2 HIGH WIND EXCEPTIONAL EVENT ANALYSIS: April 30, 2008

2.1 Description of Exceedances

Violations of the PM10 NAAQS were recorded in the Coachella Valley at the AQMD air quality monitoring stations at Indio (AQS Site Code 060652002) and Palm Springs (AQS Site Code 060655001) on April 30, 2008. The 24-hour mass concentrations were 212 and 169 $\mu g/m^3$ at Indio and Palms Springs, respectively, as measured with federal equivalent method (FEM) Beta Attenuation Monitor (BAM) PM10 samplers, based on hourly measurements averaged from midnight to midnight. The Palm Springs monitoring station is somewhat sheltered from the winds by the San Jacinto Mountains and PM10 concentrations were lower than those at Indio, as is typical for events with strong winds through the San Gorgonio Pass. This was a routine 1-in-6-day FRM sampling day, so FRM PM10 mass, sulfate, nitrate and chloride mass loadings from the filters are also available for this day. The FRM PM10 concentrations were elevated on April 30, 128 and 75 $\mu g/m^3$ at Indio and Palm Springs, respectively, but they did not exceed the federal standard. It is not the purpose here to discuss the differences and potential issues with the monitoring methodologies. The AQMD FEM data has been submitted to the AQS database and flagged to request exclusion as a high wind natural event under the U.S. EPA Exceptional Event Rule. While the FRM data can supersede the FEM when the measurements are collocated, this analysis will document the high wind event on April 30 that caused the FEM PM10 exceedances.

The FRM 24-hour concentrations and the continuous, hourly FEM BAM data from Indio and Palm Springs are shown in Table 2-1, starting at 1200 PST on April 29 before the concentrations started to increase and ending at 0600 PST on May 1 after the elevated concentrations ended. Concentrations exceeding 150 $\mu g/m^3$ are highlighted in bold type. The hourly concentrations at both Indio and, especially, Palm Springs were elevated through the afternoon of April 29, due to locally gusty winds starting in the Coachella Valley. The Indio monitor spiked to 446 $\mu g/m^3$ at the hour beginning at midnight (0000 PST) on April 30, then dropped to relatively low concentrations for the next six hours. At 0700 PST the Indio PM10 concentration climbed above 150 $\mu g/m^3$ and remained high through the day, peaking at 611 $\mu g/m^3$ at the hour starting at 0800 PST in the morning. The Palm Springs BAM was also high through much of the same period, peaking at 516 $\mu g/m^3$ for the hour starting at 1900 PST in the evening of April 30. The differences in the hourly PM10 concentrations between Palm Springs and Indio are due to the shielding that occurs at Palm Springs from the San Jacinto Mountains causing less consistent flows from the blowsand source areas.

TABLE 2-1
Hourly FEM BAM and 24-hour FRM PM10 Measurements at the AQMD Indio and Palm Springs Air Monitoring Stations in the Coachella Valley Between 1200 PST April 29 and 0600 PST May 1, 2008

		Indio Monitoring Station			Palm Springs Monitoring Station		
DATE	HOUR (PST)	BAM Hourly PM10 ($\mu g/m^3$)	24-Hour Average PM10 ($\mu g/m^3$) (midnight to midnight)		BAM Hourly PM10 ($\mu g/m^3$)	24-Hour Average PM10 ($\mu g/m^3$) (midnight to midnight)	
			BAM	FRM		BAM	FRM
4/29/08	1200	37.3			45.9		
	1300	28.5			44.2		
	1400	26.0			39.8		
	1500	35.9			72.1		
	1600	29.7			89.3		
	1700	51.1			97.2		
	1800	59.1			97.6		
	1900	68.4			68.5		
	2000	73.6			67.3		
	2100	43.3			62.3		
	2200	40.2			59.7		
	2300	39.1	65.9		83.4	54.4	
4/30/08	0000	**446.1**			90.6		
	0100	46.1			83.9		
	0200	40.6			100.1		
	0300	47.4			93.3		
	0400	44.6			59.7		
	0500	34.5			80.8		
	0600	50.3			109.4		
	0700	**164.0**			**180.0**		
	0800	**611.3**			**305.5**		
	0900	**438.6**			**325.6**		
	1000	**439.4**			**235.0**		
	1100	**414.2**			99.0		
	1200	**209.2**			130.8		
	1300	**246.2**			**151.9**		
	1400	**314.8**			138.3		
	1500	**327.3**			142.6		
	1600	**267.8**			85.9		
	1700	133.5			**163.7**		
	1800	**153.0**			**391.9**		
	1900	141.0			**516.3**		
	2000	**179.4**			115.7		
	2100	128.6			101.3		
	2200	94.1			108.9		
	2300	107.5	**211.6**	128	**246.6**	**169.0**	75
5/1/08	0000	88.1			130.6		
	0100	59.1			76.9		
	0200	48.3			55.0		
	0300	40.5			39.3		
	0400	39.5			33.0		
	0500	37.1			37.0		
	0600	37.2			17.9		

2.2 Conceptual Model: How the Event Unfolded

Strong, gusty winds developed in the Coachella Valley, starting in the afternoon of April 29 and increasing on April 30, 2008, to cause FEM PM10 NAAQS exceedances at the Palm Springs and Indio stations on April 30. The analysis of the meteorological setting, including weather charts, pressure gradients and satellite imagery, indicates significant potential for strong winds in the Coachella Valley on April 30. Previous natural event analyses defined four primary meteorological mechanisms that lead to high-wind PM10 events in the Coachella Valley, as discussed in Section 1.6.2: (Type 1) strong pressure and density gradients forcing high winds through the San Gorgonio Pass; (Type 2) storms and frontal passages; (Type 3) thunderstorm outflow winds; and (Type 4) Santa Ana wind events. The meteorological conditions on April 30 can be classified primarily as a Type 1 event with strong onshore pressure and density gradients between the coastal and desert air masses. This was enhanced by the synoptic weather pattern with low pressure at the surface over the Great Basin and a strong Pacific High in the eastern Pacific Ocean, as well as coupled along-valley flow aloft. As an upper level trough moved through, a deep marine layer west of the San Gorgonio Pass and the strong onshore pressure gradients caused flows through the Pass and high winds along the Coachella Valley.

Wind speeds in the Coachella Valley upwind of the Indio and Palm Springs air monitoring stations were high on this day, with sustained winds speeds well over 25 mph. The high PM10 measured at Indio and Palm Springs on April 30 occurred with consistent along-valley wind flows that prevailed throughout the day. This wind event was relatively widespread throughout the Valley, but the strongest winds were measured at the AQMD Whitewater Wash wind station, located near the centerline of the valley southeast of the San Gorgonio Pass in the primary natural desert blowsand source area in the northwestern Coachella Valley. Hourly averaged sustained wind speeds at Whitewater Wash exceeded 33 mph for every hour throughout the day on April 30, well in excess of the 23 mph threshold that is typical for windblown dust in this area, with west-northwesterly wind directions. The Whitewater Wash instantaneous gusts reached 53 mph or higher during every hour of the day. The peak sustained hourly winds were 44 mph and the peak gusts reached 65 mph. The timing of the strongest winds correlate well with the timing of the highest hourly PM10 concentrations.

Further from the centerline of the Coachella Valley, sustained winds to 32 mph were recorded at the National Weather Service (NWS)/Federal Aviation Administration (FAA) station at Palm Springs Airport, along with peak wind gusts to 46 mph. *(The NWS/FAA airport stations measure sustained winds as the 2-minute average before the observation time and gusts as a running 3-second average.)* The highest sustained (1-minute averages) winds at the Palm Springs air monitoring station peaked at 22 mph on April 30. This indicates that windblown PM10 from localized sources close to the Palm Springs monitoring station were not very significant and that most of the PM10 at Palm

Springs would have been generated closer to the San Gorgonio Pass. Further to the southeast, the AQMD Palm Desert wind station measured sustained 1-hour averaged winds to 26 mph and gusts as high as 54 mph, although most hours of the day had hourly sustained wind speed below 25 mph. In this area, the Coachella Valley widens and the wind speeds are typically not as strong as those measured closer to the San Gorgonio Pass.

Further down the Coachella Valley at Indio where the highest PM10 concentrations were measured, the 1-minute sustained winds peaked at 28 mph for the day while hourly averages only reached 19 mph. While windblown dust entrained from localized sources near Indio was a potential factor as controls were overwhelmed by the strong winds, most of the particulates were generated further upwind in the natural blowsand source areas. At the NWS/FAA Thermal Airport weather station, located approximately 8.6 miles further downwind from the Indo monitor, sustained (2-minute average) winds peaked to 33 mph with peak wind gusts to 48 mph and reduced visibilities. The gusty northwesterly winds, reduced visibilities and haze reported from Thermal Airport support the presence of windblown dust at the Indio monitor throughout much of the day. In addition, NWS forecast discussions, wind advisories and news reports also describe strong winds and blowing dust in the Coachella Valley, providing substantial weight-of-evidence for the sequence of events.

Figure 2-1 shows a snapshot of the Coachella Valley sustained winds and hourly PM10 concentrations measured during the hour starting at 0800 PST on April 30 to give a geographical perspective to this wind event. This is the time of the peak hourly PM10 measurement at Indio (611.3 $\mu g/m^3$) and during a PM10 concentration peak at Palm Springs (305.5 $\mu g/m^3$). During this time, winds in the Coachella Valley were representative of flows through the San Gorgonio Pass, with stronger along-valley (west-northwesterly to northwesterly) flows at the centerline of the valley and some turning and slowing of the winds near the edges of the as the topography of the foothills and mountains influenced the flow. The AQMD Whitewater Wash wind station measured the strongest winds at this time, with sustained 1-hour averaged wind speeds of 39 mph and instantaneous gusts to 65 mph. The winds at the AQMD Desert Hot Springs wind station remained more westerly with sustained 1-hour averages speeds of 23 mph and gusts to 43 mph. The Palm Springs winds were turned and slowed by the terrain of the San Jacinto Mountains, with 1-minute sustained speeds of 19 mph at the AQMD Palm Springs air monitoring station and a 2-minute sustained observation of 17 mph at the Palm Springs Airport with gusts to 28 mph. The 1-hour averaged sustained speeds were 17 mph at Palm Desert with gusts to 36 mph. The peak 1-minute averaged sustained wind speed was 26 mph at Indio, the highest measured at the air monitoring station until later that afternoon. While 1-to-5-minute sustained winds were not recorded at the supplemental AQMD wind stations (Whitewater Wash, Desert Hot Springs and Palm Desert), they would certainly be higher than the 1-hour averages. The extremely high

winds at Whitewater Wash indicate that the Whitewater River Wash and the open desert lands of this area are the primary source for the wind entrainment of dust and sand.

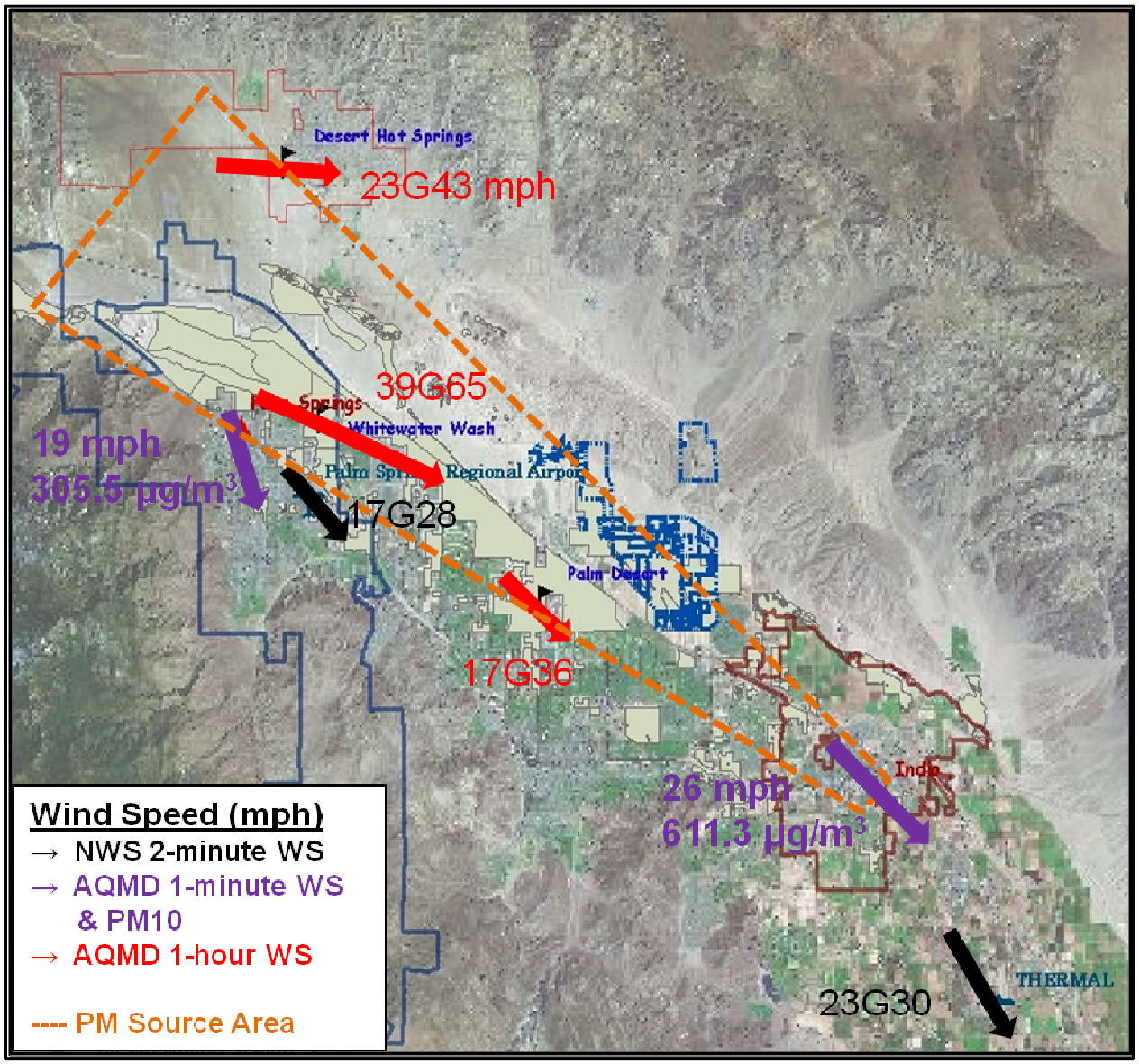

FIGURE 2-1
Map Showing Geography and Sustained Winds with Gusts (mph) Affecting the Coachella Valley PM10 Measurements (µg/m^3) during the Hour Starting at 0800 PST on April 30, 2008

[Sustained winds are 2-minute averages for NWS Airport METAR stations (black), 1-minute averages for AQMD Air Monitoring Stations (violet) and 1-hour averages for AQMD supplemental wind stations (red). Estimated PM10 source areas shown inside dashed orange border.]

Due to the widespread gusty winds in the Coachella Valley on April 30, sources of the windblown dust were both natural areas, primarily the Coachella Valley Preserve areas, and BACM-controlled anthropogenic sources. On this day, the wind entrained dust originated primarily from non-anthropogenic natural sources within the Coachella Valley, mainly the natural blowsand source areas of the Whitewater Wash and Coachella Valley Preserve System and other open desert areas. A portion of the wind-entrained dust may have also originated from anthropogenic sources, including some agricultural operations, construction activities and roadways, that are well controlled in the Coachella Valley as described in Section 1.6, Regulatory Measures. The timing of this event is verified with the high wind observations and reports of reduced visibility and blowing sand and dust, in conjunction with the hourly BAM PM10 measurement data from the Coachella Valley. With the weight of evidence provided, AQMD concludes that the PM10 exceedances would not have occurred without the high winds and wind-entrained dust from sources that were not reasonably controllable or preventable.

