Exceptional Event Demonstration for Particulate Matter Exceedances in New Mexico January 2008 to December 2008

NMED
New Mexico Environment Department

This document was prepared by the New Mexico Environment Department's Air Quality Bureau. Interested persons may submit commit on this document by March 25, 2011 through email or in writing to:

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1.0 INTRODUCTION

On March 22, 2007, the U.S. Environmental Protection Agency (EPA) adopted its final rule for state and local air quality management agencies regarding the review and handling of certain air quality monitoring data (72 FR 13560). The rule, "Treatment of Data Influenced by Exceptional Events" or Exceptional Events Rule (EER), became effective on May 22, 2007 (40 CFR §50.14). The EER allows the EPA to exclude data showing exceedances of a National Ambient Air Quality Standard (NAAQS) when determining an area's ability to meet the standard for a given criteria pollutant.

Prior to excluding data for New Mexico, the New Mexico Environment Department (NMED)-Air Quality Bureau (AQB) must demonstrate that an "exceptional event" occurred and affected measured particulate matter (PM) concentrations at any site or group of sites in the monitoring network. An exceptional event is defined by Section 319 of the Clean Air Act (CAA) as an event that:

1) affects air quality;
2) is not reasonably controllable or preventable;
3) is caused by human activity that is unlikely to recur at a particular location or is a natural event; and
4) the EPA determines the event is exceptional.

The AQB must document a "clear causal relationship" between the event and the data when preparing demonstrations to justify exclusions of data. The rule does not include specific requirements concerning the type or level of evidence an agency must provide due to the wide range of events and circumstances that are covered under the rule. Hence, EPA determines data exclusion on a case-by-case basis after considering the weight of evidence provided in the demonstrations. The primary purpose of this report is to demonstrate that these prerequisites have been met for excluding data due to exceptional events in New Mexico for calendar year 2008.

2.0 BACKGROUND

2.1 Requirements of the Exceptional Events Rule

The administrative and procedural requirements of the EER must be met by the AQB in order for EPA to consider excluding air quality monitoring data due to an exceptional event. The AQB must notify EPA of its intent to exclude data by placing an initial flag and event description next to the data in EPA's Air Quality System (AQS) database. The initial flags must be submitted to EPA by July 1st following the end of the year in which an exceptional event takes place. The demonstration to support the initial flag and provide the EPA evidence of an exceptional event must be submitted by the AQB within the lesser of three years from the calendar quarter of the event or twelve (12) months prior to an EPA regulatory decision. Also, the AQB must provide notice and opportunity for public comment and submit any public comments received along with the demonstration.

In order for EPA to concur with an exceptional event flag, the State's demonstration must provide accurate and reliable evidence that shows:

1) the event was exceptional as defined in the CAA;
2) there is a clear causal relationship between the exceedance and the event that is claimed to have affected air quality;
3) the event is associated with measured concentrations in excess of background levels and normal historical fluctuations; and
4) there would not have been an exceedance but for the event.

Demonstrations that meet these criteria are eligible for concurrence flags in AQS and data exclusion for determinations of attaining a NAAQS if EPA agrees with the State's findings. The purpose of this report is to demonstrate that some PM exceedances recorded in New Mexico during 2008 were due to exceptional events, particularly natural events caused by high winds.

2.2 History of Particulate Matter Exceedances in New Mexico

Since 1977, EPA has recognized the need to review and handle air quality data for which the normal planning and regulatory processes are not appropriate (72 FR 13562). Prior to the implementation of the EER, EPA policy and guidance dictated the handling of data affected by an exceptional event. The policy most pertinent to New Mexico was outlined in the May 30, 1996 Natural Events Policy (NEP). This policy addressed exceedances of the particulate matter 10 microns or less (PM_{10}) NAAQS that are caused by natural events such as high winds and wildfires. Similar to the EER, the NEP allowed the exclusion of ambient air quality monitoring data affected by natural events from determinations of attainment status, if certain requirements were met. The AQB managed its air quality monitoring data under this policy until the implementation of the EER (1996-2007). Many of the provisions of the NEP are included in the EER.

Beginning in 1994 the AQB measured the first exceedances of the PM_{10} NAAQS in Doña Ana County, located in southern New Mexico. In 2003 the AQB also measured exceedances of the PM_{10} NAAQS in Luna County, directly west of Doña Ana County. Since the number of days with exceedances was more than the number allowed by the standard, the counties were facing a violation of the PM_{10} NAAQS. However, the AQB's analysis of wind data and other information regarding conditions during the exceedances indicated that all but a few were caused by high winds, which lift and carry dust from disturbed and exposed dry soil. Certain features of Doña Ana and Luna counties' natural environments are conducive to wind erosion and windblown dust generation during high winds including: aridity, sparse vegetation cover, and large areas of highly wind-erodible soil. Previous documentation discussed these factors in detail with evidence to support the conclusion that PM_{10} exceedances were caused by high winds. The evidence includes wind roses, newspaper reports, time-lapse video photography, and time series plots of hourly PM_{10} concentration and wind speed (Aaboe, Musick, Cooke et al., 1997-2007).

2.3 Doña Ana and Luna County Natural Events Action Plans

The NEP set procedures for the development of a Natural Events Action Plan (NEAP) to protect public health in areas where the PM_{10} NAAQS may be violated due to uncontrollable natural

events. The Luna and Doña Ana County NEAPs were developed based on the following five major elements:

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

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

2.4 Topography

New Mexico is the fifth largest state in the U.S. with a total area of 121,412 square miles. The state's topography consists of numerous mountain ranges, canyons, valleys, mesas, desert lands, and plains. Average elevation is approximately 4,700 feet above sea level with the lowest point at Red Bluff Lake at 2,842 feet and the highest point at Wheeler Peak with an elevation of 13,161 feet.

The state is divided into four major topographical regions: northern mountains, central plateaus and foothills, southern desert, and eastern plains. Cutting through the northern mountains and central highlands is the Rio Grande Valley which widens considerably as it travels south. The Rio Grande begins in the San Juan Mountains of southern Colorado and flows southward through the middle of New Mexico. The Rio Grande runs the length of Doña Ana County from the northwest corner to the south-central border where New Mexico, Texas and Mexico come together, continuing southeastward along the Texas-Mexico border out into the Gulf of Mexico. The Rio Grande forms the heavily agricultural Rincon (northern) and Mesilla (southern) Valleys in Doña Ana County.

Doña Ana County is located in south-central New Mexico, bordering El Paso County, Texas, and the state of Chihuahua, Mexico to the south. The area within the county's boundaries is topographically diverse and includes mountain ranges, hills, valleys and deserts (Figure 1). The elevation range for the county is 3,730 feet at the valley floor in the south to 9,012 feet in the Mountains. The primary population areas are located within the Mesilla Valley, with the Las Cruces City limits extending to the east plateau below the Organ Mountains. The Organ Mountains toward the eastern side of the county separate the Mesilla Valley from White Sands Missile Range and White Sands National Monument. The western edge of the county tops out of the valley on a wide-open desert plateau that extends throughout Luna County.

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

2.5 Climate

New Mexico has a mild, arid to semiarid climate with light precipitation, abundant sunshine, low relative humidity, and a large daily and annual temperature range. Annual precipitation averages 8.5 inches of rainfall and 3 inches of snowfall. Wind speeds are usually moderate, except during the windy season when relatively strong winds are frequent. Windstorms are common during the late winter and spring months. Due to these high velocity winds, Luna and Doña Ana counties experience most of the particulate matter exceedances in the state. A handful of the windstorms in Luna and Doña Ana counties have been regional events affecting the entire southwestern United States. These wind events are often driven by Pacific cold front weather activity with much less frequent storms occurring due to thunderstorm outflow fronts as well as dry and wet microbursts (Novlan et al., 2007). These periods of high wind may exceed average hourly wind speeds of 30 miles per hour (mph) for several hours and reach peak speeds of more than 50 mph. Blowing dust and soil erosion of unprotected land are common during dry conditions. In general, winds are the strongest in the eastern plains of New Mexico. Winds predominately blow from the southeast in summer, from the north in fall and winter, and from the west-southwest in spring. However, local surface wind directions vary greatly because of local topography and mountain and valley breezes.

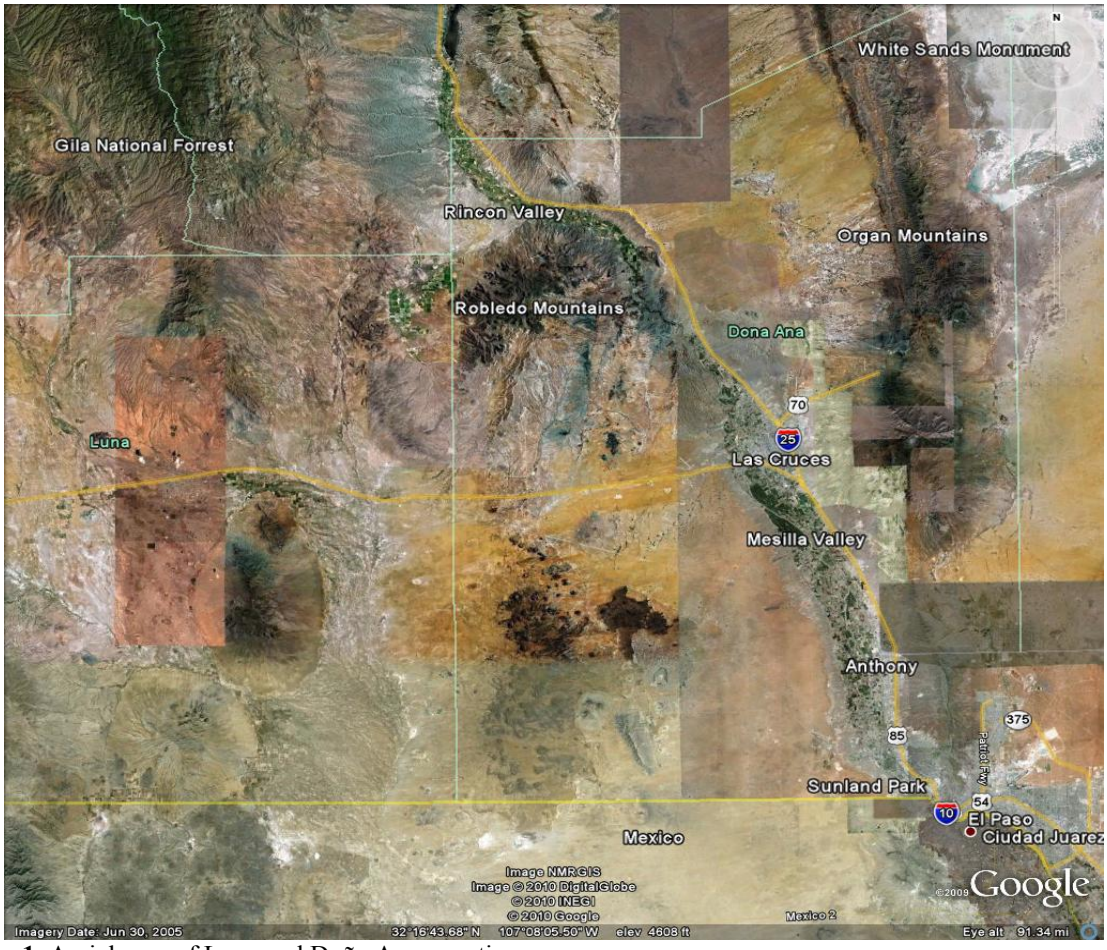

Figure 1. Aerial map of Luna and Doña Ana counties.

2.6 Population Density and Growth

In Doña Ana County, the primary areas of growth have been and continue to be in the Las Cruces metropolitan area and the southern portion of the county near El Paso. While rapid population growth has occurred in these areas, the northern portion of the county remains primarily rural.

Doña Ana County is the second most populated county in the state of New Mexico. The county seat, Las Cruces, has been ranked as one of the fastest growing communities in the United States for the past two decades. Doña Ana County has an estimated 206,419 residents with an estimated 93,570 people in Las Cruces. Between the years 1990 and 2009, the population in Doña Ana County increased by 70,909 or 52.3%, with the city of Las Cruces growing by 31,444 people. Population growth is expected to continue at a rapid pace (2-6%) during the next 20 years (U.S. Census Bureau, 2010).

Luna County is largely rural with an estimated population of 27,044. The largest city, Deming, accounts for 15,399 or 57% of the population. Luna County has grown by less than one percent during the years of 2000-2009 (U.S. Census Bureau, 2010).

2.7 Land Use

More than 50% of New Mexico's land area is pastureland, roughly 28% of the state is forest land and the remainder is classified as urban or barren land. Irrigated farm land makes up 4% of land in the state and mostly lays in the southern valleys, with some agricultural land found in the middle Rio Grande Valley, the Canadian Valley in the northeast, and the San Juan Valley in the northwest. Farmers depend on adequate winter snows in the mountains of the northern part of the state as well as southern Colorado for their main source of water. Ranching (livestock production) is the most extensive agricultural activity. Because of the mild climate, livestock can live on the open range throughout the year, grazing in the higher mountain ranges during the summer and in the lower valleys and plains during the winter. Of Doña Ana County's 3,804 square miles, approximately 75% is federal land and 12% is state land, with the remainder privately held. Doña Ana and Luna counties have long traditions of farming and ranching producing chilies, pecans, cotton, melons, onions, corn and grapes. Doña Ana and Luna County's geography makes it an ideal location for production of solar, wind and bio fuels alternative energy.

2.8 PM Sources and Emission Inventory

In 2004, the AQB participated in EPA's Atlas Project. As part of this project, an area source Particulate Matter Emission Inventory was conducted for Doña Ana County.

This emission inventory showed that airborne dust is generated by many types of activities and businesses. The anthropogenic sources of windblown dust in New Mexico are similar to those found in communities throughout the western United States.

The largest source of wind blown dust in Doña Ana County is the natural desert where areas of loose, dry, and/or barren soil are highly susceptible to wind erosion. Although the natural desert is by far the largest source of windblown dust, human activities also contribute a significant amount of emissions. Since these activities tend to occur in more populated areas, people are more likely to breathe the dust entrained in air.

It is unreasonable to expect that all windblown dust emissions can be controlled. Even the most stringent of control methods may be overcome by the natural forces of high winds. However, in the interest of public health, communities should adopt best available control measures (BACM) to limit the amount of wind blown dust emissions.

2.9 BACM

As part of the Luna and Doña Ana counties' NEAPs, the local governments developed wind erosion control ordinances based on BACM. BACM are control methods that can be used to reduce or eliminate wind blown dust in areas where natural soils have been disturbed and are prone to wind erosion. In determining what constitutes BACM for a particular community, a number of factors must be considered. These factors include the sources of anthropogenic dust in the community, when these sources are present, the available measures to control dust emissions, and the cost of these measures compared to their effectiveness at dust control. Doña Ana County and the city of Las Cruces went through this process and passed their respective wind erosion control ordinances in 2000. Luna County and the city of Deming have had their ordinances in place since 2004. The AQB is currently developing a state-wide fugitive dust rule with an anticipated implementation date of 2011.

2.10 Monitoring Network

The AQB operates a State and Local Air Monitoring Stations (SLAMS) network to measure the concentration of criteria pollutants. The Bureau maintains monitors in nine regions throughout the state (figure 2). Monitoring sites are selected according to a variety of factors. Many are set up in population centers, where many people could be exposed should high concentrations of pollution occur. Others are in areas where pollutant concentrations are likely to be high. Monitoring data is tracked and the reasons for exceedances of the NAAQS are investigated when they occur. All valid monitoring data is then compiled and submitted to EPA to determine attainment of the NAAQS for each criteria pollutant.

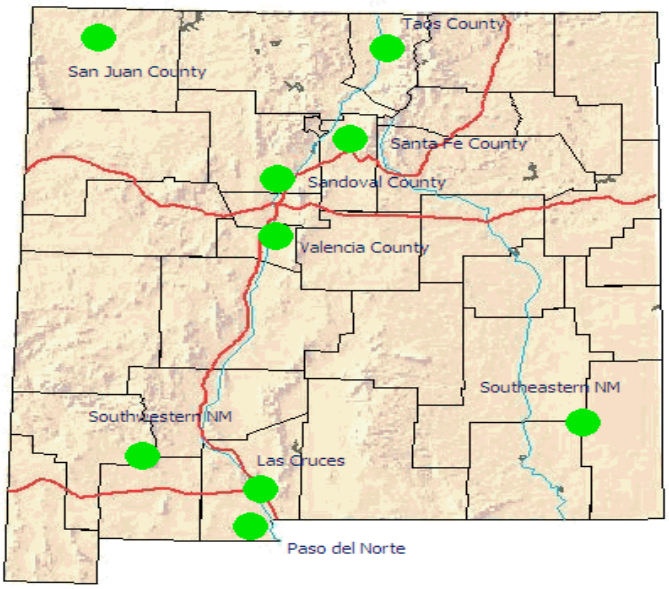

Figure 2. Map of Monitoring Regions in New Mexico.

Historically, the pollutants of concern for air quality in New Mexico have been ozone (O_3), PM_{10} and particulate matter with an aerodynamic diameter of 2.5 microns or less ($PM_{2.5}$). This report focuses on the exceedances recorded at PM monitors located in the southern half of the state.

In Doña Ana County, the AQB monitored exceedances at six PM_{10} and four $PM_{2.5}$ monitoring stations. Luna County has one PM_{10} monitor located at the Deming airport. The PM_{10} and $PM_{2.5}$ monitoring sites measuring exceedances during 2008 are listed in Table 1.

Site Name	PM_{10}	$PM_{2.5}$	AIRS Number	Lat (d-m-s)	Long (d-m-s)
6ZL Holman	✓	...	35-013-0019	32-25-29.69	106-40-26.62
6ZK Chaparral	✓	...	35-013-0020	32-02-27.48	106-24-33.09
6CM Anthony	✓	✓	35-013-0016	32-00-11.54	106-35-57.67
6ZG Sunland Park	✓	✓	35-013-0017	31-47-49.91	106-33-24.17
6ZM Desert View	✓	✓	35-013-0021	31-47-46.32	106-35-02.13
6ZN Santa Teresa	...	✓	35-013-0022	31-47-15.77	106-40-58.36
6WM West Mesa	✓	...	35-013-0024	32-16-39.9	106-51-49.68
7E Deming	✓	...	35-029-0003	32-15-20.99	107-43-21.58

Table 1. PM_{10} and $PM_{2.5}$ monitoring sites recording at least one exceptional event in Southern New Mexico during 2008.

2.11 Typical High Wind Exceedances

From 1995 to 2008, the AQB has recorded 644 exceedances of the PM_{10} NAAQS at its monitors in Doña Ana County. The highest recorded 24-hour average concentration of PM_{10} in the county was 1,841 micrograms per cubic meter ($\mu g/m^3$), or ten times greater than the NAAQS of 150 $\mu g/m^3$. On average, one or more exceedances are recorded over a period of twenty (20) days a year, with a low of nine (9) days in 2005 and a high of thirty-two (32) days in 2003.

Most high-wind exceedances occur in southern New Mexico in late winter and spring during regional-scale high wind events associated with the passage of cold fronts (Figure 3). For these events, the most compelling evidence that exceedances are caused by high wind is the co-occurrence in time of high winds and high PM_{10} concentrations as demonstrated by time series plots of PM_{10} concentrations and wind speed. These time series plots follow a common pattern: an abrupt rise in PM_{10} concentration when wind speed exceeded a variable threshold value and an equally abrupt fall in PM_{10} when wind speed fell below this threshold value. The threshold value varies due to the numerous factors affecting soil's vulnerability to erosion. The maximum hourly PM concentration usually occurred in the same hour as maximum wind speed.

Plots of hourly values of PM_{10} concentration and wind speed are also supportive of a causal relationship. Depending on site and day, the apparent threshold hourly average wind speed may vary from about 6 meters per second (m/s) to 12 m/s or more. When wind speeds were below the apparent threshold for a given site and day, PM_{10} concentrations were generally low (<100 $\mu g/m^3$) and varied more or less independently of wind speed.

A minimum threshold of about 6 m/s (for hourly average wind speed) is in agreement with other studies (Saxton et al., 2000). The wind threshold for dust emission varies because it is affected by many environmental factors, including vegetation cover, soil moisture content, soil particle size distribution, soil structure (crusts and clods), and surface roughness. Dust-emitting potential varies over the landscape, so even a shift in wind direction may result in changes in PM_{10} concentration at a monitoring site. The number and variability of factors affecting the threshold (and dust emissions at a given wind speed) make it impractical to determine a wind speed which will always distinguish high wind event exceedances from those with other causes.

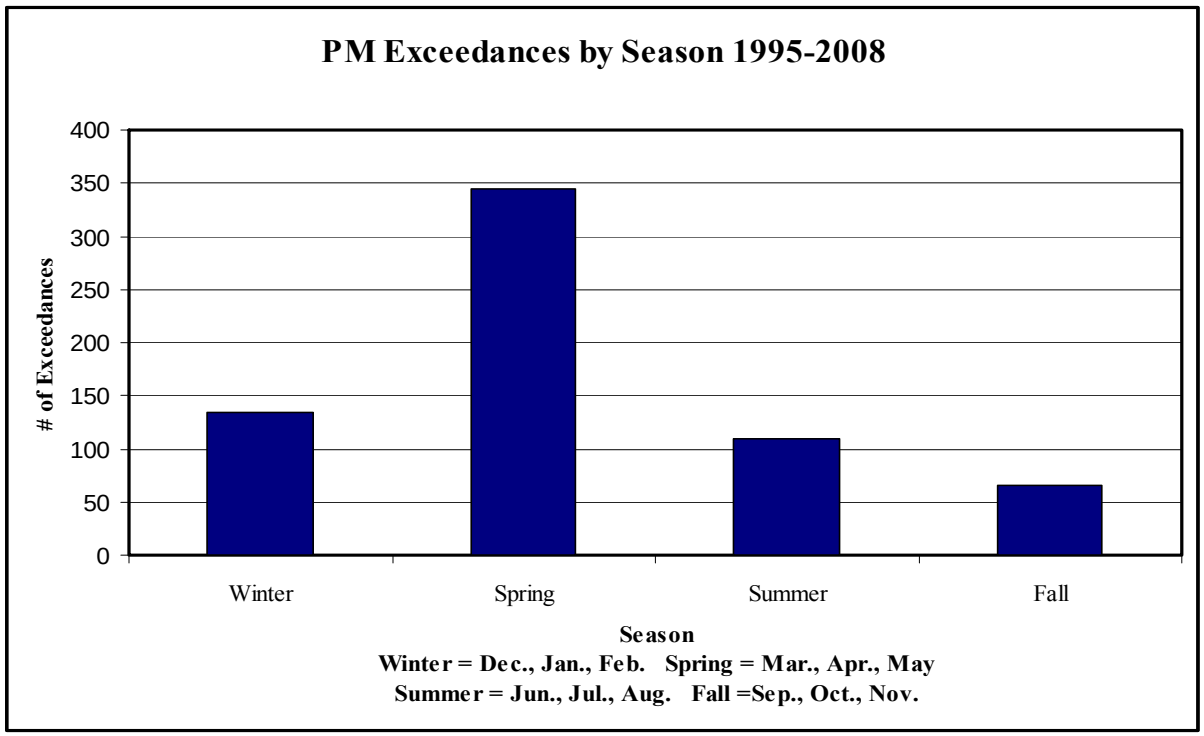

Figure 3. Exceedances by season. Data compiled by NMED AQB.

2.12 Atypical High Wind Exceedances

Some of the PM_{10} exceedances recorded by the AQB do not follow the typical pattern described above. Instead, these atypical exceedances exhibit a poor correlation between PM_{10} concentration and wind speed, with high PM_{10} sometimes occurring during one or more hours with low or moderate wind speed (less than 6 m/s). We believe that these exceedances can be explained by localized high winds generating airborne dust within the region, and the resulting dust plume being carried to other sites by lower-speed winds. No exceedances of this type occurred for this reporting period.

2.13 Low Wind Exceedances

We have recently completed an analysis of monitoring data for the Paso del Norte region showing PM_{10} and $PM_{2.5}$ exceedances when winds are calm. A saturation monitoring network for $PM_{2.5}$ was deployed at seven sites in Sunland Park, NM and six sites in Juárez, MX. The purpose of the study was to investigate the spatial and temporal behavior of $PM_{2.5}$ during low wind, stagnation episodes during winter and early spring months and to investigate possible

source areas. The majority of episodes of high levels of $PM_{2.5}$ (> 30 μg/m^3 for one hour or more) occur in the early morning and evening hours on days with calm winds (< 2 m/s). Episodes occurred every three days on average and varied in duration from one to nine hours, often extending past midnight.

Using an air mass back-trajectories model for six episodes, a source area south of Sunland Park was identified. Based on this effort, the general locations of particulate emission sources leading to the low-wind exceedances can be localized to an area three (3) to four (4) kilometers south of the Sunland Park area in Juárez, MX.

During the year 2008, the AQB recorded five (5) low wind exceedances that follow the pattern described above. In addition, the AQB recorded three $PM_{2.5}$ exceedances at the Sunland Park Partisol monitor and three $PM_{2.5}$ exceedances at the Desert View and Anthony TEOM monitors (Table 2). The Partisol type monitors are considered a Federal Reference Method (FRM) and the data recorded at these sites are used in making NAAQS attainment determinations, whereas the data from TEOM type monitors are used for information only. None of these exceedances were flagged in AQS as being due to an exceptional event.

DATE	SITE	PM2.5 (μg/m^3)	Peak Gust (m/s)	Additional Comments
20-Jan	Sunland Park	36 P	10	Not flagged-low wind
22-Jan	Sunland Park	37.4 P	7	Not flagged-low wind
23-Jan	Sunland Park	36.8 P	6	Not flagged-low wind
3-May	Desert View	46.8	13	Not flagged-TEOM
4-May	Anthony	49.0	9	Flagged-TEOM
5-May	Anthony	46.0	8	Not flagged-TEOM
7-May	Sunland Park	38.0 P	15	Not Flagged
10-May	Sunland Park	37.2 P	13	Not Flagged
9-Jun	Sunland Park	46.6 P	9	Not Flagged
8-Nov	Sunland Park	37.0 P	3	Not flagged-low wind
30-Dec	Sunland Park	35.4 P	4	Not flagged-low wind

Table 2. $PM_{2.5}$ Exceedances not included in this demonstration for data exclusion due to monitor type, low wind, or no flag placed on data in AQS. $PM_{2.5}$ data with a P after it indicates a Partisol monitor.

3.0 PM_{10} and $PM_{2.5}$ EXCEEDANCES DURING 2008

3.1 Demonstration of Exceptional Events

We consider the occurrence of peak wind gusts greater than 18 m/s (40 miles per hour) to be sufficient evidence, by itself, that an exceedance was caused by high wind. This wind gust criterion was determined by analysis of data for the 101 exceedances which occurred during the years 1999 and 2000, and which were shown by detailed analysis to have been caused by high wind. Approximately 90% of these exceedance days had peak wind gusts greater than 18 m/s (Musick et al., 2000).

For those exceedances that do not meet the peak gust criterion of 18 m/s, we provide additional evidence and analysis to document that they were caused by high wind. Such exceedances can result from sustained, moderate speed wind events (6 to 18 m/s), strong enough to raise some dust and lasting for several hours. Others can result from localized high wind events that raise clouds of dust, which are then carried to monitoring sites by winds of lower speed.

We note that the number of days with PM_{10} exceedances in Doña Ana County during 2008 was much more than normal. From 1996 to 2007, the AQB's monitoring sites in Doña Ana County recorded an average of 47 exceedances on 20 days out of a given year. In 2008 the AQB recorded 76 exceedances on 28 days at the monitoring sites (Figure 4). Also, exceedances in 2007 were associated with very high winds (peak gusts >18 m/s), whereas in 2008 it appeared that moderate wind speeds were capable of causing exceedances. Appendix 1 lists PM_{10} and $PM_{2.5}$ exceedances included in this exceptional events demonstration.

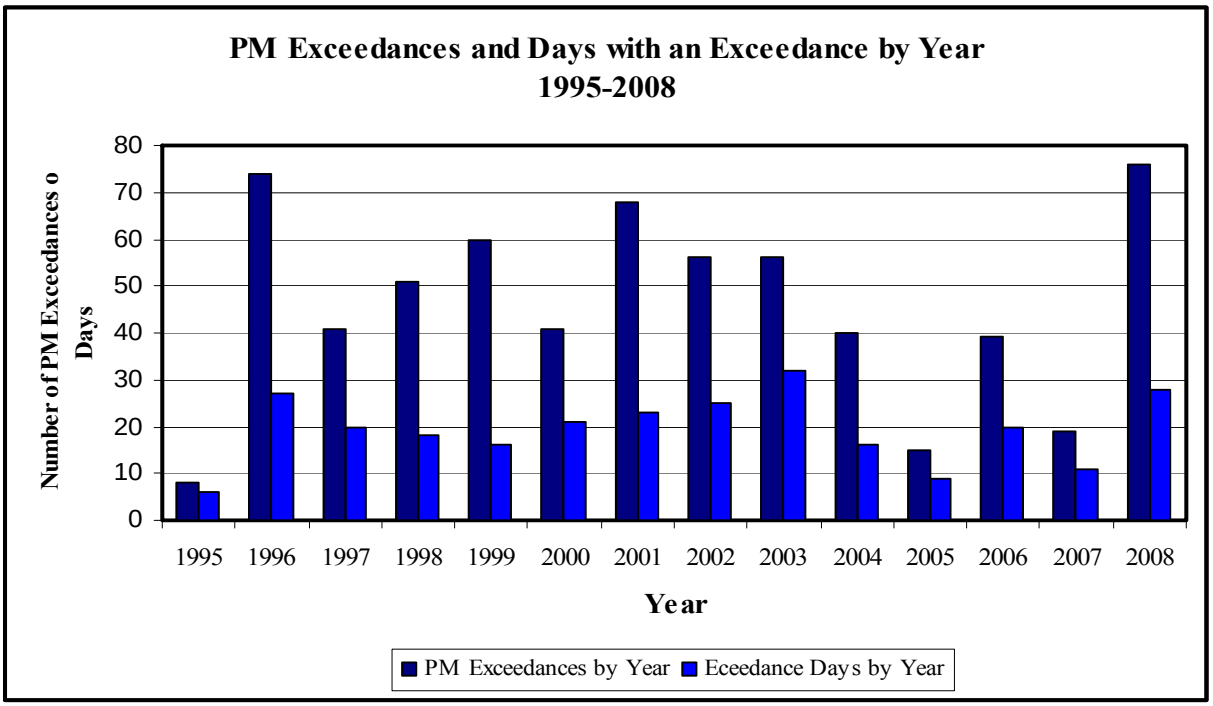

Figure 4. Number of PM Exceedances and Days with an Exceedance by year. Data compiled by the NMED AQB.

The year 2008 had more dust storms than normal in large part due to the lack of rainfall in the first six months of 2008 (Figure 5). The first half of 2008 saw approximately one half (0.5) inch of precipitation while the second half received nearly fourteen (14) inches or double the normal amount. Due to the abnormally large amount of rainfall in the second half of 2008, the total precipitation was 4 inches more than average. The lack of precipitation before July prevented formation of surface crusts that reduce soil's susceptibility to wind erosion in the short term. It also inhibited the growth of vegetative cover, especially weeds and grasses, which normally shelter the soil surface against blowing wind until the dried plant cover begins to break down. Only 3 of the 76 exceedances for 2008 were recorded from July to December (November 5 and December 23, 2008).

Nine (9) $PM_{2.5}$ exceedances were recorded on six (6) days which experienced high winds and high recorded PM_{10} concentrations at the same or nearby sites. We attribute these $PM_{2.5}$ exceedances to windblown dust raised by high winds. Hourly data show that $PM_{2.5}$ values were correlated with wind speed and generally followed the pattern of changes observed in PM_{10} values.

Although most windblown dust of geologic origin is larger than 2.5 microns in diameter, a significant fraction of this material is smaller and contributes to measured $PM_{2.5}$ concentrations. Claiborn et al. (2000) found that approximately 30% of PM_{10} during windblown dust events in Spokane, Washington consisted of $PM_{2.5}$. Li et al. (2000, 2005) found a lower percentage (9-36%) for the Paso del Norte air shed, perhaps in part to regional differences in soil composition and particle size distribution. Given that at least 9%, and perhaps as much as 30%, of PM_{10} during dust storms may be $PM_{2.5}$, very high concentrations of PM_{10} can be expected to result in exceedances of the $PM_{2.5}$ standard.

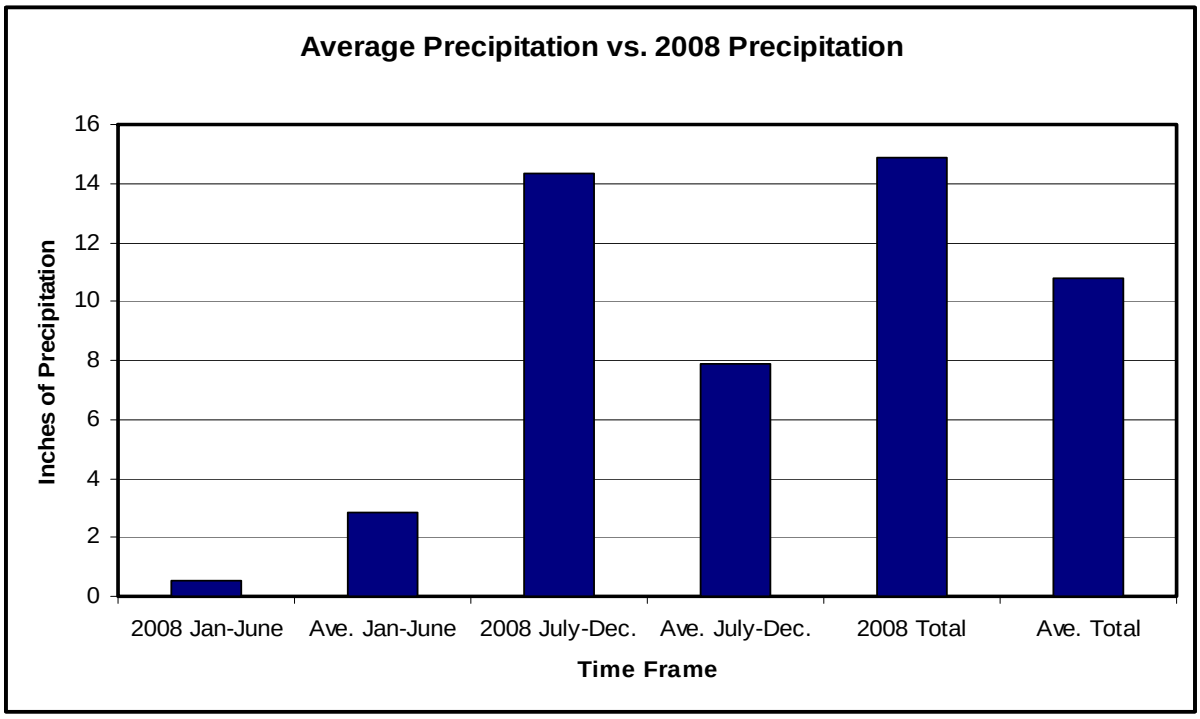

Figure 5. Average Precipitation versus 2008 Precipitation totals at Santa Teresa Airport in southern Doña Ana County. Data collected from Desert Research Institute website at www.dri.edu.

3.2 Additional Documentation

In this section, the AQB presents additional documentation that the fourteen (14) exceedance dates in appendix 1 with peak wind gusts < 18 m/s should be treated as exceptional events. Satellite images are provided for dates with existing images on the internet to help illustrate windblown dust in the region.

1) February 4, 2008: 6CM Anthony (AQS #35-013-0016)

The windblown dust event on this date caused PM_{10} exceedances at four of the six PM_{10} monitoring sites in Doña Ana County as well as an exceedance at the one site in Deming. Although peak gusts were < 18 m/s at Anthony, wind speeds > 18 m/s were recorded at the Sunland Park City Yards, Desert View, Chaparral and Deming sites (Appendix 1). Plots of hourly PM_{10} and wind speeds at these four sites show high PM_{10} values occurred at about the same time as high wind speeds (Appendix 2A-2E) with maximum concentrations occurring around 1600 hours (4:00 pm). The Texas Commission on Environmental Quality reported that strong winds caused widespread blowing dust in the El Paso area on February 4, 2008 (Appendix 16A). A satellite image showing blowing dust on this date may be found in Appendix 2F.

We conclude that this exceedance was caused by windblown dust raised by high winds.

2) March 2, 2008: 6CM Anthony (AQS #35-013-0016)

A plot of hourly PM_{10} versus hourly average wind speed and gust at Anthony is given in Appendix 3A. Although peak gusts were < 18 m/s at Anthony, wind speeds > 18 m/s were recorded at the Chaparral, Holman and Deming sites (Appendix 1). Plots of hourly PM_{10} versus wind speeds at these three sites show high PM_{10} values occurred at approximately the same time as high wind speeds (Appendix 3B-3D). Satellite Images for this event are not available online.

We conclude that this exceedance was caused by windblown dust raised by high winds.

3) March 14, 2008: 6CM Anthony (AQS #35-013-0016)

A plot of hourly PM_{10} versus hourly average wind speed and gust at Anthony is given in Appendix 4A. Although peak gusts were < 18 m/s at Anthony, wind speeds > 18 m/s were recorded at the West Mesa, Holman, Desert View, Sunland Park City Yards and Chaparral sites (Appendix 1). Plots of hourly PM_{10} versus wind speeds at all six sites show high PM_{10} values occurred at approximately the same time as high wind speeds (Appendix 4A-4F). The highest one hour average PM_{10} concentrations occurred between 1300 and 1500 hours (1:00-3:00 pm) at all six sites, despite the maximum average hourly wind gust of 14.8 m/s during the noon hour at the Anthony site. Satellite images for this event may be found in Appendix 4H-4I. Exceedances were recorded at sites in Doña Ana and Luna counties on March 16, 2008 due to high winds (Appendix 1). The Texas Commission on Environmental Quality also reported that strong winds caused widespread blowing dust in the El Paso area on March 16, 2008 (Appendix 16B).

We conclude that this exceedance was caused by windblown dust raised by high winds.

4) April 10, 2008: 6CM Anthony (AQS #35-013-0016)

The windblown dust event on this date caused PM_{10} exceedances at all six monitoring sites in Doña Ana County and one exceedance at the Deming site. At all the sites, average hourly wind speeds and gusts were above 6 m/s and 10 m/s respectively, starting in the early morning hours and lasting into the evening (Appendix 5A-5F). A peak gust of 28 m/s (~63 mph) was recorded

at the West Mesa site at noon on April 10, 2008 (Appendix 5B). Peak gusts at Anthony at that time were 15 m/s (Appendix 5A). Most sites experienced max wind gust and PM_{10} concentrations during the same hour. The same weather system caused strong winds and widespread blowing dust in New Mexico and El Paso on April 9, 2008 and in west Texas on April 10, 2008 (Table 1 and Appendix 16C-16D).

We conclude that this exceedance was caused by windblown dust raised by high winds.

5) April 27, 2008: 6CM Anthony (AQS #35-013-0016)

The highest wind gust at the Anthony monitoring station was 16 m/s with gusts ≥ 10 m/s from 2200 hours (10:00 pm) on April 26, 2008 to 1100 hours (11:00 am) on April 27, 2008 (Appendix 6A). Although peak gusts were < 18 m/s at Anthony, wind speeds reaching 21 m/s were recorded at the Sunland Park City Yards site (Appendix 1) where exceedances of the PM_{10} and $PM_{2.5}$ standards were recorded (Appendix 6B).

We conclude that this exceedance was caused by windblown dust raised by high winds.

6) April 30, 2008: 6CM Anthony (AQS #35-013-0016)

A plot of hourly PM_{10} versus hourly average wind speed and gust at Anthony is included as Appendix 7A. Although peak gusts were < 18 m/s at Anthony, wind speeds > 18 m/s were recorded at the Holman, Desert View, Sunland Park City Yards, Chaparral and Deming sites (Appendix 1). At all six sites, plots of hourly PM_{10} versus wind speed show high PM_{10} concentrations were recorded at approximately the same time as high wind speeds (Appendix 7A-7F). Satellite images for this event may be found in Appendix 7G-7H. Strong winds and blowing dust continued on May 1, 2008 (Table 1).

We conclude that this exceedance was caused by windblown dust raised by high winds.

7) May 12, 2008: 6CM Anthony (AQS #35-013-0016)

Doña Ana County experienced gusty wind conditions beginning on May 6, 2008 and continuing for over one week. On this event date, exceedances were recorded at five sites throughout the region (Appendix 1). Wind gusts ≥ 18 m/s were recorded at all sites except for Anthony. The plots of PM_{10} concentrations and wind speed at the sites shows that elevated PM_{10} levels coincide with increased wind speeds and gusts (Appendix 8A-8E). Satellite images for May 10-12, 2008 can be found in Appendix 8F-8H.

We conclude that this exceedance was caused by windblown dust raised by high winds.

8) May 13, 2008: 6CM Anthony (AQS #35-013-0016)

Continuing the observed patterns from the previous day, three Doña Ana County sites and the Deming site recorded PM_{10} exceedances on May 13, 2008. Anthony recorded a maximum wind gust of 15 m/s while Chaparral, Holman, and Deming recorded wind gusts ranging from 23 m/s

to 25 m/s (Appendix 1). As demonstrated by the plot of hourly PM_{10} concentrations versus hourly average wind speed and gusts at Anthony, elevated levels of PM_{10} correlate with elevated wind speed and gusts (Appendix 9A). A Satellite image for this date may be found in Appendix 9E.

We conclude that this exceedance was caused by windblown dust raised by high winds.

9) May 21, 2008: 6CM Anthony (AQS #35-013-0016)

All PM_{10} monitoring sites in Doña Ana County and the one in Deming recorded exceedances on this date (Appendix 1). $PM_{2.5}$ exceedances were also recorded at the Sunland Park and Anthony Sites. Anthony recorded peak wind gusts of 16 m/s while all other sites had max wind gusts of 20-25 m/s, indicating a region wide wind storm. The ratio of the concentration of $PM_{2.5}/PM_{10}$ equals 9.5% at Anthony and 13.8% at Sunland Park further indicating that the source of exceedances at both sites is geological material (blowing sand) in agreement with the Li and Claiborn studies. The time series plots of the concentration of PM versus wind speed and gusts at Anthony, shows that elevated levels of PM occur as wind gusts increase to speeds > 10 m/s and continue until the gusts drop down below this speed (Appendix 10A-10I).

We conclude that this exceedance was caused by windblown dust raised by high winds.

10) May 22, 2008: 6CM Anthony (AQS #35-013-0016) and 6ZK Chaparral (AQS #35-013-0020)

Wind gusts from the previous day died down in the early morning hours of the 22nd but started to blow faster than 10 m/s by mid-morning. Again, this increase in wind gusts picked up dust and elevated PM_{10} concentrations caused exceedances at Anthony, Chaparral, Holman, West Mesa, and Deming (Appendix 1). The Anthony and Chaparral monitoring stations recorded maximum wind gusts of 14 and 17 m/s, respectively, while the other stations recorded 20-23 m/s maximum wind gusts. As with other exceedances, the time series plots of PM concentration versus wind speed and gusts show a correlation between elevated wind speed and gusts with elevated PM concentrations (Appendix 11A-11E).

We conclude that this exceedance was caused by windblown dust raised by high winds.

11) June 04, 2008: 6CM Anthony (AQS #35-013-0016)

High concentrations of PM_{10} and $PM_{2.5}$ were recorded at Anthony on this date, with a peak wind gust reaching 16 m/s. Four other Doña Ana County monitoring sites as well as the Deming site recorded exceedances of the PM_{10} standard with maximum wind gusts ranging from 19-25 m/s at these sites (Appendix 1). The ratio of $PM_{2.5}/PM_{10}$ concentrations at Anthony equals 12.6% indicating that the source of the exceedances was geological material (dust or sand). The time series plots at these sites further indicate a close correlation between wind speed and gusts with elevated concentrations of PM (Appendix 12A-12G). A satellite image showing blowing dust on this date may be found in Appendix 12H.

We conclude that this exceedance was caused by windblown dust raised by high winds.

12) June 20, 2008: 6CM Anthony (AQS #35-013-0016), 6ZG Sunland Park (AQS #35-013-0017), 6ZK Chaparral (AQS #35-013-0020), 6ZL Holman (AQS #35-013-0019), and 6ZM Desert View (AQS #35-013-0021)

Unlike other exceedance dates, the monitoring stations throughout Doña Ana County recorded exceedances of the PM_{10} standard without recording a max wind gust of 18 m/s at any site. Five of the six Doña Ana County sites exceeded the standard while recording max wind gusts of 14-16 m/s at these sites (Appendix 1). As demonstrated by the time series plots of these monitoring sites, PM_{10} concentration increased as wind gusts increased (Appendix 13A-13E). At all five sites, wind gusts increased by $\geq$ 8 m/s from the 0000 to 0200 hours with PM_{10} concentrations increasing by approximately 325-760 $\mu g/m^3$ during this time period. Maximum PM_{10} concentrations and wind speeds were recorded at all the monitoring sites during the 0200-0300 hours. PM_{10} concentrations continued to be $\geq$ 150 $\mu g/m^3$ throughout the morning, as wind speeds and gusts were $\geq$ 6 m/s. This pattern continued until approximately the 1100 hour, when wind speeds and gusts dropped below 6 m/s while the PM_{10} concentrations dropped below 150 $\mu g/m^3$ at most sites.

We conclude that this exceedance was caused by windblown dust raised by high winds.

13) June 28, 2008: 6CM Anthony (AQS #35-013-0016)

The Anthony monitoring station recorded a PM_{10} design value of 180 $\mu g/m^3$ and max wind gusts of 16 m/s. The monitoring station at Deming also recorded an exceedance of the standard with max wind gusts of 21 m/s (Appendix 1). The time series plots of the concentration of PM_{10}, wind speed, and wind gust show that elevated levels of PM_{10} occurred as wind gusts increased at both sites (Appendix 14A-14B). As wind gusts increased from 7 to 16 m/s during the 1700-2200 hours at the Anthony site, the PM_{10} concentrations increased from 14 to 1,657 $\mu g/m^3$. At 2200 hours the maximum hourly concentration of PM_{10} (1,657 $\mu g/m^3$) and the maximum hourly average wind gust (16 m/s) were recorded at the Anthony site (Appendix 14A).

We conclude that this exceedance was caused by windblown dust raised by high winds.

14) December 23, 2008: 6CM Anthony (AQS #35-013-0016)

The last exceedance recorded during 2008 due to an exceptional event occurred on this date (Appendix 1). Although wind gusts did not exceed 18 m/s at Anthony (17 m/s), Sunland Park recorded an exceedance with a max wind gust of 23 m/s. As with other exceedance dates, the PM_{10} concentration at Anthony follows the wind gust patterns exhibited in the time series plot (Appendix 15).

We conclude that this exceedance was caused by windblown dust raised by high winds.

4.0 REFERENCES

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5.0 Appendices

Documentation of Natural Events: Particulate Matter Exceedances Caused by High Winds in Luna and Doña Ana Counties, New Mexico

Update for January 2008 – December 2008

Appendix 1

Supporting Data for Documentation of Exceedances

PM_{10} and $PM_{2.5}$ exceedances documented in this report are attributed to high wind. Values are 24-hour average PM_{10} and $PM_{2.5}$ concentrations in micrograms per cubic meter ($\mu g/m^3$). PM_{10} values greater than 150 $\mu g/m^3$ (after rounding to the nearest 10) are exceedances of the standard. Wind gusts are rounded to the closest 1 m/s.

DATE	SITE	PM_{10} ($\mu g/m^3$)	PM2.5 ($\mu g/m^3$)	Peak Gust (m/s)	Gust >18 m/s	Additional Documentation
6-Jan	Deming	250		22	✓	
7-Jan	Deming	410		23	✓	
3-Feb	Chaparral	260		25	✓	
4-Feb	Anthony	320		17		App. 2
	Sunland Park	210		22	✓	
	Chaparral	250		22	✓	
	Desert View	220		20	✓	
	Deming	300		24	✓	
23-Feb	Chaparral	220		24	✓	
2-Mar	Anthony	160		13		App. 3
	Chaparral	210		21	✓	
	Deming	180		22	✓	
	Holman	160		20	✓	
14-Mar	Anthony	210		15		App. 4
	West Mesa	170		23	✓	
	Sunland Park	180		21	✓	
	Chaparral	290		22	✓	
	Holman	520		24	✓	
	Desert View	180		19	✓	
	Deming	340		26	✓	
16-Mar	Anthony	280		18	✓	
	West Mesa	150		22	✓	
	Sunland Park	220		21	✓	
	Chaparral	230		23	✓	
	Holman	230		24	✓	
	Desert View	340	35.5	20	✓	
	Deming	870		24	✓	
23-Mar	Deming	170		18	✓	
9-Apr	Anthony	380	37.2	18	✓	
	West Mesa	160		23	✓	
	Sunland Park	400	37.3	25	✓	
	Chaparral	450		23	✓	
	Holman	180		22	✓	
	Desert View	420		24	✓	
	Santa Teresa	n/a	36.1	24	✓	
	Deming	270		23	✓	
10-Apr	Anthony	220		16		App. 5
	West Mesa	180		28	✓	

DATE	SITE	PM_{10} ($\mu g/m^3$)	PM2.5 ($\mu g/m^3$)	Peak Gust (m/s)	Gust >18 m/s	Additional Documentation
10-Apr	Sunland Park	220		22	✓	
	Chaparral	450		23	✓	
	Holman	210		23	✓	App. 5
	Desert View	180		21	✓	
	Deming	360		24	✓	
26-Apr	Deming	220		22	✓	
27-Apr	Anthony	230		16		
	Sunland Park	280	38.3	21	✓	App. 6
	Deming	860		22	✓	
30-Apr	Anthony	160		14		
	Sunland Park	240		21	✓	
	Chaparral	210		21	✓	App. 7
	Holman	170		20	✓	
	Desert View	230		19	✓	
	Deming	290		21	✓	
1-May	Sunland Park	170		19	✓	
	Chaparral	170		22	✓	
	Holman	370		22	✓	
	Deming	310		23	✓	
6-May	Deming	190		22	✓	
11-May	Sunland Park	160	35.8 P	19	✓	
12-May	Anthony	160		15		
	Sunland Park	200		19	✓	
	Chaparral	170		23	✓	App. 8
	Desert View	200		18	✓	
	Deming	240		22	✓	
13-May	Anthony	230		15		
	Chaparral	240		25	✓	App. 9
	Holman	180		23	✓	
	Deming	360		24	✓	
21-May	Anthony	400	37.9	16		
	West Mesa	200		25	✓	
	Sunland Park	300	41.4 P	20	✓	
	Chaparral	360		24	✓	App. 10
	Holman	360		23	✓	
	Desert View	270		22	✓	
	Deming	1030		25	✓	
22-May	Anthony	200		14		App. 11
	Chaparral	190		17		

DATE	SITE	PM_{10} ($\mu g/m^3$)	PM2.5 ($\mu g/m^3$)	Peak Gust (m/s)	Gust >18 m/s	Additional Documentation
22-May	West Mesa	170		23	✓	App. 11
	Holman	200		22	✓	
	Deming	170		21	✓	
4-Jun	Anthony	300	37.9	16		App. 12
	Sunland Park	270		19	✓	
	Chaparral	360		25	✓	
	Holman	210		24	✓	
	Desert View	260		19	✓	
	Deming	250		22	✓	
5-Jun	Deming	160		22	✓	
20-Jun	Anthony	260		14		App. 13
	Sunland Park	290		16		
	Chaparral	220		15		
	Holman	170		16		
	Desert View	240		14		
23-Jun	Deming	160		24	✓	
26-Jun	Chaparral	160		19	✓	
	Deming	230		20	✓	
27-Jun	Deming	310		26	✓	
28-Jun	Deming	300		21	✓	App. 14
	Anthony	180		16		
5-Nov	Chaparral	370		20	✓	
23-Dec	Anthony	200		17		App. 15
	Sunland Park	180		23	✓	

Documentation of Natural Events: Particulate Matter Exceedances Caused by High Winds in Luna and Doña Ana Counties, New Mexico

Update for January 2008 – December 2008

Appendix 2A-2F

Supporting Data for Documentation of Exceedances

February 04, 2008: 6CM Anthony (AQS #35-013-0016)

A) Plot of Hourly PM_{10} Concentration and Wind Speed at Anthony.

