



**MONTHLY AIR QUALITY REPORT FOR**  
**FEBRUARY 2011**

AOI COLOR SCALE

<b>GOOD</b>	<b>MODERATE</b>	<b>UNHEALTHY FOR SENSITIVE GROUPS</b>	<b>UNHEALTHY</b>
<b>0-50</b>	<b>51-100</b>	<b>101-150</b>	<b>151-200</b>

Calendar of maximum AQI values & their corresponding color for February 2011\*

\*Preliminary data

SAMPLE POLLUTANT REPORTING BOX

<b>1</b> (day of month)	<b>O3</b>	<b>CO</b>
	<b>PM10</b>	<b>PM2.5</b>

SUN		MON		TUES		WED		THU		FRI		SAT	
				1	39 13 54 28	2	37 05 32 14	3	36 09 21 25	4	29 15 40 56	5	27 18 49 80
6	34 23 53 93	7	37 16 44 63	8	37 14 63 53	9	40 13 41 36	10	41 11 36 40	11	39 19 57 59	12	39 19 40 62
13	41 20 42 59	14	41 18 53 59	15	40 22 54 53	16	42 13 51 50	17	40 13 33 39	18	33 11 47 44	19	31 10 107 37
20	41 10 13 46	21	42 10 19 54	22	45 15 31 68	23	43 16 28 59	24	46 11 22 49	25	40 13 31 53	26	42 15 37 40
27	40 11 10 34	28	44 13 22 52										

**Calendar of High Pollution Advisories and Health Watches issued during February 2011**

SUN			MON			TUE			WED			THU			FRI			SAT		
					1			2			3			4			5			
6		7			8			9			10			11			12			
13		14			15			16			17			18			19			
20		21			22			23			24			25			26			
27		28							NONE											
									ISSUED											

**LEGEND**

**HIGH POLLUTION ADVISORIES**  
**A** = PM-10 High Pollution Advisory  
**B** = PM-2.5 High Pollution Advisory  
**C** = Ozone High Pollution Advisory

**HEALTH WATCHES**  
**D** = PM-10 Health Watch  
**E** = PM-2.5 Health Watch  
**F** = Ozone Health Watch

**Calendar of Meteorological Conditions observed in Metro Phoenix during February 2011**

SUN			MON			TUE			WED			THU			FRI			SAT		
					1			2			D			3			4			5
6		7			8			D						10			11			12
13		14			E			E						17			B			A B C
20		B C			C						E			24						B C
27		B C																		D

**LEGEND**

**ELECTROMETEORS**  
**A** = Thunderstorm

**HYDROMETEORS**  
**B** = Rain/Drizzle/Hail/Snow  
**C** = Fog

**LITHOMETEORS**  
**D** = Blowing Dust  
**E** = Haze (vsby <10SM)  
**F** = Smoke

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**Exceedance days during FEB 2011-**

Total= 1	<u>Date</u>	<u>Max AQI</u>	<u>Pollutant</u>	<u>Site/s</u>
	02/19	107	PM-10	West Chandler

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**Health Watches issued during FEB 2011-**

Total= 0	<u>Date</u>	<u>Max AQI</u>	<u>Pollutant</u>	<u>Site/s</u>
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**High Pollution Advisories issued during FEB 2011-**

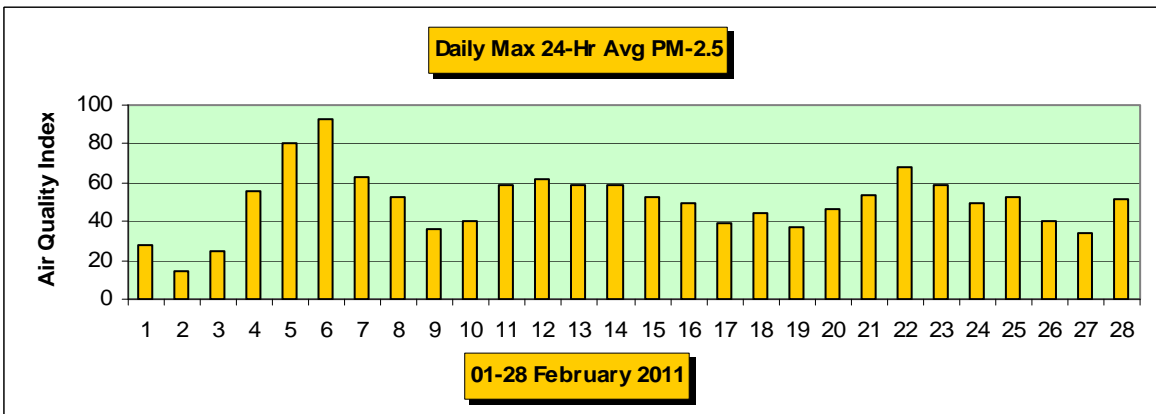
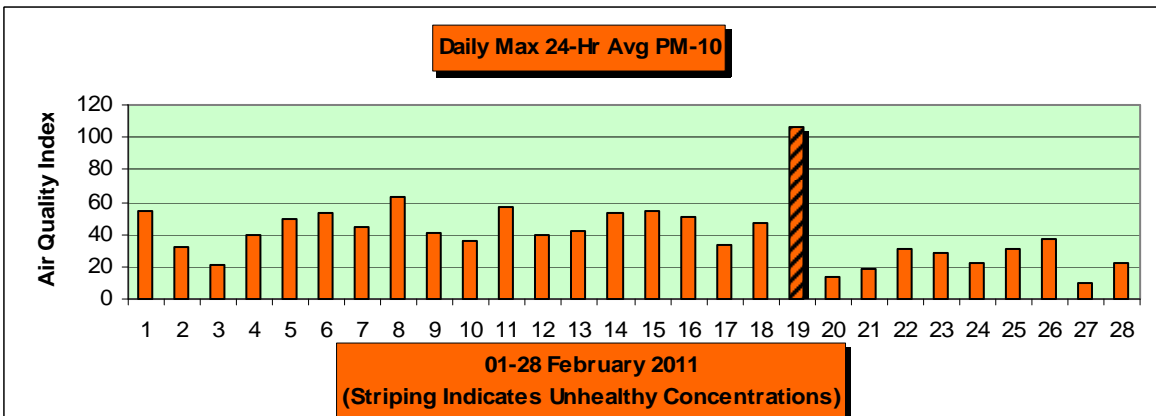
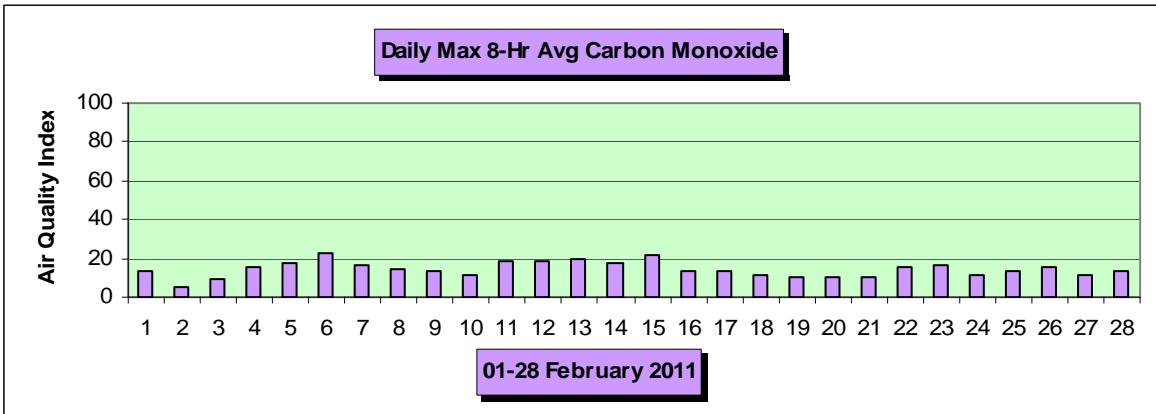
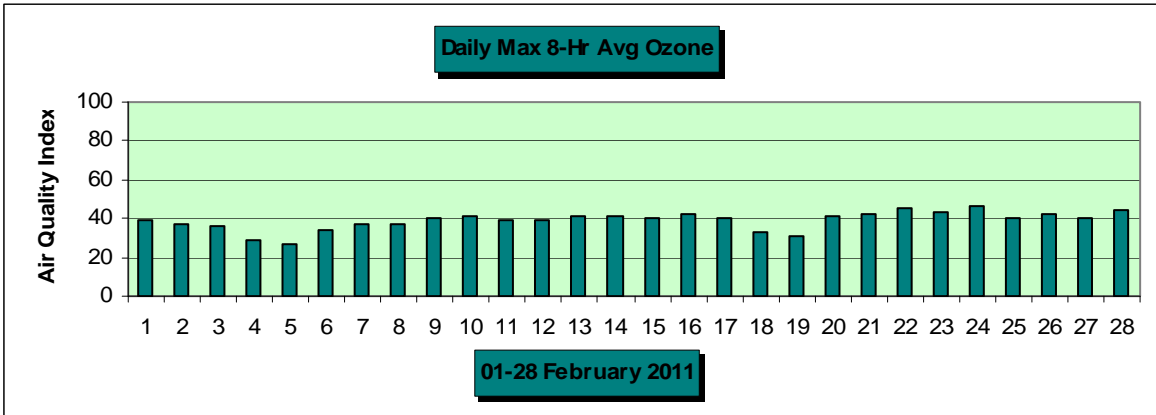
Total= 0	<u>Date</u>	<u>Max AQI</u>	<u>Pollutant</u>	<u>Site/s</u>
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**Concentration Recap:**

