5/SE	15/N 3/S	9/S 6/S	9/S 6/S	6/E 6/E	6/E 6/E	9/SW	16/SW	16/SW	14/NW	0	14/S	7/W	-	

APPENDIX D

Supporting documents for the April 15, 2003 PM₁₀ exceedances at Roswell (ROW), Hobbs (HOB), and Deming (DMN).

Aqua/MODIS 4/15/2003 2:20 p.m. MC



Courtesy of the National Aeronautics and Space Administration



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West Texas Dust Storm April 15, 2003

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- [Web Cam Animation from Chelsea St.](#)
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Description

The worst dust storm since April of 2001 swept across West Texas on Tuesday, April 15, 2003. High winds associated with a strong low pressure system centered in Colorado kicked up large plumes of dust from parts of northern Mexico, southern New Mexico, and West Texas. The University of Texas at El Paso (UTEP) Continuous Air Monitoring Station (CAMS) 12 recorded a peak one-hour PM10 average of 4,724 micrograms per cubic meter ($\mu\text{g}/\text{m}^3$) for the hour from 1:00 to 2:00 p.m. Mountain Daylight Time (MDT) and had a 24-hour average of 718 $\mu\text{g}/\text{m}^3$. The Ascarate Park CAMS 37 had a peak one-hour PM10 average of 4,710 $\mu\text{g}/\text{m}^3$ for the hour from 1:00 to 2:00 p.m. MDT and a 24-hour average of 715 $\mu\text{g}/\text{m}^3$. The daily average PM10 at both sites rated as **Hazardous** on the U.S. Environmental Protection Agency (EPA)  [Air Quality Index \(AQI\)](#) scale.

The [satellite animation](#) shows dust originating in northern Mexico blowing across much of West Texas and parts of southern New Mexico. The largest dust plume originates on the north side of a large dry lake bed about 50

miles west-southwest of El Paso as shown in the [true-color satellite image](#) (courtesy of the National Aeronautic and Space Administration).

The El Paso Airport reported visibility as low as to 1/8 mile with blowing dust at 1:03 p.m. MDT and a peak wind gust of 66 miles per hour (mph) at 1:09 p.m. MDT. The Guadalupe Pass automatic weather station reported a minimum visibility of 1/2 mile at 3:29 p.m. MDT and a peak wind gust of 98 mph at 1:54 p.m. MDT. The highest peak wind gust measured in the El Paso air monitoring network was 68 mph at Lower Valley CAMS 36 at 1:35 p.m. MDT. Two additional sites measured wind gusts above 60 mph. McDonald Observatory CAMS 317 to the east of El Paso measured a maximum wind gust of 61 mph at 6:05 p.m. Central Daylight Time (CDT). Ascarate Park CAMS 37 reported visibilities less than 5 miles from 10:10 a.m. to 4:35 p.m. MDT with a minimum visibility of 0.4 mile at 12:40 p.m. and 1:05 p.m. MDT.

