State of Arizona Exceptional Event Documentation for October 4, 2011, for the Phoenix PM10 Nonattainment Area

Produced by:

Arizona Department of Environmental Quality
Maricopa County Air Quality Department
Maricopa Association of Governments

Final Report
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I. EXCEPTIONAL EVENT RULE (EER) REQUIREMENTS

In addition to the technical requirements that are contained within the EER, procedural requirements must also be met in order for EPA to concur with the flagged air quality monitoring data. This section of the report lays out the requirements of the EER and associated guidance, and discusses how the Arizona Department of Environmental Quality (ADEQ) addressed those requirements.

Procedural Requirements

This section presents a review of the procedural requirements of the EER as required by 40 CFR 50.14 (Treatment of Air Quality Monitoring Data Influenced by Exceptional Events) and explains how ADEQ fulfills them. The Federal EER requirements include public notification that an event was occurring, the placement of informational flags on data in EPA's Air Quality System (AQS), the notification of EPA of the intent to flag through submission of initial event description, the documentation that the public comment process was followed, and the submittal of a demonstration supporting the exceptional events flag. ADEQ has addressed all of these procedural and documentation requirements.

Public notification that event was occurring (40 CFR 50.14(c)(1(i))

ADEQ issued Dust Control Action Forecasts and Ensemble Forecasts for the Greater Phoenix area advising citizens of the potential for high wind / dust events on October 4, 2011. More information on ADEQ's forecasting program can be found in Section IV. The forecast products that were issued for October 4, 2011 are included in Appendix A.

Place informational flag on data in AQS (40 CFR 50.14(c)(2)(ii))

ADEQ and other operating agencies in Arizona submit data into EPA's AQS. Data from both filter-based and continuous monitors operated in Arizona are submitted to AQS.

When ADEQ and/or another agency operating monitors in Arizona suspects that data may be influenced by an exceptional event, ADEQ and/or the other operating agency expedites analysis of the filters collected from the potentially-affected filter-based air monitoring instruments, quality assures the results and submits the data into AQS. ADEQ and/or other operating agencies also submit data from continuous monitors into AQS after quality assurance is complete.

If ADEQ and/or the operating agency have determined a potential exists that the monitor reading has been influenced by an exceptional event, a preliminary flag is submitted for the measurement in the AQS. The data are not official until they undergo more thorough quality assurance and quality control, leading to certification by May 1st of the year following the calendar year in which the data were collected (40 CFR 58.15(a)(2)). The presence of the flag can be confirmed in AQS.

Notify EPA of intent to flag through submission of initial event description by July 1 of calendar year following event (40 CFR 50.14(c)(2)(iii))

ADEQ submit notice to EPA on August 29, 2012 listing all days from calendar year 2011 that ADEQ intends to analyze under the Exceptional Events Rule. The Exceedances that occurred on October 4,

2011, within the Phoenix PM10 nonattainment area will be included on this list. This assessment report serves as both the initial notification to EPA of ADEQ's intention to flag these data, as well as the demonstration supporting the flagging of these data.

On October 4, 2011, two monitors within the boundaries of the Phoenix PM10 nonattainment area exceeded the 24-hour PM10 standard during the high wind event that occurred on that day. They were the West Chandler monitor (04-013-4004-81102-1) and Higley monitor (04-013-4006-81102-1) operated by MCAQD.

Document that the public comment process was followed for event documentation (40 CFR 50.14(c)(3)(iv))

ADEQ posted this assessment report on the ADEQ webpage and placed a hardcopy of the report in the ADEQ Records Management Center for public review. ADEQ opened a 30-day public comment period on December 3, 2012. A copy of the public notice certification, along with any comments received, will be submitted to EPA, consistent with the requirements of 40 CFR 50.14(c)(3)(iv). See Appendix C for a copy of the affidavit of public notice.

Submit demonstration supporting exceptional event flag (40 CFR 50.14(a)(1-2))

At the close of the comment period, and after ADEQ has had the opportunity to consider any comments submitted on this document, ADEQ will submit this document, the comments received, and ADEQ's responses to those comments to EPA Region IX headquarters in San Francisco, California. The deadline for the submittal of this demonstration package is December 31, 2014.

Documentation Requirements

Section 50.14(c)(3)(iii) of the EER states that in order to justify excluding air quality monitoring data, evidence must be provided for the following elements:

a. The event satisfies the criteria set forth in 40 CFR 501(j) that:
   (1) the event affected air quality,
   (2) the event was not reasonably controllable or preventable, and
   (3) the event was caused by human activity unlikely to recur in a particular location or was a natural event;
b. There is a clear causal relationship between the measurement under consideration and the event;
c. The event is associated with a measured concentration in excess of normal historical fluctuations; and
d. There would have been no exceedance or violation but for the event.

Section II of this assessment introduces the conceptual model of the low pressure system wind event that transpired on October 4, 2011, providing a background narrative of the exceptional event and an overall explanation that 'the event affected air quality'. Further evidence that 'the event affected air quality' is provided in Section V. Sections II and V also provide evidence that the event was a natural event.

Section IV of this assessment details the existing area control measures and demonstrates that despite the presence and enforcement of these controls, the event on October 4, 2011 was not reasonably controllable or preventable.

Section V of this assessment establishes a clear causal connection between the natural event on October 4, 2011 and the exceedance of the 24-hour PM10 standard at the West Chandler and Higley monitoring stations. The evidence in this section (and the previous section on historical fluctuations) also confirms that the event in question both affected air quality and was the result of a natural event.

Section III of this assessment provides data summaries and time series graphs which help illustrate that the event on October 4, 2011 produced PM10 concentrations in excess of normal historical fluctuations.

Section VI of this assessment builds upon the demonstration showing a clear causal connection between the natural event and the exceedance and concludes there would have been no exceedances on October 4, 2011 but for the presence of the natural event.

II. CONCEPTUAL MODEL

Geographic Setting and Climate

Geographic Setting

Phoenix is located in the Salt River Valley in south-central Arizona. It lies at a mean elevation of 1,090 feet above mean sea level (msl) in the northeastern part of the Sonoran Desert. Other than the mountains in and around the city, the topography of Phoenix is generally flat. The Phoenix area is surrounded by the McDowell Mountains (~4,200 ft msl) to the northeast, the foothills of the Bradshaw (~7,900 ft msl) and Mazataal (~7,900 ft msl) ranges to the north, the White Tank Mountains (~4,500 ft msl) to the west, the Sierra Estrella (~4,450 ft msl) to the southwest, and the Superstition Mountains (~5,000 ft msl) far to the east. Within the City are the Phoenix Mountains (~2,600 ft msl) and South Mountain (~2,600 ft msl). Current development is pushing north, west, and south into Pinal County. The Phoenix metropolitan area contains a fairly dense network of PM10 monitors throughout the area, with a much less dense network of monitors located throughout the rest of the state. Figure 2–1 shows the general geographic setting of Phoenix, as well as the locations of PM10 monitors throughout the state. It should be noted that some of the monitors shown in Figure 2-1 are filter-based monitors; therefore, monitoring data from all locations may only be available for select days (i.e. 1-in-6 run days).

Figure 2–2 depicts the drainage systems or watersheds for the State of Arizona. Many of the rivers that form Arizona's drainage system are dry for most of the year and, consequently, are sources of silt and fine soils that become suspended and add to regional PM10 loadings during high wind events. Much of this alluvial matter and fine soil is deposited in the low lying areas of central and southern Arizona, with larger depositional areas focused in and around the confluences of dry river channels.

Figure 2-1. Phoenix Geographic Setting and PM10 Monitor Locations (source: EPA AQS DataMart, NASA MODIS Satellite, Google Earth). PM10 monitor locations are indicated by white markers.

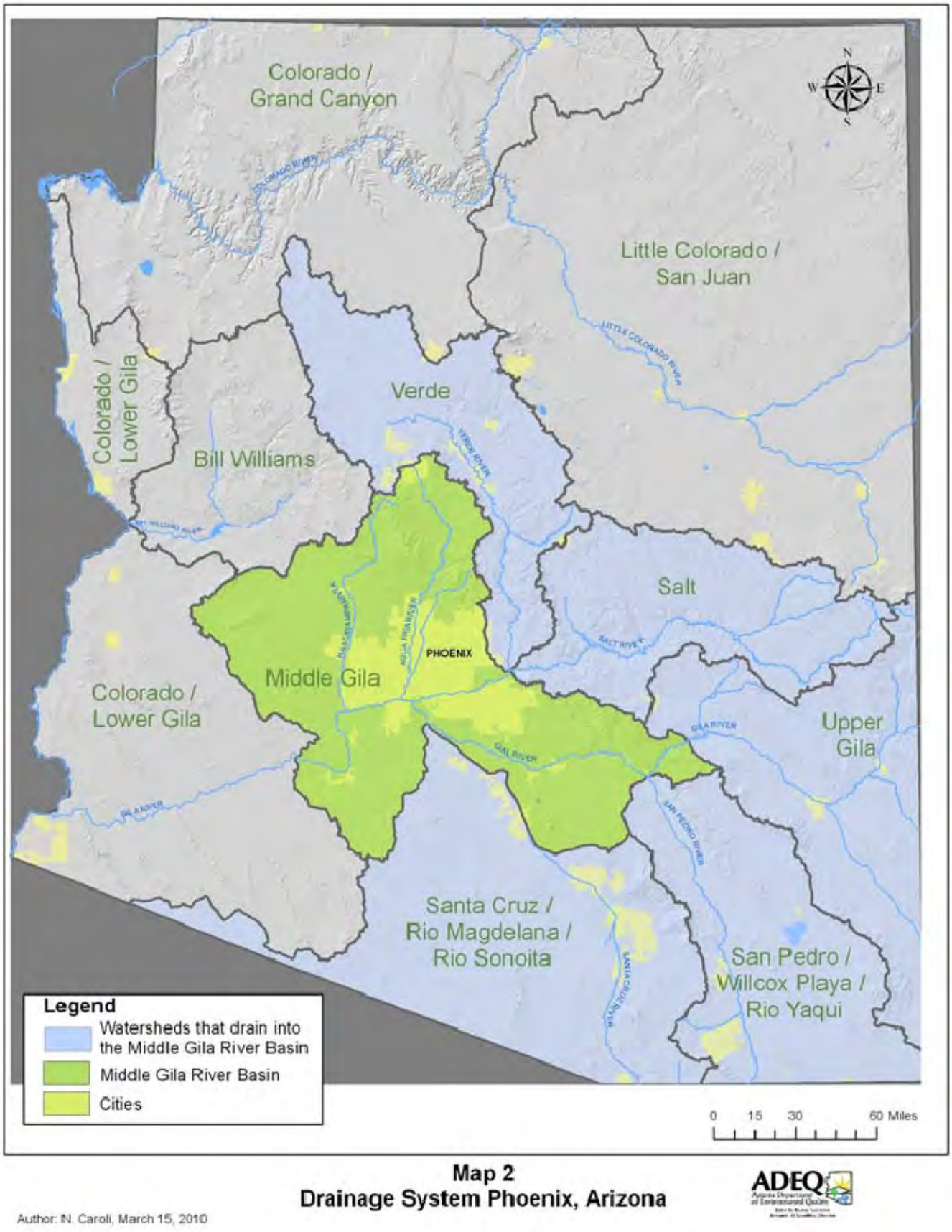


Figure 2-2. Drainage System of Phoenix, Arizona.

Climate

Phoenix has an arid climate, with very hot summers and temperate winters. The average summer high temperature is among the hottest of any populated area in the United States. The temperature reaches or exceeds 100ºF an average of 110 days during the year and highs top 110ºF an average of 18 days during the year. Phoenix receives an average of 7.66 inches of rain per year.

Precipitation is sparse during the first part of the summer, but the influx of monsoonal moisture, which generally begins in early July and lasts until mid-September, raises humidity levels and can cause heavy localized precipitation and flooding. Although thunderstorms are possible at any time of the year, they are most common during the monsoon season from July to mid-September as humid air is advected from the Gulf of California, Gulf of Mexico, and large thunderstorm complexes from the Sierra Madre Occidental Mountains in Mexico. This influx in moisture, combined with intense solar heating, often creates a very unstable environment that is ripe for thunderstorm development. These thunderstorms can bring strong winds and blowing dust, large hail, and heavy rain. Dust storms associated with these thunderstorms typically occur in the early part of the monsoon season (July) before soaking rains help keep soil particles bound to one another. However, depending on the amount of precipitation received during the monsoon season, extremely hot temperatures act to dry out the surface quickly, and dust storms can occur at any time. During the December through March period, winter storms moving inland from the Pacific Ocean can bring strong winds, blowing dust and significant rains throughout Arizona. This December – March time period, and July – August time period are typically the wettest parts of the year. Meanwhile, a distinct dry season occurs during the period April through June for Phoenix and the rest of Arizona. While these weather patterns describe the general climatology for the Phoenix area over a long period of time, Phoenix and the entire state of Arizona is also prone to a high degree of variability in these weather patterns from year to year.

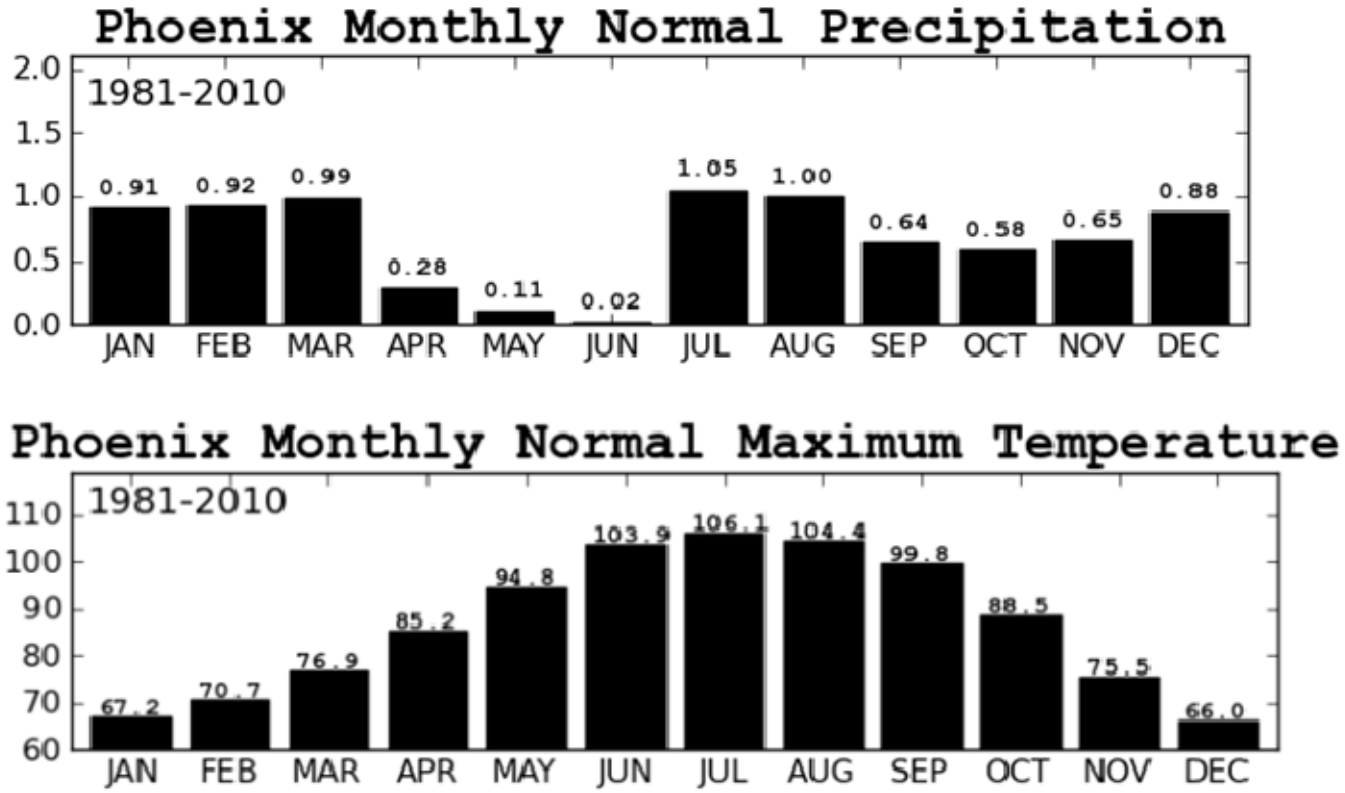


Figure 2-3 Phoenix Monthly Precipitation (top) and Maximum Temperature (bottom) Climatology (source: National Weather Service).

Low Pressure System Dust Storm Event Summary

On October 4, 2011, the National Weather Service's Storm Prediction Center forecasted energetic convective activity over Arizona as the result of a westerly moving low pressure system located on the Arizona/California border. This low pressure system contained a potent PV-MAX (positive vorticity) which was predicted to generate high winds and thunderstorms as the system moved eastward across central Arizona (see Figures 2–4 and 2–5).

The approaching low pressure system began to generate high winds in central Arizona and Maricopa County by 10:30 AM. Surface winds were largely from the south with sustained speeds in mid to high teens and gusts up to 29 mph. These winds increased throughout the morning to sustained speeds over 20 mph and gusts up to 35 mph. By 12:30 PM windblown dust was noticeable at several Maricopa County monitors with five-minute PM10 concentrations over 500 $\mu g/m^3$. Simultaneously, high PM10 concentrations were also recorded in Pinal and Pima counties, located to the south of Maricopa County.

At 1:11 PM, the National Weather Service issued a blowing dust advisory until 7:00 PM for Maricopa and northwest Pinal County predicting wind gusts up to 40 mph, and visibility reduced to a half-mile in some areas. The highest PM10 concentrations in the nonattainment area were recorded between 1:00 and 5:00 PM, with some five-minute values as high as 3,571 $\mu g/m^3$. During this time period, gusts up to 46 mph and sustained winds up to 34 mph were recorded in the nonattainment area. PM10 concentrations were also extremely high in neighboring southern Pinal County in response to winds of similar force and duration. Wind speeds of this intensity easily overwhelmed local controls within the nonattainment area and facilitated the additional transport of dust from the desert areas of Pima and Pinal counties outside the nonattainment area.

As a result of this low pressure system, six PM10 monitors in Pinal County and one monitor in Pima County exceeded the PM10 standard. The West Chandler and Higley monitors located in southeastern Maricopa County, closest to the open spaces and deserts of Pinal County, also recorded exceedances. As seen in Figure 2–6, severe drought conditions in southeastern Maricopa, Pinal, and Pima counties likely exacerbated the amount of dust the low pressure system winds were able to entrain.

Significant rain in the form of thunderstorms did not reach the nonattainment area until 5:30 PM. The rain was confined to the northern and western potions of the nonattainment area and provided no relief for the exceeding monitors located in the southeast. Additionally, the strongest winds reported throughout the event were associated with the arrival of these thunderstorms, producing gusts up to 64 mph and sustained winds speeds up to 39 mph. These strong and gusty winds produced a second, supply-limited round of windblown dust throughout the central portions of the nonattainment area that generally dissipated with the exiting of the low pressure system.

By 7:30 PM, sustained winds from the exiting low pressure system were below 10 mph and PM10 concentrations throughout the nonattainment area had returned to normal levels. A more detailed explanation and time series visualization of the low pressure system dust storm event is available in Section V, describing the clear causal connection between the approaching system and the elevated and exceeding PM10 concentrations recorded in the nonattainment area.

As a summary of the event, Figure 2–7 displays an hourly graph of PM10 concentrations throughout Maricopa County and the nonattainment area. Table 2–1 contains PM10 concentration data from all recorded monitors throughout the State of Arizona.

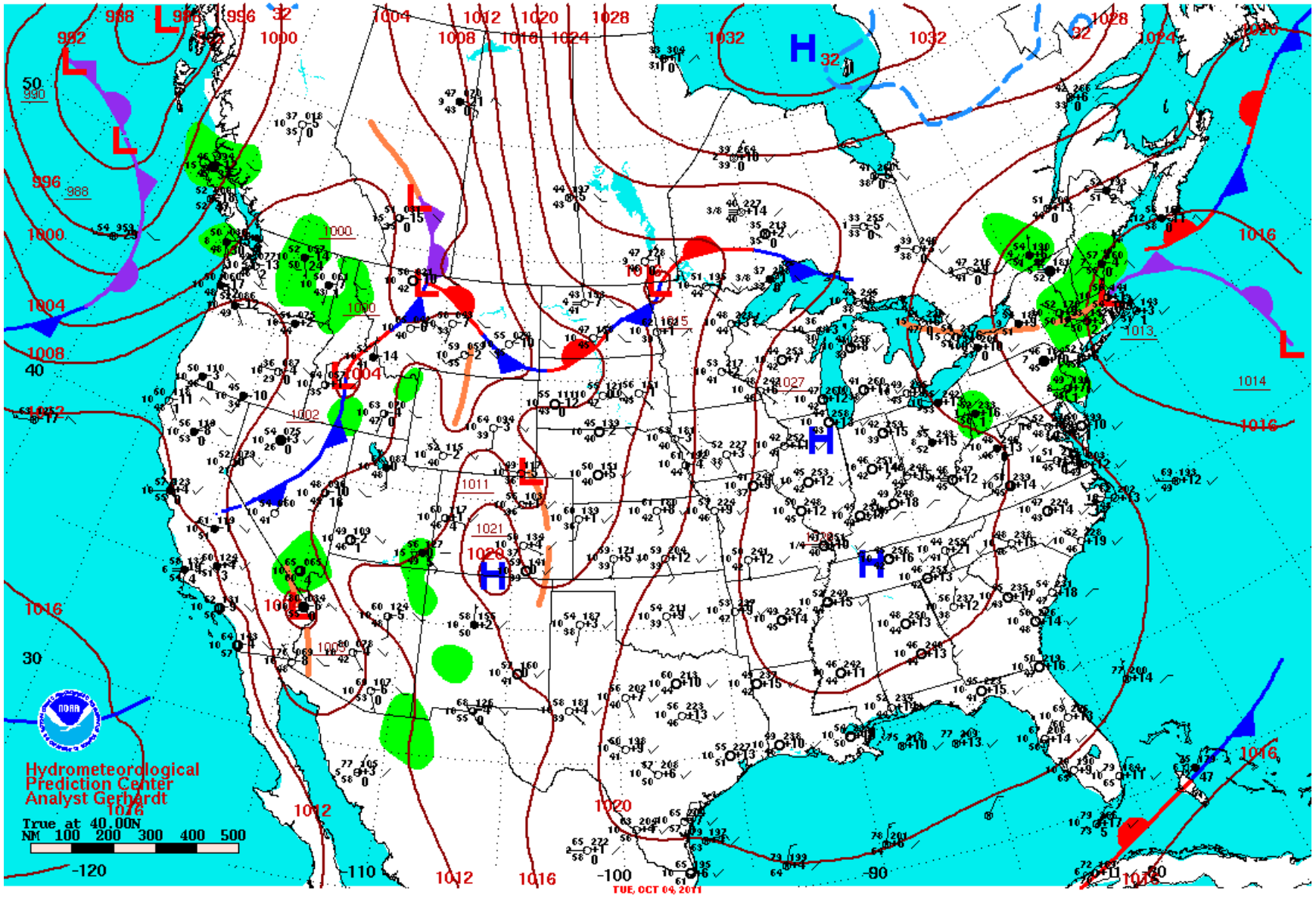


Figure 2-4 Location of low pressure system on California/Arizona border as of 5:00 AM Arizona time on October 4, 2011 (NOAA Daily Weather Map).

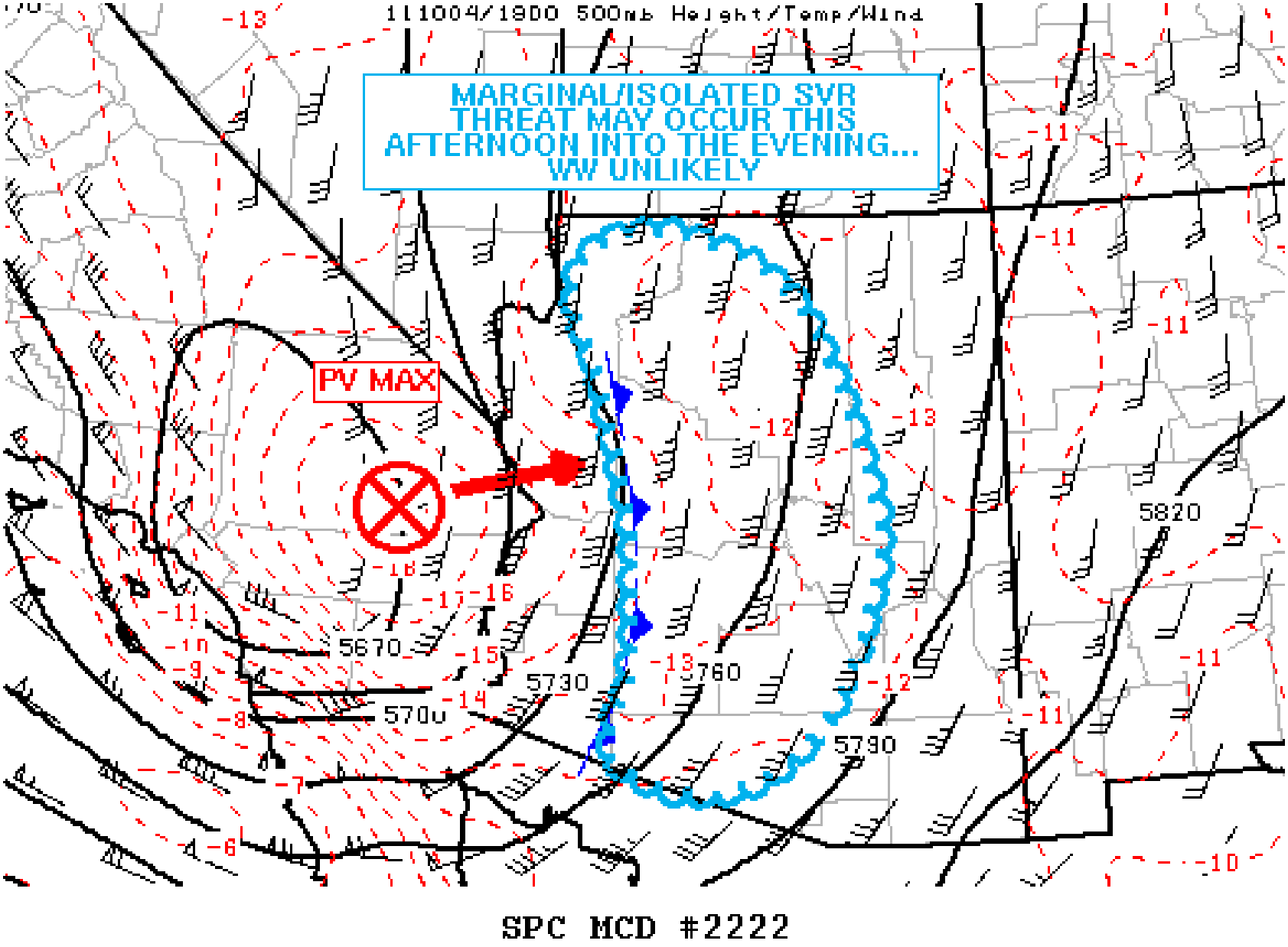


Figure 2-5. NOAA Storm Prediction Center mesoscale discussion of possible severe thunderstorms in Arizona as a result of the eastward moving low pressure system. (NOAA Mesoscale Discussion 2222)

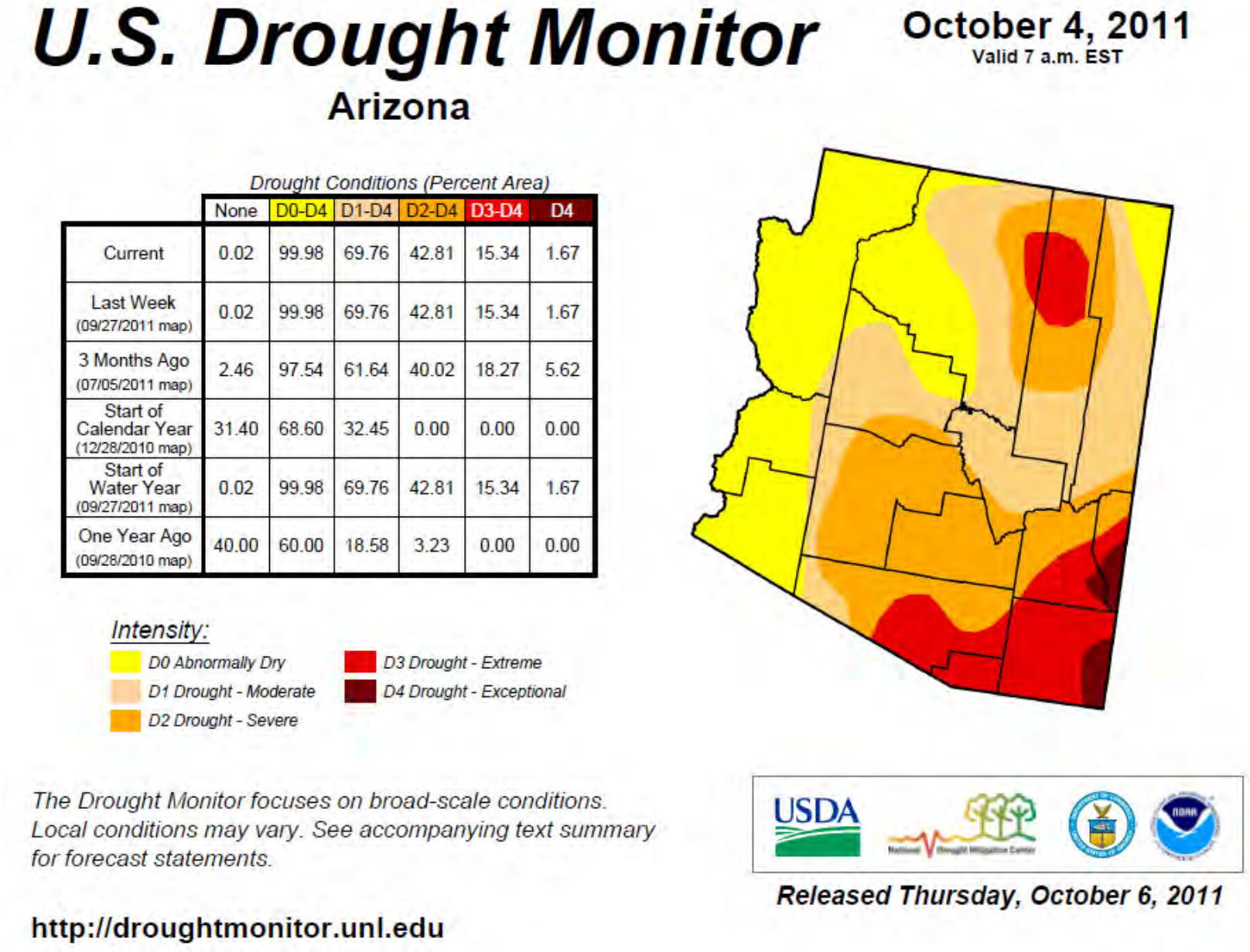


Figure 2-6. U.S. Drought Monitor analysis of Arizona released around the time period of the exceedance described in this report.