Days in the <b>Good</b> category:	10
Days in the <b>Moderate</b> category:	17
Days in the <b>Unhealthy for Sensitive Groups</b> category:	1
Days in the <b>Unhealthy</b> category:	<u>0</u>
Total Forecast Days:	28

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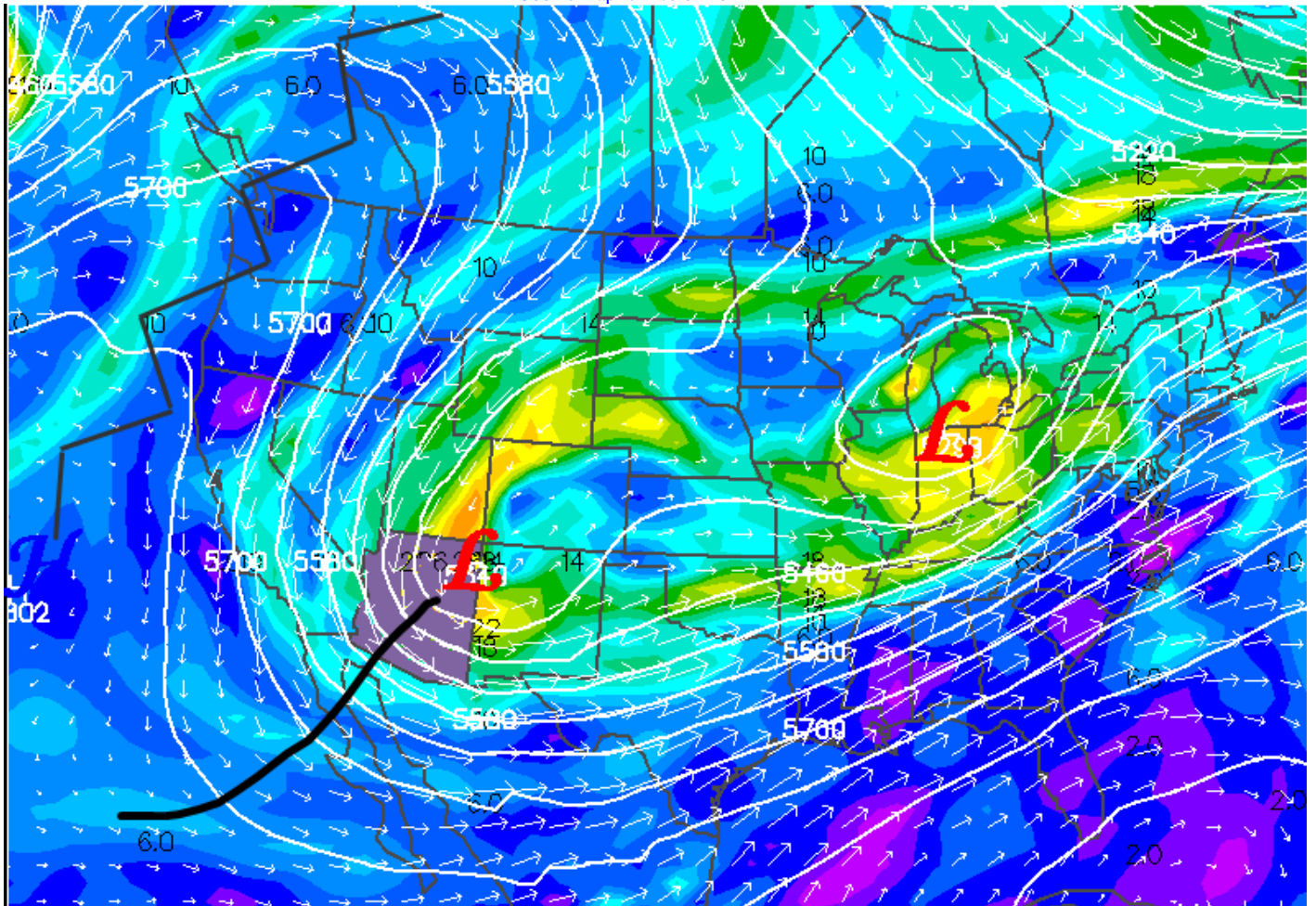