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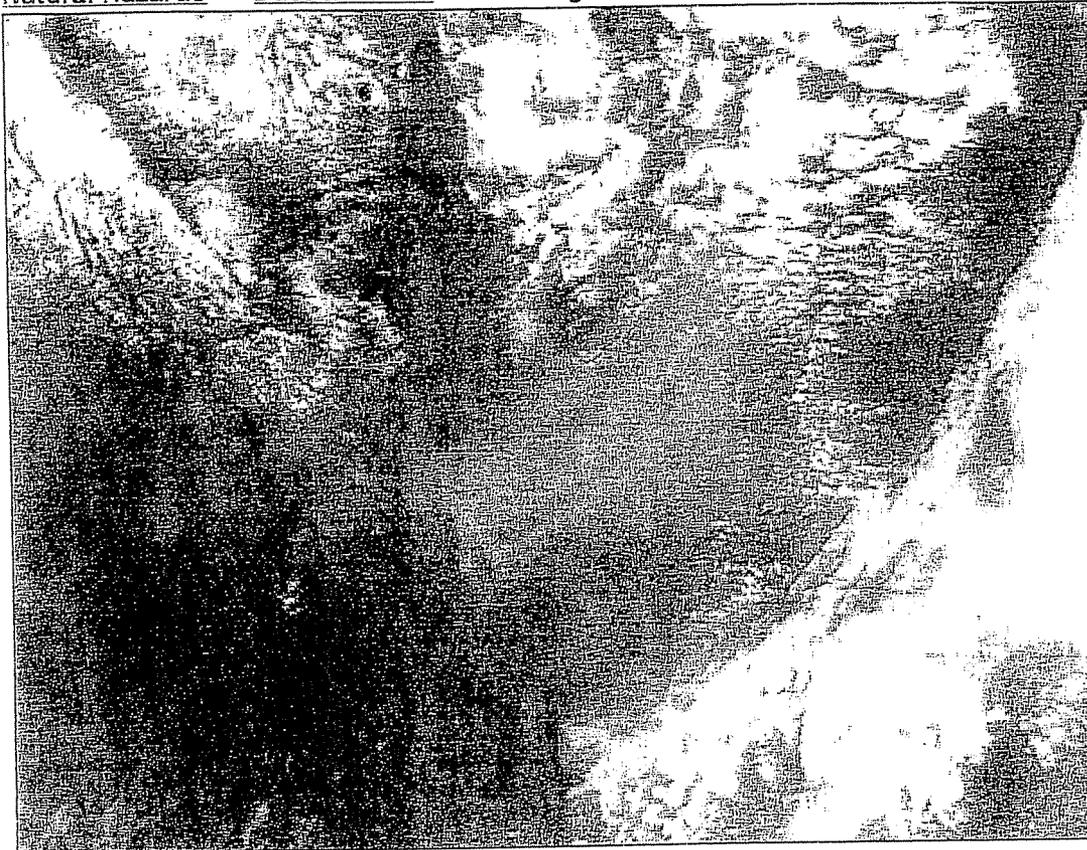
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Blowing Dust Affects Mexico and the U.S.

On Wednesday, April 15, 2003, strong winds blew dust from northern Mexico up into the United States, affecting Texas and New Mexico. In New Mexico at least two people were killed when blowing dust reduced visibility and caused a multiple car accident. This true-color [Moderate Resolution Imaging Spectroradiometer \(MODIS\)](#) of the storm was captured by the [Aqua](#) satellite, and it shows the blowing dust centered in the image.

Image courtesy Liam Gumley, based on data acquired by direct broadcast and processed at Space Science and Engineering Center, University of Wisconsin-Madison.

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Where in the World

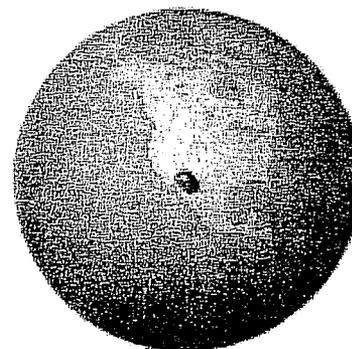


Image Acquired

April 15, 2003

Satellite & Sensor

Aqua- MODIS

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Las Cruces Sun~News

Strong winds cause minor damage By Steve Ramirez

Wednesday, April 16, 2003 -

Sun-News reporter

Strong westerly winds, which included peak gusts in excess of 126 mph Tuesday at San Augustin Pass on U.S. Highway 70, caused widespread, but minimal, damage throughout Las Cruces and southern New Mexico.

Trees were uprooted, branches on older trees were blown off and littered city streets, and traffic lights at some intersections malfunctioned during Tuesday's windstorm. Motorists reported minor damage to vehicles as a result of trees and branches falling on vehicles.

"It clipped the side of my truck pretty good," Ramon Gomez said of some tree branches that hit his 1991 Chevy pickup truck as he was driving on Melendres Street, near Brown Road. "I was just driving along when, whap, part of this tree hit the passenger side of my truck. It startled me and I swerved, but there wasn't anyone else on the road. So thankfully, it wasn't any worse than it was."

The broken tree branch was about four feet long and slightly scratched the right door to the truck. "Depending on how much it's going to cost me, I might just get some rubbing compound or scratch remover," Gomez said.

Traffic lights at the intersections of Telshor Boulevard and Lohman Avenue, and Madrid Avenue and Alameda Boulevard malfunctioned late Tuesday morning.

Also, all high school sporting events were postponed in Las Cruces.

Recorded peak gusts within Las Cruces reached 46 mph early Tuesday afternoon and visibility was reduced to about half a mile.

Milo Porterfield was walking toward Las Cruces' main post office when an especially strong gust literally pushed him back about four feet.