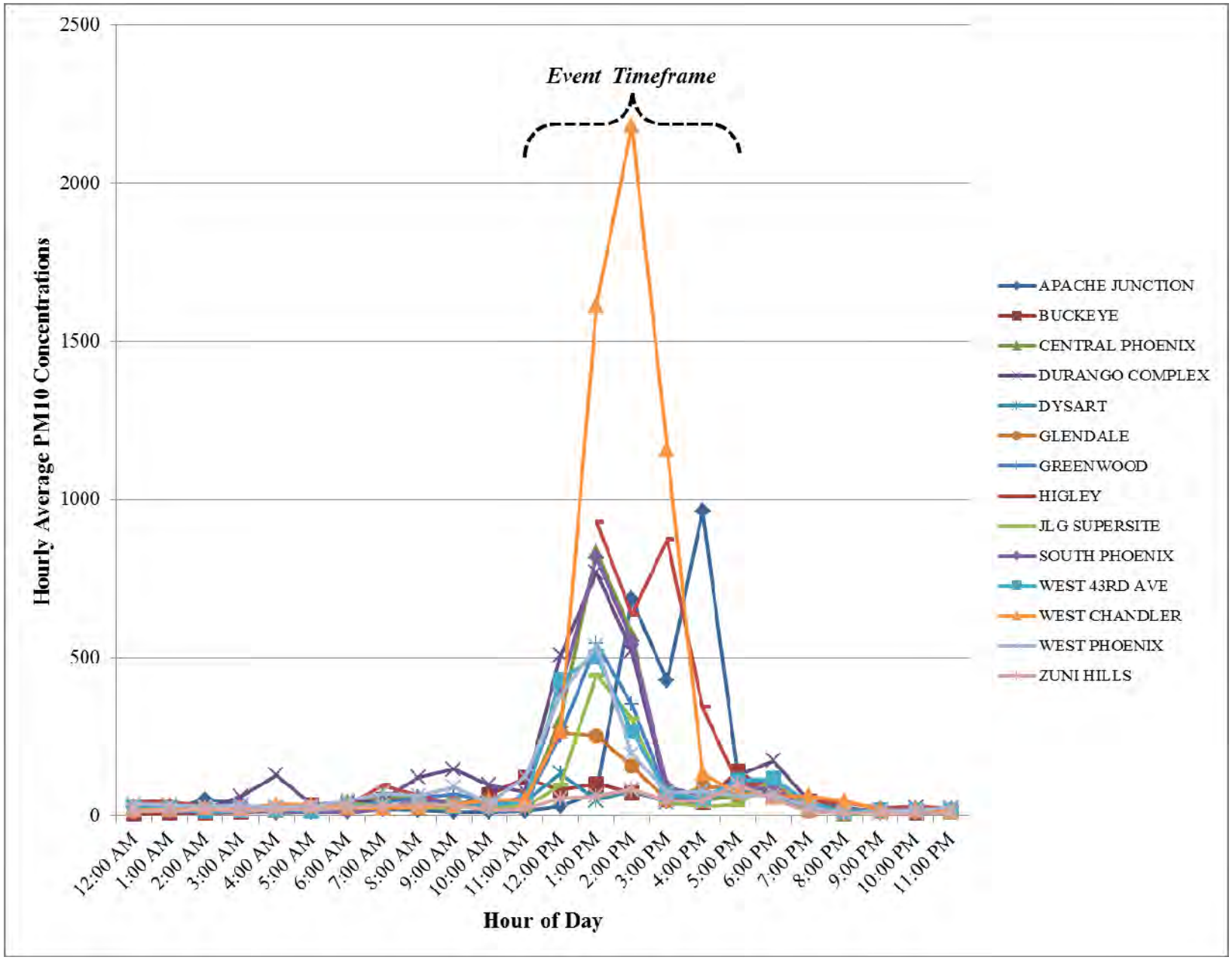


Figure 2-7. Timeline of PM10 concentrations at monitors in Maricopa County and the PM10 nonattainment area on October 4, 2011.

Table 2-1. Summary of Statewide PM10 Measurements for October 4, 2011.

Monitor	Monitor Type	Operator	AQS Monitor ID	24-hr Avg PM10 ($\mu g/m^3$)	1-hr Max PM10 ($\mu g/m^3$)	Max Time	AQS Qualifier Flag
Apache County							
N/A	N/A	WMAT	04-001-1003-81102-1	11.2	53	23	
Cochise County							
Douglas Red Cross	N/A	ADEQ	04-003-1005-81102-1	No Data	N/A	N/A	
Paul Spur Chemical Lime Plant	N/A	ADEQ	04-003-0011-81102-1	No Data	N/A	N/A	
Paul Spur Chemical Lime Plant	N/A	ADEQ	04-003-0011-81102-2	No Data	N/A	N/A	
Coconino County							
Flagstaff Middle School	N/A	ADEQ	04-005-1008-81102-1	No Data	N/A	N/A	
N/A	N/A	NN	04-005-1237-81102-1	26.5	99	15	
Gila County							
Hayden Old Jail	TEOM	ADEQ	04-007-1001-81102-3	122.3	718	16	
Payson Well Site	N/A	ADEQ	04-007-0008-81102-1	No Data	N/A	N/A	
Payson Well Site	N/A	ADEQ	04-007-0008-81102-2	No Data	N/A	N/A	
Maricopa County							
Buckeye	TEOM	MC	04-013-4011-81102-1	45.9	141	17	
Central Phoenix	TEOM	MC	04-013-3002-81102-4	105.8	835	13	
Durango Complex	TEOM	MC	04-013-9812-81102-1	131.8	770	13	
Dysart	TEOM	MC	04-013-4010-81102-1	38.6	134	12	
Fort McDowell/ Yuma Frank	TEOM	FMIR	04-013-5100-8112-1	No Data	N/A	N/A	
Glendale	TEOM	MC	04-013-2001-81102-1	59.1	264	12	
Greenwood	TEOM	MC	04-013-3010-81102-1	84.3	544	13	
High School Air Monitoring Station	N/A	SRP-MIC	04-013-7024-81102-1	No Data	N/A	N/A	
Higley	TEOM	MC	04-013-4006-81102-1	157.5	930	13	RJ
JLG Supersite	BAM	ADEQ	04-013-9997-81102-3	62.5	461	13	
JLG Supersite	TEOM	ADEQ	04-013-9997-81102-4	62.5	446	13	
Lehi Air Monitoring Station	N/A	SRP-MIC	04-013-7022-81102-1	No Data	N/A	N/A	
Mesa	FRM	MC	04-013-1003-81102-1	No Data	N/A	N/A	
North Phoenix	FRM	MC	04-013-1004-81102-1	74.4	683	13	
Senior Center Air Monitoring Station	N/A	SRP-MIC	04-013-7020-81102-1	No Data	N/A	N/A	
Senior Center Air Monitoring Station	N/A	SRP-MIC	04-013-7020-81102-2	No Data	N/A	N/A	
South Phoenix	TEOM	MC	04-013-4003-81102-1	105.0	817	13	
South Scottsdale	FRM	MC	04-013-3003-81102-1	No Data	N/A	N/A	
West Chandler	TEOM	MC	04-013-4004-81102-1	251.0	2181	14	RJ
West Forty Third	TEOM	MC	04-013-4009-81102-1	83.0	503	13	
West Phoenix	TEOM	MC	04-013-0019-81102-1	88.9	538	13	
Zuni Hills	TEOM	MC	04-013-4016-81102-1	32.8	100	17	
Mohave County							
Bullhead City ADEQ	N/A	ADEQ	04-015-1003-81102-1	No Data	N/A	N/A	
Navajo County							
N/A	N/A	WMAT	04-017-1002-81102-1	10.9	45	14	
Pima County							
Ajo	TEOM	ADEQ	04-019-0001-81102-3	41.9	195	12	
Corona de Tucson	FRM	PCDEQ	04-019-0008-81102-1	No Data	N/A	N/A	
Geronimo	BAM	PCDEQ	04-019-1113-81102-1	29.9	78	18	
Green Valley	BAM	PCDEQ	04-019-1030-81102-1	75.6	514	17	
Orange Grove	FRM	PCDEQ	04-019-0011-81102-2	30.0	N/A	N/A	
Prince Road	FRM	PCDEQ	04-019-1009-81102-1	No Data	N/A	N/A	
Rillito	TEOM	ADEQ	04-019-0020-81102-3	171.3	1118	14	RJ
Santa Clara	FRM	PCDEQ	04-019-1026-81102-1	No Data	N/A	N/A	
South Tucson	FRM	PCDEQ	04-019-1001-81102-1	35.0	N/A	N/A	

Monitor	Monitor Type	Operator	AQS Monitor ID	24-hr Avg PM10 (µg/m^3)	1-hr Max PM10 (µg/m^3)	Max Time	AQS Qualifier Flag
Tangerine	FRM	PCDEQ	04-019-1018-81102-1	No Data	N/A	N/A	
Pinal County							
Apache Junction Fire Stn.	FRM	PCAQCD	04-021-3002-81102-1	115.0	N/A	N/A	
Casa Grande Downtown	TEOM	PCAQCD	04-021-0001-81102-3	215.0	1052	14	RJ
Coolidge	FRM	PCAQCD	04-021-3004-81102-1	No Data	N/A	N/A	
Combs School	TEOM	PCAQCD	04-021-3009-81102-3	212.0	1488	17	RJ
Cowtown	FRM	PCAQCD	04-021-3013-81102-1	No Data	N/A	N/A	
Cowtown	TEOM	PCAQCD	04-021-3013-81102-3	271.0	2748	16	RJ
Eloy	FRM	PCAQCD	04-021-3014-81102-1	No Data	N/A	N/A	
Maricopa	TEOM	PCAQCD	04-021-3010-81102-3	185.0	N/A	N/A	RJ
Pinal Air Park	N/A	PCAQCD	04-021-3007-81102-1	No Data	N/A	N/A	
Pinal County Housing	FRM	PCAQCD	04-021-3011-81102-1	No Data	N/A	N/A	
Pinal County Housing	FRM	PCAQCD	04-021-3011-81102-2	No Data	N/A	N/A	
Pinal County Housing	TEOM	PCAQCD	04-021-3011-81102-3	575.0	3668	16	RJ
Stanfield	TEOM	PCAQCD	04-021-3008-81102-3	410.0	2823	14	RJ
N/A	N/A	PCAQCD	04-021-7004-81102-1	No Data	N/A	N/A	
N/A	N/A	PCAQCD	04-021-7004-81102-2	No Data	N/A	N/A	
Santa Cruz County							
Nogales Post Office	BAM	ADEQ	04-023-0004-81102-1	No Data	N/A	N/A	
Nogales Post Office	BAM	ADEQ	04-023-0004-81102-3	36.9	65	13	
Yavapai County							
Prescott Valley	FRM	ADEQ	04-025-2002-81102-1	No Data	N/A	N/A	
Yuma County							
Yuma Supersite	TEOM	ADEQ	04-027-8011-81102-3	70.5	220	16	

III. HISTORICAL FLUCTUATIONS

Figures 3–1 and 3–2 display a time series plot of the 24-hour PM10 concentrations for the period January 1, 2007 through December 31, 2011 for the exceeding West Chandler and Higley monitors. Additionally, the West Chandler monitor has continuous data available as of September 26, 2009, which allows for a time series plot of the daily maximum hourly average PM10 concentrations as shown in Figure 3–3. The Higley monitor has continuous data for over five years, allowing for a time series plot of the daily maximum hourly average PM10 concentrations from 2007 through 2011 as shown in Figure 3–4. All figures indicate that the PM10 concentrations seen at the West Chandler and Higley monitors on October 4, 2011 were in excess of normal historical fluctuations.

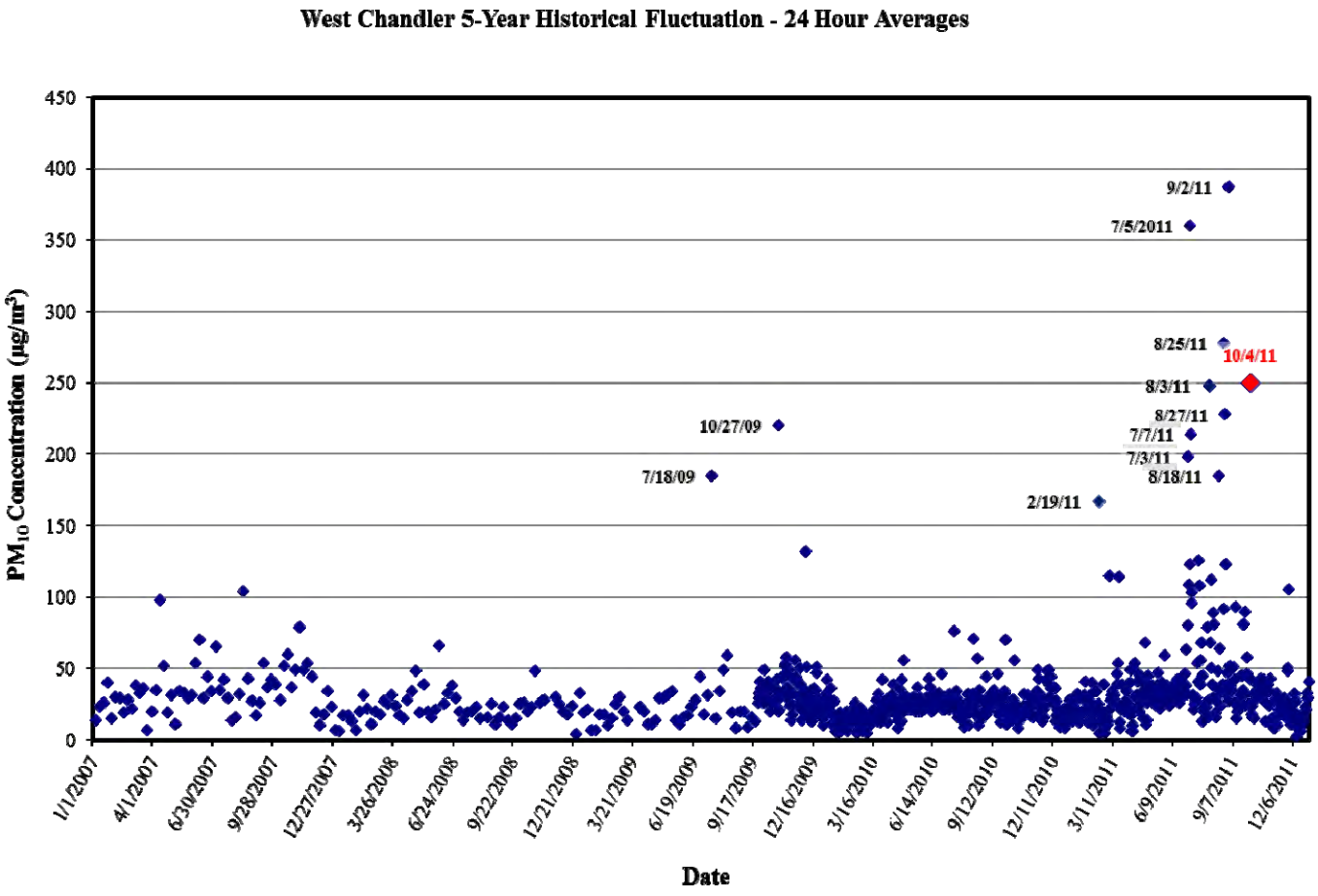


Figure 3-1. Plot of 24-hour average PM10 concentrations (2007 – 2011) at the West Chandler monitor.

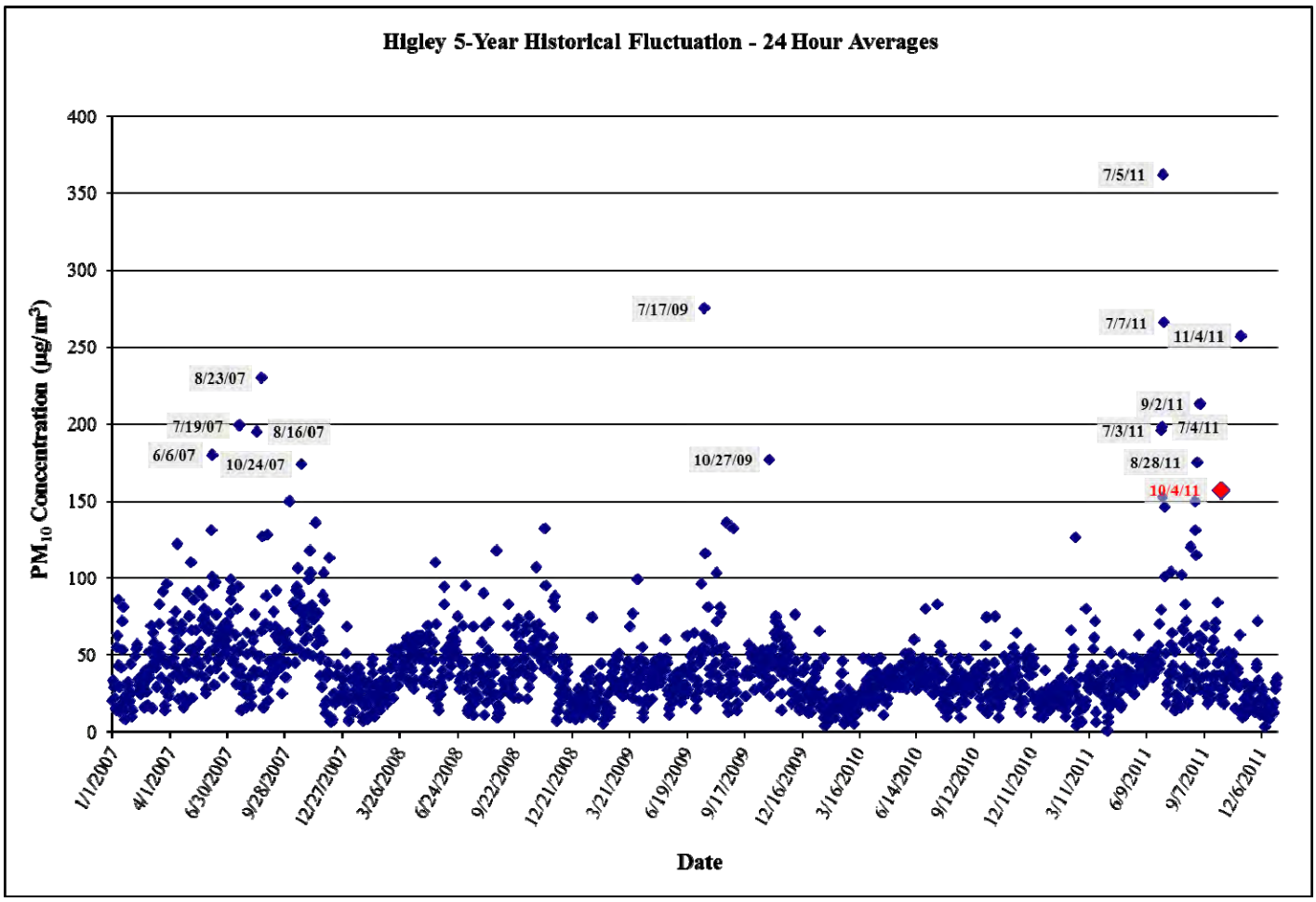


Figure 3-2. Plot of 24-hour average PM10 concentrations (2007 – 2011) at the Higley monitor.

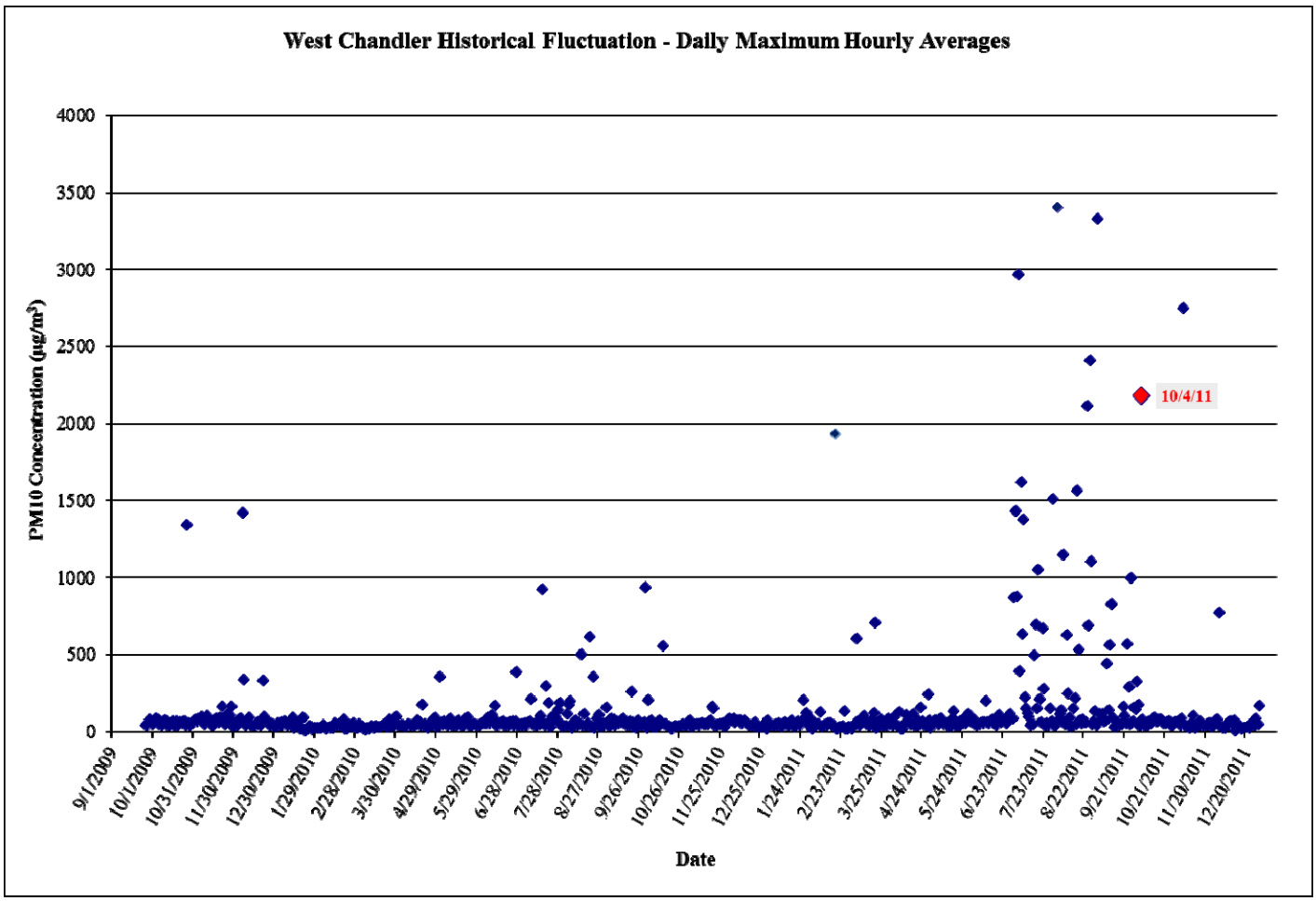


Figure 3-3. Plot of daily hourly maximum PM10 concentrations (September 2009 – 2011) at the West Chandler monitor.