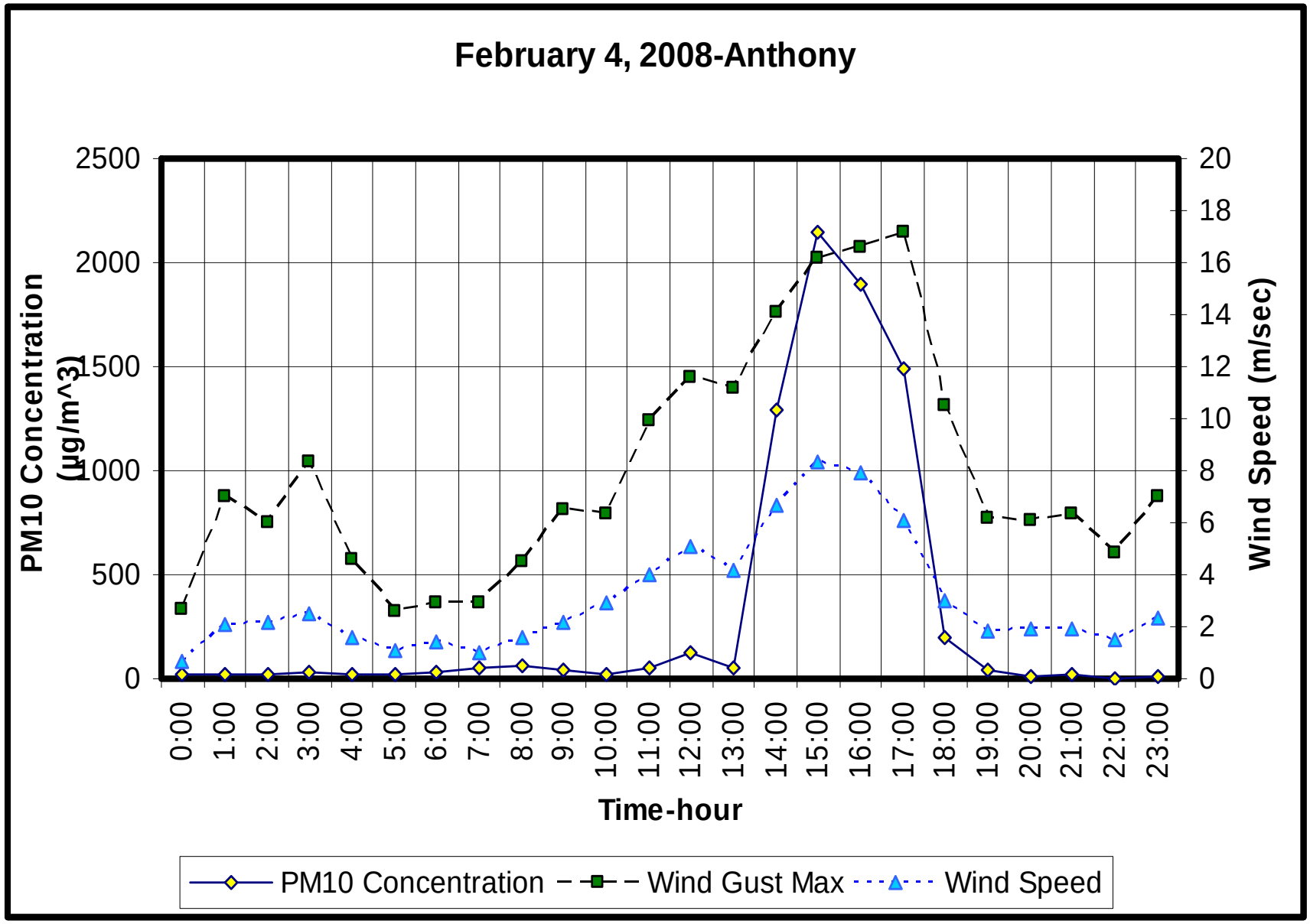
B) Plot of Hourly PM_{10} Concentration and Wind Speed at Sunland Park City Yards.

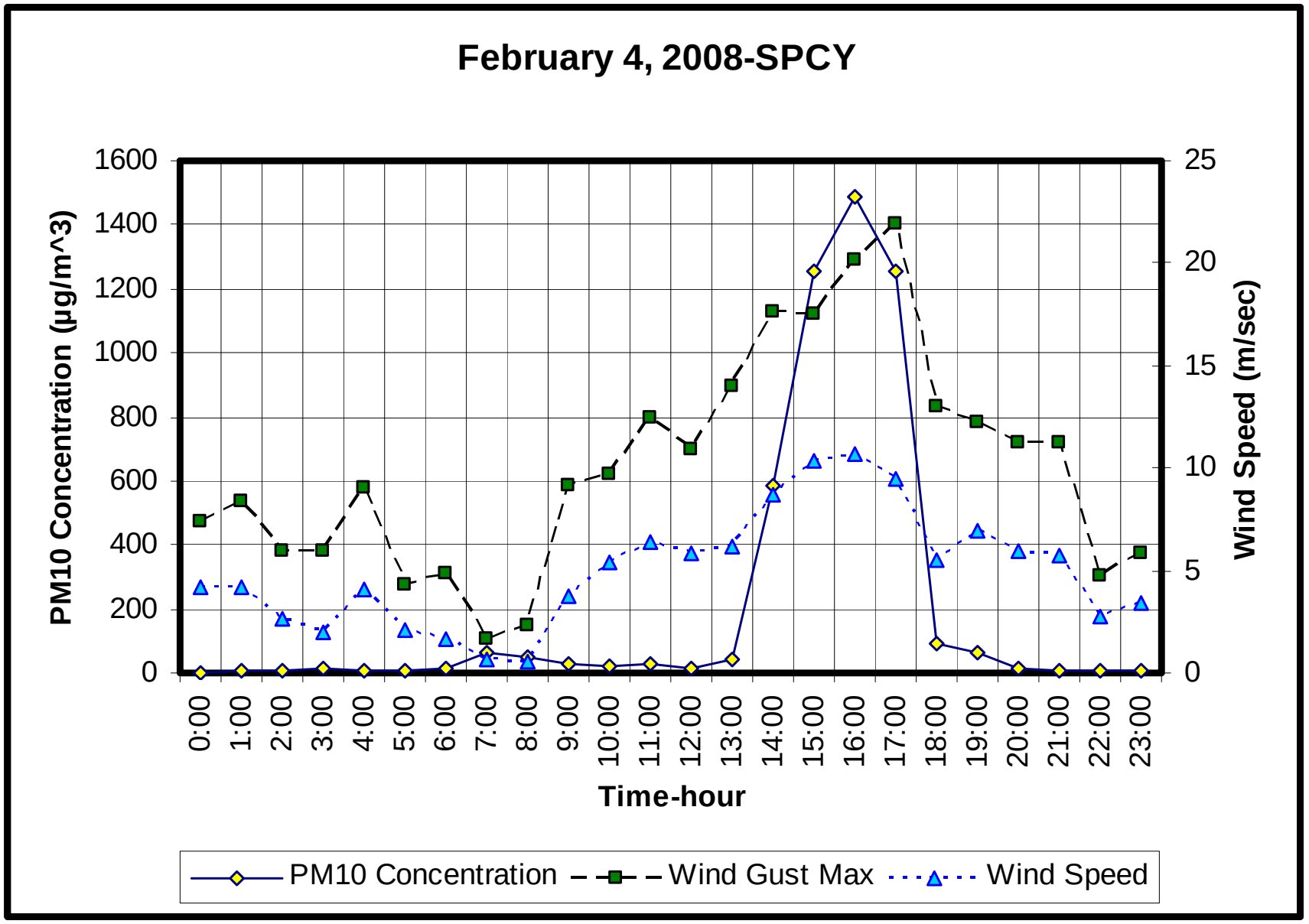
C) Plot of Hourly PM_{10} Concentration and Wind Speed at Desert View.

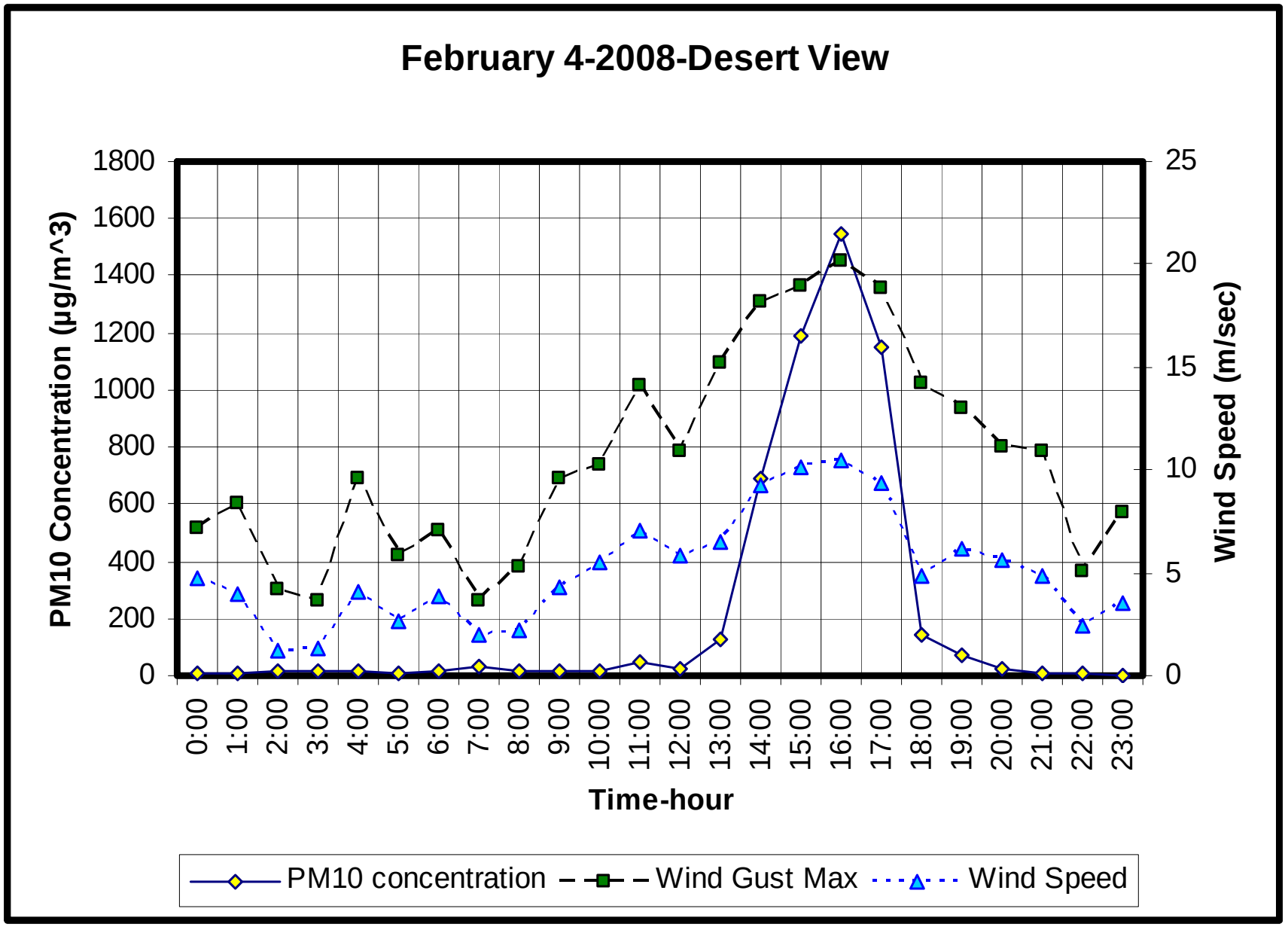
D) Plot of Hourly PM_{10} Concentration and Wind Speed at Chaparral.

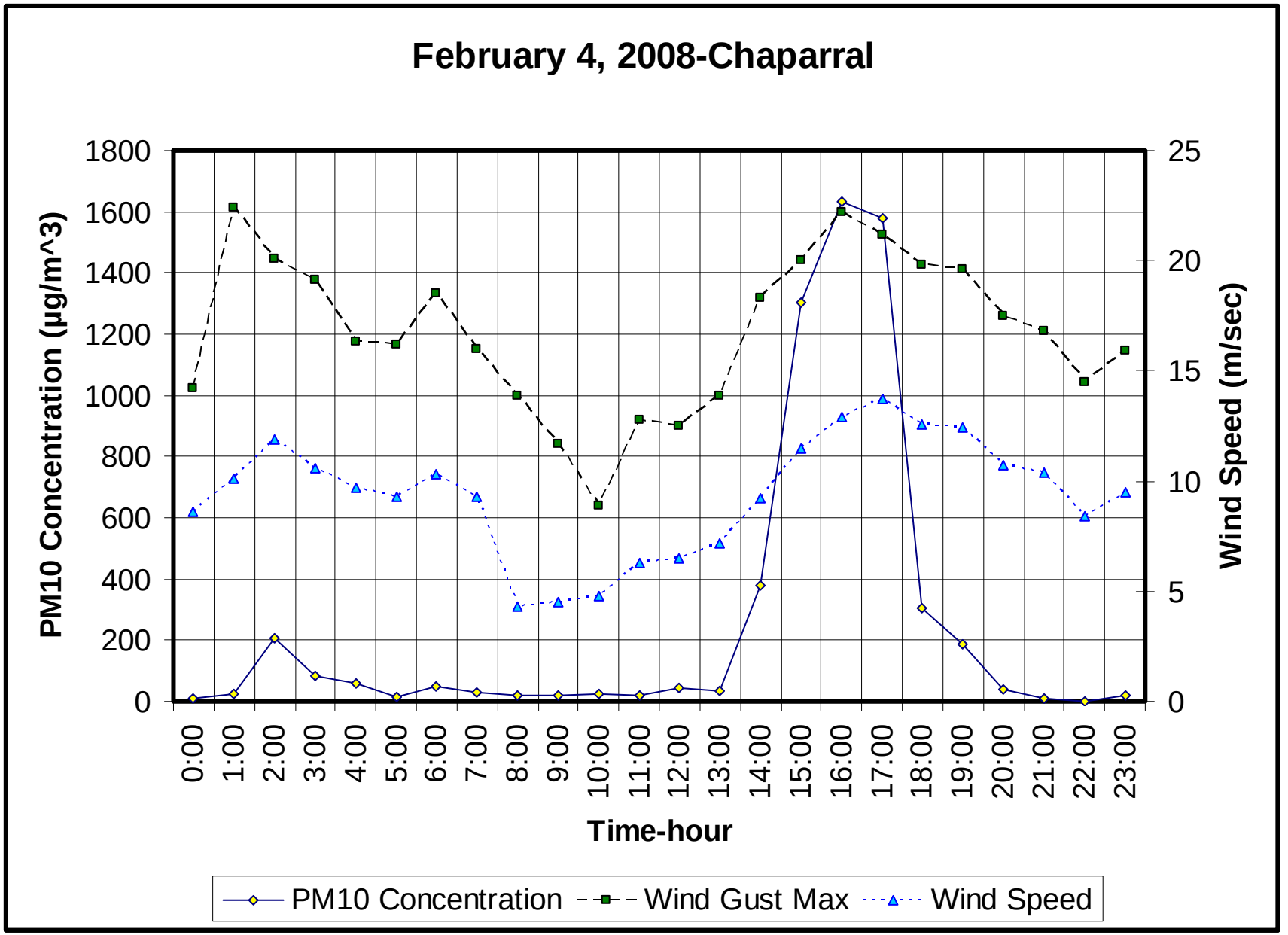
E) Plot of Hourly PM_{10} Concentration and Wind Speed at Deming.

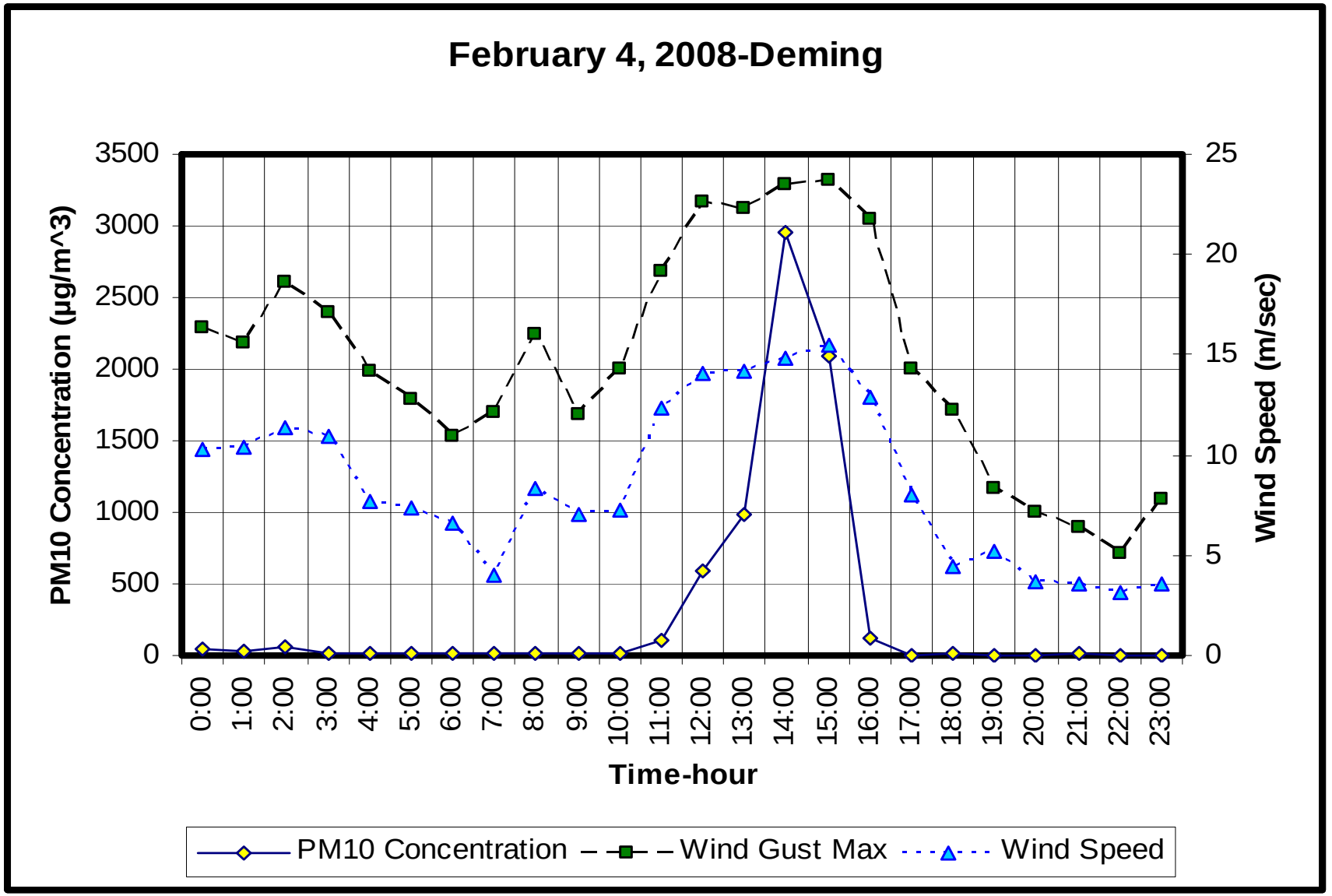
F) MODIS Satellite Image for February 04, 2008. Downloaded from http://rapidfire.sci.gsfc.nasa.gov/subsets/?subset=NewMexico


February 4, 2008-Anthony
PM10 Concentration (µg/m^3)
Wind Speed (m/sec)
2500
2000
1500
1000
500
0
20
18
16
14
12
10
8
6
4
2
0
0:00
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
Time-hour
PM10 Concentration
Wind Gust Max
Wind Speed


February 4, 2008-SPCY
PM10 Concentration (µg/m^3)
Wind Speed (m/sec)
Time-hour
0
200
400
600
800
1000
1200
1400
1600
0
5
10
15
20
25
0:00
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
PM10 Concentration
Wind Gust Max
Wind Speed


February 4-2008-Desert View
PM10 Concentration (µg/m^3)
Wind Speed (m/sec)
1800
1600
1400
1200
1000
800
600
400
200
0
25
20
15
10
5
0
0:00
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
Time-hour
PM10 concentration
Wind Gust Max
Wind Speed


February 4, 2008-Chaparral
PM10 Concentration (µg/m^3)
Wind Speed (m/sec)
1800
1600
1400
1200
1000
800
600
400
200
0
25
20
15
10
5
0
0:00
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
Time-hour
PM10 Concentration
Wind Gust Max
Wind Speed


February 4, 2008-Deming
PM10 Concentration (µg/m^3)
Wind Speed (m/sec)
Time-hour
3500
3000
2500
2000
1500
1000
500
0
25
20
15
10
5
0
0:00
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00
13:00
14:00
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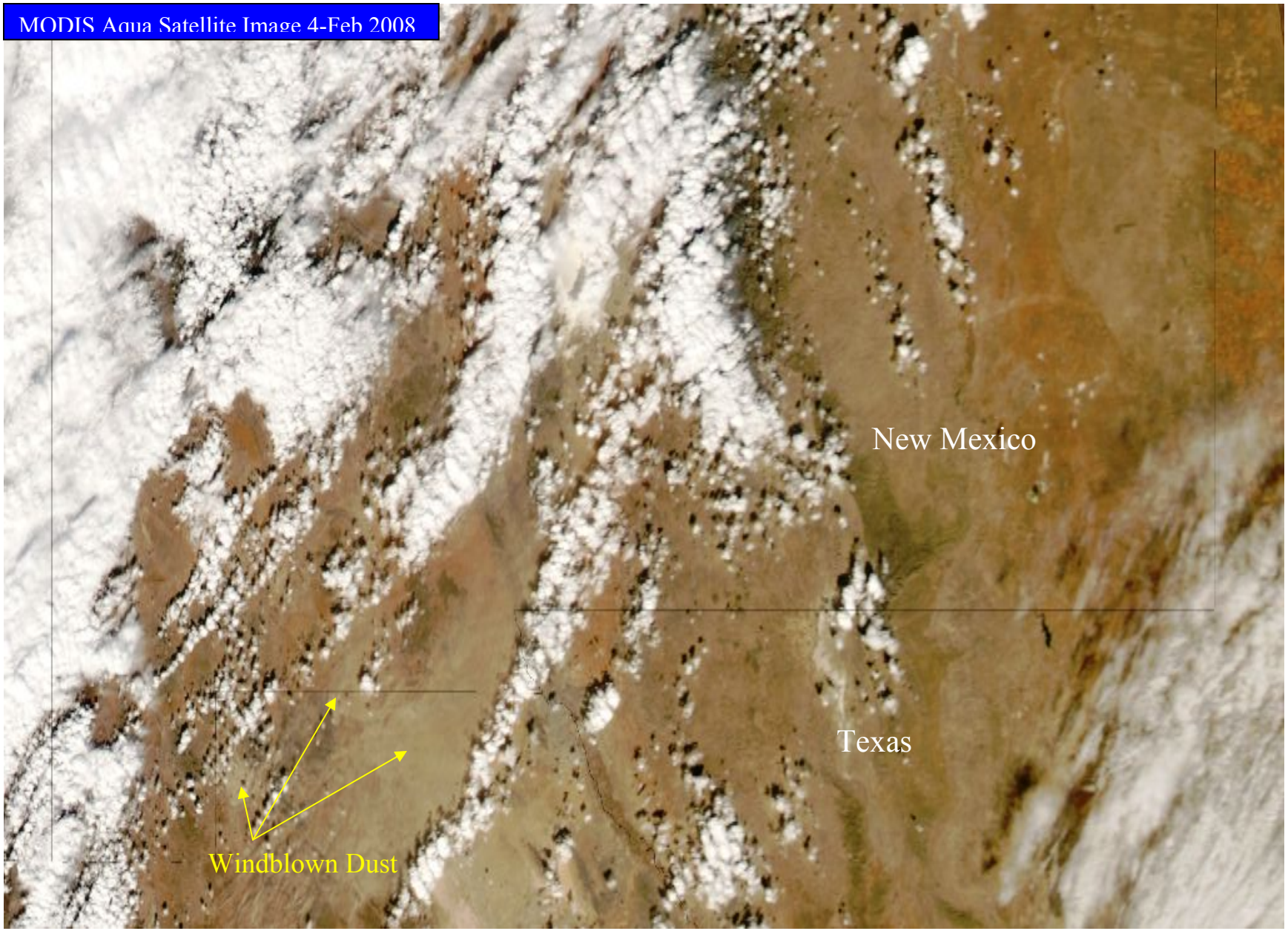
21:00
22:00
23:00
PM10 Concentration
Wind Gust Max
Wind Speed


MODIS Aqua Satellite Image 4-Feb 2008
New Mexico
Texas
Windblown Dust

Documentation of Natural Events: Particulate Matter Exceedances Caused by High Winds in Luna and Doña Ana Counties, New Mexico

Update for January 2008 – December 2008

Appendix 3A-3D

Supporting Data for Documentation of Exceedances

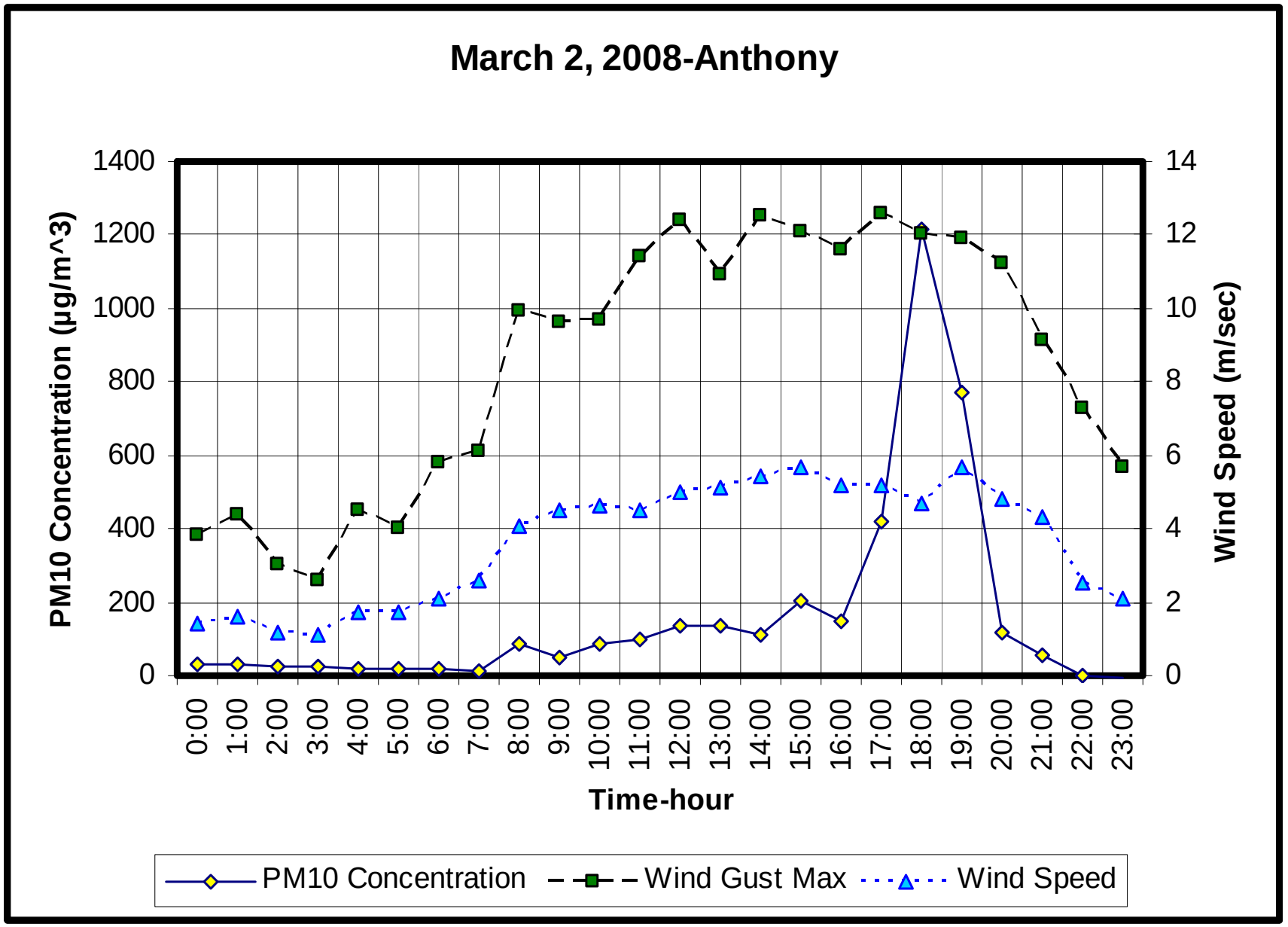
March 02, 2008: 6CM Anthony (AQS #35-013-0016)

A) Plot of Hourly PM_{10} Concentration and Wind Speed at Anthony.

B) Plot of Hourly PM_{10} Concentration and Wind Speed at Holman.

C) Plot of Hourly PM_{10} Concentration and Wind Speed at Chaparral.

D) Plot of Hourly PM_{10} Concentration and Wind Speed at Deming.


March 2, 2008-Anthony
PM10 Concentration (µg/m^3)
Wind Speed (m/sec)
Time-hour
0
200
400
600
800
1000
1200
1400
0
2
4
6
8
10
12
14
0:00
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00
13:00
14:00
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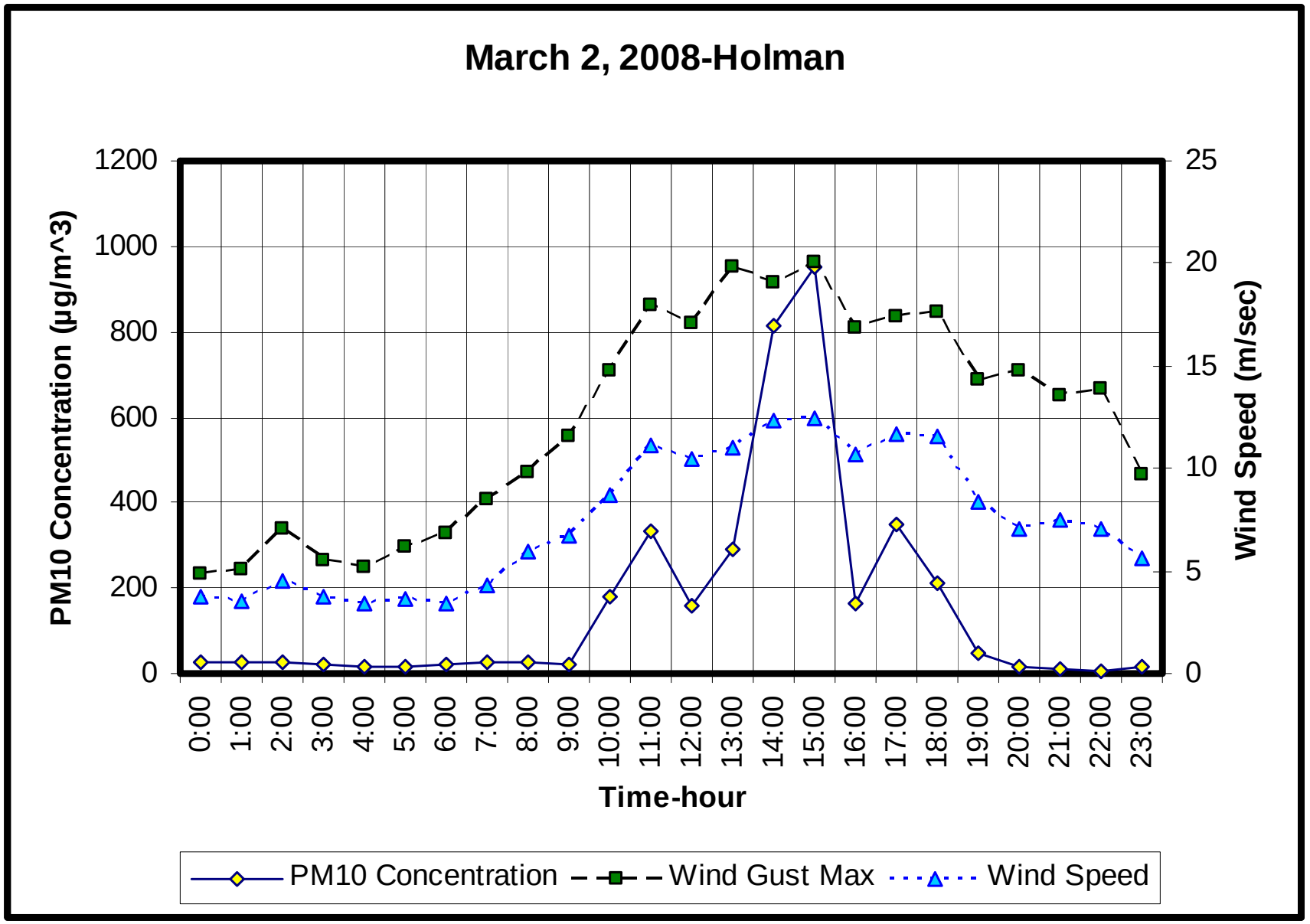
21:00
22:00
23:00
PM10 Concentration
Wind Gust Max
Wind Speed


March 2, 2008-Holman
PM10 Concentration (µg/m^3)
Wind Speed (m/sec)
1200
1000
800
600
400
200
0
25
20
15
10
5
0
0:00
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00
13:00
14:00
15:00
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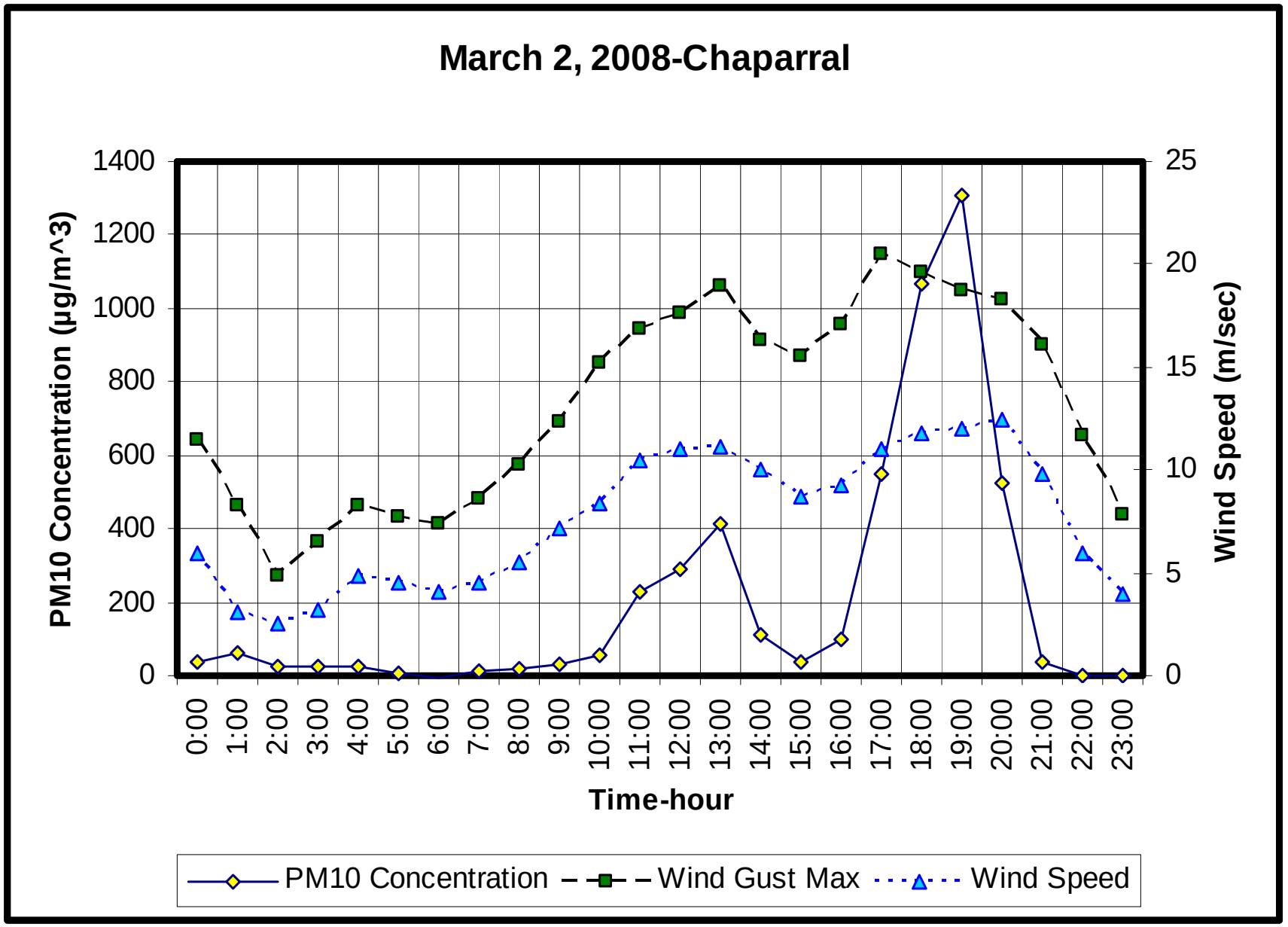
22:00
23:00
Time-hour
PM10 Concentration
Wind Gust Max
Wind Speed


March 2, 2008-Chaparral
PM10 Concentration (µg/m^3)
Wind Speed (m/sec)
Time-hour
0
200
400
600
800
1000
1200
1400
0
5
10
15
20
25
0:00
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00
13:00
14:00
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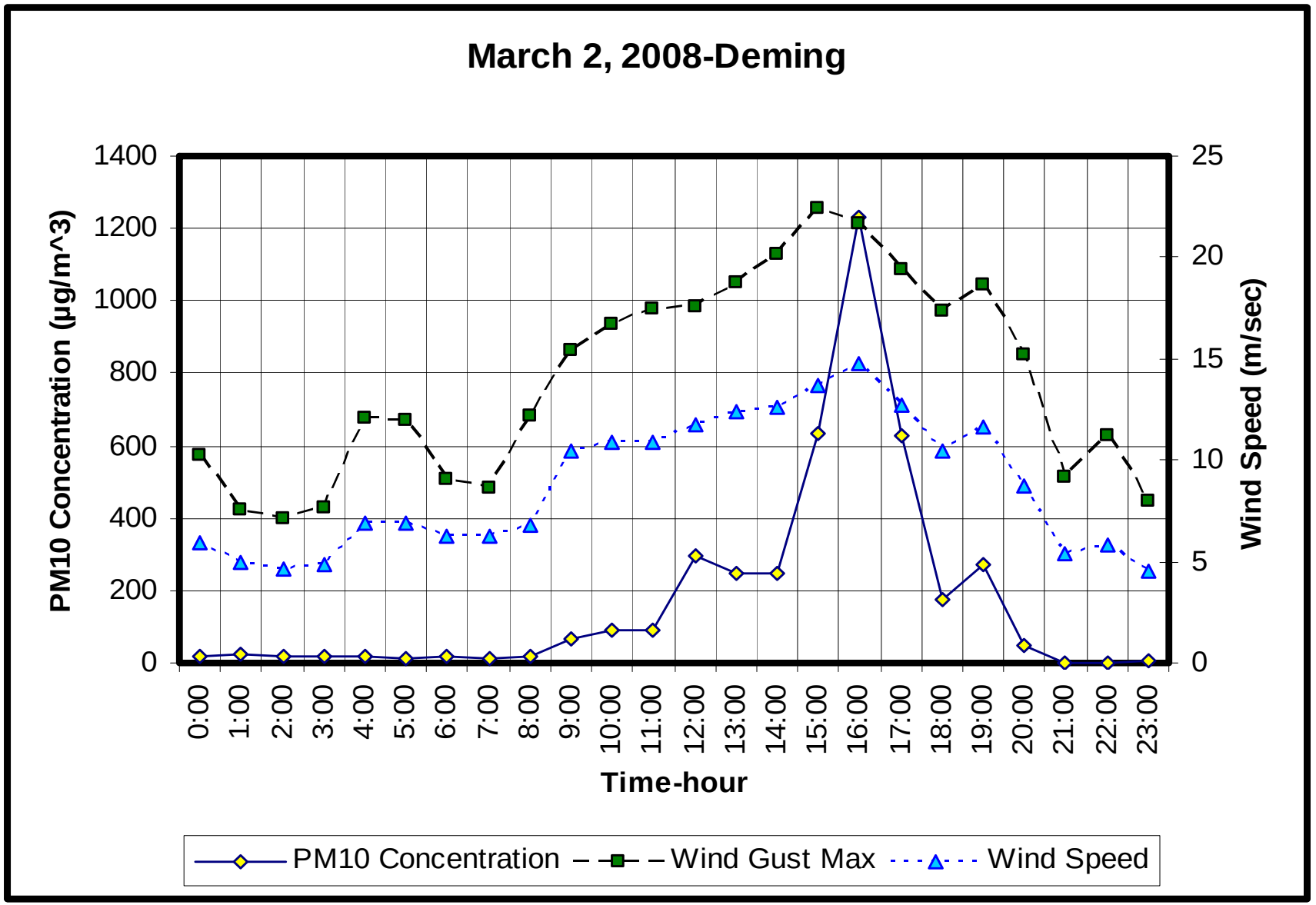
21:00
22:00
23:00
PM10 Concentration
Wind Gust Max
Wind Speed


March 2, 2008-Deming
PM10 Concentration (µg/m^3)
Wind Speed (m/sec)
1400
1200
1000
800
600
400
200
0
25
20
15
10
5
0
0:00
1:00
2:00
3:00
4:00
5:00
6:00
7:00
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10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
Time-hour
PM10 Concentration
Wind Gust Max
Wind Speed

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

Update for January 2008 – December 2008

Appendix 4A-4I

Supporting Data for Documentation of Exceedances

March 14, 2008: 6CM Anthony
(AQS #35-013-0016)

A) Plot of Hourly PM_{10} Concentration and Wind Speed at Anthony.

B) Plot of Hourly PM_{10} Concentration and Wind Speed at West Mesa.

C) Plot of Hourly PM_{10} Concentration and Wind Speed at Sunland Park City Yard.

D) Plot of Hourly PM_{10} Concentration and Wind Speed at Desert View.

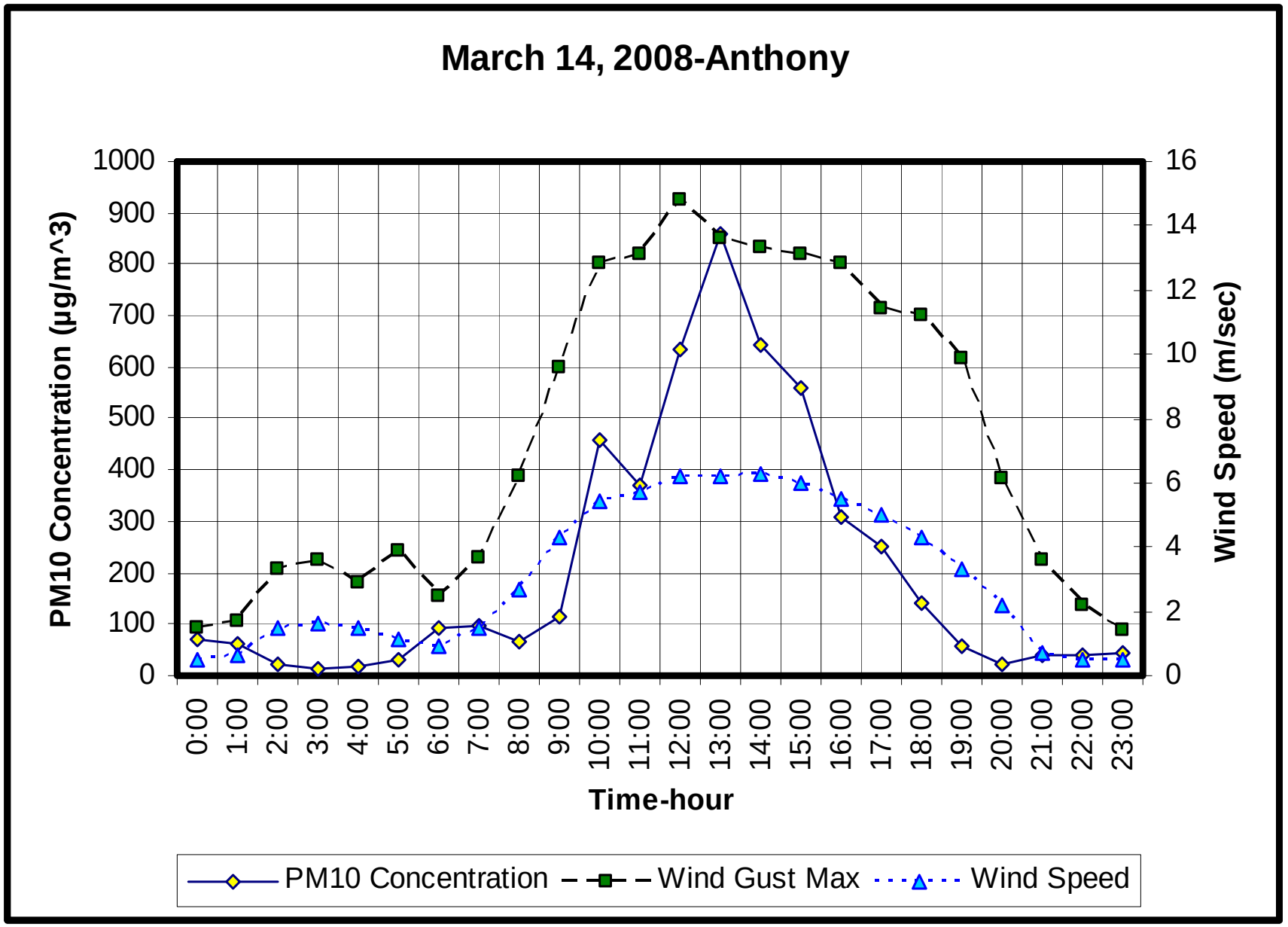
E) Plot of Hourly PM_{10} Concentration and Wind Speed at Holman.

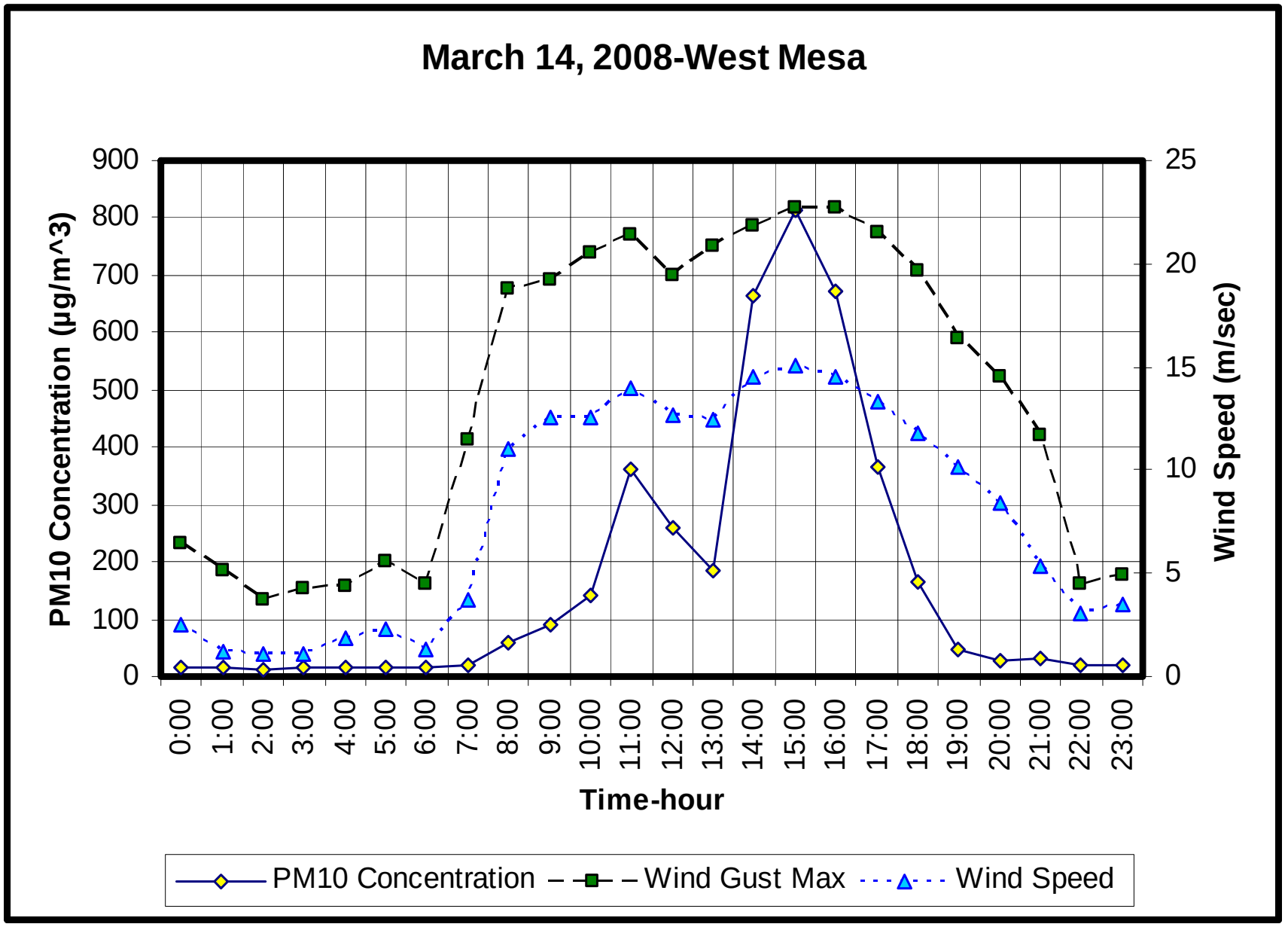
F) Plot of Hourly PM_{10} Concentration and Wind Speed at Chaparral.