**Narrative:**

A wide variety of weather and air quality conditions occurred in the Phoenix metro area during February 2011. The month began with the arrival of very cold and dry arctic air mass. The high temperature at Sky Harbor Airport dropped from 64 deg F on the 1st to only 44 deg F on the 2nd. As a large upper trough (Figure 1) and surface cold front arrived, west to northerly wind gusts of up to 43 mph occurred on the 1st and northwest to northeasterly wind gusts up to 37 mph occurred on the 2nd. On the latter day enough blowing dust was generated to reduce the visibility to between 2 1/2 and 9 miles at several locations between 9:00 and 11:00 a.m. Despite the dust, 24-hour average PM-10 (coarse particle) levels remained in the good range of the Air Quality Index. These winds ushered in incredibly dry air as outlined in the special weather statement from the National Weather Service office in Phoenix (Statement 1) located on page six of this report.

**Figure 1**

500mb map for Feb 02 2011



## Statement 1

PUBLIC INFORMATION STATEMENT  
NATIONAL WEATHER SERVICE PHOENIX AZ  
354 AM MST FRI FEB 4 2011

...EXCEPTIONALLY DRY AIR INVADES PHOENIX...

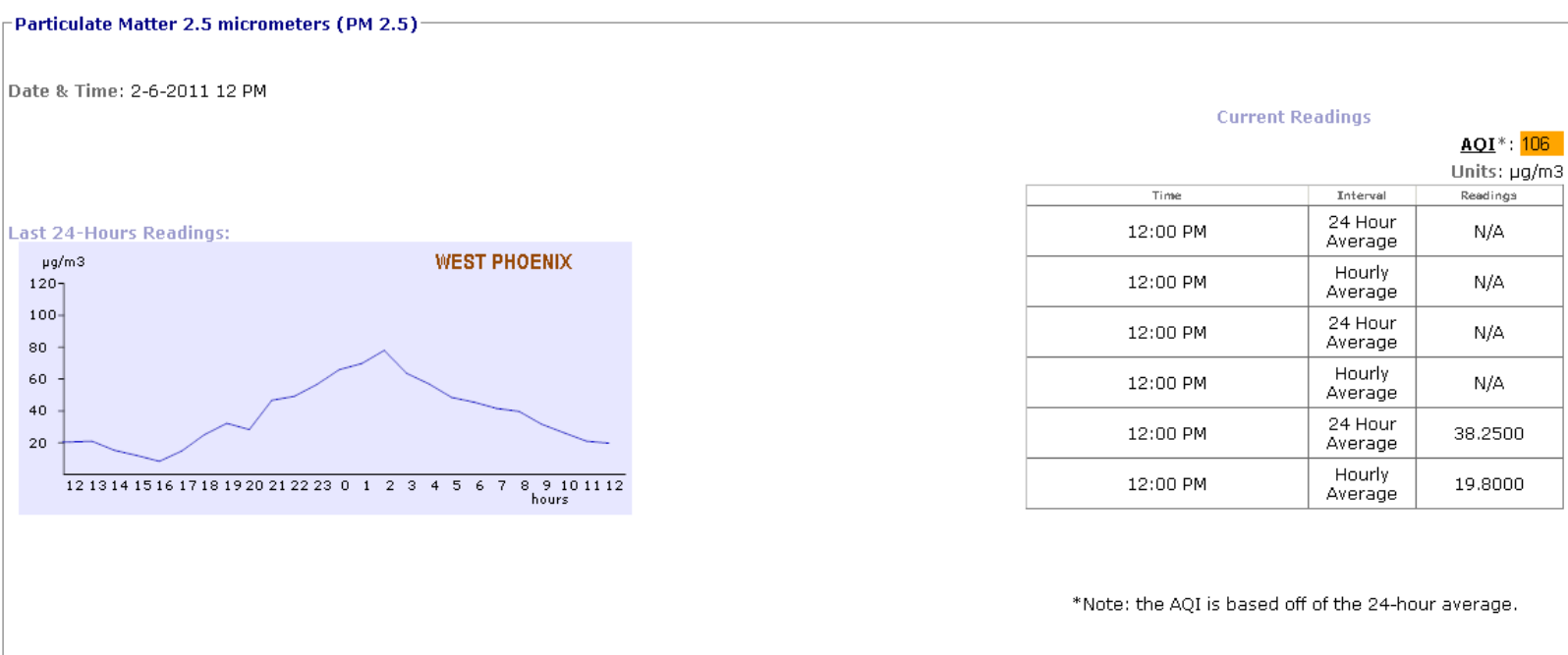
A VERY COLD ARCTIC AIRMASS MOVED INTO THE SOUTHWEST UNITED STATES ON FEBRUARY 1ST. BY FEBRUARY 2ND...THE COLD AND EXCEPTIONALLY DRY AIR SETTLED OVER THE AREA...GENERATING NUMEROUS RECORD LOW TEMPERATURES INCLUDING A NEW RECORD LOW HIGH IN PHOENIX /44 DEG...PREVIOUS 49 IN 1985/. OVERALL IT APPEARS TO BE THE COLDEST AIRMASS TO MOVE INTO THIS PART OF THE COUNTRY SINCE 1985.

EXHIBITING THE TRUE CHARACTERISTICS OF AN AIRMASS WITH ORIGIN OVER THE CANADIAN PROVINCES...IN THE LEE OF THE CANADIAN ROCKIES...THIS AIRMASS WAS INCREDIBLY DRY. DEW POINT TEMPERATURES...A MEASURE OF HOW MUCH MOISTURE IS IN THE AIR...PLUMMETED TOWARD 20 DEGREES BELOW ZERO. IN PHOENIX...THE DEW POINT DROVE TO MINUS 18 DEG FOR SEVERAL HOURS DURING THE AFTERNOON OF FEBRUARY 2ND AND TO -17 DEG ON FEBRUARY 3RD. LOOKING AT HOURLY WEATHER OBSERVATIONS IN PHOENIX...THE EARLIEST OF WHICH ARE FROM 1931...THE -18 DEG ON FEB 2 2011 WILL TIE AS THE 5TH LOWEST DEW POINT EVER RECORDED. THE LOWEST WAS -22 DEG ON NOV 28 1976.