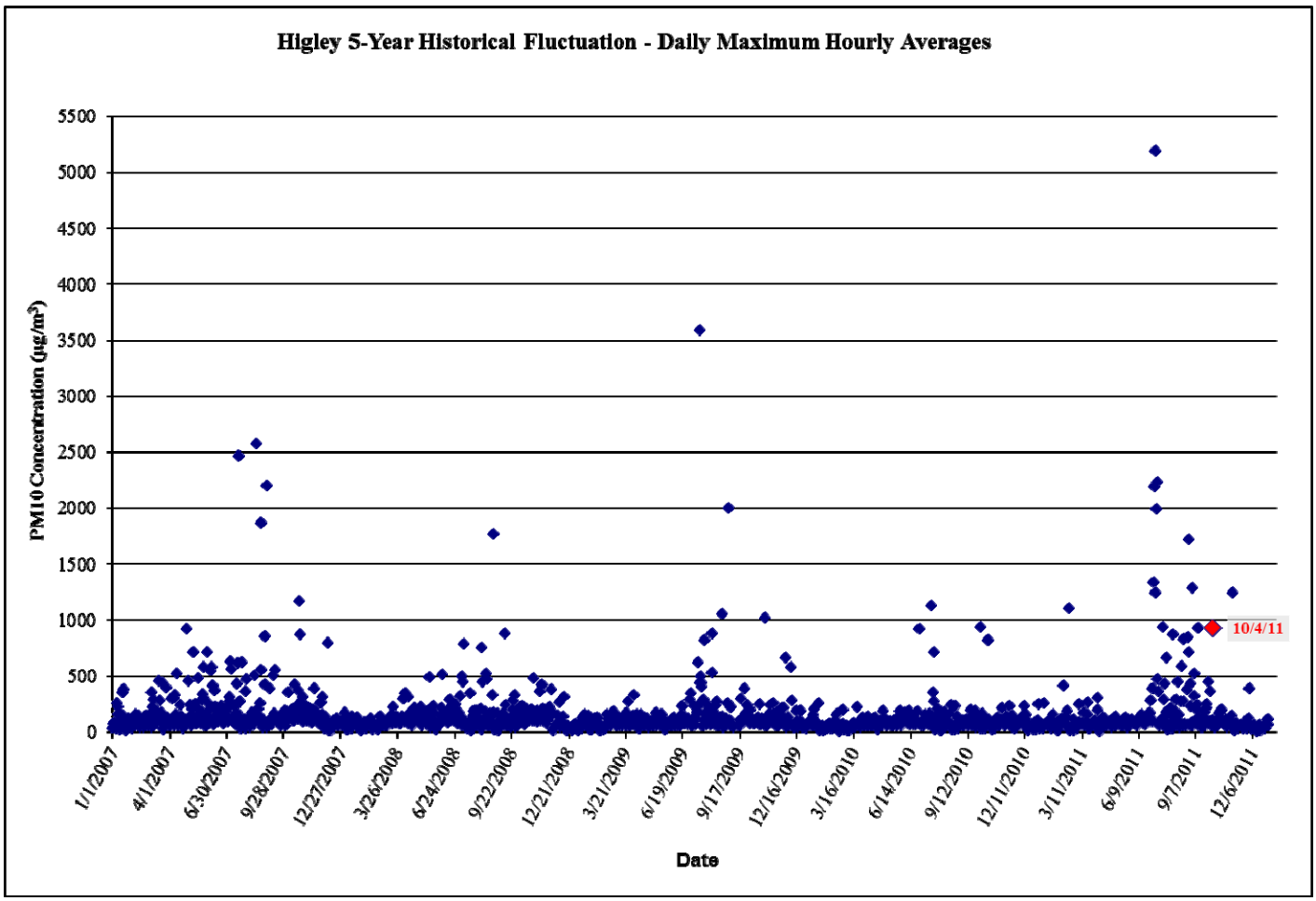


Figure 3-4. Plot of daily hourly maximum PM10 concentrations (2007 – 2011) at the Higley monitor.

IV. NOT REASONABLY CONTROLLABLE OR PREVENTABLE

Section 50.1(j) of Title 40 CFR Part 50 requires that an event must be "not reasonably controllable or preventable" in order to be defined as an exceptional event. This requirement is met by demonstrating that despite reasonable control measures in place within Maricopa County and the nonattainment area, high wind conditions overwhelmed all reasonably available controls. The event occurring on October 4, 2011 was directly related to strong and gusty winds generated by a low pressure storm system. The strong winds overwhelmed all reasonably available controls, and were also responsible for the transport of some PM into the Maricopa County PM10 nonattainment area from areas outside of the nonattainment area. As shown in Section V, strong winds both overwhelmed local controls and allowed for the transport of PM from the open and desert areas of Pinal and Pima counties, where the low pressure system winds generated the highest amounts of windblown PM. Precipitation from the storm was confined to the northern and western portions of the nonattainment area, exacerbating the effects of windblown dust in the area where the exceeding monitors were located. Strict controls on local sources of fugitive dust were in place and enforced during the event on October 4, 2011, but were overwhelmed by strong low pressure system winds and were not capable of addressing transport of dust from desert and open areas outside of the nonattainment area.

The following sections describe the BACM- and MSM-level PM10 control measures in place on October 4, 2011, and the robustness of the programs designed to enforce these measures. Inspections of local sources performed before, during and after October 4, 2011, confirmed that no unusual anthropogenic PM10-producing activities occurred in Maricopa County, the Phoenix PM10 nonattainment area, nor the local areas surrounding the exceeding monitors.

Regulatory Measures and Control Programs

The Arizona Department of Environmental Quality (ADEQ) and the Maricopa County Air Quality Department (MCAQD) are responsible for implementing regulatory measures to control emissions from agricultural sources, stationary sources, fugitive dust sources, and open burning within Maricopa County. Three major programs provide or contribute to air pollution control measures for the Greater Phoenix area. These programs include:

1.) ADEQ's Agricultural Best Management Program (AgBMP)
2.) Maricopa County's Inspection and Compliance Program
3.) ADEQ's Air Quality Forecasting Program

Specifically, ADEQ is responsible for compliance assistance and enforcement of Agricultural Best Management Practices developed by the Governor's Agricultural Best Management Practices Committee, while MCAQD is responsible for compliance assurance for all other significant sources of PM10 emissions. In addition to routine inspections and inspections driven by complaints, inspections are often increased when 1.) ADEQ forecasters issue a High Risk for the Maricopa County Dust Control Forecast, 2.) ADEQ forecasters issue a High Pollution Advisory, or 3.) near real-time monitoring data indicate unique activity via high PM concentrations. The forecasting program and inspection / compliance programs work together so that resources can be best utilized during days that are of greatest risk for elevated PM emissions.

On July 25, 2002, EPA took initial action to finalize approval of the Best Available Control Measure (BACM) and the Most Stringent Measure (MSM) demonstrations in the Serious Area PM10 plan for the Maricopa County portion of the metropolitan Phoenix PM10 nonattainment area (67 FR 48718). These BACM and MSM demonstrations were again approved by EPA on July 14, 2006 (71 FR 43979). The Agricultural Best Management Practices General Permit rule and related definitions have been approved into the Arizona Administrative Code as R18-2-610 and R18-2-611 pursuant to Arizona Revised Statutes § 49-457[1] . Maricopa County regulations of PM10 emissions are listed in Table 4-1.

Table 4-1. Rules and Ordinances Regulating Particulate Matter Emissions in Maricopa County.

Rule/Ordinance Number & Title	Description
Rule 300: Visible Emissions	Establishes standards for visible emissions and opacity.
Rule 310: Fugitive Dust from Dust-Generating Operations	Establishes limits for the emissions of particulate matter into the ambient air from any property, operations, or activity that may serve as a fugitive dust source.
Rule 310.01: Fugitive Dust from Non-Traditional Sources of Fugitive Dust	Establishes limits for the emissions of particulate matter into the ambient air from open areas, vacant lots, unpaved parking lots, and unpaved roadways which are not regulated by Rule 310 and which are not required to have either a permit or a dust control plan.
Rule 311: Particulate Matter from Process Industries	Establishes emission rates based on process weight applicable to any affected operations not subject to Rule 316.
Rule 312: Abrasive Blasting	Establishes limits for particulate emissions from abrasive blasting operations.
Rule 314: Open Outdoor Fires and Indoor Fireplaces at Commercial and Institutional Establishments	Establishes limits for the emissions of air contaminants produced from open burning.
Rule 316: Nonmetallic Mineral Processing	Establishes limits for the emissions of particulate matter into the ambient air from any nonmetallic mining operation or rock product processing plant.
Rule 317: Hospital/Medical/ Infectious Waste Incinerators	Establishes limits for the emissions of air pollutants from medical waste incinerators.
Rule 322: Power Plant Operations	Establishes limits for the emissions of nitrogen oxides, sulfur oxides, carbon monoxide and particulate matter from existing power plants and cogeneration plants.
Rule 323: Fuel Burning Equipment from Industrial/Commercial/ Institutional (ICI) Sources	Establishes limits for the emissions of nitrogen oxides, sulfur oxides, carbon monoxide and particulate matter from ICI sources.
Rule 324: Stationary Internal Combustion (IC) Engines	Establishes limits for the emissions of carbon monoxide, nitrogen oxides, sulfur oxides, volatile organic compounds, and particulate matter from stationary internal combustion engines, including stationary IC engines used in cogeneration.

[1] Updates to the AgBMP program in December , 2011, clarified BMPs for crop and added BMPs for animal operations. Effective 12/29/2011, R18-2-611 was renumbered to R18-2-610.0,1 **Agricultural PM10 Genral Permit for Crop Operations** and R18-2-611.01, **Animal Operations PM10 General Permit** was added. Definitions for Crop Operations were revised at R18-2-610 and new definitions for Animal Operations were added at R18-2-611.

Rule/Ordinance Number & Title	Description
Rule 325: Brick and Structural Clay Products (BSCP) Manufacturing	Establishes limits for particulate matter emissions from the use of tunnel kilns for curing in the brick and structural clay product (BSCP) manufacturing processes.
Ordinance P-25: Leaf Blower Restriction	Establishes restrictions for leaf blowers in incorporated and unincorporated sections of Area A in Maricopa County.
Ordinance P-26: Residential Woodburning Restriction	Establishes restrictions for residential woodburning.
Ordinance P-27: Vehicle Parking and Use on Unstabilized Vacant Lots	Establishes restrictions for vehicle parking and use on unstabilized vacant lots in unincorporated sections of Area A in Maricopa County.
Ordinance P-28: Off-Road Vehicle Use in Unincorporated Areas of Maricopa County	Establishes restrictions for operating vehicles on unpaved property in unincorporated areas of Maricopa County.
Arizona Administrative Code R18-2-611 & 610: Agricultural PM10 General permit	Establishes a requirement for commercial farmers to implement best management practices and maintain a record demonstrating compliance

In addition to the rules and regulations listed in the above table, other PM10 reducing control measures (e.g., paving of unpaved roads, PM10 certified street sweepers, controlling unpaved parking lots, etc.) have been committed to, and implemented by, local jurisdictions throughout the PM10 nonattainment area, and incorporated into the Arizona SIP through PM10 plans such as the Revised MAG 1999 Serious Area Particulate Plan for PM10 for the Maricopa County Nonattainment Area. The Pinal County Air Quality Control District (PCAQCD) also implements regulatory control measures on emissions from existing and new non-point sources within Pinal County (see Table 4-2). Additionally, the PCAQCD implements specific nonattainment rules for that part of the Phoenix PM10 nonattainment area that resides in Pinal County (see Table 4-3).

Table 4-2. Pinal County Rules Regulating Existing and New Non-point Sources in Pinal County.

Article Number & Title	Description
Article 2: Fugitive Dust	Provides a mechanism to reasonably regulate operations which periodically may cause fugitive dust emissions into the atmosphere
Article 3: Construction Sites – Fugitive Dust	Improves the control of excessive fugitive dust emissions that have been traditionally associated with construction, earthwork, and land development, and thereby minimize nuisance impacts

Table 4-3. Pinal County Rules Regulating Fugitive Dust in Pinal County Portion of MC PM10 NAA.

Article Number & Title	Description
Article 4: Nonattainment Area Rules; Dustproofing for Commercial Parking, Drives and Yards	Establishes rules to avoid violations of the prevailing PM10 standard and additionally minimize nuisance impacts by improving control of excessive fugitive dust emissions from unpaved parking lots
Article 5: Nonattainment Area Rules; Stabilization for Residential Parking and Drives	Establishes rules for stabilizing residential properties
Article 6: Restrictions on Vehicle Parking and Use on Vacant Lots	Establishes rules for unpaved or unstabilized vacant lots

Article Number & Title	Description
Article 7: Construction Sites in Nonattainment Areas – Fugitive Dust	Establishes rules to avoid violations of the prevailing PM10 standard and additionally minimize nuisance impacts by improving control of excessive fugitive dust emissions from activities associated with construction, earthwork, or land development.
Article 8: Nonattainment Area Rules, Requirement for Stabliazation of Disturbed Areas at Vacant Lots	Establishes rules for stabilizing disturbed areas at vacant lots

PM10 Rule Effectiveness

MCAQD analyzed the effectiveness of its fugitive dust rules (Rules 310, 310.01 and 316) in terms of permit compliance rates. This rule effectiveness (RE) study was designed to assess how many sources regulated by MCAQD during the subject time period received no PM10 emissions-related violations. As a basis for comparison, the percentage of permitted sources in compliance during calendar year 2007 was 76% for sources subject to Rule 310, 85% for Rule 310.01 sources, and 40% for Rule 316 sources. In early 2008, Rules 310, 310.01, and 316 were strengthened, and new ordinances (covering additional source categories such as leaf blowers, vacant lots, and off-road vehicles) were adopted. These enhancements resulted from MCAQD department's obligations under such agreements as the 2005 Revised PM10 State Implementation Plan for the Salt River Area and the Maricopa Association of Governments (MAG) 2007 Five Percent Plan for PM10 for the Maricopa County Nonattainment Area to reduce PM10 emissions throughout the county. Three major areas that contributed to increased compliance were an increase in departmental staffing (especially inspectors), a robust training program, and regulatory changes that broadened and strengthened control measures under Rules 310, 310.01, and 316.

Source compliance rates were re-assessed for FY 2009 (July 2008–June 2009), a period that allowed time for the new and revised regulations to take effect. The results showed significant increases in compliance compared with the earlier period: to 90% (from 76%) for Rule 310 sources, 95% compliance (from 85%) for Rule 310.01 sources, and 65% (from 40%) for Rule 316 sources. These improvements continued into calendar year 2010 with compliance rates of 94% for Rule 310 sources, 96% for Rule 310.01, and 73% for Rule 316 sources. The timeline below illustrates the improvements in RE over the last several years, and also points out significant revisions to previous rules, as well as newly adopted rules and ordinances.

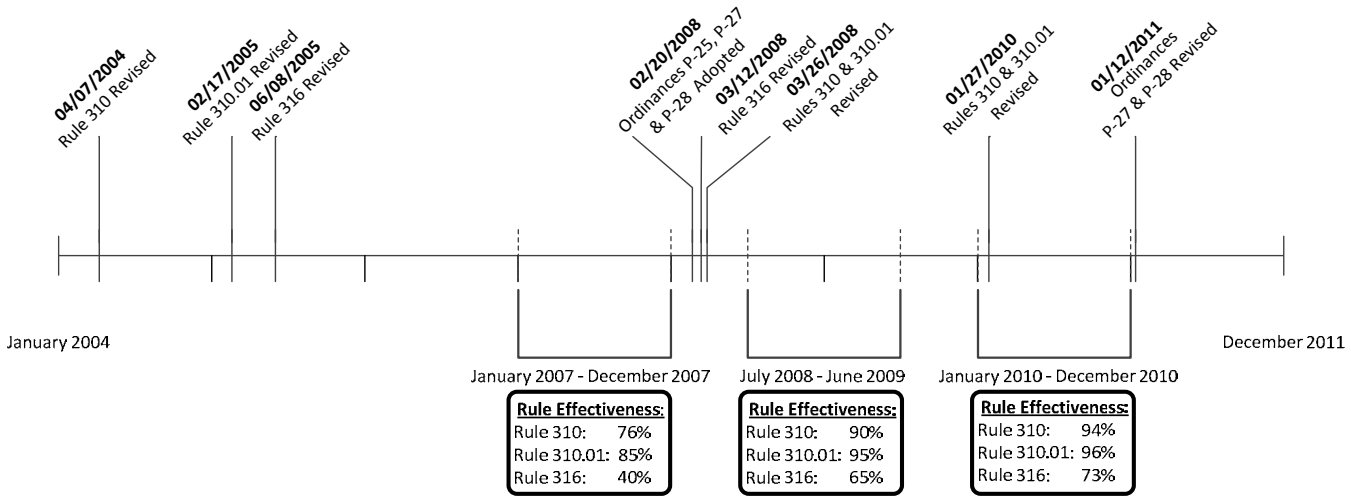


Figure 4-1. Timeline of Maricopa County fugitive dust rules and ordinances.

Compliance and Enforcement Activities

MCAQD is prepared to proactively respond to high wind events and to protect human health and well-being. MCAQD's approach consists of two primary components: routine proactive inspections, as well as surveillance inspections, conducted both during and after significant events. MCAQD proactively inspects dust control-permitted sites and increases the frequency for larger sites of 10 acres or more. Rule 316 sources are also proactively inspected multiple times every year. Maricopa County also responds to the majority of complaints within 24 hours.

Maricopa County monitors the ADEQ Five-Day Dust Control Forecast to identify the potential for elevated PM_{10} pollution levels due to high winds or stagnant conditions. When a High Pollution Advisory (HPA) is issued for Maricopa County, MCAQD conducts additional surveillance before, during, and after the forecast event(s). MCAQD also conducts event surveillance and post-event activities on exceedance days that had not been forecast (i.e., those instances in which an HPA had not been issued).

Pre-event surveillance consists of surveying high risk areas for any dust-generating activities, educating sources of the impending HPA event, and issuing violations for failure to comply with local, state, or federal regulations. During the event, MCAQD inspectors survey high-risk areas to confirm that control measures are in place, document any violations, and contact other regulatory agencies if necessary. Post-event activities include continued surveys of high-risk areas, re-inspection of sources that had received violations within two business days, and an internal MCAQD debriefing of event activities.

Recently, a total of twelve MCAQD air monitoring sites have been updated with new equipment that allows the monitoring sites to automatically report monitored readings at 5-minute intervals, where previously only hourly data were available. The real-time monitoring data programming includes threshold triggers that cause the system to send alerts to MCAQD staff that the PM concentrations are elevated. The system allows MCAQD responders to review concentrations at the monitor and to consult the National Weather Service website to check for weather event activity. This capability allows the responder to identify regional events and monitor specific issues. If necessary, the MCAQD responders can inform nearby stakeholders and local governments of the elevated PM_{10} concentrations.

For October 4, 2011, a Maricopa County Dust Control Forecast was issued indicating a moderate risk level for unhealthy PM10. The Dust Control Forecast also indicated a potential for blowing dust. For the event on October 4, 2011 included in this analysis, MCAQD responders evaluated the situation when concentrations were elevated. During the alerts MCAQD observed weather system activity and noted that many monitors were sequentially impacted by high winds. MCAQD Inspectors were dispatched to conduct surveillance around air quality monitors at approximately 1:00 pm on October 4, 2011; no evidence of unusual anthropogenic-based PM10 emissions was discovered.

An evaluation of inspection reports and compliance records indicate no evidence of unusual anthropogenic-based PM_{10} emissions. During the time period of October 1 through October 7, 2011, MCAQD inspectors conducted a total of 164 inspections on permitted facilities, of which 124 were at fugitive dust sources. Additionally, MCAQD conducted 9 inspections on vacant lots and unpaved parking lots.

During this 7-day period, a total of 30 violations were issued county-wide for PM_{10} and non-PM_{10}-related violations. No violations were issued for PM_{10} emissions within a 4-mile radius of the exceeding monitors.

MCAQD was prepared for any complaints received due to the high wind event. During the 7 day period from October 1 through October 7, 2011, MCAQD received 37 complaints, of which 28 were windblown dust-related. Each complaint was assigned and investigated by a MCAQD inspector. A review of all records during this period reveals that MCAQD inspectors did not observe any violations of local, state, or federal regulations within a 4-mile radius of the exceeding monitors.

In addition to MCAQD's efforts in pre-event surveillance and proactive inspections, ADEQ's Agricultural Best Management Practice Program (Ag BMP) inspector also monitors the ADEQ Five-Day Dust Control Forecast and the MCAQD air monitoring sites that include real-time data. The ADEQ Ag BMP inspector uses specific knowledge of seasonal activities and associations with the local growers and dairymen to communicate the importance of limiting dust-generating activities, especially during high-wind events. Additional outreach is conducted with facility representatives prior to forecasted high-wind alert days. Should the PM10 readings at a MCAQD air monitoring site show notable increases, the ADEQ Ag BMP inspector is dispatched to contact the owners and operators of agriculture fields in the area to discern if their activities are causing negative impacts. The Ag BMP inspector is prepared to respond to most agriculture complaints within 24 hours.

Based on a review of the inspection reports and site visit documentation, there is no evidence to suggest that agricultural activities produced unusual PM10 emissions. On October 3, 2011, the ADEQ Ag BMP inspector received two complaints in the western portion of the Valley and one complaint near Agila approximately 60 miles west of the Phoenix area. The complaints were not in the vicinity of the exceeding monitors and would not have contributed to PM10 measurements at the site.

Conclusions

The strong and gusty low pressure system winds on October 4, 2011 overwhelmed local controls and allowed for the transport of PM10 from areas outside of the PM10 nonattainment area. PM10 levels were elevated throughout Maricopa, Pinal and Pima counties in response to the low pressure system winds; however, the desert areas of Pinal and Pima counties generated the highest levels of PM10 and the allowed for the transport of PM to the exceeding monitors in the southeast portion of the nonattainment area. The Maricopa County area is designated as a serious nonattainment area for PM10 and is required

to have BACM for all significant sources of PM10. BACM-approved control measures on significant anthropogenic sources were in place and enforced during the events, and pro-active tracking and response to the events by regulatory agencies and local governments confirmed the uncontrollable nature of the dust emissions; therefore, these pre-existing/prior approved required controls are adequate for meeting the requirements of an exceptional event and should be considered “reasonable” for these purposes.

Despite the deployment of comprehensive control measures and sophisticated response programs, high wind conditions associated with the low pressure system generated and transported high concentrations of PM10 emissions into, and also overwhelmed controls within, the nonattainment area. Sustained winds over 30 mph and gusts over 45 mph easily overwhelmed all available efforts to limit PM10 concentrations from the event. The fact that this was a natural event involving a low pressure storm system that generated and transported PM10 emissions in Maricopa County provides strong evidence that the exceedances on October 4, 2011 recorded at the West Chandler and Higley monitors were not reasonably controllable or preventable.

V. CLEAR CAUSAL RELATIONSHIP

Introduction

A demonstration of the clear causal connection between windblown dust generated by low pressure system winds and the exceedances at the West Chandler and Higley monitors on October 4, 2011 is provided in this section. A strong, slow-moving low pressure system generated sustained winds over 30 mph and gusts over 45 mph throughout Maricopa, Pinal and Pima counties. PM10 concentrations were elevated throughout all three counties in sync with the arrival of low pressure system winds. The desert and open areas of Pinal and Pima counties were particularly impacted by the strong winds, generating enough windblown dust to cause seven monitors in those counties to exceed. Although almost all monitors in the Maricopa County nonattainment area displayed elevated PM10 concentrations associated with the arrival of the storm system, the monitors located in the southeastern portion of the nonattainment area registered the highest 24 hour PM10 concentrations, with the West Chandler and Higley monitors recording exceedances of the PM10 standard. In this area, the winds from the low pressure system overwhelmed local controls and were clearly strong enough to generate and transport the windblown dust that was the sole cause of the exceedances at the West Chandler and Higley monitors.

A detailed description of the meteorology that caused the natural windblown dust exceedance event at the West Chandler and Higley monitors is described below in a series of time-stamped maps. Visibility photos from within the nonattainment area provide additional temporal evidence of the link between the blowing dust from the low pressure system winds and high PM10 concentrations. The weight of evidence from these sources provides the clear causal connection between the windblown dust generated and transported by low pressure storm system winds and the exceedances at the West Chandler and Higley monitors on October 4, 2011.

Time Series Maps and Visibility Photos.

Figures 5–1 through 5–10 provide a time series GIS-based visualization of the meteorology and PM10 concentrations associated with the storm system. The data displayed in the following maps were gathered from five data sources. All available meteorological and air quality data was used in order to present the most complete story of the event. Table 5–1 displays the types of data used from each agency in creating the maps.

Table 5-1. Data Sets Used in the Creation of Time Series GIS Maps.

Agency	Data Sets
Arizona Department of Environmental Quality (ADEQ)	Hourly PM10 Concentrations, Wind Speed, Wind Direction and Wind Gusts
Arizona Meteorological Network (AZMET)	Hourly Wind Speed, Wind Direction and Wind Gusts
Maricopa County Air Quality Department (MCAQD)	5-Minute PM10 Concentrations, Wind Speed, Wind Direction, and Wind Gusts (hourly data used when 5-minute was unavailable)
Pinal County Air Quality Control District (PCAQCD)	Hourly PM10 Concentrations, 5-Minute and Hourly Wind Speed, Wind Direction and Wind Gusts
National Weather Service (NWS)	Point in Time Wind Speed, Wind Direction, Wind Gusts, and Visibility

Map Description

A description of each time series map is provided to highlight important data in each map and explain the progression of the meteorology and PM10 concentrations through time. Taken as a whole, the maps and associated explanatory text describe the clear causal connection between the windblown dust generated and transported by the low pressure storm system winds and the PM10 exceedances at the West Chandler and Higley monitors.

11:00 AM – 11:30 AM

The conditions as the low pressure system begin to effect the region are shown in this map. Sustained winds from the south are in the teens and largely uniform across the region, with gusts up to 31 mph. Elevated PM10 concentrations are noted at three monitors in Pinal County and also the Buckeye monitor near the western border of the nonattainment area. Visibility still remains good throughout the region as dust production is just beginning at this point.

12:00 PM – 12:30 PM

Southerly sustained winds have increased in magnitude to the upper teens and low 20s, with gusts as high as 38 mph. Increased PM10 concentrations are seen in the central portion of the nonattainment area, especially at the stations reporting high gusts. Five monitors in Pinal county report significant PM10 concentrations in response to the low pressure system winds. Two monitors in Pima County also report elevated PM10 concentrations indicating widespread windblown dust production from the low pressure system.

12:30 PM – 1:00 PM

PM10 concentrations continue to rise at the central phoenix monitors in response to sustained winds in the low 20s and gust up to 40 mph. The low pressure system's movement across the region from west to east is noticeable by the westerly winds now noted at the western Buckeye area monitors. Generally, dust production winds stay ahead of the low pressure system, similar to pre-frontal winds, which help explain why high PM10 concentrations are east of the center of the low pressure system. Visibility at Sky Harbor Airport has been reduced to six miles in response to the blowing dust, and the first significantly elevated concentrations are seen at the southeastern nonattainment area monitors. Visibility continues to deteriorate in Pinal County to three miles in response to the blowing dust. The National Weather Service issues a special weather statement at 12:51 PM warning of blowing dust across Maricopa and Pinal counties throughout the afternoon.

1:00 PM – 1:30 PM

Sustained winds up to 31 mph and gusts up to 41 mph continue to increase PM10 concentrations at the central phoenix area monitors. Visibility has been reduced to only 2.5 miles at the Deer Valley Airport in response to the blowing dust. Very high PM10 concentrations are noted throughout Pinal County in response to the windblown dust from desert area source regions. The southeastern nonattainment area monitors also show increased PM10 concentrations in response to the elevated winds in their region, along with feeling the impacts of transported dust from the open and desert spaces of Pinal County. The National Weather Service issued a blowing dust advisory at 1:11 PM warning of prolonged decreases in visibility in response to wind gusts in the 40s.

1:30 PM – 2:00 PM

As the low pressure system moves to the east across the region, prevailing winds begin to shift more from the south-southwest in response. This will begin to concentrate higher PM10 concentrations to the eastern and southern portions of the region. Visibility is still poor at three miles in the central Phoenix area, but concentrations are starting to come down from their highs in response to shifting winds. Visibility and concentrations are worsening in the southeast region of the nonattainment area, in response to increased windblown dust production and transport. Williams Gateway Airport reports visibility as low as 1.5 miles. Sustained winds are as high as 28 mph with gusts up to 37 mph in this region.

2:00 PM – 2:30 PM

Windblown dust generation continues in the desert regions of Pinal and Pima counties, with the Pima County Rillito monitor noting a significant rise in PM10 concentrations that will eventually lead to an exceedance. The low pressure system continues to move east across the region, with the front of the system now reaching the central Phoenix area. Some thunderstorm activity begins to develop behind the front of the system, as evidences by the trace amounts of rain recorded at Luke Air Force base. Sustained winds remain high throughout the nonattainment area with gusts over 40 mph. The highest PM10 concentrations at the exceeding nonattainment area monitors are recorded during this and the following period.

2:30 PM – 3:00 PM

Windblown dust production is now isolated mostly to the south and east portions of the region as the low pressure system pushes eastward. Visibility has dropped to one mile at the Chandler Municipal Airport. During this time gusts of 46 mph and sustained winds of 34 mph are also recorded at the airport. The nearby Chandler and Higley monitors, which will exceed in response to this event, continue to have very elevated PM10 concentrations due to the elevated winds and continued transport from desert areas to the south of the monitors. Any remaining windblown dust from the central Phoenix area is now also being pushed into the exceeding monitors by westerly winds behind the front of the low pressure system.