2.3 Technical Criteria for a High Wind Dust Exceptional Event Demonstration

Exceptional Event Criteria Summary

The technical criteria outlined in the Exceptional Event Rule for this high wind and windblown dust exceptional event demonstration are addressed in the order set forth in Table 2-2. The following sections describe how the technical criteria are met for the April 30, 2008 natural event.

TABLE 2-2

Technical Criteria for High Wind PM10 Exceptional Event Demonstration

Technical Criteria	Document Section
Not reasonably controllable or preventable	2.3.1
Clear causal relationship between the measurement and the event	2.3.2
Evidence that the event is associated with a concentration in excess of normal historical fluctuations, including background	2.3.2.1
Affects air quality	2.3.3
Caused by human activity unlikely to recur at a particular location OR a natural event	2.3.4
No exceedance or violation but for the event	2.3.5

2.3.1 Is Not Reasonably Controllable or Preventable

This demonstration identifies the sources that were expected to have contributed to the event, both natural and anthropogenic, and indicates how they were not reasonably controllable or preventable.

2.3.1.1 Source areas and categories expected to have contributed to the exceedance

Sources of windblown dust were both natural areas, particularly from the mountains and deserts, and BACM-controlled anthropogenic sources. This area is mapped in Figure 2-1, with the primary source areas outlined. The source area upwind of the Palm Springs monitor includes part of the Whitewater River Wash with large areas of natural blowsand below the canyons of the San Gabriel and San Jacinto Mountains and portions at the northern and western portion of the Coachella Valley. The Whitewater Wash and the Coachella Valley Preserve have been set aside as an undisturbed, natural ecological preserve under the Coachella Valley Multiple Species Habitat Conservation Plan, since the shifting sand is important to several wildlife species. The primary sources with the potential to contribute PM10 in this area include undeveloped public and privately held lands. Other potential sources are construction activities, landfill operations, freeways and other roadways, light industry, and rock and gravel operations. The same potential PM10 sources are also upwind of the Indio monitor, with much larger portions of the Whitewater River Wash and the Coachella Valley Preserve system creating the blowsand zone along the centerline of the Coachella Valley upwind of Indio. The mix of potential BACM-controlled anthropogenic sources upwind of Indio is similar. Further down the Valley, beyond Indio and into Imperial County, agriculture becomes more prevalent. These and all sources in the Coachella Valley are subject to strict AQMD regulatory controls. While there was wildfire activity in the San Jacinto Mountains on this day, smoke and ash contributions to the Palm Springs and Indio PM10 were not significant.

Analysis of Source Influence

A statistical model relating wind speeds at the Whitewater Wash blowsand source area to the PM10 measured at the Indio air monitoring station has been presented for several previous Coachella Valley natural event evaluations. Figure 2-2 shows this model graphically. The statistical model further illustrates that the April 30 exceedance of the PM10 NAAQS at Indio was caused by windblown dust emanating mainly from the natural PM10 source area of the Whitewater Wash and Coachella Valley preserve blowsand area. Using the 24-hour, 10-meter wind speed of 38.5 mph from the

Whitewater Wash site, the predicted PM10 concentration is 203.5 μg/m^3 on the best-fit curve of Whitewater 24-hour averaged wind speed versus Indio 24-hour averaged PM10 (Figure 2-2). The 37 μg/m^3 local background that the model estimates at Indio regardless of wind is then subtracted to give 166.5 μg/m^3 that would be contributed by blowsand. In other words, the blowsand source model is unable to distinguish whether this 37 μg/m^3 average is caused by wind action on the blowsand, so it is conservatively assumed to be primarily anthropogenic and not from the natural source and it is removed from consideration as part of the windblown dust from the natural source. Therefore, without the high-wind event entraining dust from the natural source, PM10 concentrations of approximately 45.1 μg/m^3 (211.6 μg/m^3 measured minus 166.5 μg/m^3 blowsand) would have been expected at Indio on April 30, well below the 24-hour PM10 NAAQS. This conservatively estimated PM10 source influence at Indio on April 30, 2008 is summarized in Table 2-3.

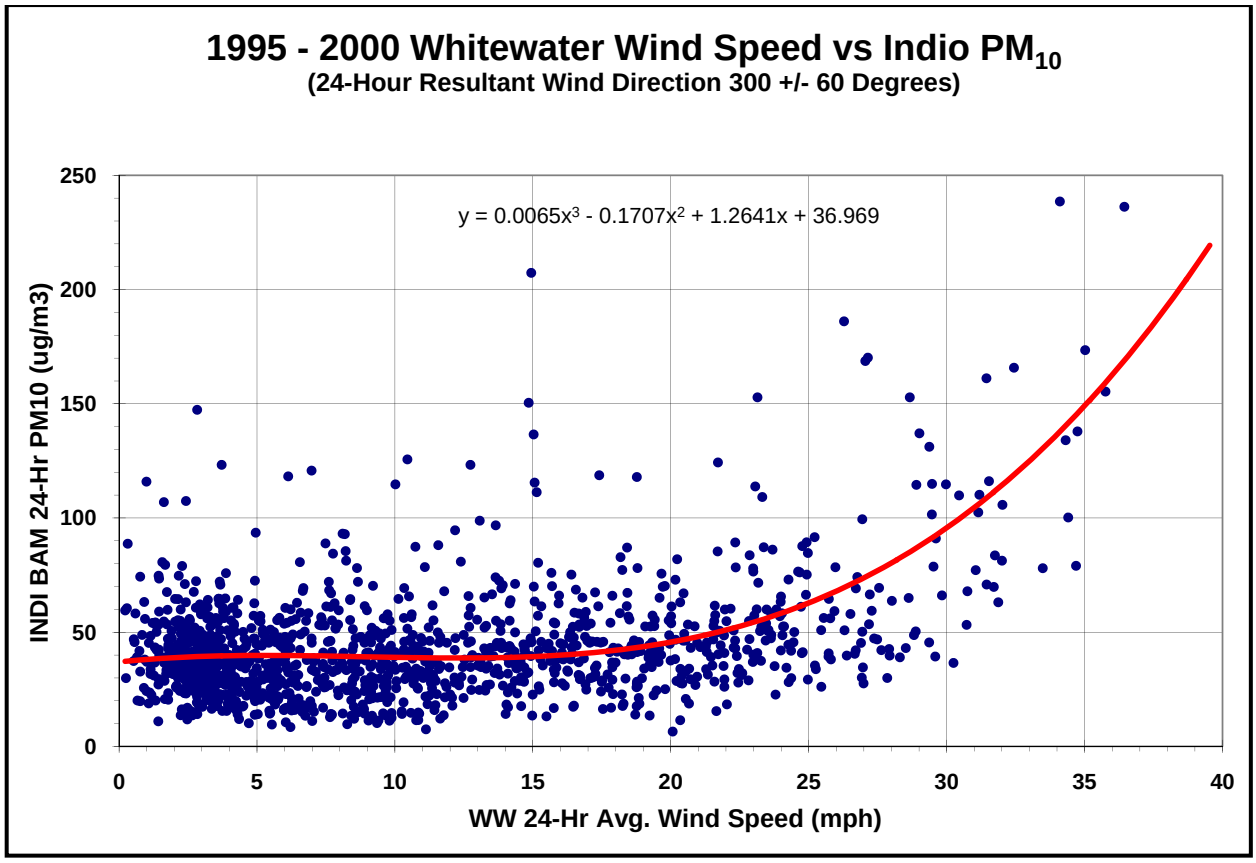

FIGURE 2-2

Plot of Paired 1995 - 2000 Whitewater Wash 24-Hour Averaged Wind Speeds (mph) versus Indio 24-Hour Averaged BAM PM10 Concentrations (μg/m^3) for winds through the Banning Pass

(Plotted curve is best-fit polynomial to data)

TABLE 2-3

Estimated PM10 Blowsand Source Influence at Indio on April 30, 2008 using the 24-Hour Period with High Winds and PM10 Concentrations

PM10 Origin	PM10 Concentration
Total Measured PM10 (24-hour FEM BAM Sampler)	**211.6 μg/m^3**
Model-Estimated PM10 (38.5 mph 24-Hour Avg. Wind)	203.5 μg/m^3
Avg. Local Background PM10 (24-Hour)	37.0 μg/m^3
Natural Source PM10 (24-Hour)	**166.5 μg/m^3**
PM10 without Natural Event	**45.1 μg/m^3**

2.3.1.2 Analysis of wind speed

The high PM10 measured at Indio and Palm Springs on April 30 occurred with strong northwesterly, along-valley wind flows that prevailed throughout the day. Table 2-4 summarizes the peak wind speeds measured in the Coachella Valley on April 30, including 1-hour averaged sustained, 1-to-5-minute averaged sustained and 1-to-3-second gusts, as available. This wind event was relatively widespread throughout the Valley and all wind monitors, except the AQMD Palm Springs air monitoring station, measured sustained winds in excess of 25 mph. Wind speeds near 25 mph are commonly used as a threshold for when undisturbed natural lands will allow wind entrainment of PM10 dust or when BACM controls on anthropogenic PM10 sources are likely to be overwhelmed. This threshold is reasonable for the purpose of this analysis. The strongest winds were measured at the AQMD Whitewater Wash wind station, located near the centerline of the Valley southeast of the San Gorgonio Pass in the primary natural desert blowsand source area. Hourly averaged sustained wind speeds at Whitewater Wash, exceeded 33 mph for every hour throughout the day on April 30, well in excess of the 25 mph threshold. The 24-hour wind speed at Whitewater Wash, averaged over the whole day, exceeded 38 mph from the northwest on April 30, providing windblown dust from the northwestern Coachella Valley, downwind to the Palm Springs and Indio 24-hour PM10 monitors. The Whitewater Wash instantaneous gusts reached 53 mph or higher during every hour of the day. The peak sustained hourly wind speed was 44 mph and the peak gusts reached 65 mph. It is clear that winds in the

general vicinity upwind of the PM10 monitors reached sustained speeds high enough to overwhelm controls on anthropogenic sources and entrain dust from natural sources and then transport it to the Palm Springs and Indio PM10 monitors.

TABLE 2-4
Sustained Wind Speeds and Peak Wind Gusts (mph) Measured in Coachella Valley on April 30, 2008 with Time of Occurrence (PST)

(AQMD air monitoring stations at Palm Springs and Indio measure hourly averaged and 1-minute maximum sustained wind speeds; no gusts are recorded. AQMD Coachella Valley Wind Network stations measure hourly averaged sustained winds and instantaneous gusts. Sustained winds at the NWS airport stations are 2-minute averages preceding the observation time. Peak wind gusts at the NWS stations are defined as the highest 3-second running average during the hour preceding the observation time.)

Station Location	Hourly Averaged Peak Sustained Wind Speed (mph)	Time of Peak Hourly Sustained Wind (PST)	1-5 Minute Averaged Peak Sustained Wind Speed (mph)	Time of Peak 1-5 Minute Sustained Wind (PST)	Peak Wind Gust (mph)	Time of Peak Gust (PST)
AQMD Whitewater Wash (blowsand source area near Coachella Valley centerline)	**44**	1800			**65**	0800 1600
NWS Thermal Airport (~8.6 miles SE of Indio monitor)			**32**	1737	**49**	1737 2312
NWS Palm Springs Airport (E of Palm Springs monitor)			**32**	2253	**46**	2244
AQMD Desert Hot Springs (northern Coachella Valley)	**30**	0600 0800			**51**	0300
AQMD Palm Desert (between Indio & Palm Springs monitors)	**26**	2200			**54**	2200
AQMD Indio Air Monitoring Station (southeastern Coachella Valley)	19	1100 1500	**28**	2300		
AQMD Palm Springs Air Monitoring Station (northwestern Coachella Valley)	16	1800	22	1800 2300		

2.3.1.3 Recurrence frequency

The sustained (hourly averaged) winds at the Whitewater Wash wind monitor in the blowsand source area exceed 25 mph quite often, on approximately one third of all days during the 2005 through 2009 period, as shown previously in Figure 1-6 in Section 1.6.3, Historical Perspective. In the 2005-2009 period, exceedances of the PM10 NAAQS occur approximately 1.4 times per year at Indio and 0.8 times per year at Palm Springs (Figures 1-4 and 1-5). That there are not more exceedances of the federal PM10 standard shows that other factors play a role and that the BACM controls on windblown dust sources in the Coachella Valley are effective on all but very windy days. All the PM10 24-hour NAAQS exceedances in the Coachella Valley since 1993 have been attributed to high-wind natural events, which may recur and still be considered for exclusion under the exceptional event rule.

2.3.1.4 Controls analysis

This requirement is met by demonstrating that despite having reasonable and appropriate measures in place, the April 30, 2008 wind event caused the NAAQS violation. During this event, there were no other unusual PM10-producing activities occurring in the Coachella Valley and anthropogenic emissions were approximately constant before, during and after the event. Reasonable and appropriate measures were in place, as has been described in Section 1.5, Regulatory Measures. Examining the make-up of the Coachella Valley PM10 on this day using FRM PM10 and PM2.5 data, the coarse particles (PM10-2.5), which are associated with windblown dust, represent over 87% of the total PM10 mass collected at Indio and over 75% at Palm Springs. PM10 sulfates, nitrates and chloride components were also low on the Indio and Palm Springs FRM samples, indicating primarily crustal material in the samples and not transported or locally generated urban pollution or combustion sources. Smoke from wildfires, agricultural or residential burning did not appear to have added any significant amount of PM10 to the concentrations recorded at Indio and Palm Springs. A relatively small wildfire started on April 29 with the gusty winds in the San Jacinto Mountains near Idyllwild, west of the Coachella Valley. It burned just over 700 acres, but the smoke was elevated and dispersed away from the Coachella Valley.

Wind speeds were high enough to entrain dust from natural areas including undisturbed mountain and desert areas upwind of the monitor. Natural particulate source areas contributed heavily to the measured PM10 at Palm Springs and Indio on April 30, from the upwind Whitewater River Wash and Coachella Valley Preserve areas, the undeveloped terrain of the northwestern Coachella Valley. Dust from these natural sources was not reasonably controllable or preventable during this event, due to the cost of applying controls over such a large land area and potential detrimental effects that controls could have on the natural ecosystems. PM10 was emitted from some BACM-

controlled anthropogenic sources (mainly construction related activities) as control measures were locally overwhelmed by the high winds. Due to the AQMD High Wind Day forecasts issued for April 30, earth-moving construction and agricultural operations were minimal in the Coachella Valley on this day. The primary source of the windblown dust on April 30 was the natural blowsand preserve areas that were most impacted by the strong winds. These BACM-controlled sources are mainly in the developed areas of the Coachella Valley, mainly southwest of the Valley centerline from Palm Springs to Indio, as outlined in Figure 2-1.

A survey of the AQMD complaint records and inspection reports for the Coachella Valley indicated no evidence of unusual particulate emissions on April 30, 2008, other than related to the windblown dust event. The complaints are summarized in Table 2-5 from the AQMD CLean Air Support System (CLASS) database for complaints and compliance actions. Due to the windy conditions, AQMD Compliance staff responded to six complaints related to windblown dust in the Coachella Valley on April 30. No Notices of Violation or Notices to Comply were issued for fugitive dust violations on this day. Several complaints were directly related to the strong winds and windblown dust that overwhelmed the strict fugitive dust controls that are enforced in the Coachella Valley. The control methods were generally effective throughout the Coachella Valley, but were apparently overwhelmed in several instances by the strong, gusty winds, causing windblown dust and sand to be entrained in the atmosphere.

