



# MONTHLY AIR QUALITY REPORT FOR NOVEMBER 2011

## AQI COLOR SCALE

<b>GOOD</b>  0-50	<b>MODERATE</b>  51-100	<b>UNHEALTHY FOR SENSITIVE GROUPS</b>  101-150	<b>UNHEALTHY</b>  151-200
	<b>VERY UNHEALTHY</b>  201-300	<b>HAZARDOUS</b>  301-500	

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

\*Preliminary data

## SAMPLE POLLUTANT REPORTING BOX

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

SUN			MON			TUES			WED			THU			FRI			SAT		
						1	42	20	2	46	08	3	42	14	4	34	16	5	36	08
							63	40		283	35		80	75		599	75		19	25
6	40	11	7	36	11	8	34	10	9	39	16	10	40	10	11	39	15	12	36	16
	31	44		18	25		27	36		34	48		31	19		50	34		41	28
13	35	08	14	37	11	15	36	14	16	39	14	17	37	19	18	38	19	19	38	14
	19	23		27	35		30	38		40	41		48	52		43	46		37	49
20	36	16	21	35	10	22	34	14	23	36	17	24	36	19	25	36	10	26	40	13
	40	51		29	29		43	34		45	31		47	60		31	35		39	40
27	40	17	28	39	20	29	39	25	30	38	25									
	42	25		57	47		67	63		67	60									

### Calendar of High Pollution Advisories and Health Watches issued during November 2011

SUN			MON			TUE			WED			THU			FRI			SAT		
					1				2			3			4	A		5		
6			7		8				9			10			11			12		
13			14		15				16			17			18			19		
20			21		22				23			24			25			26		
27			28		29				30											

#### 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 November 2011

SUN				MON			TUE			WED			THU			FRI			SAT								
								1				2				3				4	A	B	C	5	A	B	C
												D						E			D				D		
6				7	A	B	C	8				9			E	10				11			E	12		B	
														E								E					
13		B	C	14			C	15			C	16			C	17			E	18				19			
										E				E				E									
20				21	A	B	C	22				23			E	24		B		25		B	E	26			
										E				E													
27				28		E		29			E	30			E												

#### 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 NOV 2011-**

Total= 2	<u>Date</u>	<u>Max AQI</u>	<u>Pollutant</u>	<u>Site/s</u>
	11/02	283	PM-10	Zuni Hills
	11/04	599	PM-10	West Chandler
		166	PM-10	Buckeye
		163	PM-10	West Phoenix
		153	PM-10	Zuni Hills
		148	PM-10	Durango
		144	PM-10	West Forty Third
		138	PM-10	Greenwood
		137	PM-10	Glendale
		135	PM-10	Dysart
		134	PM-10	Central Phoenix
		127	PM-10	Higley
		123	PM-10	Phoenix Supersite
		116	PM-10	North Phoenix

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**Health Watches issued during NOV 2011-**