3:00 PM – 3:30 PM

The low pressure system front has passed over the central Phoenix monitors, returning the PM10 concentrations to normal levels. Windblown dust production has actually intensified again in the desert areas of Pinal, which will allow for more transport of dust to the exceeding monitors in the nonattainment area. Sustained winds ahead of the low pressure system remain in the low 20s, with gusts up to 43 mph.

3:30 PM – 4:00 PM

Visibility remains poor in the southeastern portion of the nonattainment area, with multiple airports reporting three miles of visibility. The edge of the low pressure system has finally reached this area and has shifted the winds more from the west than the south. PM10 production remains high in Pinal County, with visibility only at 1.8 miles.

4:00 PM – 4:30 PM

PM10 concentrations in the southeastern portions of the nonattainment area final drop in response to the exiting of the low pressure system. Concentrations in Pinal County have also dropped in response.

Sustained winds are largely from the west with speeds in the teens and gusts up to 34 mph. Visibility is still poor at Williams Gateway Airport (two miles) as the windblown dust blows out to the east.

4:30 PM – 5:00 PM

As the low pressure system moves east, PM10 concentrations within the nonattainment area have largely returned to normal levels, except for the eastern most Apache Junction monitor. Visibility levels have returned to the good range and sustained winds are largely in the low to mid-teens from the west.

5:30 PM – 5:30 PM

Some of the predicted thunderstorm activity associated with the unstable conditions of the low pressure system arrives in the western portion of the nonattainment area near Luke Air Force base. Very strong localized gusts and heavy rains are associated with this activity, with gusts as high as 64 mph reported. For the areas that do not receive rain, this burst of wind speed from the thunderstorm will cause a small rise in PM10 concentrations in central Phoenix but will quickly die down as the thunderstorm activity translates into more sustained rains in the northern portions of the nonattainment area.

6:30 PM – 7:00 PM

Outflow winds from the thunderstorm activity can be seen in the eastern portions of the nonattainment area. Rain in the northern portions of the nonattainment area keep PM10 concentrations low and diminish wind speed in the central portions of the nonattainment area. Rain will remain confined to the northern and western portion of the nonattainment area. Pinal County monitors record a brief rise in PM10 concentrations associated with some thunderstorm outflows as well.

7:30 PM – 8:00 PM

The effects from the exited low pressure system are no longer felt, except for lingering rain in the northern portion of the nonattainment area. Almost all sustained winds are less than 10 mph and all but one nonattainment area monitor record PM10 concentrations less than 50 $\mu g/m^3$.

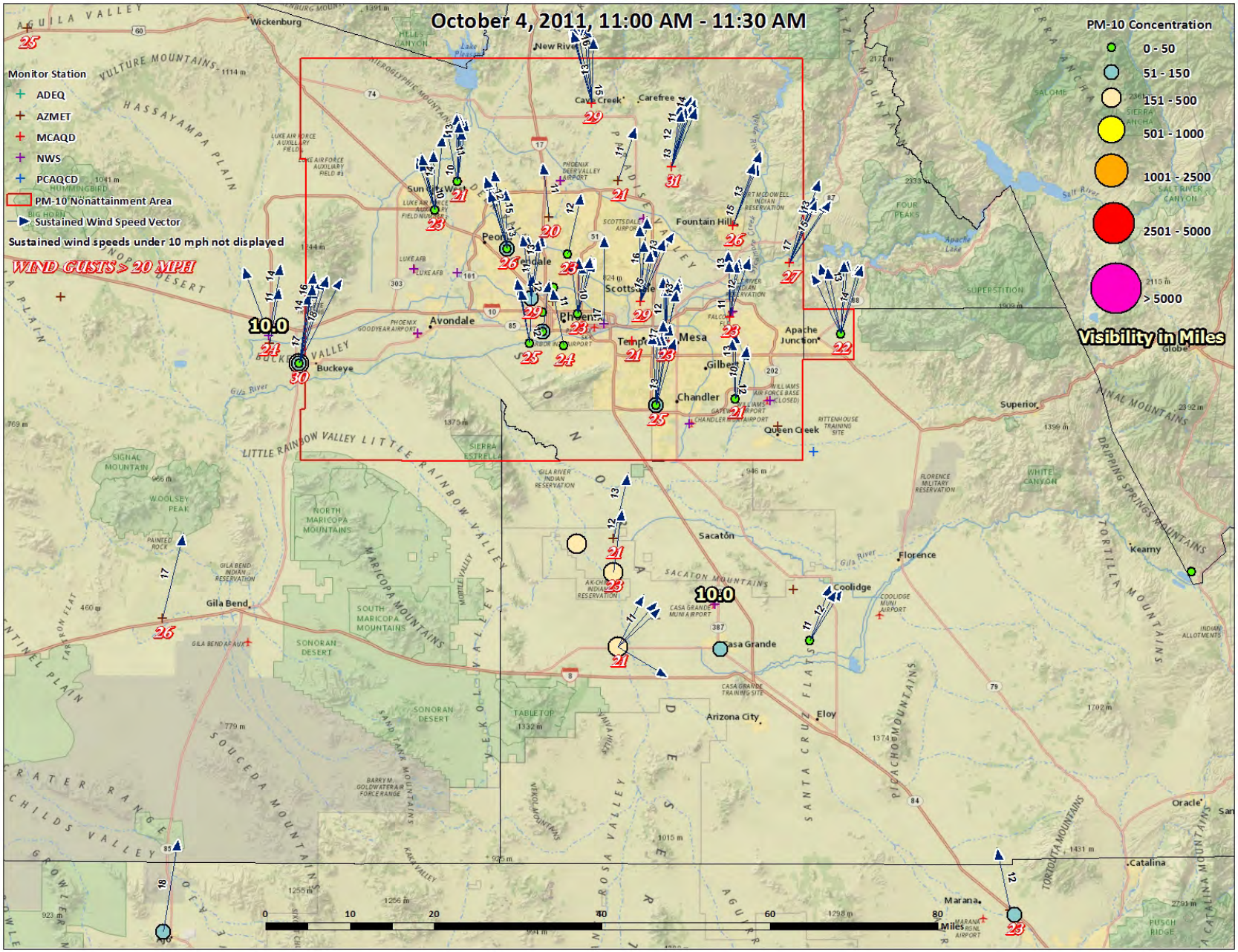


Figure 5-1. October 4, 2011, 11:00 AM – 11:30 AM.

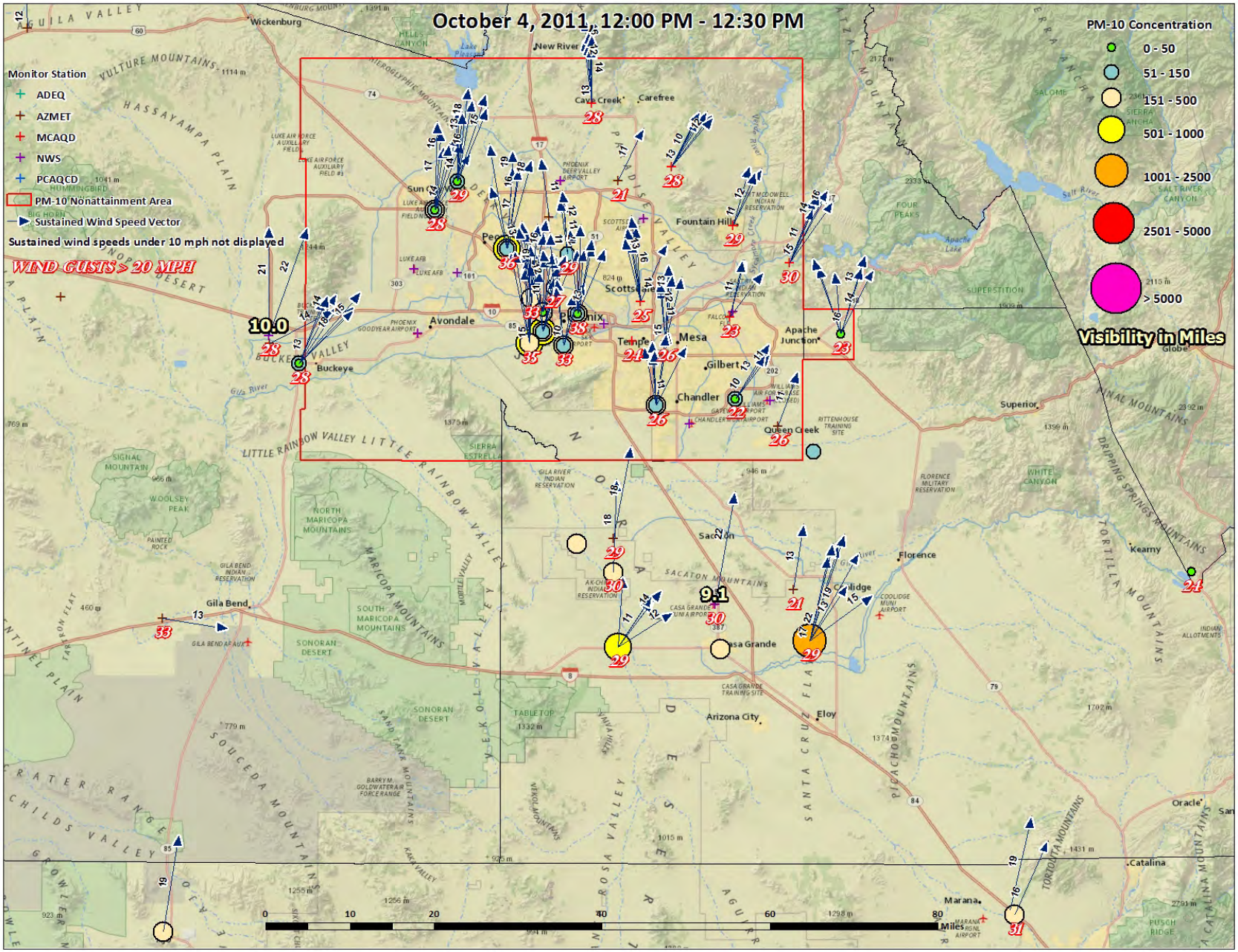


Figure 5-2. October 4, 2011, 12:00 PM – 12:30 PM.

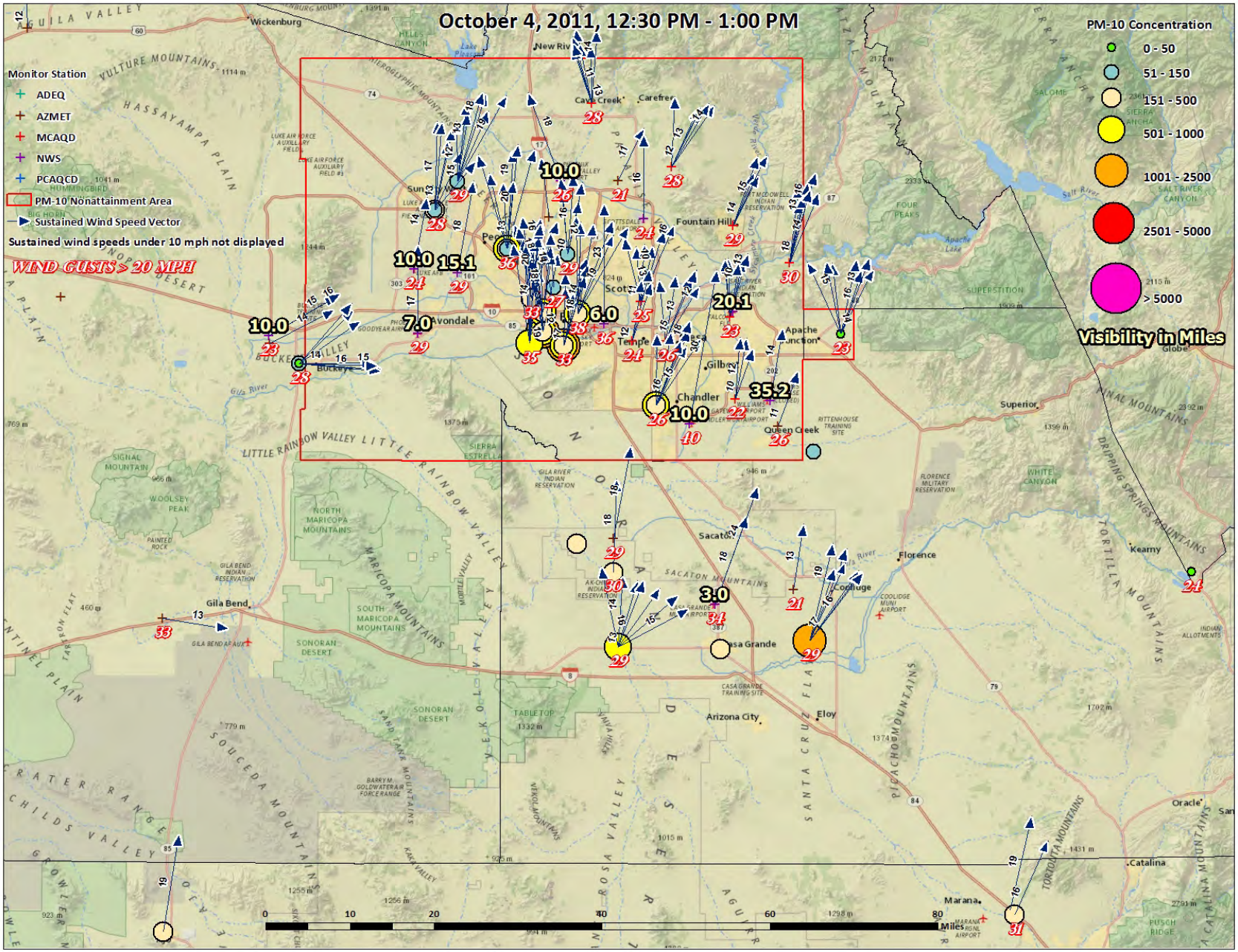


Figure 5-3. October 4, 2011, 12:30 PM – 1:00 PM.

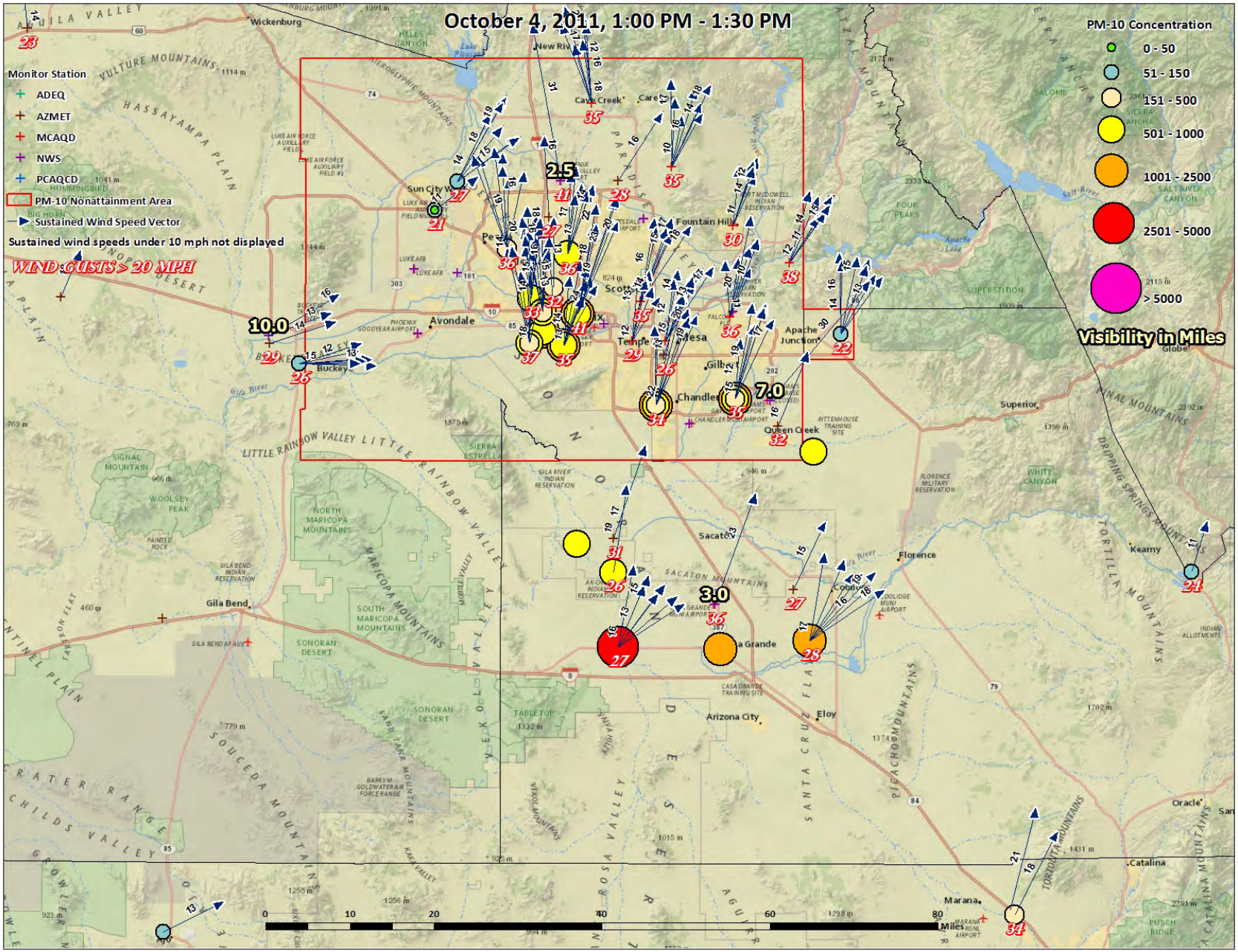


Figure 5-4. October 4, 2011, 1:00 PM – 1:30 PM.

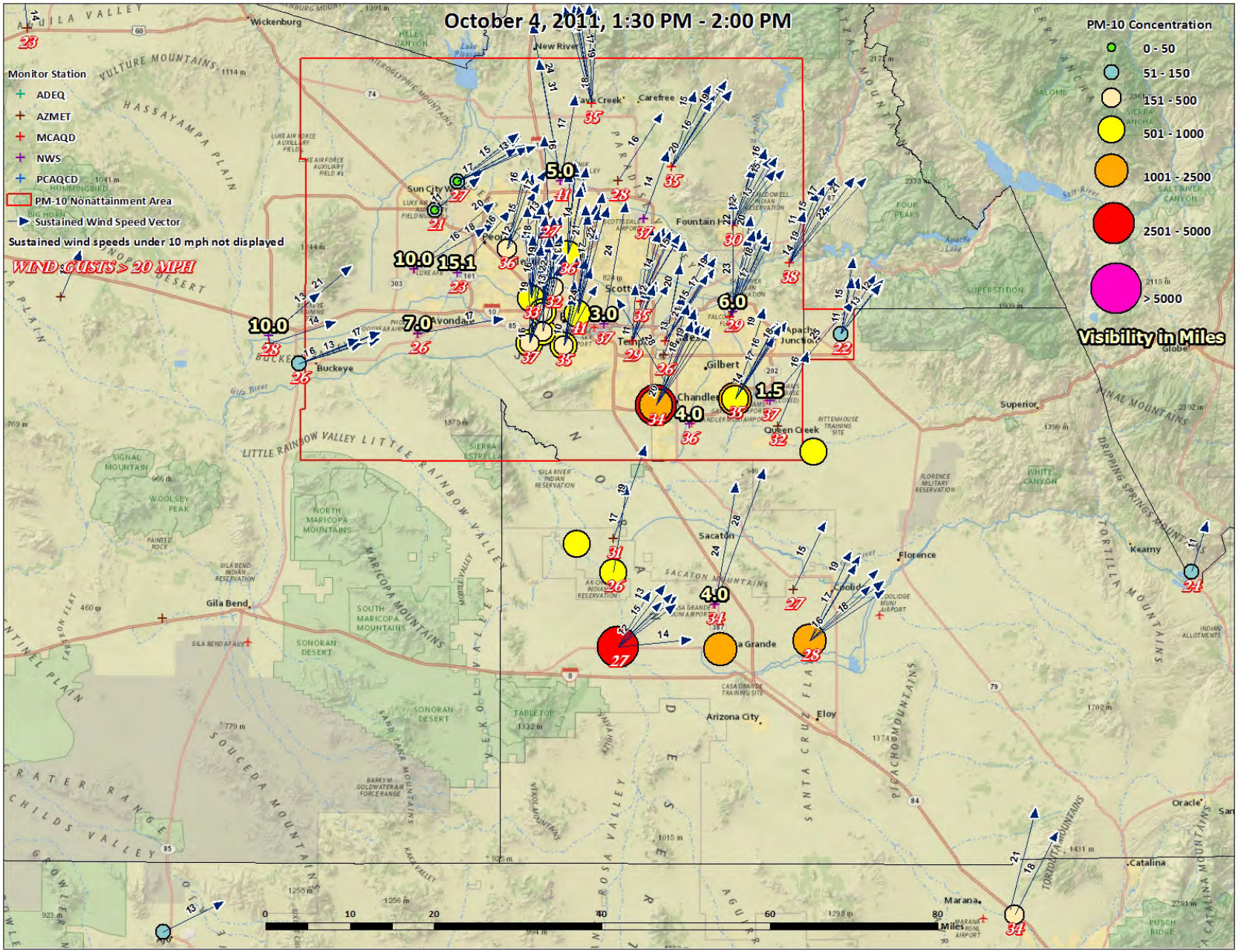


Figure 5-5. October 4, 2011, 1:30 PM – 2:00 PM.

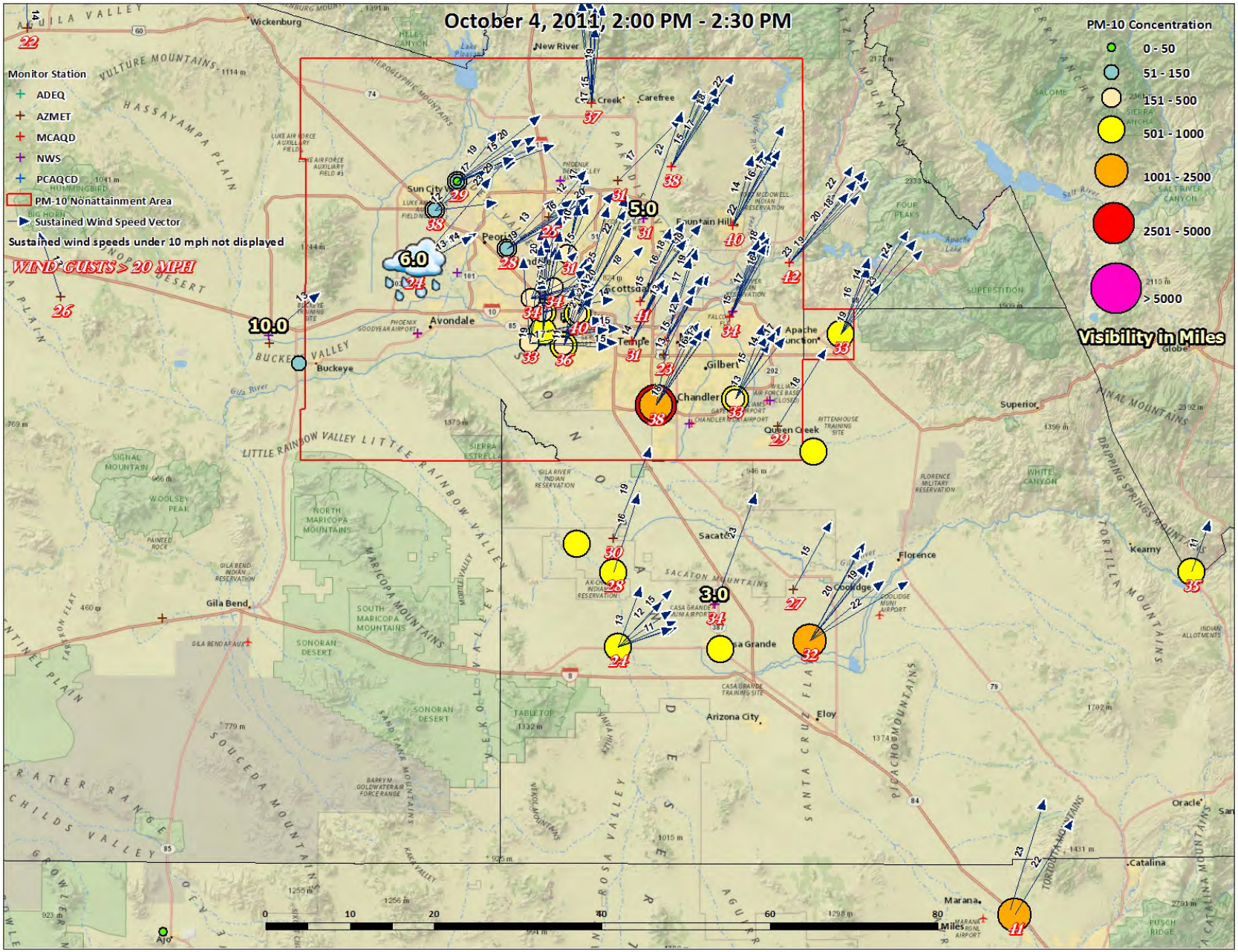


Figure 5-6. October 4, 2011, 2:00 PM – 2:30 PM.

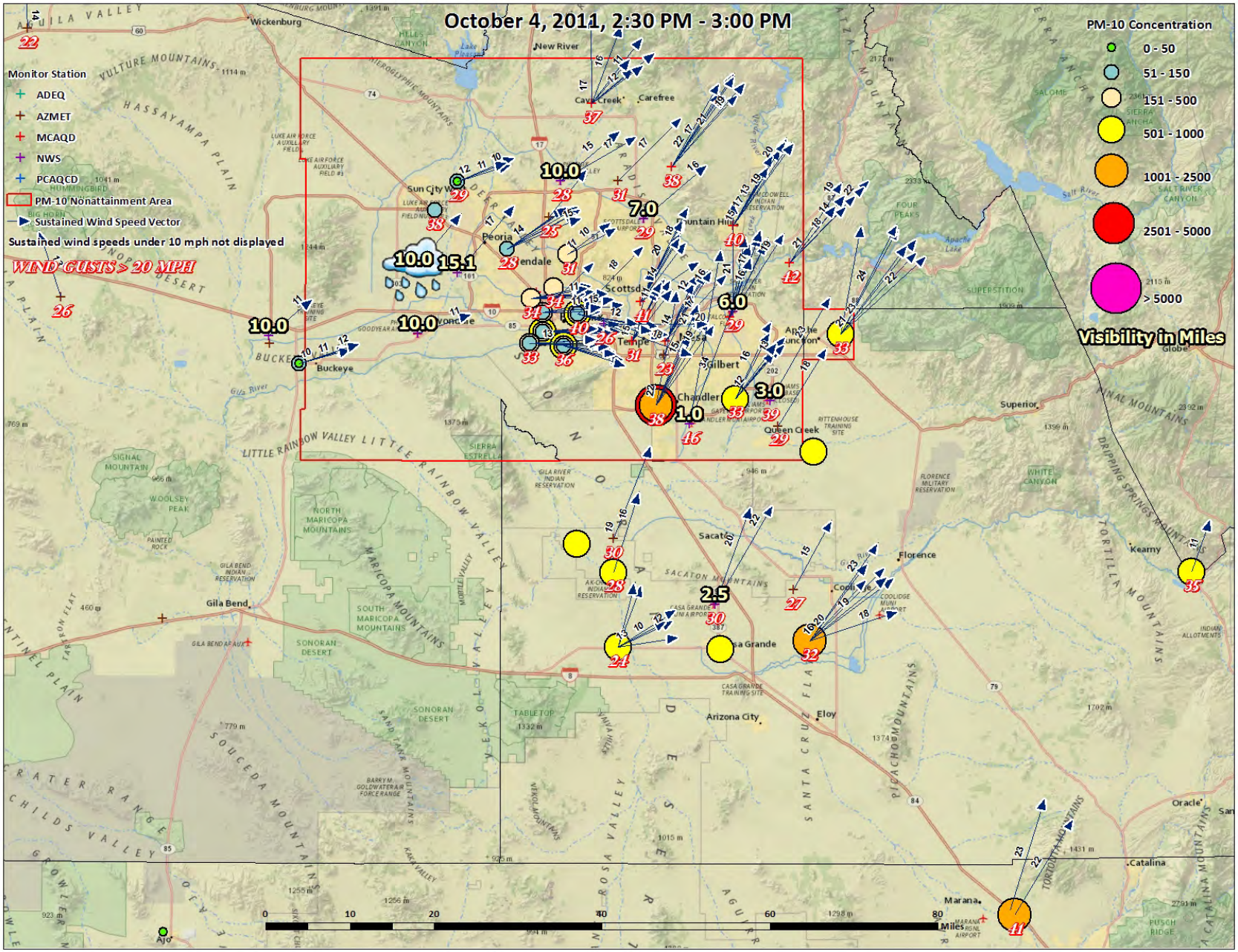


Figure 5-7. October 4, 2011, 2:30 PM – 3:00 PM.