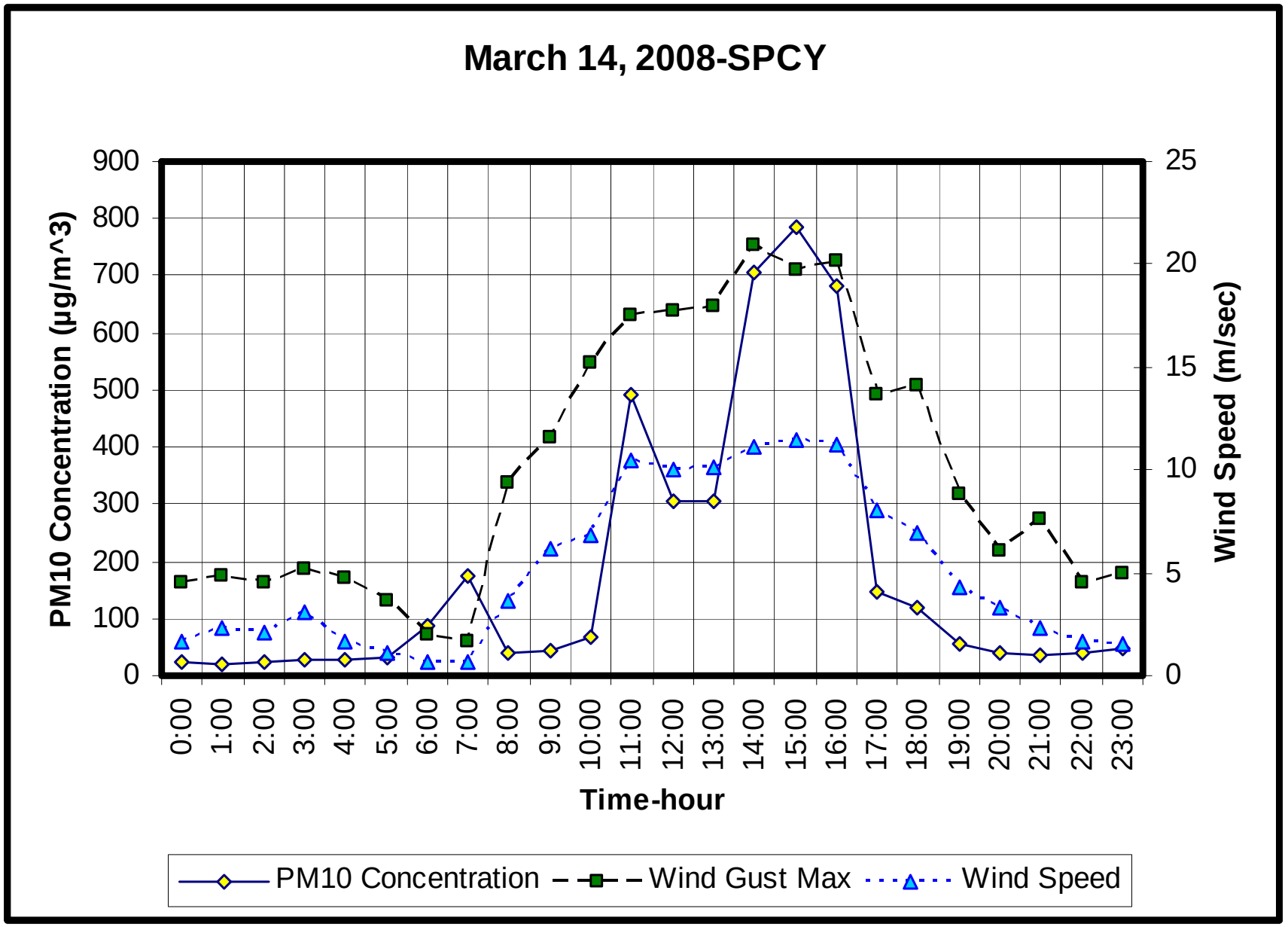
G) Plot of Hourly PM_{10} Concentration and Wind Speed at Deming.

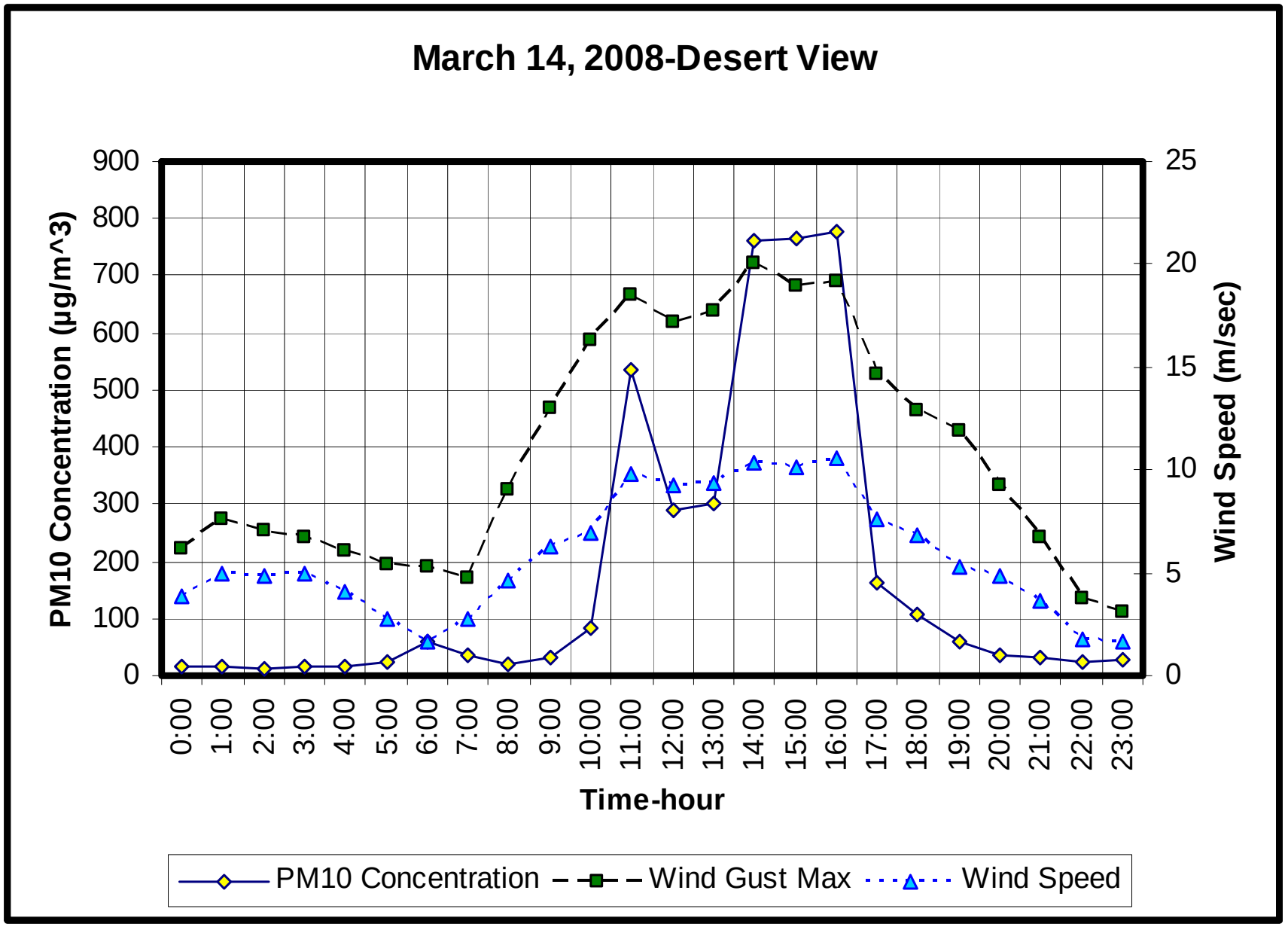
H) MODIS Satellite Image for March 14, 2008. Downloaded from http://rapidfire.sci.gsfc.nasa.gov/subsets/?subset=NewMexico

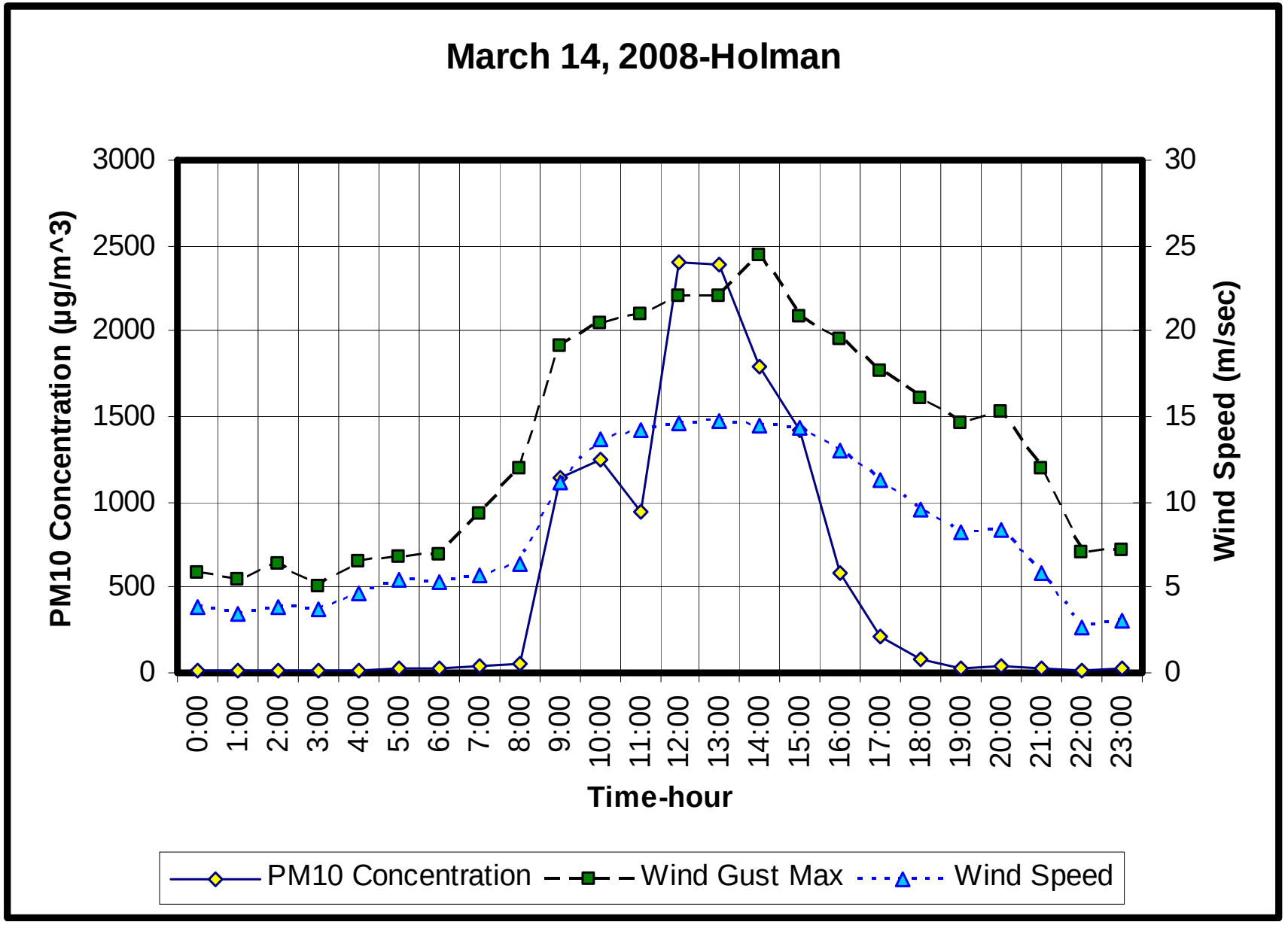
I) MODIS Satellite Image for March 16, 2008. Downloaded from http://rapidfire.sci.gsfc.nasa.gov/subsets/?subset=NewMexico

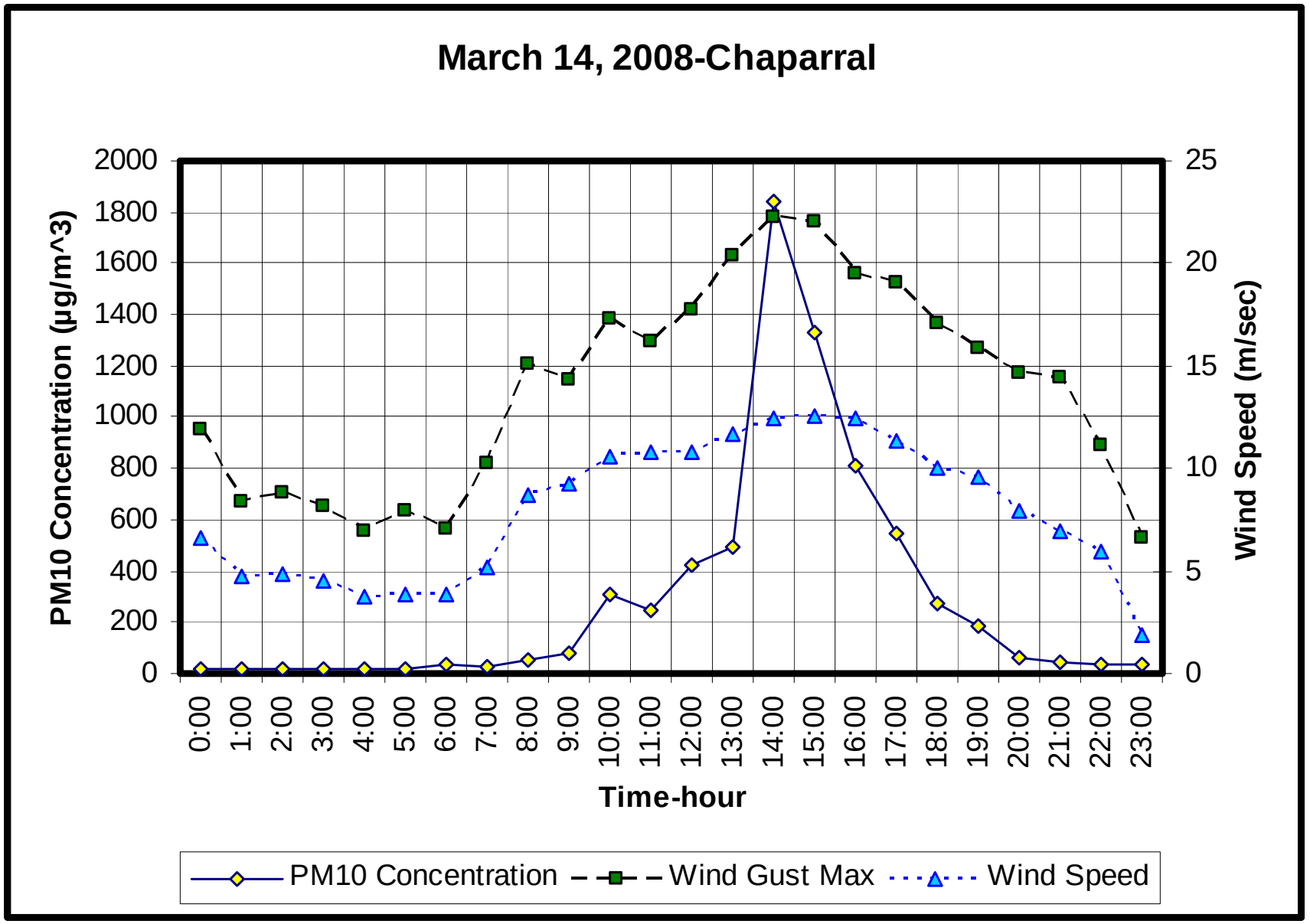

March 14, 2008-Anthony
PM10 Concentration (µg/m^3)
Wind Speed (m/sec)
Time-hour
0
100
200
300
400
500
600
700
800
900
1000
0
2
4
6
8
10
12
14
16
0:00
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
PM10 Concentration
Wind Gust Max
Wind Speed

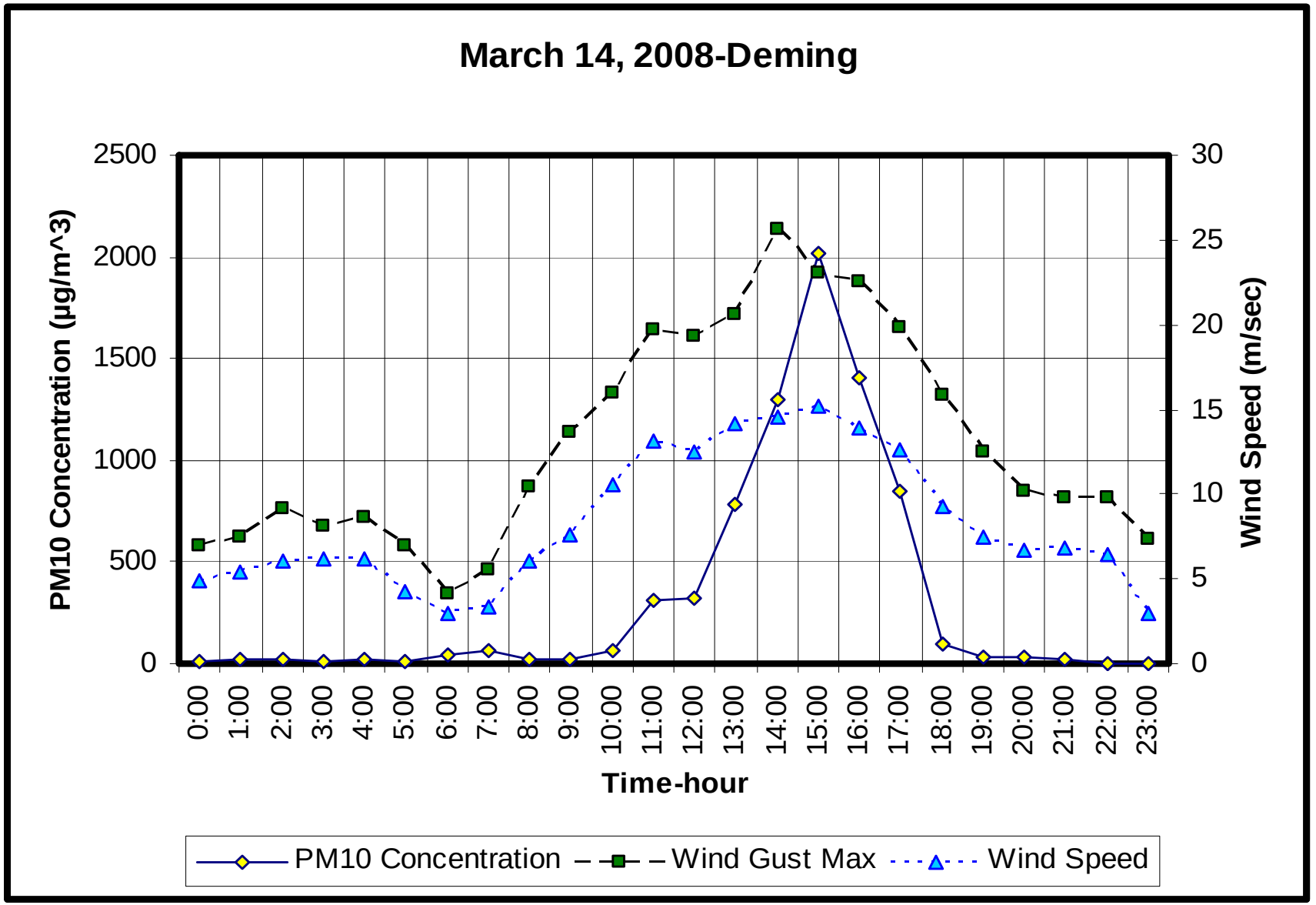

March 14, 2008-West Mesa
PM10 Concentration (µg/m^3)
Wind Speed (m/sec)
900
800
700
600
500
400
300
200
100
0
25
20
15
10
5
0
0:00
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
Time-hour
PM10 Concentration
Wind Gust Max
Wind Speed

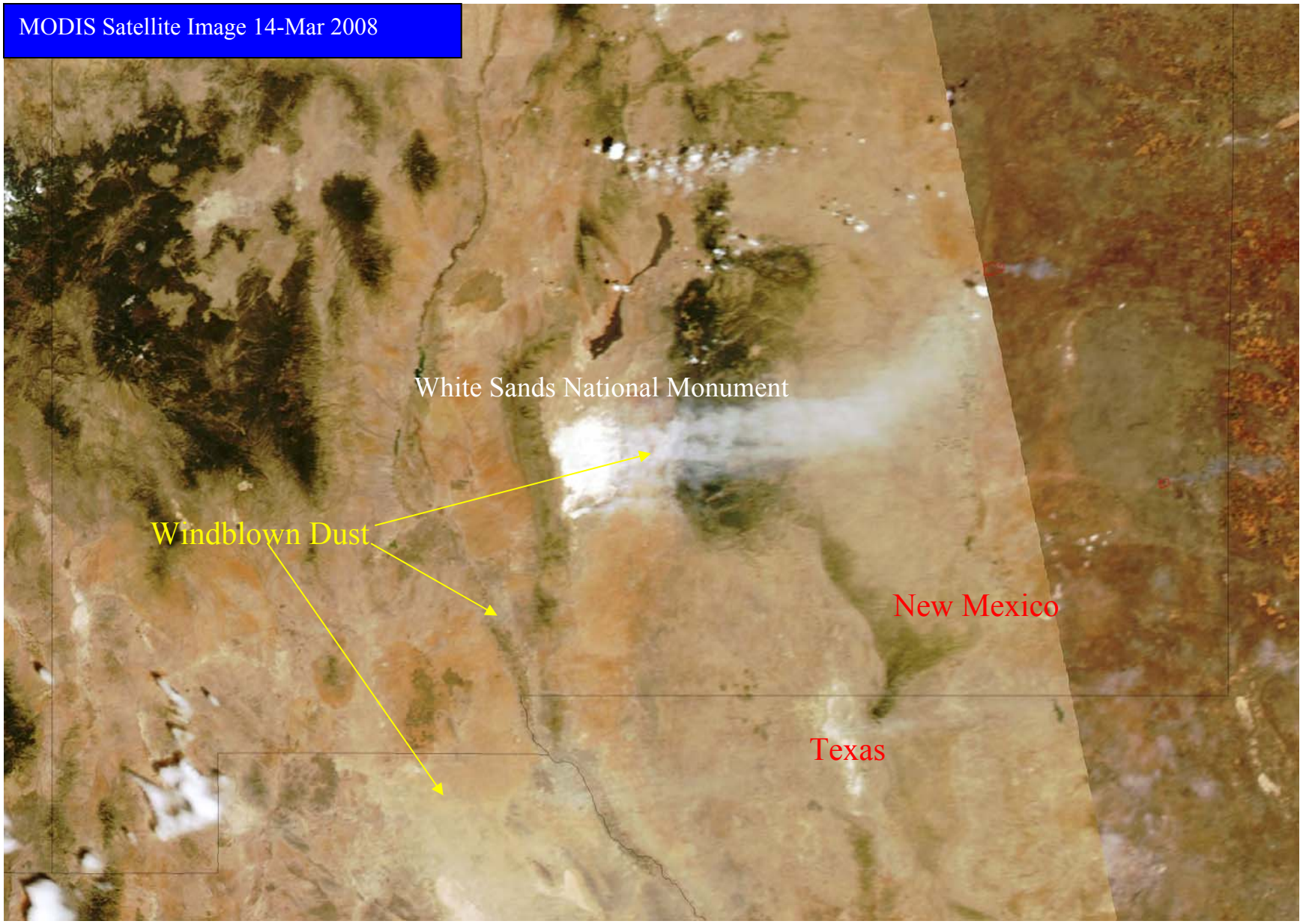

March 14, 2008-SPCY
PM10 Concentration (µg/m^3)
Wind Speed (m/sec)
Time-hour
0
100
200
300
400
500
600
700
800
900
0
5
10
15
20
25
0:00
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
PM10 Concentration
Wind Gust Max
Wind Speed

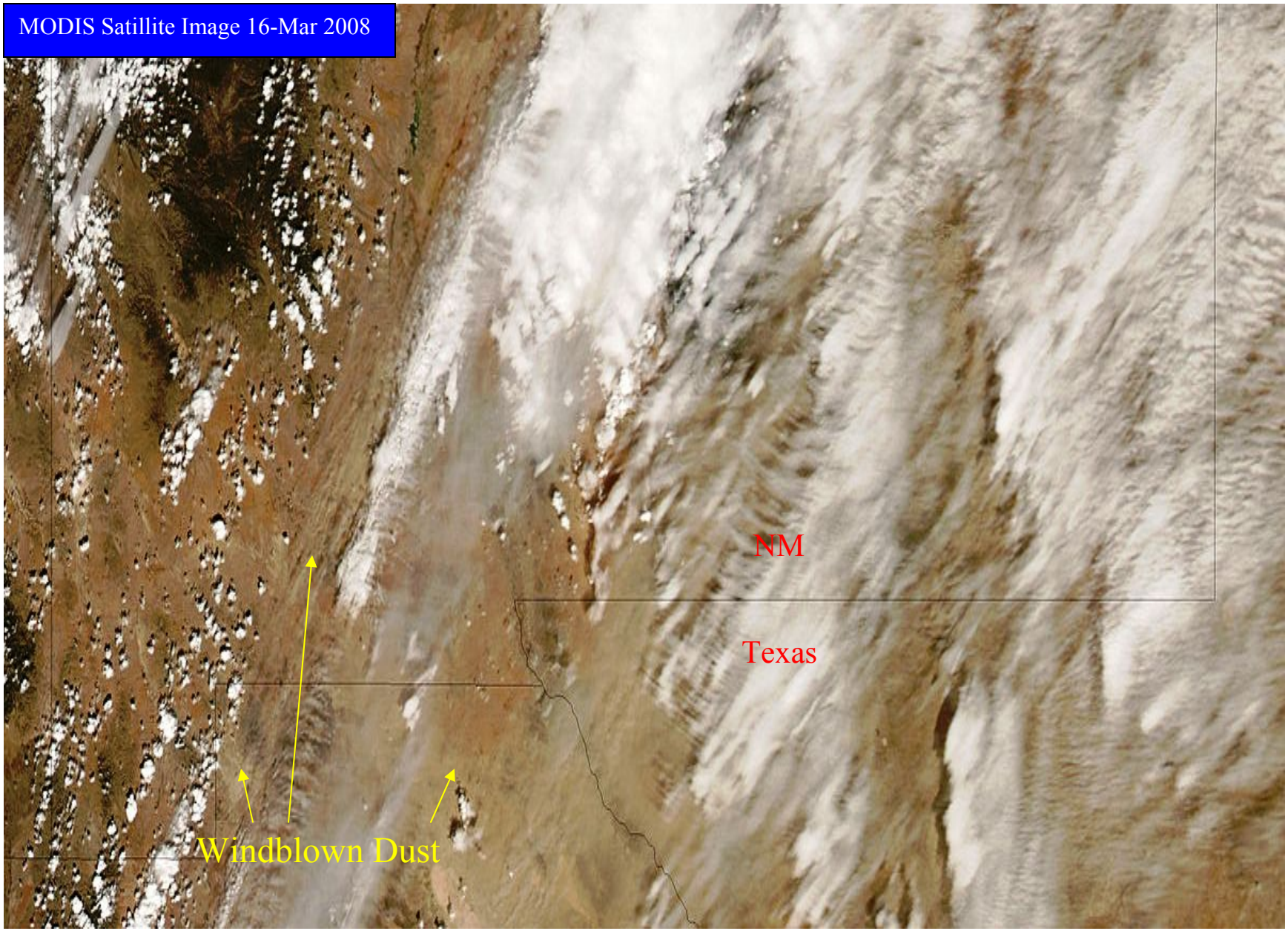

March 14, 2008-Desert View
PM10 Concentration (µg/m^3)
Wind Speed (m/sec)
900
800
700
600
500
400
300
200
100
0
25
20
15
10
5
0
0:00
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
Time-hour
PM10 Concentration
Wind Gust Max
Wind Speed


March 14, 2008-Holman
PM10 Concentration (µg/m^3)
Wind Speed (m/sec)
Time-hour
0
500
1000
1500
2000
2500
3000
0
5
10
15
20
25
30
0:00
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
PM10 Concentration
Wind Gust Max
Wind Speed


March 14, 2008-Chaparral
PM10 Concentration (µg/m^3)
Wind Speed (m/sec)
Time-hour
0
200
400
600
800
1000
1200
1400
1600
1800
2000
0
5
10
15
20
25
0:00
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
PM10 Concentration
Wind Gust Max
Wind Speed


March 14, 2008-Deming
PM10 Concentration (µg/m^3)
Wind Speed (m/sec)
2500
2000
1500
1000
500
0
30
25
20
15
10
5
0
0:00
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
Time-hour
PM10 Concentration
Wind Gust Max
Wind Speed


MODIS Satellite Image 14-Mar 2008
White Sands National Monument
Windblown Dust
New Mexico
Texas


MODIS Satillite Image 16-Mar 2008
NM
Texas
Windblown Dust

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

Update for January 2008 – December 2008

Appendix 5A-5G

Supporting Data for Documentation of Exceedances

April 10, 2008: 6CM Anthony
(AQS #35-013-0016)

A) Plot of Hourly PM_{10} Concentration and Wind Speed at Anthony.

B) Plot of Hourly PM_{10} Concentration and Wind Speed at West Mesa.

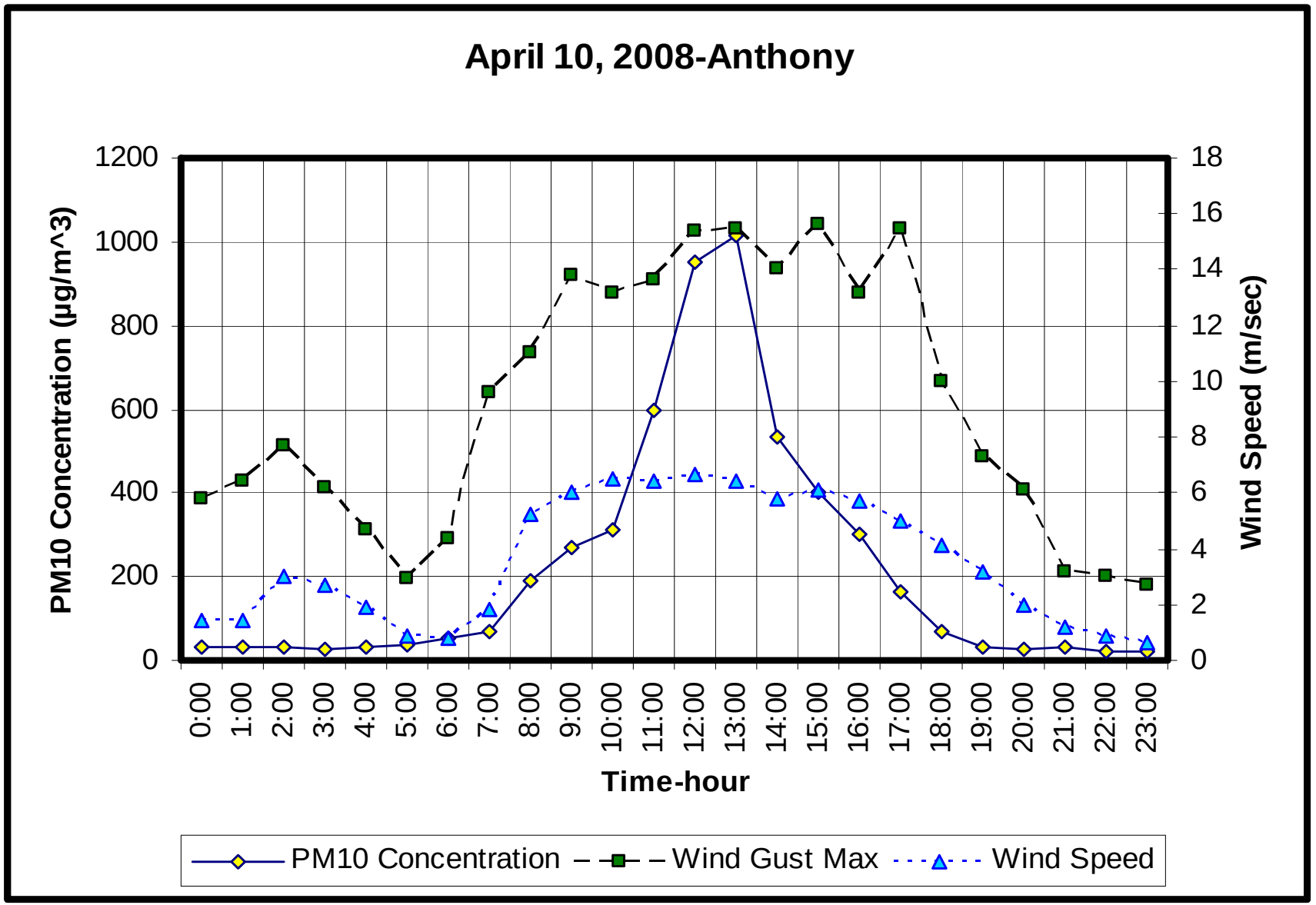
C) Plot of Hourly PM_{10} Concentration and Wind Speed at Sunland Park City Yard.

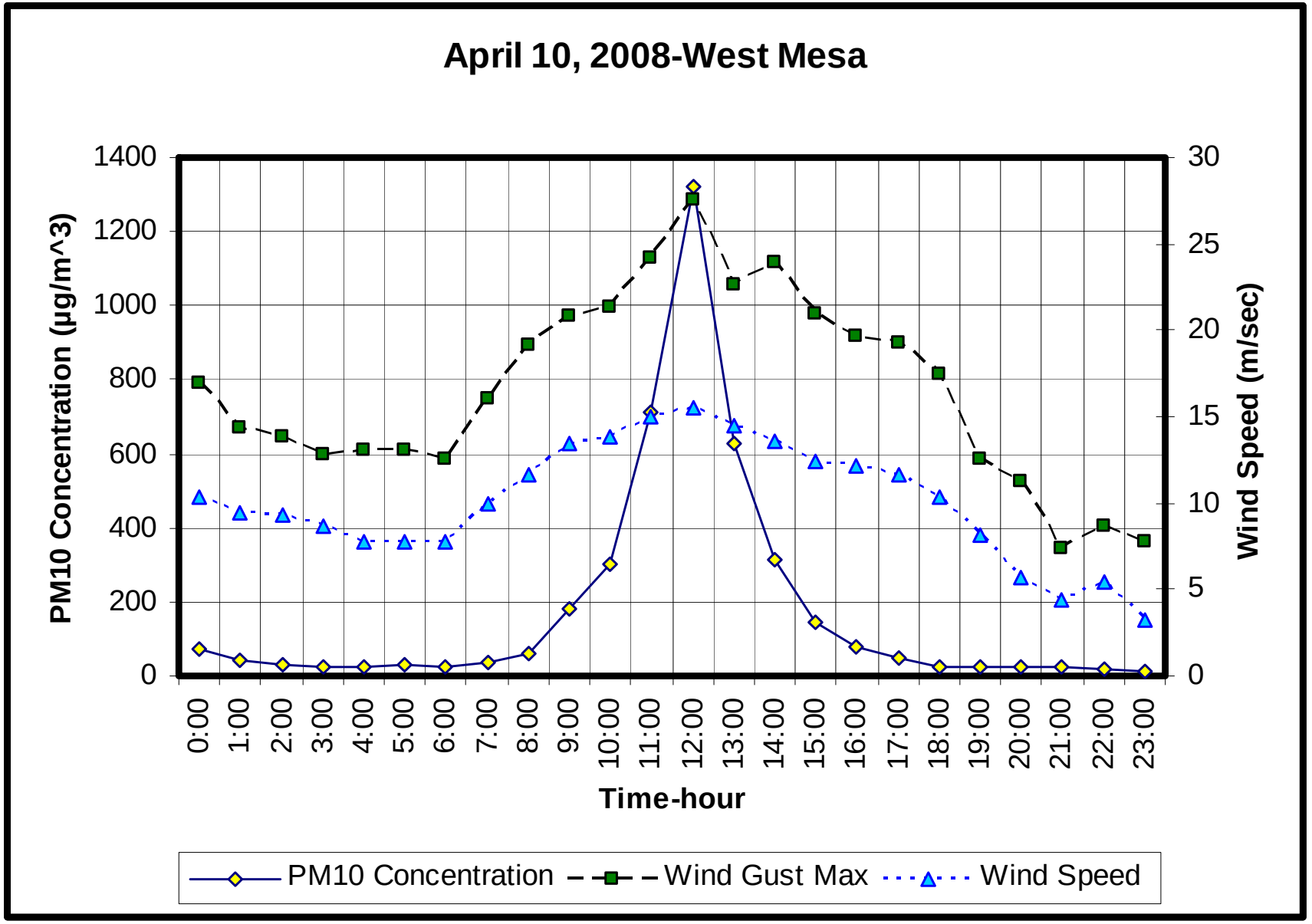
D) Plot of Hourly PM_{10} Concentration and Wind Speed at Desert View.

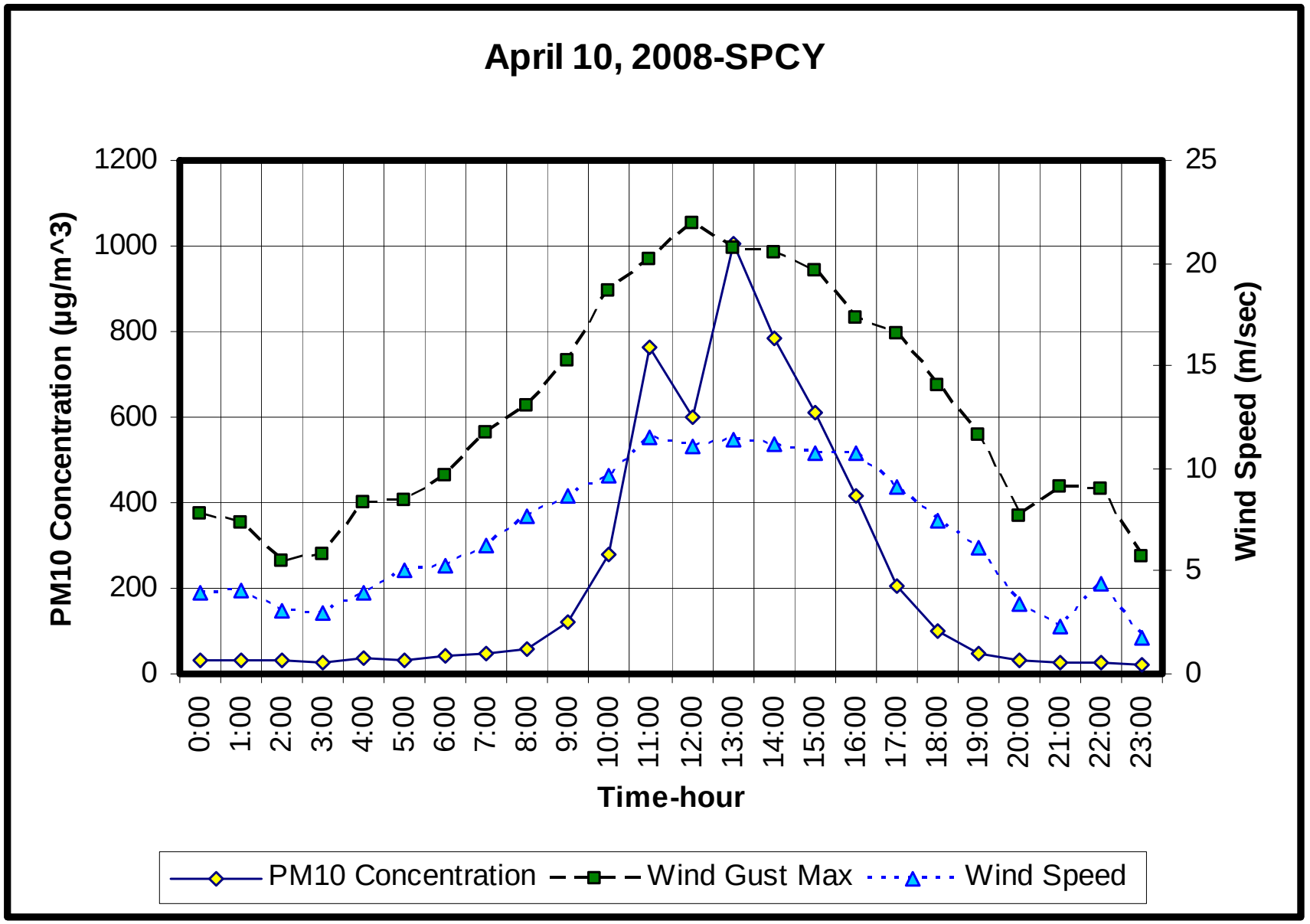
E) Plot of Hourly PM_{10} Concentration and Wind Speed at Holman.

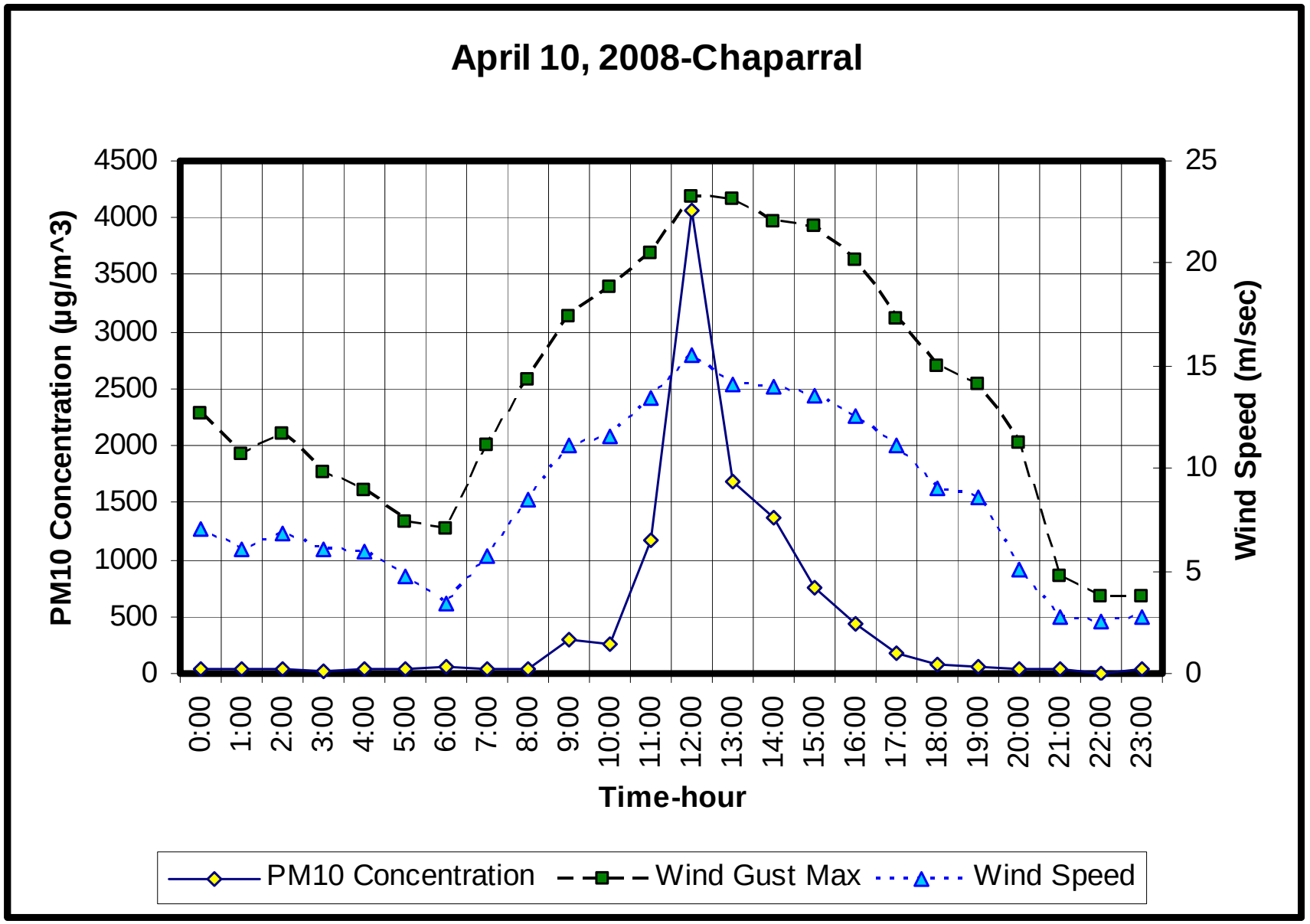
F) Plot of Hourly PM_{10} Concentration and Wind Speed at Chaparral.

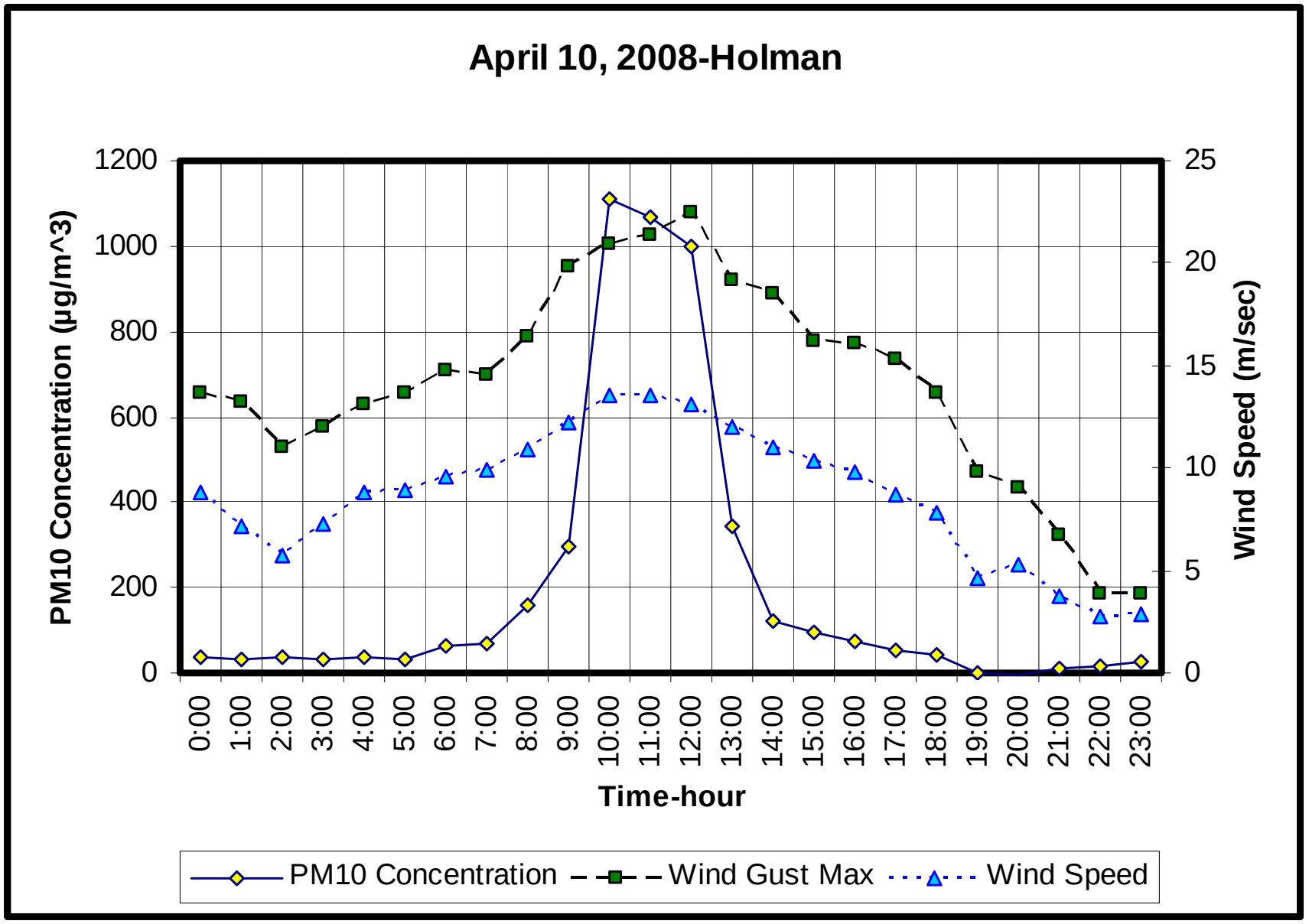
G) Plot of Hourly PM_{10} Concentration and Wind Speed at Deming.