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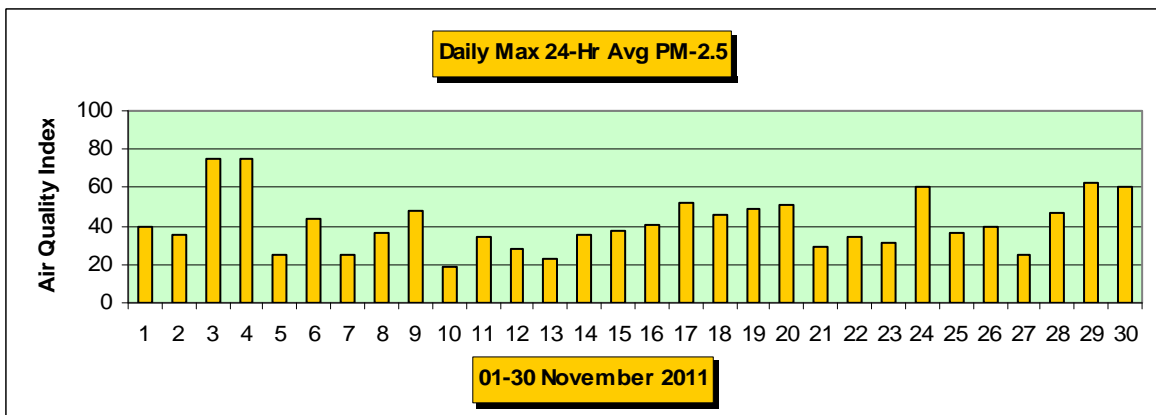
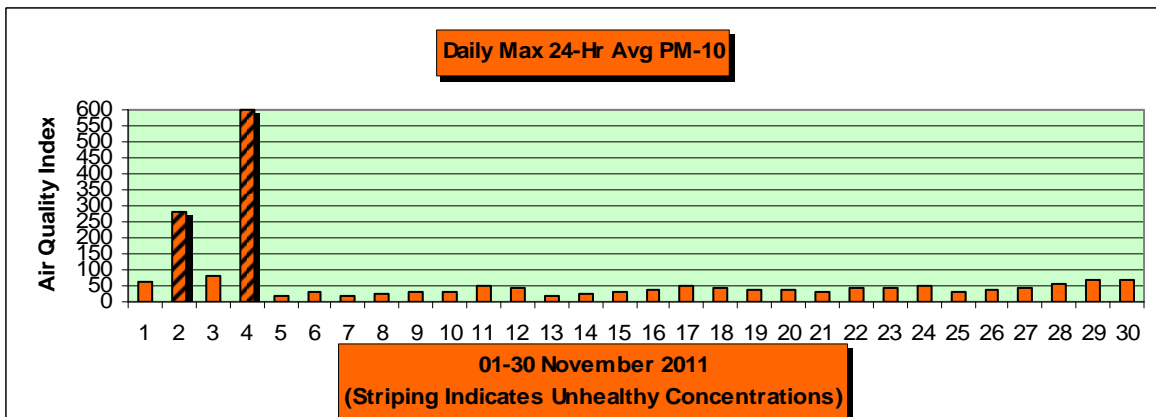
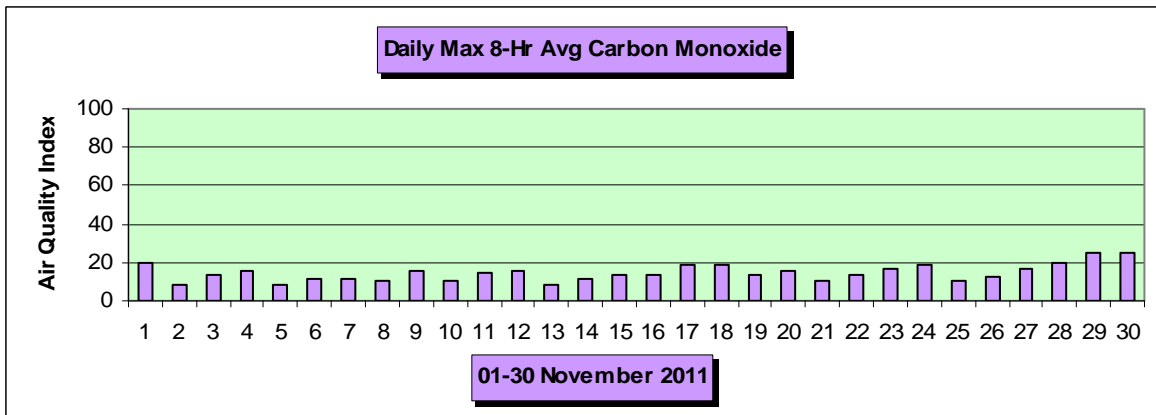
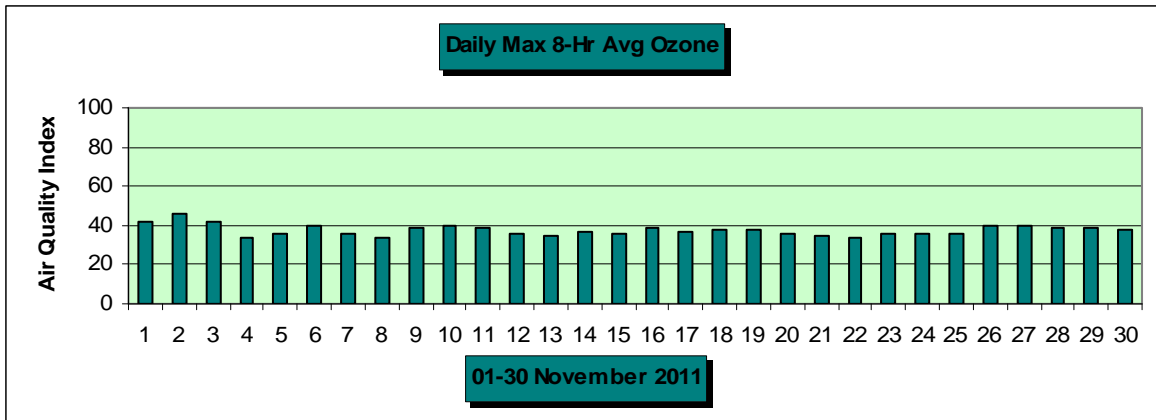
**High Pollution Advisories issued during NOV 2011-**

Total= 1	<u>Date</u>	<u>Max AQI</u>	<u>Pollutant</u>	<u>Site/s</u>
	11/04	599	PM-10	West Chandler