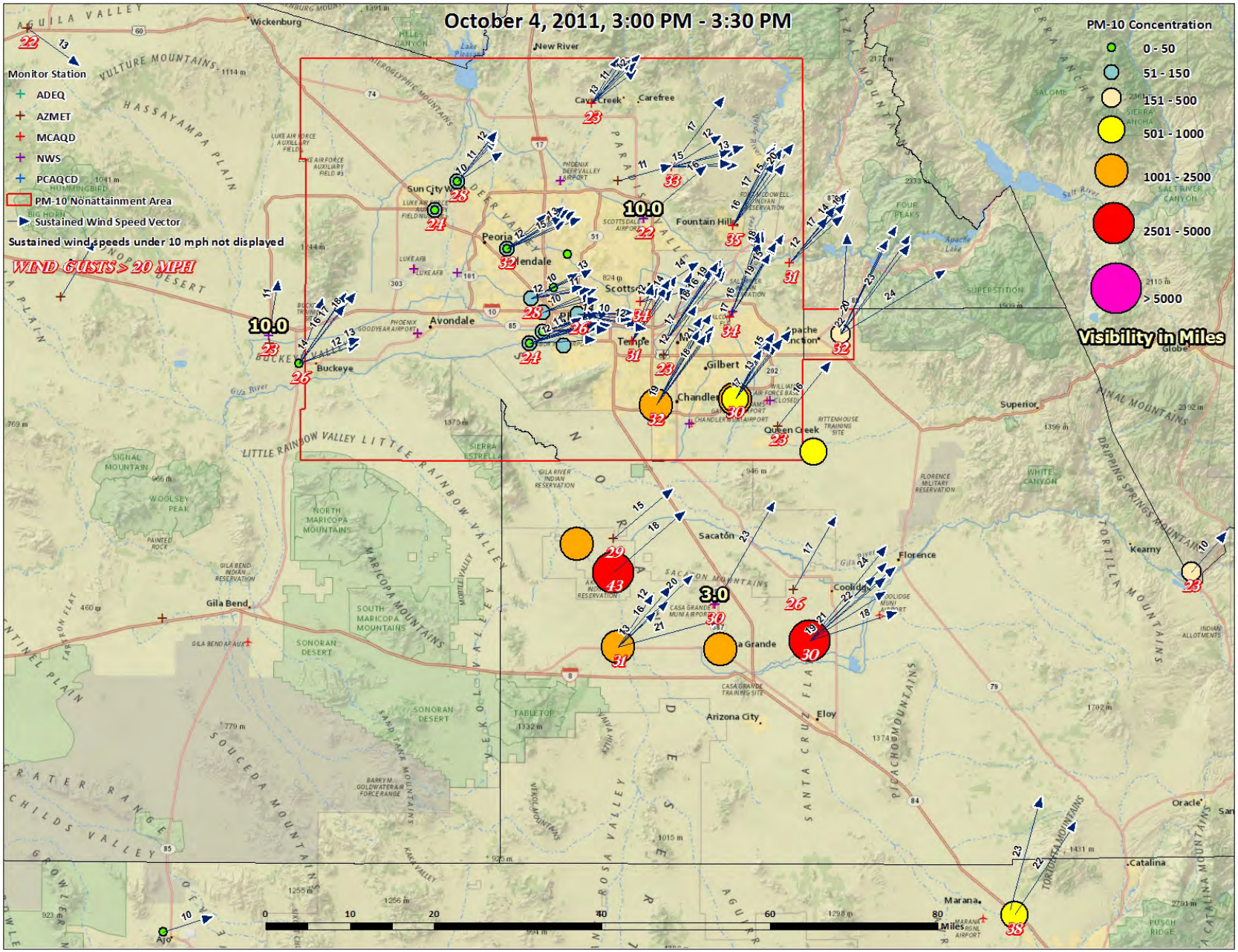


Figure 5-8. October 4, 2011, 3:00 PM – 3:30 PM.

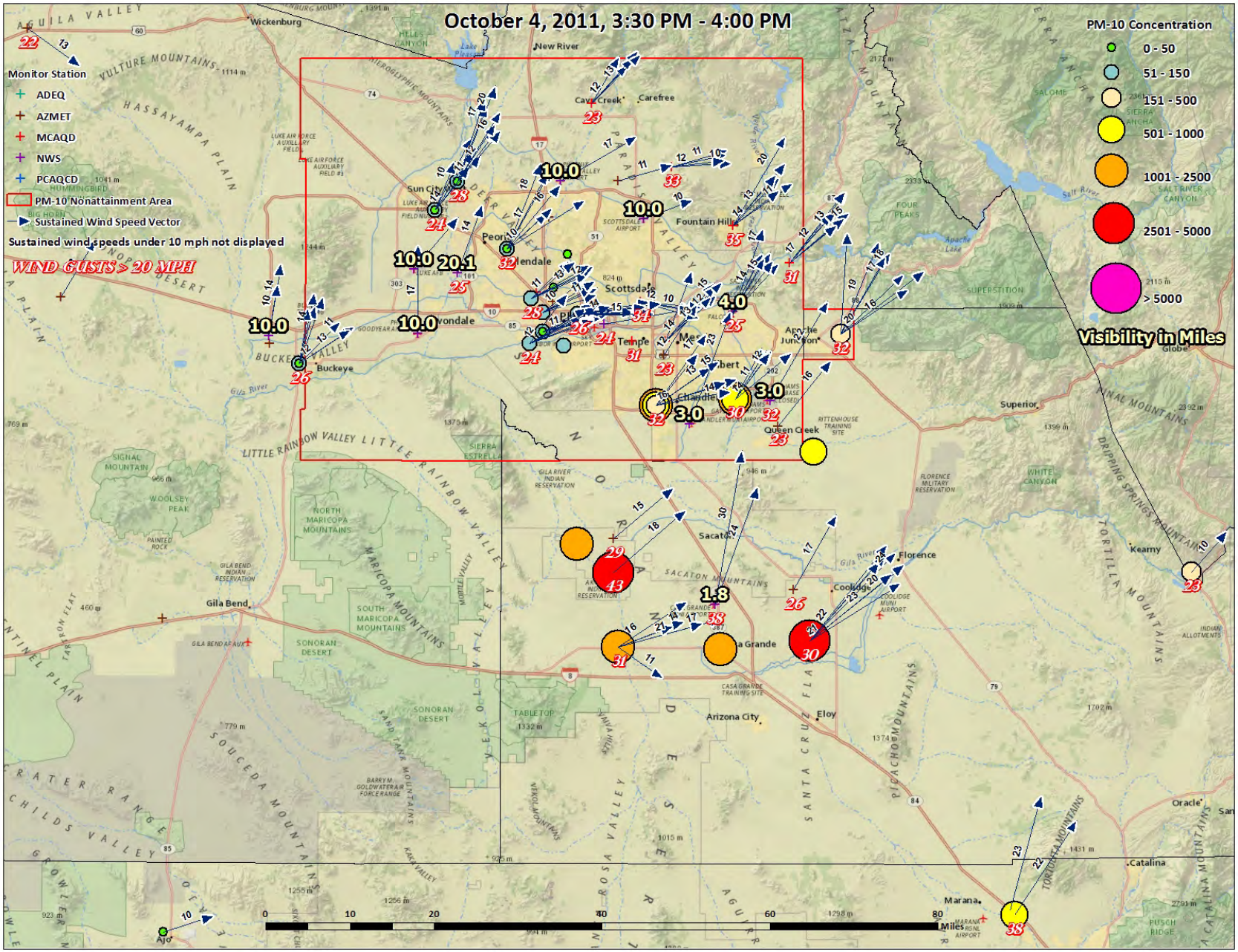


Figure 5-9. October 4, 2011, 3:30 PM – 4:00 PM.

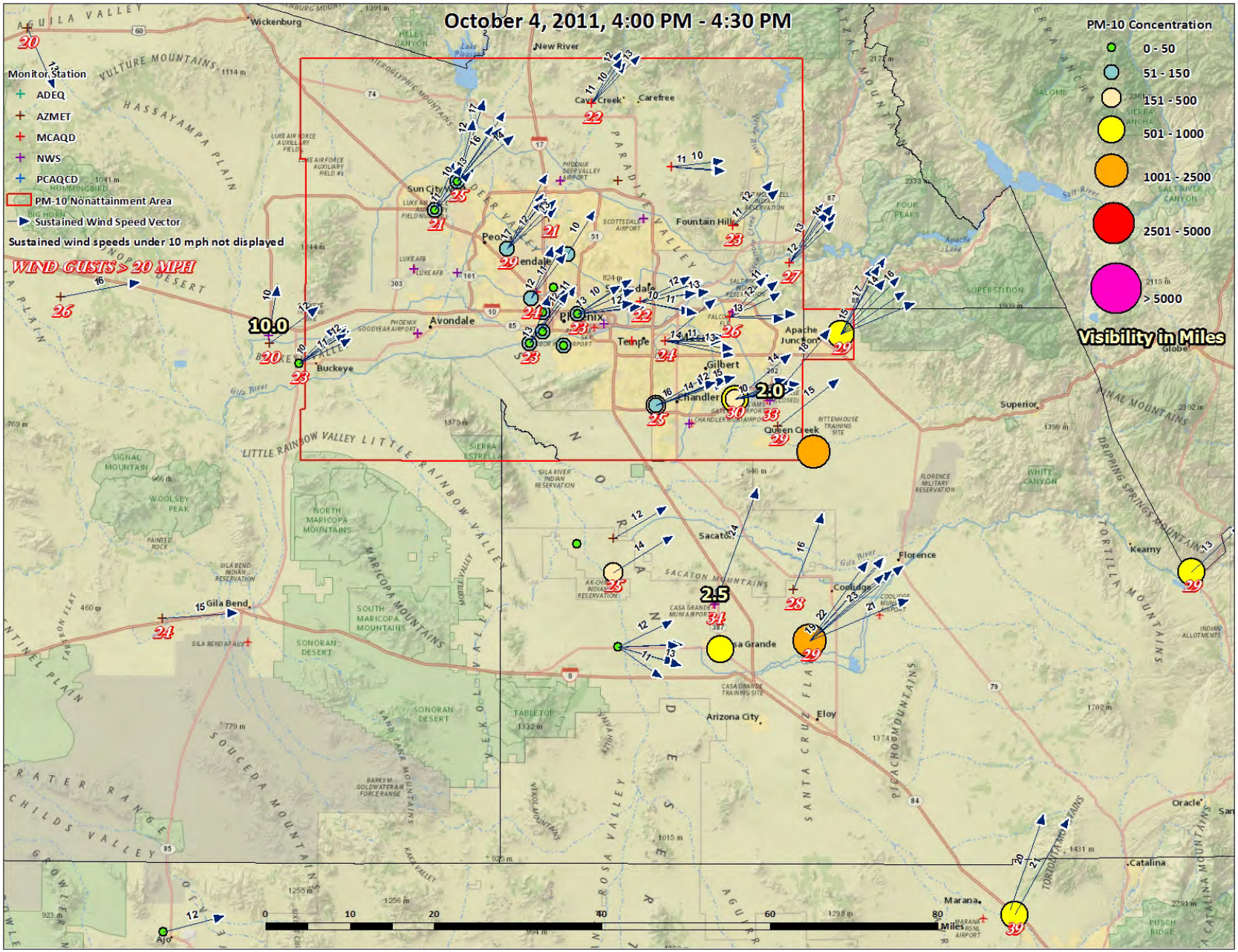


Figure 5-10. October 4, 2011, 4:00 PM – 4:30 PM

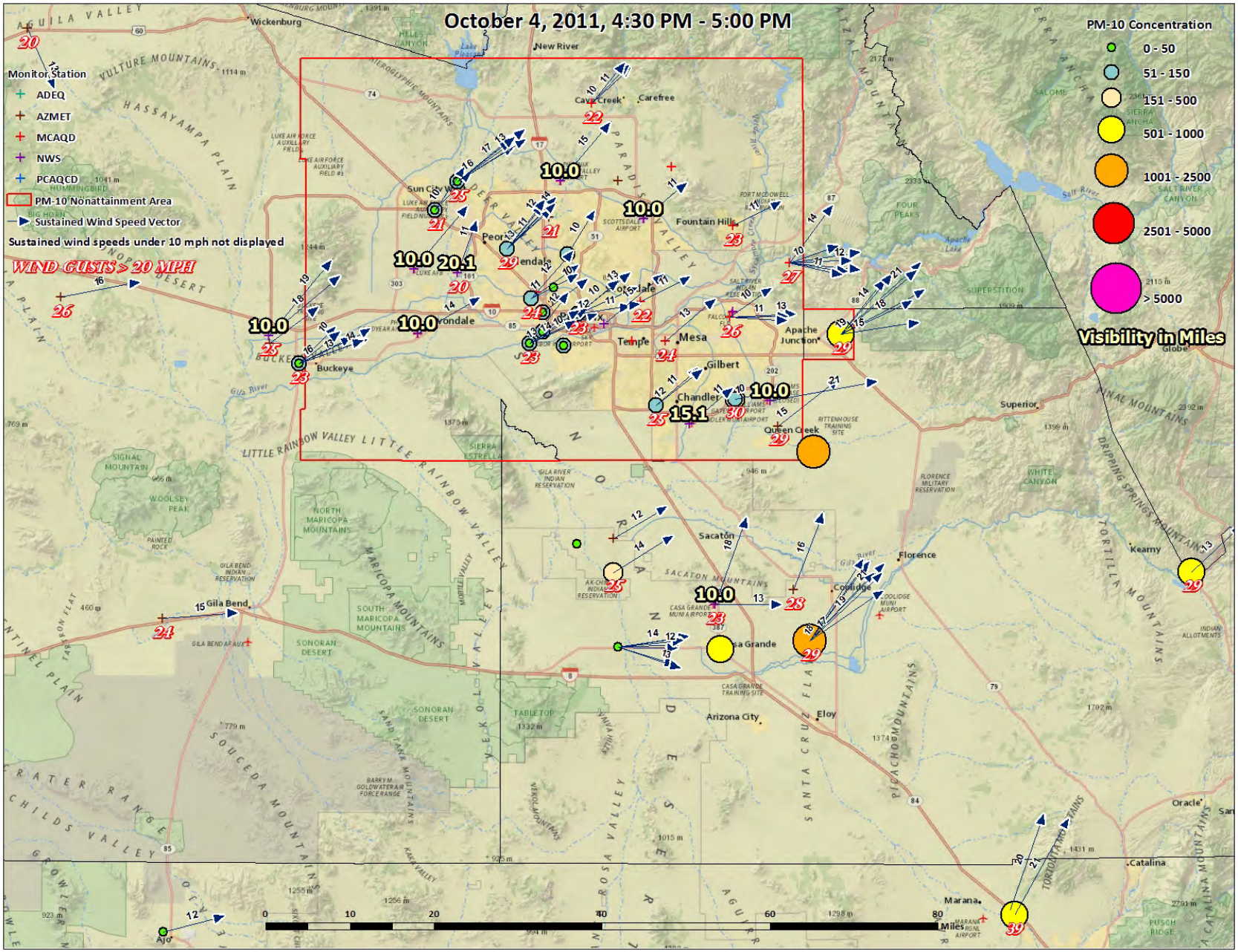


Figure 5-11. October 4, 2011, 4:30 PM – 5:00 PM

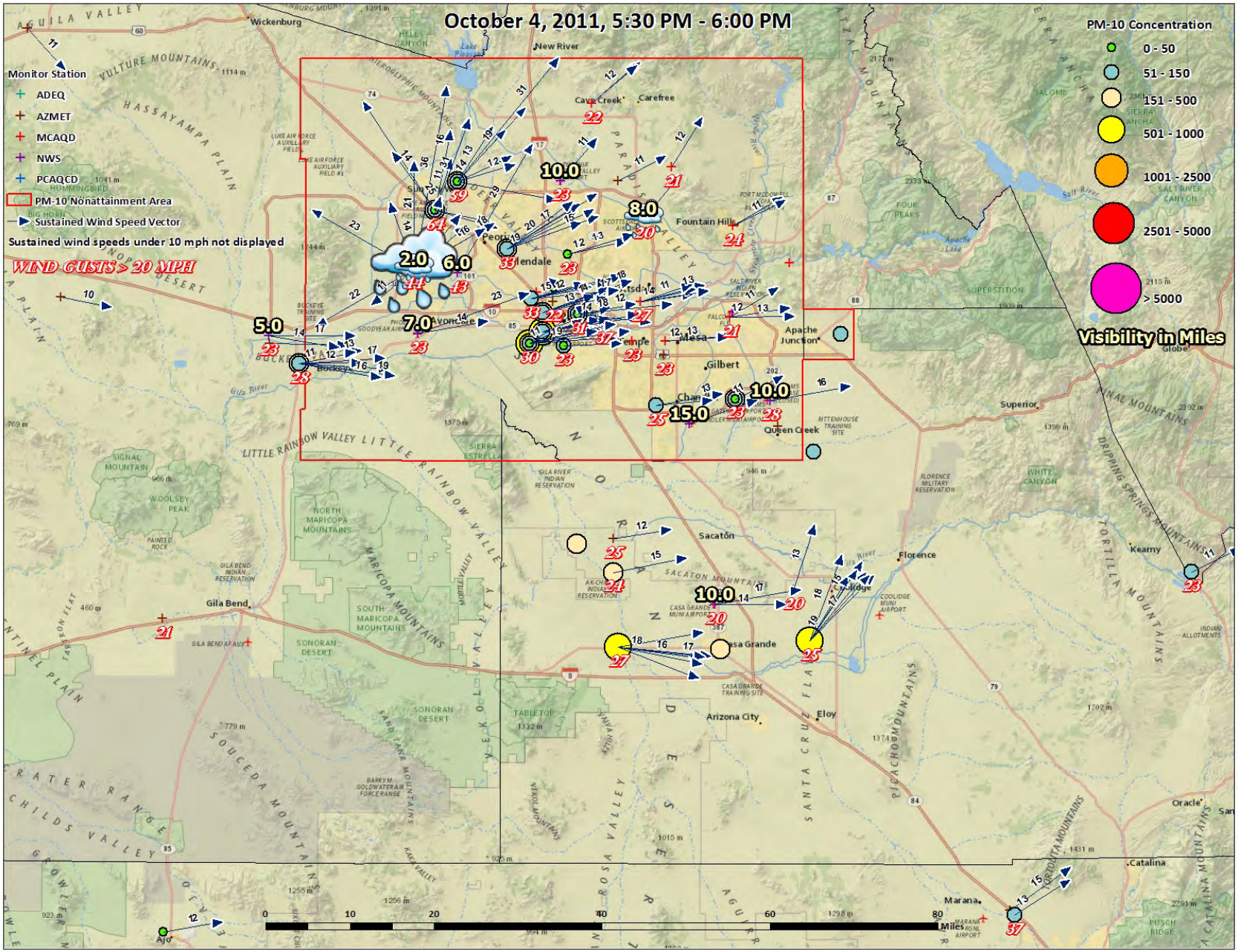


Figure 5-12. October 4, 2011, 5:30 PM – 6:00 PM

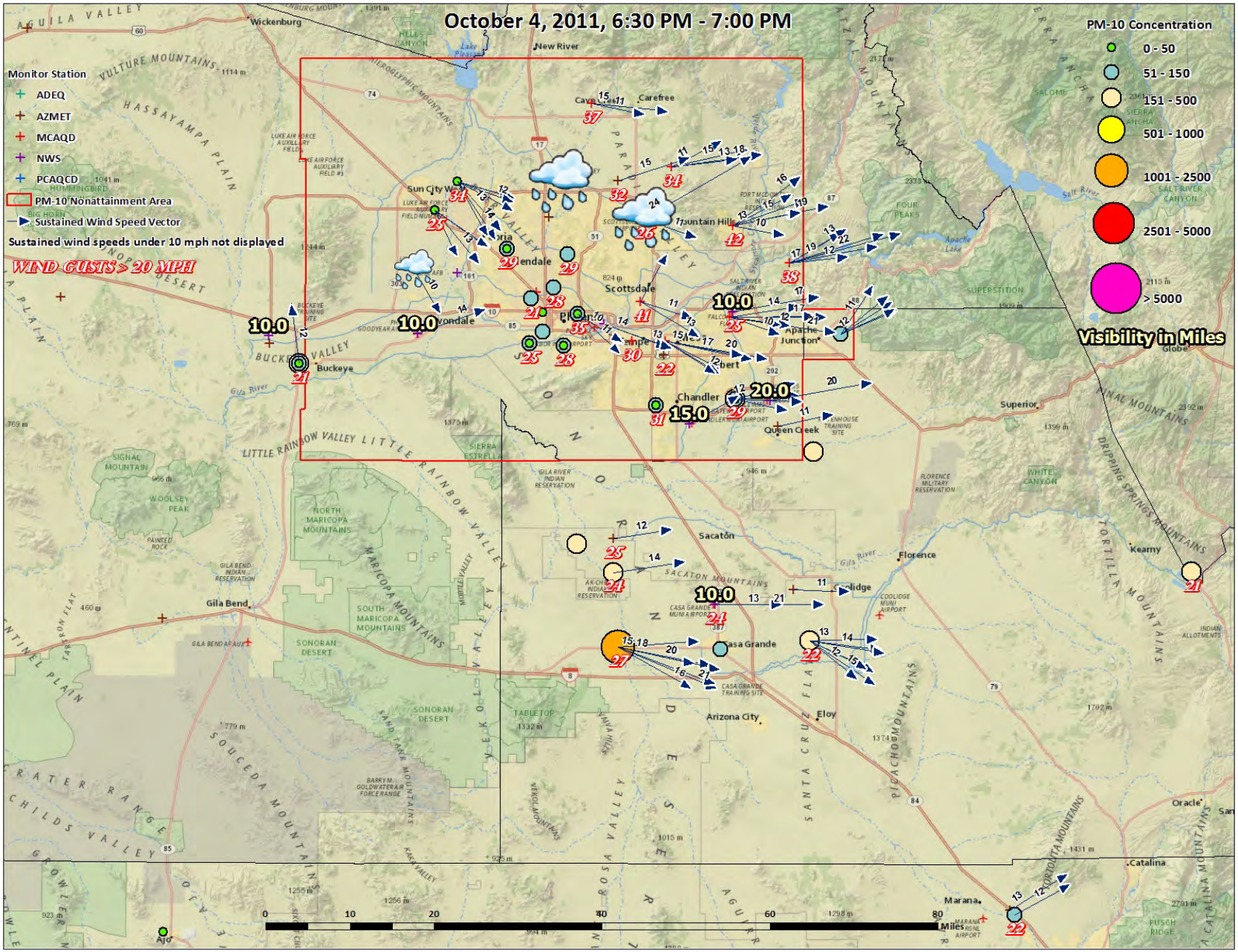


Figure 5-13. October 4, 2011, 6:30 PM – 7:00 PM

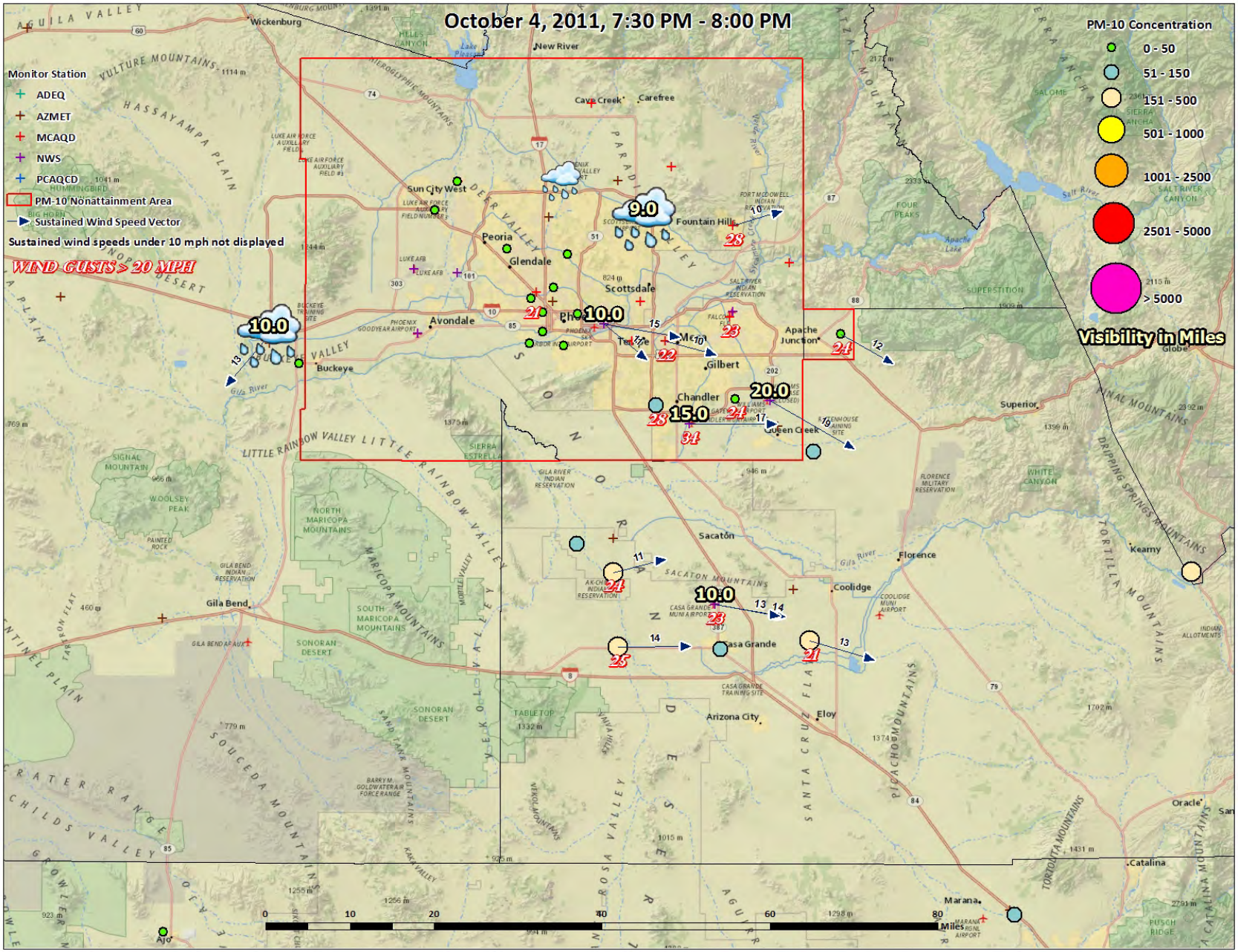


Figure 5-14. October 4, 2011, 7:30 PM – 8:00 PM.