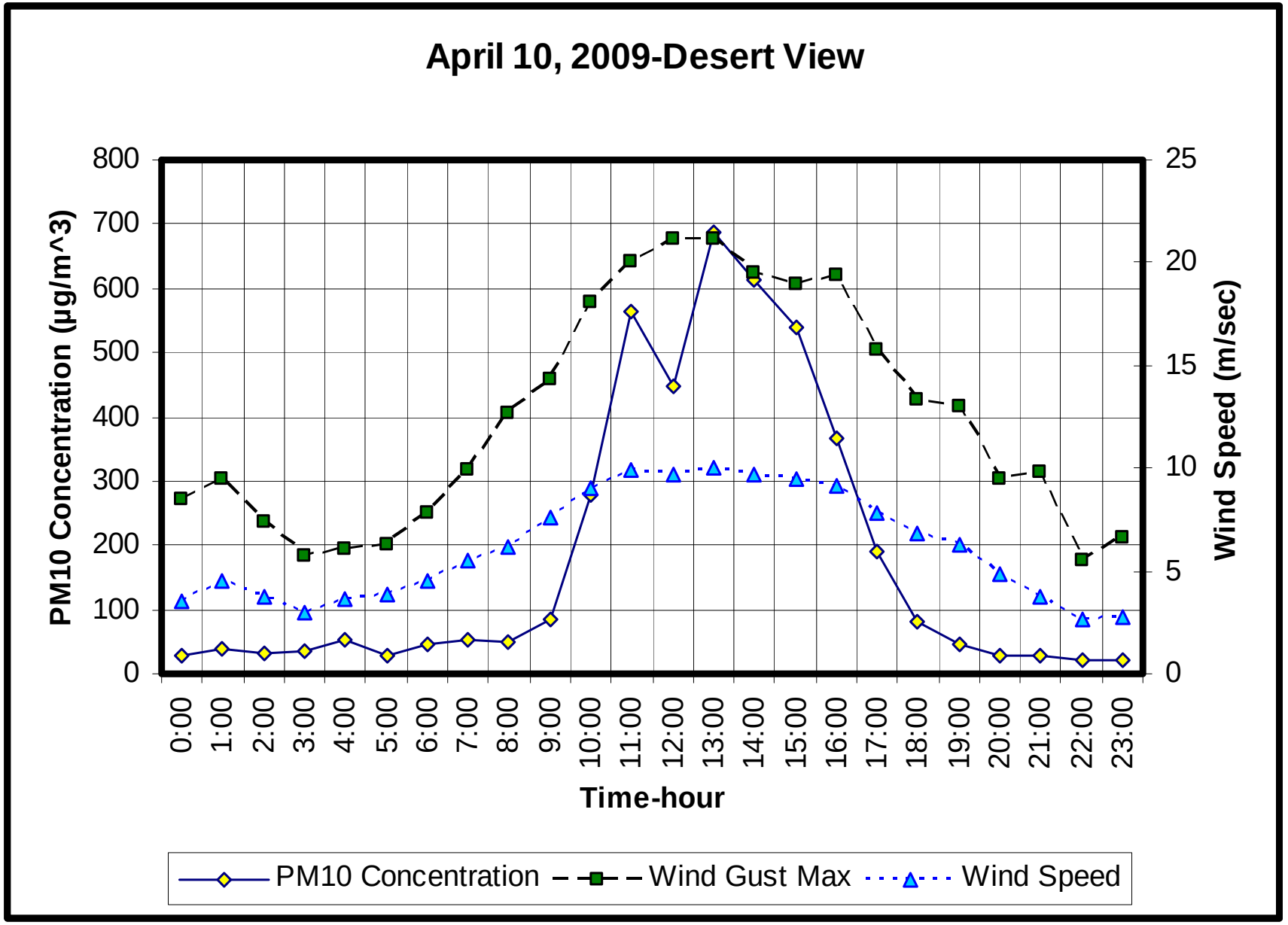

April 10, 2008-Anthony
PM10 Concentration (µg/m^3)
Wind Speed (m/sec)
1200
1000
800
600
400
200
0
18
16
14
12
10
8
6
4
2
0
0:00
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
Time-hour
PM10 Concentration
Wind Gust Max
Wind Speed

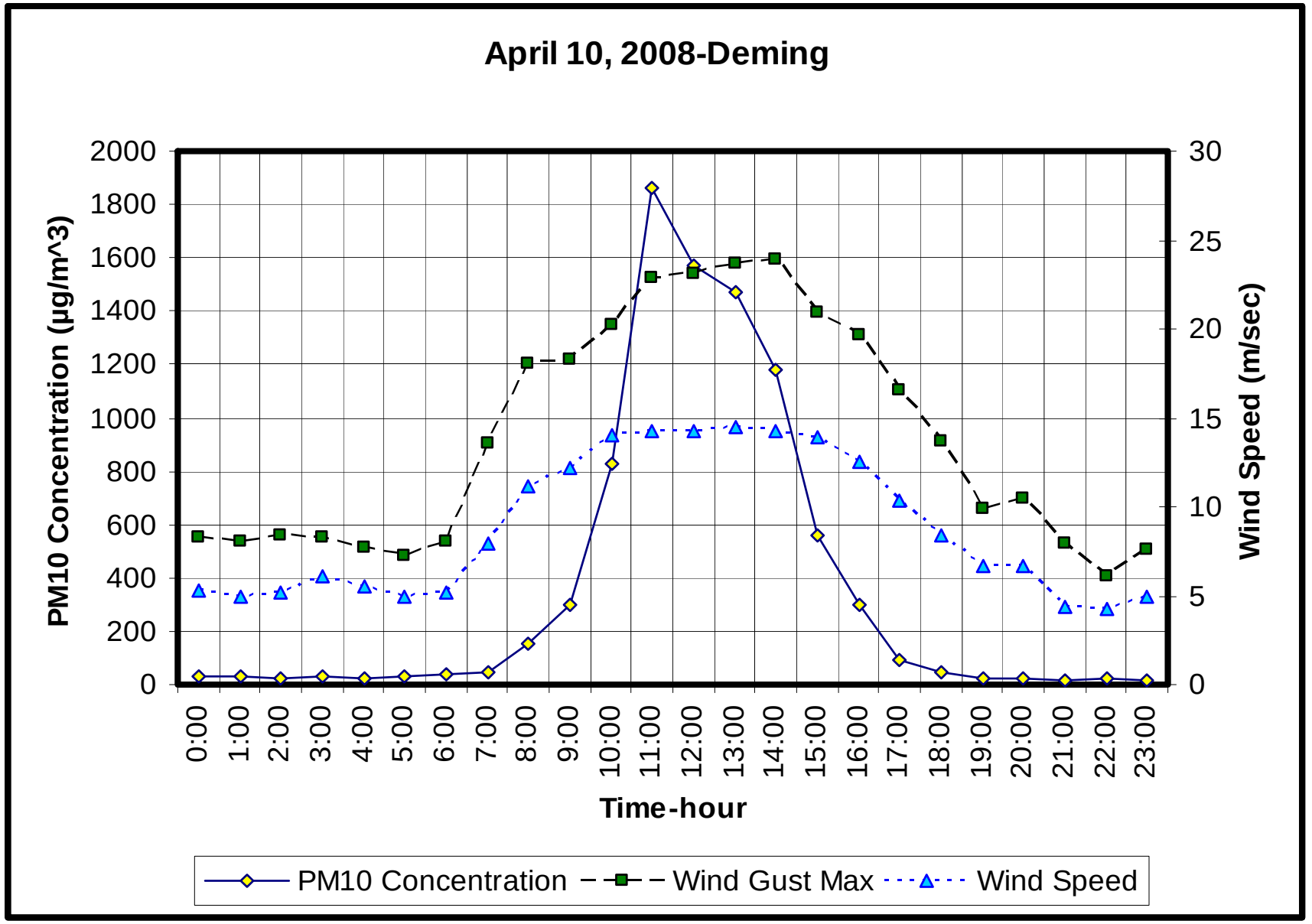

April 10, 2008-West Mesa
PM10 Concentration (µg/m^3)
Wind Speed (m/sec)
Time-hour
0
200
400
600
800
1000
1200
1400
0
5
10
15
20
25
30
0:00
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
PM10 Concentration
Wind Gust Max
Wind Speed


April 10, 2008-SPCY
PM10 Concentration (µg/m^3)
Wind Speed (m/sec)
Time-hour
0
200
400
600
800
1000
1200
0
5
10
15
20
25
0:00
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
PM10 Concentration
Wind Gust Max
Wind Speed


April 10, 2008-Chaparral
PM10 Concentration (µg/m^3)
Wind Speed (m/sec)
Time-hour
4500
4000
3500
3000
2500
2000
1500
1000
500
0
25
20
15
10
5
0
0:00
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
PM10 Concentration
Wind Gust Max
Wind Speed


April 10, 2008-Holman
PM10 Concentration (µg/m^3)
Wind Speed (m/sec)
Time-hour
0
200
400
600
800
1000
1200
0
5
10
15
20
25
0:00
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
PM10 Concentration
Wind Gust Max
Wind Speed


April 10, 2009-Desert View
PM10 Concentration (µg/m^3)
Wind Speed (m/sec)
800
700
600
500
400
300
200
100
0
25
20
15
10
5
0
0:00
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
Time-hour
PM10 Concentration
Wind Gust Max
Wind Speed


April 10, 2008-Deming
PM10 Concentration (µg/m^3)
Wind Speed (m/sec)
Time-hour
2000
1800
1600
1400
1200
1000
800
600
400
200
0
30
25
20
15
10
5
0
0:00
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
PM10 Concentration
Wind Gust Max
Wind Speed

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

Update for January 2008 – December 2008

Appendix 6A-6C

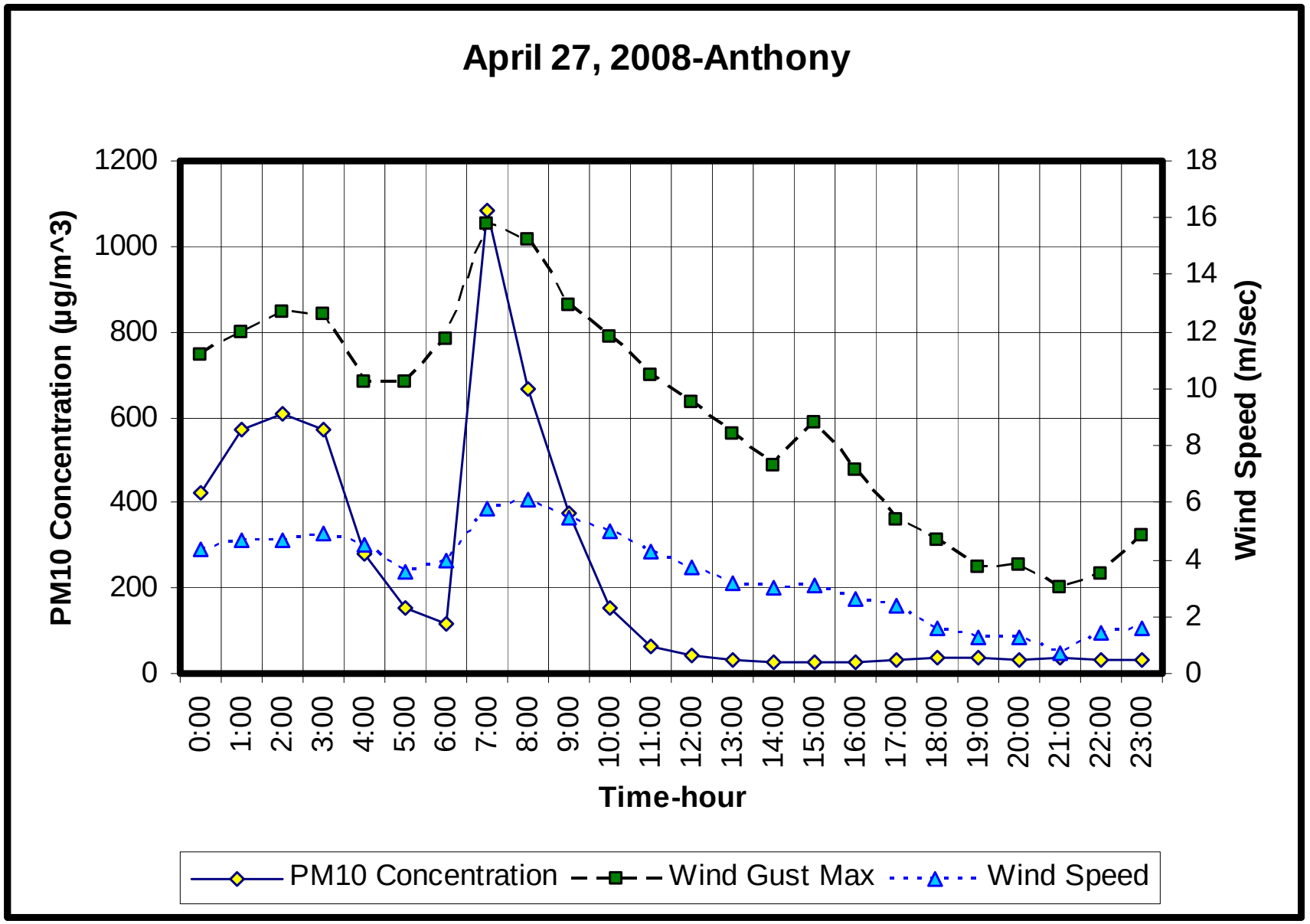
Supporting Data for Documentation of Exceedances

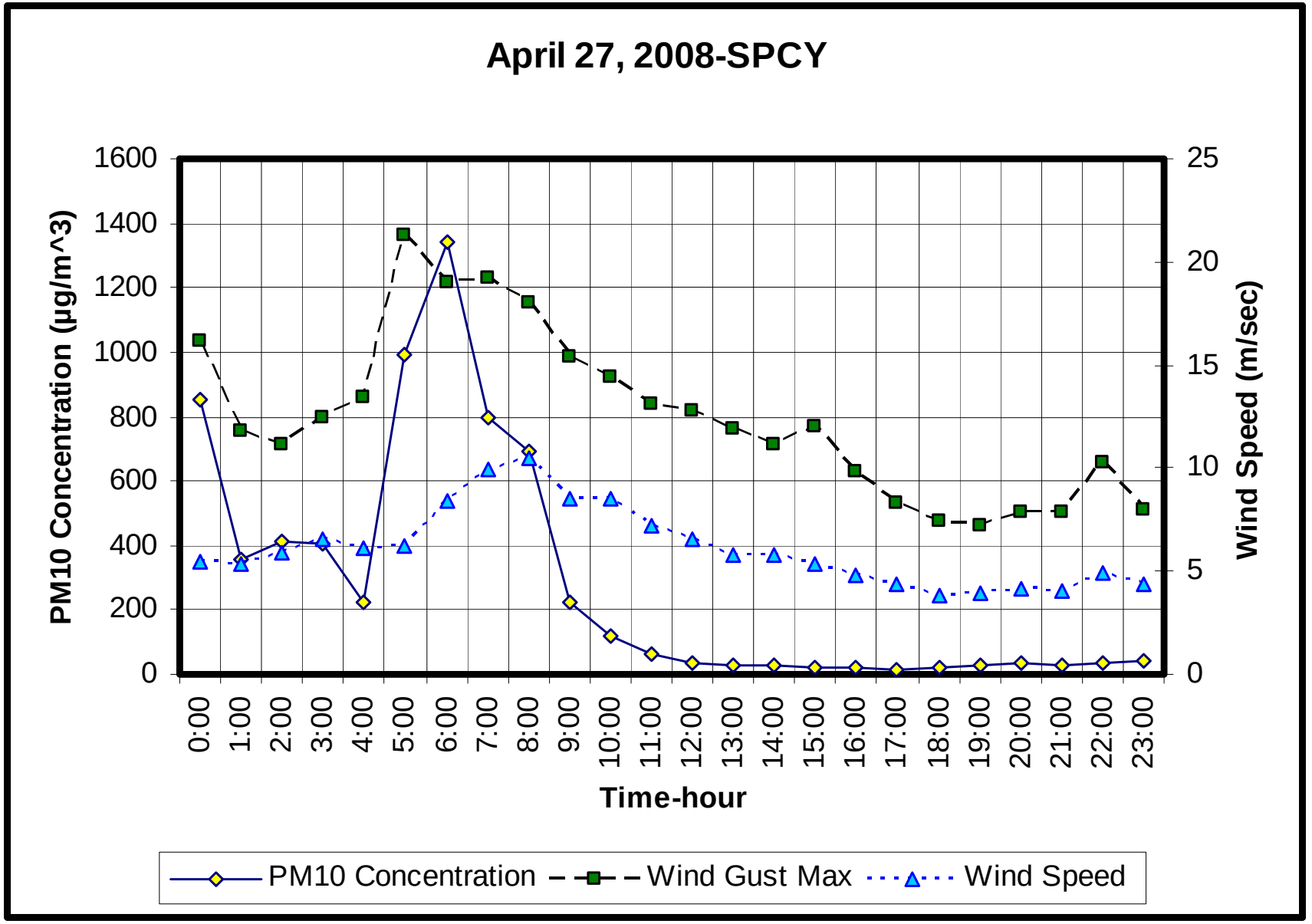
April 27, 2008: 6CM Anthony (AQS #35-013-0016)

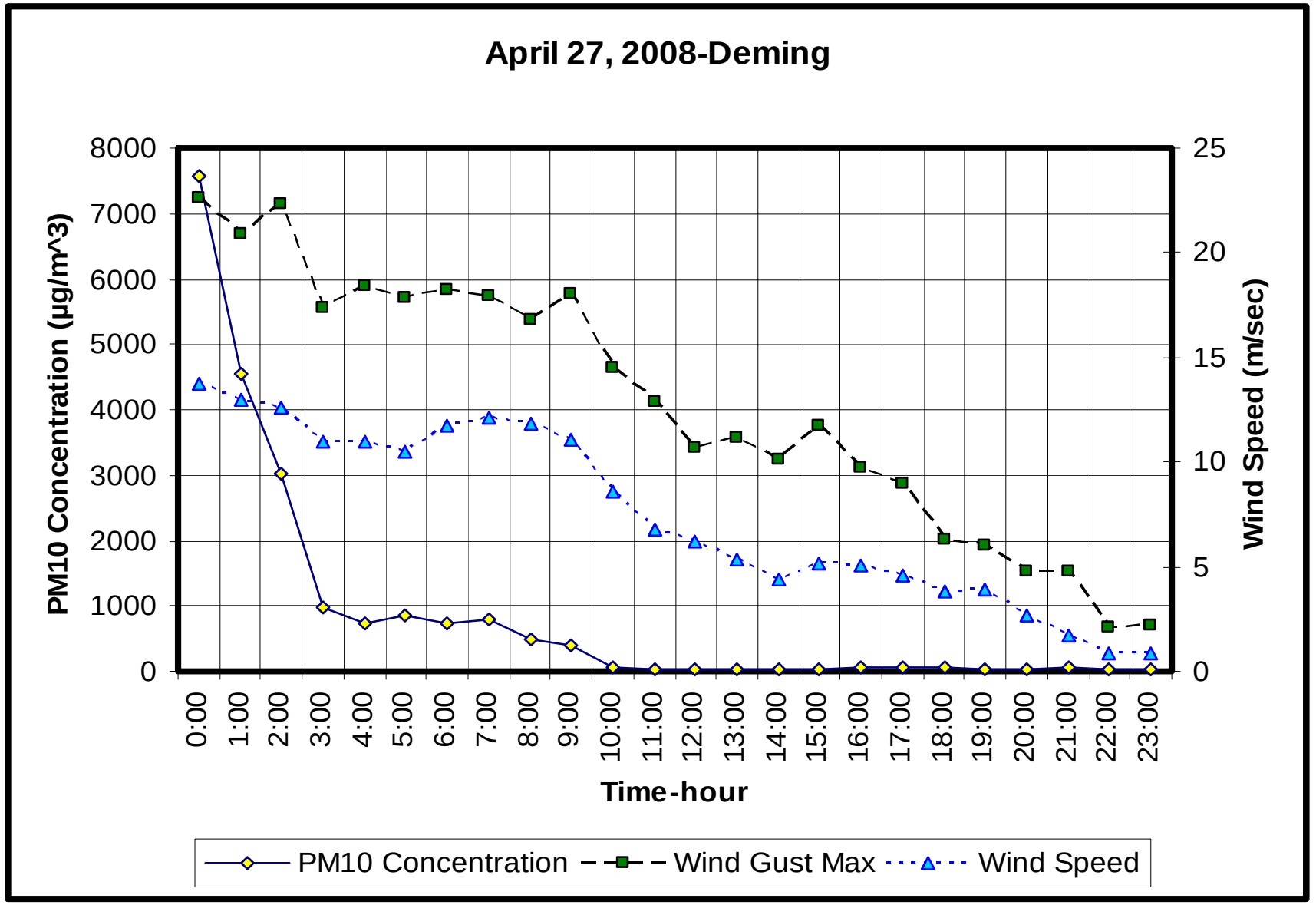
A) Plot of Hourly PM_{10} Concentration and Wind Speed at Anthony.

B) Plot of Hourly PM_{10} Concentration and Wind Speed at Sunland Park City Yard.

C) Plot of Hourly PM_{10} Concentration and Wind Speed at Deming.


April 27, 2008-Anthony
PM10 Concentration (µg/m^3)
Wind Speed (m/sec)
Time-hour
0
200
400
600
800
1000
1200
0
2
4
6
8
10
12
14
16
18
0:00
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
PM10 Concentration
Wind Gust Max
Wind Speed


April 27, 2008-SPCY
PM10 Concentration (µg/m^3)
Wind Speed (m/sec)
Time-hour
0
200
400
600
800
1000
1200
1400
1600
0
5
10
15
20
25
0:00
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
PM10 Concentration
Wind Gust Max
Wind Speed


April 27, 2008-Deming
PM10 Concentration (µg/m^3)
Wind Speed (m/sec)
8000
7000
6000
5000
4000
3000
2000
1000
0
25
20
15
10
5
0
0:00
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
Time-hour
PM10 Concentration
Wind Gust Max
Wind Speed

Documentation of Natural Events: Particulate Matter Exceedances Caused by High Winds in Luna and Doña Ana Counties, New Mexico

Update for January 2008 – December 2008

Appendix 7A-7I

Supporting Data for Documentation of Exceedances

April 30, 2008: 6CM Anthony (AQS #35-013-0016)

A) Plot of Hourly PM_{10} Concentration and Wind Speed at Anthony.

B) Plot of Hourly PM_{10} Concentration and Wind Speed at Sunland Park City Yard.

C) Plot of Hourly PM_{10} Concentration and Wind Speed at Chaparral.

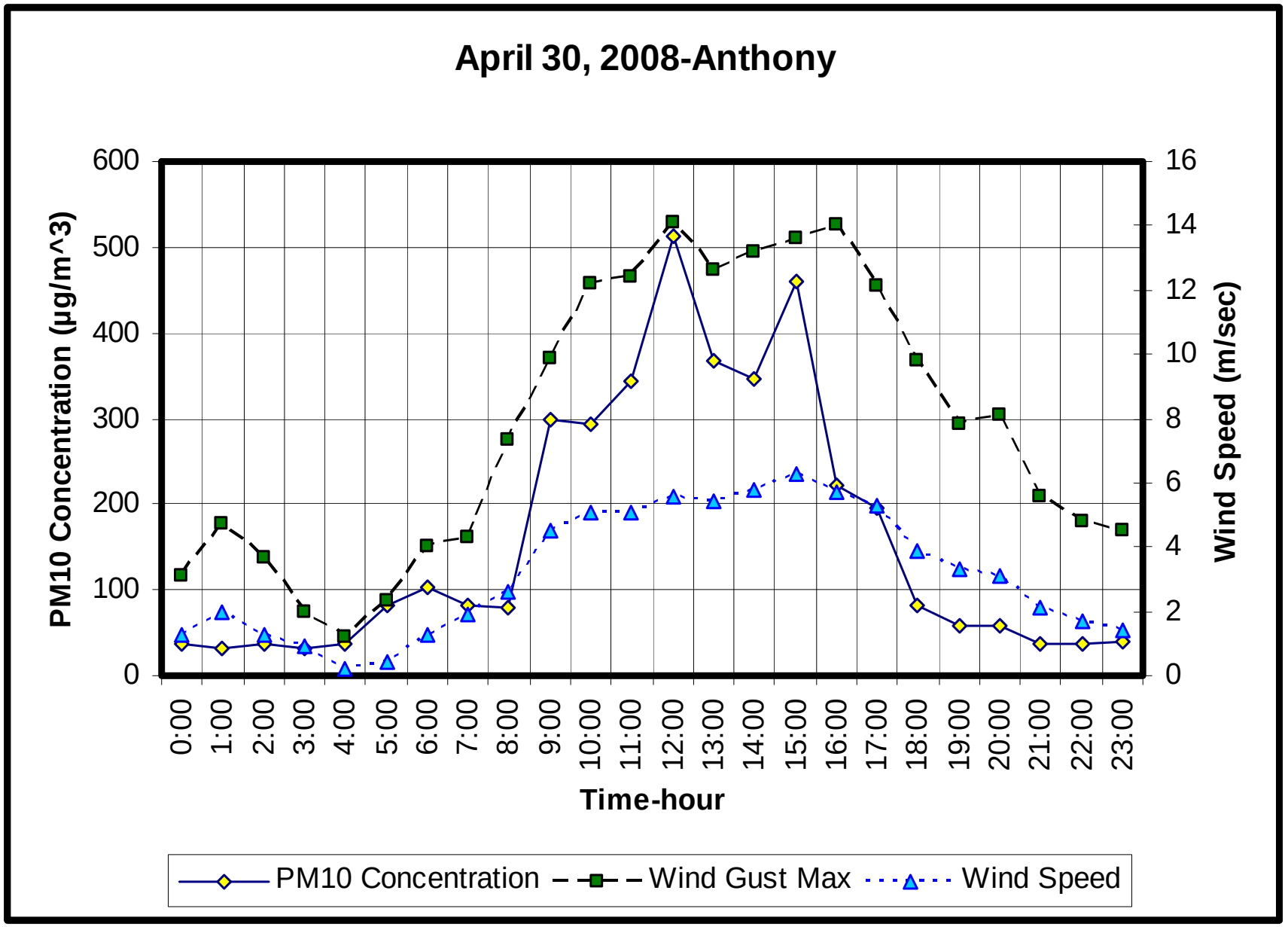
D) Plot of Hourly PM_{10} Concentration and Wind Speed at Holman.

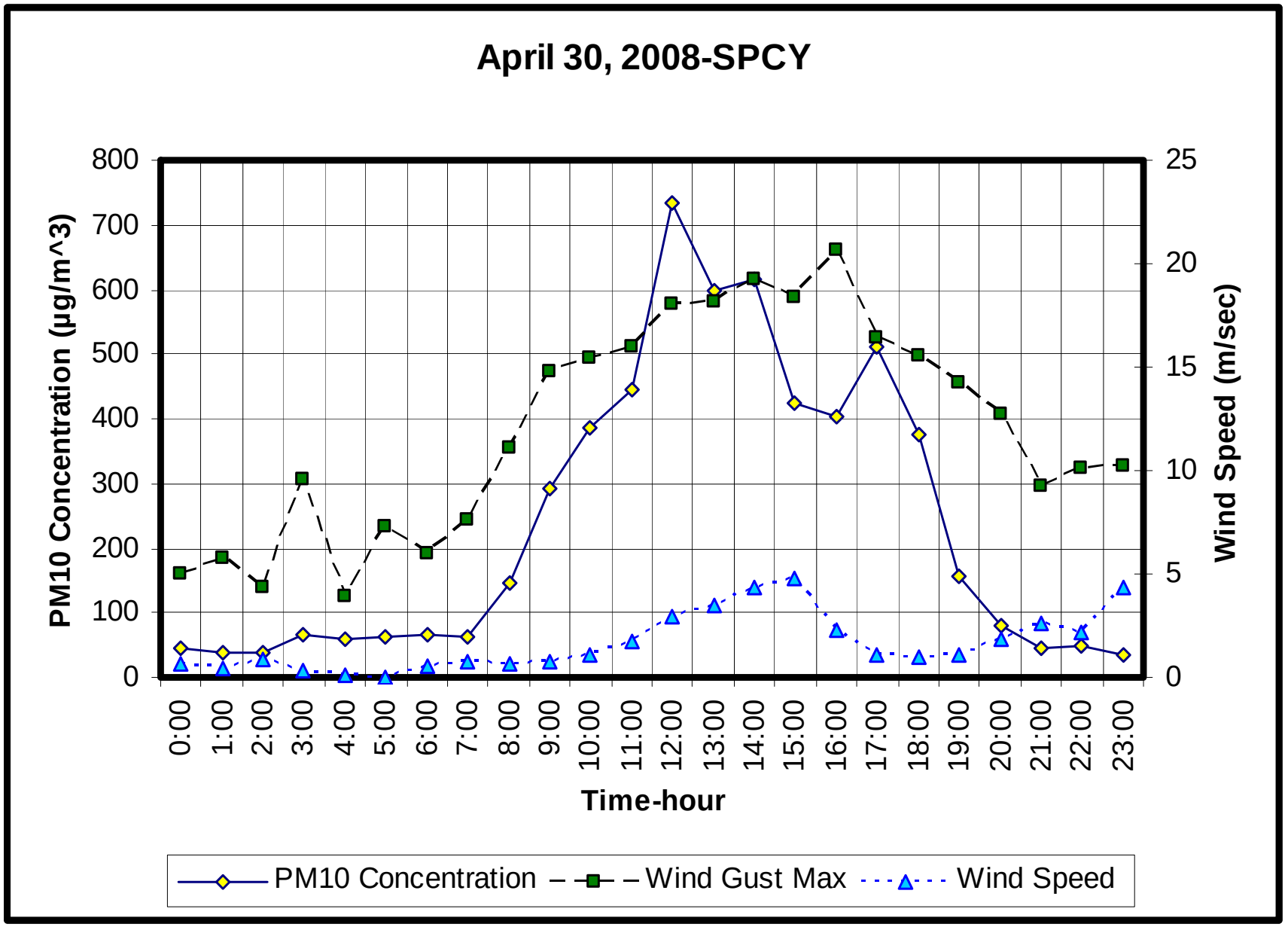
E) Plot of Hourly PM_{10} Concentration and Wind Speed at Desert View.

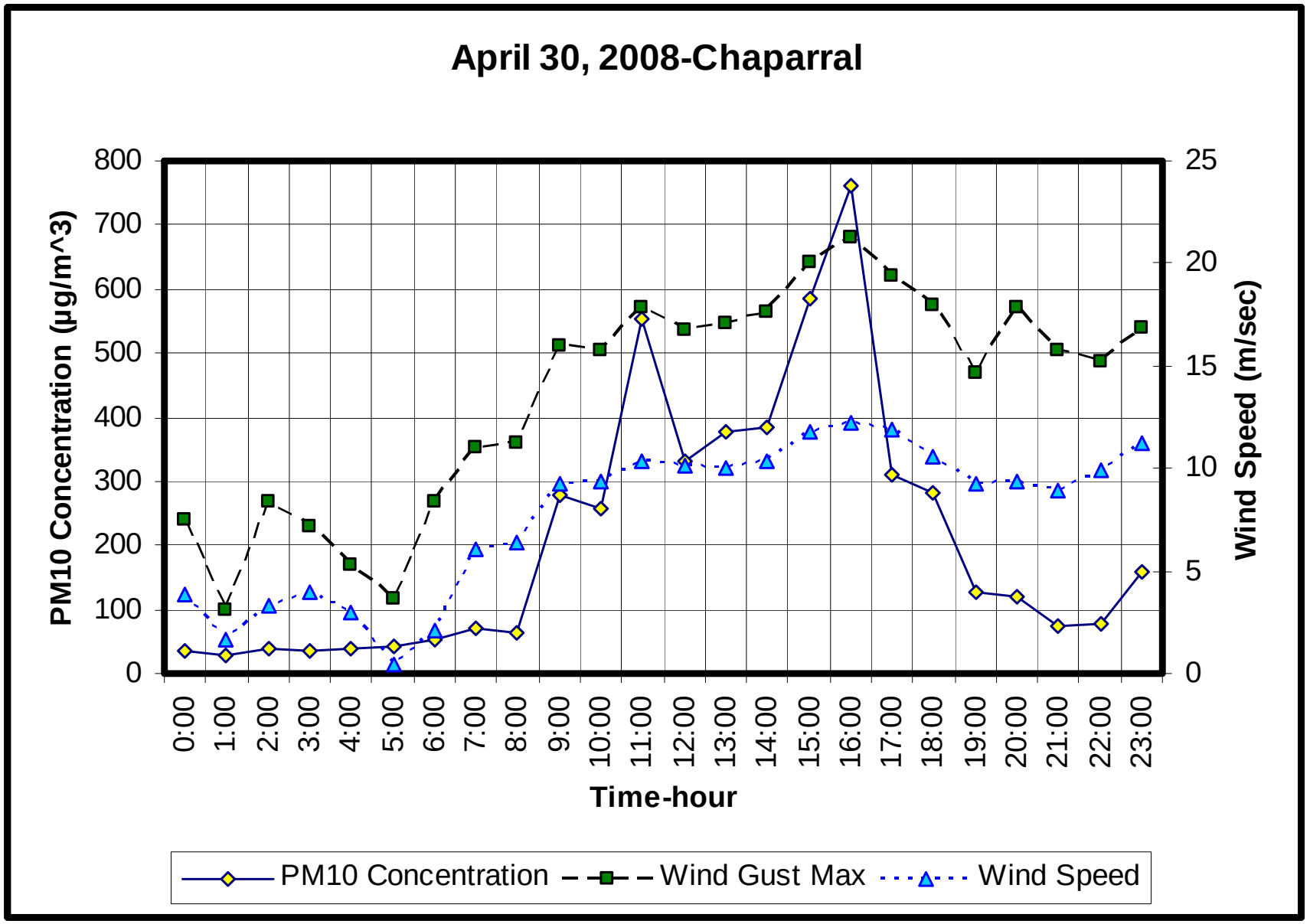
F) Plot of Hourly PM_{10} Concentration and Wind Speed at Deming.

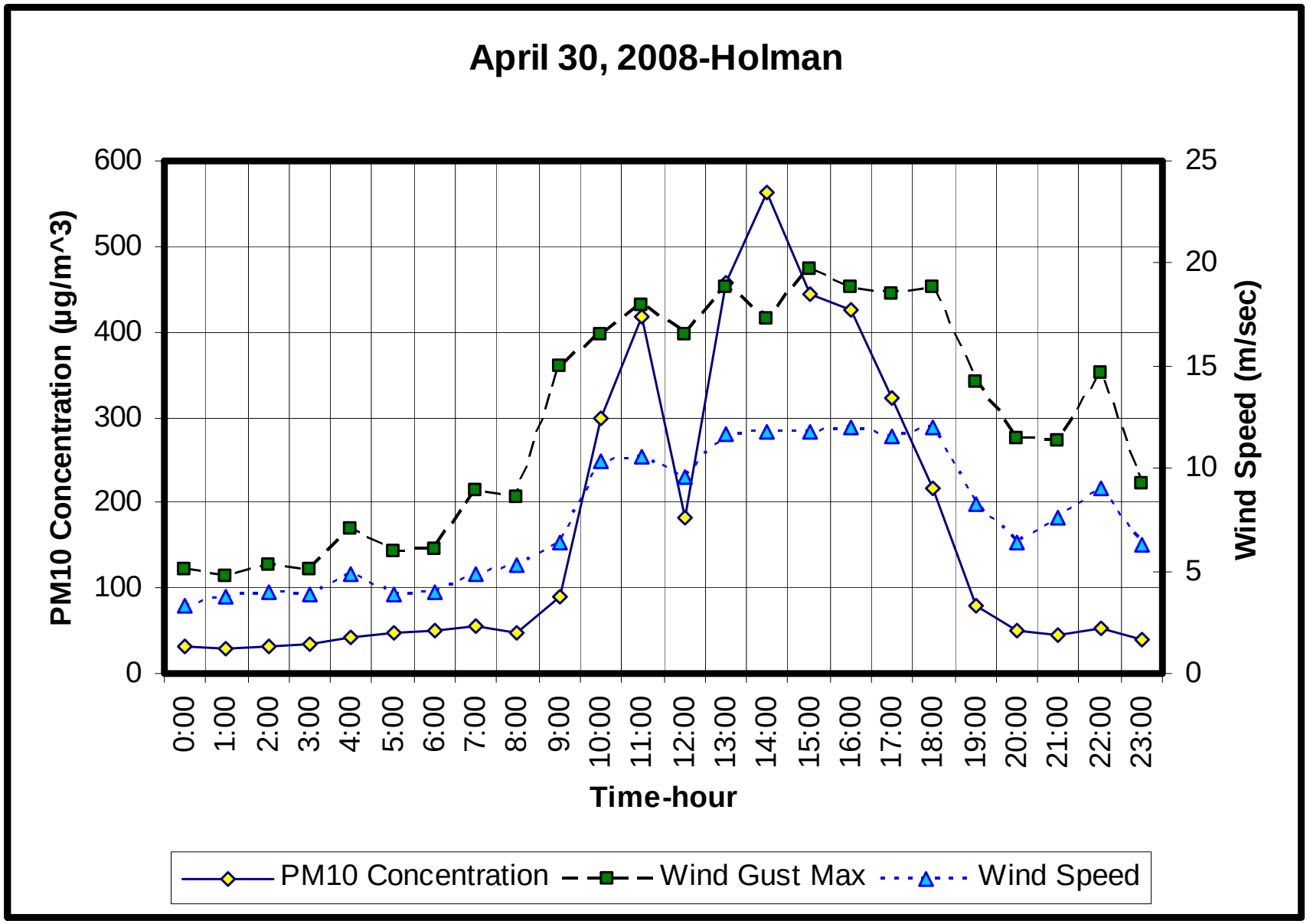
H) MODIS Satellite Image for April 30, 2008. Downloaded from http://rapidfire.sci.gsfc.nasa.gov/subsets/?subset=NewMexico

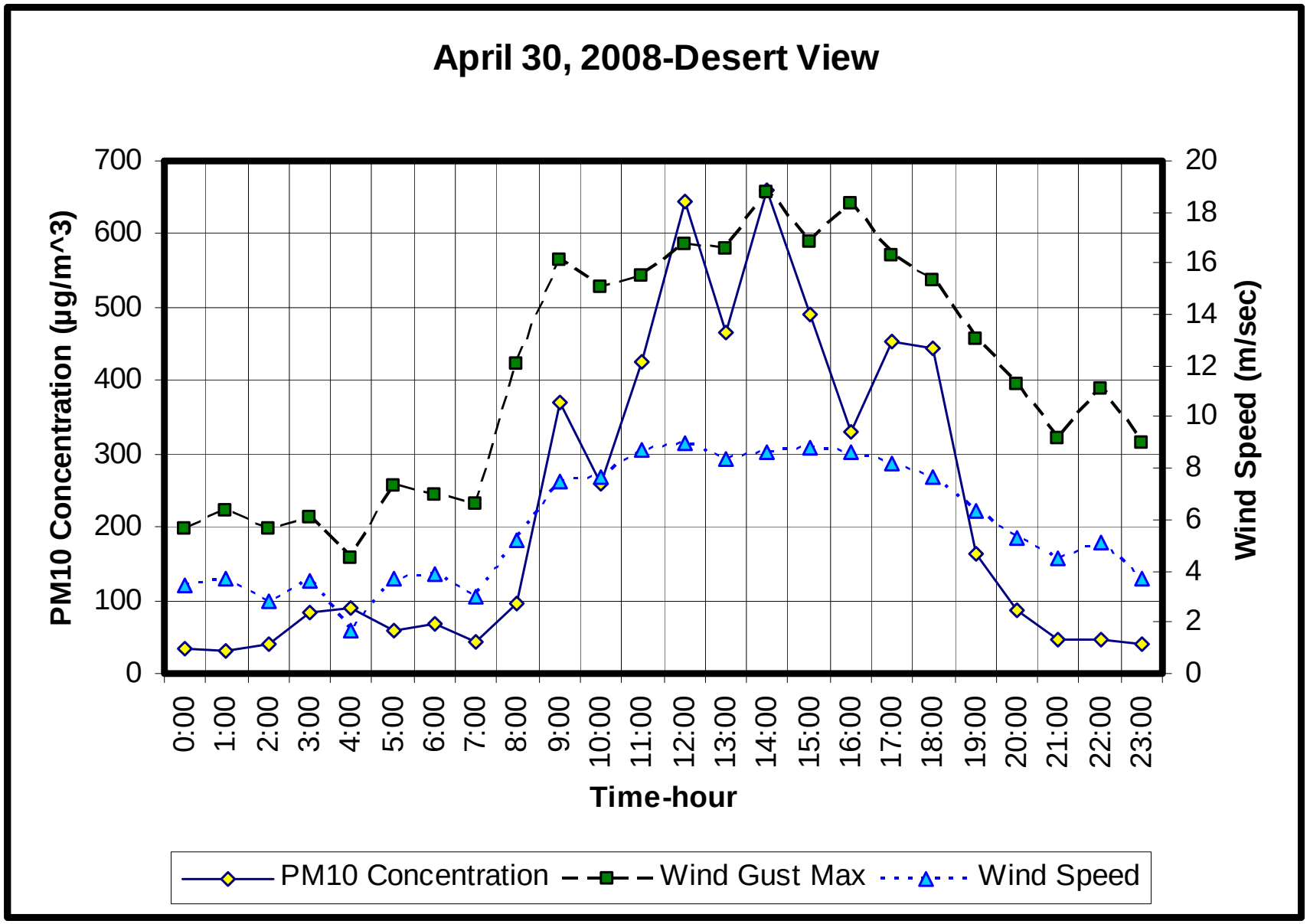
I) MODIS Satellite Image for May 1, 2008. Downloaded from http://rapidfire.sci.gsfc.nasa.gov/subsets/?subset=NewMexico

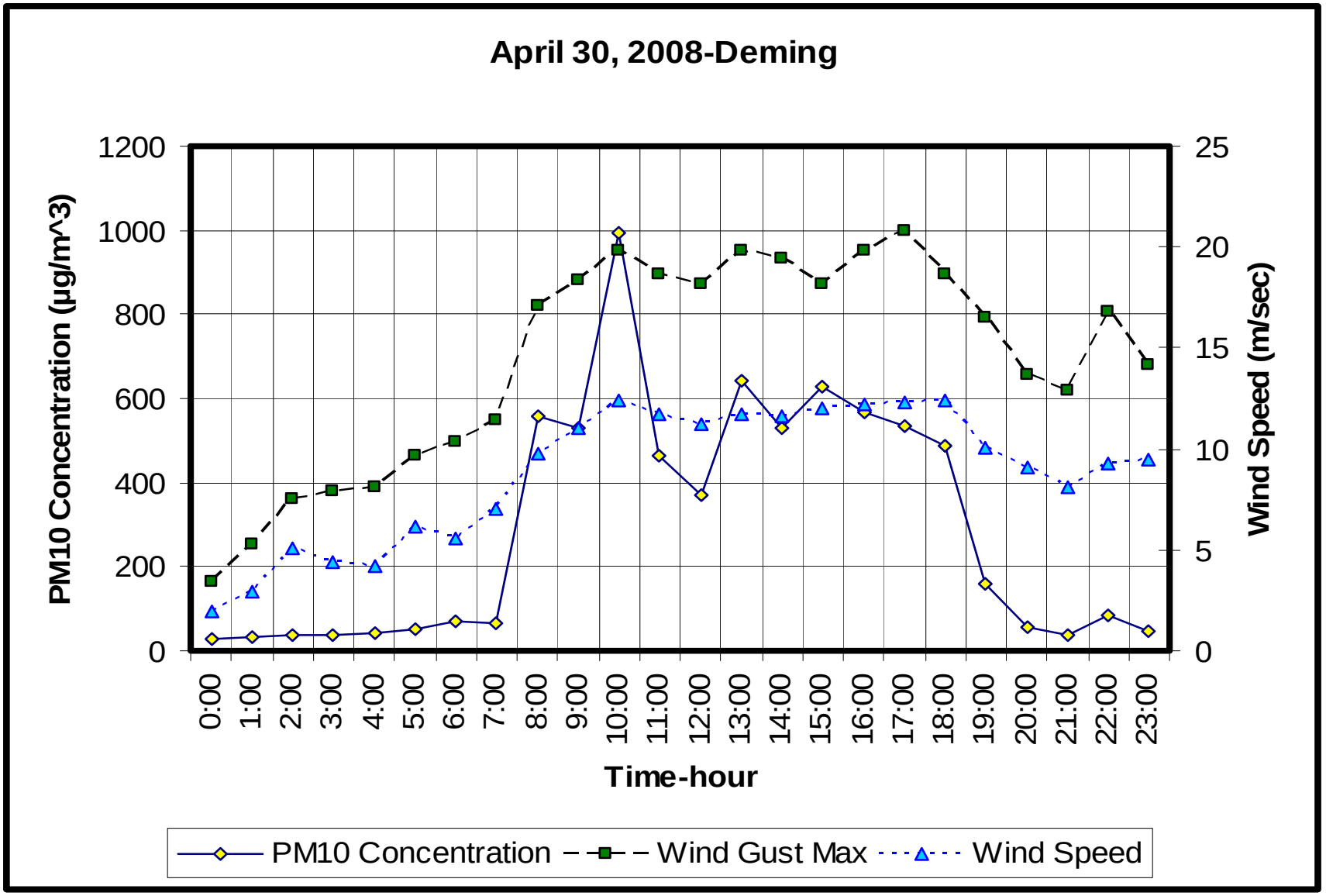

April 30, 2008-Anthony
PM10 Concentration (µg/m^3)
Wind Speed (m/sec)
Time-hour
0
100
200
300
400
500
600
0
2
4
6
8
10
12
14
16
0:00
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
PM10 Concentration
Wind Gust Max
Wind Speed

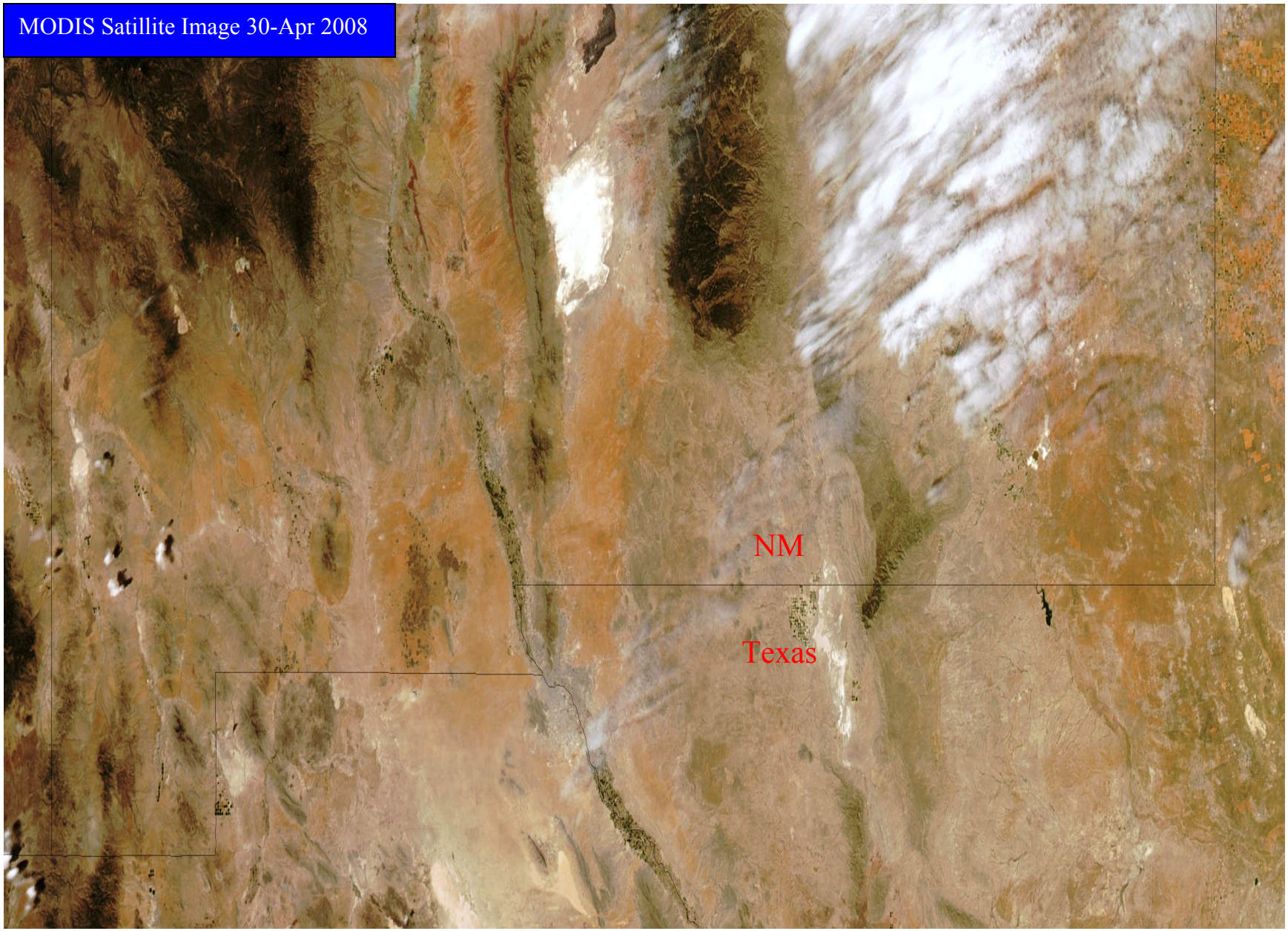

April 30, 2008-SPCY
PM10 Concentration (µg/m^3)
Wind Speed (m/sec)
Time-hour
0
100
200
300
400
500
600
700
800
0
5
10
15
20
25
0:00
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
PM10 Concentration
Wind Gust Max
Wind Speed

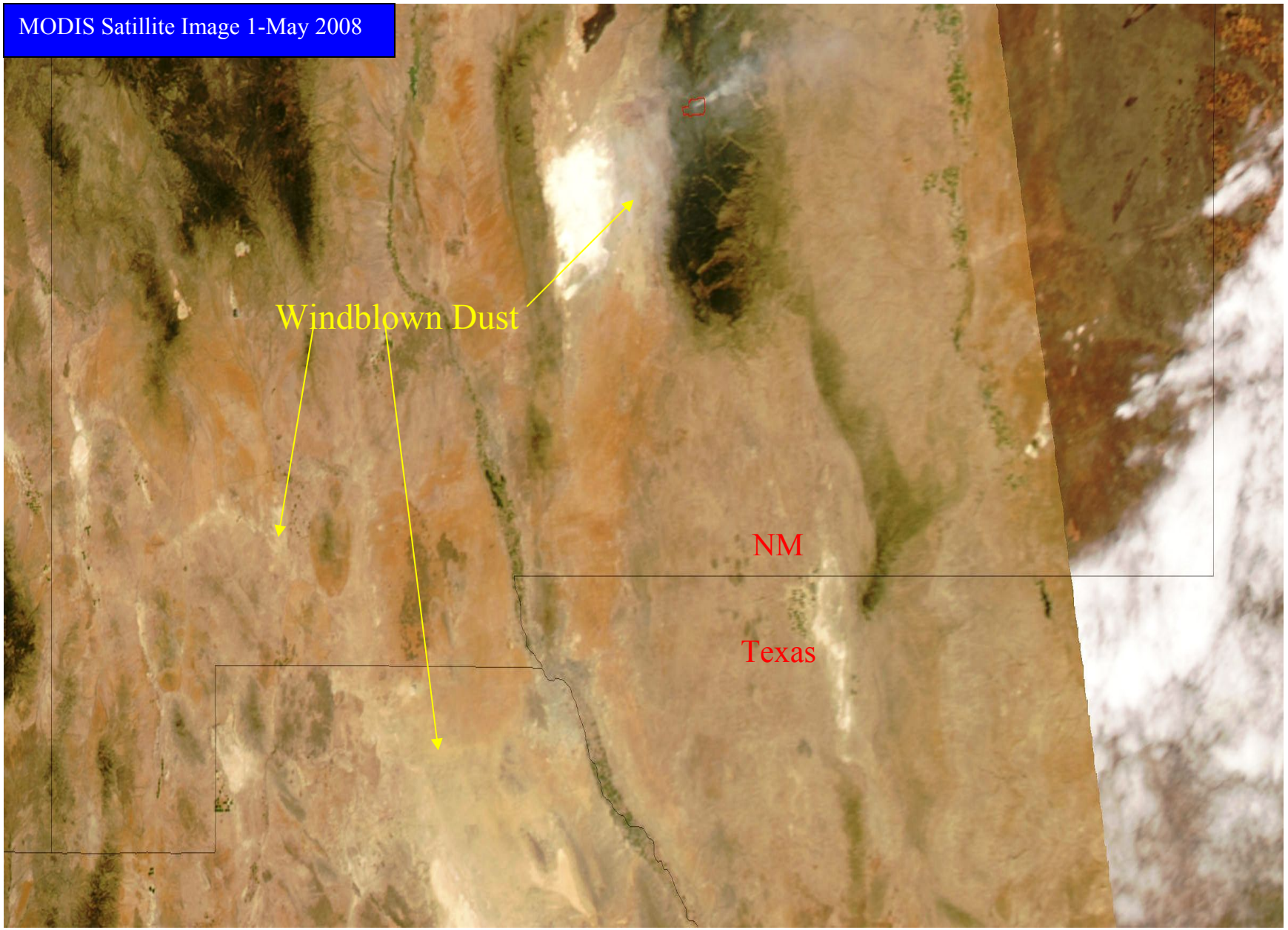

April 30, 2008-Chaparral
PM10 Concentration (µg/m^3)
Wind Speed (m/sec)
Time-hour
0
100
200
300
400
500
600
700
800
0
5
10
15
20
25
0:00
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
PM10 Concentration
Wind Gust Max
Wind Speed


April 30, 2008-Holman
PM10 Concentration (µg/m^3)
Wind Speed (m/sec)
600
500
400
300
200
100
0
25
20
15
10
5
0
0:00
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
Time-hour
PM10 Concentration
Wind Gust Max
Wind Speed


April 30, 2008-Desert View
PM10 Concentration (µg/m^3)
Wind Speed (m/sec)
Time-hour
0
100
200
300
400
500
600
700
0
2
4
6
8
10
12
14
16
18
20
0:00
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
PM10 Concentration
Wind Gust Max
Wind Speed


April 30, 2008-Deming
PM10 Concentration (µg/m^3)
Wind Speed (m/sec)
Time-hour
0
200
400
600
800
1000
1200
0
5
10
15
20
25
0:00
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
PM10 Concentration
Wind Gust Max
Wind Speed


MODIS Satillite Image 30-Apr 2008
NM
Texas


MODIS Satillite Image 1-May 2008
Windblown Dust
NM
Texas

Documentation of Natural Events: Particulate Matter Exceedances Caused by High Winds in Luna and Doña Ana Counties, New Mexico

Update for January 2008 – December 2008

Appendix 8A-8H

Supporting Data for Documentation of Exceedances

May 12, 2008: 6CM Anthony (AQS #35-013-0016)

A) Plot of Hourly PM_{10} Concentration and Wind Speed at Anthony.