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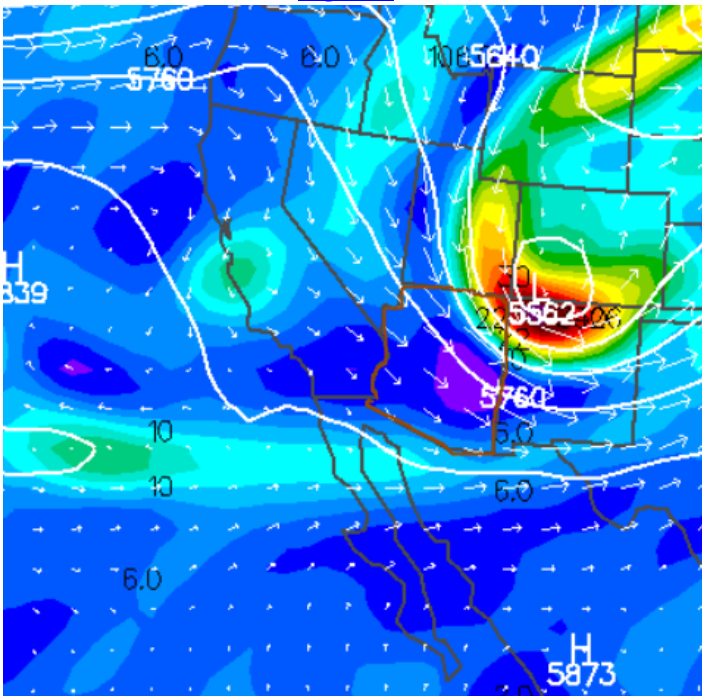
<b><u>Concentration Recap:</u></b>	Days in the <b>Good</b> category:	20
	Days in the <b>Moderate</b> category:	8
	Days in the <b>Unhealthy for Sensitive Groups</b> category:	0
	Days in the <b>Unhealthy</b> category:	0
	Days in the <b>Very Unhealthy</b> category:	1
	Days in the <b>Hazardous</b> category:	<u>1</u>
	Total Forecast Days:	30

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**Narrative:** Air quality in the Phoenix metro area during the month of November 2011 was relatively innocuous except for a pair of wind and blowing dust events – both of which led to exceedances of the PM-10 (coarse particle) standard. The event that occurred on November 2 had some peculiarities to it: the sole PM-10 exceedance occurred at a monitoring site (Zuni Hills) that rarely exceeds, and the prevailing winds that contributed to it were from the north and northeast – a component rarely associated with blowing dust in the Valley during this time of year. This dust event was restricted to the west portion of the metro area with only two sites – Zuni Hills & Dysart – reporting high hourly PM-10 concentrations – 2,243ug/m<sup>3</sup> at the former and 586ug/m<sup>3</sup> at the latter. Figure 1 shows the synoptic weather pattern (at 500mb) over the southwest U.S. on November 2 that features a vigorous short wave trough in the mid-latitude storm track situated over the Four Corners region and a high-amplitude ridge building over the intermountain west. Figure 2 shows the resulting tight surface pressure gradient (blue isolines) associated with a dry cold front that was approaching the Phoenix metro area that morning. Weather reports around the Valley indicated that north to northeasterly winds gusted up to 49 mph after daybreak and that dense blowing dust was reported at Luke AFB and Goodyear Airport between 7:00 and 9:00 a.m. with visibilities as low as two miles at times. Both of these air fields are located over the western portion of the Phoenix metro area and lie on a nearly straight north to south transect. Figure 3 (next page) is a topographical map of the area of interest and clearly indicates that terrain also played a role by channeling the already heightened winds off the higher terrain north of the Valley toward the Agua Fria River bed. Figure 4 is an image from the local VISNET camera array looking west from near downtown. This is a good visual representation of the degree of blowing dust that occurred that morning over the west Valley.