Visibility Photos

Figures 5–15 through 5–17 display time-stamped photos taken by three visibility cameras throughout the nonattainment area. A photo before, during, and after the event from each camera has been selected. These images clearly show the good visibility before the arrival of the low pressure system winds, the poor visibility due to blowing dust as the low pressure system winds arrive, and the subsequent clear conditions after the low pressure system exits the nonattainment area. These images provide a clear causal connection between the regional blowing dust generated and transported by low pressure system winds with the high PM10 concentrations at monitors throughout the nonattainment area. The regional nature of the blowing dust in the images also highlights the unlikelihood of controllable anthropogenic sources being the source of the windblown dust.

Figure 5-15. Visibility photos looking south to downtown Phoenix and South Mountain park at 11:00 AM, 1:15 PM, and 5:00 PM respectively.

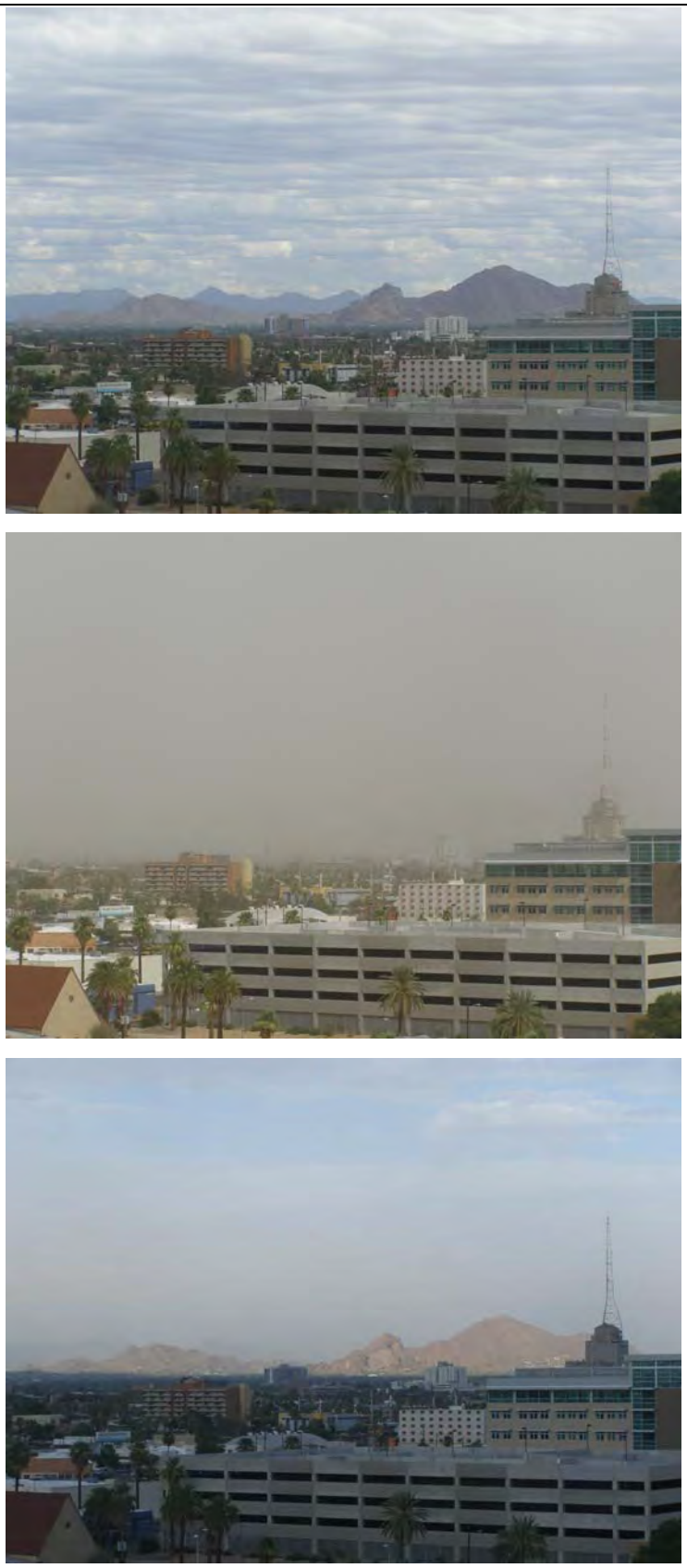


Figure 5-16. Visibility photos looking northeast towards Camelback Mountain in Phoenix at 11:00 AM, 1:15 PM, and 4:45 PM respectively.

Figure 5-17. Visibility photos looking east from Mesa towards the Superstition Mountains at 11:00 AM, 2:30 PM and 5:00 PM respectively.

Conclusion

The information presented within this section has adequately demonstrated a clear causal relationship between the emissions generated by uncontrollable natural events and the exceedances measured at the monitors. The maps and visibility photos provided in this section contain an illustration of the event as it unfolded. The series of maps for the event show a spatial and temporal representation of the low pressure system winds and associated windblown dust as they move throughout Maricopa, Pinal, and northern Pima counties. These maps and visibility photos show a clear causal connection between the windblown dust generated and transported by the low pressure system winds and the exceedance at the West Chandler and Higley monitors. The particular wind magnitudes and wind direction, the proximity of the exceeding monitors to open and desert areas of Pinal County, and the delay in the low pressure system winds exiting the areas around the exceeding monitors provide solid evidence as to why only these monitors within the Maricopa County nonattainment area recorded exceedances. It is clear from these data that sustained wind speeds over 30 mph and gusts over 45 mph were strong enough to generate and transport uncontrollable windblown PM10 emissions to the West Chandler and Higley monitors and demonstrate the clear causal connection between the low pressure system winds and the recorded exceedances.

VI. "BUT FOR" ANALYSIS

Section 50.14(c)(3)(iv)(D) in 40 CFR part 50 requires that an exceptional event demonstration must satisfy that "[t]here would have been no exceedance or violation but for the event." The prior sections of this submittal have provided detailed information that the exceedance on October 4, 2011 was not reasonably controllable or preventable and that there is a clear causal relationship between the windblown dust generated and transported by low pressure system winds and the exceedances at the West Chandler and Higley monitors. The weight of evidence in these sections demonstrates that but for the existence of windblown dust emissions generated and transported by low pressure system winds, there would have been no exceedance of the 24-Hour PM10 standard.

As detailed in Section IV, all reasonable control measures were in place and actively enforced before, during, and after the exceedances on October 4, 2011. Inspection and compliance data of local fugitive dust sources during this time period revealed that PM10 from anthropogenic activities was well controlled and constant. Local regulatory agencies, industry and the general public were alerted to the arrival of the storm through daily forecasts and a blowing dust advisory issued by the National Weather Service. Real-time surveillance of PM10 monitoring stations during the event established a clear link between rapidly rising PM10 concentrations and the arrival of the low pressure system winds. As shown in Figures 6–1 and 6–2, PM10 concentrations in the hours before the event at the exceeding West Chandler and Higley monitors were at normal levels, indicating no significant anthropogenic activities. PM10 concentrations in the hours after the event show a quick return to low levels once winds from the low pressure system exited.

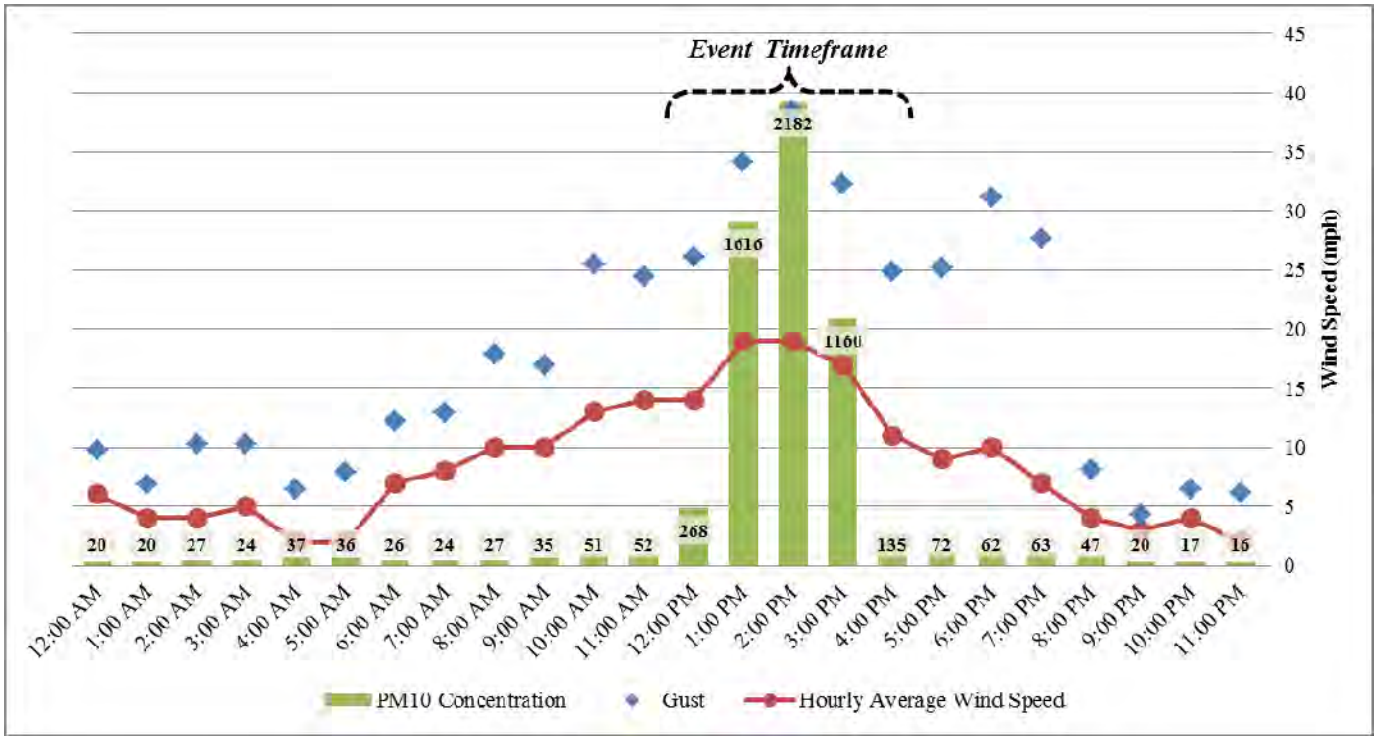


Figure 6-1. Hourly PM10 concentration, wind gust, and average wind speed as recorded at the exceeding West Chandler monitor.

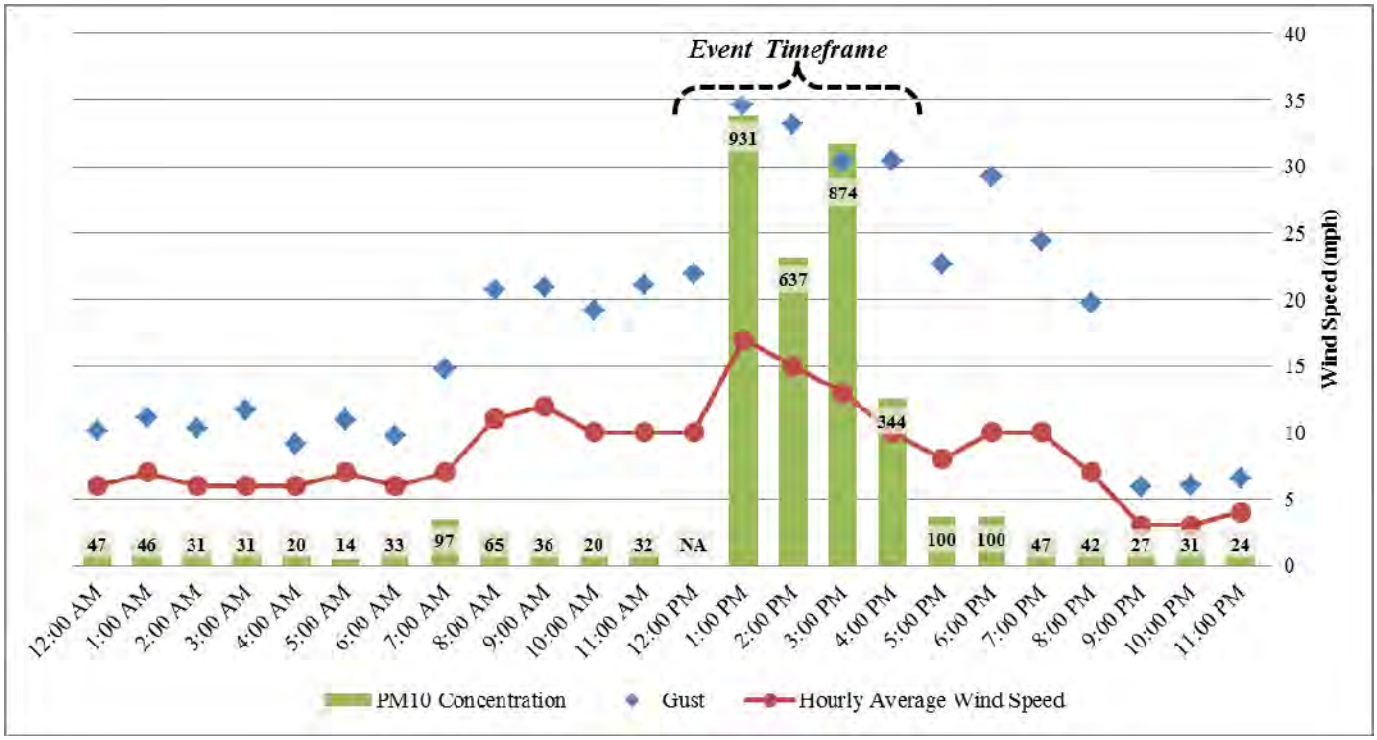


Figure 6-2. Hourly PM10 concentration, wind gust, and average wind speed as recorded at the exceeding Higley monitor.

As shown in Section V, detailed, time series maps establish a clear causal relationship between the arrivals of windblown dust generated by low pressure system winds and elevated PM10 concentrations at the monitors. Sustained winds over 30 mph and gusts over 45 mph overwhelmed all reasonable controls in the nonattainment area and generated region-wide blowing dust. The delayed exit of the low pressure system and the particular location of the exceeding West Chandler and Higley monitors near the open and desert areas of Pinal County establish the clear causal connection between the exceedance and the windblown dust generated and transported by low pressure system winds.

The body of evidence presented in this submittal confirms that the exceedances on October 4, 2011 were a natural event and that there would have been no exceedance but for the presence of the uncontrollable windblown dust from the low pressure system winds.

VII. CONCLUSIONS

The exceedances that occurred on October 4, 2011 satisfy the criteria of 40 CFR 50.1(j) and meet the definition of an exceptional event. These criteria are:

- The event affects air quality.
- The event is not reasonably controllable or preventable.
- The event is unlikely to reoccur at a particular location or [is] a natural event.

A. Affects Air Quality

As stated in the preamble to the Exceptional Events Rule, the event in question is considered to have affected air quality if it can be shown that there is a clear causal relationship between the monitored exceedance and the event, and that the event is associated with a measured concentration in excess of normal historical fluctuations. Given the information presented in Sections II, III, IV and V, it is reasonable to conclude that the event in question affected air quality.

B. Not Reasonably Controllable or Preventable

Section 50.1(j) of Title 40 CFR Part 50 requires that an event must be "not reasonably controllable or preventable" in order to be defined as an exceptional event. This requirement is met by demonstrating that despite reasonable control measures in place within Maricopa County and the Phoenix PM10 nonattainment area, high wind conditions overwhelmed all reasonably available controls. Despite the deployment of comprehensive control measures and sophisticated response programs, high wind conditions associated with low pressure system winds generated and transported high concentrations of PM10 emissions into, and also overwhelmed controls within, the Phoenix PM10 nonattainment area. Sustained winds over 30 mph and gusts over 45 mph easily overwhelmed all available efforts to limit PM10 concentrations from the event. The fact that this was a natural event involving low pressure system winds that generated and transported PM10 emissions in Maricopa County provides strong evidence that the exceedances on October 4, 2011 recorded at the West Chandler and Higley monitors were not reasonably controllable or preventable.

C. Natural Event

As discussed above, the event shown to cause these exceedances were emissions of PM10 caused by low pressure system winds on October 4, 2011. The event therefore qualifies as a natural event.

In summary, the exceedances of the federal 24-hour PM10 standard on October 4, 2011, would not have occurred but for the uncontrollable windblown dust emissions generated and transported by low pressure system winds, based on the following weight of evidence:

- Section II explains the meteorology associated with a low pressure system and displays how this type of system produces strong and gusty winds which in turn generate significant quantities of windblown dust.

- The Historical Fluctuation analysis in Section III, showing five years of 24-hour average data for the West Chandler and Higley monitors, demonstrates the atypical values recorded at the monitors on October 4, 2011.

- Section IV discusses rules that are in place in the Phoenix PM10 nonattainment area as well as inspections that were conducted in the area to verify compliance with those rules in order to show that the event was not reasonably controllable or preventable and that no significant anthropogenic dust emissions were present during the event.

- Figures in Section V show that the timing of elevated PM10 concentrations at the West Chandler and Higley monitors are tied to the progression of low pressure system winds across Maricopa, Pinal and Pima counties. These sustained winds of over 30 mph and gusts over 45 mph generated and transported uncontrollable windblown dust to PM10 monitors throughout the nonattainment area. The delayed exit of the low pressure system and the proximity of the monitors to the open and desert spaces of Pinal County explain why the West Chandler and Higley monitors in particular exceeded the PM10 standard.

- Visibility camera imagery displayed in Section V indicates the regional nature of the windblown dust caused by the low pressure system winds and provides evidence that high PM10 concentrations are linked to natural sources as opposed to specific anthropogenic sources of dust.

APPENDIX A

ADEQ FORECAST PRODUCTS FOR PHOENIX AND MARICOPA COUNTY

MARICOPA COUNTY DUST CONTROL FORECAST

ISSUED MONDAY, OCTOBER 03, 2011

Five-day weather outlook:

A series of vigorous upper level disturbances in the mid-latitude storm track will impact Arizona during this forecast period. In addition to gusty gradient winds at times, these disturbances will be capable of spawning showers and/or thunderstorms capable of generating strong downdrafts and dense blowing dust in the Phoenix metro area on Tuesday but especially on Thursday. As a result, until or unless significant rainfall occurs there will be a moderate to high risk of unhealthy PM-10 levels both days.

R I S K F A C T O R S

	WINDS		STAGNATION		UNHEALTHY PM-10 RISK LEVEL
Day 1: Tue 10/04/2011	South to southwesterly 15-25 mph with gusts near 30 mph except strong and gusty due to outflow from thunderstorms.	+	No stagnation expected.	=	**MODERATE**
Day 2: Wed 10/05/2011	Southwesterly 15-25 mph during the afternoon.	+	Somewhat stagnant during the morning hours.	=	**LOW**
Day 3: Thu 10/06/2011	Southwesterly 20-30 mph with gusts near 40 mph except even stronger due to outflow from thunderstorms.	+	No stagnation expected.	=	**HIGH**
EXTENDED OUTLOOK					
Day 4: Fri 10/07/2011	Northwesterly 10-20 mph	+	Somewhat stagnant during the morning hours.	=	**LOW**
Day 5: Sat 10/08/2011	Northerly 5-15 mph	+	Somewhat stagnant during the morning hours.	=	**LOW**

The Maricopa County Dust Control Action Forecast is issued to assist in the planning of work activities to help reduce dust pollution. A recorded message of this forecast can be accessed at 602-771-2368. To review the complete air quality forecast for the Phoenix metropolitan area, as well as the health impacts and reduction methods for different air pollutants, call 602-771-2367 for recorded forecast information or click on ADEQ's Air Quality Forecast at http://www.azdeq.gov/environ/air/ozone/ensemble.pdf.

CKR 04/28/2011

ADEQ Arizona Department of Environmental Quality

VERY UNHEALTHY (201-300)

UNHEALTHY (151-200)

UNHEALTHY FOR SENSITIVE GROUPS (101-150)

MODERATE (51-100)

GOOD (0-50)

For more information visit:
http://www.epa.gov/airnow/aqibroch

LINK TO 2011 AIR POLLUTION EXCEEDANCE GRAPH

AIR QUALITY FORECAST FOR TUESDAY, OCTOBER 04, 2011

This report is updated by 1:00 p.m. Sunday thru Friday and is valid
for areas within and bordering Maricopa County in Arizona

FORECAST DATE **NOTICES** (*SEE BELOW FOR DETAILS) AIR POLLUTANT	YESTERDAY SUN 10/02/2011 **NONE** Highest AQI Reading/Site (Preliminary data only)	TODAY MON 10/03/2011 **DUST**	TOMORROW TUE 10/04/2011 **DUST**	EXTENDED WED 10/05/2011 **NONE**
O3*	**64** **PHOENIX SUPERSITE**	**50** **GOOD**	**44** **GOOD**	**42** **GOOD**
CO*	**07** **GREENWOOD & WEST PHOENIX**	**09** **GOOD**	**08** **GOOD**	**10** **GOOD**
PM-10*	**41** **WEST PHOENIX**	**50** **GOOD**	**84** **MODERATE**	**56** **MODERATE**
PM-2.5*	**32** **WEST PHOENIX**	**30** **GOOD**	**43** **GOOD**	**34** **GOOD**

* O3 = Ozone CO = Carbon Monoxide PM-10 = Particles 10 microns & smaller PM-2.5 = Particles smaller than 2.5 microns

*"Ozone Health Watch" means that the highest concentration of OZONE may approach the federal health standard.
"PM-10 or PM-2.5 Health Watch" means that the highest concentration of PM-10 or PM-2.5 may approach the federal health standard.
"High Pollution Advisory" means that the highest concentration of OZONE, PM-10, or PM-2.5 may exceed the federal health standard.
"DUST" means that short periods of high PM-10 concentrations caused by outflow from thunderstorms are possible.

Health message for Monday October 03: No health impacts are expected.

Health message for Tuesday October 04: Unusually sensitive people should consider reducing prolonged or heavy exertion.

Synopsis and Discussion

PARTICLES: The first in a series of vigorous upper level disturbances in the mid-latitude storm track will impact Arizona during this forecast period. Gusty gradient winds are likely by Tuesday the afternoon, although considerable mostly high cloud cover may keep gradient wind speeds below their potential. This disturbance will also be capable of spawning showers and/or thunderstorms with the possibility of strong downdrafts and episodes of dense blowing dust in the Phoenix metro area. As a result, until or unless significant rainfall occurs there is the potential for elevated PM-10 (coarse particle) levels tomorrow.

OZONE: Gusty winds at times, lowering temperatures, and an increase in daytime cloud cover the next few days should help to lower Valley ozone levels into the good range of the Air Quality Index Tuesday and Wednesday.

MONITORING SITE MAPS: STATIC MAP – **http://www.azdeq.gov/environ/air/monitoring/images/map.jpg**
INTERACTIVE MAPS – **http://aqwww.maricopa.gov/AirMonitoring/SitePollutionMap.aspx**
http://www.airnow.gov/

POLLUTION MONITOR READINGS FOR SUNDAY, OCTOBER 02, 2011

O3 (OZONE)

SITE NAME	MAX 8-HR VALUE (PPB)	MAX AQI	AQI COLOR CODE
Apache Junction (Pinal County)	49	42	
Blue Point	51	43	
Central Phoenix	57	48	
Fountain Hills	57	48	
North Phoenix	61	54	
Phoenix Supersite	64	64	
Pinnacle Peak	53	45	
South Phoenix	56	47	
South Scottsdale	59	50	
West Phoenix	60	51	

CO (CARBON MONOXIDE)

SITE NAME	MAX 8-HR VALUE (PPM)	MAX AQI	AQI COLOR CODE
Buckeye	0.0	00	
Central Phoenix	26	24	
Dysart	0.2	02	
Glendale	0.4	05	
Greenwood	0.6	07	
Mesa	0.3	03	
North Phoenix	0.2	02	
Phoenix Supersite	NOT AVBL	NOT AVBL	NOT AVBL
South Phoenix	0.5	06	
South Scottsdale	0.4	05	
Tempe	0.5	06	
West Chandler	0.2	02	
West Phoenix	0.6	07	

PM-10 (PARTICLES)

SITE NAME	MAX 24-HR VALUE (ug/m3)	MAX AQI	AQI COLOR CODE
Buckeye	25	23	
Central Phoenix	26	24	
Combs School(Pinal County)	36	33	
Durango	29	27	
Dysart	24	22	
Glendale	29	27	
Greenwood	28	26	
Higley	22	20	
Maricopa	34	31	
North Phoenix	22	20	
Phoenix Supersite	23	21	
South Phoenix	37	34	
West Chandler	26	24	
West Forty Third	28	26	
West Phoenix	44	41	
Zuni Hills	21	19	

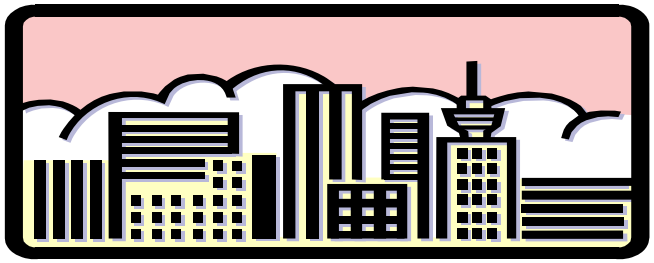
PM-2.5 (PARTICLES)

(Some data derived from light-scattering equipment)

For maps go to: http://www.airnow.gov/

SITE NAME	MAX 24-HR VALUE (ug/m3)	MAX AQI	AQI COLOR CODE
Durango	7.6	25	
Dysart	4.7	15	
Estrella Mountain Park	5.0	16	
Glendale	8.4	27	
North Phoenix	8.0	26	
Phoenix Supersite	5.7	19	
South Phoenix	7.0	23	
Vehicle Emissions Lab	3.4	13	
West Phoenix	10.0	32	

LOCAL AIR POLLUTANTS IN DETAIL



O3 (OZONE):

Description – This is a secondary pollutant that is formed by the reaction of other primary pollutants (precursors) such as VOCs (volatile organic compounds) and NOx (Nitrogen Oxides) in the presence of heat and sunlight.

Sources – VOCs are emitted from motor vehicles, chemical plants, refineries, factories, and other industrial sources. NOx is emitted from motor vehicles, power plants, and other sources of combustion.

Potential health impacts – Exposure to ozone can make people more susceptible to respiratory infection, result in lung inflammation, and aggravate pre-existing respiratory diseases such as asthma. Other effects include decrease in lung function, chest pain, and cough.
Unit of measurement – Parts per billion (ppb).
Averaging interval – Highest eight-hour period within a 24-hour period (midnight to midnight).
Reduction tips – Curtail daytime driving, refuel cars and use gasoline-powered equipment as late in the day as possible.

CO (CARBON MONOXIDE):

Description – A colorless, odorless, poisonous gas formed when carbon in fuels is not burned completely.
Sources – In cities, as much as 95 percent of all CO emissions emanate from automobile exhaust. Other sources include industrial processes, non-transportation fuel combustion, and natural sources such as wildfires. Peak concentrations occur in colder winter months.
Potential health impacts – Reduces oxygen delivery to the body's organs and tissues. The health threat is most serious for those who suffer from cardiovascular disease.
Unit of measurement – Parts per million (ppm).
Averaging interval – Highest eight-hour period within a 24-hour period (midnight to midnight)
Reduction tips – Keep motor vehicle tuned properly and minimize nighttime driving.

PM-10 & PM-2.5 (PARTICLES):

Description – The term "particulate matter" (PM) includes both solid particles and liquid droplets found in air. Many manmade and natural sources emit PM directly or emit other pollutants that react in the atmosphere to form PM. Particles less than 10 micrometers in diameter tend to pose the greatest health concern because they can be inhaled into and accumulate in the respiratory system. Particles less than 2.5 micrometers in diameter are referred to as "fine" particles and are responsible for many visibility degradations such as the "Valley Brown Cloud" (see http://www.phoenixvis.net/). Particles with diameters between 2.5 and 10 micrometers are referred to as "coarse".
Sources – Fine = All types of combustion (motor vehicles, power plants, wood burning, etc.) and some industrial processes. Coarse = crushing or grinding operations and dust from paved or unpaved roads.
Potential health impacts – PM can increase susceptibility to respiratory infections and can aggravate existing respiratory diseases, such as asthma and chronic bronchitis.
Units of measurement – Micrograms per cubic meter (ug/m3)
Averaging interval – 24 hours (midnight to midnight).
Reduction tips – Stabilize loose soils, slow down on dirt roads, carpool, and use public transit.