AVERAGING THE DEW POINT VALUE THROUGHOUT THE DAY...FEB 2 2011 WILL GO DOWN AS THE DRIEST DAY ON RECORD IN PHOENIX WITH AN AVERAGE DEW POINT OF -10.4 DEG. IN ADDITION...FEB 3 2011 WILL BE THE THIRD DRIEST ON RECORD WITH AN AVERAGE DEW POINT OF -8.7 DEG. THE PREVIOUS DRIEST DAY ON RECORD IN PHOENIX WAS DEC 21 1977 WITH AN AVERAGE DEW POINT OF -9.0 DEG.

By the 4th the leading edge of a high amplitude ridge had built over AZ accompanied by very strong warming aloft (32 deg F at the 5K' level and 27deg F at the 10K' level in 48 hours) and mostly light or calm surface winds. This combination resulted in a very stagnant air mass over the Valley characterized by strong overnight inversion formation, shallow mixing depths, and poor or marginal dispersion on the 4th and 5th of the month. This in turn contributed to increasing concentrations of fine particles (PM-2.5) that lasted thru the 6th when the 24-hour average AQI reached 93 at two monitoring sites. Figures 2 and 3 below show the 24-hour PM-2.5 time-series graph from one of those sites and an image from the one of the cameras in the local VISNET array.

**Figure 2**



**Figure 3**



This ridge aloft and the resulting air mass stagnation was to remain in place thru the 16th of the month but was interrupted on the 8th by the rapid passage of an embedded short wave trough in the northwest flow aloft. This feature and its associated cold front produced another round of gradient winds that gusted up to 30 mph during the afternoon hours. Blowing dust was again produced with visibilities as low as seven miles. Even so, highest PM-10 levels only reached the low-moderate range of the Air Quality Index. Figures 4 thru 6 show the extent of the blowing & suspended dust during that event and Figure 7 shows a PM-10 time-series graph from the West Forty Third monitoring site.

[Figure 4](#)



[Figure 5](#)