**Figure 1**



**Figure 2**

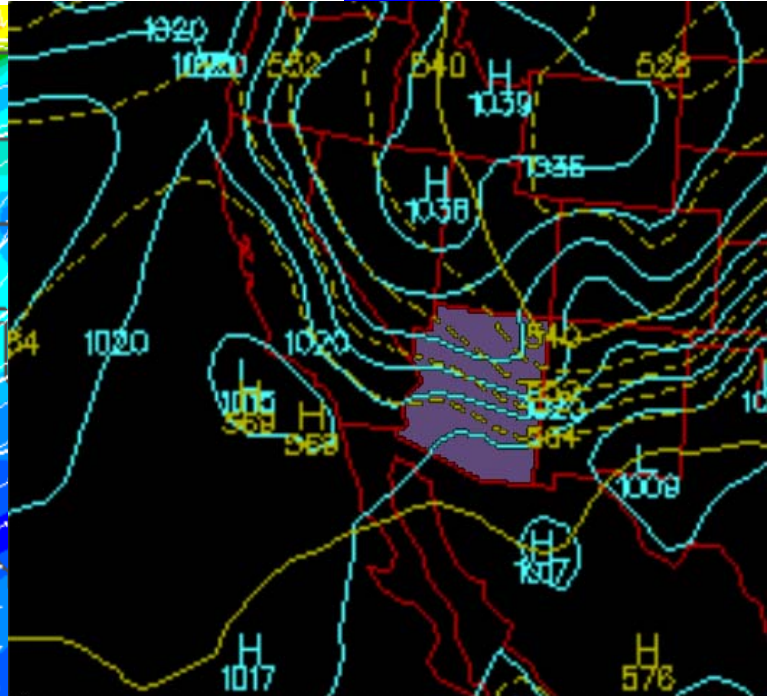


Figure 3



Figure 4

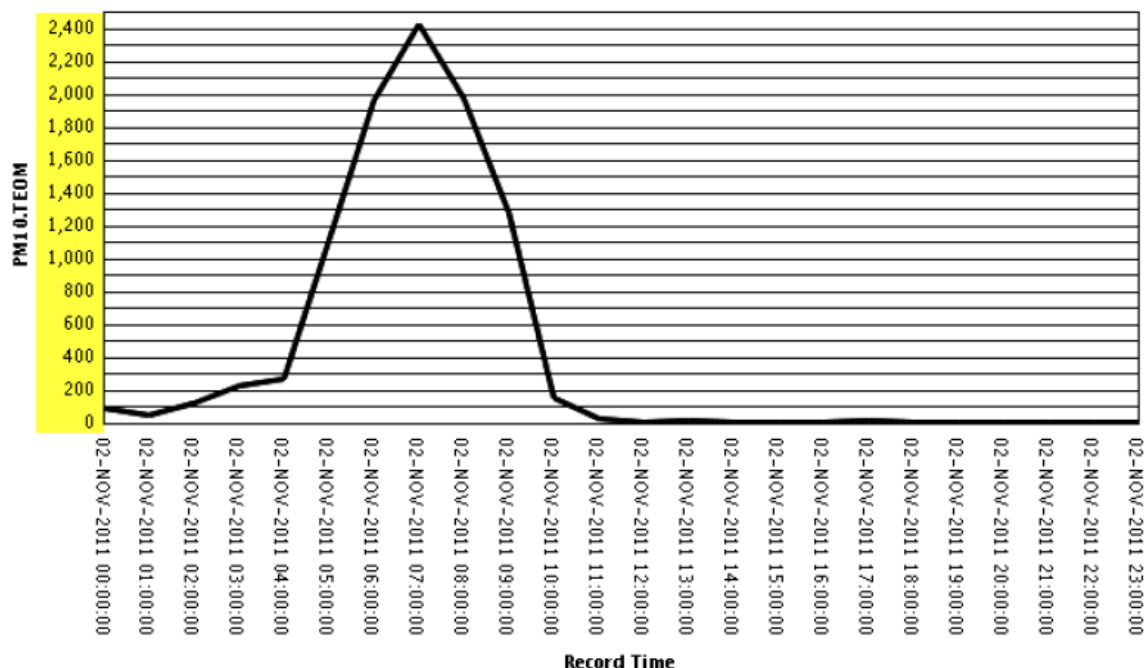




Figure 5 below shows the PM-10 time series graph for the Zuni Hills monitoring site and Figure 6 shows the PM-10 report for all sites for November 2 2011.