TABLE 2-5
Summary of PM-Related Complaints in the Coachella Valley on April 30, 2008

Complaint Date/Time	Location	Complaint Description	Disposition
4/30/08 1115 PST	Palm Desert	Dust from construction site; hard to see across street; watering but not enough	Inspector visit on 5/1: Did not observe fugitive dust emissions. Inspector reviewed site records and discussed the complaint. No further action taken.
4/30/08 1632 PST	Palm Desert	Dust from construction site	Inspector visit on 5/1: Observed 3 water trucks actively watering different areas of the site. No fugitive dust was observed. No further action taken.
4/30/08 1821 PST	La Quinta	Dirt all over property; wind blowing	Inspector visit on 5/1: Did not observe fugitive dust emissions emanating from the site. Several pads had been stabilized. Water trucks had been operating until late in the evening on 4/30. No further action taken.
4/30/08 1827 PST	Palm Desert	Blowing Sand	Inspector visit on 5/1: Observed dust/sand in complainant's back yard. Did not observe fugitive dust from nearby construction sites. No further action taken.
4/30/08 1834 PST	Palm Desert	Blowing Sand (2^{nd} report of above complaint)	Same as above
4/30/08 2016 PST	Bermuda Dunes	Blowing Sand	Inspector unable to contact complainant. No further action taken.

2.3.2 Causal Connection

This demonstration shows a clear causal connection between the PM10 measured at the Palm Springs and Indio air monitoring stations and the high wind event. In this case, there is a clear causal connection between the onset of the strong, gusty winds upwind of the air monitoring stations, starting in the afternoon of April 29 and continuing through the day on April 30, and coinciding increases in the hourly PM10 concentrations at Palm Springs and Indio.

2.3.2.1 Historical fluctuations

While high wind natural events may recur, sometimes frequently, and qualify for exclusion under the exceptional events rule, information on the historical fluctuations of the particulate concentrations and the winds can give insight as to the frequency of events that may be expected in a given area. This also helps to demonstrate that an event affected air quality with a causal connection. The historical perspective is presented in detail in Section 1.6.3 and is summarized here in relation to April 30, 2008. Five-year time series of the FRM PM10 (2005-2009) concentrations and the FEM BAM 24-hour PM10 concentrations (2008-2009), since submittal of the FEM data to AQS, are shown in Figures 1-4 and 1-5 for Indio and Palms Springs, respectively. Daily maximum sustained (1-hour averaged) wind speeds from the AQMD Whitewater Wash wind station are shown in Figure 1-6 for the same period. These show that PM10 exceedances occur an average of 1.4 times per year at Indio and less than once per year at Palm Springs. As was shown previously in Tables 1-2 and 1-3, on April 30 the 212 $\mu g/m^3$ 24-hour PM10 concentration was the 99.8^{th} percentile value (the third highest of the period) for the full 5-year period and the 169 $\mu g/m^3$ concentration at Palm Springs was the 99.6^{th} percentile value (the fourth highest of the period). If considering the 3-month seasonal period of April through June, the Indio concentration was the 99.7^{th} percentile value and the Palm Springs concentration was the 99.5^{th} percentile value. This event on April 30 was associated with the third highest sustained (1-hour averaged) wind speed at the AQMD Whitewater Wash wind monitor, 44 mph, measured during the 2005-2009 period.

2.3.2.2 Event occurrence and geographic extent

This section contains details of the high-wind natural event occurrence on April 30, 2008, including a description of meteorological conditions with details of the sequence of events that led to the PM10 NAAQS exceedances. Wind measurements, weather analysis charts, reports of blowing dust and reduced visibilities, wind advisories, news reports, and satellite images were all analyzed for this evaluation. Figure 2-1 shows the

geographic extent of the wind near the time of the peak hourly PM10 measurement at Indio and a high concentration at Palms Springs.

Meteorological Setting

The meteorological conditions on April 30 can be classified primarily as a Type 1 event, as defined previously, with strong pressure and density gradients between the desert and coastal air masses. This was enhanced by the synoptic weather pattern with low pressure at the surface over the Great Basin and a strong Pacific High in the eastern Pacific Ocean, as well as coupled along-valley flow aloft. On Tuesday, April 29, 2008, an upper level trough of low pressure was developing over the west coast, moving slowly southeastward toward southern California. Figure 2-3 shows the height analysis chart of the 500 millibar (MB) pressure level at 1600 PST, April 29. The winds at this level were westerly at this time over southern California. The passage of the upper level low and surface cold front had brought gusty winds to much of northern California, the Owens Valley and the San Joaquin Valley, where gust to 60 mph were reported in the mountains and deserts of Kern County. By 0400 PST in the morning of April 30 (Figure 2-4), the trough had deepened over southern California, causing stronger northwesterly winds aloft at the coast. By 1600 PST in the afternoon of April 30, (Figure 2-5), the trough moved inland bringing northwesterly winds aloft over the deserts of southern California and Nevada. The trough provided upper-level support for the strong westerly and northwesterly winds at the surface during this period.

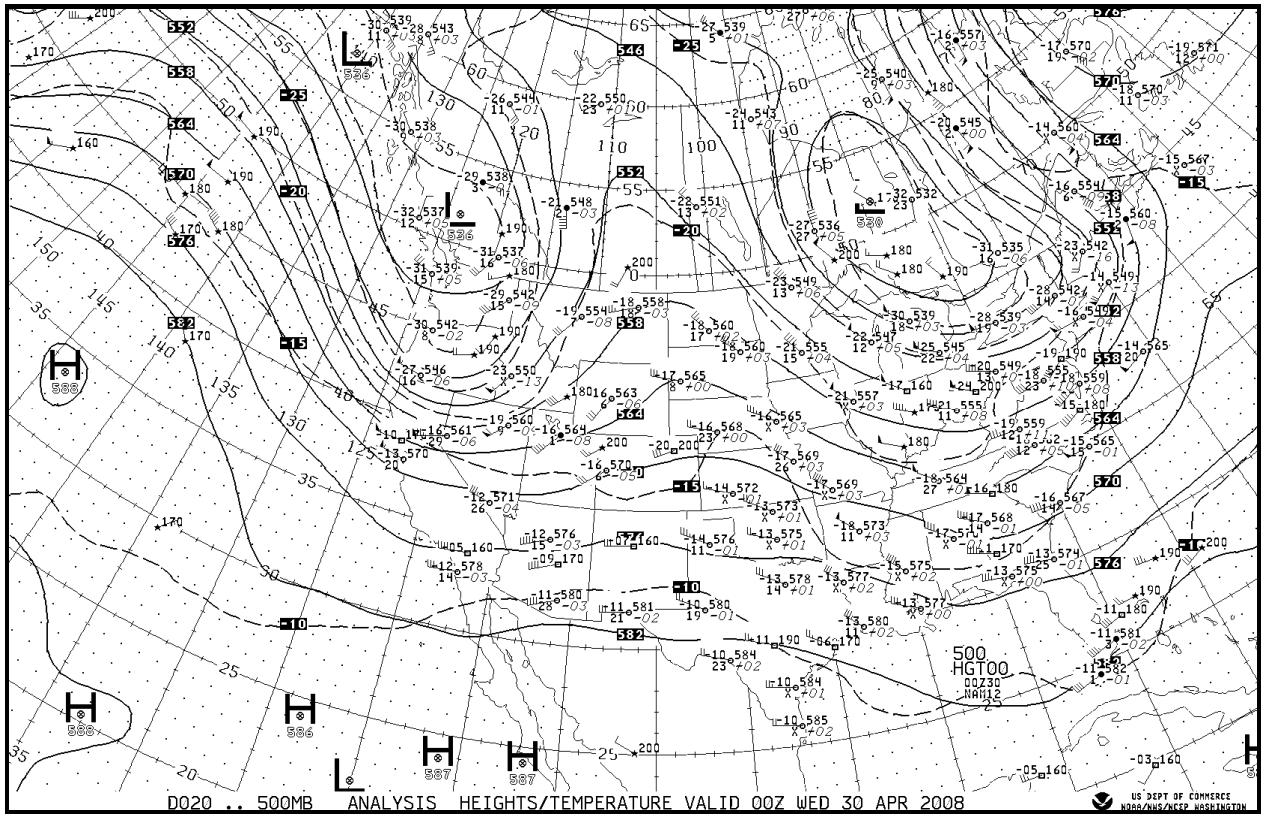

FIGURE 2-3

National Weather Service Height Analysis (solid contours in tens of meters) of the 500 Millibar Pressure Surface for 1600 PST Tuesday, April 29, 2008

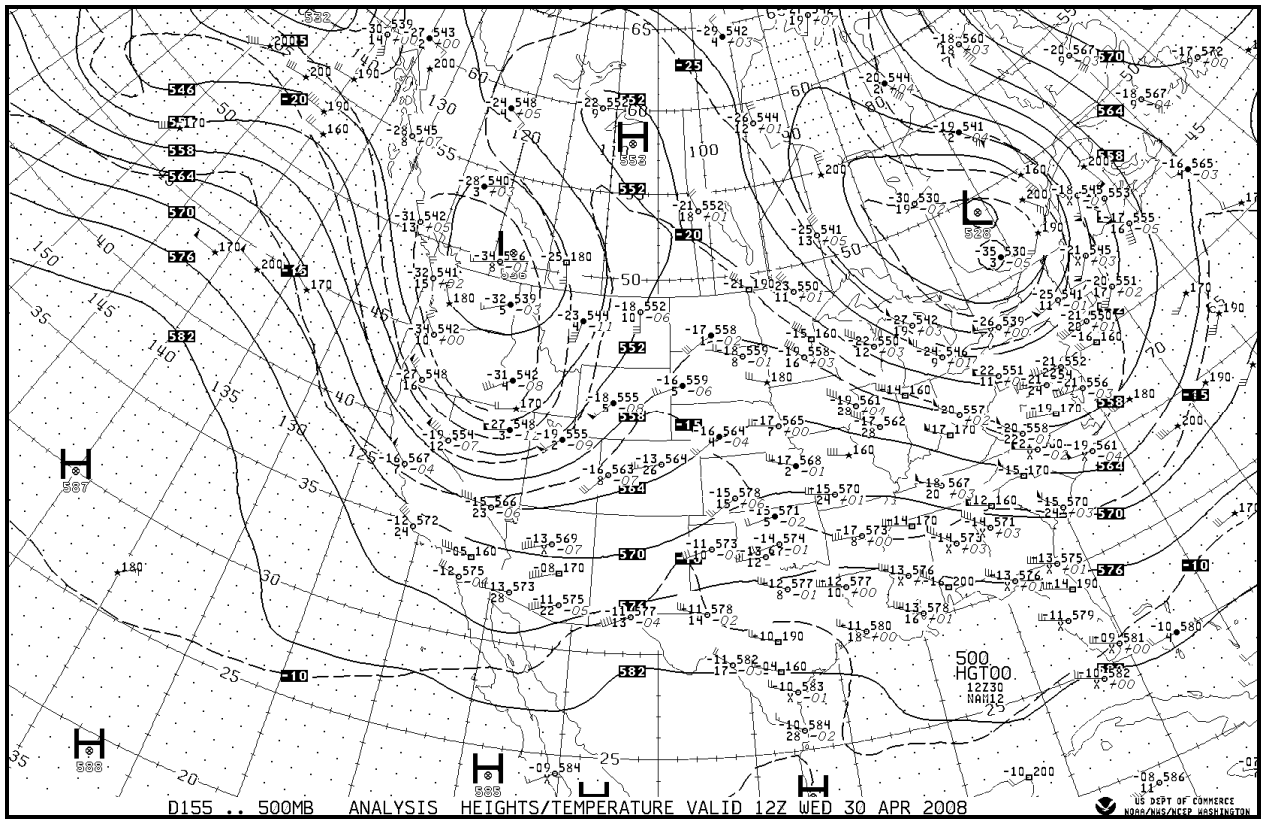

FIGURE 2-4

National Weather Service Height Analysis (solid contours in tens of meters) of the 500 Millibar Pressure Surface for 0400 PST Wednesday, April 30, 2008

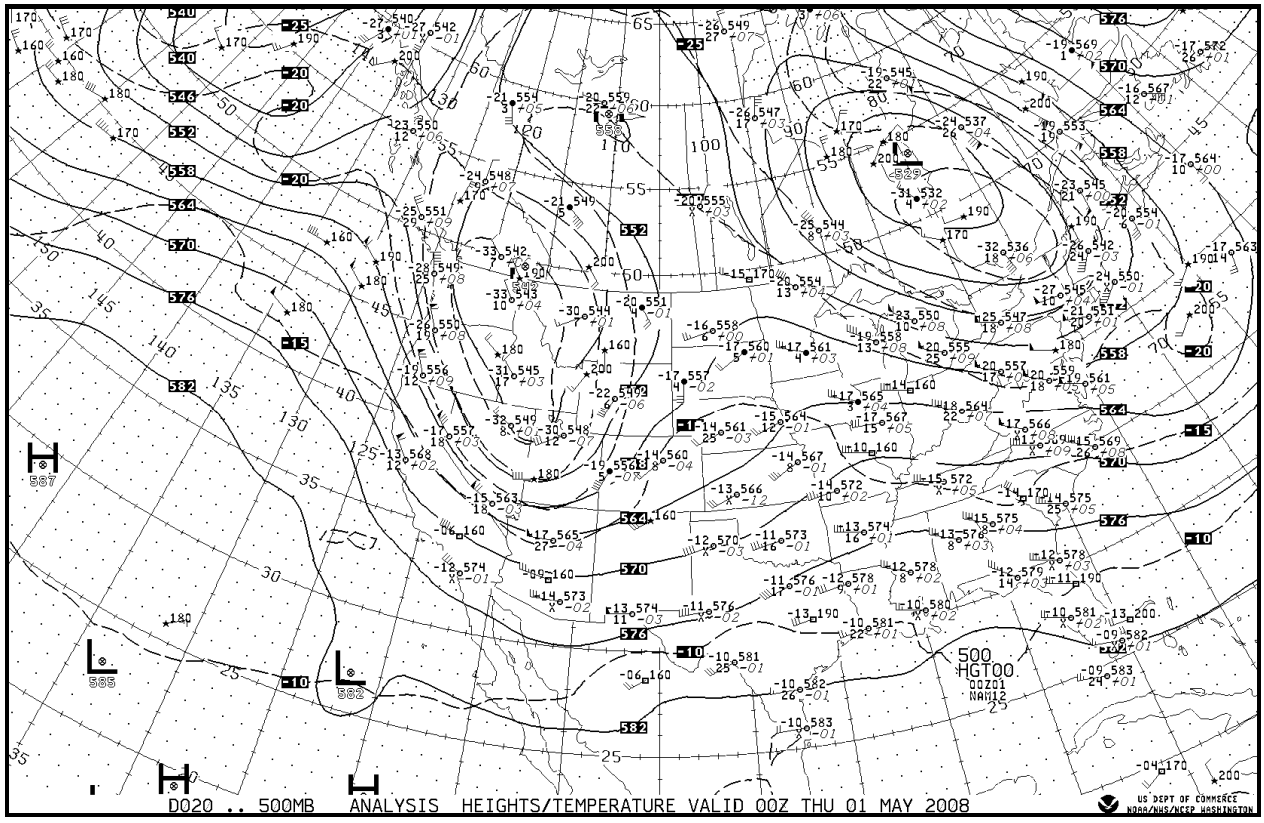

FIGURE 2-5

National Weather Service Height Analysis (solid contours in tens of meters) of the 500 Millibar Pressure Surface for 1600 PST Wednesday April 30, 2008

Figures 2-6A and 2-6B show the NWS mean sea level pressure analysis every three hours throughout the day on April 30, 2008, starting at 0100 PST. An area of low pressure was over the states of Wyoming, Montana, Colorado and Utah through the period, with a cold front extending westward through southern California. As the day progressed, the frontal system impacted the Coachella Valley area; the tight spacing of the isobars indicates stronger pressure gradients and stronger winds throughout the area. This pattern brought west and northwesterly winds across southern California and through the Coachella Valley throughout the day.