B) Plot of Hourly PM_{10} Concentration and Wind Speed at Sunland Park City Yard.

C) Plot of Hourly PM_{10} Concentration and Wind Speed at Chaparral.

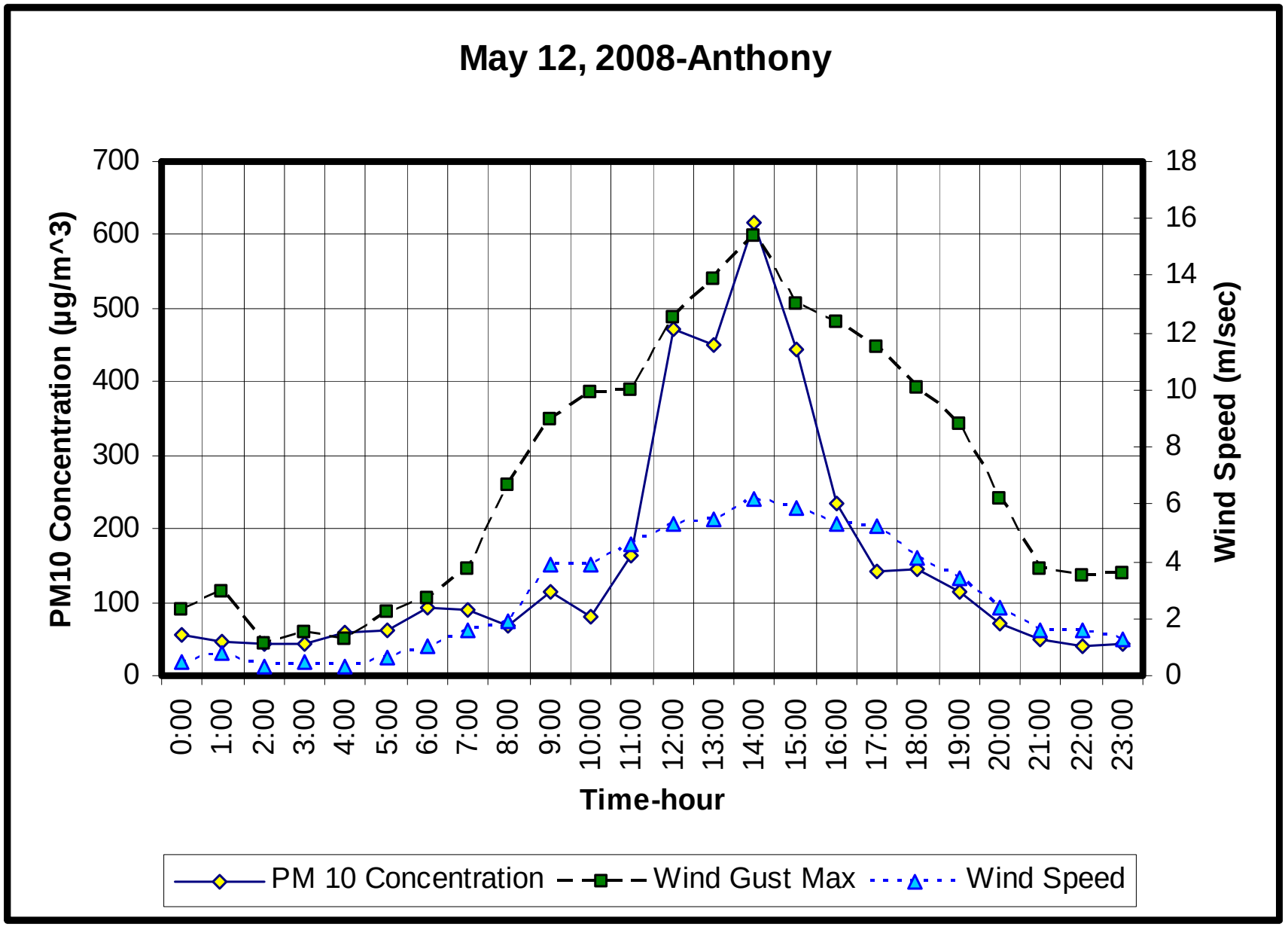
D) Plot of Hourly PM_{10} Concentration and Wind Speed at Desert View.

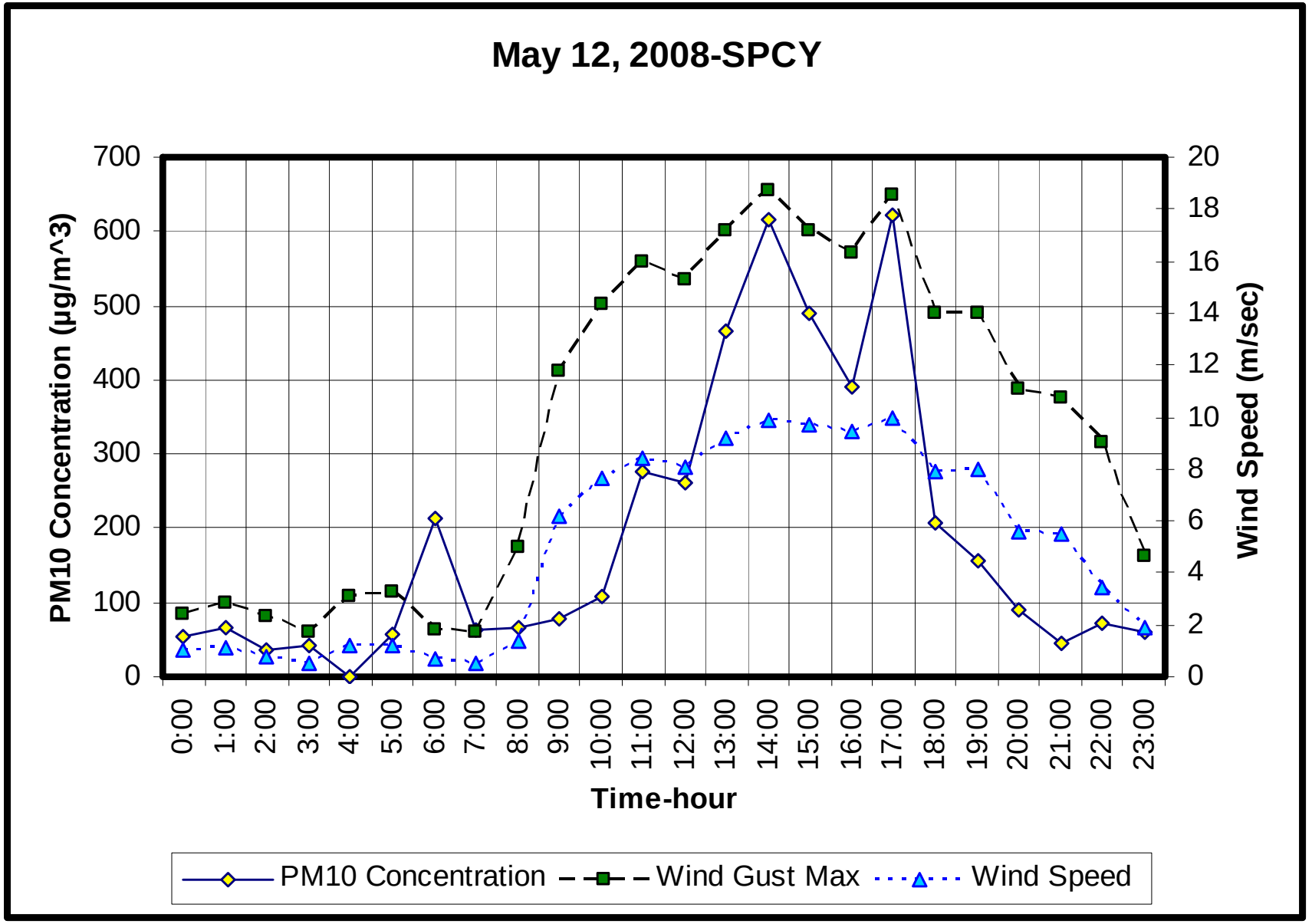
E) Plot of Hourly PM_{10} Concentration and Wind Speed at Deming.

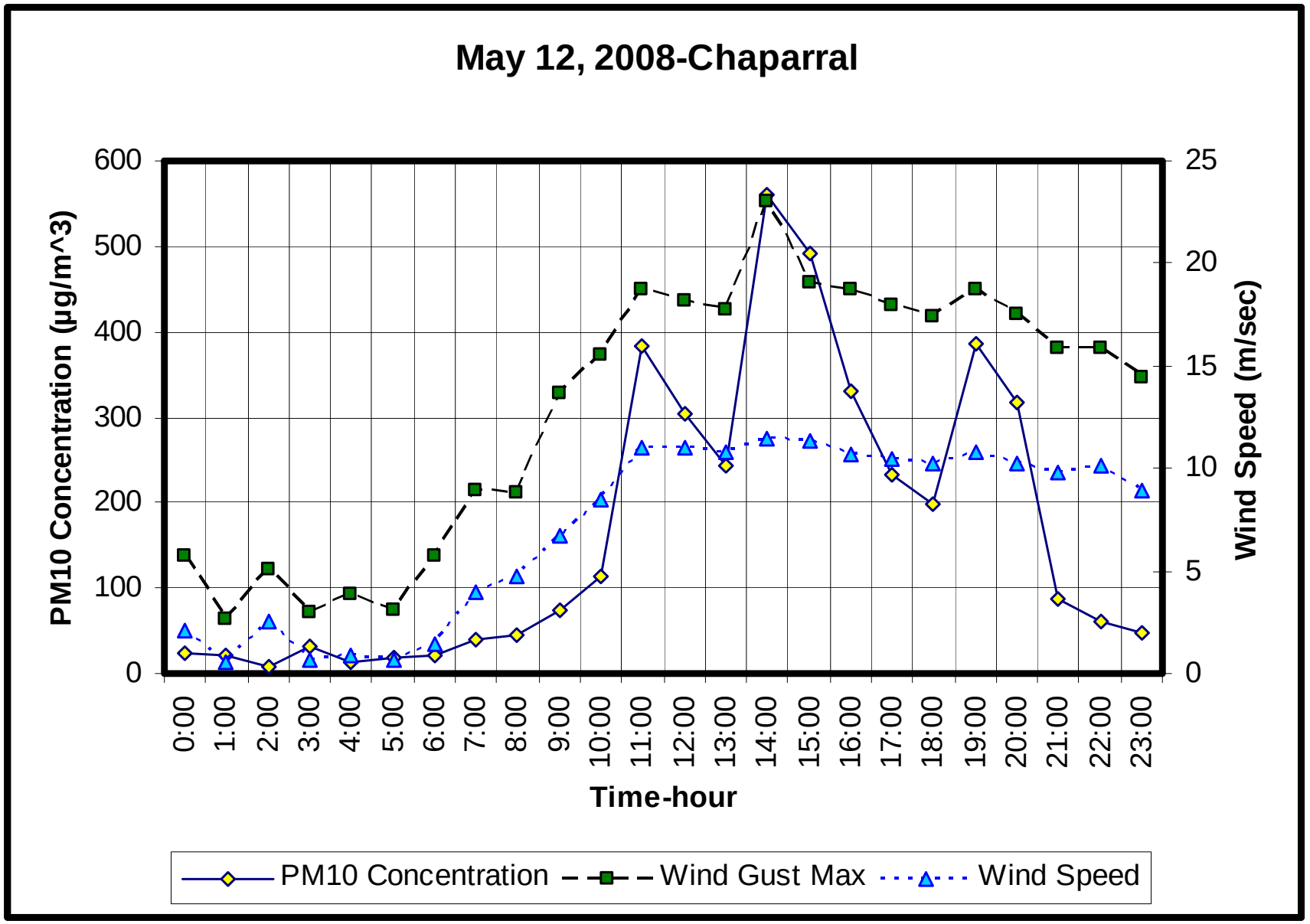
F) MODIS Satellite Image for May 10, 2008. Downloaded from http://rapidfire.sci.gsfc.nasa.gov/subsets/?subset=NewMexico

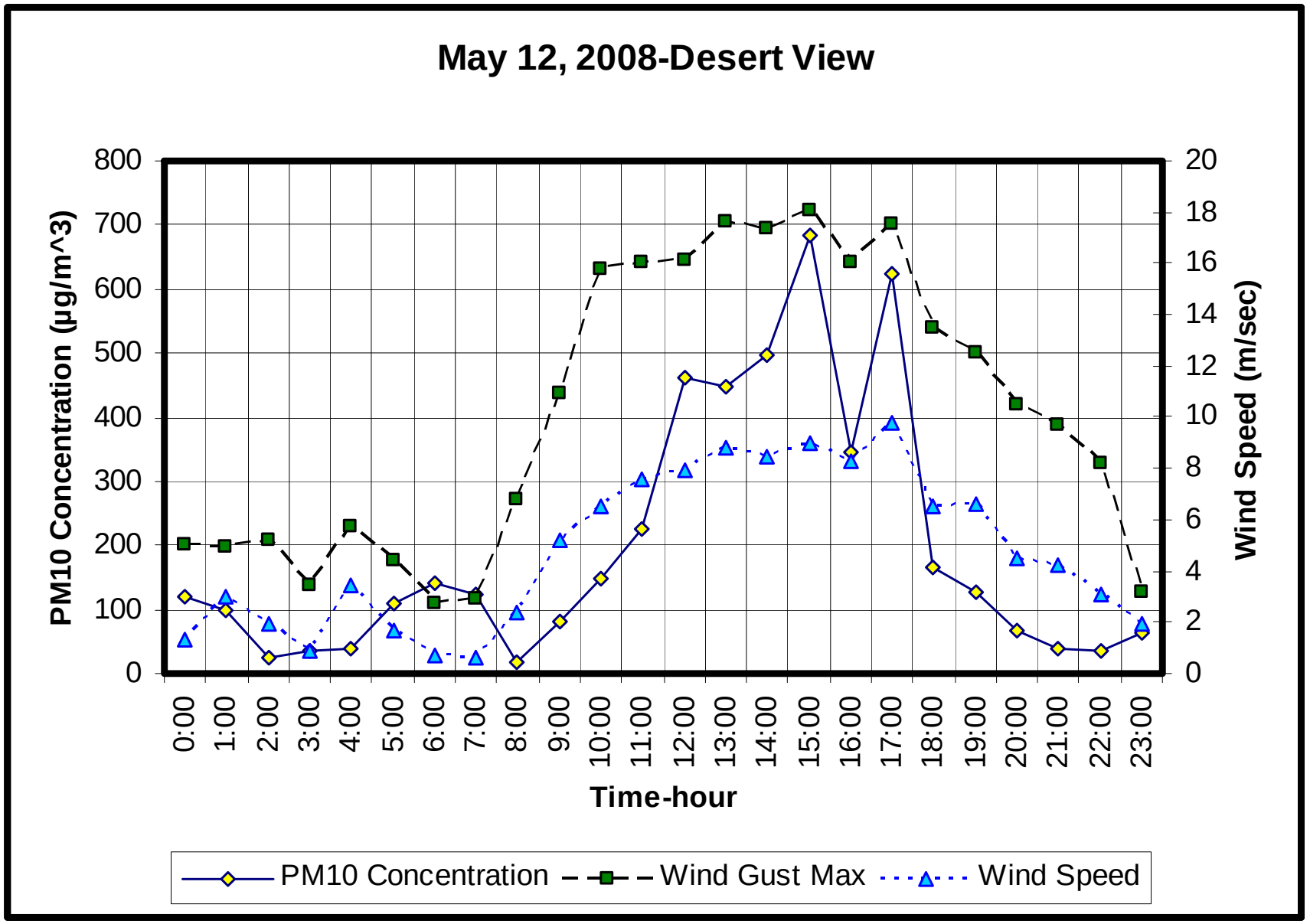
G) MODIS Satellite Image for May 11, 2008. Downloaded from http://rapidfire.sci.gsfc.nasa.gov/subsets/?subset=NewMexico

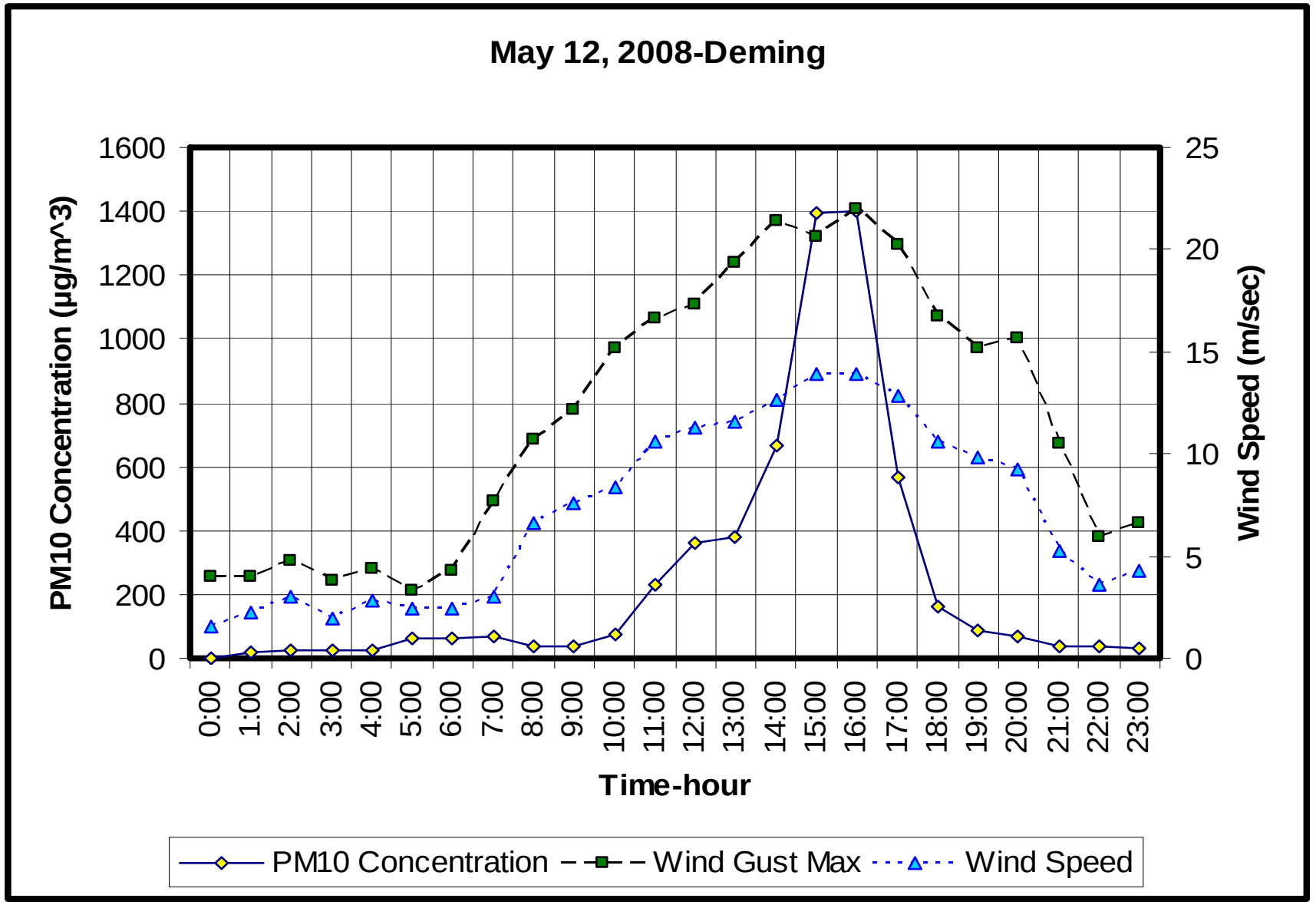
H) MODIS Satellite Image for May 12, 2008. Downloaded from http://rapidfire.sci.gsfc.nasa.gov/subsets/?subset=NewMexico

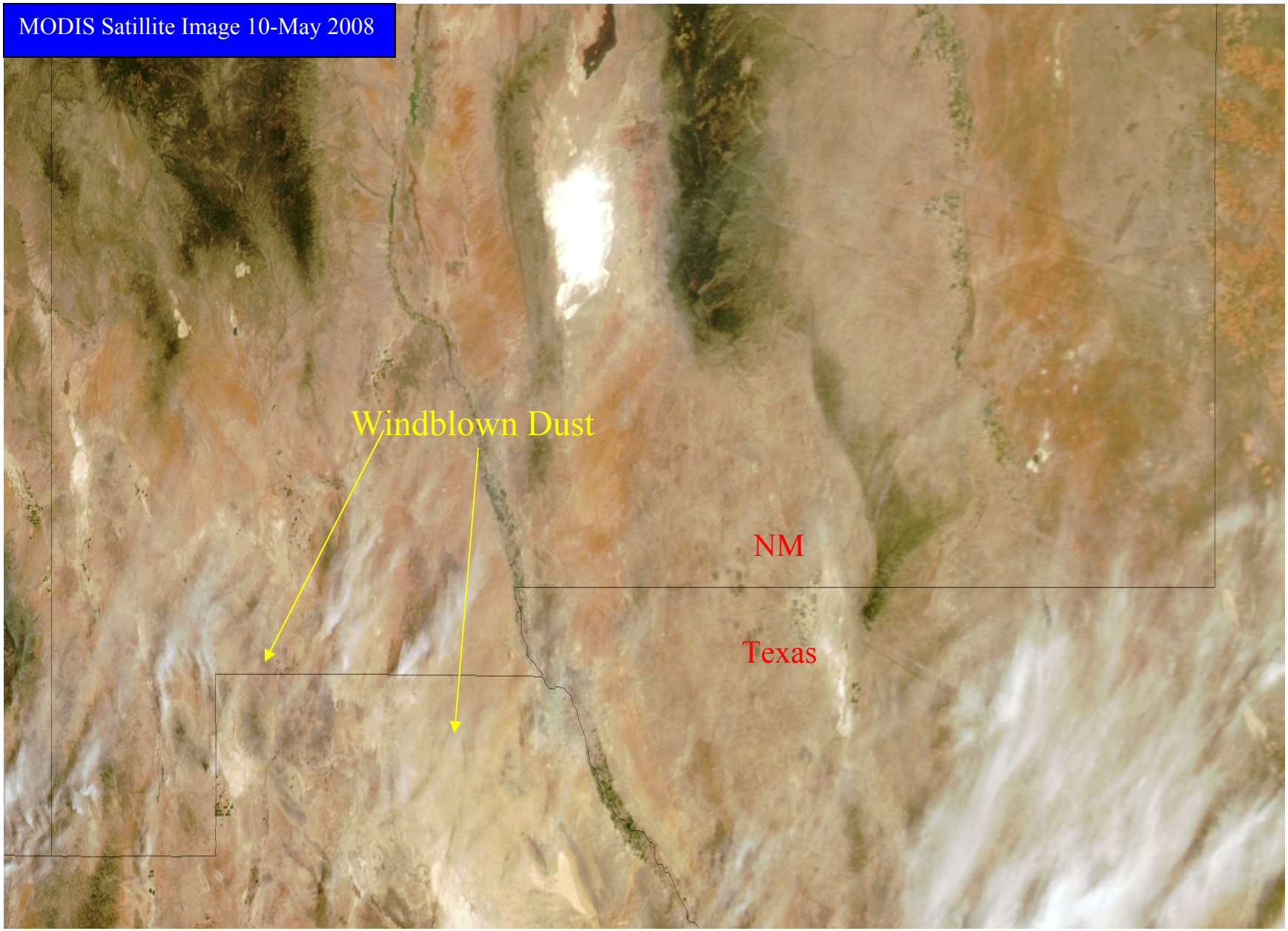

May 12, 2008-Anthony
PM10 Concentration (µg/m^3)
Wind Speed (m/sec)
Time-hour
0
100
200
300
400
500
600
700
0
2
4
6
8
10
12
14
16
18
0:00
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
PM 10 Concentration
Wind Gust Max
Wind Speed

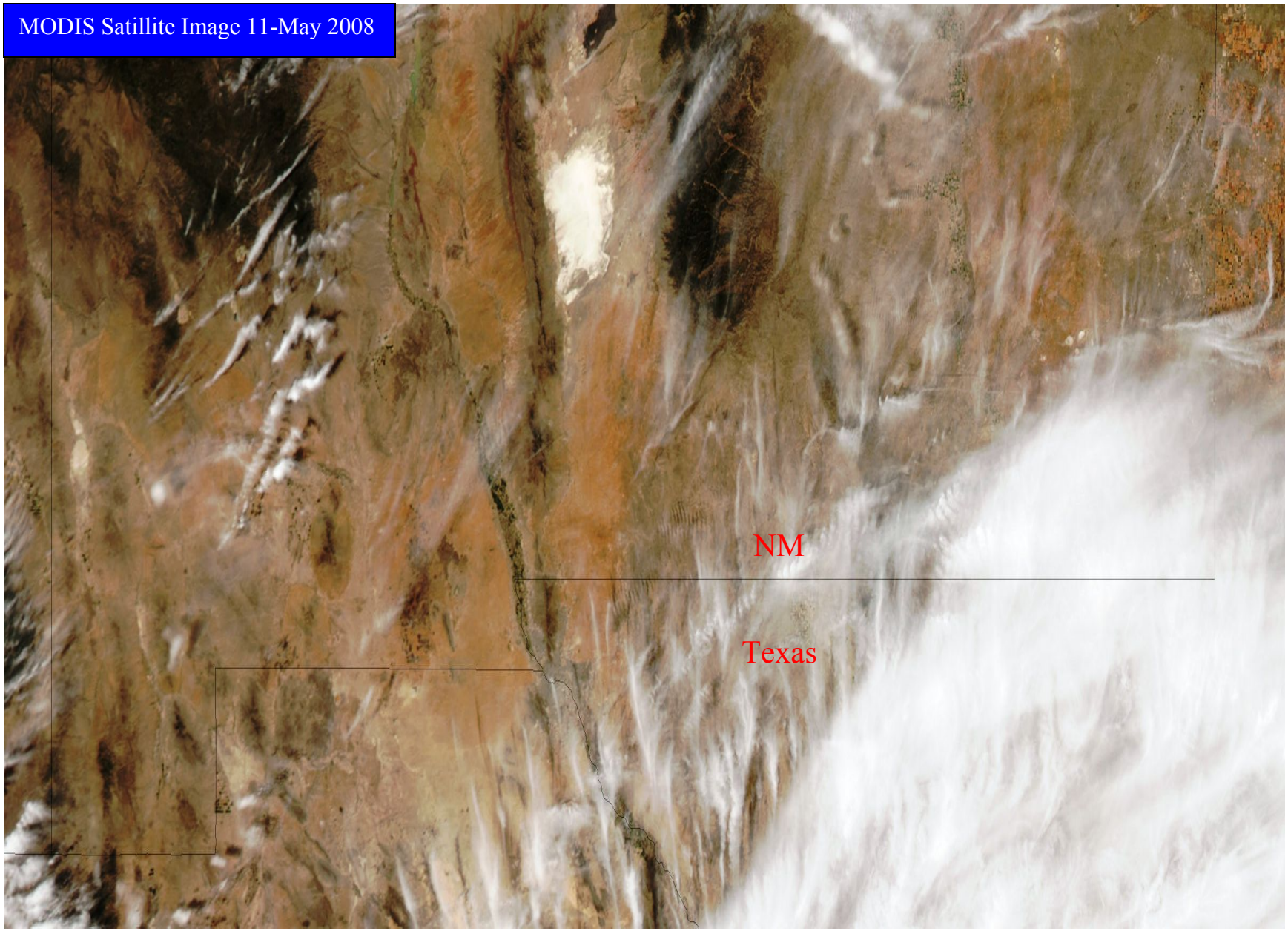

May 12, 2008-SPCY
PM10 Concentration (µg/m^3)
Wind Speed (m/sec)
Time-hour
0
100
200
300
400
500
600
700
0
2
4
6
8
10
12
14
16
18
20
0:00
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
PM10 Concentration
Wind Gust Max
Wind Speed

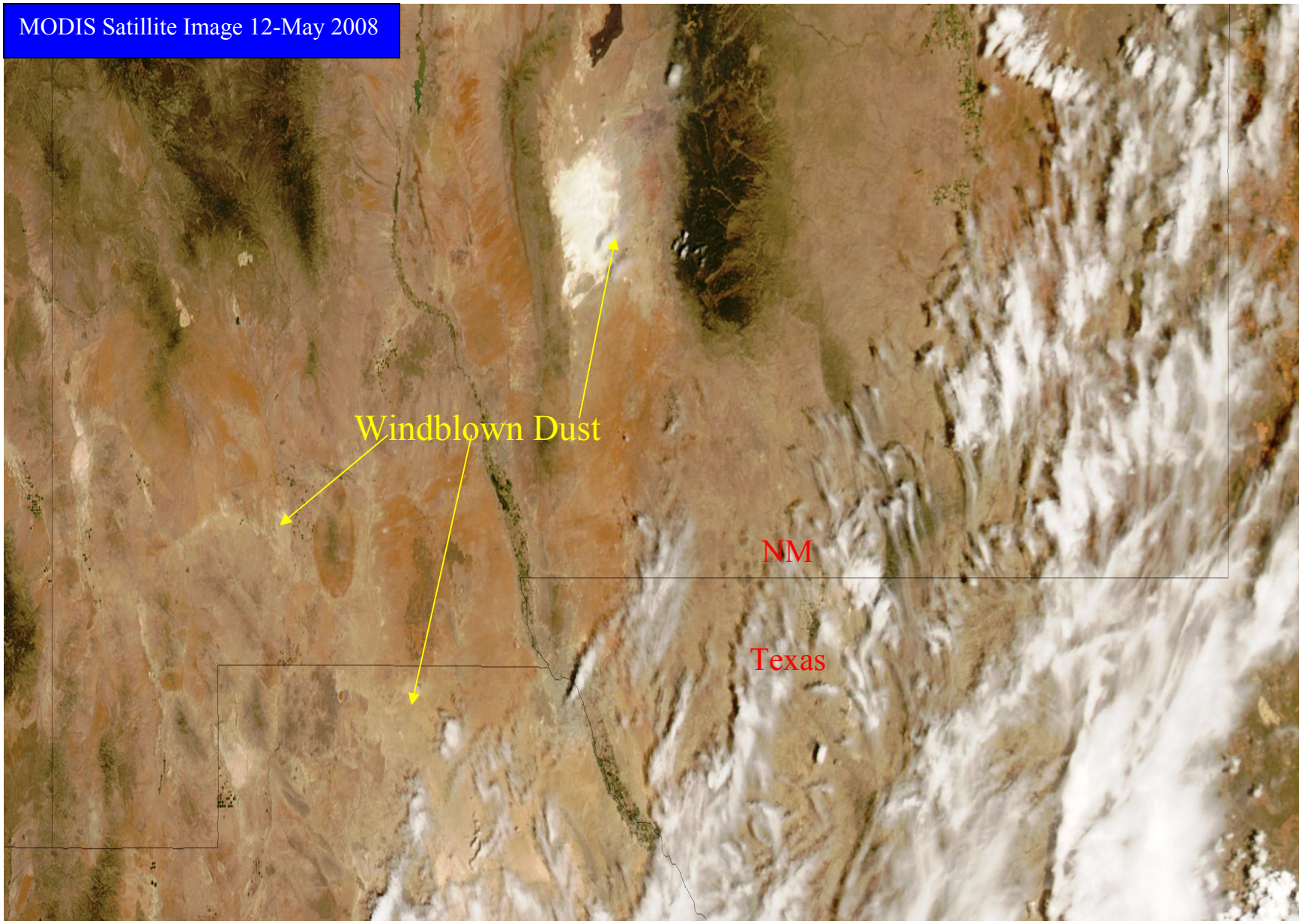

May 12, 2008-Chaparral
PM10 Concentration (µg/m^3)
Wind Speed (m/sec)
Time-hour
600
500
400
300
200
100
0
25
20
15
10
5
0
0:00
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
PM10 Concentration
Wind Gust Max
Wind Speed


May 12, 2008-Desert View
PM10 Concentration (µg/m^3)
Wind Speed (m/sec)
800
700
600
500
400
300
200
100
0
20
18
16
14
12
10
8
6
4
2
0
0:00
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
Time-hour
PM10 Concentration
Wind Gust Max
Wind Speed


May 12, 2008-Deming
PM10 Concentration (µg/m^3)
Wind Speed (m/sec)
1600
1400
1200
1000
800
600
400
200
0
25
20
15
10
5
0
0:00
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
Time-hour
PM10 Concentration
Wind Gust Max
Wind Speed


MODIS Satillite Image 10-May 2008
Windblown Dust
NM
Texas


MODIS Satillite Image 11-May 2008
NM
Texas


MODIS Satillite Image 12-May 2008
Windblown Dust
NM
Texas

Documentation of Natural Events: Particulate Matter Exceedances Caused by High Winds in Luna and Doña Ana Counties, New Mexico

Update for January 2008 – December 2008

Appendix 9A-9E

Supporting Data for Documentation of Exceedances

May 13, 2008: 6CM Anthony (AQS #35-013-0016)

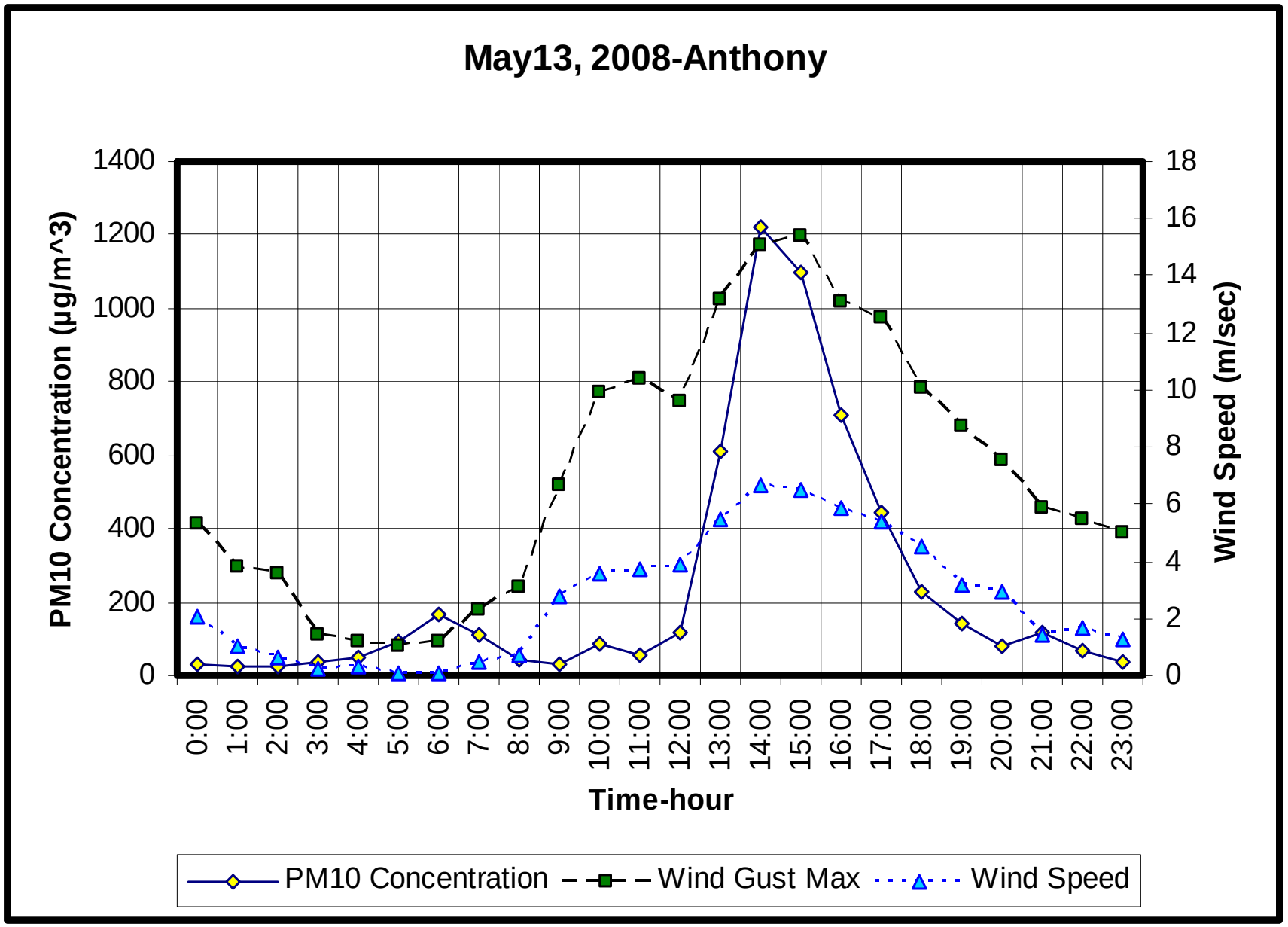
A) Plot of Hourly PM_{10} Concentration and Wind Speed at Anthony.

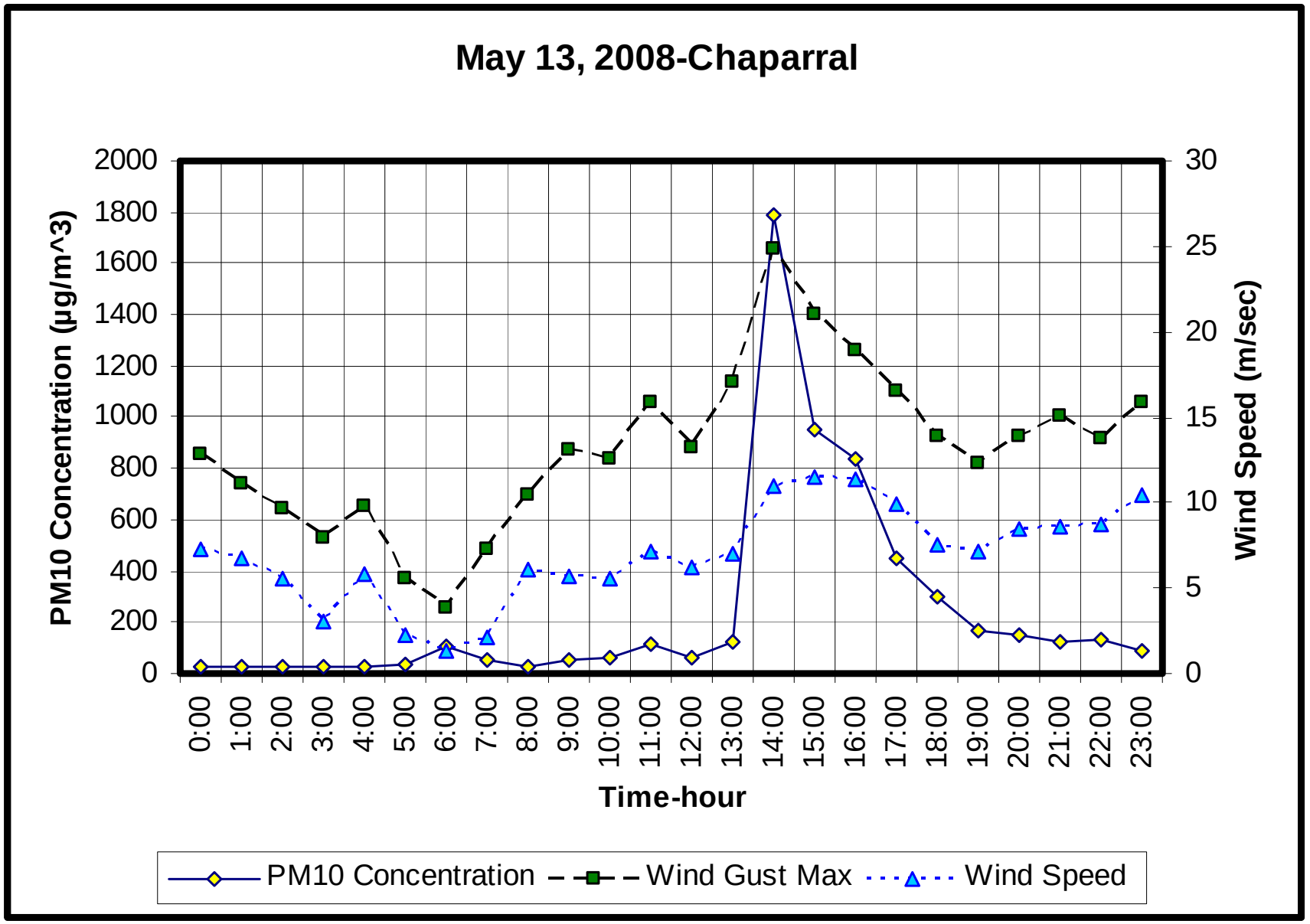
B) Plot of Hourly PM_{10} Concentration and Wind Speed at Chaparral.

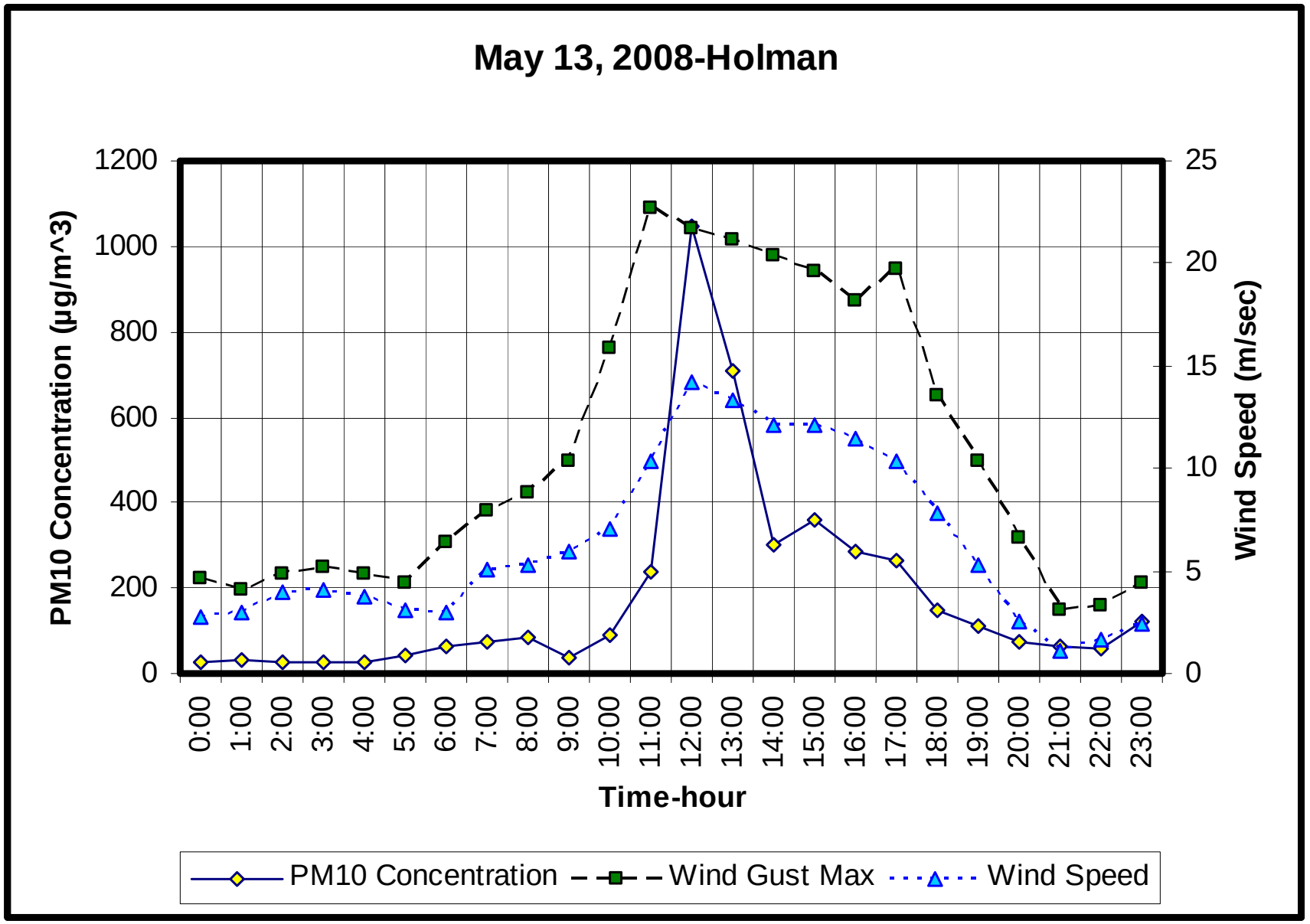
C) Plot of Hourly PM_{10} Concentration and Wind Speed at Holman.