**Figure 5**

Name: ZUNI HILLS AQD



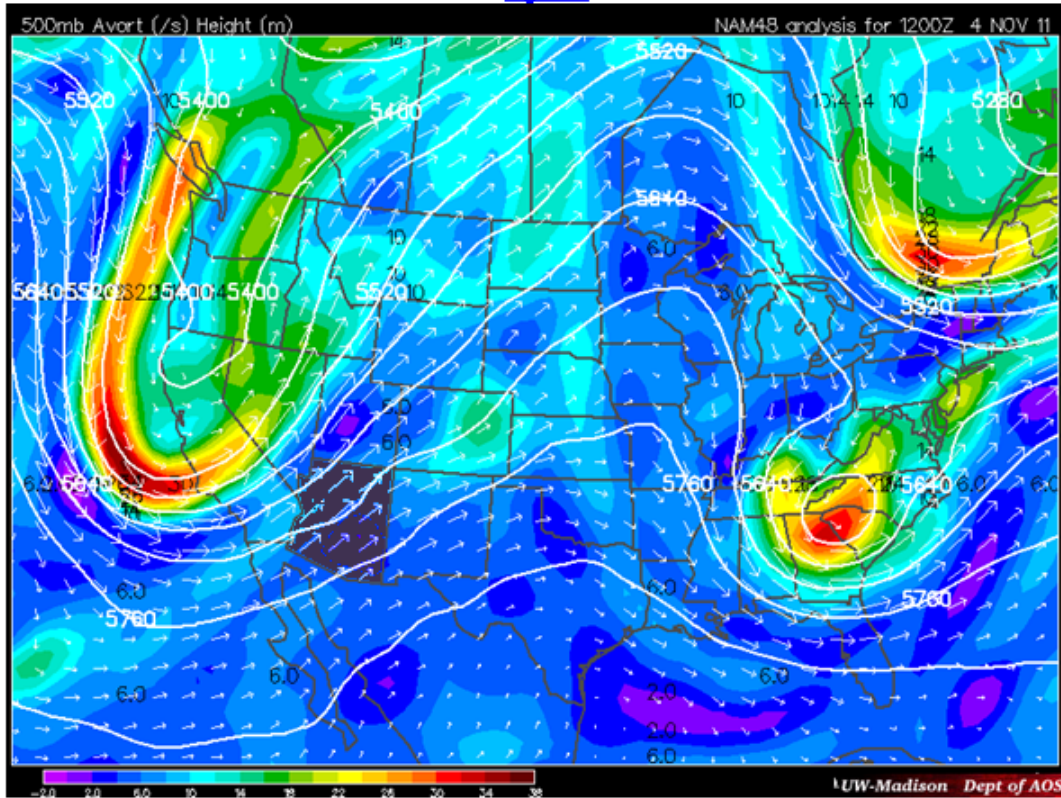
**Figure 6**

MAXIMUM OBSERVED CONTINUOUS PM10 (ug/m3)  
FOR 11/02/2011  
Preliminary Data QA LEVEL - 2  
Ordered by PLACE ASC

Place ID	Name	Network	Instrument Type	POC	* Hour	1-Hour Average	24-Hour Average	24-Hour Exc	Category	24-Hour AQI
16316	AJO	ADEQ	TEOM - PM10	3	1200	167.2	57.3		Moderate	52
21525	BUCKEYE	MARICOPA	TEOM - PM10	3	0700	116.6	51.0		Good	46
16329	CENTRAL PHOENIX	MARICOPA	TEOM - PM10	3	1800	57.1	25.7		Good	23
16375	DURANGO COMPLEX	MARICOPA	TEOM - PM10	3	0100	146.9	39.5		Good	36
19550	DYSART	MARICOPA	TEOM - PM10	3	0800	586.6	105.0		Moderate	76
16378	GLENDALE	MARICOPA	TEOM - PM10	3	0400	114.4	35.5		Good	32
16372	GREENWOOD	MARICOPA	TEOM - PM10	3	0100	99.4	37.8		Good	34
16326	HAYDEN OLD JAIL	ADEQ	TEOM - PM10	3	0200	273.3	67.1		Moderate	57
16505	HIGLEY	MARICOPA	TEOM - PM10	3	1800	60.1	29.6		Good	27
16328	JLG SUPERSITE	ADEQ	BAM - PM10	3	0000	93	30.0		Good	27
16328	JLG SUPERSITE	ADEQ	TEOM - PM10	3	0000	56.2	24.0		Good	22
16511	NOGALES POST OFFICE	ADEQ	BAM - PM10	3	0700	199	85.2		Moderate	66
16390	NORTH PHOENIX	MARICOPA	TEOM - PM10	3	0000	66.6	22.1		Good	20
16499	RILLITO	ADEQ	TEOM - PM10	3	2200	86.2	57.4		Moderate	52
16377	SOUTH PHOENIX	MARICOPA	TEOM - PM10	3	1700	227.3	54.0		Good	49
16478	WEST CHANDLER	MARICOPA	TEOM - PM10	3	0800	43.8	25.2		Good	23
16659	WEST FORTY THIRD	MARICOPA	TEOM - PM10	3	0100	145.4	37.0		Good	34
16477	WEST PHOENIX	MARICOPA	TEOM - PM10	3	0100	158.8	48.4		Good	44
113219	YUMA SUPERSITE	ADEQ	TEOM - PM10	3	0700	326.6	118.2		Moderate	82
138246	ZUNI HILLS AQD	MARICOPA	TEOM - PM10	3	0700	2423.8	411.9	Y	Very Unhealthy	282

A much more serious wind and dust event occurred just two days later on November 4. As can be seen from the 500mb weather chart for that date ([Figure 7](#)), an intense upper level trough was situated to the west of Arizona and was moving east. Since a lengthy period of strong winds was forecast to occur, the National Weather Service office in Phoenix issued a Wind Advisory valid from 11:00 a.m. to 11:00 p.m. Gusty winds began by late morning and as [Figure 8](#) shows some dust had already become airborne by 10:00 a.m. This prompted the National Weather Service to then issue a Blowing Dust Advisory valid from 11:00 a.m. to 8:00 p.m.

[Figure 7](#)



[Figure 8](#)





Figures 9-11 are additional images from the local VISNET camera array and show to great effect the severity of the blowing and suspended dust situation that lasted into the nighttime hours. Wind gusts of up to 61 mph were reported as were visibilities as low as one mile between 2:00 and 12:00 p.m. Unfortunately, the end result was another 13 PM-10 site exceedances that included an hourly concentration of 2,743ug/m<sup>3</sup> at the West Chandler site along with an incredible 24-hour average concentration of 670.2ug/m<sup>3</sup>. The corresponding Air Quality Index value of 599 is twice that of the cut-off for the hazardous range. Figure 12 shows the PM-10 time-series graph for that site.