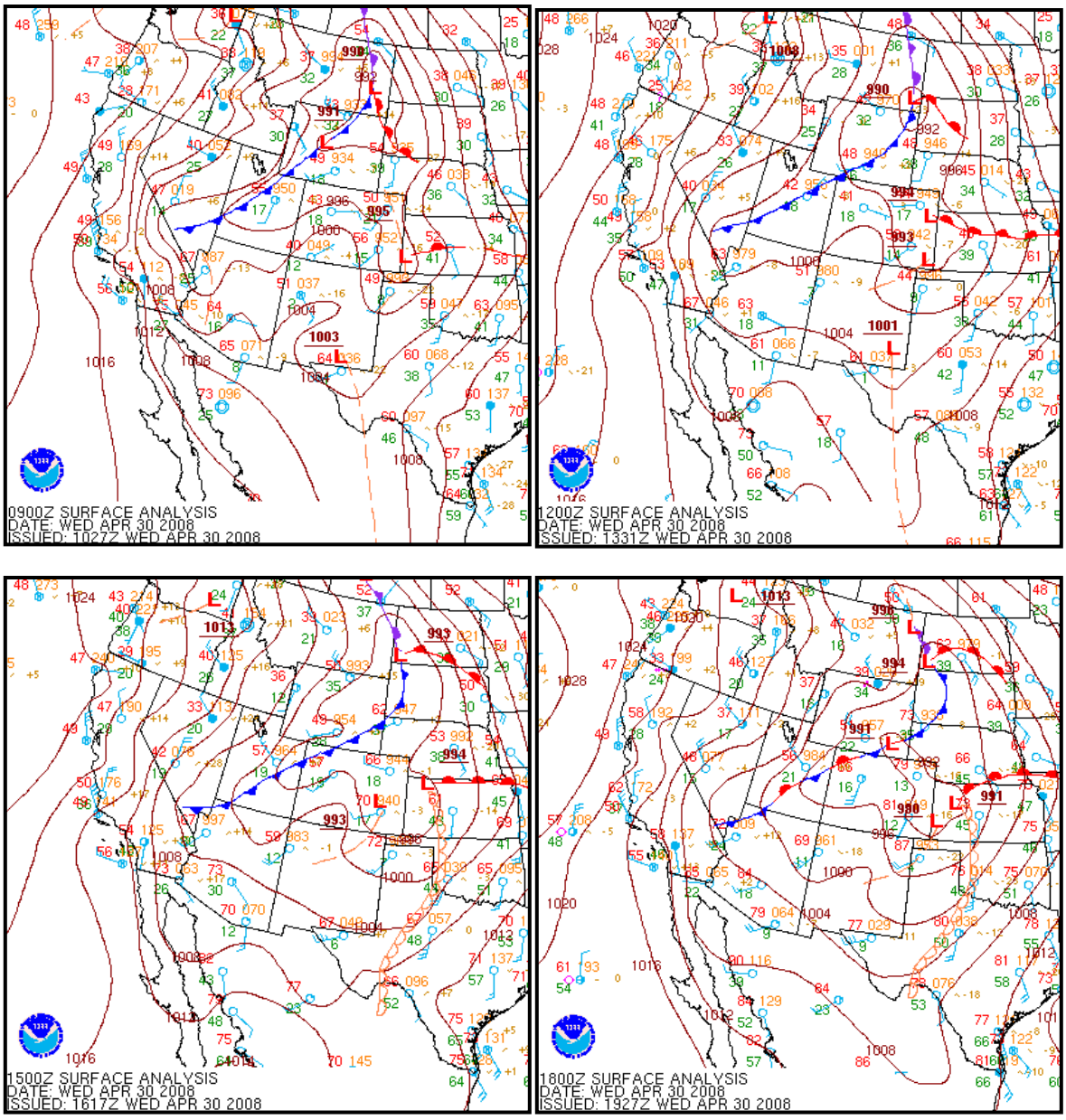

FIGURE 2-6A

National Weather Service Sea-Level Pressure Analysis (contours every 4 millibars) for every three hours between 0100 and 1000 PST Wednesday, April 30, 2008

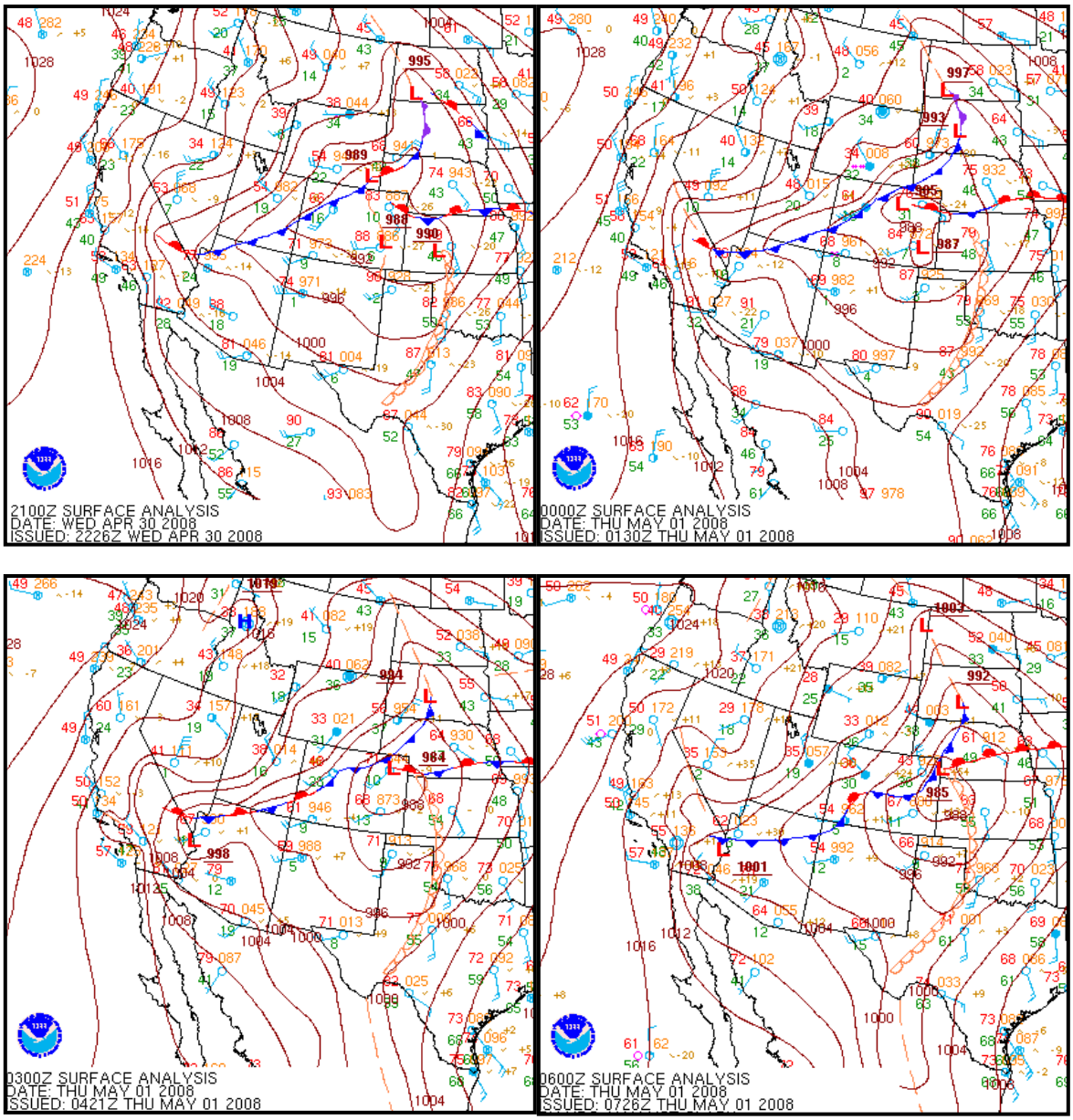

FIGURE 2-6B

National Weather Service Sea-Level Pressure Analysis (contours every 4 millibars) for every three hours between 1300 and 2200 PST Wednesday, April 30, 2008

The coastal inversion base at 0400 PST in the morning of April 30 was 3,500 feet. The trough had created a coastal eddy offshore, deepening the marine layer and bringing patchy fog and some drizzle to the South Coast Air Basin west of the mountains overnight. This is illustrated in the visible satellite image from 1103 PST on April 30 (Figure 2-7), that shows no clouds over the deserts and a weak coastal eddy bringing low clouds west of the mountains. The deep marine layer and onshore flow supported the onshore pressure and density gradient through the San Gorgonio Pass and the gusty winds observed in the Coachella Valley.

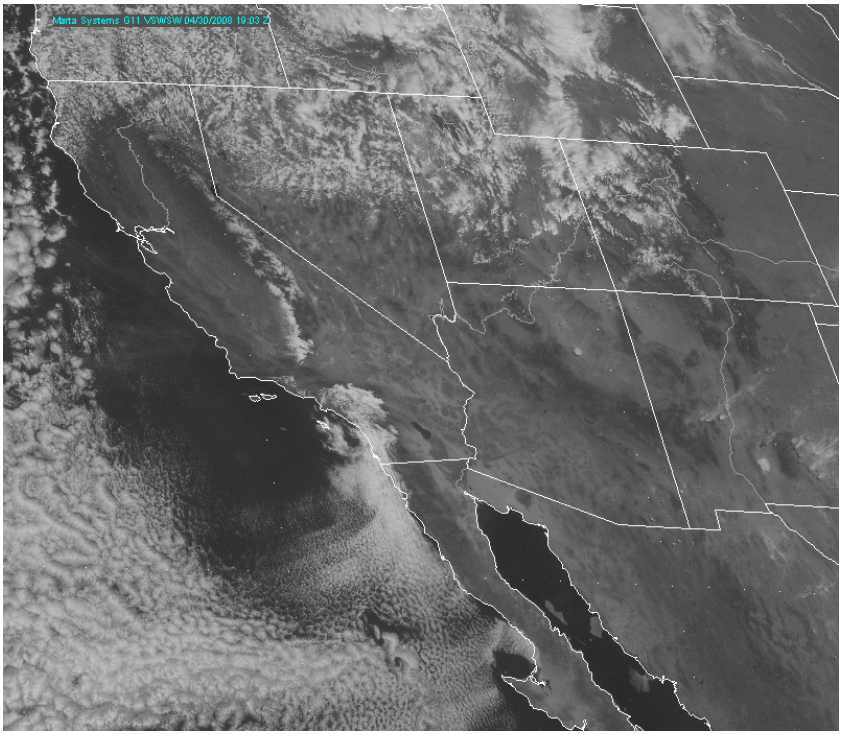

FIGURE 2-7

Visible Satellite Image for 1103 PST in the morning of Wednesday April 30, 2008

In their forecasts for the Coachella Valley, the NWS San Diego Forecast Office predicted gusty winds to start in the evening of Tuesday, April 29 and to continue through Thursday morning, May 1, along with blowing dust and sand. The peak wind gusts were expected to reach 45 mph in the evening of Wednesday, April 30. With their forecast issued at 0108 PST on Wednesday morning, NWS San Diego issued a wind advisory for the Coachella Valley, as well as for the Apple and Lucerne Valleys in San Bernardino County, the San Bernardino and Riverside County Mountains and the San

Diego County Mountains. These wind advisories were to be in effect between 1000 PST Wednesday, April 30 and 0400 PST on Thursday, May 1. The following summarizes the NWS Zone Forecasts issued for the Coachella Valley during the period.

CAZ061-3001015-
COACHELLA VALLEY
230 PM PDT TUE APR 29 2008 (1330 PST, Tuesday, April 29, 2008)

.TONIGHT… CLEAR. LOWS 59 TO 68. WINDS NORTHWEST 15 TO 25 MPH. GUSTS TO 40 MPH IN THE EVENING.

.WEDNESDAY…MOSTLY SUNNY. HIGHS 81 TO 86. WINDS NORTHWEST 15 TO 25 MPH.

.WEDNESDAY NIGHT…MOSTLY CLEAR. LOWS 56 TO 62. WINDS NORTHWEST 15 TO 25 MPH. NEAR BANNING PASS…WINDS NORTHWEST 25 TO 30 MPH…BECOMING 15 TO 20 MPH AFTER MIDNIGHT. GUSTS TO 40 MPH IN THE EVENING.

CAZ061-010015-
COACHELLA VALLEY
208 AM PDT WED APR 30 2008 (0108 PST, Wednesday, April 30, 2008)

…WIND ADVISORY IN EFFECT FROM 11 AM THIS MORNING TO 5 AM PDT THURSDAY…

.TODAY…MOSTLY SUNNY. AREAS OF BLOWING SAND AND BLOWING DUST IN THE AFTERNOON. HIGHS 81 TO 86. WINDS NORTHWEST 15 MPH…BECOMING 20 TO 30 MPH IN THE AFTERNOON. GUSTS TO 40 MPH.

.TONIGHT…MOSTLY CLEAR. AREAS OF BLOWING SAND AND BLOWING DUST. LOWS 56 TO 62. WINDS NORTHWEST 20 TO 30 MPH. GUSTS TO 45 MPH IN THE EVENING.

CAZ061-010415-
COACHELLA VALLEY
603 AM PDT WED APR 30 2008 (0503 PST, Wednesday, April 30, 2008)

…WIND ADVISORY IN EFFECT FROM 11 AM THIS MORNING TO 5 AM PDT THURSDAY…

.REST OF TODAY…MOSTLY SUNNY. AREAS OF BLOWING SAND AND BLOWING DUST IN THE AFTERNOON. HIGHS 81 TO 86. WINDS NORTHWEST 15 MPH…BECOMING 20 TO 30 MPH IN THE AFTERNOON.

.TONIGHT…MOSTLY CLEAR. AREAS OF BLOWING SAND AND BLOWING DUST. LOWS 56 TO 62. WINDS NORTHWEST 20 TO 30 MPH. GUSTS TO 45 MPH IN THE EVENING.

CAZ061-010415-
COACHELLA VALLEY
1021 AM PDT WED APR 30 2008 (0921 PST, Wednesday, April 30, 2008)

…WIND ADVISORY IN EFFECT UNTIL 5 AM PDT THURSDAY…

.REST OF TODAY…MOSTLY SUNNY. AREAS OF BLOWING SAND AND BLOWING DUST. HIGHS 81 TO 86. WINDS NORTHWEST 20 TO 30 MPH.

.TONIGHT…MOSTLY CLEAR. AREAS OF BLOWING SAND AND BLOWING DUST. LOWS 56 TO 62. WINDS NORTHWEST 20 TO 30 MPH. GUSTS TO 45 MPH IN THE EVENING.