{**Updated 09/24/2007**}

APPENDIX B

NATIONAL WEATHER SERVICE METEOROLOGICAL OBSERVATIONS AND STORM REPORTS

U.S. Department of Commerce
National Oceanic & Atmospheric Administration

QUALITY CONTROLLED LOCAL CLIMATOLOGICAL DATA (final)
HOURLY OBSERVATIONS TABLE
PHOENIX SKY HARBOR INTL AIRPORT (23183)
PHOENIX, AZ
(10/2011)

National Climatic Data Center
Federal Building
151 Patton Avenue
Asheville, North Carolina 28801

Elevation: 1107 ft. above sea level
Latitude: 33.427
Longitude: -112.003
Data Version: VER3

Date	Time (LST)	Station Type	Sky Conditions	Visibility (SM)	Weather Type	Dry Bulb Temp		Wet Bulb Temp		Dew Point Temp		Rel Humd %	Wind Speed (MPH)	Wind Dir	Wind Gusts (MPH)	Station Pressure (in. hg)	Press Tend	Net 3-hr Chg (mb)	Sea Level Pressure (in. hg)	Report Type	Precip. Total (in)	Alti-meter (in. hg)
						(F)	(C)	(F)	(C)	(F)	(C)											
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
04	0051	11	SCT120 BKN210	10.00		82	27.8	59	15.0	40	4.4	22	8	100		28.66			29.78	AA		29.84
04	0151	11	BKN120 BKN210	10.00		82	27.8	59	15.2	41	5.0	23	6	130		28.66	0	000	29.77	AA		29.84
04	0251	11	BKN130 BKN210	10.00		83	28.3	60	15.8	43	6.1	24	7	120		28.65			29.75	AA		29.82
04	0351	11	SCT130 BKN210	10.00		82	27.8	60	15.4	42	5.6	24	8	150		28.65			29.75	AA		29.82
04	0451	11	FEW130 SCT210	10.00		80	26.7	59	15.0	42	5.6	26	7	140		28.65	5	004	29.76	AA		29.82
04	0551	11	SCT140	10.00		79	26.1	59	14.7	42	5.6	27	7	150		28.66			29.77	AA		29.83
04	0651	11	SCT130 BKN250	10.00		78	25.6	59	14.8	43	6.1	29	11	150		28.66			29.77	AA		29.83
04	0751	11	FEW075 SCT130 BKN250	10.00		80	26.7	60	15.6	45	7.2	29	11	150		28.66	1	004	29.78	AA		29.83
04	0851	11	FEW085 BKN140 BKN250	10.00		84	28.9	61	16.2	44	6.7	25	13	160		28.66			29.78	AA		29.83
04	0951	11	FEW100 BKN140 BKN180	10.00		87	30.6	62	16.4	42	5.6	21	10	160		28.66			29.77	AA		29.83
04	1051	11	FEW110 BKN140 BKN180	10.00		91	32.8	63	17.1	42	5.6	18	17	180	29	28.64	8	008	29.75	AA		29.81
04	1151	11	FEW110 SCT130 BKN180	10.00		91	32.8	63	17.3	43	6.1	19	20	180	26	28.62			29.73	AA		29.79
04	1251	11	FEW110 BKN130 BKN250	6.00	BLDU	95	35.0	63	17.3	39	3.9	14	23	180	36	28.58			29.69	AA		29.75
04	1351	11	FEW030 SCT080 BKN130	3.00		92	33.3	62	16.6	38	3.3	15	24	190	37	28.55	8	030	29.66	AA		29.72
04	1451	11	FEW027 SCT080 BKN130	8.00		86	30.0	67	19.2	55	12.8	35	20	270	25	28.55			29.66	AA		29.72
04	1458	11	FEW027 SCT080 BKN130	10.00		86	30.0	68	19.8	57	14.0	37	18	290	26	28.55			M	SP		29.72
04	1551	11	FEW046 SCT080 BKN130	10.00		84	28.9	65	18.1	52	11.1	33	17	260	24	28.55			29.66	AA		29.72
04	1651	11	SCT080 SCT120 SCT170	10.00		85	29.4	63	17.0	47	8.3	27	15	230		28.55	8	001	29.66	AA		29.72
04	1738	11	FEW080CB SCT100CB	10.00		79	26.0	64	17.7	54	12.0	42	14	130	37	28.57			M	SP		29.74
04	1751	11	FEW080 SCT100 BKN170	10.00		77	25.0	65	18.1	57	14.0	50	7	200		28.58			29.70	AA	0.01	29.75
04	1814	11	FEW050CB SCT090CB	9.00		75	24.0	64	17.7	57	14.0	54	29	270	34	28.61			M	SP		29.78
04	1847	11	FEW050 BKN090 BKN110	10.00		70	21.0	62	16.7	57	14.0	64	13	290		28.61			M	SP		29.78
04	1851	11	FEW050 BKN090 BKN110	10.00		70	21.1	63	17.0	58	14.4	66	14	290		28.61			29.74	AA	0.03	29.78
04	1909	11	FEW050CB BKN090CB BKN120	10.00		70	21.0	62	16.7	57	14.0	64	18	290		28.64			M	SP		29.81
04	1937	11	FEW050 BKN090 BKN110	10.00		70	21.0	62	16.7	57	14.0	64	15	280		28.66			M	SP		29.83
04	1951	11	FEW050 BKN090 BKN110	10.00		70	21.1	62	16.4	56	13.3	61	11	310		28.66	3	037	29.78	AA	0.02	29.83
04	2051	11	FEW090 SCT110 SCT190	10.00		70	21.1	60	15.6	53	11.7	55	6	360		28.68			29.80	AA		29.85
04	2151	11	FEW090 SCT110 SCT190	10.00		68	20.0	63	16.9	59	15.0	73	5	100		28.68			29.80	AA		29.85
04	2251	11	FEW110 SCT190	10.00		67	19.4	62	16.4	58	14.4	73	3	100		28.68	0	006	29.80	AA		29.85
04	2351	11	FEW110 SCT190	10.00		67	19.4	62	16.4	58	14.4	73	0	000		28.68			29.80	AA		29.85

Dynamically generated Wed Oct 17 13:54:05 EDT 2012 via http://cdo.ncdc.noaa.gov/qclcd/QCLCD

U.S. Department of Commerce
National Oceanic & Atmospheric Administration

QUALITY CONTROLLED LOCAL CLIMATOLOGICAL DATA (final) HOURLY OBSERVATIONS TABLE WILLIAMS GATEWAY AIRPORT (23104) PHOENIX, AZ (10/2011)

National Climatic Data Center
Federal Building
151 Patton Avenue
Asheville, North Carolina 28801

Elevation: 1382 ft. above sea level
Latitude: 33.3
Longitude: -111.666
Data Version: VER2

Date	Time (LST)	Station Type	Sky Conditions	Visibility (SM)	Weather Type	Dry Bulb Temp (F)	Dry Bulb Temp (C)	Wet Bulb Temp (F)	Wet Bulb Temp (C)	Dew Point Temp (F)	Dew Point Temp (C)	Rel Humd %	Wind Speed (MPH)	Wind Dir	Wind Gusts (MPH)	Station Pressure (in. hg)	Press Tend	Net 3-hr Chg (mb)	Sea Level Pressure (in. hg)	Report Type	Precip. Total (in)	Alti-meter (in. hg)
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
04	0015	0	CLR	10.00		82	28.0	61	16.0	45	7.0	27	8	130		28.43			M	AA		29.89
04	0035	0	CLR	10.00		82	28.0	61	16.0	45	7.0	27	8	130		28.43			M	AA		29.89
04	0055	0	CLR	10.00		82	28.0	61	16.0	45	7.0	27	8	130		28.43			M	AA		29.89
04	0115	0	CLR	10.00		81	27.0	61	15.8	45	7.0	28	8	140		28.43			M	AA		29.89
04	0135	0	CLR	10.00		81	27.0	61	15.8	45	7.0	28	7	130		28.43			M	AA		29.89
04	0155	0	CLR	10.00		82	28.0	61	16.0	45	7.0	27	8	130		28.43			M	AA		29.89
04	0215	0	CLR	10.00		82	28.0	60	15.5	43	6.0	25	8	120		28.42			M	AA		29.88
04	0235	0	CLR	10.00		82	28.0	61	16.2	46	8.0	28	9	140		28.41			M	AA		29.87
04	0255	0	CLR	10.00		82	28.0	62	16.7	48	9.0	31	8	140		28.41			M	AA		29.87
04	0315	0	CLR	10.00		82	28.0	63	17.2	50	10.0	33	8	130		28.41			M	AA		29.87
04	0335	0	CLR	10.00		82	28.0	61	16.2	46	8.0	28	9	120		28.40			M	AA		29.86
04	0355	0	CLR	10.00		82	28.0	61	16.2	46	8.0	28	11	110		28.40			M	AA		29.86
04	0415	0	CLR	10.00		82	28.0	62	16.7	48	9.0	31	10	110		28.40			M	AA		29.86
04	0435	0	CLR	10.00		81	27.0	61	16.0	46	8.0	29	6	140		28.41			M	AA		29.87
04	0455	0	CLR	10.00		81	27.0	63	17.0	50	10.0	34	6	150		28.41			M	AA		29.87
04	0515	0	CLR	10.00		79	26.0	61	16.1	48	9.0	34	6	150		28.41			M	AA		29.87
04	0535	0	CLR	10.00		77	25.0	61	16.2	50	10.0	39	8	140		28.42			M	AA		29.88
04	0547	0	SCT120 SCT200	20.00		81	27.0	62	16.5	48	9.0	32	9	140		28.42			M	AA		29.88
04	0653	0	SCT100 SCT200	45.00		77	25.0	60	15.7	48	9.0	36	9	150		28.42			M	AA		29.88
04	0750	0	SCT100 BKN200	45.00		82	28.0	63	17.2	50	10.0	33	14	130		28.42			M	AA		29.88
04	0847	0	FEW080 BKN110 BKN200	45.00		88	31.0	66	18.8	52	11.0	29	13	140	18	28.41			M	AA		29.87
04	0947	0	SCT080 BKN110 BKN200	45.00		90	32.0	64	17.7	46	8.0	22	15	150		28.41			M	AA		29.87
04	1047	0	BKN080 BKN110 BKN200	45.00		91	33.0	63	17.3	43	6.0	19	14	150	18	28.39			M	AA		29.85
04	1147	0	BKN080 BKN110 BKN200	35.00		91	33.0	63	17.3	43	6.0	19	11	180	23	28.37			M	AA		29.83
04	1247	0	BKN080 BKN120 BKN200	35.00		93	34.0	64	17.6	43	6.0	18	14	190		28.34			M	AA		29.80
04	1316	0	BKN080 BKN110 BKN200	7.00	BLDU	97	36.0	66	18.8	45	7.0	17	30	220		28.31			M	AA		29.77
04	1347	0	BKN080 BKN100 BKN200	1.50	BLDU	97	36.0	65	18.4	43	6.0	16	25	220	37	28.30			M	AA		29.76
04	1447	0	BKN100 BKN200	3.00	BLDU	95	35.0	64	18.0	43	6.0	17	23	210	39	28.30			M	AA		29.76
04	1551	0	BKN100 BKN200	3.00	BLDU	91	33.0	62	16.9	41	5.0	17	22	210	32	28.29			M	AA		29.75
04	1613	0	BKN100 BKN200	2.00	BLDU	90	32.0	64	17.5	45	7.0	21	18	220	33	28.29			M	AA		29.75
04	1647	0	BKN100 BKN200	10.00		86	30.0	65	18.4	52	11.0	31	21	260		28.31			M	AA		29.77
04	1754	0	BKN120 BKN200	10.00		84	29.0	65	18.0	52	11.0	33	16	260	28	28.33			M	AA		29.79
04	1847	0	BKN120	20.00		79	26.0	64	17.9	55	13.0	44	20	260		28.37			M	AA		29.83
04	1947	0	BKN	20.00		77	25.0	M	M	54	12.0	M	19	300		M			M	AA		29.87
04	1955	0	CLR	10.00	VCTS	77	25.0	63	17.3	54	12.0	45	25	290	31	28.42			M	AA		29.88
04	2015	0	CLR	10.00	VCTS	72	22.0	62	16.5	55	13.0	55	13	300		28.43			M	AA		29.89
04	2035	0	CLR	10.00		70	21.0	61	15.8	54	12.0	57	13	320	20	28.44			M	AA		29.90
04	2047	0	BKN	20.00		70	21.0	M	M	55	13.0	M	13	340		M			M	AA		29.89
04	2055	0	CLR	10.00	TS	70	21.0	61	15.8	54	12.0	57	6	320		28.43			M	AA		29.89
04	2115	0	CLR	10.00		68	20.0	60	15.4	54	12.0	61	5	030		28.43			M	AA		29.89
04	2135	0	CLR	10.00		70	21.0	61	15.8	54	12.0	57	5	040		28.43			M	AA		29.89
04	2155	0	CLR	10.00		70	21.0	60	15.3	52	11.0	53	5	060		28.43			M	AA		29.89
04	2215	0	CLR	10.00		70	21.0	60	15.3	52	11.0	53	0	000		28.43			M	AA		29.89
04	2235	0	CLR	10.00		68	20.0	59	14.8	52	11.0	57	5	160		28.43			M	AA		29.89
04	2315	0	CLR	10.00		68	20.0	60	15.4	54	12.0	61	5	180		28.43			M	AA		29.89
04	2335	0	CLR	10.00		68	20.0	60	15.4	54	12.0	61	6	170		28.42			M	AA		29.88

Dynamically generated Wed Oct 17 13:55:30 EDT 2012 via http://cdo.ncdc.noaa.gov/qclcd/QCLCD

U.S. Department of Commerce
National Oceanic & Atmospheric Administration

QUALITY CONTROLLED LOCAL CLIMATOLOGICAL DATA (final) HOURLY OBSERVATIONS TABLE LUKE AFB AIRPORT (23111) GLENDALE, AZ (10/2011)

National Climatic Data Center
Federal Building
151 Patton Avenue
Asheville, North Carolina 28801

Elevation: 1085 ft. above sea level
Latitude: 33.55
Longitude: -112.366
Data Version: VER2

Date	Time (LST)	Station Type	Sky Conditions	Visibility (SM)	Weather Type	Dry Bulb Temp (F)	Dry Bulb Temp (C)	Wet Bulb Temp (F)	Wet Bulb Temp (C)	Dew Point Temp (F)	Dew Point Temp (C)	Rel Humd %	Wind Speed (MPH)	Wind Dir	Wind Gusts (MPH)	Station Pressure (in. hg)	Press Tend	Net 3-hr Chg (mb)	Sea Level Pressure (in. hg)	Report Type	Precip. Total (in)	Alti-meter (in. hg)
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
04	0055	0	OVC120	10.00		82	27.7	61	15.8	44	6.5	26	3	100		28.68			29.74	AA		29.83
04	0155	0	BKN130	10.00		81	27.0	61	15.8	45	7.3	28	0	000		28.67	8	002	29.74	AA		29.82
04	0255	0	SCT130	10.00		81	27.4	60	15.6	44	6.6	27	6	140		28.66			29.72	AA		29.81
04	0355	0	CLR	10.00		76	24.4	58	14.3	43	6.2	31	3	190		28.67			29.74	AA		29.82
04	0455	0	CLR	10.00		78	25.4	59	14.8	43	5.9	29	8	120		28.66	6	003	29.73	AA		29.81
04	0555	0	CLR	10.00		71	21.9	56	13.2	43	6.1	37	0	000		28.67			29.75	AA		29.82
04	0655	0	CLR	10.00		72	22.3	57	13.7	44	6.9	37	0	000		28.68			29.75	AA		29.83
04	0755	0	CLR	10.00		79	26.3	59	15.2	44	6.7	29	3	VR		28.68	1	005	29.76	AA		29.83
04	0842	0	SCT130	10.00	-DZ	81	27.0	61	16.0	46	8.0	29	8	150		28.68			29.75	AA		29.83
04	0843	0	SCT	10.00		81	27.0	M	M	46	8.0	M	6	140		M			M	AA		29.81
04	0844	0	SCT130	10.00		81	27.0	61	16.0	46	8.0	29	6	140		28.66			M	AA		29.81
04	0849	0	SCT120	10.00		81	27.0	61	16.0	46	8.0	29	7	140		28.68			29.75	AA		29.83
04	0855	0	SCT120	10.00		81	27.4	61	16.0	46	7.6	29	7	130		28.68			29.75	AA		29.83
04	0955	0	SCT120	10.00		86	30.0	63	17.0	46	7.7	25	13	160		28.67			29.74	AA		29.82
04	1037	0	SCT130	10.00	-DZ	88	31.0	63	17.2	45	7.0	22	16	180		28.66			29.73	AA		29.81
04	1052	0	FEW130	10.00		88	31.0	63	17.4	46	8.0	23	17	170		28.63			M	AA		29.78
04	1055	0	FEW130	10.00		88	31.1	63	17.4	46	8.0	23	18	170		28.65	8	010	29.72	AA		29.80
04	1155	0	CLR	10.00		91	33.0	63	17.1	42	5.7	18	23	200	30	28.62			29.69	AA		29.77
04	1255	0	CLR	10.00		92	33.3	64	17.5	43	6.3	18	14	190	24	28.58			29.65	AA		29.73
04	1353	0	FEW110	10.00	-SHRA	86	30.0	65	18.4	52	11.0	31	18	240		28.55			M	AA		29.70
04	1355	0	BKN110	10.00	-TSRA	84	29.0	66	18.6	54	12.0	36	20	230		28.55	7	032	M	AA		29.70
04	1358	0	FEW110	10.00	TS	86	30.0	66	19.0	54	12.0	33	16	240		28.57	6	025	29.65	AA		29.72
04	1406	0	FEW047	5.00	-TSRA	84	29.0	67	19.4	57	14.0	40	29	220	47	28.59			29.67	AA	0.02	29.74
04	1407	0	FEW047	4.00	-TSRA	84	29.0	68	20.0	59	15.0	43	23	220	47	28.59			29.66	AA	0.02	29.74
04	1416	0	FEW110	6.00	-TSRA	79	26.0	66	19.1	59	15.0	50	14	240	47	28.58			29.66	AA	0.02	29.73
04	1418	0	CLR	10.00	TS	79	26.0	68	19.7	61	16.0	54	13	240	24	28.58			29.67	AA	0.02	29.73
04	1423	0	CLR	10.00	VCTS	79	26.0	68	19.7	61	16.0	54	11	230		28.58			29.67	AA	0.02	29.73
04	1455	0	FEW190	10.00		82	27.6	65	18.5	55	13.0	40	14	220		28.57			29.65	AA	0.02	29.72
04	1555	0	CLR	10.00		84	28.7	66	18.9	55	13.0	37	13	220		28.58			29.66	AA		29.73
04	1655	0	CLR	10.00		83	28.5	65	18.1	53	11.9	36	16	220		28.57	0	001	29.65	AA		29.72
04	1729	0	FEW065 SCT080 SCT090	2.50		82	28.0	64	17.7	52	11.0	35	39	190	54	28.60			29.68	AA	0.31	29.75
04	1730	0	FEW024 SCT080 SCT090	1.50		81	27.0	65	18.0	54	12.0	39	31	200	54	28.64			29.73	AA	0.31	29.79
04	1731	0	FEW002 SCT070 BKN085	1.25		79	26.0	64	17.7	54	12.0	42	21	180	54	28.63			29.72	AA	0.31	29.78
04	1732	0	FEW002 SCT070 BKN085	1.00		77	25.0	64	17.5	55	13.0	47	23	120	54	28.61			29.70	AA	0.31	29.76
04	1734	0	FEW002 SCT027 SCT070	1.00		73	23.0	62	16.5	54	12.0	52	22	060	54	28.60			29.70	AA	0.31	29.75
04	1735	0	FEW002 SCT029 BKN065	0.75		73	23.0	61	15.9	52	11.0	48	11	050	54	28.61			29.70	AA	0.31	29.76
04	1738	0	FEW002 SCT034 BKN080	1.00		73	23.0	60	15.4	50	10.0	44	10	260	54	28.62			29.72	AA	0.31	29.77
04	1739	0	FEW002 BKN037 BKN070	1.25		73	23.0	60	15.4	50	10.0	44	18	240	54	28.62			29.72	AA	0.31	29.77
04	1740	0	FEW002 BKN036 BKN070	1.50		73	23.0	60	15.4	50	10.0	44	16	240	40	28.62			29.72	AA	0.31	29.77
04	1741	0	FEW002 BKN035 BKN070	2.50		73	23.0	61	15.9	52	11.0	48	13	230	40	28.62			29.72	AA	0.31	29.77
04	1742	0	BKN035 BKN070 BKN120	4.00	-TSRA	73	23.0	62	16.5	54	12.0	52	14	220	36	28.61			29.71	AA	0.31	29.76
04	1743	0	SCT035 BKN070 BKN090	6.00		73	23.0	62	16.5	54	12.0	52	15	200	36	28.61			29.71	AA	0.31	29.76
04	1751	0	FEW002 SCT038 BKN065	2.50		73	23.0	63	17.3	57	14.0	57	36	190	44	28.63			29.72	AA	0.31	29.78
04	1755	0	FEW002 BKN038 BKN065	1.50		70	20.9	62	16.7	57	13.7	64	14	160	44	28.64			29.74	AA	0.31	29.79
04	1800	0	FEW002 BKN038 OVC085	2.00	-TSRA	70	21.0	61	15.8	54	12.0	57	5	210	44	28.63			29.74	AA	0.01	29.78
04	1800	0	OVC	2.00		70	21.0	M	M	54	12.0	M	5	210	44	M			29.74	SP		29.78
04	1803	0	FEW002 BKN038 BKN090	5.00	-TSRA	72	22.0	60	15.7	52	11.0	50	8	210		28.63			29.74	AA	0.01	29.78
04	1808	0	FEW002 SCT037 BKN075	10.00		73	23.0	61	15.9	52	11.0	48	13	320		28.64			29.75	AA	0.01	29.79
04	1819	0	FEW002 SCT070 BKN100	10.00		73	23.0	62	16.5	54	12.0	52	11	300		28.66			29.76	AA	0.01	29.81
04	1855	0	FEW060 BKN100	10.00		70	21.1	63	17.0	58	14.5	66	10	330		28.66			29.76	AA	0.01	29.81
04	1955	0	FEW060 SCT090	10.00		66	19.1	61	16.2	58	14.4	76	3	300		28.69	1	037	29.78	AA	0.01	29.84
04	2048	0	CLR	10.00	-DZ	66	19.0	62	16.5	59	15.0	78	3	030		28.69			29.79	AA	T	29.84
04	2055	0	CLR	10.00	-DZ	66	19.0	61	16.2	58	14.6	76	0	000		28.70			29.80	AA	T	29.85
04	2056	0	CLR	10.00		66	19.0	62	16.5	59	15.0	78	0	000		28.70			29.80	AA	T	29.85
04	2155	0	CLR	10.00		65	18.4	61	16.3	59	14.9	81	3	320		28.71			29.80	AA		29.86
04	2255	0	FEW120	10.00		65	18.1	61	16.3	59	15.0	81	3	300		28.71	1	006	29.80	AA		29.86
04	2355	0	SCT110	10.00		64	17.6	62	16.4	60	15.4	87	0	000		28.71			29.80	AA		29.86

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U.S. Department of Commerce
National Oceanic & Atmospheric Administration

QUALITY CONTROLLED LOCAL CLIMATOLOGICAL DATA (final) HOURLY OBSERVATIONS TABLE CHANDLER MUNICIPAL AIRPORT (53128) CHANDLER, AZ (10/2011)

National Climatic Data Center
Federal Building
151 Patton Avenue
Asheville, North Carolina 28801

Elevation: 1243 ft. above sea level
Latitude: 33.268
Longitude: -111.812
Data Version: VER2

Date	Time (LST)	Station Type	Sky Conditions	Visibility (SM)	Weather Type	Dry Bulb Temp (F)	Dry Bulb Temp (C)	Wet Bulb Temp (F)	Wet Bulb Temp (C)	Dew Point Temp (F)	Dew Point Temp (C)	Rel Humd %	Wind Speed (MPH)	Wind Dir	Wind Gusts (MPH)	Station Pressure (in. hg)	Press Tend	Net 3-hr Chg (mb)	Sea Level Pressure (in. hg)	Report Type	Precip. Total (in)	Alti-meter (in. hg)
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
04	0547	0	BKN200	15.00		73	23.0	58	14.4	46	8.0	38	6	150		28.53			M	AA		29.85
04	0648	0	SCT150 BKN200	40.00		77	25.0	59	15.0	45	7.0	32	11	150	17	28.54			M	AA		29.86
04	0747	0	SCT150 BKN200	40.00		79	26.0	63	17.1	52	11.0	39	8	140		28.53			M	AA		29.85
04	0847	0	FEW080 SCT120 BKN200	40.00		86	30.0	62	16.8	45	7.0	24	11	150	16	28.54			M	AA		29.86
04	0947	0	SCT100 BKN200	40.00		88	31.0	63	17.4	46	8.0	23	14	150	18	28.53			M	AA		29.85
04	1047	0	SCT100 BKN200	40.00		90	32.0	63	17.1	43	6.0	19	17	170	23	28.51			M	AA		29.83
04	1147	0	SCT100 BKN200	40.00		86	30.0	62	16.4	43	6.0	22	20	180	25	28.49			M	AA		29.81
04	1247	0	SCT100 BKN180	10.00	BLDU	93	34.0	64	17.7	43	6.0	18	30	190	40	28.46			M	AA		29.77
04	1347	0	FEW100 BKN180	4.00	BLDU	91	33.0	63	17.3	43	6.0	19	28	150	36	28.43			M	AA		29.74
04	1434	0	SCT100 BKN180	1.00	BLDU	91	33.0	63	16.9	41	5.0	17	34	200	44	28.42			M	AA		29.73
04	1447	0	SCT100 BKN180	1.00	BLDU	90	32.0	61	16.3	39	4.0	17	34	190	46	28.42			M	AA		29.73
04	1548	0	SCT100 BKN180	3.00	BLDU	88	31.0	62	16.7	43	6.0	21	23	200		28.40			M	AA		29.72
04	1647	0	FEW100 SCT130 BKN250	15.00		82	28.0	62	16.7	48	9.0	31	11	230	18	28.43			M	AA		29.74
04	1747	0	SCT100 BKN150 BKN200	15.00		79	26.0	63	17.1	52	11.0	39	14	250		28.44			M	AA		29.76
04	1850	0	SCT080 BKN150 BKN200	15.00s		72	22.0	60	15.7	52	11.0	50	11	240	18	28.48			M	AA		29.80
04	1947	0	BKN080 BKN150	15.00s		66	19.0	60	15.3	55	13.0	68	17	270	34	28.53			M	AA		29.85
04	2001	0	BKN070 BKN090	15.00s	-TSRA	64	18.0	60	15.4	57	14.0	78	7	260		28.55			M	AA		29.87
04	2047	0	BKN070 BKN110	15.00s		64	18.0	61	16.1	59	15.0	84	7	360		28.55			M	AA		29.87

Dynamically generated Wed Oct 17 13:56:24 EDT 2012 via http://cdo.ncdc.noaa.gov/qclcd/QCLCD

U.S. Department of Commerce
National Oceanic & Atmospheric Administration

QUALITY CONTROLLED LOCAL CLIMATOLOGICAL DATA (final) HOURLY OBSERVATIONS TABLE CASA GRANDE MUNICIPAL ARPT (03914) CASA GRANDE, AZ (10/2011)

National Climatic Data Center
Federal Building
151 Patton Avenue
Asheville, North Carolina 28801

Elevation: 1462 ft. above sea level
Latitude: 32.95
Longitude: -111.766
Data Version: VER2