[Figure 9](#)



[Figure 10](#)

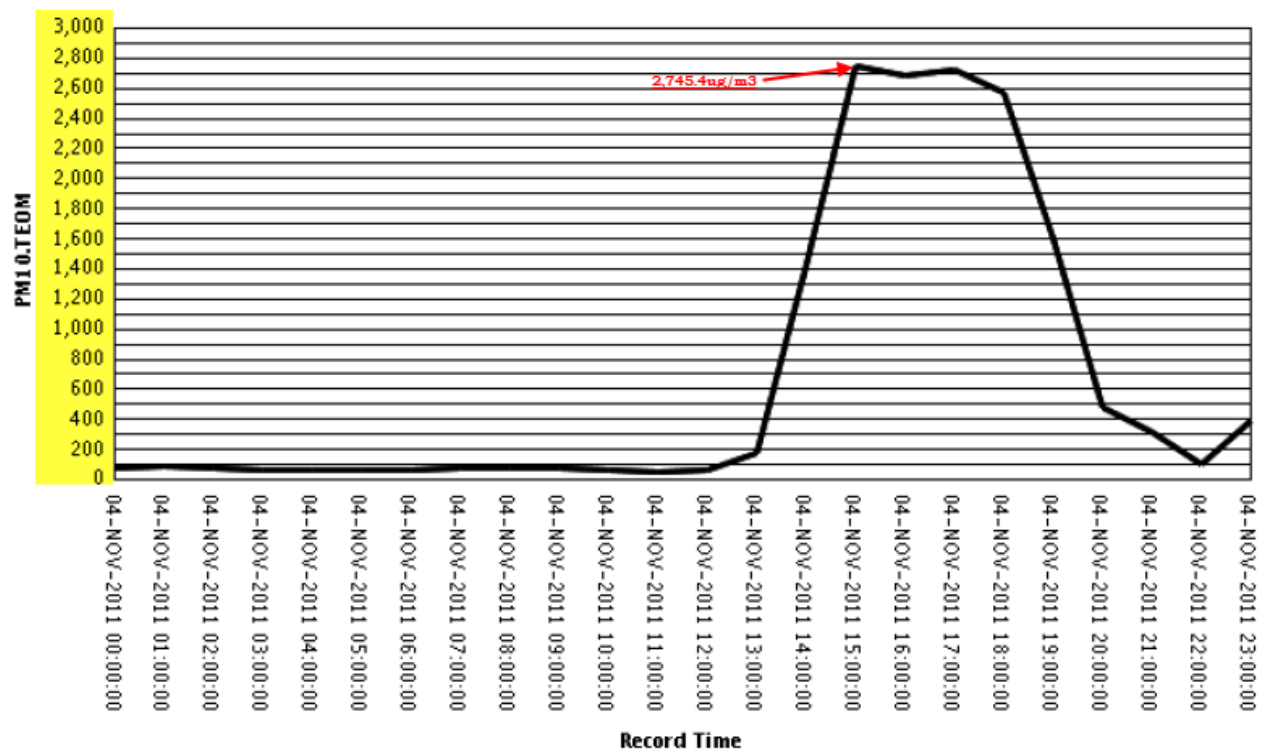


[Figure 11](#)



[Figure 12](#)

Name: WEST CHANDLER



Strong winds and blowing dust continued into the early morning hours of November 5 with wind gusts up to 52 mph and visibilities as low as seven miles thru 4:00 a.m. However, this system was also accompanied by showers and thunderstorms that began around 9:00 p.m. on November 4 and continued thru 8:00 a.m. on the 5th. This precipitation – along with additional rainfall events on the 7th, 12th, and 13th, was instrumental in overall good air quality in the Valley for much of the remainder of the month. Figures 13 and 14 illustrate some fog and moist haze that persisted over the metro area following the latter event.