CAZ061-011115-
COACHELLA VALLEY
230 PM PDT WED APR 30 2008 (1330 PST, Wednesday, April 30, 2008)

…WIND ADVISORY IN EFFECT UNTIL 5 AM PDT THURSDAY…

.TONIGHT…MOSTLY CLEAR. AREAS OF BLOWING SAND AND BLOWING DUST. LOWS 56 TO 62. WINDS NORTHWEST 20 TO 30 MPH. GUSTS TO 45 MPH IN THE EVENING.

.THURSDAY…MOSTLY SUNNY. HIGHS 85 TO 90. WINDS NORTH 15 MPH IN THE MORNING BECOMING LIGHT.

CAZ061-011115-
COACHELLA VALLEY
330 AM PDT THU MAY 1 2008 (0230 PST, Thursday, May 1, 2008)

…WIND ADVISORY IN EFFECT UNTIL 5 AM PDT EARLY THIS MORNING…

.TODAY…MOSTLY SUNNY. HIGHS 81 TO 86. WINDS NORTHWEST 20 TO 30 MPH EARLY WITH GUSTS TO 45 MPH…BECOMING NORTHWEST 10 TO 20.

The criteria used by the AQMD Meteorology Section to forecast high winds and windblown dust events in the Coachella Valley in accordance with AQMD Rule 403.1, Wind Entrainment of Fugitive Dust, require:

(1) 0700 PST Pressure Gradient Index (PGI) > 17 MB,

where PGI = the 0700 PST Summation Pressure Gradient [SPG = (SAN-LAS)[8] + (LGB-DAG)[9] + (RIV-DAG)[10]] + the 24-hour change in the SPG from the previous day;

and

(2) 0400 PST Coastal Temperature Inversion Base > 1,500 feet;

or

0700 PST (SFO-TRM)[11] Pressure Gradient ≥ 8 MB.

On the morning of April 30, the 0700 PST Summation Pressure Gradient (SPG) was 25.8 MB. The 24-hour change in the SPG was 11.9 MB, giving a Pressure Gradient Index (PGI) of 37.7 MB. The San Francisco to Thermal pressure gradient was 15.1 MB. The coastal inversion base at 0400 PST in the morning of April 30 was 3,500 feet. Thus, the conditions favored strong winds through the Pass and the Coachella Valley on this day. The AQMD Meteorology Section predicted this on the previous day and issued a Rule 403.1 high wind forecast valid for April 30. The AQMD high-wind forecast is available to the public and facilities subject to AQMD Rule 403.1 as part of the AQMD daily air quality forecast, available on the web at:

http://www.aqmd.gov/telemweb/Forecast.aspx.

A section of the AQMD text forecast for April 30 was as follows:

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 Coachella Valley Rule 403.1 Wind Forecast:  High Wind Day

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[8] Sea Level Pressure difference between San Diego and Las Vegas
[9] Sea Level Pressure difference between Long Beach and Daggett
[10] Sea Level Pressure difference between Riverside and Daggett
[11] Sea Level Pressure difference between San Francisco and Thermal

A daily recorded message for the AQMD Coachella Valley wind forecast is also available through 1-800-CUT-SMOG or directly at 909-396-2399. The wording for the Rule 403.1 high-wind advisory forecast message on April 30 was as follows:

> The following forecast is valid for Wednesday, April 30, 2008.
>
> The South Coast Air Quality Management District has designated Wednesday, April 30 as a Rule 403.1 High Wind Day in the Coachella Valley. This means that localized wind gusts are expected to exceed 25 miles per hour throughout the valley.

In the morning of Wednesday, April 30, AQMD issued a PM10 Dust Advisory for the Coachella Valley, reproduced below. This advisory was distributed via FAX, Email and the AQMD website. Due to the observed PM10 BAM readings in the morning, the advisory warned of the Air Quality Index (AQI) in the Coachella Valley reaching Unhealthy for Sensitive Groups or higher levels, due to windblown dust with the strong winds. In addition, a Smoke Advisory was also issued, warning of the potential of smoke and ash from the Apache Fire in the San Jacinto Mountains of Riverside County, near Idyllwild, affecting the Coachella Valley and the Anza Area. No significant impacts of the fire were measured at Indio or Palm Springs, where PM2.5 measurements remained in the low Moderate AQI category or better throughout the day.

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT
COACHELLA VALLEY WINDBLOWN DUST ADVISORY
& SMOKE ADVISORIES
WEDNESDAY, APRIL 30, 2008

Valid Wednesay, April 30, 2008

Coachella Valley PM10 Dust Advisory

A **PM10 Dust Advisory** is in effect for the Coachella Valley (Area 30). Strong winds and blowing dust are expected to last throughout the day. Air quality is expected to reach the Unhealthy for Sensitive Groups level or higher in areas of the Coachella Valley impacted by windblown dust. People with respiratory disease, such as asthma, should avoid outdoor exertion; everyone else, especially the elderly and children, should limit prolonged outdoor exertion in the dust impacted areas.

Smoke Advisories

Areas of the Coachella Valley (Area 30) and the Anza Area (Area 27) in **Riverside County** may experience smoke and ash from the Apache Fire currently burning in the San Jacinto Mountains west of Idyllwild. Localized areas may experience air quality in the **Unhealthy for Sensitive Groups category or higher in areas directly impacted by smoke and ash from the wildfire**.

Due to the Santa Anita Wildfire in **Los Angeles County**, localized areas of smoke may still occur, although conditions have improved. As a result, **concentrations of fine particulates may reach the Unhealthy for Sensitive Groups level in localized areas that are directly impacted by smoke,** i.e. areas that can see and smell smoke**.** The greatest potential for smoke impacts is currently in the West San Gabriel Valley (Area 8), the East San Gabriel Valley (Area 9), and the San Gabriel Mountains (Area 15).

Everyone should avoid any vigorous outdoor or indoor exertion in smoke impacted areas; people with respiratory or heart disease, the elderly, and children should remain indoors. Keep your windows and doors closed unless it is extremely hot inside. In these cases, seek alternate shelter. Run your air conditioner if you have one. Keep the fresh air intake closed and the filter clean to prevent bringing additional smoke inside.

For more tips on avoiding health impacts from the smoke, see http://www.aqmd.gov/pubinfo/factsheets.htm on AQMD's website.

Current air quality readings and forecasts from the AQMD can be obtained on our Web Page: *www.aqmd.gov*
or our automated voice recording system: (800) 445-3826
Please send any questions, comments or contact changes to: Mr. Kevin Durkee, Air Quality Specialist
Phone: (909) 396-3168, FAX: (909) 396-3927, E-Mail: kdurkee@aqmd.gov

News articles from the Desert Sun Newspaper are reproduced below, relating to the winds and the Apache Fire. Winds, reported at 20 mph winds with 40 mph gusts, blew over a truck on Gene Autry Trail, close to the Whitewater Wash wind station. The road was closed in the morning of April 30, due to blowing sands. A track and field meet scheduled for the afternoon of April 30 at Indio High School was postponed because of the high winds until the next afternoon.

Wildfire near Idyllwild estimated at five acres
By Colin Atagi • The Desert Sun • April 29, 2008

Firefighters are estimating a blaze burning near Idyllwild this evening has engulfed five acres, according to the U.S. Forest Service.

Five firefighters who hiked about 3.5 miles on the Pacific Crest Trail from Keenwild Station to the Apache Fire were at the scene as of 11 p.m.

They were expected to hike further up the mountain to get a better view of the area and confirm the fire's size, officials said.

The fire is in the San Jacinto Mountains about three miles from Idyllwild near the Carmen Valley area.

“It is a ground fire,” said Tracey Kern, a dispatcher with the San Bernardino National Forest. “There are no structures, no big trees. It’s hitting snow, so it’s creating a lot of smoke. It’s slowly creeping way high on the peak. It’s really high, as far as I know.”

Smoke and flames from the wildfire are visible across the Coachella Valley tonight.

The fire can be seen at least as far east as La Quinta and was even more visible at the base of the San Jacinto Mountains.

“It’s coming down the ridge over on to our side of the mountain ... very high up ... but we can see it and certainly smell it from Andreas Hills,” said Marie Weigel in an e-mail to The Desert Sun. She is wife of Palm Springs City Councilman Lee Weigel, who lives in the Indian Canyons area.

The fire is "at least several miles" above Palm Springs, Kern said.

Firefighters are expected to remain at the scene all night and continue their battle Wednesday morning, U.S. Forest Service spokeswoman Valerie Baca said.

Temperatures are expected to be in the low 50s this morning with 11 mph winds in the Idyllwild area, according to AccuWeather.

Winds blew about 26 mph in 60-degree temperatures this evening.

A helicopter and air tanker were used to battle the fire this afternoon but had to be grounded. “The weather caused some problems for us,” Baca said.

Officials expect to launch the aircraft again Wednesday morning, Baca said.

As of 9:15 p.m., Cal Fire crews have not been called in to assist with the fire, officials there said.

The Palm Springs Police Department received numerous 911 calls reporting the fire Tuesday evening. The high volume of calls tied up phone lines, according to the department.

The U.S. Forest Service has set a 7 a.m. meeting Wednesday at the Keenwild Station to assess efforts in fighting the fire.

Visit mydesert.com for more updates on the fire throughout the day.

Crews re-launching air assault on 700-acre Apache Peak Fire
crews attacking fire with five aircrafts, digging containment lines
Colin Atagi and Angela Franzer • The Desert Sun • April 30, 2008

Fire crews are re-launching an air assault against a wildfire that's been burning near Idyllwild in the San Jacinto Mountains since late Tuesday afternoon that has grown to 700 acres.

Firefighters are using five aircrafts to drop water and retardant on the blaze.

“They’re flying this afternoon due to the decrease in wind and the lifting of the marine layer,” fire information officer Robin Prince said.

She added firefighters are at the scene and are in the process of digging containment lines.

There are no communities threatened and no evacuations scheduled, experts told the Desert Sun at 1:10 p.m.

Fires "often look closer than they really are, especially at night," Prince said.

Fire officials initially suspected the blaze, called the Apache Peak fire, would be easily put out, but fog and wind conditions have presented some problems.

It is being fueled by heavy downed logs and timber moving into grass and brush, allowing flames to spread rapidly, according to the U.S. Forest Service.

Smoke from the fire has engulfed Palm Springs this afternoon, but all Coachella Valley hospitals have not received reports of any respiratory ailments from local residents.

About 170 fire personnel are now at the scene attempting to tackle the blaze.

Planned air attacks were delayed earlier because weather conditions would be dangerous for pilots.

Firefighters were up against 15-to-20-mph winds with 40-mph gusts, National Weather Service Meteorologist Ted MacKechnie said.

“Forty-mph gusts will affect flight, plus the turbulence in the wake of the ridge is very hard to fly in,” he said. “In fact, it’s very dangerous to fly in.”

Winds are expected to drop to less than 10 mph Thursday with light and variable gusts.

“All in all, I think it’s going to become more manageable tomorrow,” MacKechnie said.

The fire is burning east on a combination of forest and Agua Caliente land, according to Kate Kramer, spokeswoman with the U.S. Forest Service.

She said the blaze has already burned through timber by 2 p.m. Wednesday and officials hope this would slow its progression.

A hiker reported the wildfire around 4:35 p.m. Tuesday afternoon, and by dusk Wednesday, its flames and smoke could be seen as far east as La Quinta.

"It's coming down the ridge over on to our side of the mountain ... very high up ... but we can see it and certainly smell it from Andreas Hills," said Marie Weigel in a Tuesday e-mail to The Desert Sun. She is the wife of Palm Springs City Councilman Lee Weigel, who lives in the Indian Canyons are.

"It's actually kind of pretty. It's really kind of neat watching the forces of nature," Weigel said, adding that the residents in her neighborhood were not overly concerned about the fire and that she has no additional insurance for living in a fire area.

Weigel said she would not be allowing her two children, both who suffer from asthma, to play outside today because of air quality.

In addition, a smoke advisory has been issued for the Coachella Valley and Anza areas.

Those sensitive or susceptible to air quality issues should avoid unnecessary outdoor activity, the South Coast Air Quality Management District announced.

Firefighters on Tuesday hiked 3.5 miles starting at Keenwild Station on the Pacific Crest Trail to reach the blaze in the Apache Peak area. They have yet to determine its cause.

"There are no structures, no big trees," said Kern said. "It's hitting snow, so it's creating a lot of smoke. It's slowly creeping way high on the peak."

Indian Canyon Park and the San Jacinto Wilderness is closed to hikers today until further notice.

"We're taking a wait and see approach on the fire and how quick it's contained," said Margaret Park, director of planning for the Agua Caliente Band of Cahuilla Indians, who recalls the park had been closed because of fire in the past.

Desert Hot Springs resident Fritz Collins recalled a fire in the late 70s that burnt across the entire mountain range for three weeks.

"I just came to see how bad it was. My worst nightmare is that it goes that way," Collins said pointing to Desert Hot Springs.

A helicopter and air tanker were used to battle the fire Tuesday afternoon but had to be grounded. "The weather caused some problems for us," Baca said.

A prescribed burn was scheduled in the area for this week, but canceled because of high winds.

State fire officials are worried that this fire season throughout Southern California could be quite dangerous. Late-winter rains brought wildflowers and other vegetation on hills and mountains throughout the area. Experts fear they will help fuel intense fires.

Return to mydesert.com for more details throughout the day.

For more information about the fire, call 909-383-5688.

Winds expected to die down Thursday
Colin Atagi • April 30, 2008

Weather experts expect local winds that have blown over vehicles and spread a nearby wildfire to decrease by Thursday.

AccuWeather forecasters predict Thursday's winds to blow 10 mph with 21-mph gusts.

This is down from today's 20-mph winds and 40-mph gusts that blew over a truck on Gene Autry Trail, which had to be shut down this morning because of blowing sands.

Firefighters battling the Apache Wildfire also should have an easier time tomorrow as they try to put out flames, National Weather Service Meteorologist Ted MacKechnie said.

Today's 15-to-20-mph winds and 40-mph gusts should drop below 10 mph Thursday with light and variable gusts.

“All in all, I think it’s going to become more manageable tomorrow,” MacKechnie said.

Local temperatures will likely remain in the high-80s, while firefighters should find themselves in 60-degree temperatures Thursday.

High winds delay track-and-field finals
Desert Sun staff • April 30, 2008

The Desert Valley League track and field finals scheduled for 4 p.m. today at Indio High School have been postponed.