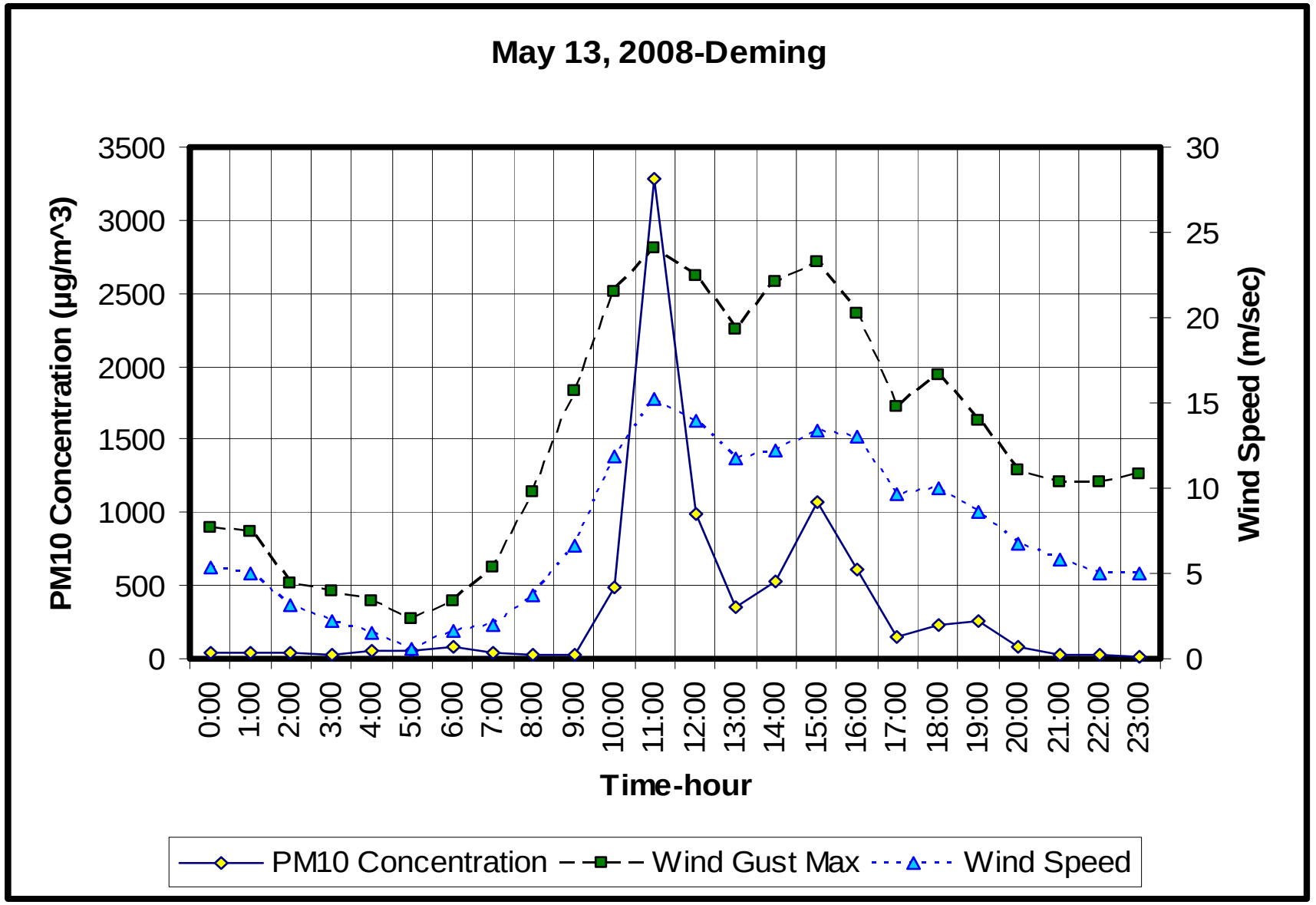
D) Plot of Hourly PM_{10} Concentration and Wind Speed at Deming.

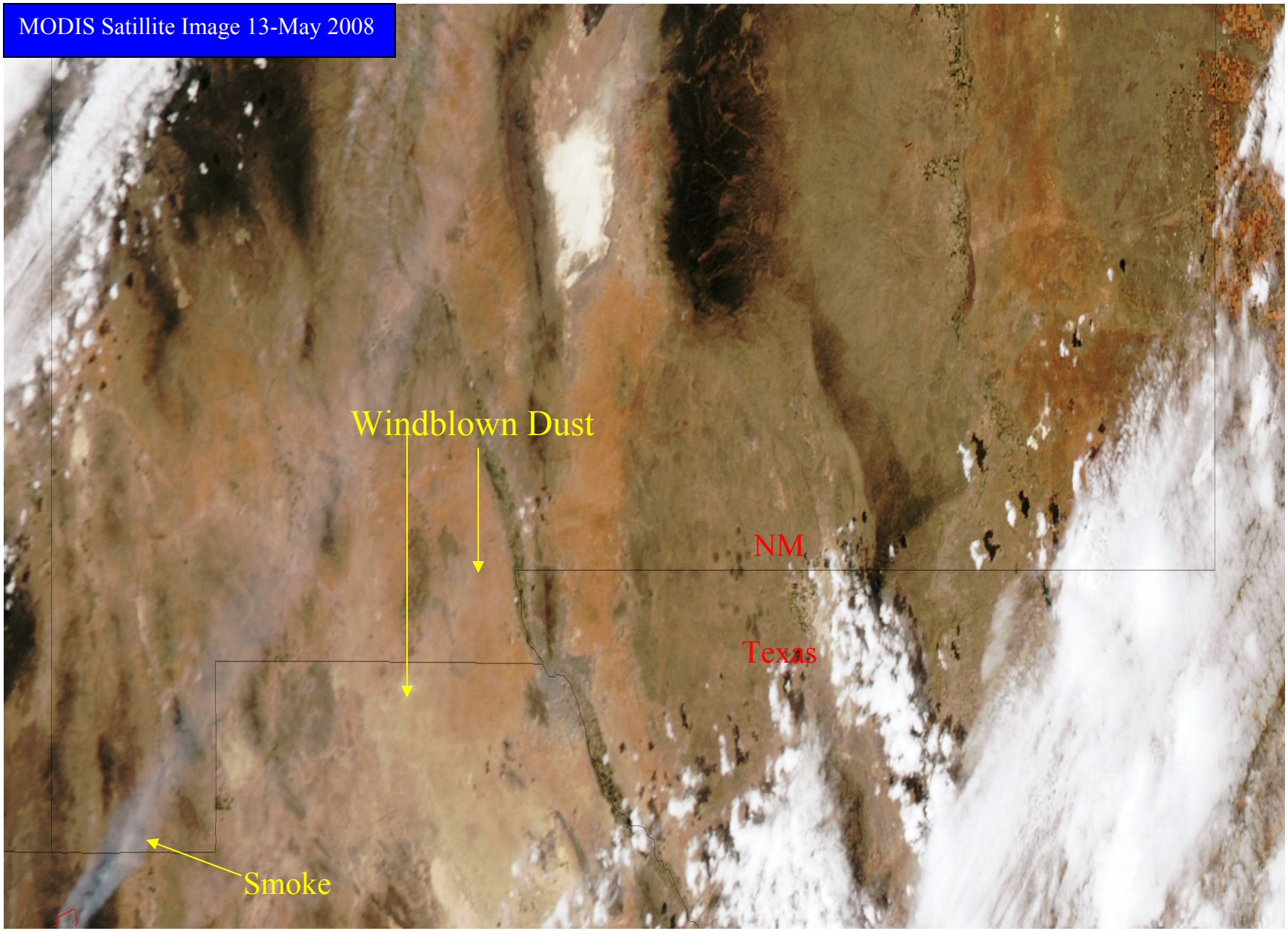
E) MODIS Satellite Image for May 13, 2008. Downloaded from http://rapidfire.sci.gsfc.nasa.gov/subsets/?subset=NewMexico


May13, 2008-Anthony
PM10 Concentration (µg/m^3)
Wind Speed (m/sec)
Time-hour
0
200
400
600
800
1000
1200
1400
0
2
4
6
8
10
12
14
16
18
0:00
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
PM10 Concentration
Wind Gust Max
Wind Speed


May 13, 2008-Chaparral
PM10 Concentration (µg/m^3)
Wind Speed (m/sec)
Time-hour
0
200
400
600
800
1000
1200
1400
1600
1800
2000
0
5
10
15
20
25
30
0:00
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
PM10 Concentration
Wind Gust Max
Wind Speed


May 13, 2008-Holman
PM10 Concentration (µg/m^3)
Wind Speed (m/sec)
Time-hour
0
200
400
600
800
1000
1200
0
5
10
15
20
25
0:00
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
PM10 Concentration
Wind Gust Max
Wind Speed


May 13, 2008-Deming
PM10 Concentration (µg/m^3)
Wind Speed (m/sec)
Time-hour
3500
3000
2500
2000
1500
1000
500
0
30
25
20
15
10
5
0
0:00
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
PM10 Concentration
Wind Gust Max
Wind Speed


MODIS Satillite Image 13-May 2008
Windblown Dust
NM
Texas
Smoke

Documentation of Natural Events: Particulate Matter Exceedances Caused by High Winds in Luna and Doña Ana Counties, New Mexico

Update for January 2008 – December 2008

Appendix 10A-10I

Supporting Data for Documentation of Exceedances

May 21, 2008: 6CM Anthony (AQS #35-013-0016)

A) Plot of Hourly PM_{10} Concentration and Wind Speed at Anthony.

B) Plot of Hourly PM_{10} Concentration and Wind Speed at West Mesa.

C) Plot of Hourly PM_{10} Concentration and Wind Speed at Sunland Park City Yard.

D) Plot of Hourly PM_{10} Concentration and Wind Speed at Chaparral.

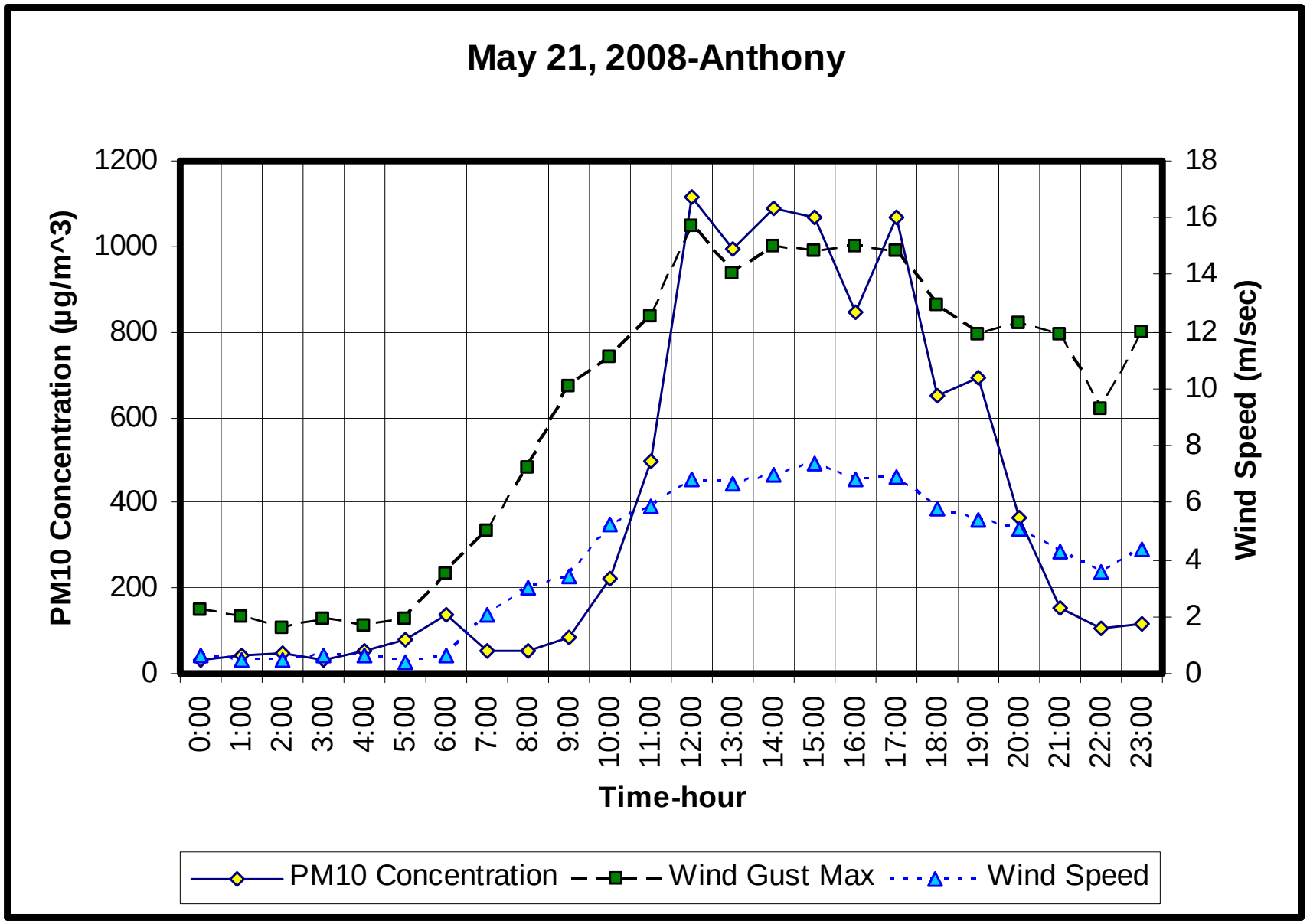
E) Plot of Hourly PM_{10} Concentration and Wind Speed at Holman.

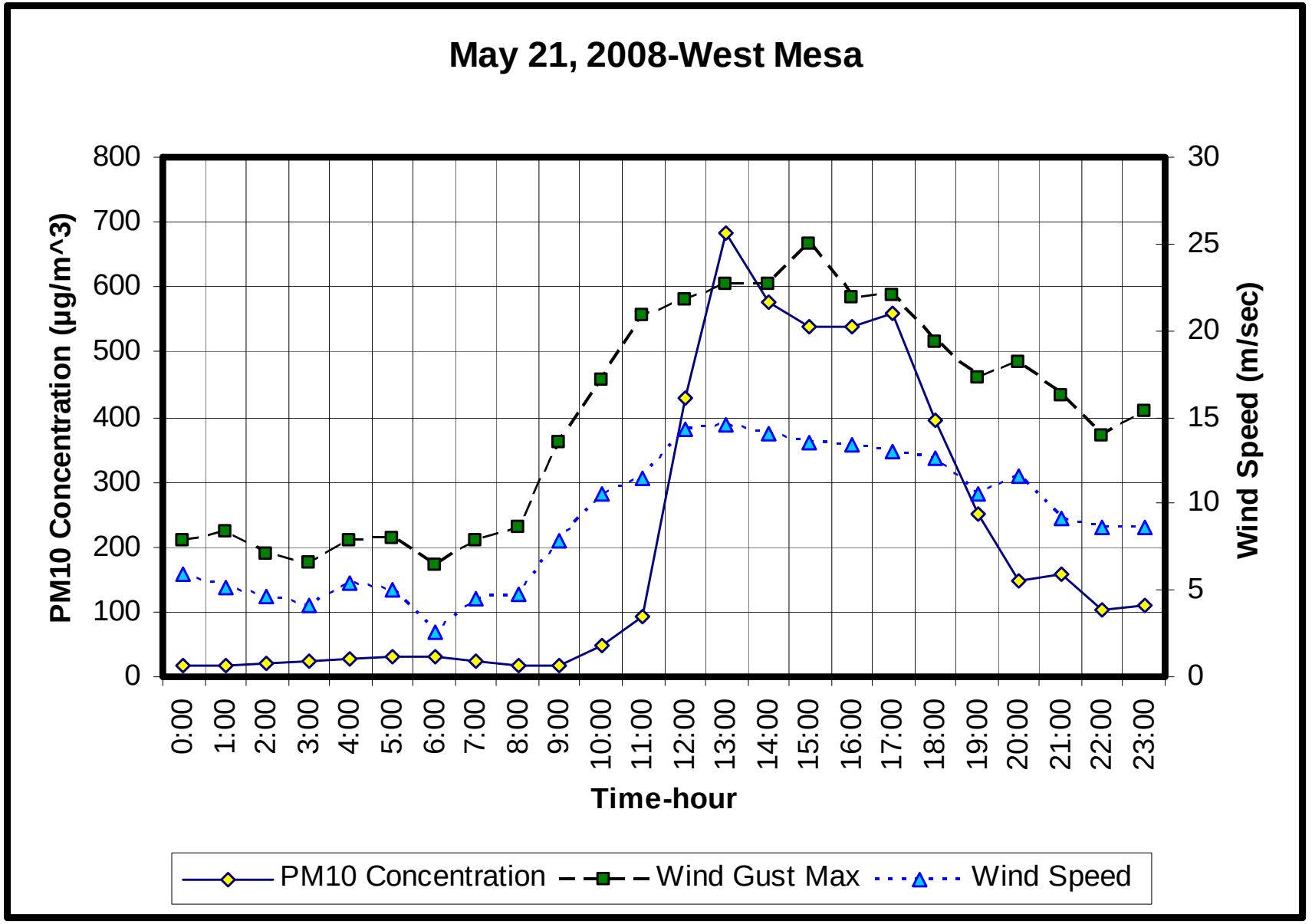
F) Plot of Hourly PM_{10} Concentration and Wind Speed at Desert View.

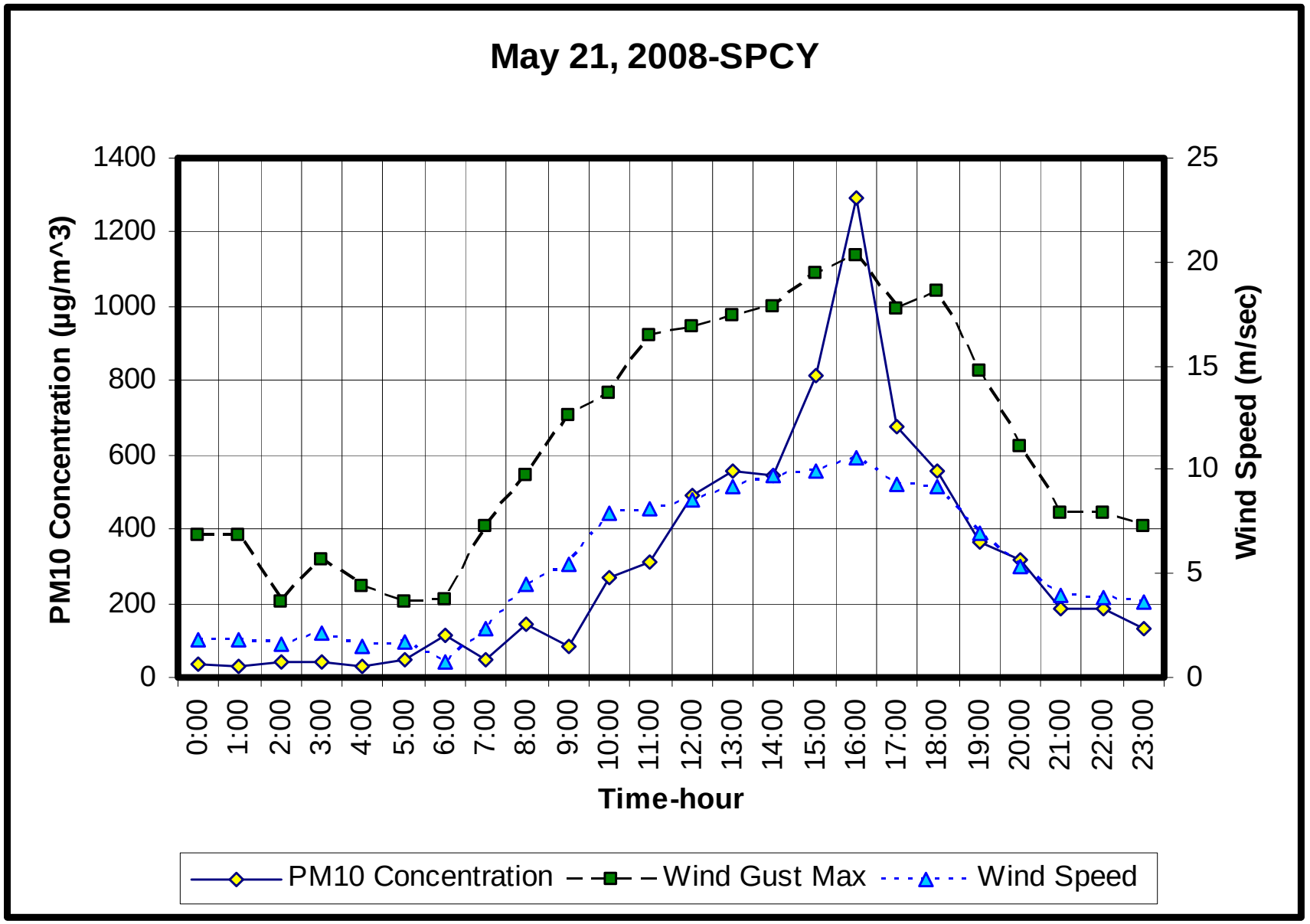
G) Plot of Hourly PM_{10} Concentration and Wind Speed at Deming.

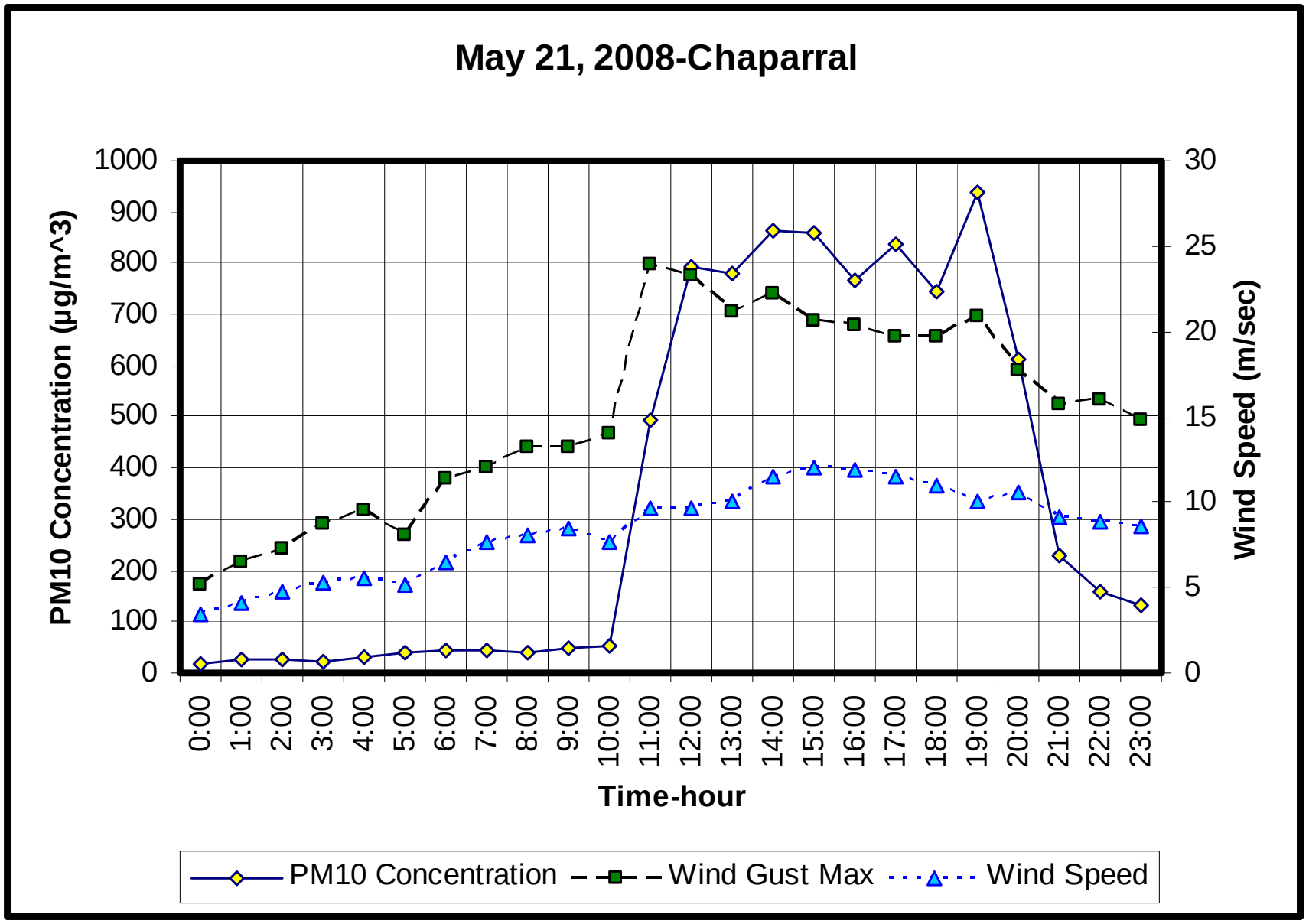
H) Plot of Hourly $PM_{2.5}$ Concentration and Wind Speed at Anthony.

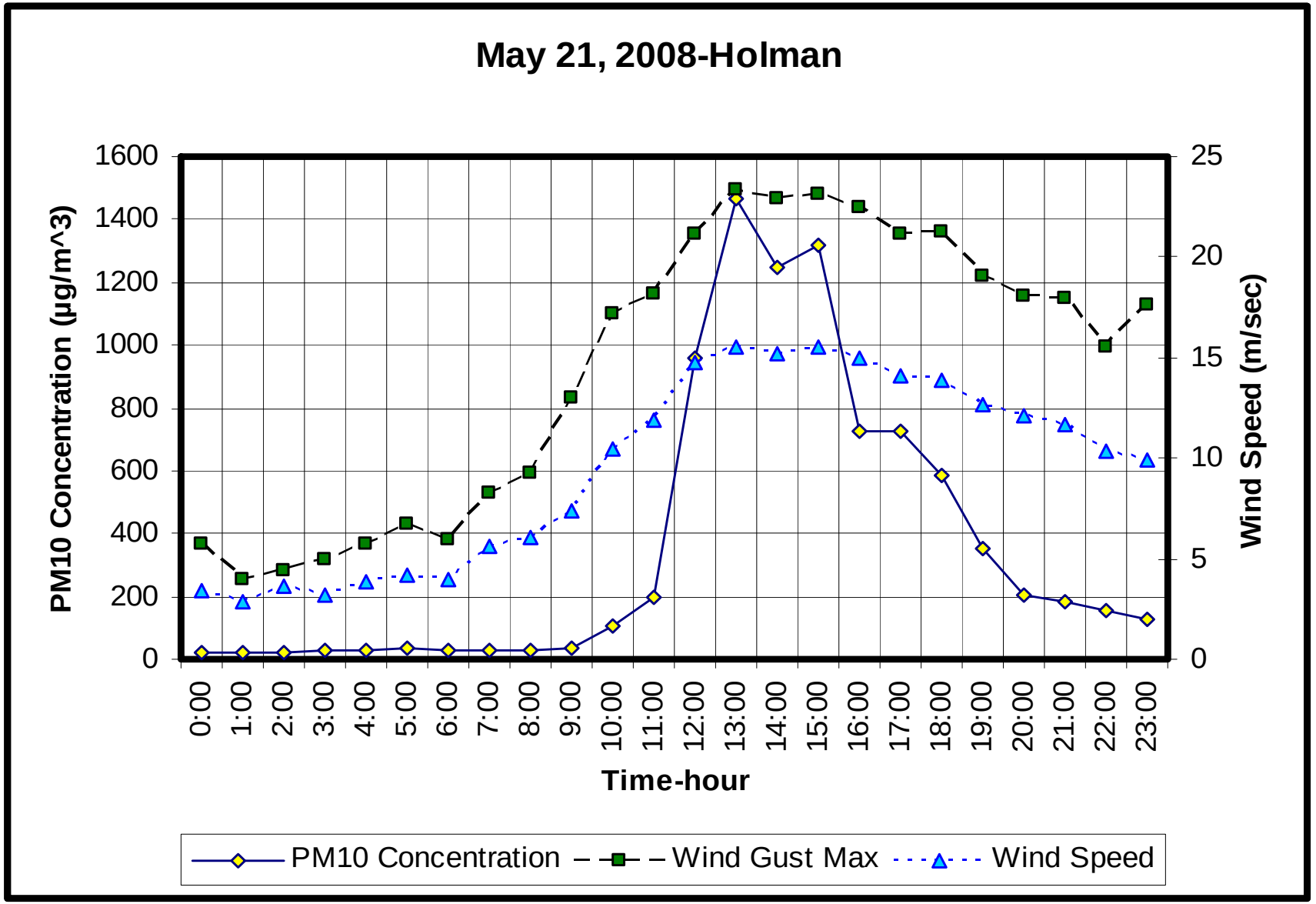
I) Plot of Hourly $PM_{2.5}$ Concentration and Wind Speed at Sunland Park City Yard.

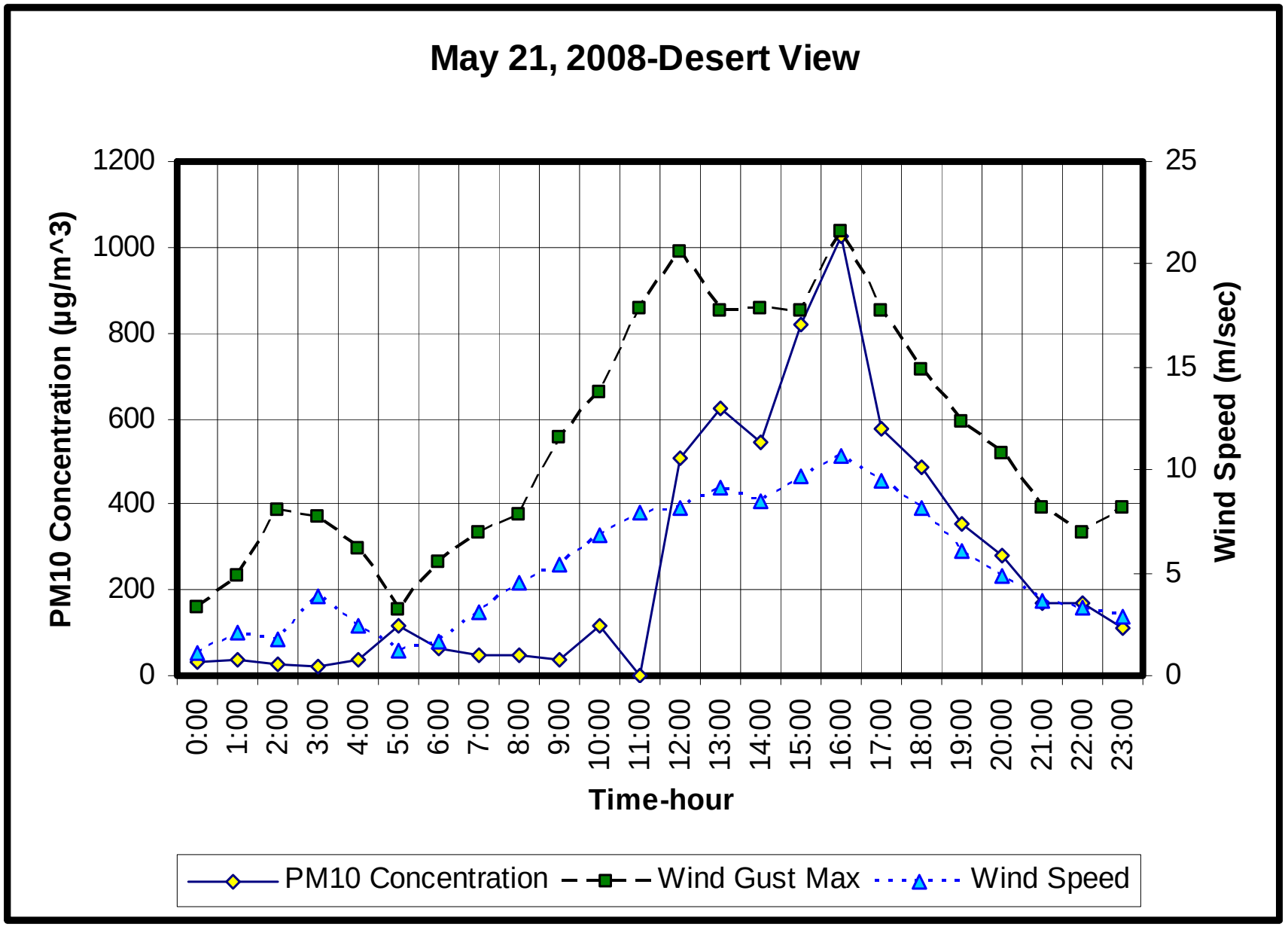

May 21, 2008-Anthony
PM10 Concentration (µg/m^3)
Wind Speed (m/sec)
Time-hour
0
200
400
600
800
1000
1200
0
2
4
6
8
10
12
14
16
18
0:00
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
PM10 Concentration
Wind Gust Max
Wind Speed

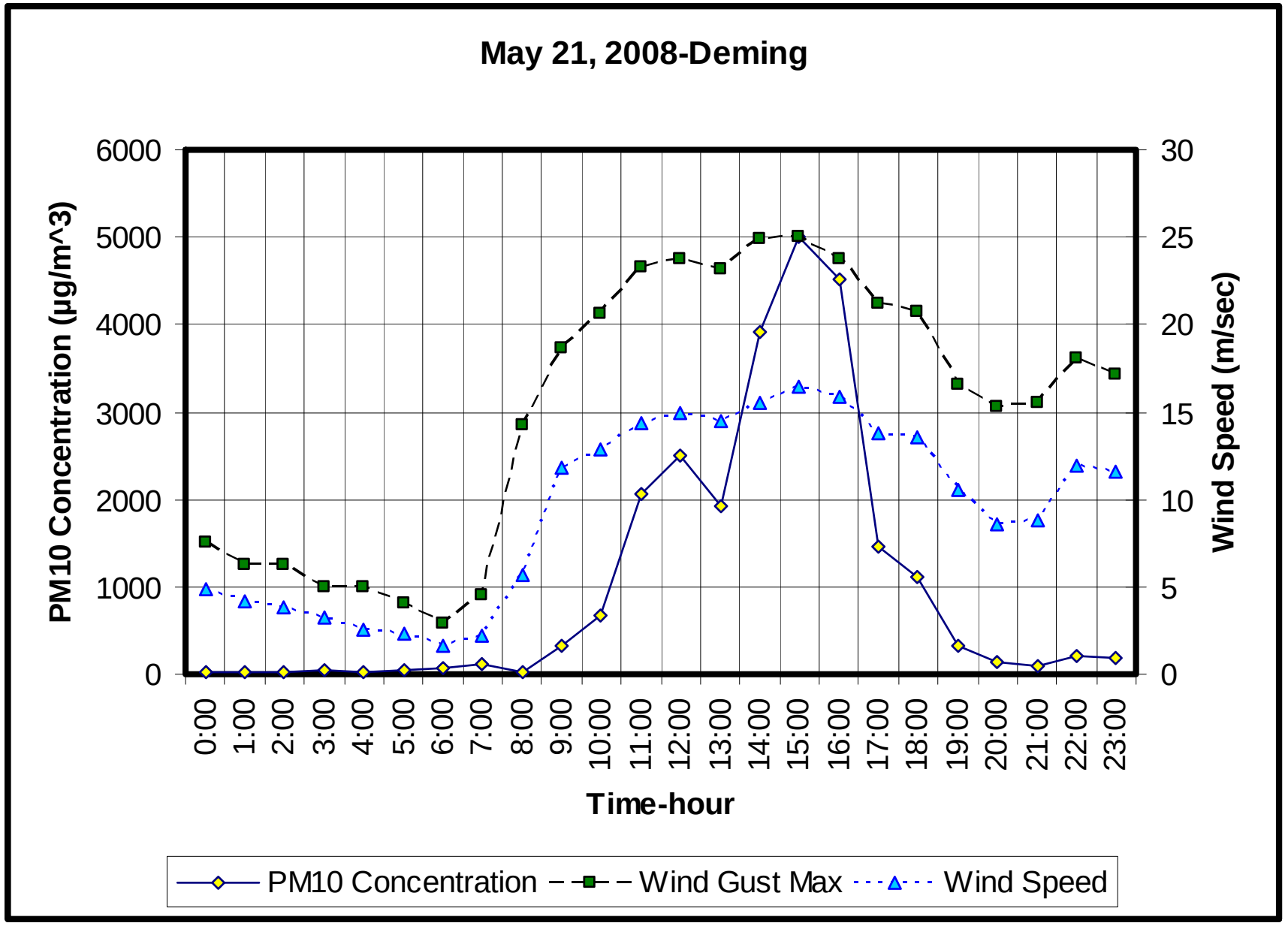

May 21, 2008-West Mesa
PM10 Concentration (µg/m^3)
Wind Speed (m/sec)
Time-hour
0
100
200
300
400
500
600
700
800
0
5
10
15
20
25
30
0:00
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
PM10 Concentration
Wind Gust Max
Wind Speed

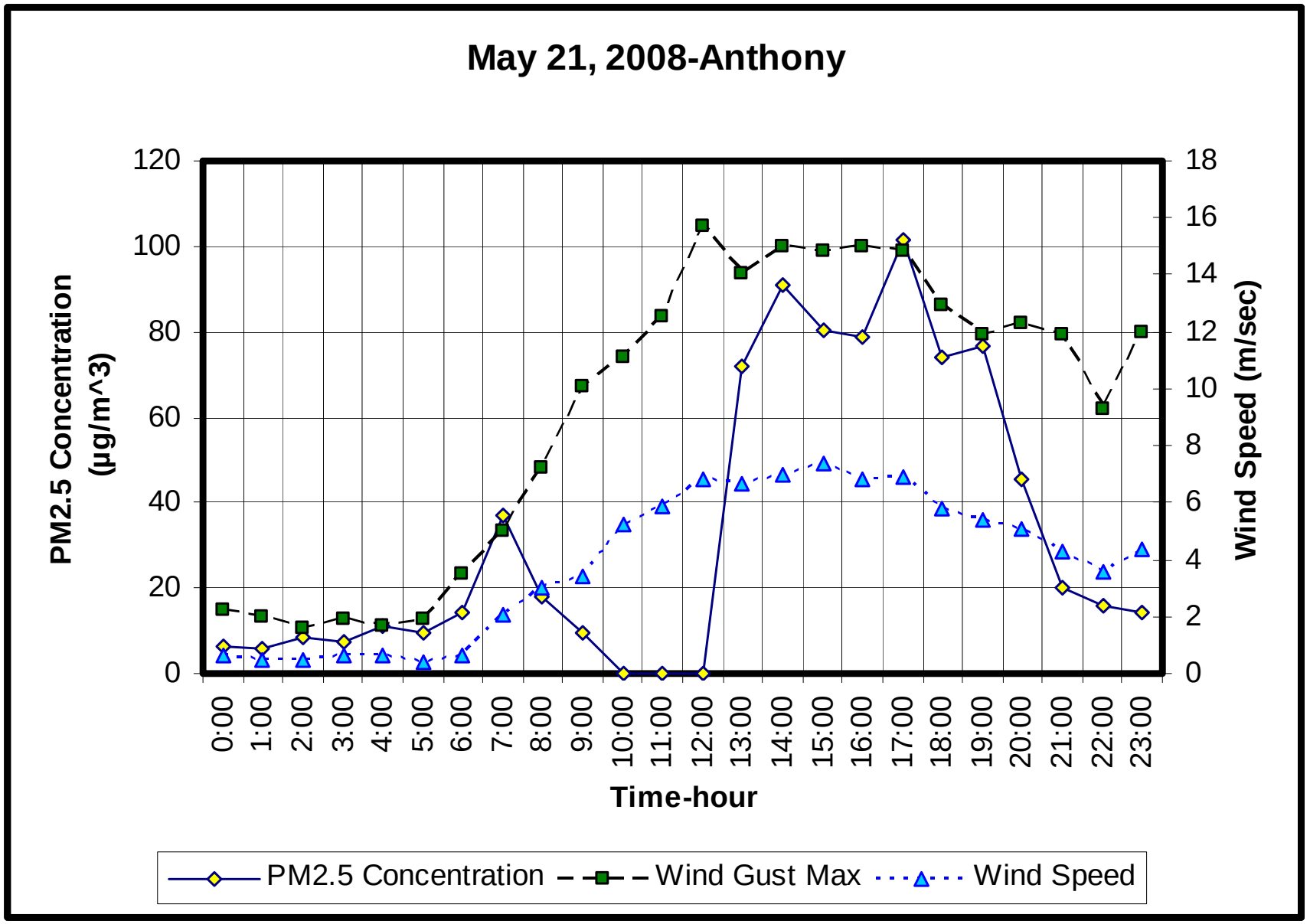

May 21, 2008-SPCY
PM10 Concentration (µg/m^3)
Wind Speed (m/sec)
Time-hour
0
200
400
600
800
1000
1200
1400
0
5
10
15
20
25
0:00
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
PM10 Concentration
Wind Gust Max
Wind Speed

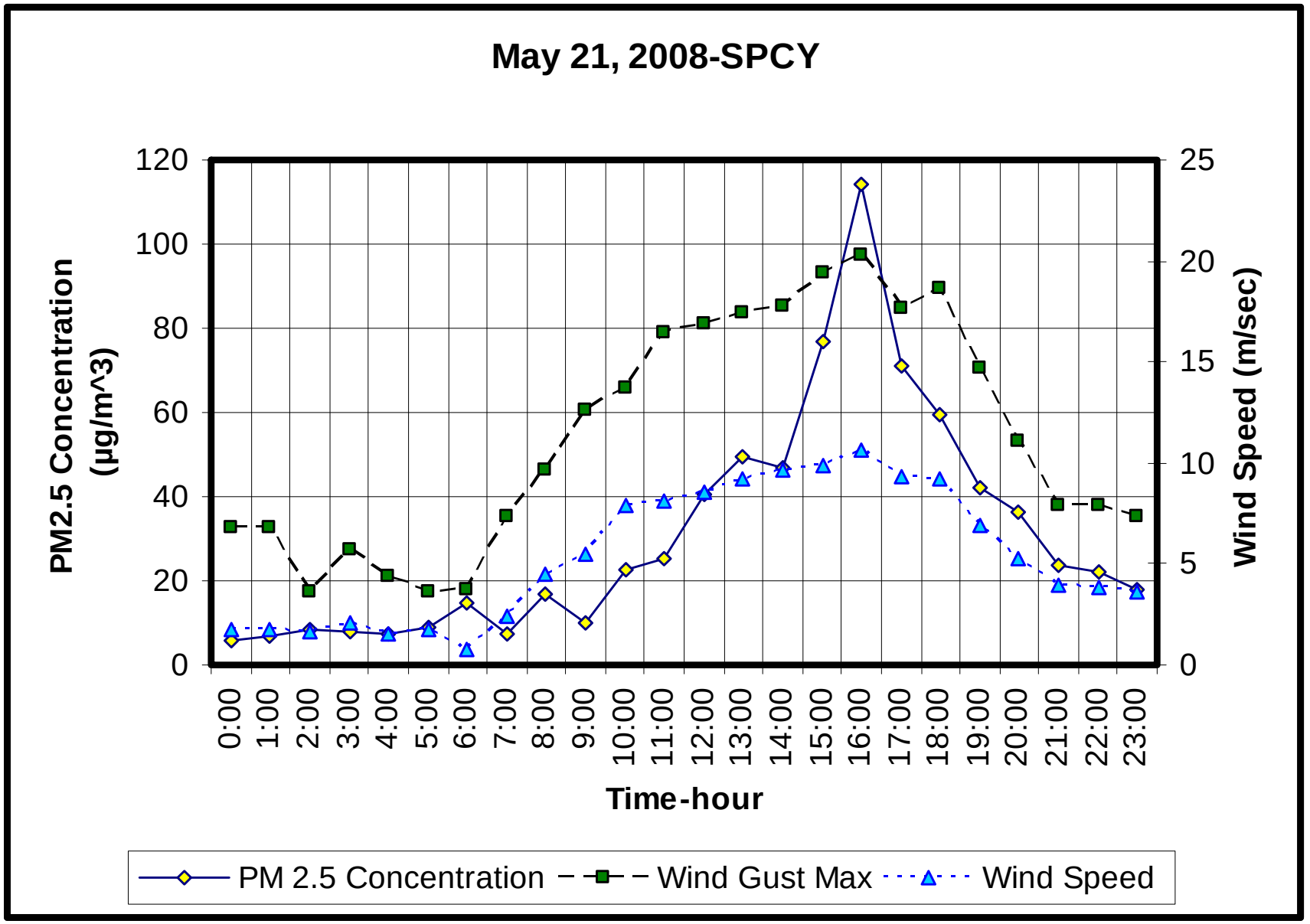

May 21, 2008-Chaparral
PM10 Concentration (µg/m^3)
Wind Speed (m/sec)
Time-hour
0
100
200
300
400
500
600
700
800
900
1000
0
5
10
15
20
25
30
0:00
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
PM10 Concentration
Wind Gust Max
Wind Speed


May 21, 2008-Holman
PM10 Concentration (µg/m^3)
Wind Speed (m/sec)
1600
1400
1200
1000
800
600
400
200
0
25
20
15
10
5
0
0:00
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
Time-hour
PM10 Concentration
Wind Gust Max
Wind Speed


May 21, 2008-Desert View
PM10 Concentration (µg/m^3)
Wind Speed (m/sec)
Time-hour
0
200
400
600
800
1000
1200
0
5
10
15
20
25
0:00
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
PM10 Concentration
Wind Gust Max
Wind Speed


May 21, 2008-Deming
PM10 Concentration (µg/m^3)
Wind Speed (m/sec)
6000
5000
4000
3000
2000
1000
0
30
25
20
15
10
5
0
0:00
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
Time-hour
PM10 Concentration
Wind Gust Max
Wind Speed


May 21, 2008-Anthony
PM2.5 Concentration (µg/m^3)
Wind Speed (m/sec)
Time-hour
0
20
40
60
80
100
120
0
2
4
6
8
10
12
14
16
18
0:00
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
PM2.5 Concentration
Wind Gust Max
Wind Speed


May 21, 2008-SPCY
PM2.5 Concentration (µg/m^3)
Wind Speed (m/sec)
120
100
80
60
40
20
0
25
20
15
10
5
0
0:00
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
Time-hour
PM 2.5 Concentration
Wind Gust Max
Wind Speed

Documentation of Natural Events: Particulate Matter Exceedances Caused by High Winds in Luna and Doña Ana Counties, New Mexico

Update for January 2008 – December 2008

Appendix 11A-11E

Supporting Data for Documentation of Exceedances

May 22, 2008: 6CM Anthony (AQS #35-013-0016) and 6ZK Chaparral (AQS #35-013-0020)

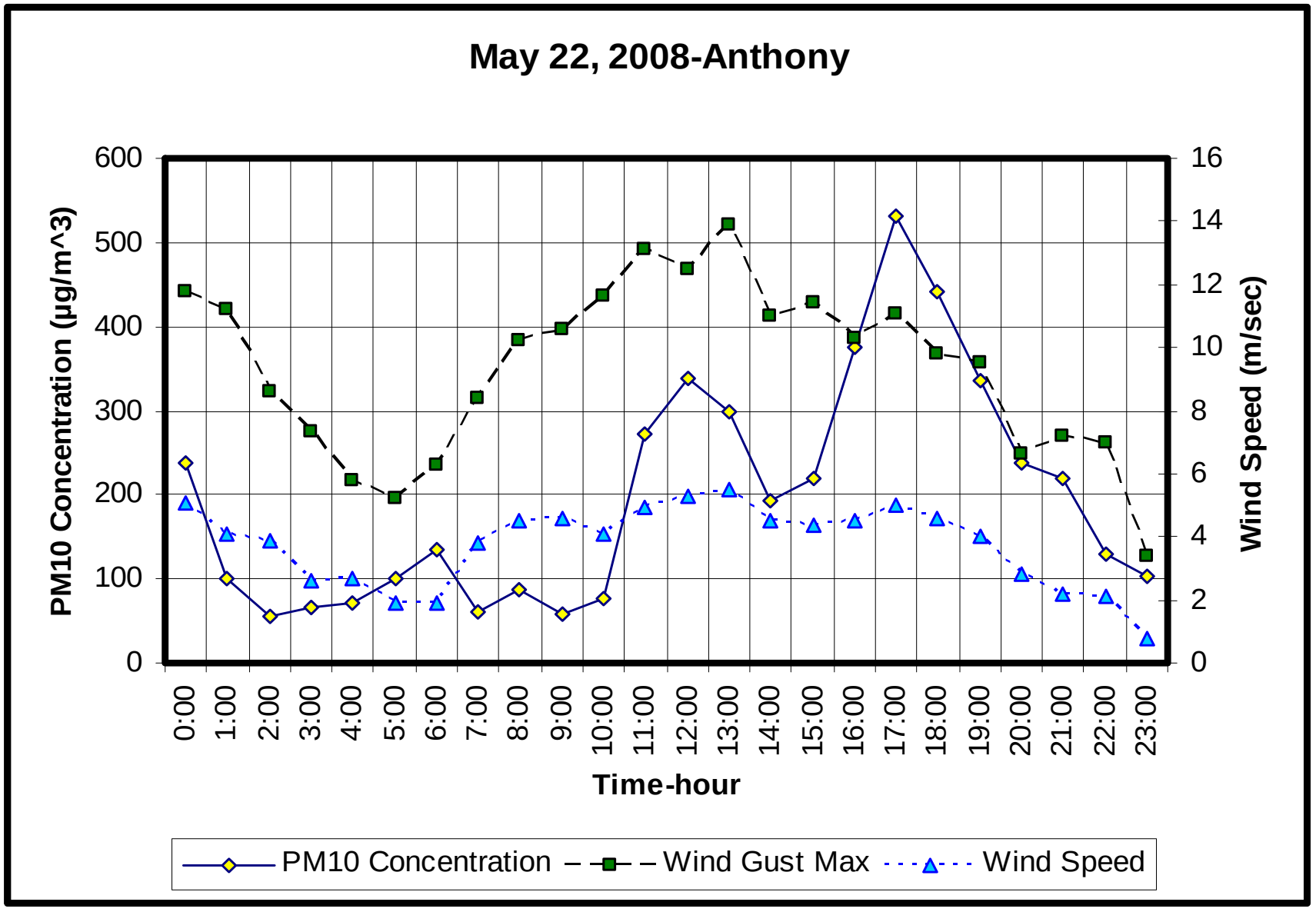
A) Plot of Hourly PM_{10} Concentration and Wind Speed at Anthony.