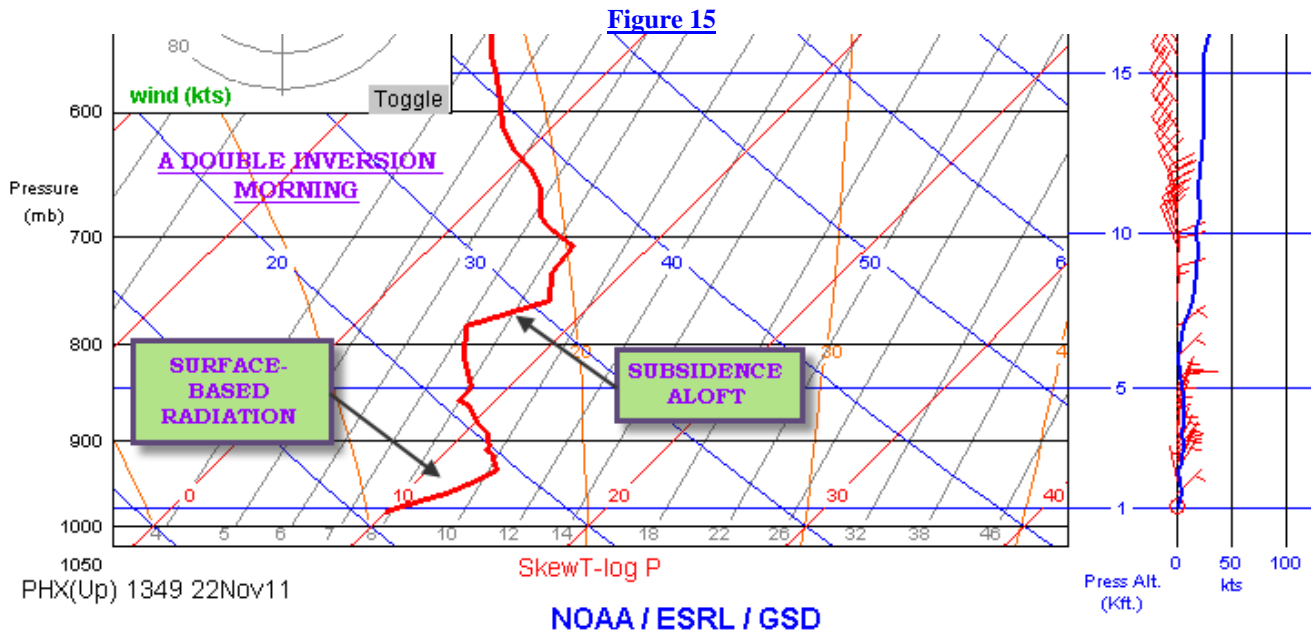
**Figure 13**



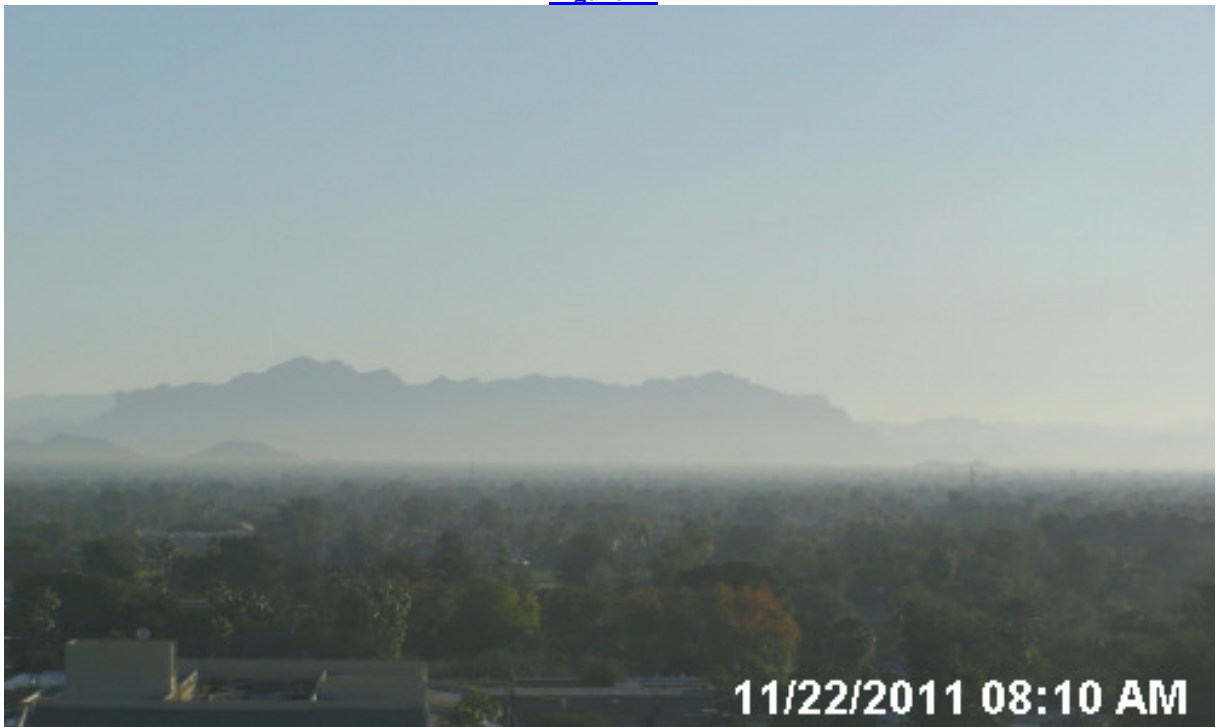
**Figure 14**



The mid-latitude storm track then became relatively inactive over Arizona with several periods of stagnant weather conditions as warm air aloft became established in concert with ridging aloft. Some examples of the impacts of this air mass stagnation are illustrated below. Inversion formed at two levels over the Valley by the 22nd (Figure 15) and this, along with a mixing depth of only 3500' and marginal dispersion, trapped enough particulate matter and moisture to reduce local visibilities to as low as five miles at times (Figures 16-17).