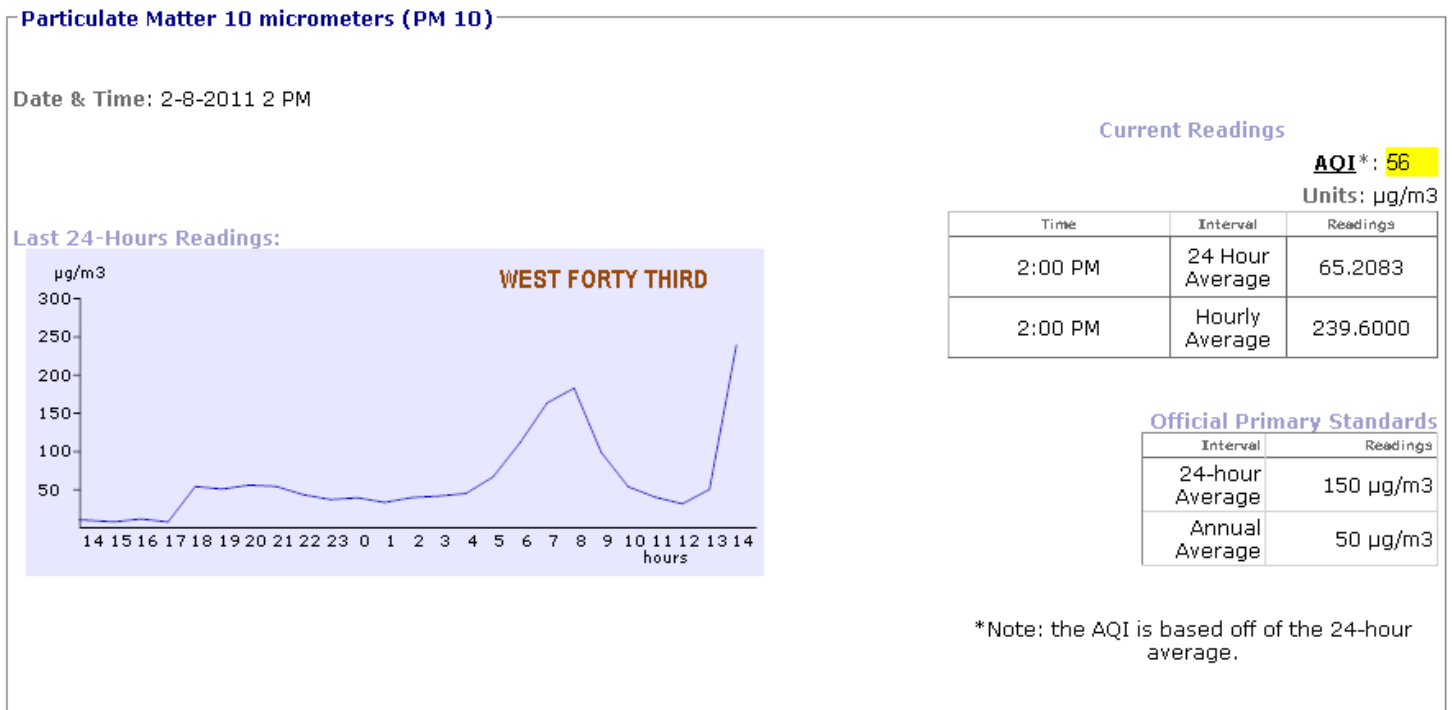




Figure 6

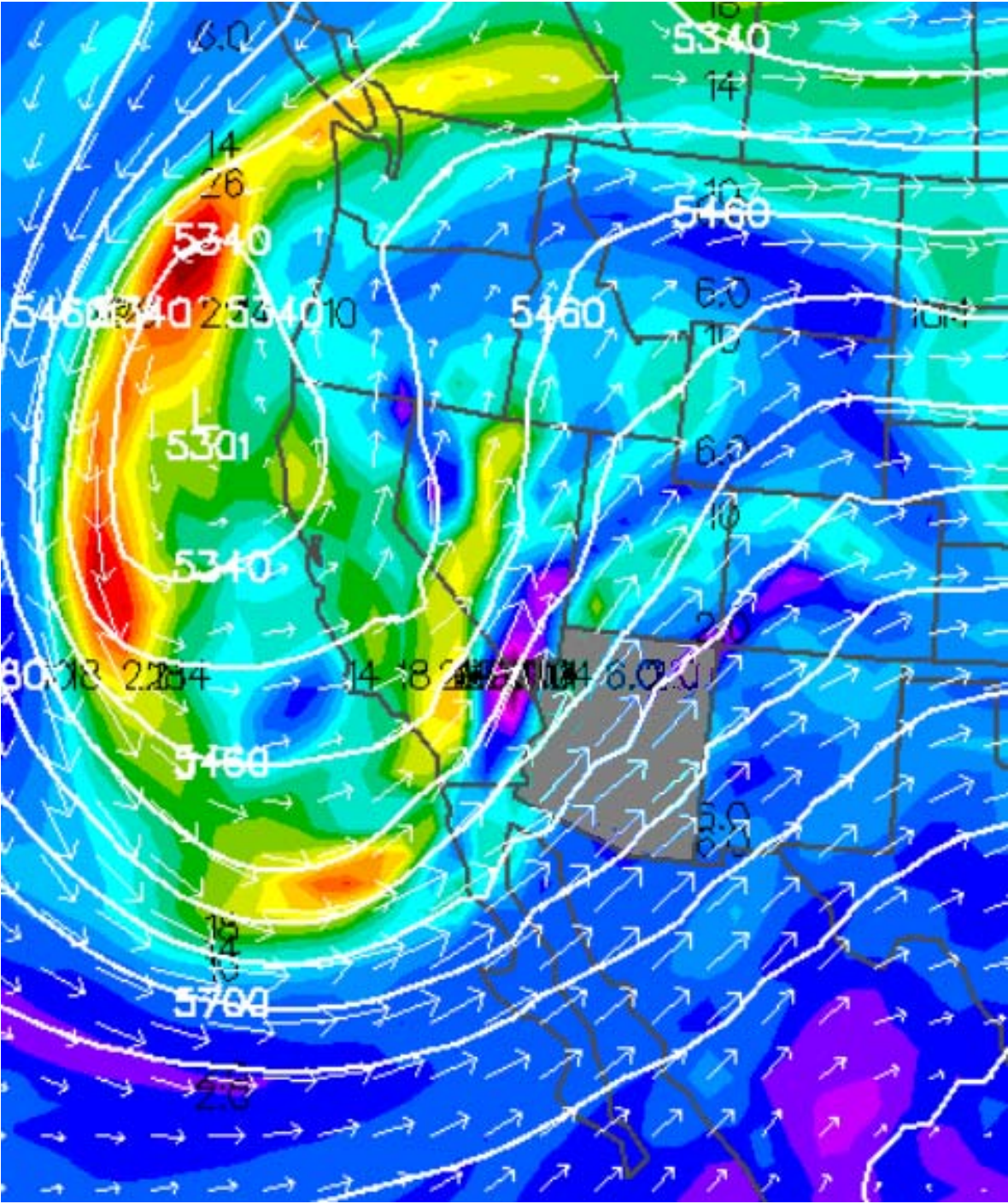


Figure 7



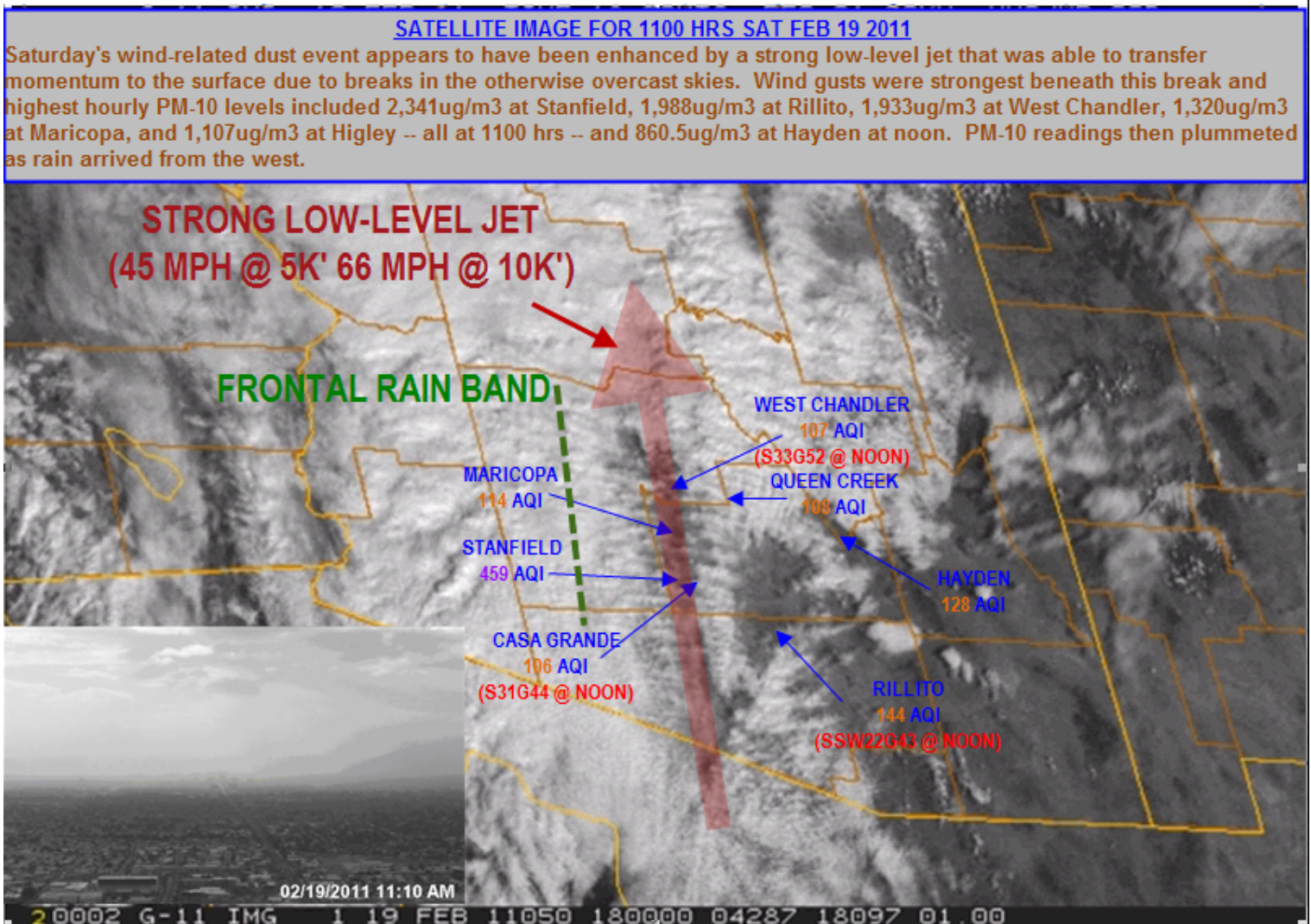
A major shift in the synoptic weather pattern then occurred that brought a series of strong and moisture-laden Pacific weather systems over the area. The first in the series was the strongest and would have the most significant impact on local air quality. On February 19 a large and deep upper level trough approached Arizona from the west, anchored by a 5300m closed low height center situated off the northern California coast (Figure 8). At the same time the associated strong surface cold front was over western Arizona.