"That was the dangdest thing. Nothing like that has ever happened to me," said a surprised Porterfield. "I know I'm a little guy, only 5-(foot)-2 and about 90 pounds, but no wind has ever been able to do that to me."

The winds uprooted and damaged several trees, including one located outside a home on Westmoreland Avenue.

"It split the tree in my backyard into three pieces," said a woman who identified herself only as Ms. Marta. "The winds came up, amazingly, about 12:30 (p.m.) outside of my house. It ripped one off one whole side of the tree, and about an hour later it split another piece.

"It kind of made me sad because it was the only tree in the yard that was surviving. I felt sad for my 7-year-old daughter, too. She loved that tree and told us that it was her tree."

While the winds closed Interstate 10, from Las Cruces west to the Arizona state line, U.S. 70 remained open.

Larry Furrow, White Sands spokesman, said the sustained wind speed at San Augustin Pass was 88.5 mph Tuesday with a peak gust of 126.5 mph, which happened about 2:30 p.m. Tuesday. Although no formal records are kept of wind speeds at the pass, Furrow said the previous high gust at the pass was 110.4 mph in January 1996.

San Augustin Pass is located on U.S. 70, about 18 miles east of Las Cruces. The elevation at the pass is slightly more than 5,700 feet above sea level.

"To try to put that into some kind of perspective, it's considered a hurricane when wind gusts reach 75 mph," Furrow said. "As a result of the winds, the commanding general (Brig. Gen. William F. Engel) advised the work force to remain on post until 5 p.m."

A "Phase Three Weather Warning," which is considered life threatening by White Sands officials was issued early Tuesday afternoon and remained in effect until 5 p.m. Furrow said weather warnings at White Sands are classified in three phases, with the third phase being the most severe.

A Phase Three warning includes severe, damaging winds greater than 85 mph, flash flood, tornado or severe thunderstorm warnings.

Winds at pass blew out the windshield of a White Sands police vehicle and six parked vehicles at White Sands' sustained minor wind damage.

The stiff winds also delayed a school bus from leaving Oñate High School with students who live at White Sands. Because the Phase Three Warning did not expire until 5 p.m. Tuesday, the bus did not leave for White Sands until that time.

The winds also caused intermittent outages of some radio and television stations in Las Cruces and El Paso.

A wind advisory for all of southern New Mexico and far west Texas remained in effect until midnight Tuesday. According to meteorologists with the National Weather Service a strong cold front pushed its way across the western one-third of New Mexico Tuesday afternoon, which triggered the winds. Another cold front is expected to pass through the region on Friday, which will bring windy weather again.

But daytime wind speeds today are predicted to be considerably less than Tuesday's, with winds today from the northwest at 5 mph to 15 mph. Winds are expected to shift to the southwest later today.

Partly cloudy skies, breezy conditions, and daytime high temperatures in the mid 70s are in the forecast for Thursday. But winds are expected to return Friday, with partly cloudy skies and temperatures in the lower 70s.

Weather conditions for Saturday and Sunday appear favorable, for now. Skies should be partly cloudy, and winds will be breezy on Saturday, with daytime highs in the lower 70s. It is expected to remain partly cloudy on Sunday with the high temperature near 70.

Steve Ramirez can be reached at sramirez@lcsun-news.com .

60-mph winds cause accidents, damage

*Erica Molina and Daniel Borunda
El Paso Times*

Tuesday's strong winds, which topped 120 mph near White Sands Missile Range, caused problems throughout the region, including two traffic deaths on a New Mexico highway and the destruction of a church under construction in Tornillo.

The sandstorm reduced visibility and caused a multiple-car pileup that killed an elderly couple from Bayard, N.M., on U.S. 180 between Deming and Silver City, state police said.

The Rev. Silas Cortez, pastor of Apostolic Church in Tornillo, said one wall remains standing of the church building, which was scheduled to be completed at the end of July.

"Everybody was there when it fell, and they were crying," Cortez said. "Thank God nobody was hurt."

The winds struck Tuesday morning as the sky turned brown from the blowing dust. The National Weather Service issued a high-wind advisory for El Paso at 5 a.m., and it was upgraded to a warning about 11 a.m., indicating that the sustained winds of at least 40 mph were accompanied by gusts of around 60 mph. The wind storm was the strongest of the year with gusts topping hitting 98 mph in Guadalupe Pass east of El Paso, the weather service said.