Date	Time (LST)	Station Type	Sky Conditions	Visibility (SM)	Weather Type	Dry Bulb Temp		Wet Bulb Temp		Dew Point Temp		Rel Humd %	Wind Speed (MPH)	Wind Dir	Wind Gusts (MPH)	Station Pressure (in. hg)	Press Tend	Net 3-hr Chg (mb)	Sea Level Pressure (in. hg)	Report Type	Precip. Total (in)	Alti-meter (in. hg)
						(F)	(C)	(F)	(C)	(F)	(C)											
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
04	0015	0	BKN120	10.00		81	27.0	59	14.9	41	5.0	24	8	100		28.34			M	AA		29.89
04	0035	0	BKN120	10.00		81	27.0	60	15.3	43	6.0	26	7	110		28.34			M	AA		29.89
04	0055	0	BKN120	10.00		81	27.0	59	14.9	41	5.0	24	8	110		28.34			M	AA		29.89
04	0115	0	BKN120	10.00		81	27.0	59	14.9	41	5.0	24	7	130		28.33			M	AA		29.88
04	0135	0	FEW120	10.00		81	27.0	58	14.5	39	4.0	22	8	120		28.33			M	AA		29.88
04	0155	0	CLR	10.00		81	27.0	58	14.5	39	4.0	22	6	120		28.32	7	007	M	AA		29.87
04	0215	0	FEW120	10.00		81	27.0	59	14.9	41	5.0	24	6	120		28.32			M	AA		29.87
04	0235	0	FEW120	10.00		81	27.0	59	14.9	41	5.0	24	6	130		28.32			M	AA		29.87
04	0255	0	FEW120	10.00		81	27.0	60	15.3	43	6.0	26	6	120		28.32			M	AA		29.87
04	0315	0	FEW120	10.00		81	27.0	60	15.3	43	6.0	26	6	130		28.32			M	AA		29.87
04	0335	0	CLR	10.00		79	26.0	59	14.9	43	6.0	28	5	180		28.32			M	AA		29.87
04	0355	0	CLR	10.00		77	25.0	58	14.5	43	6.0	30	0	000		28.32			M	AA		29.87
04	0415	0	CLR	10.00		75	24.0	57	14.1	43	6.0	32	0	000		28.32			M	AA		29.87
04	0435	0	CLR	10.00		75	24.0	57	14.1	43	6.0	32	5	140		28.32			M	AA		29.87
04	0455	0	CLR	10.00		73	23.0	57	13.6	43	6.0	34	5	260		28.32	4	000	M	AA		29.87
04	0515	0	CLR	10.00		72	22.0	55	13.0	41	5.0	33	6	220		28.32			M	AA		29.87
04	0535	0	CLR	10.00		72	22.0	56	13.4	43	6.0	35	6	190		28.33			M	AA		29.88
04	0555	0	CLR	10.00		72	22.0	55	13.0	41	5.0	33	0	000		28.33			M	AA		29.88
04	0615	0	CLR	10.00		70	21.0	55	12.5	41	5.0	35	0	000		28.34			M	AA		29.89
04	0635	0	CLR	10.00		68	20.0	53	11.6	39	4.0	35	0	000		28.34			M	AA		29.89
04	0655	0	CLR	10.00		70	21.0	54	12.1	39	4.0	32	0	000		28.34			M	AA		29.89
04	0715	0	CLR	10.00		72	22.0	55	13.0	41	5.0	33	0	000		28.34			M	AA		29.89
04	0735	0	CLR	10.00		75	24.0	57	14.1	43	6.0	32	3	050		28.33			M	AA		29.88
04	0755	0	CLR	10.00		77	25.0	58	14.5	43	6.0	30	5	110		28.33	2	003	M	AA		29.88
04	0815	0	CLR	10.00		81	27.0	61	16.0	46	8.0	29	13	140		28.33			M	AA		29.88
04	0835	0	CLR	10.00		81	27.0	61	16.0	46	8.0	29	11	150		28.34			M	AA		29.89
04	0855	0	CLR	10.00		82	28.0	61	16.2	46	8.0	28	11	130		28.33			M	AA		29.88
04	0915	0	CLR	10.00		84	29.0	62	16.6	46	8.0	27	11	130		28.33			M	AA		29.88
04	0935	0	CLR	10.00		84	29.0	62	16.4	45	7.0	26	11	150		28.32			M	AA		29.87
04	0955	0	CLR	10.00		86	30.0	62	16.8	45	7.0	24	11	180		28.32			M	AA		29.87
04	1015	0	CLR	10.00		86	30.0	62	16.8	45	7.0	24	14	170		28.32			M	AA		29.87
04	1035	0	CLR	10.00		88	31.0	63	17.1	45	7.0	22	9	200		28.31			M	AA		29.86
04	1055	0	CLR	10.00		86	30.0	62	16.8	45	7.0	24	9	210		28.30	7	010	M	AA		29.85
04	1115	0	CLR	10.00		88	31.0	63	17.1	45	7.0	22	8	200		28.30			M	AA		29.85
04	1135	0	CLR	10.00		88	31.0	63	17.1	45	7.0	22	7	180		28.28			M	AA		29.83
04	1155	0	CLR	10.00		90	32.0	64	17.5	45	7.0	21	15	190		28.27			M	AA		29.82
04	1215	0	CLR	9.00		91	33.0	64	17.7	45	7.0	20	22	190	30	28.27			M	AA		29.81
04	1235	0	CLR	9.00		91	33.0	64	17.7	45	7.0	20	18	200	30	28.27			M	AA		29.81
04	1255	0	CLR	3.00		91	33.0	64	17.7	45	7.0	20	24	200	34	28.25			M	AA		29.79
04	1315	0	CLR	3.00		91	33.0	64	17.7	45	7.0	20	23	200	36	28.23			M	AA		29.77
04	1335	0	CLR	8.00		90	32.0	64	17.5	45	7.0	21	24	190	33	28.23			M	AA		29.77
04	1355	0	CLR	4.00		88	31.0	63	17.1	45	7.0	22	28	200	34	28.23	7	027	M	AA		29.77
04	1415	0	CLR	3.00		88	31.0	63	17.1	45	7.0	22	23	200	34	28.23			M	AA		29.77
04	1435	0	CLR	4.00		88	31.0	62	16.7	43	6.0	21	22	210	30	28.22			M	AA		29.76
04	1455	0	CLR	2.50		88	31.0	62	16.7	43	6.0	21	20	200	30	28.22			M	AA		29.76
04	1515	0	CLR	3.00		88	31.0	62	16.7	43	6.0	21	23	210	30	28.22			M	AA		29.76
04	1535	0	BKN005 OVC010	0.50		88	31.0	62	16.7	43	6.0	21	24	200	38	28.21			M	AA		29.75
04	1555	0	SCT008 BKN012	1.75		88	31.0	62	16.7	43	6.0	21	30	190	38	28.20			M	AA		29.74
04	1615	0	FEW022	2.50		88	31.0	61	16.3	41	5.0	19	24	200	34	28.21			M	AA		29.75
04	1635	0	CLR	10.00		82	28.0	64	17.7	52	11.0	35	13	210	20	28.22			M	AA		29.76
04	1655	0	CLR	10.00		82	28.0	63	17.1	50	10.0	33	18	200	23	28.22	7	003	M	AA		29.76
04	1715	0	CLR	10.00		84	29.0	62	16.4	45	7.0	26	17	240	31	28.23			M	AA		29.77
04	1735	0	FEW090	10.00		81	27.0	64	17.5	52	11.0	37	14	270	20	28.24			M	AA		29.78
04	1755	0	FEW090	10.00		79	26.0	63	17.1	52	11.0	39	17	260		28.25			M	AA		29.80
04	1815	0	FEW080	10.00		75	24.0	62	16.8	54	12.0	48	18	270	25	28.27			M	AA		29.81
04	1835	0	CLR	10.00		73	23.0	60	15.4	50	10.0	44	21	270	26	28.27			M	AA		29.82
04	1855	0	CLR	10.00		72	22.0	59	15.1	50	10.0	46	13	270	24	28.28			M	AA		29.83
04	1915	0	CLR	10.00		72	22.0	59	15.1	50	10.0	46	17	270	22	28.29			M	AA		29.84
04	1935	0	CLR	10.00		70	21.0	59	14.7	50	10.0	49	14	280	23	28.31			M	AA		29.86
04	1955	0	SCT120	10.00		68	20.0	59	14.8	52	11.0	57	13	280		28.31	2	034	M	AA		29.86
04	2015	0	SCT110	10.00		68	20.0	58	14.3	50	10.0	53	8	290		28.32			M	AA		29.87
04	2035	0	BKN100 BKN120	10.00		70	21.0	58	14.2	48	9.0	46	10	310		28.32			M	AA		29.87
04	2055	0	FEW050 SCT065 OVC100	10.00		70	21.0	58	14.2	48	9.0	46	11	360		28.33			M	AA		29.88
04	2115	0	FEW065 BKN090 OVC120	10.00		66	19.0	58	14.4	52	11.0	61	11	360		28.33			M	AA		29.88
04	2135	0	BKN120	10.00		66	19.0	58	14.4	52	11.0	61	5	310		28.33			M	AA		29.88
04	2155	0	FEW090 SCT120	10.00		66	19.0	57	13.8	50	10.0	57	9	020		28.33			M	AA		29.88
04	2215	0	FEW055 SCT080 BKN110	10.00		66	19.0	57	13.8	50	10.0	57	5	080		28.34			M	AA		29.89
04	2235	0	FEW055 BKN080 OVC110	10.00		68	20.0	59	14.8	52	11.0	57	5	020		28.34			M	AA		29.89
04	2255	0	SCT080 SCT110	10.00		66	19.0	58	14.4	52	11.0	61	6	070		28.34	2	010	M	AA		29.89
04	2315	0	FEW100	10.00		66	19.0	59	15.0	54	12.0	65	7	100		28.34			M	AA		29.89
04	2335	0	CLR	10.00		64	18.0	57	14.0	52	11.0	65	7	100		28.34			M	AA		29.89
04	2355	0	CLR	10.00		64	18.0	57	14.0	52	11.0	65	7	100		28.34			M	AA		29.89

Dynamically generated Wed Oct 17 13:44:18 EDT 2012 via http://cdo.ncdc.noaa.gov/qclcd/QCLCD

WWUS85 KPSR 041656
SPSPSR
SPECIAL WEATHER STATEMENT
NATIONAL WEATHER SERVICE PHOENIX AZ
956 AM MST TUE OCT 4 2011
AZZ026-027-041730-
YUMA AZ-MARICOPA AZ-
956 AM MST TUE OCT 4 2011
...SIGNIFICANT WEATHER ADVISORY...
THE NATIONAL WEATHER SERVICE IN PHOENIX HAS ISSUED A
SIGNIFICANT WEATHER ADVISORY FOR...
  SOUTHWESTERN MARICOPA COUNTY IN SOUTH CENTRAL ARIZONA
  EAST CENTRAL YUMA COUNTY IN SOUTHWEST ARIZONA
UNTIL 1030 AM MST
AT 954 AM MST...NATIONAL WEATHER SERVICE METEOROLOGISTS DETECTED A
STRONG THUNDERSTORM 11 MILES NORTHEAST OF PALOMA...MOVING NORTHEAST
AT 25 MPH.
HAIL UP TO ONE-HALF INCH IN DIAMETER AND WIND GUSTS UP TO 50 MPH ARE
EXPECTED WITH THIS STORM.
LOCATIONS IMPACTED INCLUDE...
   SUNDAD...
LAT...LON 3330 11320 3314 11301 3289 11334 3302 11349
TIME...MOT...LOC 1656Z 224DEG 20KT 3302 11334
$$
HIRSCH

WWUS85 KPSR 041711
SPSPSR
SPECIAL WEATHER STATEMENT
NATIONAL WEATHER SERVICE PHOENIX AZ
1011 AM MST TUE OCT 4 2011
AZZ021-022-041800-
LA PAZ AZ-MARICOPA AZ-
1011 AM MST TUE OCT 4 2011
...SIGNIFICANT WEATHER ADVISORY...
THE NATIONAL WEATHER SERVICE IN PHOENIX HAS ISSUED A
SIGNIFICANT WEATHER ADVISORY FOR...
  NORTHWESTERN MARICOPA COUNTY IN SOUTH CENTRAL ARIZONA
  EAST CENTRAL LA PAZ COUNTY IN WEST CENTRAL ARIZONA
UNTIL 1100 AM MST
AT 1003 AM MST...NATIONAL WEATHER SERVICE METEOROLOGISTS DETECTED
STRONG THUNDERSTORMS ALONG A LINE EXTENDING FROM GLADDEN TO 23 MILES
NORTH OF SUNDAD...AND MOVING NORTHEAST AT 25 MPH.
HAIL UP TO ONE-HALF INCH IN DIAMETER AND WIND GUSTS UP TO 40 MPH ARE
EXPECTED WITH THESE STORMS.
LOCATIONS IMPACTED INCLUDE...
   AGUILA...
   INTERSTATE TEN WEST OF TONOPAH...
LAT...LON 3401 11332 3401 11307 3367 11305 3340 11334
      3340 11351 3392 11345 3404 11334
TIME...MOT...LOC 1711Z 211DEG 20KT 3392 11331 3353 11334
$$
INIGUEZ

WWUS85 KPSR 041928
SPSPSR
SPECIAL WEATHER STATEMENT
NATIONAL WEATHER SERVICE PHOENIX AZ
1228 PM MST TUE OCT 4 2011
AZZ027-042015-
MARICOPA AZ-
1228 PM MST TUE OCT 4 2011
...SIGNIFICANT WEATHER ADVISORY...

THE NATIONAL WEATHER SERVICE IN PHOENIX HAS ISSUED A
SIGNIFICANT WEATHER ADVISORY FOR...
  SOUTHWESTERN MARICOPA COUNTY IN SOUTH CENTRAL ARIZONA
UNTIL 115 PM MST
AT 1223 PM MST...NATIONAL WEATHER SERVICE METEOROLOGISTS DETECTED A
STRONG THUNDERSTORM 10 MILES EAST OF SENTINEL...MOVING NORTHEAST AT
35 MPH.
HAIL UP TO ONE-HALF INCH IN DIAMETER AND WIND GUSTS UP TO 40 MPH ARE
EXPECTED WITH THIS STORM.
LOCATIONS IMPACTED INCLUDE...
  INTERSTATE EIGHT BETWEEN SENTINEL AND GILA BEND...
LAT...LON 3324 11293 3311 11264 3266 11297 3264 11314
      3289 11317
TIME...MOT...LOC 1928Z 207DEG 29KT 3287 11304
$$
INIGUEZ

WWUS85 KPSR 041951
SPSPSR
SPECIAL WEATHER STATEMENT
NATIONAL WEATHER SERVICE PHOENIX AZ
1251 PM MST TUE OCT 4 2011
AZZ022-023-027-028-050030-
NORTHWEST MARICOPA COUNTY-GREATER PHOENIX AREA-
SOUTHWEST MARICOPA COUNTY-NORTHWEST AND NORTH CENTRAL PINAL COUNTY-
INCLUDING THE CITIES OF...BUCKEYE...LAKE PLEASANT...MORRISTOWN...
NEW RIVER...TONOPAH...WICKENBURG...CAREFREE...CAVE CREEK...
CHANDLER...FOUNTAIN HILLS...GILBERT...GLENDALE...MESA...PEORIA...
PHOENIX...SCOTTSDALE...SUN CITY...TEMPE...GILA BEND...
APACHE JUNCTION...CASA GRANDE...COOLIDGE...AND FLORENCE
1251 PM MST TUE OCT 4 2011
STRONG WINDS AHEAD OF AN APPROACHING LOW PRESSURE SYSTEM HAS RESULTED
IN WIDESPREAD AREAS OF BLOWING DUST ACROSS MARICOPA AND NORTHWEST
PINAL COUNTIES THIS AFTERNOON. VISIBILITY WILL VARY GREATLY...EVEN
OVER SHORT DISTANCES...VARYING FROM GREATER THAN FIVE MILES TO LESS
THAN A HALF MILE. ISOLATED AREAS WILL DROP BRIEFLY DROP TO A QUARTER
MILE. BLOWING DUST WILL CONTINUE THROUGH THE REMAINDER OF THE
AFTERNOON.
STAY UP-TO-DATE ON THE LATEST FORECASTS BY LISTENING TO WEATHER RADIO
ON THE PUBLIC SERVICE BAND. MORE DETAILED INFORMATION IS AVAILABLE
FROM THE NATIONAL WEATHER SERVICE IN PHOENIX ON THE INTERNET AT
WEATHER.GOV/PHOENIX
$$
INIGUEZ

WWUS85 KPSR 041958
AWWPHX
AZZ023-050200-
AIRPORT WEATHER WARNING FOR SKY HARBOR AIRPORT
NATIONAL WEATHER SERVICE PHOENIX AZ
1258 PM MST TUE OCT 4 2011
...AIRPORT WEATHER WARNING FOR SKY HARBOR AIRPORT IN EFFECT UNTIL
400 PM MST...
THE NATIONAL WEATHER SERVICE IN PHOENIX HAS ISSUED AN AIRPORT WEATHER
WARNING FOR SKY HARBOR AIRPORT FOR STRONG GUSTY WINDS.
SOUTH TO SOUTHWEST WINDS WILL PERSIST THIS AFTERNOON. WIND GUSTS UP
TO 35 KNOTS WILL BE POSSIBLE THROUGH AT LEAST 4 PM MST.
$$

WWUS75 KPSR 042011
NPWPSR

URGENT - WEATHER MESSAGE
NATIONAL WEATHER SERVICE PHOENIX AZ
111 PM MST TUE OCT 4 2011
AZZ022-023-027-028-050200-
/O.NEW.KPSR.DU.Y.0002.111004T2011Z-111005T0200Z/
NORTHWEST MARICOPA COUNTY-GREATER PHOENIX AREA-
SOUTHWEST MARICOPA COUNTY-
NORTHWEST AND NORTH CENTRAL PINAL COUNTY-
INCLUDING THE CITIES OF...BUCKEYE...NEW RIVER...WICKENBURG...
MESA...PHOENIX...GILA BEND...APACHE JUNCTION...CASA GRANDE...
FLORENCE
111 PM MST TUE OCT 4 2011
...BLOWING DUST ADVISORY IN EFFECT UNTIL 7 PM MST THIS EVENING...
THE NATIONAL WEATHER SERVICE IN PHOENIX HAS ISSUED A BLOWING DUST
ADVISORY...WHICH IS IN EFFECT UNTIL 7 PM MST THIS EVENING.
* AFFECTED AREA: MARICOPA AND NORTHWEST PINAL COUNTIES. THIS INCLUDES
  INTERSTATES EIGHT AND TEN.
* LOCATIONS INCLUDE: GILA BEND...BUCKEYE...MESA...PHOENIX...NEW
  RIVER...WICKENBURG...APACHE JUNCTION...CASA GRANDE...FLORENCE
* TIMING: NOW THROUGH 7 PM.
* WINDS: WIND GUSTS WILL APPROACH 40 MPH.
* VISIBILITY: DOWN TO ONE HALF MILE AT TIMES.
* IMPACTS: SUDDEN REDUCTION IN VISIBILITY WILL MAKE FOR HAZARDOUS
  DRIVING CONDITIONS.
PRECAUTIONARY/PREPAREDNESS ACTIONS...
A BLOWING DUST ADVISORY MEANS THAT BLOWING DUST WILL RESTRICT
VISIBILITIES. TRAVELERS ARE URGED TO USE EXTRA CAUTION.
&&
$$
NATIONAL WEATHER SERVICE PHOENIX IS ON THE INTERNET AT
WEATHER.GOV/PHOENIX

WWUS85 KPSR 042028
SPSPSR
SPECIAL WEATHER STATEMENT
NATIONAL WEATHER SERVICE PHOENIX AZ
128 PM MST TUE OCT 4 2011
AZZ022-042115-
MARICOPA AZ-
128 PM MST TUE OCT 4 2011
...SIGNIFICANT WEATHER ADVISORY...
THE NATIONAL WEATHER SERVICE IN PHOENIX HAS ISSUED A
SIGNIFICANT WEATHER ADVISORY FOR...
  WEST CENTRAL MARICOPA COUNTY IN SOUTH CENTRAL ARIZONA
UNTIL 215 PM MST
AT 118 PM MST...NATIONAL WEATHER SERVICE METEOROLOGISTS DETECTED A
STRONG THUNDERSTORM 12 MILES NORTHWEST OF TONOPAH...MOVING NORTH AT
20 MPH.
HAIL UP TO ONE-HALF INCH IN DIAMETER AND WIND GUSTS UP TO 40 MPH ARE
EXPECTED WITH THIS STORM.
LOCATIONS IMPACTED INCLUDE...
  HIGHWAY 60 BETWEEN WICKENBURG AND AGUILA...
SOME UNSECURED OBJECTS COULD BE BLOWN AROUND. SEEK SHELTER INDOORS
UNTIL THE STORM PASSES.
LAT...LON 3359 11290 3365 11314 3401 11311 3401 11282
      3400 11281
TIME...MOT...LOC 2028Z 188DEG 18KT 3371 11301
$$
INIGUEZ

WWUS85 KPSR 042227
AWWPHX

AZZ023-050430-
AIRPORT WEATHER WARNING FOR SKY HARBOR AIRPORT
NATIONAL WEATHER SERVICE PHOENIX AZ
327 PM MST TUE OCT 4 2011
...AIRPORT WEATHER WARNING FOR SKY HARBOR AIRPORT HAS BEEN
CANCELLED...
THE AIRPORT WEATHER WARNING FOR SKY HARBOR AIRPORT FOR STRONG GUSTY
WINDS IS NO LONGER IN EFFECT.
WIND GUSTS HAVE DIMINISHED UNDER 35 KNOTS OVER THE LAST HOUR.
THEREFORE THE AIRPORT WEATHER WARNING IS NO LONGER IN EFFECT.
HOWEVER...SOME INCREASED GUSTS UP TO 25 KNOTS WILL BE POSSIBLE
THROUGH THE EVENING.
$$

WWUS75 KPSR 050025
NPWPSR
URGENT - WEATHER MESSAGE
NATIONAL WEATHER SERVICE PHOENIX AZ
525 PM MST TUE OCT 4 2011
AZZ022-023-027-028-050130-
/O.CAN.KPSR.DU.Y.0002.000000T0000Z-111005T0200Z/
NORTHWEST MARICOPA COUNTY-GREATER PHOENIX AREA-
SOUTHWEST MARICOPA COUNTY-
NORTHWEST AND NORTH CENTRAL PINAL COUNTY-
INCLUDING THE CITIES OF...BUCKEYE...NEW RIVER...WICKENBURG...
MESA...PHOENIX...GILA BEND...APACHE JUNCTION...CASA GRANDE...
FLORENCE
525 PM MST TUE OCT 4 2011
...BLOWING DUST ADVISORY IS CANCELLED...
THE NATIONAL WEATHER SERVICE IN PHOENIX HAS CANCELLED THE BLOWING
DUST ADVISORY.
STRONG GUSTY WINDS CONTINUE TO WEAKEN ACROSS MOST OF THE AREA. AS WIND
SPEEDS DECLINE...THE DUST WILL CONTINUE TO SETTLE AND NOT BE TRANSPORTED
GREAT DISTANCES BY THE WIND...AND VISIBILITIES WILL CONTINUE TO IMPROVE
THROUGH THE EVENING HOURS.
HOWEVER...ISOLATED THUNDERSTORMS ARE STILL POSSIBLE THIS EVENING...AND
GUSTY OUTFLOW FROM THESE STORMS CAN PRODUCE LOCALIZED REDUCTIONS IN
VISIBILITY DUE TO BLOWING DUST FOR SHORT PERIODS OF TIME.
$$
NATIONAL WEATHER SERVICE PHOENIX IS ON THE INTERNET AT
WEATHER.GOV/PHOENIX

WWUS55 KPSR 050059
SVSPSR
SEVERE WEATHER STATEMENT
NATIONAL WEATHER SERVICE PHOENIX AZ
559 PM MST TUE OCT 4 2011
AZC013-050130-
/O.CON.KPSR.SV.W.0074.000000T0000Z-111005T0130Z/
MARICOPA AZ-
559 PM MST TUE OCT 4 2011
...A SEVERE THUNDERSTORM WARNING REMAINS IN EFFECT UNTIL 630 PM MST
FOR CENTRAL MARICOPA COUNTY...
AT 552 PM MST...NATIONAL WEATHER SERVICE METEOROLOGISTS CONTINUED TO
DETECT A SEVERE THUNDERSTORM CAPABLE OF PRODUCING DAMAGING WINDS IN
EXCESS OF 60 MPH. IN ADDITION...DENSE BLOWING DUST MAY ACCOMPANY
THIS SEVERE STORM. THIS STORM WAS LOCATED NEAR EL MIRAGE...OR ABOUT
10 MILES WEST OF DEER VALLEY AIRPORT...MOVING NORTH AT 30 MPH.
OTHER LOCATIONS IN THE WARNING INCLUDE BUT ARE NOT LIMITED TO PEORIA
PRECAUTIONARY/PREPAREDNESS ACTIONS...
REPORT SEVERE WEATHER TO THE NEAREST LAW ENFORCEMENT AGENCY. THEY
WILL RELAY YOUR REPORT TO THE NATIONAL WEATHER SERVICE FORECAST
OFFICE.

&&
LAT...LON 3384 11238 3375 11212 3329 11237 3337 11255
TIME...MOT...LOC 0058Z 201DEG 28KT 3366 11232
$$
DG

APPENDIX C

NOTICE OF PUBLIC COMMENT PERIOD

ADEQ Arizona Department of Environmental Quality
Janice K. Brewer, Governor
Henry R. Darwin, Director

PUBLIC NOTICE

Request for Public Comments on Exceptional Events in the Greater Phoenix Area

In 2005, Congress identified a need to account for events that result in exceedances of the National Ambient Air Quality Standards (NAAQS) that are exceptional in nature (e.g., not expected to reoccur or caused by acts of nature beyond man-made controls.) In response, EPA promulgated the Exceptional Events Rule (EER) to address exceptional events in 40 CFR Parts 50 and 51 on March 22, 2007 (72 FR 13560). On May 2, 2011, EPA released draft guidance documents on the implementation of the EER to State, tribal and local air agencies for review. The EER allows for states and tribes to "flag" air quality monitoring data as an exceptional event. If flagged, these data can be excluded from consideration in air quality planning if EPA concurs with the demonstration submitted by the flagging agency documenting that all procedural and technical requirements have been met.

Pursuant to 40 CFR 50.14(c)(3)(i), the Arizona Department of Environmental Quality (ADEQ) is soliciting comments on its final demonstrations of events that have caused elevated concentrations of PM_{10} in the Greater Phoenix area on February 19; July 18; August 3; August 18; August 25 through 28; September 2; October 4; November 4, 2011; January 21 – 22 and February 27, 2012. ADEQ has decided to flag these episodes based on these analyses. Copies of the demonstrations are available for review beginning Monday, December 3, 2012, on the ADEQ website at www.azdeq.gov/environ/air/plan/. Interested parties can submit written comments throughout the comment period which will end at 5:00 p.m. on Tuesday, January 1, 2013. Any comments received will be responded to and forwarded to EPA with the final demonstrations.

Written comments should be addressed, faxed, or e-mailed to:
Andra Juniel, Air Assessment Section, Arizona Department of Environmental Quality, 1110 W. Washington Street, 3415-A, Phoenix, AZ 85007, PHONE: (602) 771-4417; FAX: (602) 771-2366, E-mail: juniel.andra@azdeq.gov.

In addition to being available on-line, copies of the analyses are available for review, Monday through Friday, 8:30 a.m. to 4:30 p.m., at the ADEQ Records Center, 1110 W. Washington St., Phoenix, AZ, 85007, Attn: David Olivo, (602) 771-4380, email: olivo.david@azdeq.gov.

Persons with a disability may request reasonable accommodations by contacting Linda Morrison at (602) 771-4793 or 1-800-234-5677 ext. 771-4793. This document is available in alternative formats by contacting ADEQ TDD phone number at (602) 771-4829.