Figure 8



A line of rain showers developed along this frontal boundary and at 11:00 a.m. was located over western Maricopa County (Figure 9). Strong winds aloft in the 5-10K' layer were also present ahead of the front and the axis of strongest winds (jet) appeared to be directly over the metro area when an elongated break in the otherwise cloudy skies occurred. As a result, surface winds in the Valley gusted up to 52 mph and areas of dense blowing dust were generated that reduced visibilities to as low as 1/4 mile. [Figures 10 and 11](#) are photographs from the local VISNET camera array and show the magnitude of the blowing dust to good effect.

**Figure 9**



[Figure 10](#)

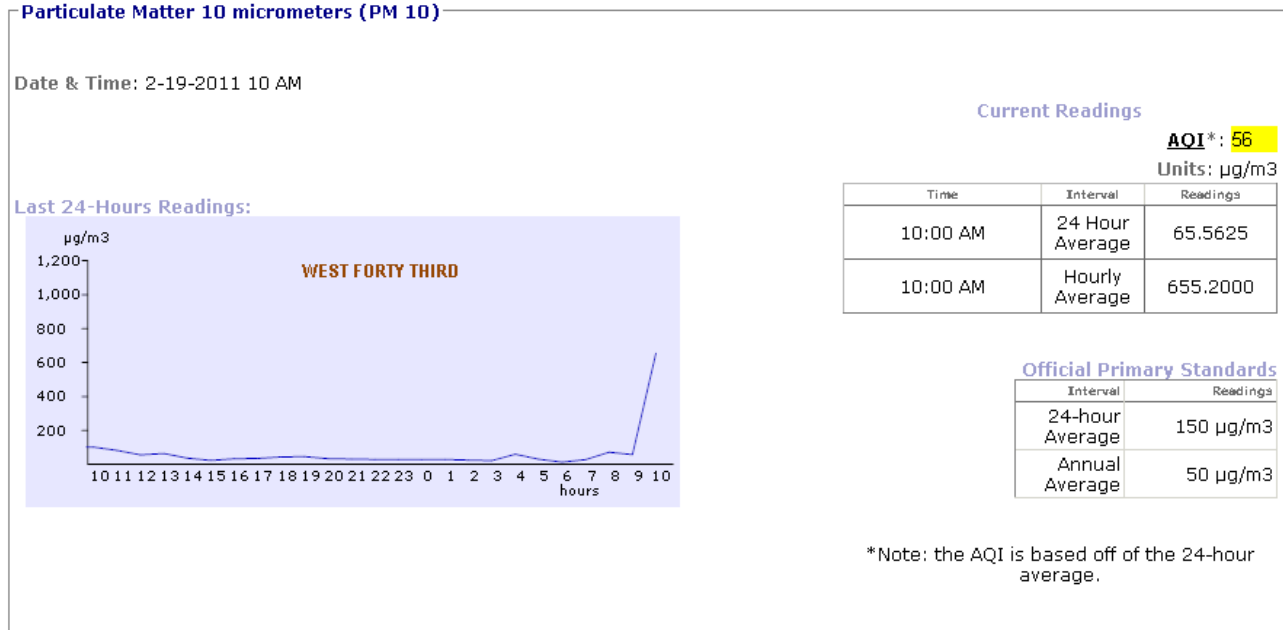


[Figure 11](#)

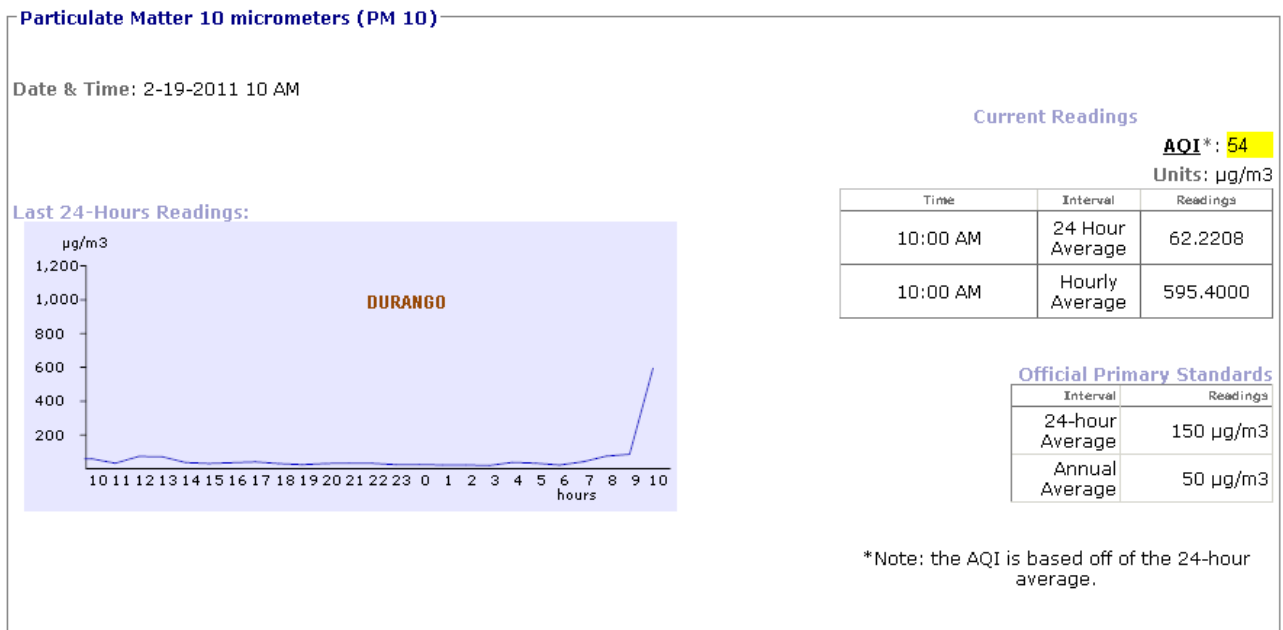


This dense blowing dust was picked by local PM-10 coarse particle monitors and the series of graphs from several different monitors illustrated in [Figures 12 thru 18](#) show how this severe blowing dust event evolved.