The wind ripped the roof off a house owned by the El Paso Housing Authority in the 2600 block of Sacramento, and an 18-wheeler overturned on Trans Mountain Road and could not be righted for hours because of the winds.

"This could be dangerous for high-profile vehicles, especially in cross-wind conditions," said Michael Langevein, a meteorologist with the National Weather Service in Santa Teresa.

The New Mexico Highway and Transportation Department closed off several major roads because of winds, including Interstate 10 from Las Cruces to the Arizona state line. Many flights were delayed at El Paso International Airport because of the bad weather, said Pat Abeln, director of aviation.

"The wind can reduce visibility to zero," Langevein said.

Several areas throughout El Paso had electrical outages, and crews



Victor Calzada / El Paso Times
Ricardo Davila, holding his daughter Fatima Davila, 2, looked at an uprooted tree outside the Loma Apartments, located on the 2600 block of Sacramento, where they live. The tree was knocked over Tuesday by high winds that hit the region.

worked continuously to fix the problems, El Paso Electric Co. spokeswoman Teresa Souza said.

Some area high-school baseball and softball teams found their games canceled, and four other baseball games were canceled at the Sportspark on the East Side.

Today's weather is expected to be sunny with light winds and a high in the mid-70s. Winds are expected to return Friday.

Erica Molina may be reached at emolina@elpasotimes.com; Daniel Borunda may be reached at dborunda@elpasotimes.com



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Las Cruces Sun-News

10-vehicle pileup in heavy dust kills two, injures five
By Kevin Buey

Wednesday, April 16, 2003 -

For the Sun-News

High winds and blowing dust are blamed for a 10-car pileup between Deming and Silver City that killed two people and injured five Tuesday morning.

State Police closed main roads in southwest New Mexico for about five hours.

"All we can determine is one car was stopped in the road and was struck by another, which caused a chain reaction," State Police Capt. Scott Ford said.

There were 10 vehicles involved in all, he said.

Names of those killed were not released pending notification of relatives.

Four people were taken to Mimbres Memorial Hospital in Deming and the fifth was airlifted to Thomason Hospital in El Paso, State Police Lt. Jerry Anderson said.

Their injuries ranged from minor to severe, but conditions were not known and names were being withheld until relatives could be notified.

Kevin Buey is a reporter for the Deming Headlight. The Associated Press contributed to this story.

ATTACHMENT 2: Excerpt from Chaves County Comprehensive Plan

Natural Events Policy

In April of 2003 Chaves County exceeded the National Standard for airborne particulates set by the US Environmental Protection Agency (EPA). Under the Federal Clean Air Act (1970), EPA established maximum standards for six major air pollutants to protect public health. Particulate matter is one of the six pollutants. Standards were set based upon health criteria. Particulate matter, PM10, refers to particles less than or equal to 10 microns in diameter – about 1/7 the diameter of a human hair. PM10 is made up of many things such as dust, smoke, and soot. The Air Quality Bureau of the New Mexico Environment Department has advised Chaves County that this single occurrence allows EPA to designate Chaves County as Non-Attainment of Air Quality Standards unless the County develops a Natural Events Policy. The primary component of a Natural Events Policy is a Natural Events Action Plan (NEAP). An NEAP may include a local ordinance which would require local enforcement of dust control measures on certain activities.

Goal 5.10: To develop a Natural Events Action Plan

Objective 5.10.A: Develop a Natural Events Action Plan (NEAP) that would:

- Document when and to what extent natural events affect PM10;
- Inform the public about the harmful effects of particulate matter;
- Minimize public exposure to high levels of PM10 using notifications and health advisory programs;
- Notify the public of when the air quality is affected by natural events;
- Reduce loose, uncovered soils in construction projects, disturbed vacant lands, and unpaved roads and parking lots;
- Provide alternatives for controlling significant sources of human-caused windblown dust; and
- Understand that Mother Nature will override dust control efforts at times.

Objective 5.10.B: Develop Best Available Control Measures (BACMs) within the NEAP.

Policy 5.10: It is the policy of Chaves County to develop a Natural Events Action Plan, which would include Best Available Control Measures, in an effort to improve air quality in Chaves County, improve traffic safety, improve the marketability of Chaves County and the state of New Mexico, allow for local control of local environmental issues, and to show that Chaves County is dedicated to sustained growth.