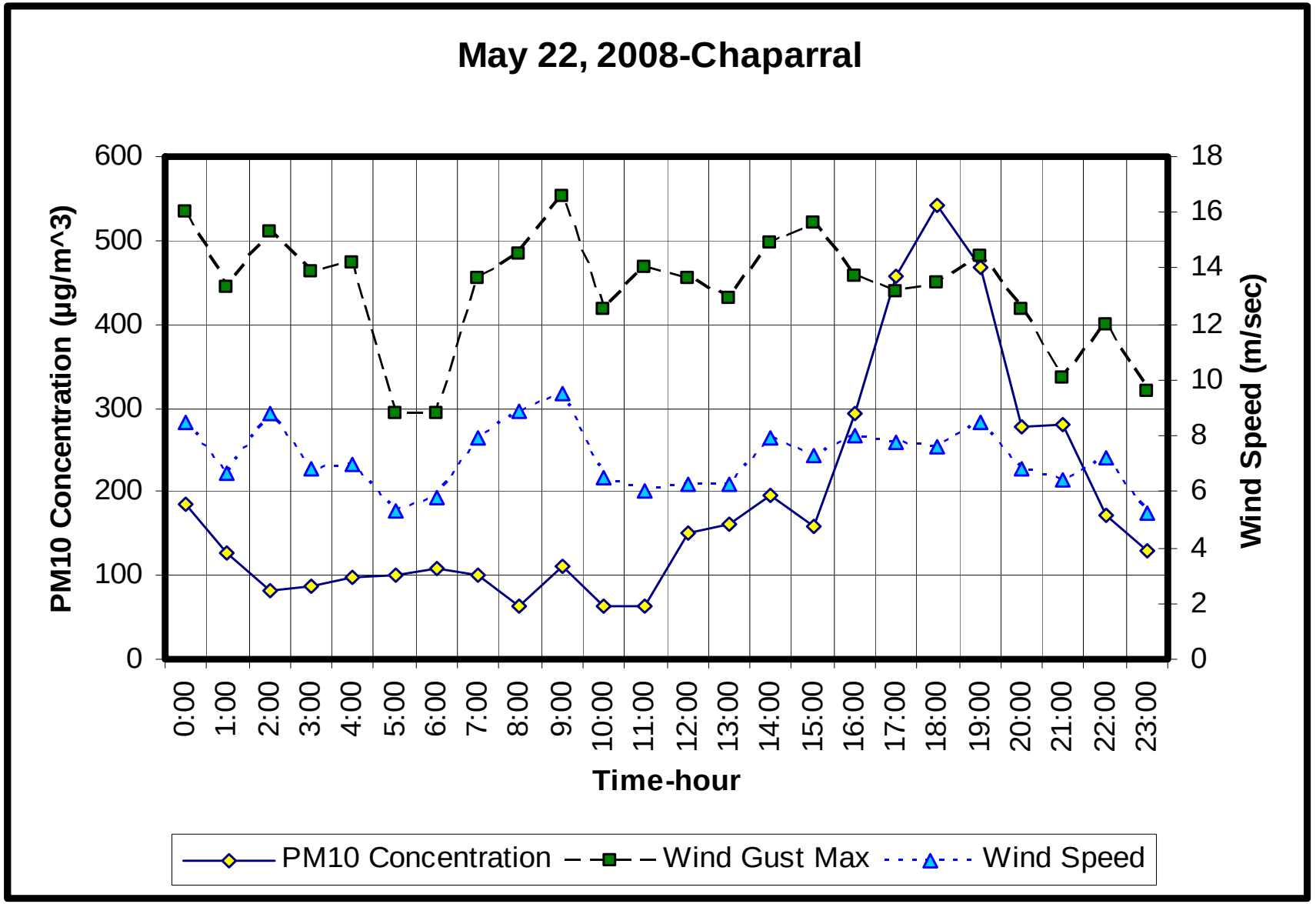
B) Plot of Hourly PM_{10} Concentration and Wind Speed at Chaparral.

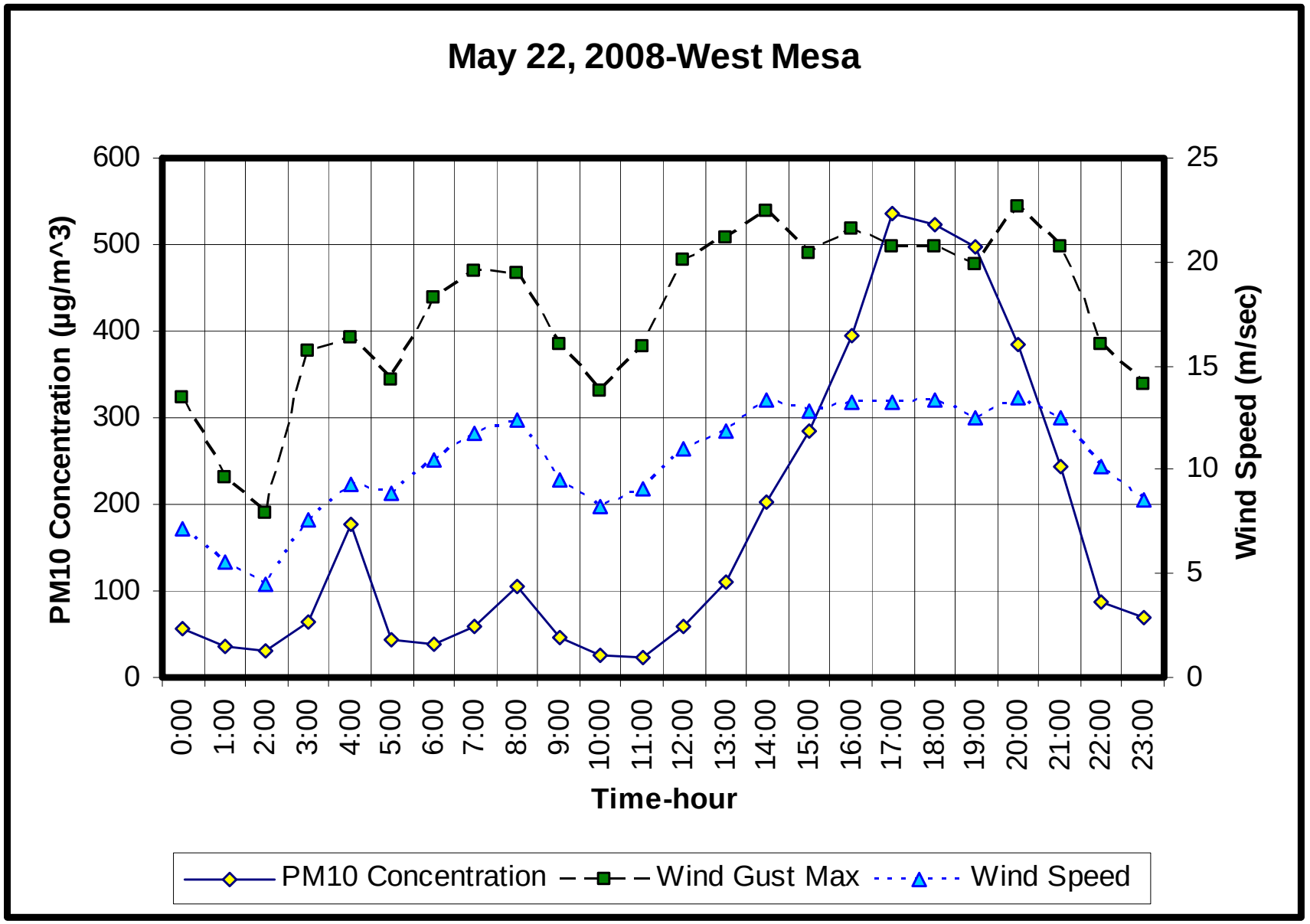
C) Plot of Hourly PM_{10} Concentration and Wind Speed at West Mesa.

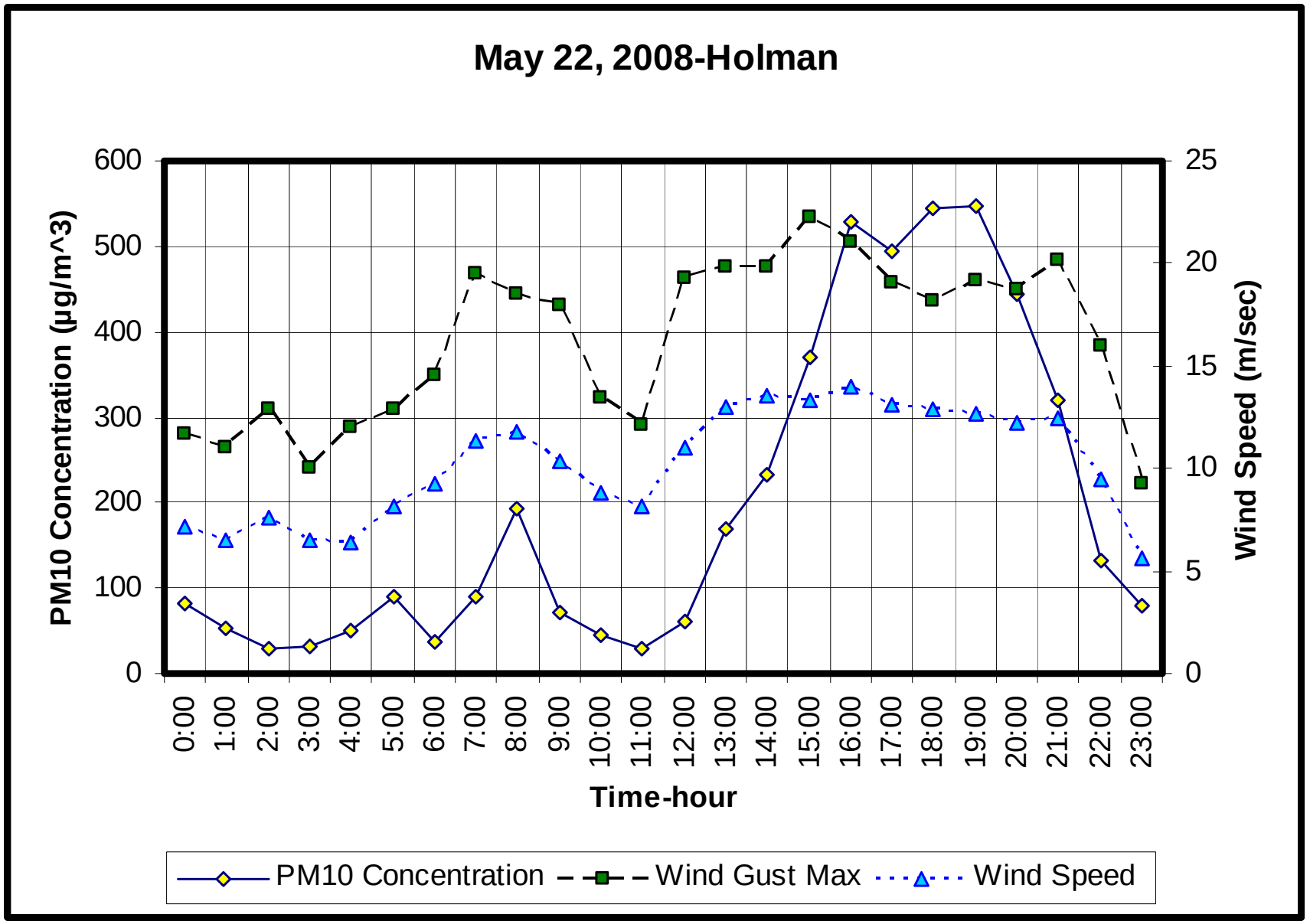
D) Plot of Hourly PM_{10} Concentration and Wind Speed at Holman.

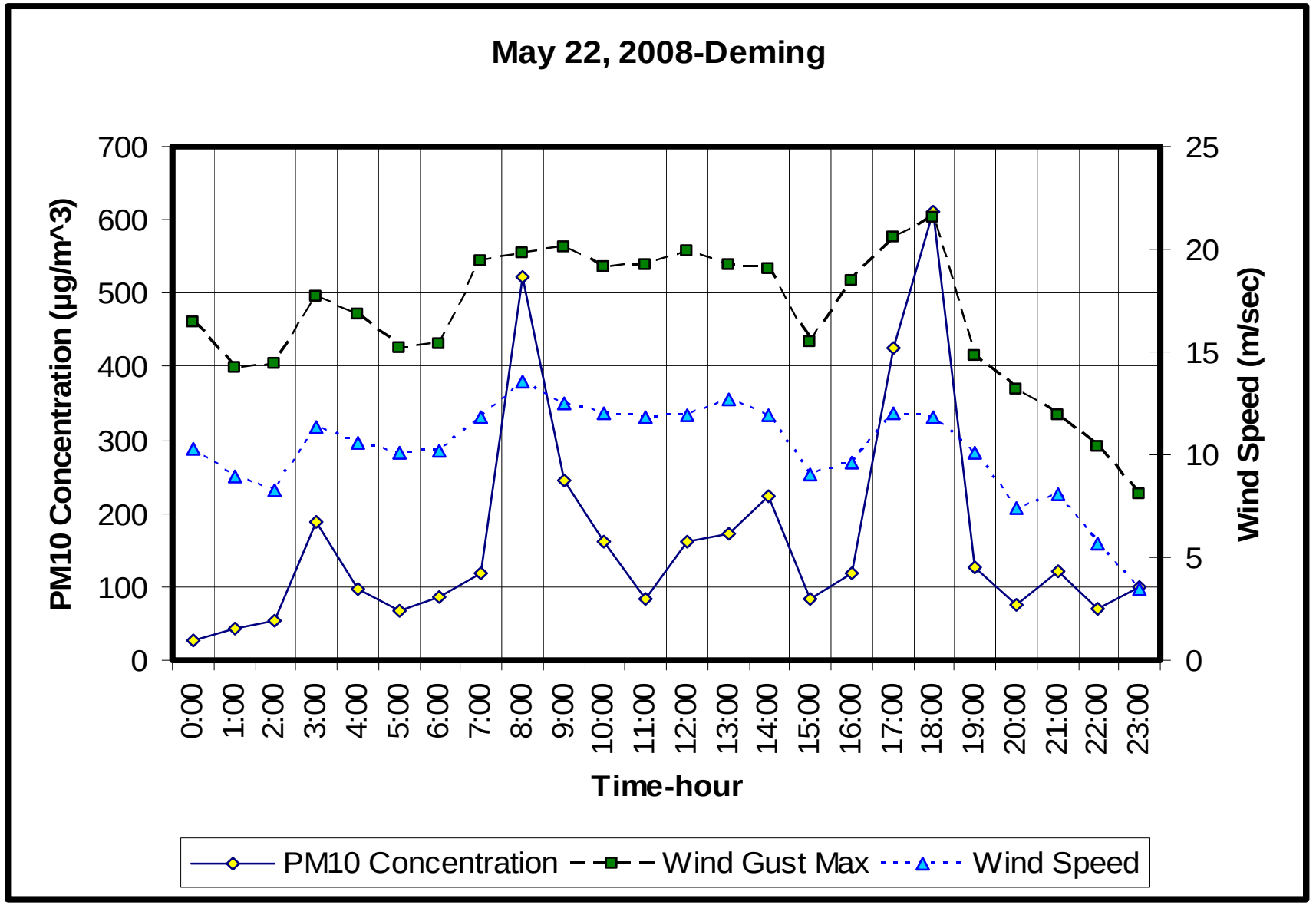
E) Plot of Hourly PM_{10} Concentration and Wind Speed at Deming.


May 22, 2008-Anthony
PM10 Concentration (µg/m^3)
Wind Speed (m/sec)
Time-hour
0
100
200
300
400
500
600
0
2
4
6
8
10
12
14
16
0:00
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
PM10 Concentration
Wind Gust Max
Wind Speed


May 22, 2008-Chaparral
PM10 Concentration (µg/m^3)
Wind Speed (m/sec)
Time-hour
0
100
200
300
400
500
600
0
2
4
6
8
10
12
14
16
18
0:00
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
PM10 Concentration
Wind Gust Max
Wind Speed


May 22, 2008-West Mesa
PM10 Concentration (µg/m^3)
Wind Speed (m/sec)
Time-hour
0
100
200
300
400
500
600
0
5
10
15
20
25
0:00
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
PM10 Concentration
Wind Gust Max
Wind Speed


May 22, 2008-Holman
PM10 Concentration (µg/m^3)
Wind Speed (m/sec)
600
500
400
300
200
100
0
25
20
15
10
5
0
0:00
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
Time-hour
PM10 Concentration
Wind Gust Max
Wind Speed


May 22, 2008-Deming
PM10 Concentration (µg/m^3)
Wind Speed (m/sec)
Time-hour
0
100
200
300
400
500
600
700
0
5
10
15
20
25
0:00
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
PM10 Concentration
Wind Gust Max
Wind Speed

Documentation of Natural Events: Particulate Matter Exceedances Caused by High Winds in Luna and Doña Ana Counties, New Mexico

Update for January 2008 – December 2008

Appendix 12A-12H

Supporting Data for Documentation of Exceedances

June 04, 2008: 6CM Anthony (AQS #35-013-0016)

A) Plot of Hourly PM_{10} Concentration and Wind Speed at Anthony.

B) Plot of Hourly PM_{10} Concentration and Wind Speed at Sunland Park City Yard.

C) Plot of Hourly PM_{10} Concentration and Wind Speed at Chaparral.

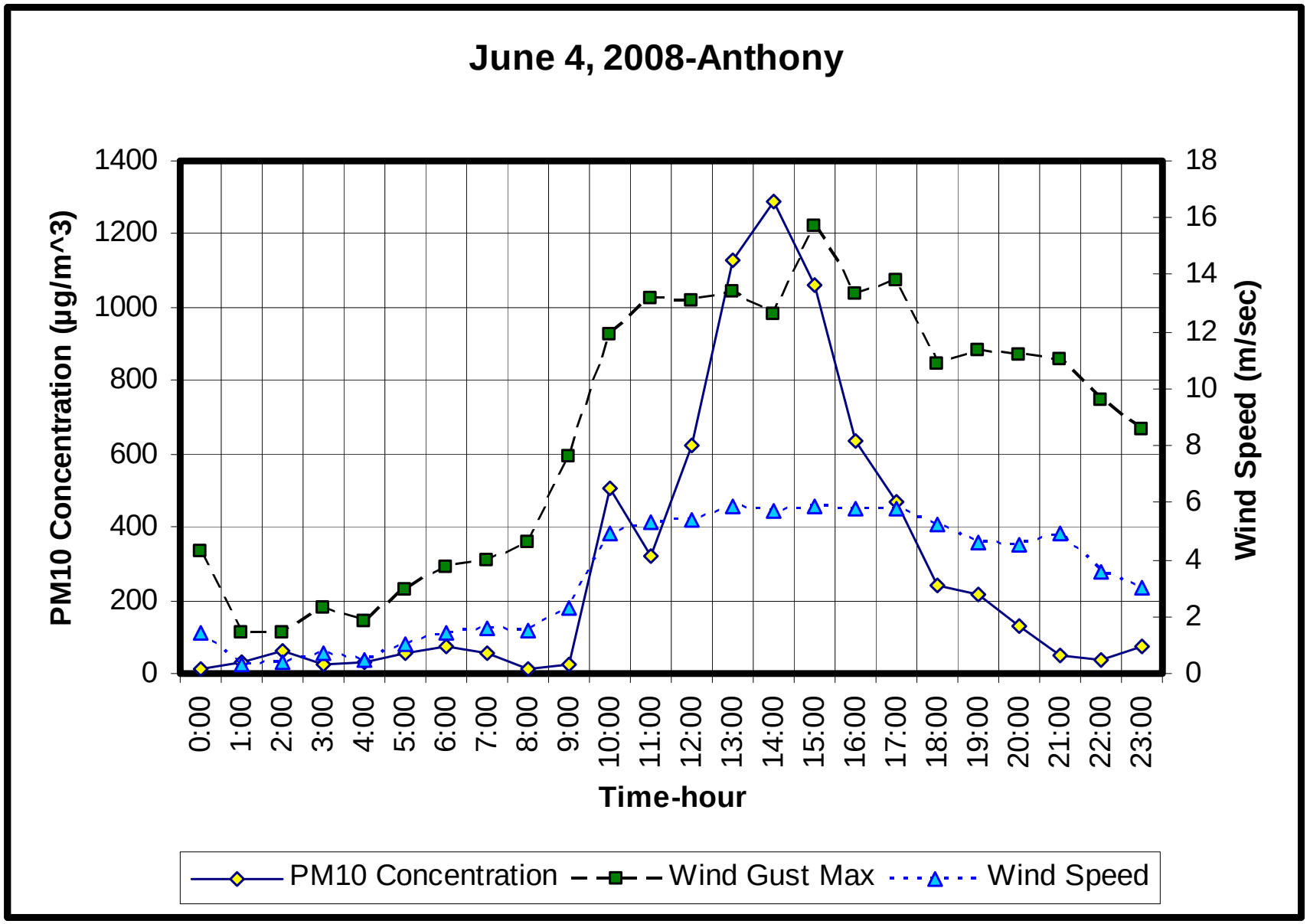
D) Plot of Hourly PM_{10} Concentration and Wind Speed at Holman.

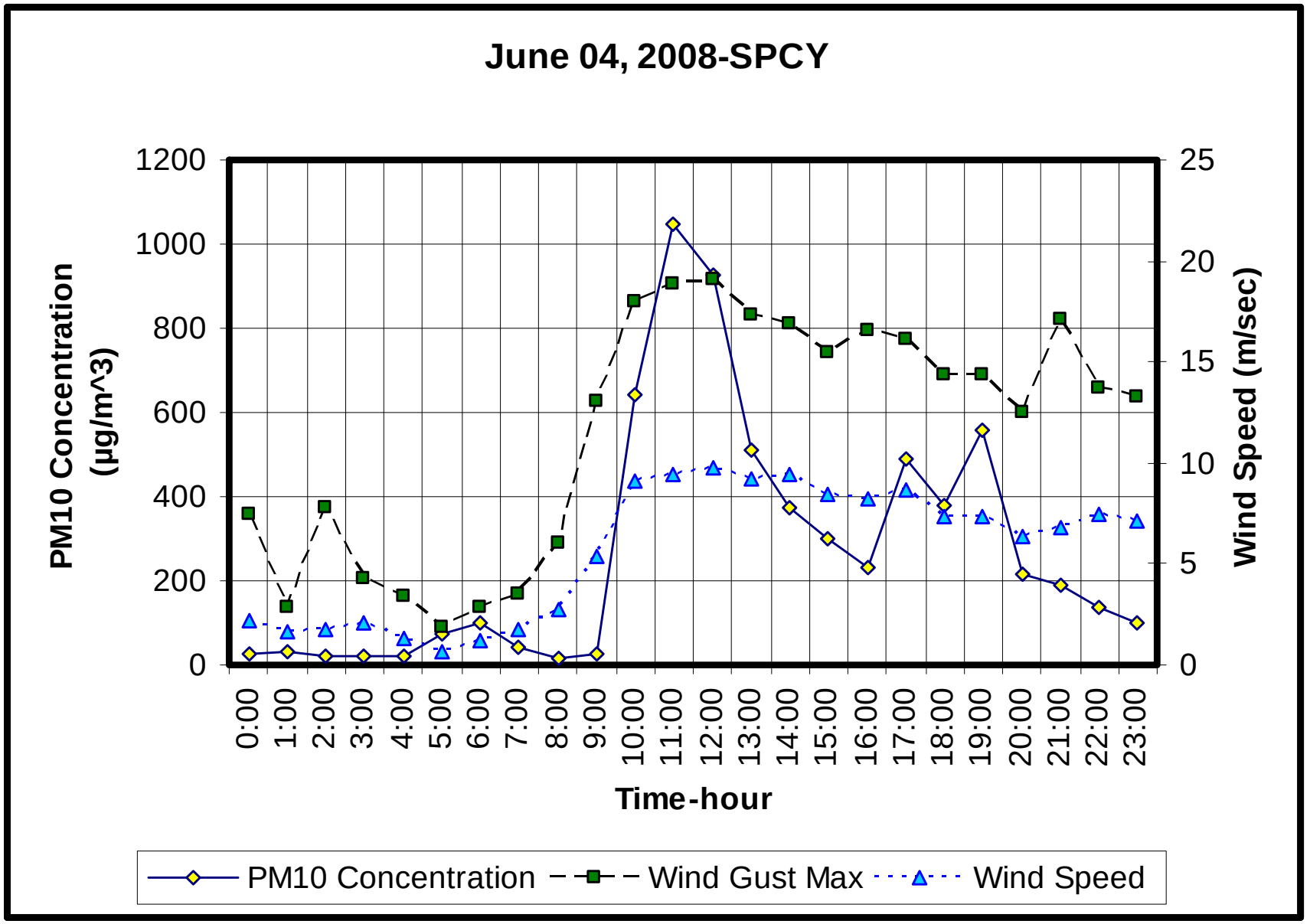
E) Plot of Hourly PM_{10} Concentration and Wind Speed at Desert View.

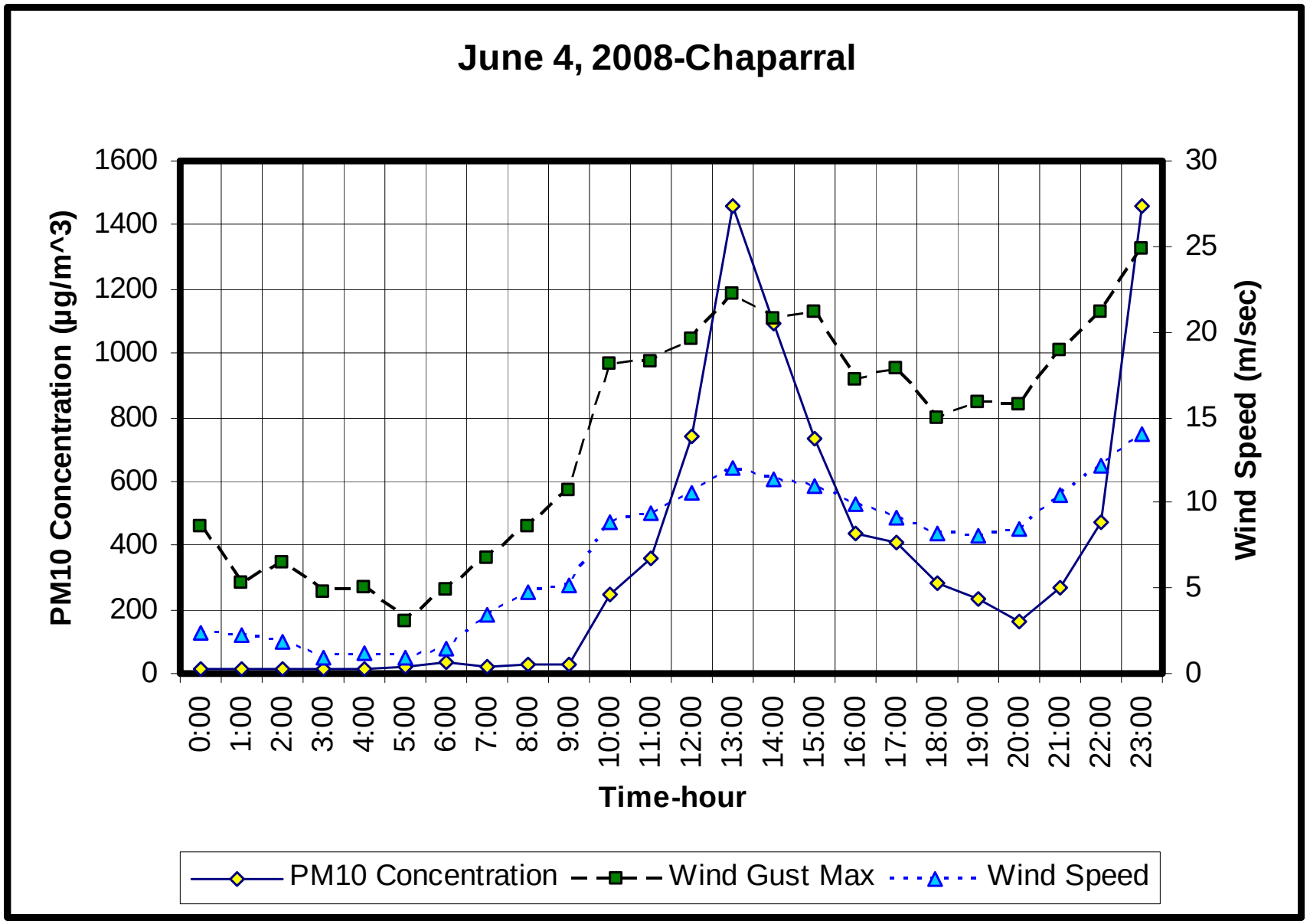
F) Plot of Hourly PM_{10} Concentration and Wind Speed at Deming.

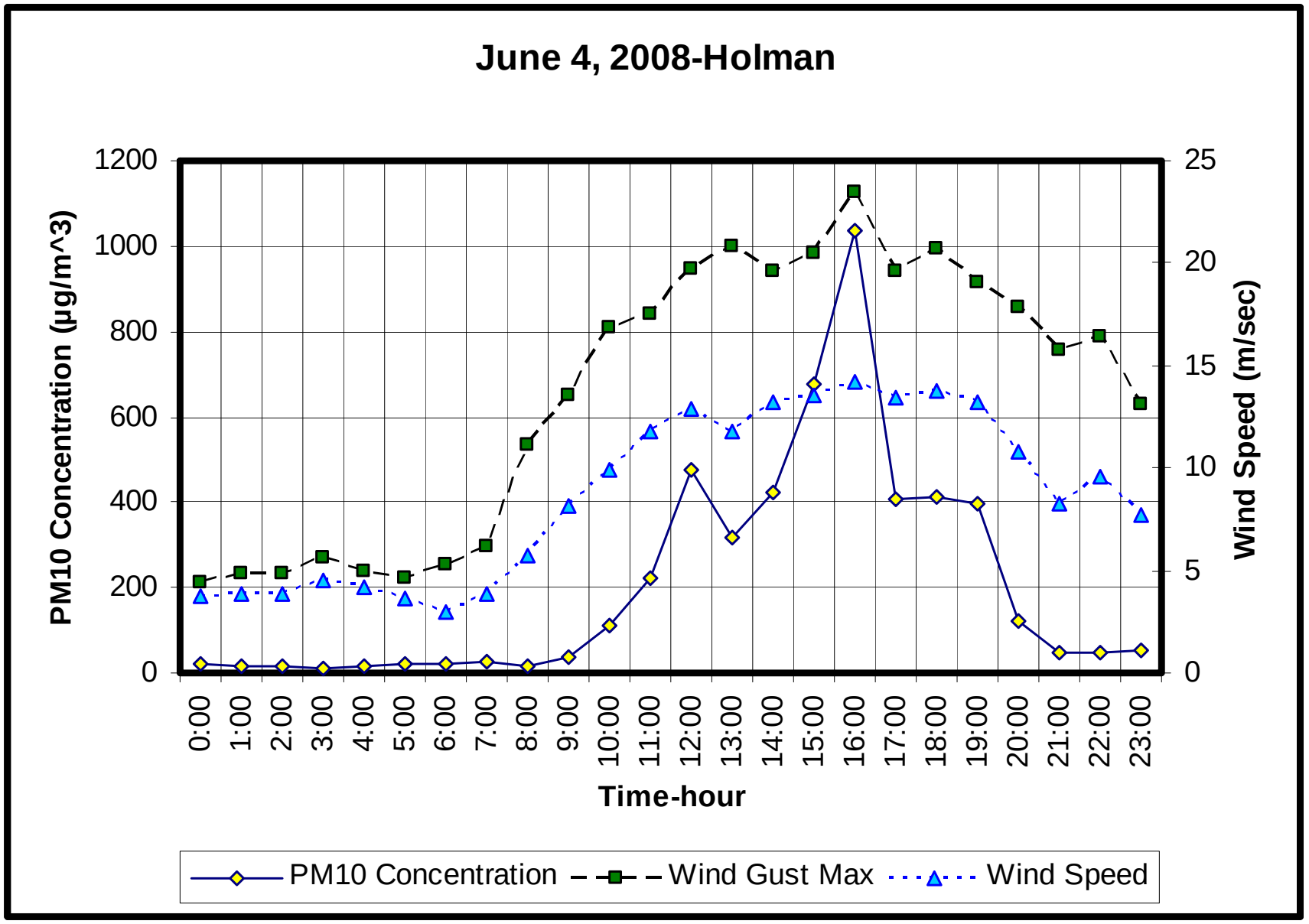
G) Plot of Hourly $PM_{2.5}$ Concentration and Wind Speed at Anthony.

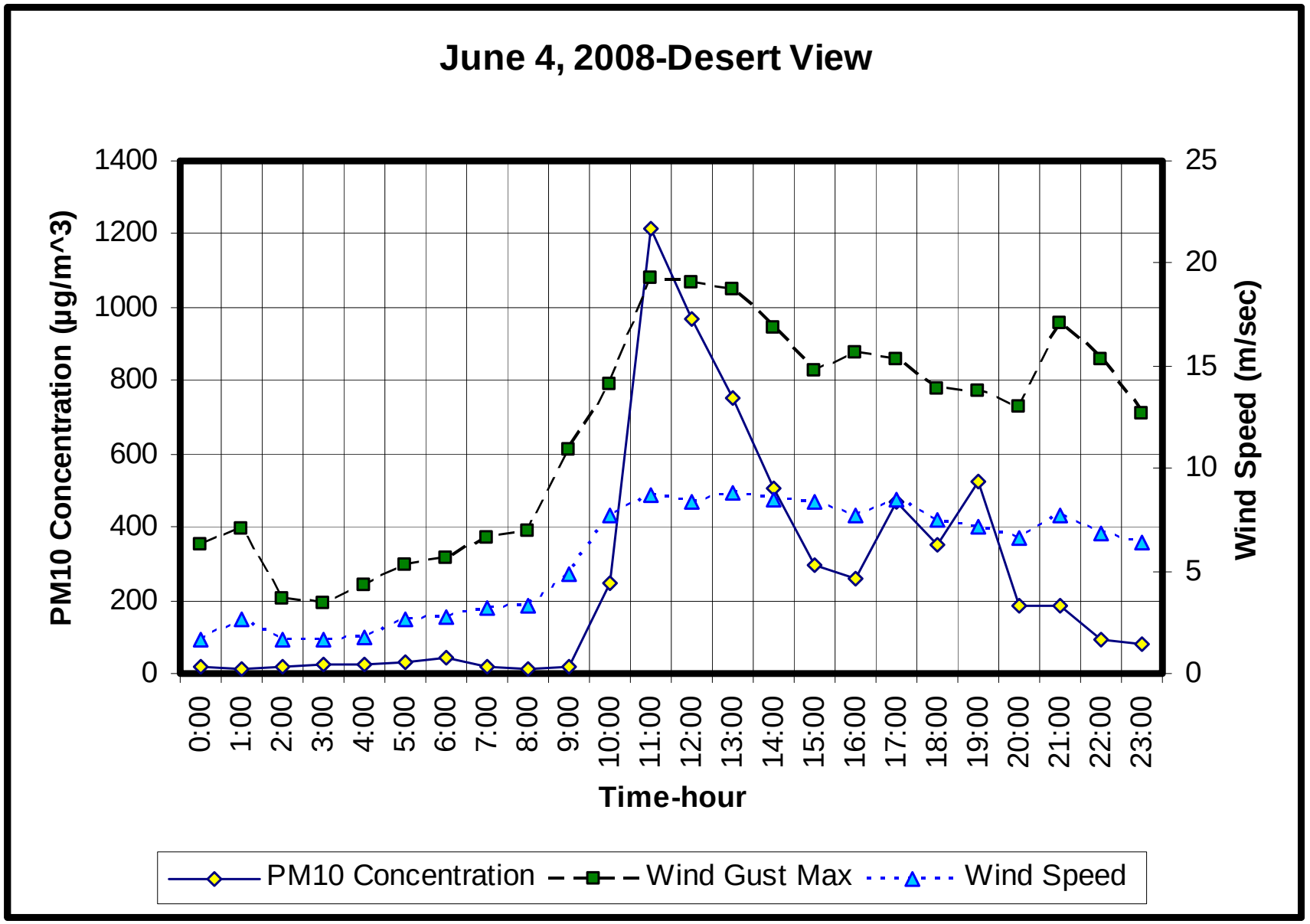
H) MODIS Aqua Satellite Image for June 4, 2008. Downloaded from http://rapidfire.sci.gsfc.nasa.gov/subsets/?subset=NewMexico

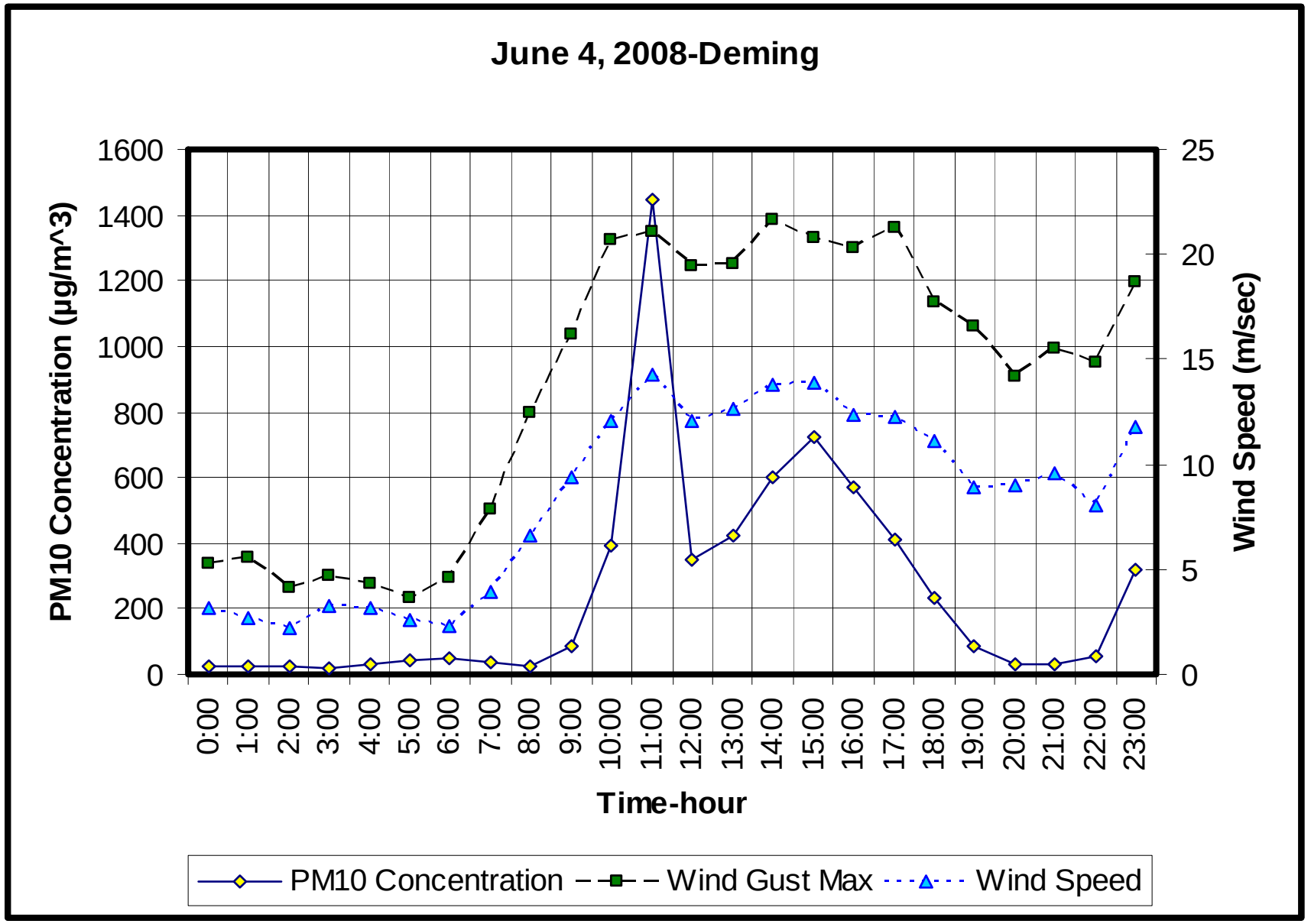

June 4, 2008-Anthony
PM10 Concentration (µg/m^3)
Wind Speed (m/sec)
Time-hour
0
200
400
600
800
1000
1200
1400
0
2
4
6
8
10
12
14
16
18
0:00
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
PM10 Concentration
Wind Gust Max
Wind Speed

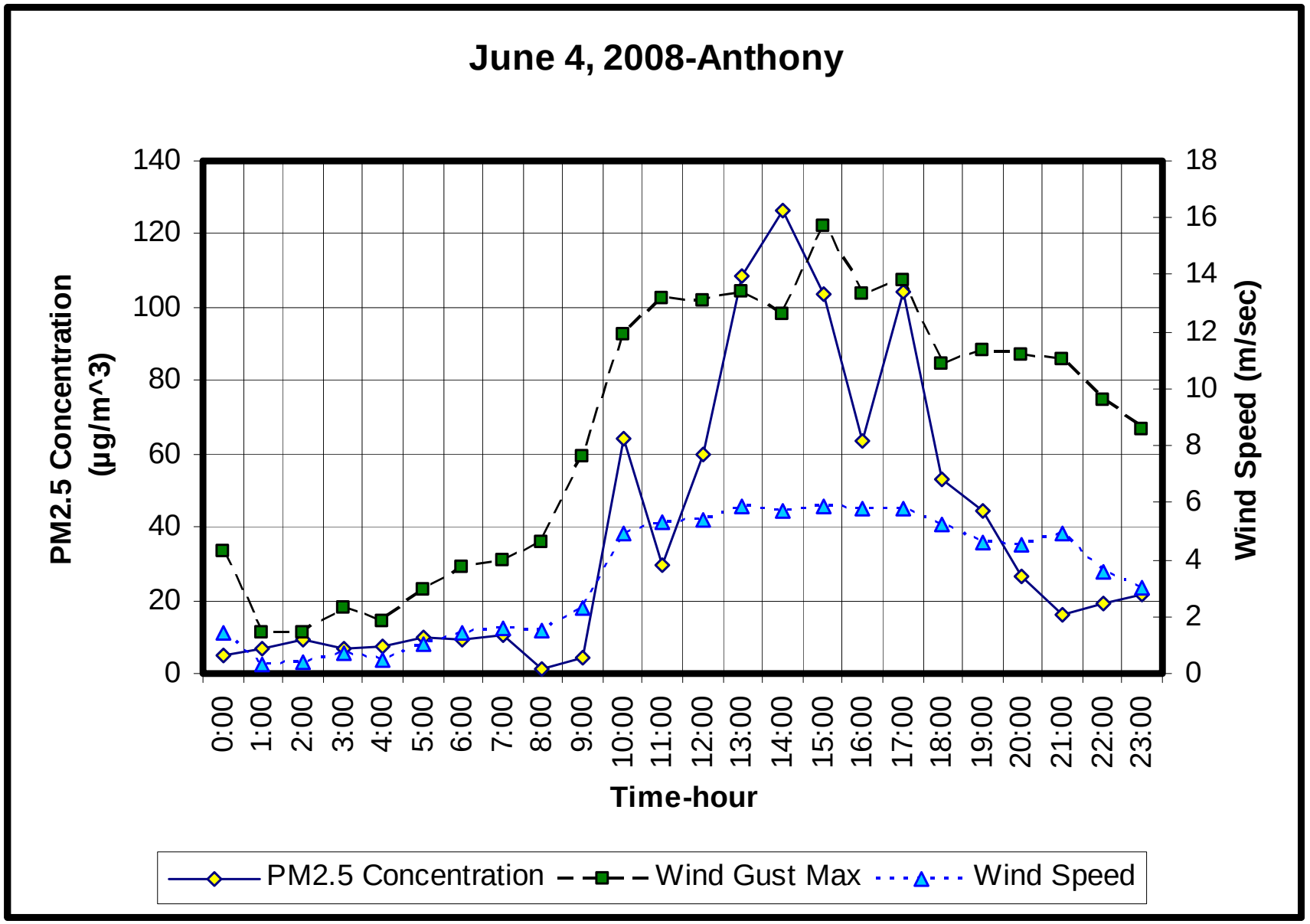

June 04, 2008-SPCY
PM10 Concentration (µg/m^3)
Wind Speed (m/sec)
Time-hour
0
200
400
600
800
1000
1200
0
5
10
15
20
25
0:00
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
PM10 Concentration
Wind Gust Max
Wind Speed

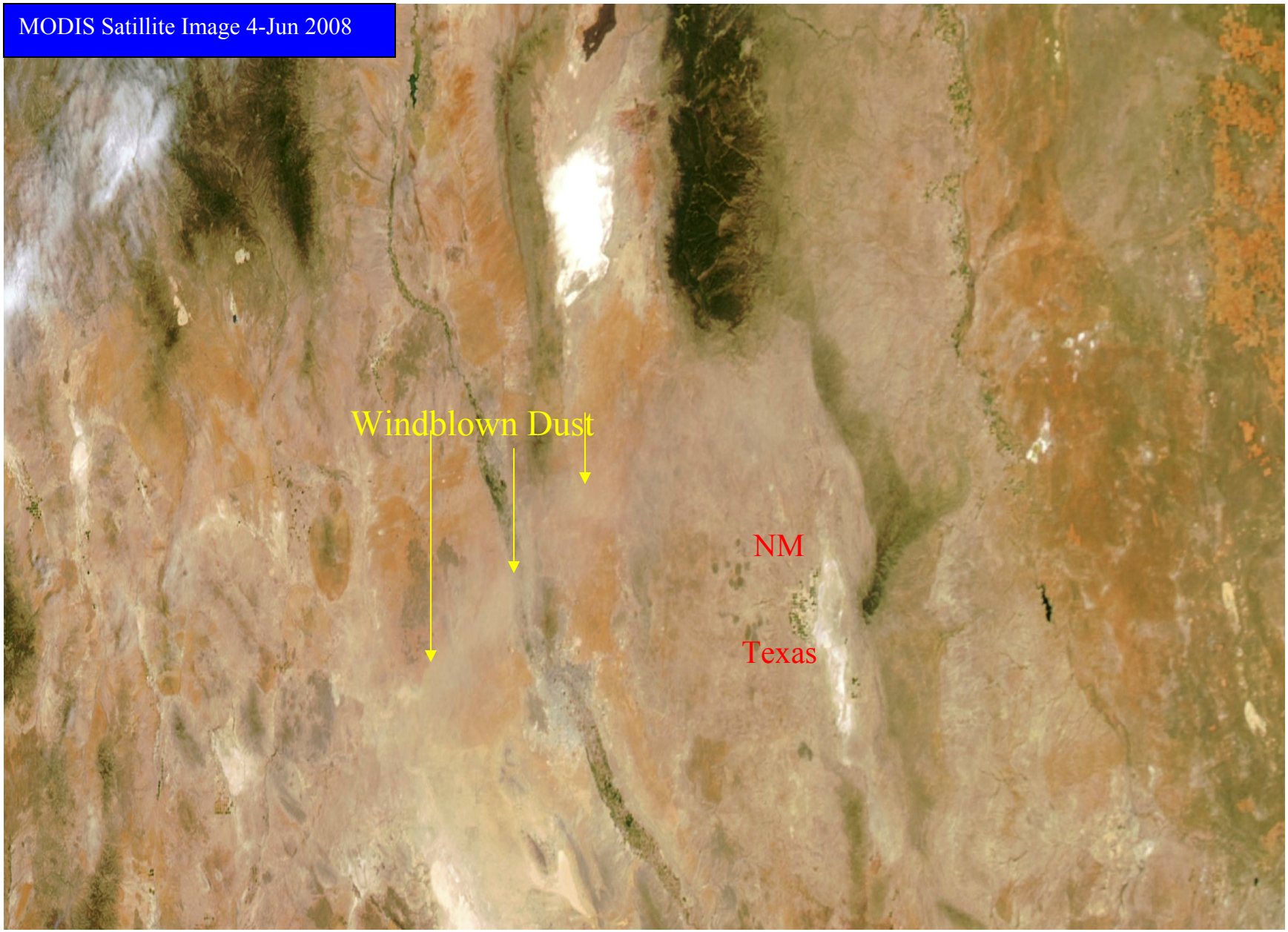

June 4, 2008-Chaparral
PM10 Concentration (µg/m^3)
Wind Speed (m/sec)
Time-hour
0
200
400
600
800
1000
1200
1400
1600
0
5
10
15
20
25
30
0:00
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
PM10 Concentration
Wind Gust Max
Wind Speed


June 4, 2008-Holman
PM10 Concentration (µg/m^3)
Wind Speed (m/sec)
Time-hour
0
200
400
600
800
1000
1200
0
5
10
15
20
25
0:00
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
PM10 Concentration
Wind Gust Max
Wind Speed


June 4, 2008-Desert View
PM10 Concentration (µg/m^3)
Wind Speed (m/sec)
Time-hour
0
200
400
600
800
1000
1200
1400
0
5
10
15
20
25
0:00
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
PM10 Concentration
Wind Gust Max
Wind Speed


June 4, 2008-Deming
PM10 Concentration (µg/m^3)
Wind Speed (m/sec)
1600
1400
1200
1000
800
600
400
200
0
25
20
15
10
5
0
0:00
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
Time-hour
PM10 Concentration
Wind Gust Max
Wind Speed


June 4, 2008-Anthony
PM2.5 Concentration (µg/m^3)
Wind Speed (m/sec)
Time-hour
0
20
40
60
80
100
120
140
0
2
4
6
8
10
12
14
16
18
0:00
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
PM2.5 Concentration
Wind Gust Max
Wind Speed


MODIS Satillite Image 4-Jun 2008
Windblown Dust
NM
Texas

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

Update for January 2008 – December 2008

Appendix 13A-13E

Supporting Data for Documentation of Exceedances

June 20, 2008: 6CM Anthony (AQS #35-013-0016), 6ZG Sunland Park (AQS #35-013-0017), 6ZK Chaparral (AQS #35-013-0020), 6ZL Holman (AQS #35-013-0019), and 6ZM Desert View (AQS #35-013-0021)

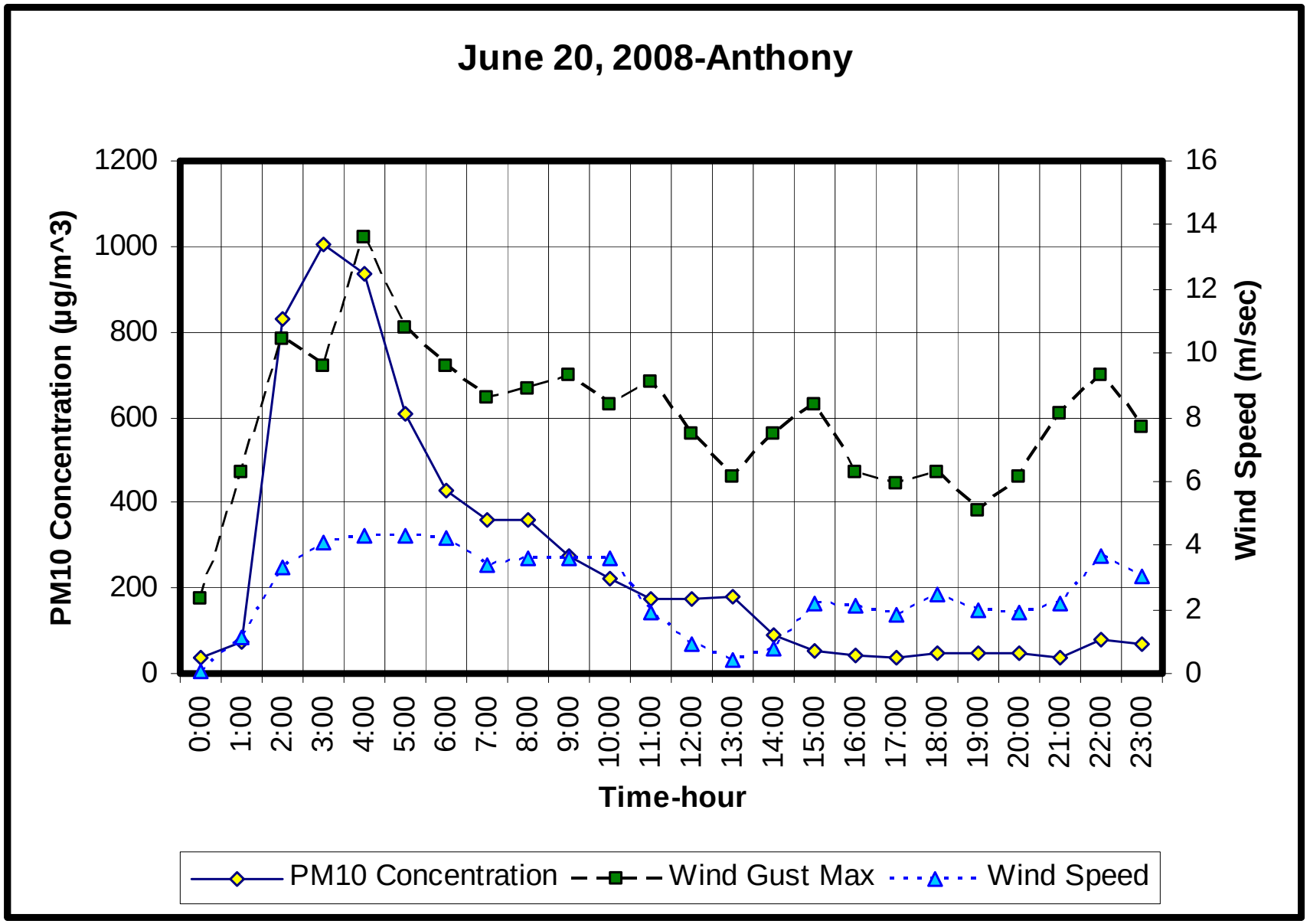
A) Plot of Hourly PM_{10} Concentration and Wind Speed at Anthony.