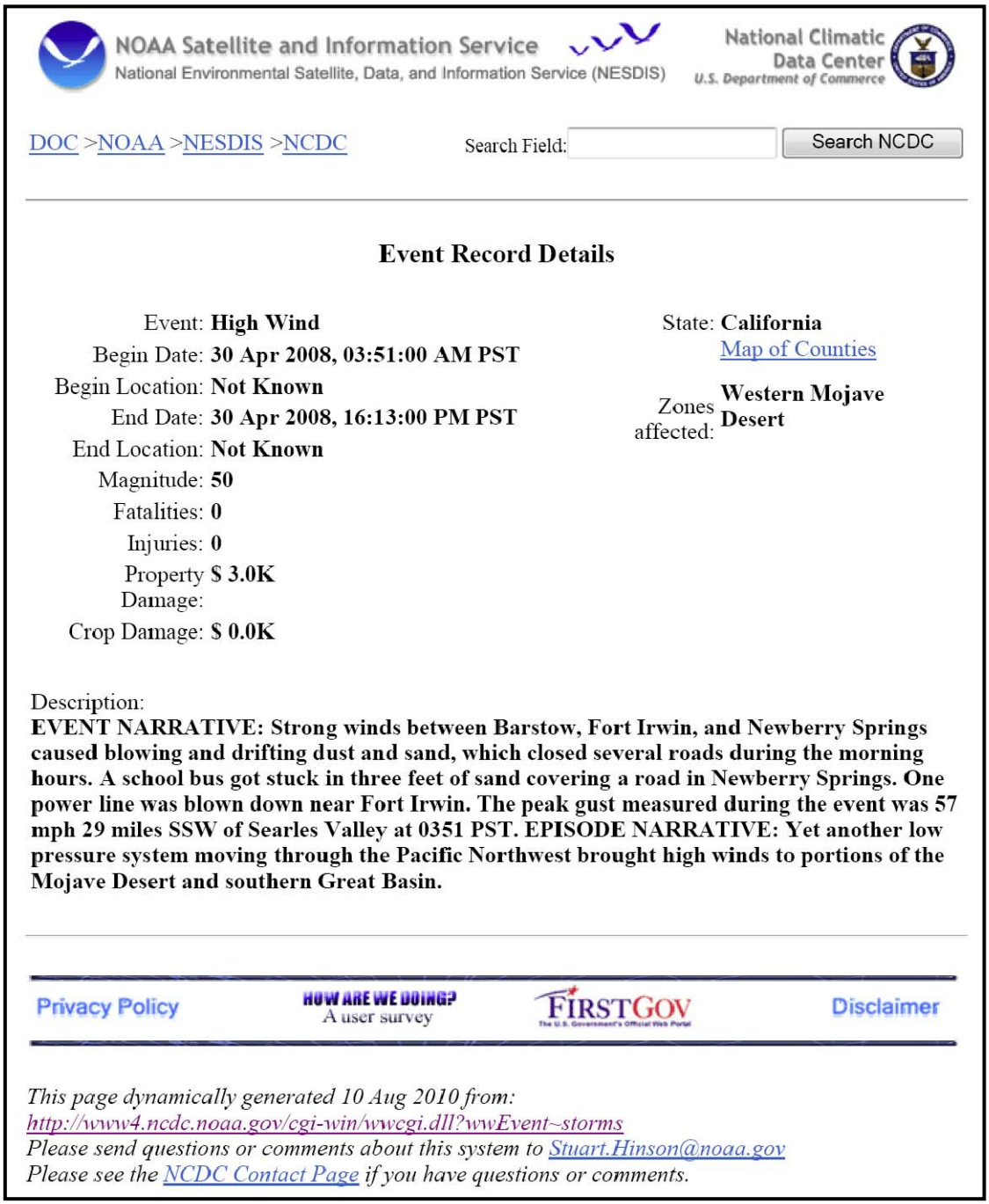
The postponement was caused by high winds in the eastern Coachella Valley, according to the Indio High athletic office.

The meet, which includes all six schools in the DVL, has been rescheduled for 4 p.m. Thursday at Indio High.

Sand cleanup closes roads, causes delays
The Desert Sun - Palm Springs, Calif.
Author: Angela Franzer
Date: May 2, 2008
Start Page: B.1
Section: Local
Text Word Count: 269
Abstract (Document Summary)

The Desert Sun Tempers flared and many motorists were late to work Thursday morning as they dealt with the aftermath of the previous day's high winds - sand drifts in the road.

The passage of the upper level trough and surface frontal system that contributed to the high winds in the Coachella Valley also brought gusty winds and blowing sand to the western Mojave Desert near Barstow on April 30 between 0351 and 1613 PST. The National Climatic Data Center (NCDC) Event Record Reports[12] contained the following description.



NOAA Satellite and Information Service
National Environmental Satellite, Data, and Information Service (NESDIS)

National Climatic Data Center
U.S. Department of Commerce

DOC >NOAA >NESDIS >NCDC Search Field: Search NCDC

Event Record Details

Event: **High Wind**
Begin Date: **30 Apr 2008, 03:51:00 AM PST**
Begin Location: **Not Known**
End Date: **30 Apr 2008, 16:13:00 PM PST**
End Location: **Not Known**
Magnitude: **50**
Fatalities: **0**
Injuries: **0**
Property Damage: **$ 3.0K**
Crop Damage: **$ 0.0K**

State: **California**
Map of Counties
Zones affected: **Western Mojave Desert**

Description:
EVENT NARRATIVE: Strong winds between Barstow, Fort Irwin, and Newberry Springs caused blowing and drifting dust and sand, which closed several roads during the morning hours. A school bus got stuck in three feet of sand covering a road in Newberry Springs. One power line was blown down near Fort Irwin. The peak gust measured during the event was 57 mph 29 miles SSW of Searles Valley at 0351 PST. EPISODE NARRATIVE: Yet another low pressure system moving through the Pacific Northwest brought high winds to portions of the Mojave Desert and southern Great Basin.

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This page dynamically generated 10 Aug 2010 from:
http://www4.ncdc.noaa.gov/cgi-win/wwcgi.dll?wwEvent~storms
Please send questions or comments about this system to Stuart.Hinson@noaa.gov
Please see the NCDC Contact Page if you have questions or comments.

[12] *NOAA/NESDIS/NCDC: http://www4.ncdc.noaa.gov/cgi-win/wwcgi.dll?wwEvent~Storms*

Windblown Dust Analysis

Just upwind of the San Gorgonio Pass, the winds at the AQMD Banning Airport air monitoring station (Table 2-6) increased in the afternoon of April 29 and remained elevated throughout the day on April 30. The wind directions were from the west and west-southwest, indicating consistent flows through the pass. While this site did not measure particularly strong winds to locally create significant windblown dust, sustained hourly averages to 18 mph and several hourly maximum 1-minute averaged sustained winds of 25 mph were measured. This demonstrates that the onshore surface pressure gradient was forcing the flow through the San Gorgonio Pass and into the Coachella Valley.

The AQMD Palm Springs air monitoring station is typically sheltered from the strongest winds in the Coachella Valley by the San Jacinto Mountains, but that station also measured some elevated winds through the day, with 1-minute averaged sustained speeds to 22 mph (Table 2-6). The wind directions at Palm Springs were more northerly as the winds came through the San Gorgonio Pass and were deflected by the San Jacinto Mountains into Palm Springs.

The winds at the AQMD Indio air monitoring station (Table 2-6) were also elevated, starting in the afternoon of April 29 and throughout most of the day on April 30. The strongest winds at this site occurred between 0800 and 1000 PST and then in the afternoon and late evening. The sustained hourly averaged wind speeds reached 19 mph with 1-minute averaged sustained speeds over 25 mph for nine hours to a peak of 28 mph at 2300 PST. The wind directions were consistently from the northwest, indicating flow along the Coachella Valley from the San Gorgonio Pass. Instantaneous gusts would be higher at the AQMD air monitoring stations, if they were available. Some local contribution to the PM10 concentration was possible, especially at Indio, as the local winds at Indio and Palm Springs were strong enough at times to overwhelm local dust controls, but the wind speeds at these sites are mostly not consistently strong enough to generate enough local windblown dust near the stations to cause the high PM10 measured. The PM10 was primarily generated upwind of the air monitoring stations, further up the Coachella Valley toward the San Gorgonio Pass, then transported and deposited where the winds were weaker due to the deflection and weakening of the flow due to the mountains near Palm Springs and the widening of the Valley before Indio.

TABLE 2-6

Hourly Wind Directions (degrees), Wind Speeds (mph) and Maximum 1-Minute Average Speed for each Hour (mph) for AQMD Air Quality Monitoring Stations in the Coachella Valley and San Gorgonio Pass on April 30, 2008

		Banning Airport Monitoring Station (BNAP)			Palm Springs Monitoring Station (PLSP)			Indio Monitoring Station (INDI)		
DATE	**HOUR (PST)**	**WD (deg)**	**WS (mph)**	**Maximum 1-Minute Avg. (mph)**	**WD (deg)**	**WS (mph)**	**Maximum 1-Minute Avg. (mph)**	**WD (deg)**	**WS (mph)**	**Maximum 1-Minute Avg. (mph)**
4/29/08	1000	254	11	14	180	3	6	190	5	9
	1100	264	11	17	196	4	10	176	5	8
	1200	249	12	15	349	9	14	166	4	8
	1300	240	13	20	358	10	15	213	3	7
	1400	232	16	22	354	11	16	55	6	11
	1500	229	16	21	345	11	15	260	10	15
	1600	245	15	19	352	12	15	265	9	14
	1700	237	12	19	344	12	17	277	9	14
	1800	256	12	17	348	11	17	302	11	15
	1900	262	10	16	340	10	15	332	13	20
	2000	248	11	14	347	9	15	336	12	17
	2100	257	12	17	351	11	14	336	12	16
	2200	258	15	19	352	12	18	331	10	14
	2300	266	15	19	347	13	19	316	10	16
4/30/08	0000	241	15	16	342	14	20	319	11	16
	0100	254	13	15	343	14	19	325	10	16
	0200	253	15	12	344	14	20	328	13	18
	0300	256	15	10	344	13	18	327	13	20
	0400	252	15	11	338	12	16	320	12	19
	0500	253	17	10	344	13	17	321	12	17
	0600	260	13	8	337	12	16	326	13	21
	0700	238	16	12	346	13	18	336	15	22
	0800	245	14	9	343	14	19	316	17	**26**
	0900	245	12	**25**	344	15	21	328	19	**26**
	1000	240	13	**25**	351	13	18	308	17	24
	1100	243	17	**25**	352	14	20	323	19	**25**
	1200	233	16	22	346	15	19	327	17	22
	1300	253	14	16	357	14	20	324	18	23
	1400	246	14	15	349	14	18	324	18	**25**
	1500	242	14	12	346	13	19	324	19	**25**
	1600	238	14	10	338	12	20	322	17	**27**
	1700	243	13	11	349	13	21	323	18	24
	1800	238	14	10	352	16	22	325	14	21
	1900	238	18	8	350	15	21	331	16	22
	2000	223	17	12	347	12	18	323	18	23
	2100	247	14	9	342	12	19	336	16	**25**
	2200	250	14	**25**	341	12	20	325	17	**26**
	2300	236	12	**25**	347	15	22	314	18	**28**
5/1/08	0000	249	11	**25**	342	13	17	320	15	22
	0100	243	9	22	346	15	18	320	15	21
	0200	257	8	16	347	13	19	313	14	19
	0300	256	7	15	349	10	14	318	13	17
	0400	255	7	12	340	9	15	313	12	17
	0500	239	6	10	349	7	10	316	11	17
	0600	264	5	11	334	6	9	304	9	13
	0700	269	7	10	351	5	9	290	8	11
	0800	263	4	8	354	5	10	301	6	11
	0900	121	18	12	62	6	10	263	8	16
	1000	89	20	9	53	5	9	337	7	13
	1100	101	19	25	96	2	6	24	6	11
	1200	107	17	25	151	3	6	312	6	12

Further to the east of the Palm Springs Air monitoring station, the winds at the NWS Palm Springs Airport station (Table 2-7) were northwesterly with some stronger sustained (2-minute averaged) winds to 32 mph measured in the late morning through early afternoon and again late in the evening on April 30. Peak wind gusts over 30 mph were measured at PSP starting on April 29 into the early morning of April 30, then starting again at 0843 PST and continuing for most of the day with the highest gust value recorded at 48 mph near the end of the day. The timing of these stronger gusts coincides well with the timing of the higher Palm Springs PM10 concentrations as shown in Table 2-1, which jumped to 305.5 $\mu g/m^3$ during the 0800 PST hourly average, followed by several other high values to the peak hourly average of 516.3 $\mu g/m^3$ at 1900 PST. The automated visibility at Palm Springs Airport decreased slightly from 10 miles to 8 miles for the observations at 1453 and 1753 PST, but no remarks of blowing dust were noted with the automated process at that station.

TABLE 2-7

Hourly Wind Directions (degrees), Wind Speeds (mph), Wind Gusts (mph) when reported, Visibilities (statute miles), Weather Conditions and Observer Remarks for the National Weather Service Palm Springs Airport Station on Wednesday, April 30, 2008

HZ = Haze, BLDU = Blowing Dust, BLSA = Blowing Sand, WSHFT = Wind Shift followed by time in UTC, PK WND = Peak Wind since last hour (direction &speed in knots/time in UTC), SQ = Squall, LTG = Lightning, TS = Thunderstorm, RA = Rain, + = Heavy, - = Light, SH = Shower, CB = Cumulonimbus Clouds, B = Begin time, E = End time, P = Precipitation amount since last observation in hundredths of inches (P0000 = Trace)

Palm Springs Airport (PSP)									
DATE	**HOUR (PST)**	**WD (deg)**	**WS (mph)**	**Gust (mph)**	**VIS (miles)**	**Peak WD (deg)**	**Peak WS (mph)**	**PK Wind Time (PST)**	**Remarks**
4/29/08	1153	VRB	5		10				
	1253	340	22	**31**	10	330	**31**	1253	WSHFT 1249 PST
	1309	320	17	**26**	10	10	**31**	1254	270V340
	1353	320	12	21	10	340	**33**	1325	260V340
	1453	330	24	**35**	10	320	**38**	1421	
	1553	320	23	**32**	10	320	**36**	1537	
	1653	320	**26**	**35**	10	310	**46**	1640	
	1753	320	**32**	**40**	10	320	**40**	1753	**SQ**
	1853	VRB	7	23	10	310	**32**	1811	
	1953	320	15	**26**	10				
	2053	340	18	**30**	10	340	**32**	2030	
	2153	320	21	**31**	10	310	**35**	2114	
	2253	320	23	**29**	10	330	**33**	2214	
	2353	310	21	**33**	10	310	**33**	2345	
4/30/08	0053	300	17	**28**	10	310	**31**	19	
	0153	310	22	**28**	10	310	**36**	103	
	0253	300	13	**26**	10	320	**30**	239	
	0353	VRB	3		10				
	0453	300	10	20	10				
	0553	280	10	18	10				
	0653	160	3		10				
	0753	VRB	3	22	10				
	0853	320	17	**28**	10	310	**30**	843	
	0953	330	**28**	**39**	10	330	**39**	953	
	1053	320	20	**33**	10	340	**36**	954	
	1153	320	**28**	**38**	10	320	**39**	1134	
	1253	310	**28**	**36**	10	320	**38**	1209	
	1353	320	23	**38**	10	320	**40**	1303	
	1453	310	22	**36**	8	330	**39**	1428	260V330
	1553	330	21	**44**	10	330	**44**	1549	
	1653	330	16	24	10	320	**46**	1603	
	1753	320	23	**32**	8	350	**39**	1733	
	1853	300	13	**36**	10	320	**40**	1840	
	1953	320	15	21	10	320	**43**	1908	
	2053	300	6		10				
	2153	310	13	17	10				
	2253	320	**32**	**46**	10	310	**46**	2244	
	2353	310	20	**33**	10	320	**48**	2355	
5/1/08	0053	320	**26**	**33**	10	320	**33**	53	
	0153	320	**30**	**37**	10	310	**37**	151	
	0253	300	10	22	10	320	**40**	200	
	0353	300	10	23	10				
	0453	320	12		10				
	0553	300	6		10				

The strongest winds typically occur through the centerline of the Coachella Valley, just below the San Gorgonio Pass, weakening with distance toward the southeast as the Valley widens before Indio. These strong winds are often observed along the I-10 corridor, especially near the Whitewater Wash and the Coachella Valley Preserve, where much of the blowsand that affects the Valley is generated. This case was as expected in that strong winds were measured at the AQMD Whitewater Wash wind station, part of the supplemental AQMD Coachella Valley Wind Network. This data is shown in Table 2-8. The winds were consistently from the west-northwest throughout the day on April 30. The 24-hour averaged wind at Whitewater Wash was 38.5 mph. The hourly averaged winds at Whitewater Wash exceeded 25 mph for every hour starting at 1300 PST on April 29 and throughout the day on April 30, peaking at 44 mph for the 1800 PST hour. Instantaneous wind gusts exceeded 50 mph in every hour of the day on April 30, peaking at 65 mph during the 0800 PST and 1600 PST hours.