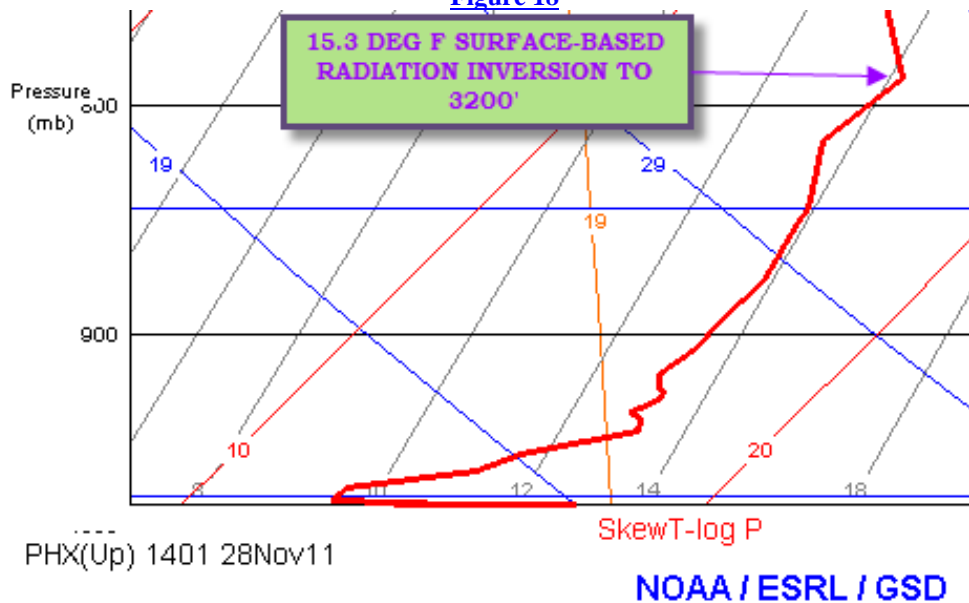


**Figure 17**

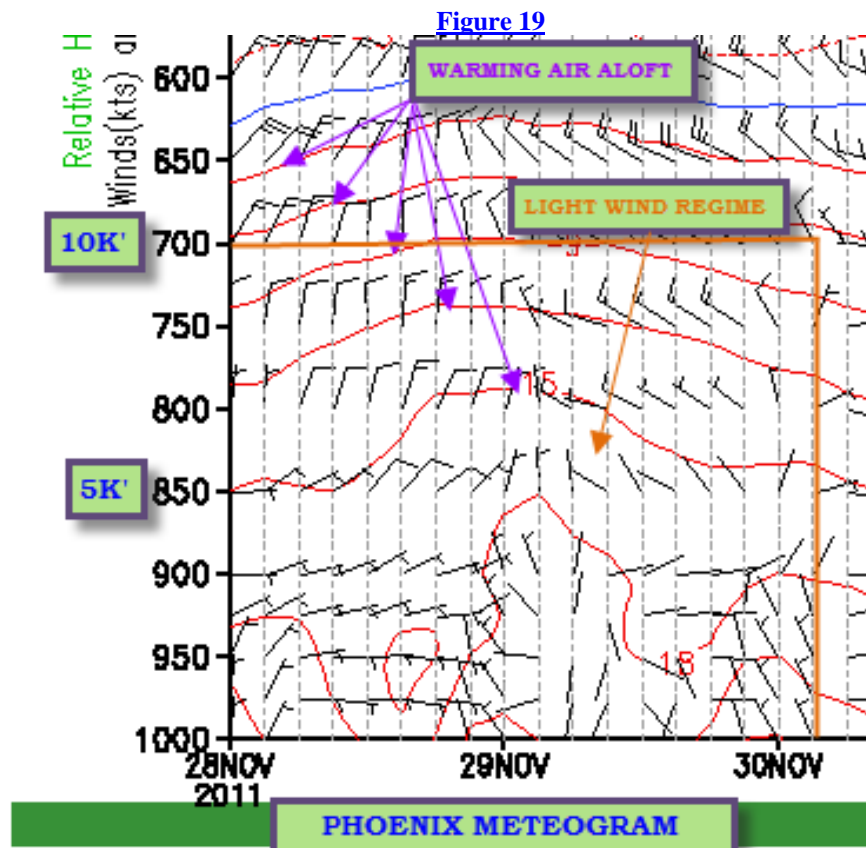


A more significant stagnation event during the final four days of the month during which period very strong surface-based radiation inversions formed overnight along with afternoon mixing depths as low as 1200 feet and poor or marginal dispersion each day. By then the combination of drying and disturbed soils and a suspected increase in smoke from residential wood burning sent concentrations of both PM-10 (coarse) and PM-2.5 (fine) particle into the low-moderate range of the Air Quality Index. [Figures 18-20](#) illustrate what the conditions were like on November 28. -Reith

**Figure 18**







**Figure 20**