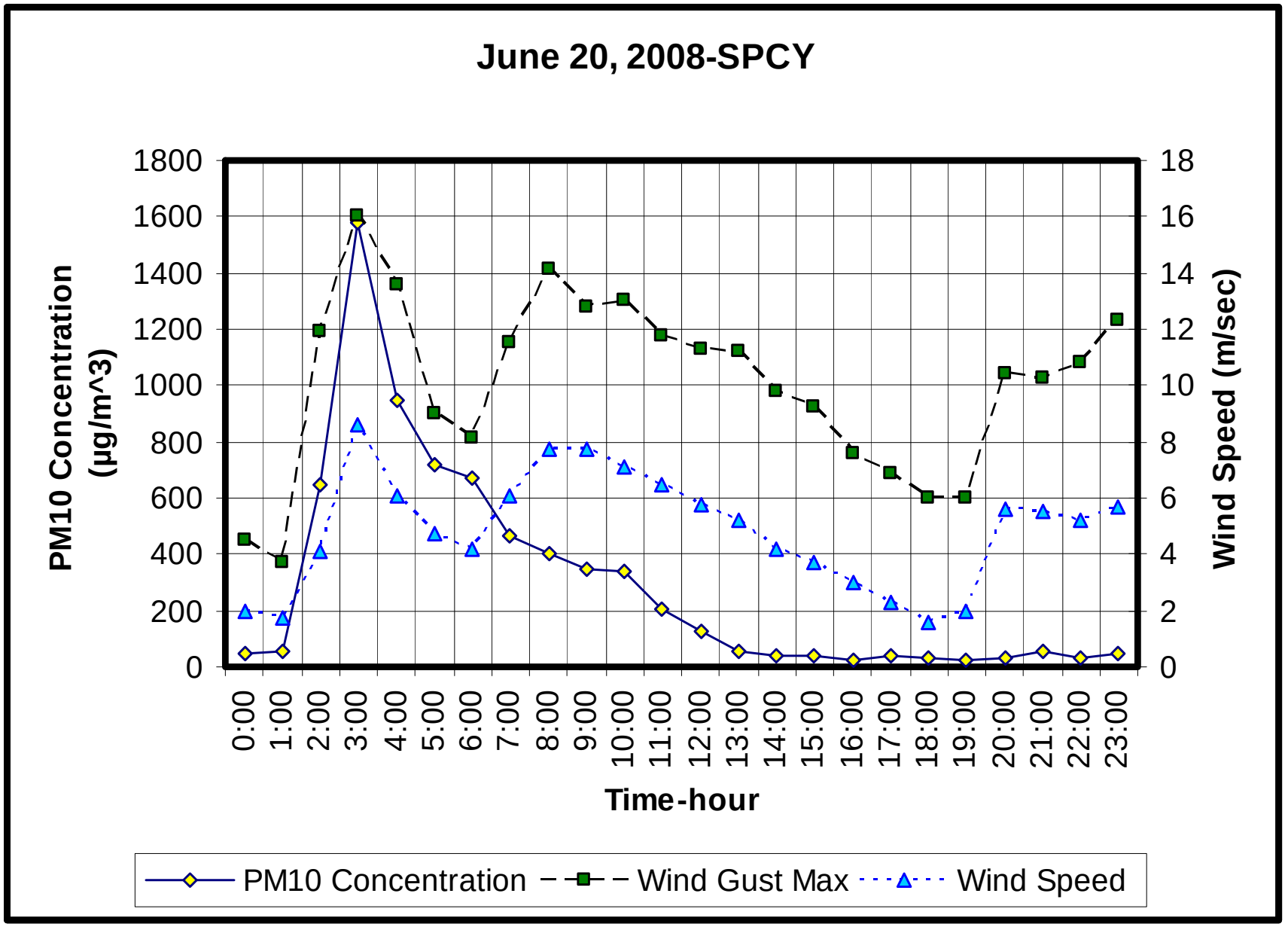
B) Plot of Hourly PM_{10} Concentration and Wind Speed at Sunland Park City Yard.

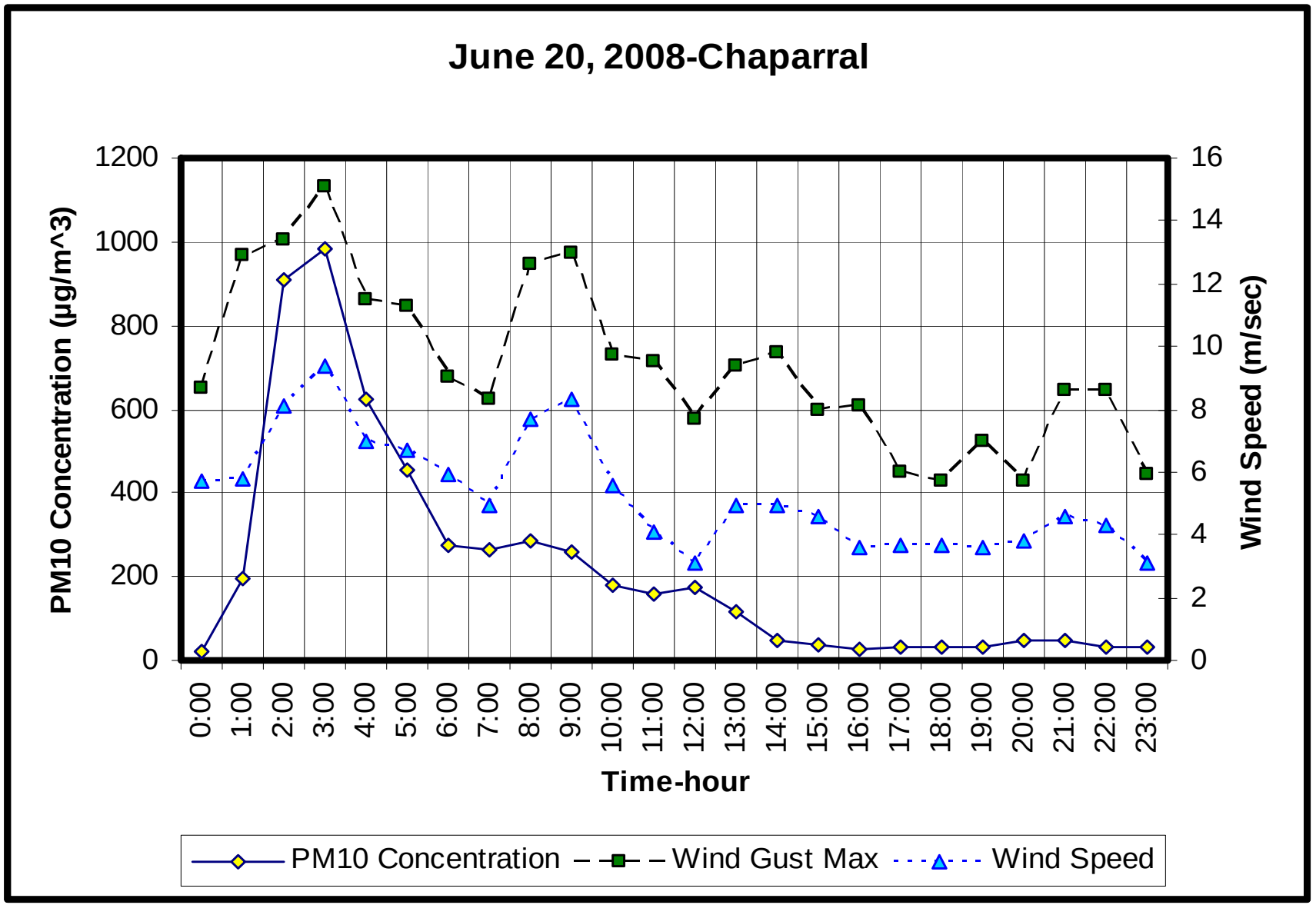
C) Plot of Hourly PM_{10} Concentration and Wind Speed at Chaparral.

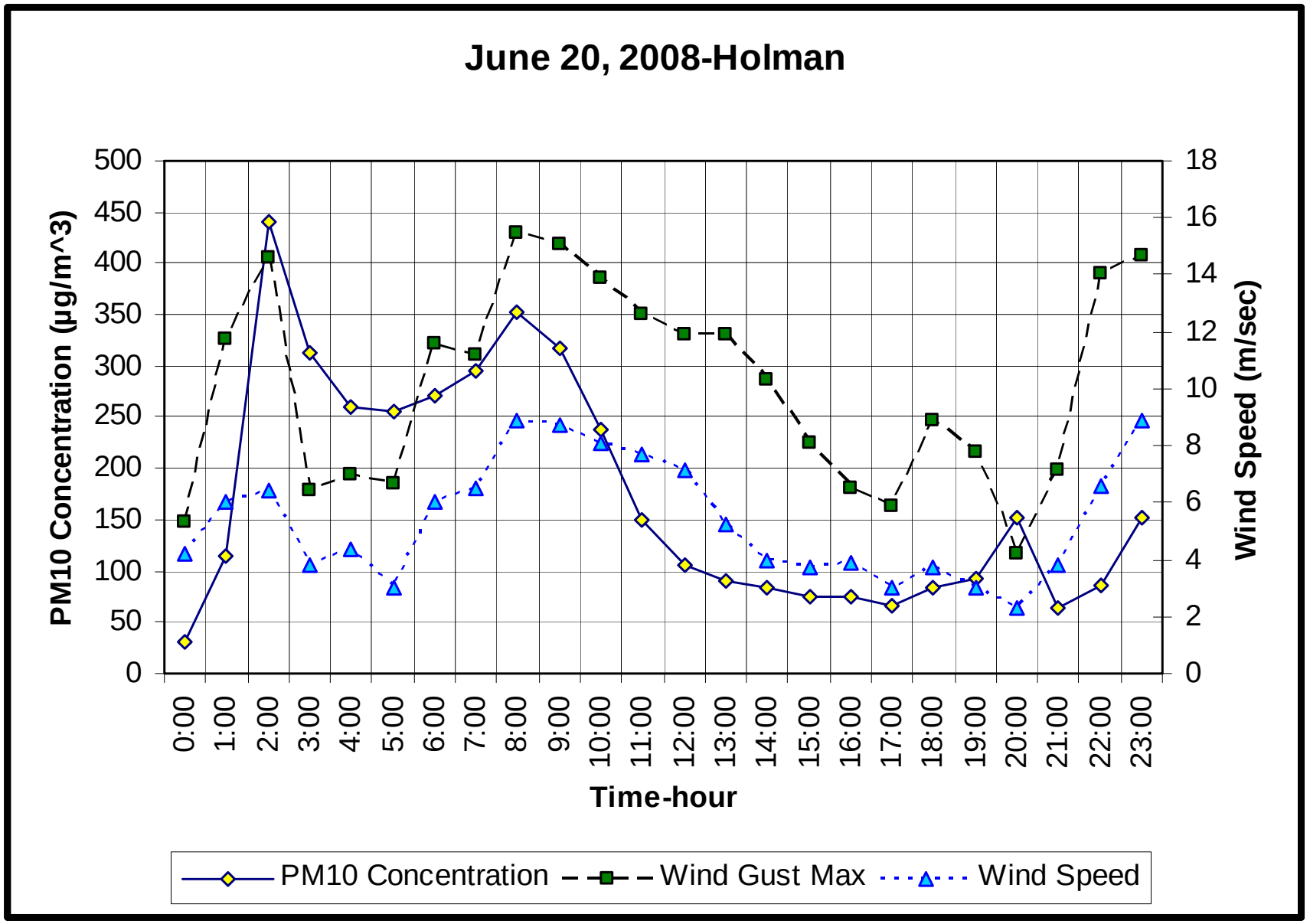
D) Plot of Hourly PM_{10} Concentration and Wind Speed at Holman.

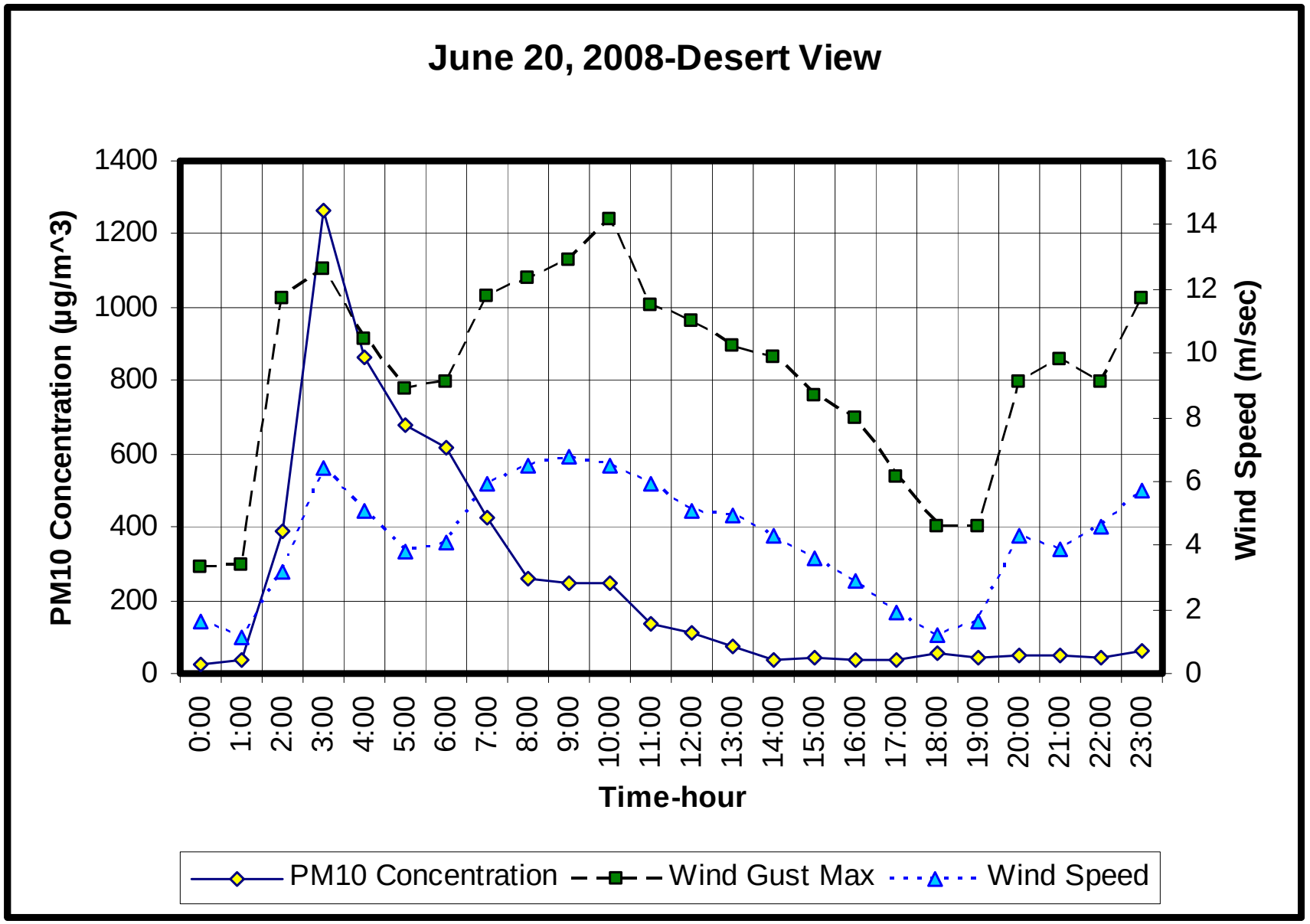
E) Plot of Hourly PM_{10} Concentration and Wind Speed at Desert View.


June 20, 2008-Anthony
PM10 Concentration (µg/m^3)
Wind Speed (m/sec)
Time-hour
0
200
400
600
800
1000
1200
0
2
4
6
8
10
12
14
16
0:00
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
PM10 Concentration
Wind Gust Max
Wind Speed


June 20, 2008-SPCY
PM10 Concentration (µg/m^3)
Wind Speed (m/sec)
Time-hour
0
200
400
600
800
1000
1200
1400
1600
1800
0
2
4
6
8
10
12
14
16
18
0:00
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
PM10 Concentration
Wind Gust Max
Wind Speed


June 20, 2008-Chaparral
PM10 Concentration (µg/m^3)
Wind Speed (m/sec)
Time-hour
0
200
400
600
800
1000
1200
0
2
4
6
8
10
12
14
16
0:00
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
PM10 Concentration
Wind Gust Max
Wind Speed


June 20, 2008-Holman
PM10 Concentration (µg/m^3)
Wind Speed (m/sec)
Time-hour
0
50
100
150
200
250
300
350
400
450
500
0
2
4
6
8
10
12
14
16
18
0:00
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
PM10 Concentration
Wind Gust Max
Wind Speed


June 20, 2008-Desert View
PM10 Concentration (µg/m^3)
Wind Speed (m/sec)
Time-hour
0
200
400
600
800
1000
1200
1400
0
2
4
6
8
10
12
14
16
0:00
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
PM10 Concentration
Wind Gust Max
Wind Speed

Documentation of Natural Events: Particulate Matter Exceedances Caused by High Winds in Luna and Doña Ana Counties, New Mexico

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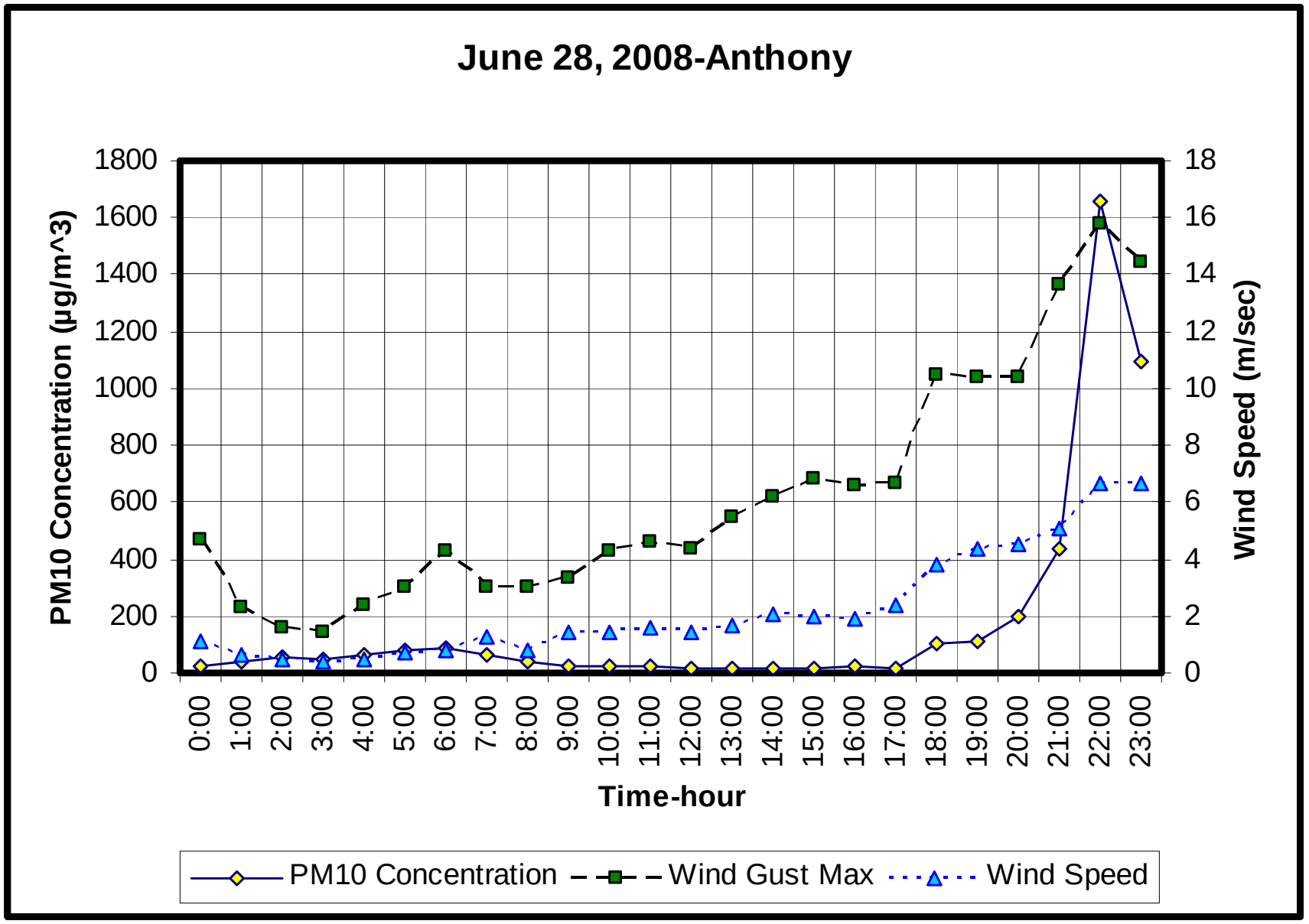
Appendix 14A-14B

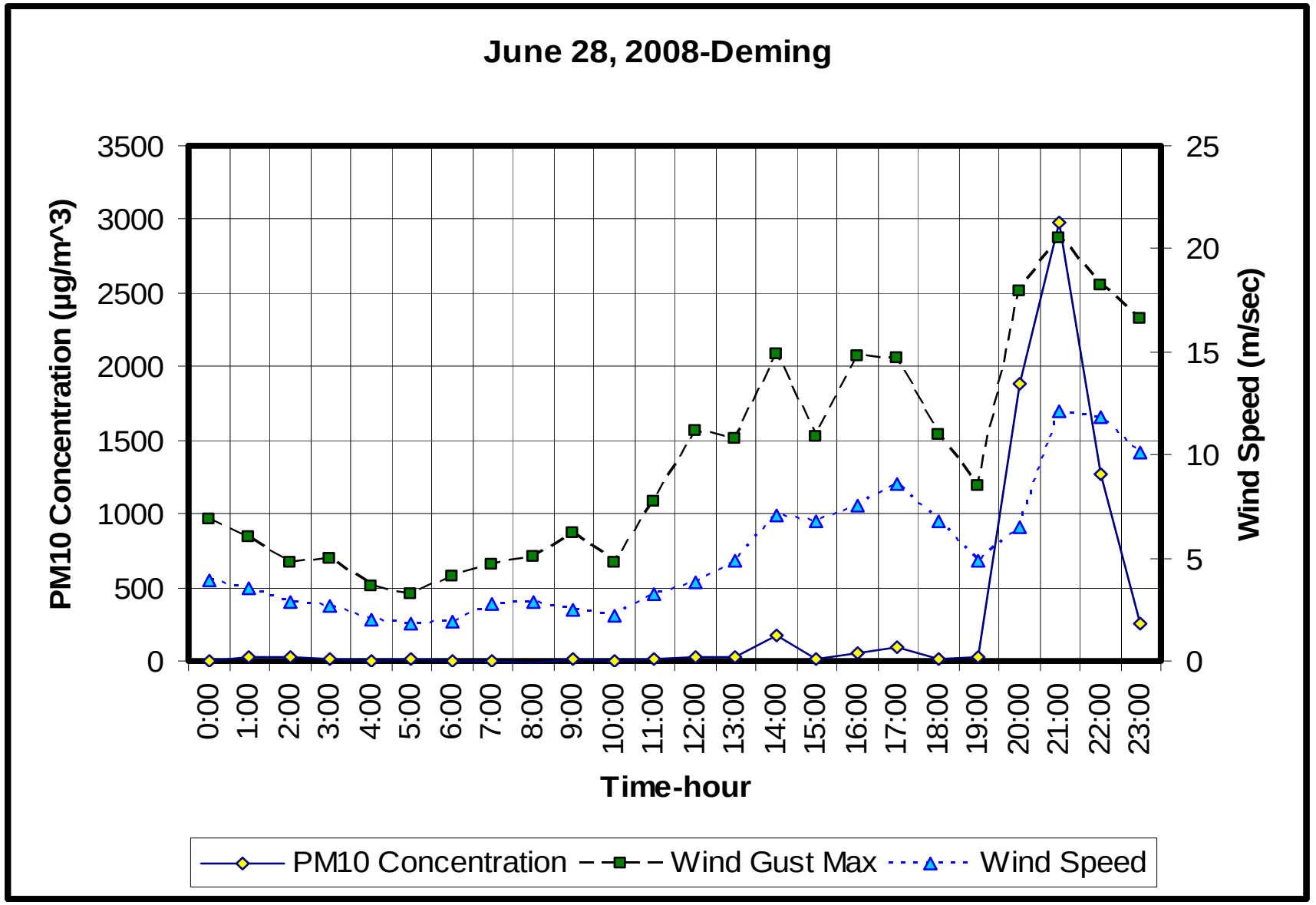
Supporting Data for Documentation of Exceedances

June 28, 2008: 6CM Anthony (AQS #35-013-0016)

A) Plot of Hourly PM_{10} Concentration and Wind Speed at Anthony.

B) Plot of Hourly PM_{10} Concentration and Wind Speed at Deming.


June 28, 2008-Anthony
PM10 Concentration (µg/m^3)
Wind Speed (m/sec)
Time-hour
0
200
400
600
800
1000
1200
1400
1600
1800
0
2
4
6
8
10
12
14
16
18
0:00
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
PM10 Concentration
Wind Gust Max
Wind Speed


June 28, 2008-Deming
PM10 Concentration (µg/m^3)
Wind Speed (m/sec)
Time-hour
3500
3000
2500
2000
1500
1000
500
0
25
20
15
10
5
0
0:00
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
PM10 Concentration
Wind Gust Max
Wind Speed

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Update for January 2008 – December 2008

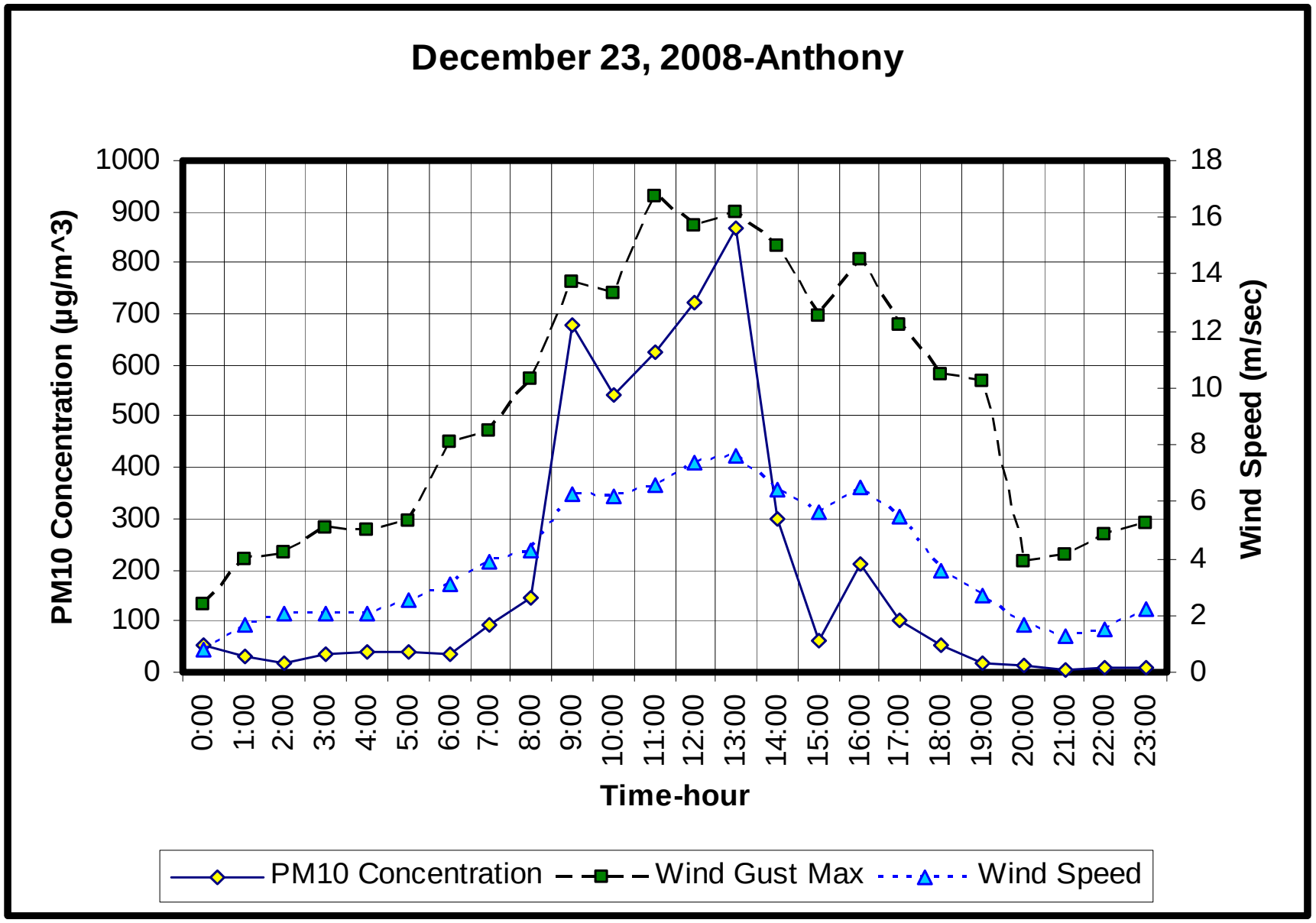
Appendix 15A-15B

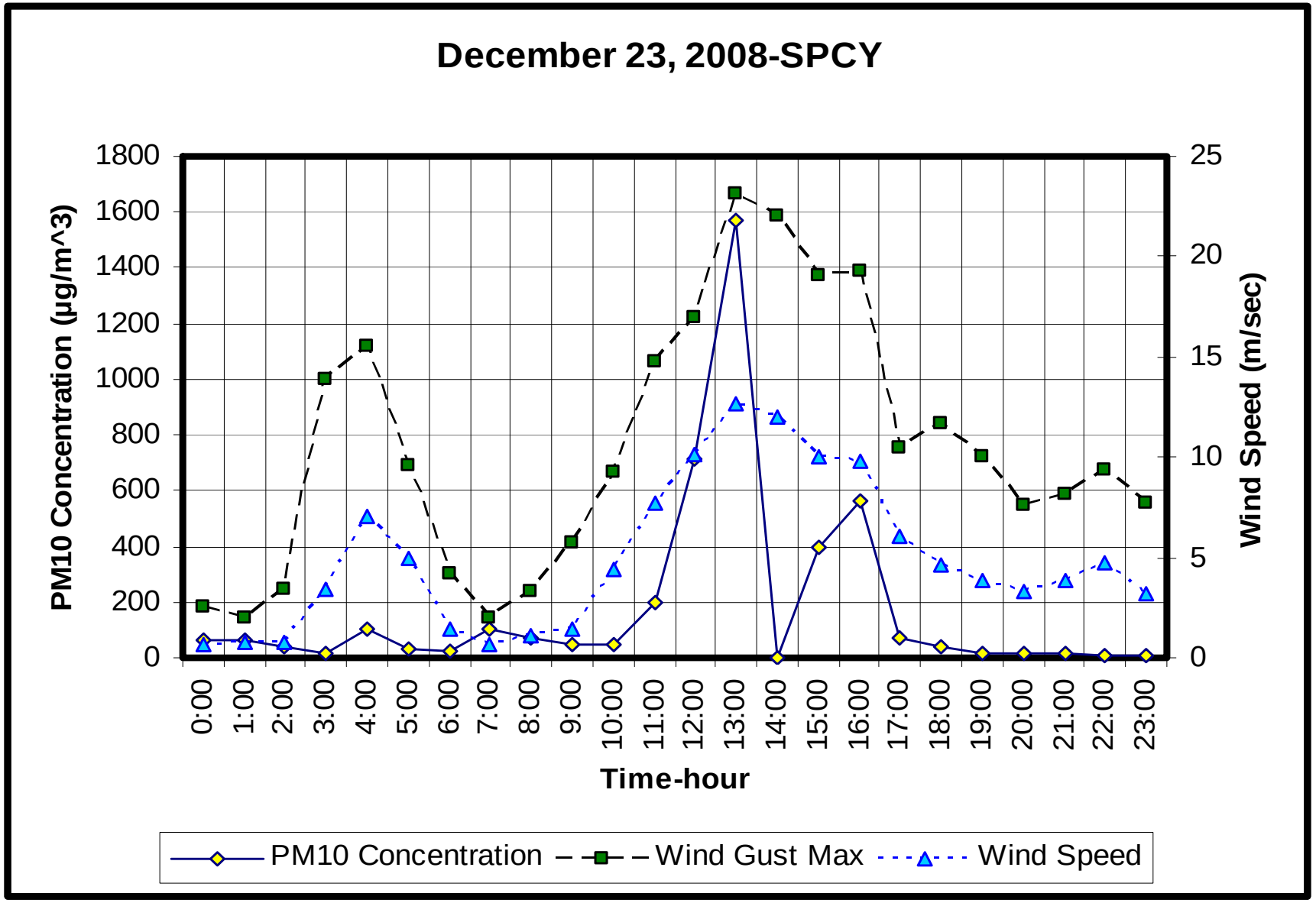
Supporting Data for Documentation of Exceedances

December 23, 2008: 6CM Anthony (AQS #35-013-0016)

A) Plot of Hourly PM_{10} Concentration and Wind Speed at Anthony.

B) Plot of Hourly PM_{10} Concentration and Wind Speed at SPCY.


December 23, 2008-Anthony
PM10 Concentration (µg/m^3)
Wind Speed (m/sec)
Time-hour
0
100
200
300
400
500
600
700
800
900
1000
0
2
4
6
8
10
12
14
16
18
0:00
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
PM10 Concentration
Wind Gust Max
Wind Speed


December 23, 2008-SPCY
PM10 Concentration (µg/m^3)
Wind Speed (m/sec)
Time-hour
0
200
400
600
800
1000
1200
1400
1600
1800
0
5
10
15
20
25
0:00
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
PM10 Concentration
Wind Gust Max
Wind Speed

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Appendix 16A-16D

Supporting Data for Documentation of Exceedances

These files were downloaded from the Texas Commission on Environmental Quality website and are for illustration purposes only. Please visit the website listed below to access the information and images provided by Texas.

A) TCEQ Event Report for February 4, 2008. Information retrieved from www.tceq.texas.gov/airquality/monops/sigevents08.html

B) TCEQ Event Report for March 16, 2008. Information retrieved from www.tceq.texas.gov/airquality/monops/sigevents08.html.

C) TCEQ Event Report for April 9, 2008. Information retrieved from www.tceq.texas.gov/airquality/monops/sigevents08.html

D) TCEQ Event Report for April 10, 2008. Information retrieved from www.tceq.texas.gov/airquality/monops/sigevents08.html

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>> Questions or Comments: monops@tceq.state.tx.us

El Paso Blowing Dust February 4, 2008

Analyses for a major air pollution event

Images

- Satellite Animation - GOES
- Satellite Animation - MODIS
- Satellite - Comparison 4th vs 6th
- Webcam Animation - Chelsea
- Webcam Animation - Ranger Peak
- Webcam Panaroma from Ranger Peak 2:00 p.m.
- Webcam Panaroma from Ranger Peak 2:30 p.m.
- GOES Visible-Infrared Composite
- Satellite Image 10:02 am MST - West Texas False Color (from UT CSR)
- Satellite Image 10:32 am MST - West Texas True Color (from UT CSR)
- Satellite Image 12:48 pm MST - West Texas False Color (from UT CSR)
- Satellite Image 1:45 pm MST - West Texas True Color (from UT CSR)
- Satellite Image 4:46 pm MST - West Texas False Color (from UT CSR)
- Satellite Image 1:57 pm MST - El Paso True Color (from UW SSEC)

Description

Strong gusty southwest winds caused blowing dust in parts of northern Mexico, southern New Mexico, and far West Texas on Monday, February 4th. Wind gusts as high as 59 miles per hour were reported at Fort Bliss in El Paso. The high winds generated numerous large dust plumes in northern Mexico that merged into a large dust cloud that swept into El Paso in the afternoon.

The highest measured daily average PM10 concentration in El Paso County was 107 micrograms per cubic meter (µg/m³) at the UTEP Continuous Ambient Monitoring Station (CAMS) 12 and rated as Level Yellow, **Moderate**, on the U.S. Environmental Protection Agency (EPA) Air Quality Index (AQI) scale. The highest measured PM10 hourly average was 791 µg/m³ at Socorro CAMS 49 for the hour from 5:00 p.m. to 6:00 p.m. Mountain Standard Time (MST). The visibility measured at Chamizal CAMS 41 dropped as low as 1.4 mile at 4:35 p.m. MST. The visibility measured at Guadalupe Mountains CAMS 5018 dropped as low as 3.8 miles at 8:40 p.m. CST, indicating that the blowing dust reached as far east as the Guadalupe Mountains.

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El Paso Blowing Dust March 16, 2008

Analyses for a major air pollution event

Images

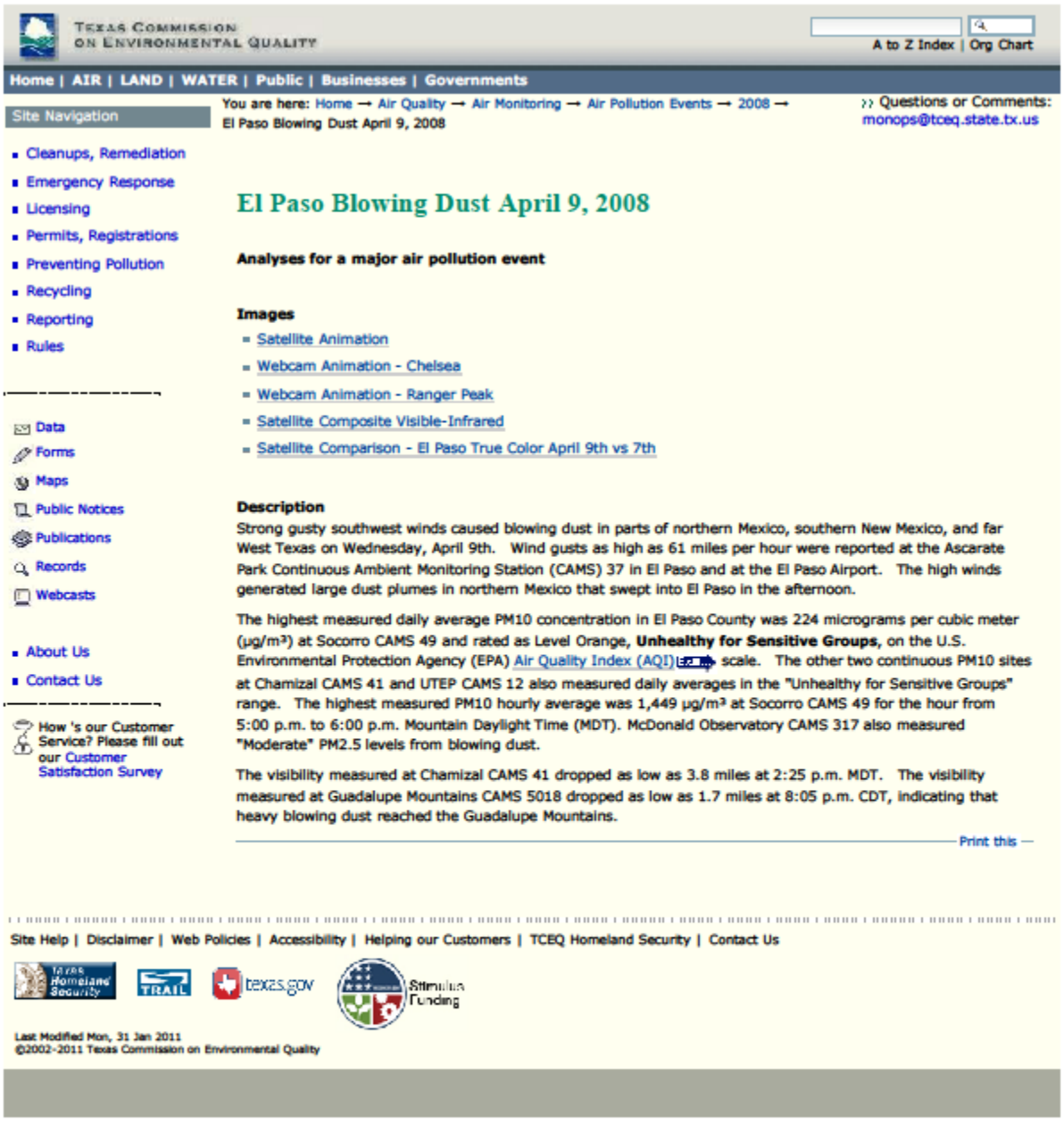
- Satellite Animation - GOES
- Webcam Animation - Chelsea
- Webcam Animation - Ranger Peak
- Satellite Image 11:22 am MDT - Texas True Color (from UW SSEC)
- Satellite Image 11:25 am MDT - El Paso True Color (from UT CSR)
- Satellite Image 11:54 pm MDT - West Texas False Color (from UT CSR)
- Satellite Image 1:23 pm MDT - West Texas False Color (from UT CSR)
- Satellite Image 2:39 pm MDT - El Paso True Color (from UT CSR)

Description

Strong gusty southwest winds caused blowing dust in parts of northern Mexico, southern New Mexico, and far West Texas on Sunday, March 16th. Wind gusts as high as 61 miles per hour were reported at Fort Bliss in El Paso. The high winds generated numerous large dust plumes in northern Mexico that merged into a large dust cloud that swept into El Paso in the afternoon.

The highest measured daily average PM10 concentration in El Paso County was 244 micrograms per cubic meter (μg/m³) at the Socorro Continuous Ambient Monitoring Station (CAMS) 49 and rated as Level Orange, **Unhealthy for Sensitive Groups**, on the U.S. Environmental Protection Agency (EPA) Air Quality Index (AQI) scale. The other two continuous PM10 sites at Chamizal CAMS 41 and UTEP CAMS 12 measured daily averages in the "Moderate" range, indicating that the blowing dust was heavier on the southeast side of the El Paso area, as was also indicated by the afternoon true color satellite image. The highest measured PM10 hourly average was 1,066 μg/m³ at Socorro CAMS 49 for the hour from 2:00 p.m. to 3:00 p.m. Mountain Daylight Time (MDT).

The visibility measured at Chamizal CAMS 41 dropped as low as 2.4 miles at 1:40 p.m. MDT. The visibility measured at Guadalupe Mountains CAMS 5018 dropped as low as 2.5 miles at 7:05 p.m. CDT, indicating that the blowing dust reached as far east as the Guadalupe Mountains.



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›› Questions or Comments: monops@tceq.state.tx.us

El Paso Blowing Dust April 9, 2008

Analyses for a major air pollution event

Images

- Satellite Animation
- Webcam Animation - Chelsea
- Webcam Animation - Ranger Peak
- Satellite Composite Visible-Infrared
- Satellite Comparison - El Paso True Color April 9th vs 7th

Description

Strong gusty southwest winds caused blowing dust in parts of northern Mexico, southern New Mexico, and far West Texas on Wednesday, April 9th. Wind gusts as high as 61 miles per hour were reported at the Ascarate Park Continuous Ambient Monitoring Station (CAMS) 37 in El Paso and at the El Paso Airport. The high winds generated large dust plumes in northern Mexico that swept into El Paso in the afternoon.

The highest measured daily average PM10 concentration in El Paso County was 224 micrograms per cubic meter (µg/m³) at Socorro CAMS 49 and rated as Level Orange, **Unhealthy for Sensitive Groups**, on the U.S. Environmental Protection Agency (EPA) Air Quality Index (AQI) scale. The other two continuous PM10 sites at Chamizal CAMS 41 and UTEP CAMS 12 also measured daily averages in the "Unhealthy for Sensitive Groups" range. The highest measured PM10 hourly average was 1,449 µg/m³ at Socorro CAMS 49 for the hour from 5:00 p.m. to 6:00 p.m. Mountain Daylight Time (MDT). McDonald Observatory CAMS 317 also measured "Moderate" PM2.5 levels from blowing dust.

The visibility measured at Chamizal CAMS 41 dropped as low as 3.8 miles at 2:25 p.m. MDT. The visibility measured at Guadalupe Mountains CAMS 5018 dropped as low as 1.7 miles at 8:05 p.m. CDT, indicating that heavy blowing dust reached the Guadalupe Mountains.

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West Texas Dust Storm April 10, 2008

Analyses for a major air pollution event

Images

- Satellite Animation
- Visibility Animation
- Satellite Composite - Visual/Infrared
- Satellite Comparison - True Color April 10th vs 7th

Description

Very strong gusty northwest winds caused intense blowing dust in parts of West Texas and eastern New Mexico on Thursday, April 10th. Wind gusts as high as 70 miles per hour (mph) were reported at Guadalupe Pass, 64 mph at Clovis, New Mexico, and up to 61 mph at Hereford. The most intense blowing dust was in the Big Spring area based on satellite imagery and airport visibility observations. The dust was carried southeastward into Central Texas the following morning.

PM10 measurements were not available in the most strongly affected blowing dust areas, but airport visibility observations indicate that PM10 likely reached Level Red, **Unhealthy**, on the U.S. Environmental Protection Agency (EPA) Air Quality Index (AQI) scale in the Big Spring area and "Unhealthy for Sensitive Groups" in the Lubbock area.

Airport visibility observations at Hereford, Plainview, Seminole, Snyder, Sweetwater, Abilene, Midland, Pecos, Fort Stockton, San Angelo, Sonora, Rocksprings, and Junction indicated probable "Moderate" PM10 levels. All three PM10 monitoring sites in the El Paso area measured "Moderate" PM10 levels from blowing dust.

Some airport minimum visibility and peak wind gust observations are shown below:

Airport Location	Lowest Visibility (miles)	Peak Gust (mph)
Clovis NM	0.5	60
Big Spring	0.75	50
Lubbock	1.25	56
Guadalupe Pass	1.75	70
Fort Stockton	1.75	50
Clovis Cannon AFB NM	2	64
Abilene	2	44
Plainview	2.5	59
Seminole	2.5	53
Decatur	2.5	36
Hereford	3	61
Roswell NM	3	58
Vernon	3	48
Childress	4	60
Snyder	4	59
Artesia NM	4	54
Midland Airpark	4	53
Pecos	4	53
Sweetwater	4	48
Hobbs NM	5	55

Documentation of Natural Events: Particulate Matter Exceedances Caused by High Winds in Luna and Doña Ana Counties, New Mexico

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Appendix 17A-17D

Supporting Data for Documentation of Exceedances

This documentation is provided to show that a public comment was solicited regarding this document. The public comment period began February 15, 2011 and ended on March 25, 2011.

A) Affidavit of printing and copy of public notice for the Las Cruces Sun-News.

B) Affidavit of printing and copy of public notice for the Deming Headlight.

C) Affidavit of printing and copy of public notice for the El Paso Times.

D) Public comments received by NMED.