TABLE 2-8

Hourly Wind Directions (degrees) and Speeds with Peak Gusts (mph) for the AQMD Coachella Valley Meteorological Network Stations on April 30, 2008

		Whitewater Wash Blowsand Site (WWW)			Desert Hot Springs Wind Station (DHS)			Palm Desert Wind Station (PDT)		
DATE	**HOUR (PST)**	**WD (deg)**	**WS (mph)**	**Gust (mph)**	**WD (deg)**	**WS (mph)**	**Gust (mph)**	**WD (deg)**	**WS (mph)**	**Gust (mph)**
4/29/08	1000	159	6	12	259	21	**37**	133	4	10
	1100	266	11	**33**	260	**24**	**42**	145	5	11
	1200	298	23	**39**	259	**25**	**41**	187	3	12
	1300	301	**25**	**39**	255	**25**	**43**	10	3	10
	1400	299	**26**	**40**	252	24	**41**	258	8	21
	1500	295	**29**	**44**	246	24	**41**	290	8	23
	1600	300	**30**	**45**	262	21	**38**	299	9	22
	1700	301	**30**	**50**	274	21	**37**	303	9	**25**
	1800	295	**29**	**53**	285	20	**40**	318	9	24
	1900	296	**27**	**54**	291	24	**41**	327	10	**25**
	2000	302	**28**	**48**	298	**25**	**46**	332	11	23
	2100	296	**30**	**51**	295	**28**	**45**	328	13	**27**
	2200	295	**31**	**50**	283	**26**	**45**	322	13	**27**
	2300	294	**33**	**61**	288	24	**43**	315	11	**28**
4/30/08	0000	292	**34**	**60**	286	24	**40**	309	8	23
	0100	292	**37**	**57**	282	**26**	**45**	316	11	**28**
	0200	293	**37**	**59**	292	**27**	**48**	323	11	**25**
	0300	293	**33**	**53**	296	**30**	**51**	329	12	**27**
	0400	293	**35**	**53**	301	**30**	**49**	333	11	22
	0500	292	**37**	**58**	310	**25**	**44**	335	11	23
	0600	289	**37**	**61**	280	**25**	**46**	315	7	21
	0700	289	**37**	**59**	280	**25**	**48**	308	9	**25**
	0800	295	**39**	**65**	274	23	**43**	315	17	**36**
	0900	294	**40**	**60**	271	22	**42**	315	18	**40**
	1000	296	**40**	**59**	273	20	**43**	315	18	**41**
	1100	291	**39**	**59**	267	19	**39**	315	17	**35**
	1200	291	**37**	**55**	266	21	**40**	316	16	**34**
	1300	292	**40**	**61**	270	22	**41**	317	17	**34**
	1400	296	**39**	**59**	270	22	**44**	318	19	**38**
	1500	300	**38**	**56**	271	23	**45**	317	19	**42**
	1600	299	**41**	**65**	270	**25**	**46**	316	20	**45**
	1700	295	**39**	**60**	271	**25**	**47**	318	23	**48**
	1800	298	**44**	**64**	270	24	**47**	315	24	**47**
	1900	299	**42**	**62**	270	**25**	**48**	320	21	**42**
	2000	303	**40**	**63**	272	**25**	**46**	322	22	**45**
	2100	305	**40**	**62**	280	24	**49**	322	23	**46**
	2200	302	**41**	**61**	279	21	**41**	319	**26**	**54**
	2300	296	**39**	**64**	293	17	**37**	315	22	**45**
5/1/08	0000	292	**36**	**52**	292	16	**31**	314	22	**46**
	0100	299	**36**	**55**	307	13	24	316	17	**38**
	0200	290	**34**	**55**	305	10	**25**	315	15	**31**
	0300	295	**28**	**44**	332	10	19	317	13	**26**
	0400	292	24	**36**	303	9	18	311	10	24
	0500	297	20	**33**	278	10	**28**	312	8	19
	0600	297	16	**25**	292	7	20	303	6	15
	0700	313	12	22	25	18	**38**	288	7	15
	0800	21	11	20	18	17	**41**	309	5	15
	0900	22	14	**25**	28	17	**38**	340	3	11
	1000	31	12	21	33	14	**30**	135	4	12
	1100	359	5	19	37	11	**28**	23	4	14
	1200	275	5	14	56	9	21	336	4	16

Given the gusty winds throughout much of the day at Whitewater Wash, windblown dust was entrained from the Coachella Valley blowsand source areas throughout the day, although the strongest winds and most consistent transport to the Indio PM10 BAM monitor occurred in the morning after 0700 PST and through much of the afternoon. The initial hourly PM10 spike of 446 $\mu g/m^3$ during the hour beginning at 0000 PST at Indio is associated with the initial jump in wind gusts at Whitewater Wash that occurred during the 2300 PST hour of April 29 when the peak hourly gust had jump more than 10 mph from the previous hour to 61 mph. The highest PM10 concentration at Indio (611 $\mu g/m^3$) was measured at 0800 PST in the morning of April 30, associated with the period of strongest wind gusts to 65 mph in the morning, then decreased erratically through the rest of the day. This decline over time at Indio in spite of additional gustiness is because the more friable fine blowsand from the natural source areas upwind of Indio was blown early in this long wind event, leaving coarser sand to help cement the surface later in the event.

The highest hourly PM10 concentrations at Palm Springs occurred at 0900 PST (326 $\mu g/m^3$) as the initial wind increase occurred at Whitewater Wash and at 1900 PST (516 $\mu g/m^3$), just after the highest sustained winds were measured at Whitewater Wash. Hourly PM10 at Palm Springs was mostly below 150 $\mu g/m^3$ in between these hours. Only the stronger winds overcome the terrain that blocks Palms Springs from the transport of sand and dust from the source areas to the north and northwest.

The AQMD Desert Hot Springs meteorological station is further east from the centerline of the Valley and the Whitewater Wash station. As a result, Desert Hot Springs winds (Table 2-8) were generally more westerly and weaker than those at Whitewater Wash as they flowed around the Morongo Mountains, north of the Coachella Valley. The hourly averaged wind speeds exceeded 25 mph in the early morning between 0100 PST and 0800 PST, peaking at 30 mph, then remained below 25 mph through the afternoon before reaching 25 mph in the late afternoon and early evening for four hours. The wind gusts at Desert Hot Springs exceeded 40 mph throughout the day, peaking at 51 mph at 0300 PST and 48 mph at 0700 and 49 mph at 2100 PST. The gusty winds at Desert Hot Springs indicate that some windblown dust was entrained from the northern portion of the Coachella Valley in addition to the centerline of the valley.

Further southeast, down the Valley from the Palm Springs and Whitewater Wash stations, the winds at the AQMD Palm Desert wind station (Table 2-8) were generally weaker that those measured at either Whitewater Wash or Desert Hot Springs. This is due to the widening of the Coachella Valley before this site and its distance from the San Gorgonio Pass. Only one hourly average at Palm Desert exceeded 25 mph, with 26 mph measured at 2200 PST. Instantaneous wind gusts exceeded 25 mph for a few hours in the morning and remained at 34 mph or higher throughout the day after 0800 PST. That the winds were strongest in the Whitewater Wash area than the other locations throughout the Coachella Valley indicates that this was the primary source area for

PM10 that was measured at Indio. This is the most significant natural blowsand source area in the Coachella Valley, as noted in several similar high wind natural events.

A few miles southeast of Indio, the NWS weather station at Thermal Airport reported northwesterly winds through the day and sustained (2-minute averaged) speeds below 25 mph through the morning, then several hours over 25 mph through the afternoon and evening, peaking at 33 mph for the 1737 PST observation (Table 2-9). Thermal recorded its first high wind gust of the day, 26 mph, at the 0152 PST observation, followed by gusts of 31 mph at 0237 and 0254 PST. The gusty winds diminished for a few hours until starting again with the 0652 PST observation. Starting with the 0852 PST observation, peak gusts of 30 mph or more were recorded during every hour through the rest of the day, with the day's highest gusts of 48 mph at 1737 and 2312 PST. Visibilities dropped to a low of 2.5 miles, with haze reported, during this period of gusty winds.

TABLE 2-9

Hourly Wind Directions (degrees), Wind Speeds (mph), Wind Gusts (mph) when reported, Visibilities (statute miles), Weather Conditions and Observer Remarks for the National Weather Service Thermal Airport Station on Wednesday, April 30, 2008

Thermal Airport (TRM)									
DATE	**HOUR (PST)**	**WD (deg)**	**WS (mph)**	**Gust (mph)**	**VIS (miles)**	**Peak WD (deg)**	**Peak WS (mph)**	**PK Wind Time (PST)**	**Remarks**
4/29/08	1152	160	5		10				
	1252	150	7		10				
	1352	250	5		10				
	1452	270	17	23	10				
	1552	260	16	**25**	10				
	1652	260	13	20	10				
	1752	280	14	**25**	10				
	1852	350	10		10				
	1952	360	18	24	10				
	2052	360	15		10	360	**31**	2029	
	2152	340	9	21	10				
	2252	350	12		10				
	2352	340	16		10				
4/30/08	0052	340	16		10				
	0152	320	15	**26**	10				
	0252	330	20	**28**	10	330	**31**	0237	
	0352	340	15		10	340	**31**	0254	
	0452	330	14		10				
	0552	330	18		10				
	0652	340	21	**29**	10				
	0752	330	21	**25**	10				
	0852	330	23	**30**	**4**	340	**30**	0849	**HZ**
	0952	320	20	**29**	**6**	320	**30**	0854	**HZ**
	1052	330	21	**36**	**5**	330	**37**	1025	**HZ**
	1152	330	23	**33**	**5**	340	**35**	1113	**HZ**
	1252	330	20	**32**	8	330	**35**	1229	
	1352	340	**26**	**35**	7	340	**35**	1352	
	1452	320	24	**36**	**6**	340	**36**	1446	**HZ**
	1552	340	**25**	**39**	**4**	340	**39**	1543	**HZ**
	1652	330	22	**33**	8	320	**37**	1642	
	1737	330	**33**	**48**	**2.5**	340	**48**	1737	**HZ**
	1752	330	**30**	**45**	**2.5**	340	**48**	1737	**HZ**
	1811	330	**30**	**40**	**5**	330	**41**	1757	**HZ**
	1852	340	24	**38**	10	330	**41**	1757	
	1952	340	24	**41**	7	340	**43**	1924	
	2052	340	25	**33**	10	330	**44**	2011	
	2152	340	**28**	**39**	9	340	**40**	2110	
	2252	330	**32**	**44**	**4**	330	**44**	2251	**HZ**
	2256	330	**32**	**45**	**2.5**	340	**45**	2254	**HZ**
	2321	340	**31**	**48**	**4**	340	**48**	2312	**HZ**
	2352	330	**29**	**40**	**5**	340	**48**	2312	**HZ**
5/1/08	0052	**330**	20	**26**	10	330	**41**	2355	
	0152	320	23	**33**	9	320	**36**	0142	
	0252	330	17	**26**	9	320	**31**	0158	
	0352	320	12	23	10				
	0452	320	15	24	10				
	0552	330	15		10				

2.3.2.3 Transport of emissions related to the event

The mapped winds in Figure 2-1 in Section 2.3.1 and the wind data presented in the tables in Section 2.3.2.2 provide wind direction data showing that emissions from sources identified as part of the "not reasonably controllable or preventable" demonstration were upwind of the Indio and Palm Springs monitors in question. The transport of emissions related to the event was in the direction of the monitors where the PM10 federal standard exceedances were recorded.

2.3.2.4 Temporal relationship between the high wind and elevated PM concentrations

The timing of the this event is verified with the high wind observations and reports of reduced visibility and blowing sand and dust, in conjunction with the hourly FEM PM10 measurement data. Figure 2-8 shows the hourly BAM PM10 data from the Palm Springs and Indio air monitoring stations, along with the wind speeds from the AQMD Whitewater Wash wind station. This shows that winds in the northwestern Coachella Valley (Whitewater Wash) increased in the afternoon of April 29, causing increasing hourly PM10. The high winds continued, with some speed variability, throughout the day on April 30, when the NAAQS violations occurred. The elevated hourly PM10 concentrations continued through April 30 at Indio and Palm Springs, with some variability due to reduced availability of blowsand with time and terrain shielding of all but the strongest winds at Palms Springs by the San Jacinto Mountains. Several relatively high PM10 spikes occurred at the Palm Springs and Indio monitoring stations, primarily when hourly wind speeds at Whitewater Wash approached 40 mph and gusts approached 60 mph. The first instantaneous gust at Whitewater Wash to exceed 60 mph was at 0600 PST, correlating with the initial PM10 concentration spike at Indio for the following hour. Both Palms Springs and Indio PM10 concentrations spiked at 0800 PST, with the Indio daily maximum hourly concentration of 611 $\mu g/m^3$, as the hourly averaged wind speed reached 40 mph and the gusts reached 65 mph. The peak hourly averaged wind speed of 44 mph occurred at 1800 PST, just prior to the highest hourly PM10 concentration at Palm Springs (516 $\mu g/m^3$) and another relatively high concentration spike at Indio. The peak instantaneous gusts of 65 mph occurred during the hours of 0800 PST and 1600 PST. Note that while the Indio and Palm Springs air monitoring station wind speeds were elevated at this time, all the sustained wind speeds at Palm Springs were below 25 mph and only 5 hours had 1-minute averaged winds above 25 mph at Indio. This indicates that the PM10 was mainly transported from the windier areas upwind of these stations, with minor contributions from locally generated PM10 in the immediate vicinity of the Palm Springs and Indio stations.