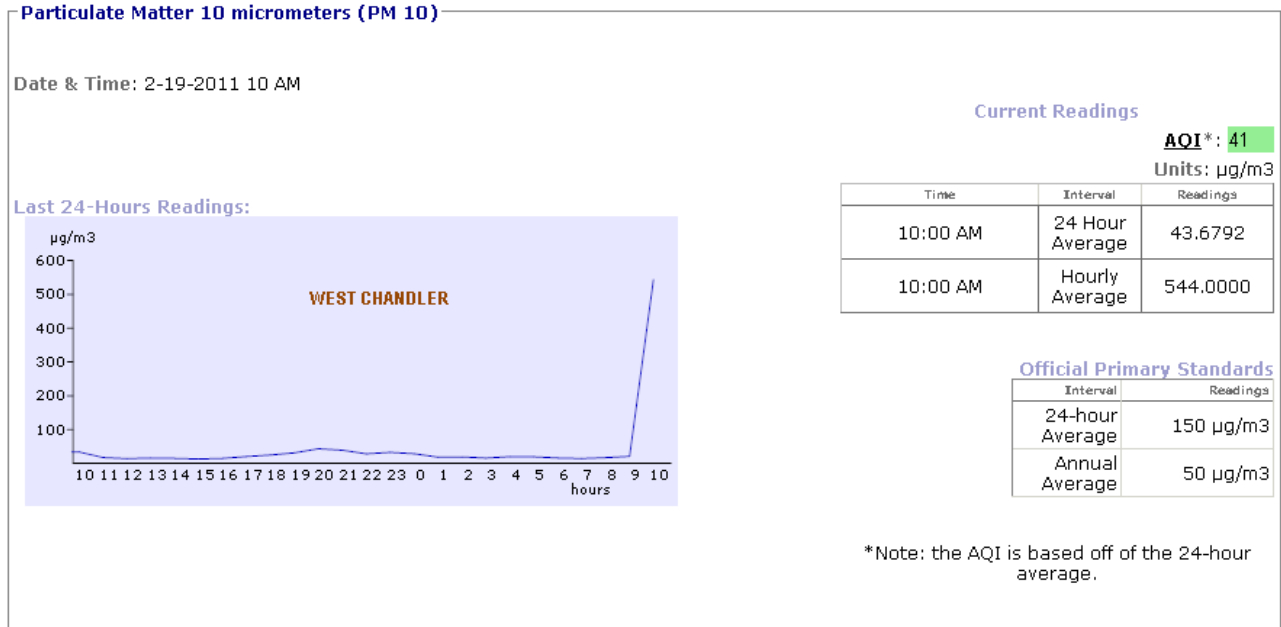
**Figure 12**



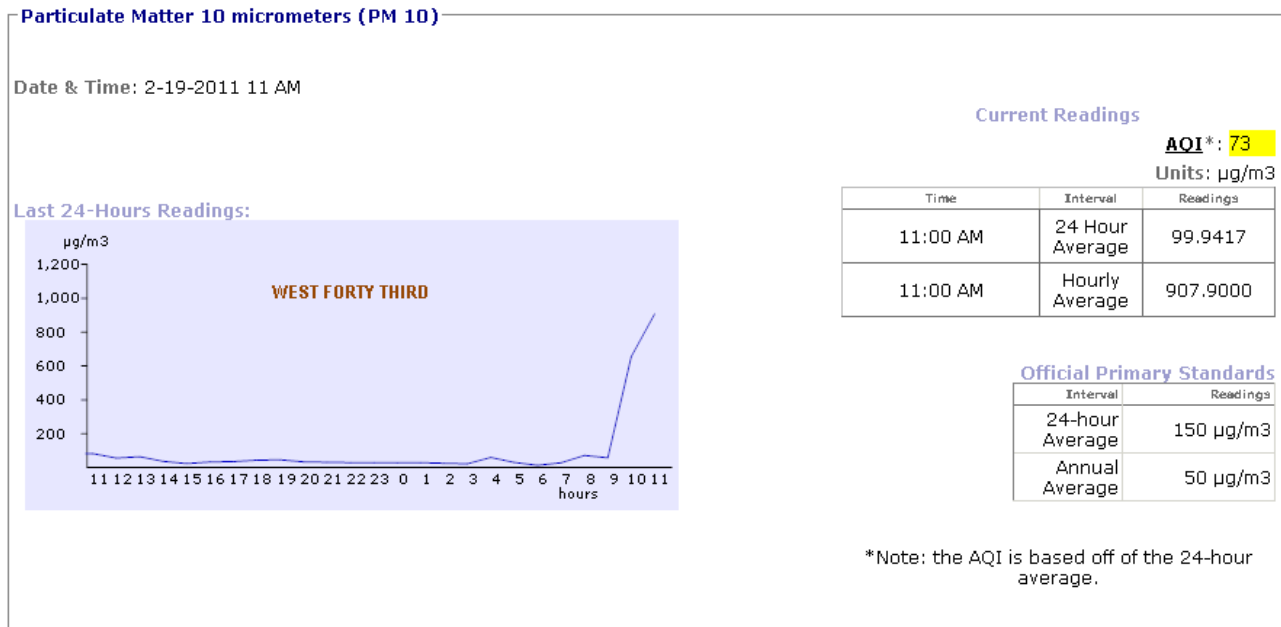
**Figure 13**



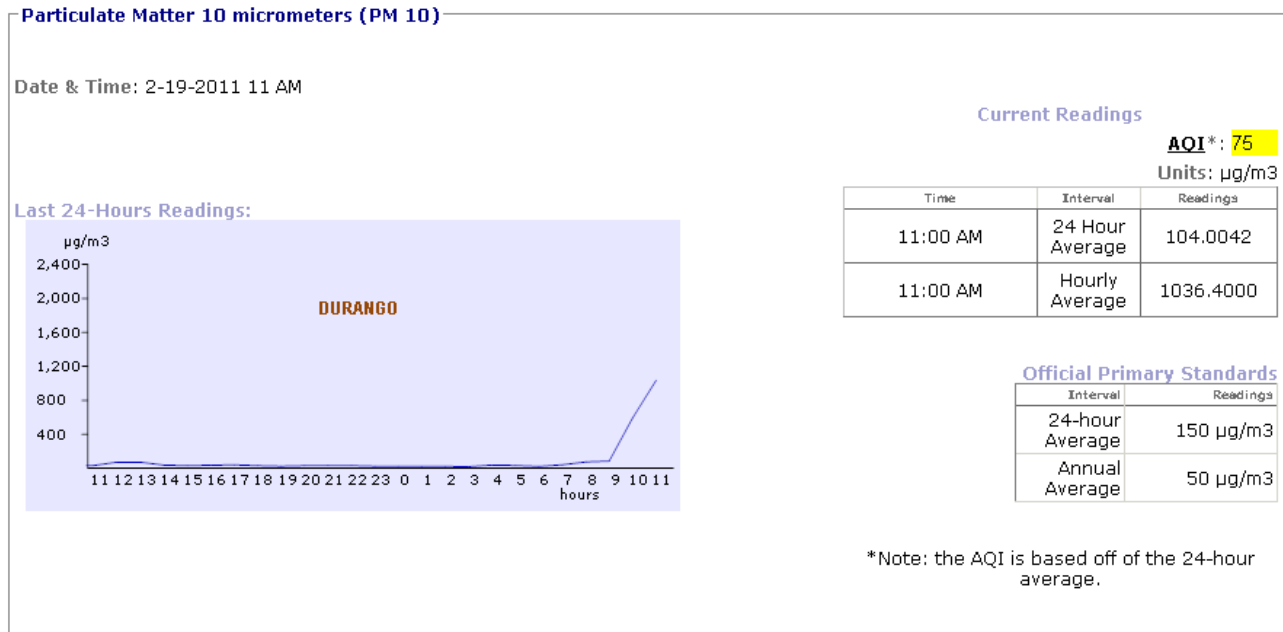
**Figure 14**



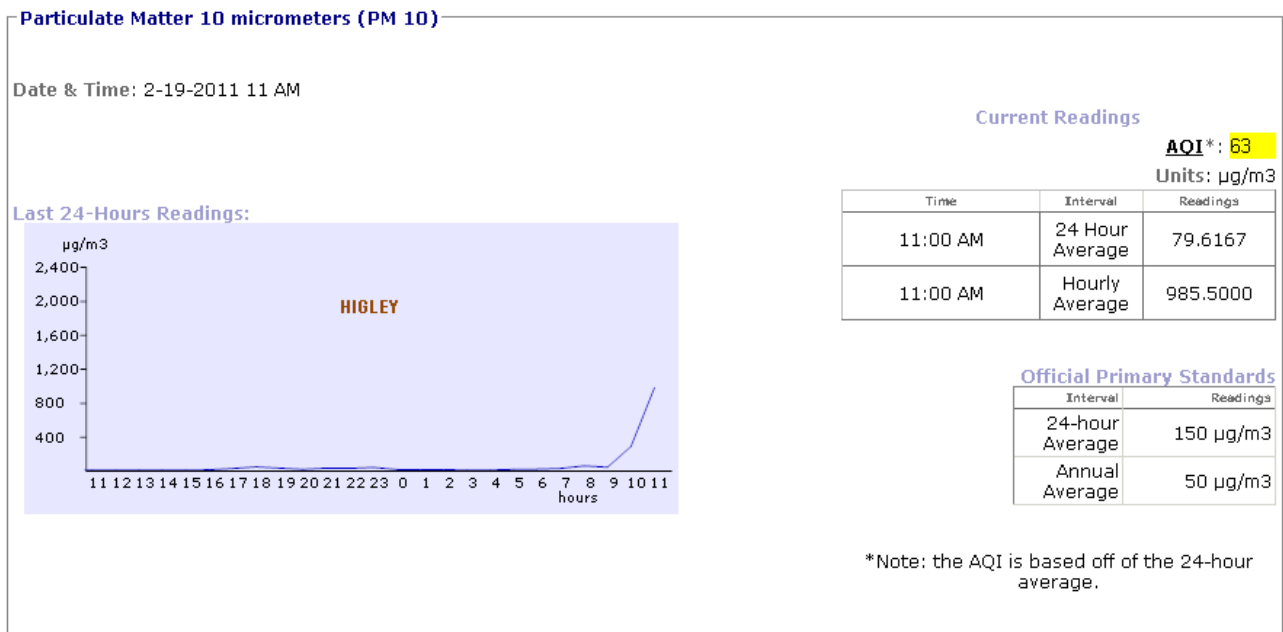
**Figure 15**



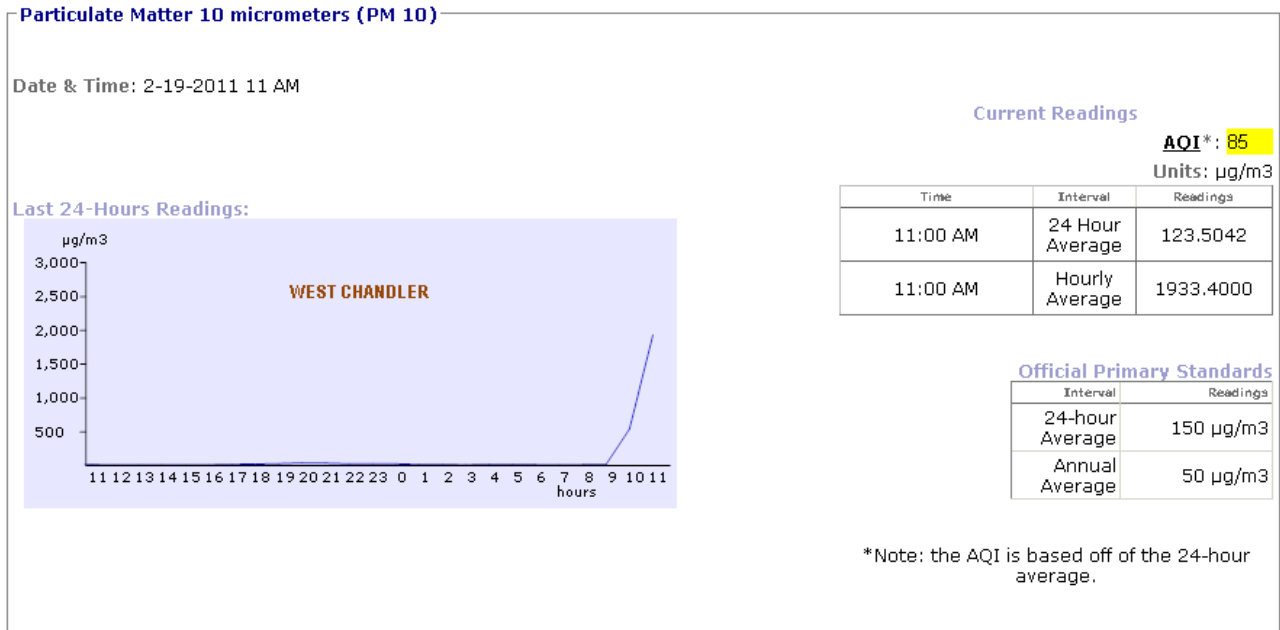
**Figure 16**



**Figure 17**



**Figure 18**



Although heavy rain, thunderstorms, and even fog occurred during the afternoon hours, the peak hourly PM-10 concentration of 1,933.4 $\mu\text{g}/\text{m}^3$  at the West Chandler monitoring site at 11:00 a.m. (Figure 19) could not be overcome by hourly concentrations that dropped into the single digits by 2:00 p.m. In the end, a PM-10 exceedance was recorded at this site with a 24-hour average AQI value of 107. Fortunately, the soil stabilization provided by the combined rainfall totals of over one inch that were received during the 19th and 20th – as well as on the 26th and 27th from a follow-up storm – kept PM-10 levels low the remainder of the month. -Reith

**Figure 19**