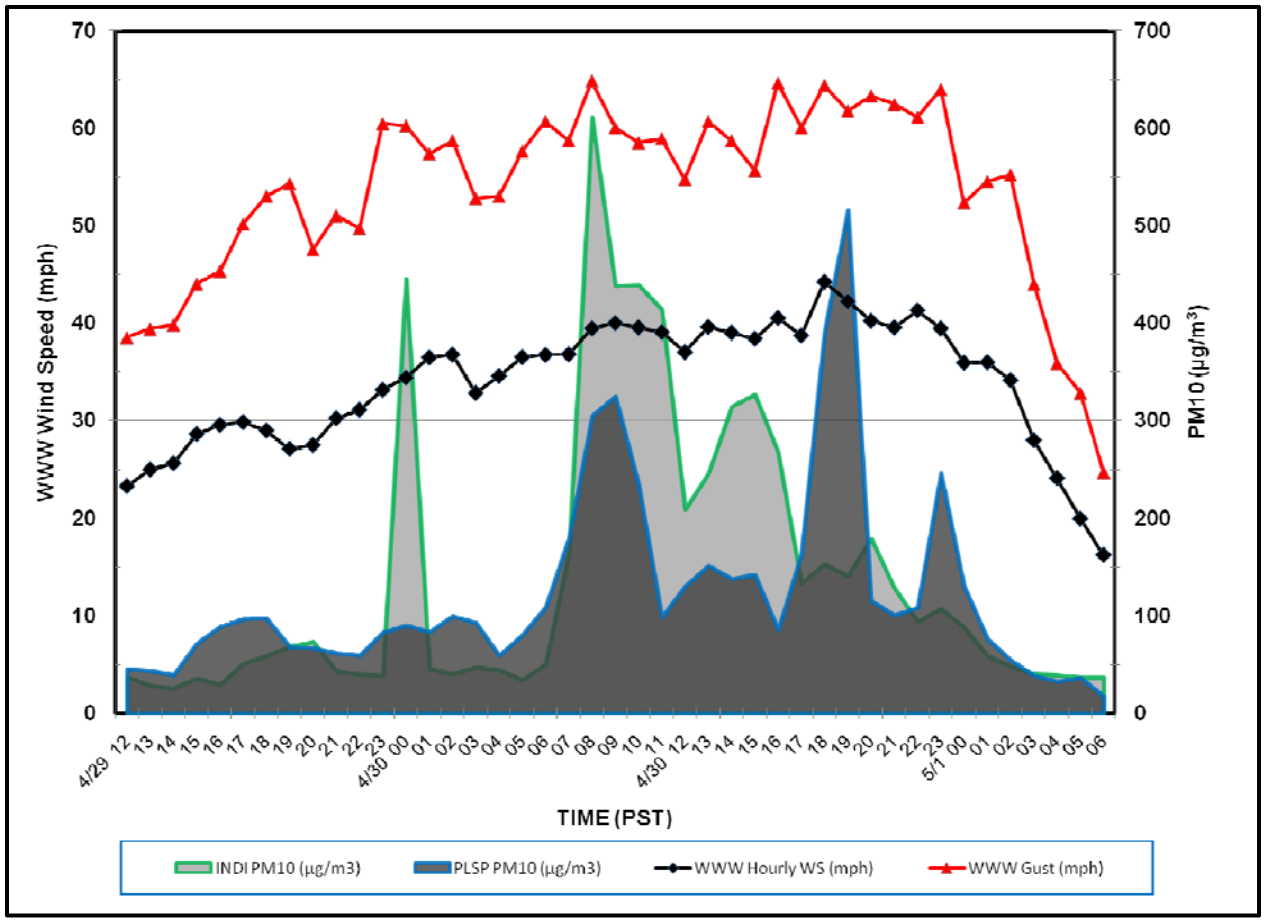

FIGURE 2-8

Time Series of Whitewater Wash (WWW) Wind Speeds (Hourly Averages and Instantaneous Gusts, mph) with Indio and Palm Springs Hourly FEM PM10 (µg/m^3) from 1200 PST April 29 through 0600 PST May 1, 2008

2.3.2.5 Chemical composition of measured pollution with that expected from sources identified as upwind

The FRM sulfate, nitrate and chloride mass loadings from the PM10 filters were 4.2, 5.8 and 0.58 $\mu g/m^3$, respectively, at Indio and 4.0, 5.3 and 0.26 $\mu g/m^3$, respectively, at Palm Springs on April 30. These low concentrations indicate that the high measured PM10 mass was primarily crustal material due to windblown sand and dust. The 24-hour PM10 and PM2.5 concentrations and the PM-Coarse percentage [(PM10-PM2.5)/PM10] on the days surrounding April 30 for the Coachella Valley stations, as well as the two nearest South Coast Air Basin stations in Riverside County (Banning and Riverside-Rubidoux), are summarized in Table 2-10. The FRM PM2.5 mass concentrations measured on April 30, 16.5 and 15.4 $\mu g/m^3$, respectively at Indio and Palm Springs, were below the 24-hour PM2.5 NAAQS and only a small portion of the PM10 mass. Using the collocated FEM BAM PM10 and FRM PM2.5 at each station on April 30, the coarse particles (PM10-2.5), which are associated with windblown dust, represent 92% of the total PM10 mass collected at Indio and over 91% at Palm Springs. Using the lower FRM PM10 with the FRM PM2.5 measurements, percentages of coarse particles in the PM10 are still high, over 87% at Indio and 80% at Palm Springs. The South Coast Air Basin stations at Riverside-Rubidoux and Banning Airport show a greater influence from the PM2.5 from combustion sources in the PM-Coarse percentage. This provides further evidence that the PM10 in the Coachella Valley was primarily due to the wind event and not related to fires, transportation or other combustion processes. No continuous PM2.5 monitors are deployed in the Coachella Valley due to the consistently low concentrations measured with the FRM samplers.

TABLE 2-10

24-Hour FRM and FEM PM10 and PM2.5 Measurements (μg/m^3) and PM-Coarse (PM10-2.5) fraction of PM10 (%) from the Coachella Valley (Indio and Palm Springs) and the nearest South Coast Air Basin (Banning Airport and Rubidoux) Air Monitoring Stations between April 27 and May 3, 2008

Station	Type	27-Apr	28-Apr	29-Apr	30-Apr	1-May	2-May	3-May
PM10								
Indio	PM10 FRM	41			128			41
Indio	PM10 BAM	36.8	37.8	65.9	**211.6**	46	34.8	38.9
Palm Springs	PM10 FRM				75			
Palm Springs	PM10 BAM	26.4	27.3	54.3	**169.1**	42.4	24.5	30.5
Banning Airport	PM10 FRM				43			
Rubidoux	PM10 FRM	49			40			61
Rubidoux	PM10 TEOM	25.8	58.6	73	46.1	62.2	64.1	62.5
PM2.5								
Indio	PM2.5 FRM	27			16.5			
Palm Springs	PM2.5 FRM	9.3			15.4			10
Banning Airport	PM2.5 BAM	14	13.8	22.3	20	23.5	14.8	16.5
Rubidoux	PM2.5 FRM	12.6	12.8	24.8	17.6	15.4	12.6	14.9
Rubidoux	PM2.5 BAM	13.7	14.3	24.8	20.4	19.5	17.8	19
PM-Coarse (%)								
Indio	FRM – FRM	34.1			87.1			
Indio	BAM – FRM	26.6			92.2			
Palm Springs	FRM – FRM				79.5			
Palm Springs	BAM – FRM	64.8			90.9			67.2
Banning Airport	FRM – BAM				53.5			
Rubidoux	FRM – FRM	74.3			56.0			75.6
Rubidoux	TEOM – BAM	46.9	75.6	66.0	55.7	68.6	72.2	69.6

2.3.2.6 Comparison of event-affected day(s) to specific non-event days

The 24-hour PM10 and PM2.5 concentrations and the PM-Coarse percentage [(PM10-PM2.5)/PM10] on the days surrounding April 30 for the Coachella Valley stations (Indio and Palm Springs), as well as the two nearest South Coast Air Basin stations in Riverside County (Banning and Riverside-Rubidoux), are summarized above in Table 2-10. The AQMD FRM PM10 filter samples are collected on a 1-in-6 day schedule, except at Riverside-Rubidoux and Indio where 1-in-3-day data is collected. These show that the PM10 concentrations were relatively low on the days before and after the high wind event at all locations. The elevated PM10 was only found in the Coachella Valley on April 30, showing that the windblown dust event did not affect the South Coast Air Basin and that PM10 transport from the urban South Coast Air Basin was not a significant factor. The PM10 was higher at both Indio and Palm Springs on April 30 than on the surrounding days due to the strong winds in the Coachella Valley. The lower measurement at Palm Springs on April 30 also shows that most of the PM10 measured at Indio was generated in the Coachella Valley. The low PM10 concentrations before and after April 30 demonstrate that the NAAQS violation would not have occurred if not for the high wind natural event. While the PM2.5 was higher at the South Coast Air Basin sites, it was relatively low in the Coachella Valley, only increasing slightly with the wind event on April 30. This indicates that urban transport from the South Coast and combustion sources, including wildfires, were not very significant to this PM10 event on April 30. The PM10 concentrations in the Coachella Valley were over three times that measured on the sampling days before and after that day. This indicates the impact of the natural event on the April 30 PM10 air quality, resulting in the higher than typical PM10 concentrations above the federal standard level at Indio and Palm Springs.

2.3.2.7 Alternative natural source hypotheses

Wildfire Analysis

A Smoke Advisory was issued by AQMD, warning of the potential of smoke and ash from the Apache Fire in the San Jacinto Mountains of Riverside County, near Idyllwild, potentially affecting the Coachella Valley and the Anza Area. The Desert Sun Newspaper had reported that smoke from the wildfire had been visible above the Coachella Valley on Tuesday night, April 29. The fire had grown to near 700 acres between its start in the afternoon of April 29 and the end of the day on April 30. It had burned a total of 784 acres when it was declared contained on May 4, according to the National Climatic Data Center (NCDC) Event Record Report[13], reproduced below. Given the strong northwesterly winds in the Coachella Valley and the San Jacinto

[13] *NOAA/NESDIS/NCDC: http://www4.ncdc.noaa.gov/cgi-win/wwcgi.dll?wwEvent~Storms*

Mountains, this fire had little or no impact to the Indio and Palm Springs PM monitoring on April 30, as the smoke was lofted above the San Jacinto Mountains and transported toward the southeast to the Anza desert area by the winds. Another wildfire had also been burning in the Santa Anita area of the San Gabriel Mountains in Los Angeles County at this time. Containment conditions with that fire had improved considerably overnight and the April 30 Smoke Advisory warned of the potential for smoke and ash in the San Gabriel Mountains and San Gabriel Valley Areas of the South Coast Air Basin. No significant impacts of either fire were measured at Indio or Palm Springs, where PM2.5 measurements remained in the low Moderate AQI category or better throughout the day.

NOAA Satellite and Information Service
National Environmental Satellite, Data, and Information Service (NESDIS)

National Climatic Data Center
U.S. Department of Commerce

DOC >NOAA >NESDIS >NCDC

Search Field: Search NCDC

Event Record Details

Event: **Wildfire**
Begin Date: **01 May 2008, 00:00:00 AM PST**
Begin Location: **Not Known**
End Date: **04 May 2008, 17:00:00 PM PST**
End Location: **Not Known**
Magnitude: **0**
Fatalities: **0**
Injuries: **0**
Property Damage: **$ 0.0K**
Crop Damage: **$ 0.0K**

State: **California**
Map of Counties

Zones affected: **Riverside County Mountains**

Description:
EPISODE NARRATIVE: The Apache Fire was started by a discarded cigarette along the Pacific Crest Trail in the San Jacinto Mountains near Apache Peak. The fire burned 784 acres between April 29 and May 4. Low humidity and gusty winds were factors in the inital spread of the Apache Fire.

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This page dynamically generated 10 Aug 2010 from:
http://www4.ncdc.noaa.gov/cgi-win/wwcgi.dll?wwEvent~storms
Please send questions or comments about this system to Stuart.Hinson@noaa.gov
Please see the NCDC Contact Page if you have questions or comments.

2.3.3 Affects Air Quality

This criterion is supported by historical concentration data and demonstrated as part of the clear causal relationship. AQMD has provided evidence for the clear causal relationship which serves also to demonstrate that the event affected air quality.

2.3.4 Was a Natural Event

A high wind dust event can be considered a natural event, even when a portion of the wind-driven emissions are anthropogenic, as long as those emissions have a clear causal relationship to the event and were determined to be not reasonably controllable or preventable. This demonstration has shown that the event was not reasonably controllable or preventable, in spite of the strong and enforced AQMD BACM-based control program. It has also established a clear causal relationship between the exceedance and the high wind event timeline and geographic location. This event can be treated as a natural event under the exceptional event rule.

2.3.5 The "But For" Test

To qualify as an exceptional event, it is necessary to demonstrate that there would have been no exceedance "but for" the event. To meet this "but for" requirement, it must first be shown that no unusual anthropogenic activities occurred in the affected area that could have resulted in the exceedances, besides the high wind event. Activities that generate anthropogenic PM10 were approximately constant in the Coachella Valley immediately preceding, during and after the event. Activity levels in the Valley were typical for the time of year and PM10 emissions control programs were being implemented, not only for fugitive dust-generating activities, but also for agricultural burning and other activities. Furthermore, due to the forecasts for high winds on April 30, the AQMD compliance teams were ready to respond to fugitive dust complaints to minimize emission-causing activities and to enforce mitigation methods like watering and soil stabilization.

Vehicular traffic, cooking and residential fires do not directly cause PM10 24-hour NAAQS violations in the Coachella Valley. Activity levels were typical for the time of year and PM10 emissions control programs were being implemented, for fugitive dust-generating activities, as well as open burning. With the unsettled windy conditions on April 30, such emissions would not contribute significantly to the PM10 measured. There were reasonable and appropriate measures in place to control PM10 in the Coachella Valley on April 30, 2008, including AQMD Rules 403, 403.1, 444, 1157 and

1186. Moreover, U.S. EPA has approved AQMD's BACM demonstration for all significant sources of PM10 in the Coachella Valley.

Examining the make-up of the PM10 in the Coachella Valley on this day using PM2.5 data, the coarse particles (PM10-2.5), which are associated with windblown dust, represent over 75% of the total PM10 mass collected at Palm Springs and 87% at Indio, using the lower FRM PM10 filter measurements. PM2.5 remained relatively low throughout the Coachella Valley on this day with no exceedance of the 24-hour NAAQS. The wildfire that was burning in the San Jacinto Mountains east of the Coachella Valley was not a primary cause of the high PM10. The FRM sulfate, nitrate and chloride mass loadings from the PM10 filters were also very low, indicating that the PM10 was primarily crustal material.

Based on the data provided in this report, AQMD concludes that there would not have been exceedances of the PM10 NAAQS in the Coachella Valley on April 30, 2008 if high winds were not present. The causal connection of the measured PM10 and the strong winds through the Coachella Valley, along with the high contribution of fugitive dust to the PM10 mass indicate that but for the high wind event this NAAQS violation would not have occurred.

2.3.6 Conclusion

The PM10 NAAQS violation on April 30, 2008 is a typical example of a Type 1 high wind event in the Coachella Valley, where strong pressure and density gradients force high winds through the San Gorgonio Pass creating strong, gusty winds along the centerline of the Coachella Valley near the AQMD Whitewater Wash site and in the Coachella Valley Preserve areas. This flow pattern was enhanced by the synoptic weather pattern with low pressure at the surface over the Great Basin and a strong Pacific High in the eastern Pacific Ocean, as well as coupled along-valley flow aloft. There is a strong causal connection between the high PM10 measured in the Coachella Valley on April 30 and the strong wind event, supported by the meteorological conditions. Sustained hourly averaged wind speeds were measured to 44 mph at Whitewater Wash, with instantaneous gusts to 65 mph. Gusty winds were recorded at stations throughout the Coachella Valley. NWS observations of reduced airport visibilities, haze and blowing dust and news accounts also support the windblown dust analysis. Due to the widespread winds, sources of the windblown dust included both natural, undisturbed areas, particularly in the mountains and high deserts, and BACM-controlled anthropogenic sources. The timing of this event is verified with the high wind observations and reports of reduced visibility and blowing sand and dust, in conjunction with the hourly BAM PM10 measurements from available monitors. These show a strong correlation between the high winds and high hourly PM10 concentrations.

The strong winds on April 30 fanned a relatively small wildfire in the San Jacinto Mountains. Overall, the fire contributed only a small fraction to the PM10 measured, if any, as shown by the relatively low concentrations of PM2.5. Most of the smoke in the mountains was lofted and transported high above the Coachella Valley monitors.

If not for the high wind event and the associated wind-entrained dust, the PM10 NAAQS violations measured at Palm Springs and Indio on April 30 would not have occurred. Therefore, with the weight of evidence provided, AQMD staff recommends the flagging of the PM10 NAAQS violations on April 30, 2008 as exceptional event due to high winds in the U.S. EPA Air Quality System (AQS) database.