



**MONTHLY AIR QUALITY REPORT FOR  
JUNE 2012**

AOI 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 June 2012\*

\*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	104	08	2	106	06
																54	43		55	49
3	90	06	4	54	05	5	90	05	6	104	08	7	48	07	8	67	09	9	42	06
	47	45		40	35		43	31		53	41		45	38		44	33		35	22
	51	05		45	07		54	08		67	08		45	05		42	03		51	05
	39	30	11	43	26	12	54	37	13	56	32	14	54	32	15	43	29	16	129	67
17	74	06	18	48	05	19	90	06	20	97	06	21	80	06	22	64	05	23	100	06
	87	55		110	49		62	43		99	99		56	37		52	31		51	44
24	50	03	25	67	03	26	61	05	27	77	06	28	74	07	29	50	05	30	58	03
	41	40		46	35		73	53		195	119		74	59		40	39		77	42

**Calendar of High Pollution Advisories and Health Watches issued during June 2012**

SUN			MON			TUE			WED			THU			FRI			SAT					
															1						2		
3		4			F				6					F	7			8					9
10		11							13						14			15					16
17		18			F			F	20		D E F				21					F	22		23
24		25			F				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 June 2012**

SUN			MON			TUE			WED			THU			FRI			SAT					
															1						2		
3		4							6		E				7		E	8					9
10		11			E				13						14			15					16
17		18			D			E	20		E F				21		E			E	22		23
24		25						B	26		D			B	27		D E				28		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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**Non-Ozone Exceedance days during JUNE 2012-**

Total=	<u>Date</u>	<u>Max AQI</u>	<u>Pollutant</u>	<u>Site/s</u>
3	6/16	129	PM-10	West Forty Third
		124	PM-10	Buckeye
		121	PM-10	Higley
		118	PM-10	West Phoenix
		117	PM-10	Durango
		107	PM-10	Dysart
		106	PM-10	South Phoenix
	6/18	110	PM-10	West Forty Third
	6/27	195	PM-10	South Phoenix
		193	PM-10	Central Phoenix
		190	PM-10	Phoenix Supersite
		189	PM-10	Glendale
		185	PM-10	Greenwood
		166	PM-10	Zuni Hills
		135	PM-10	Higley
		134	PM-10	Durango
		134	PM-10	West Chandler
		133	PM-10	West Forty Third
		113	PM-10	North Phoenix
		108	PM-10	Tempe
	6/27	119	PM-2.5	Glendale
		109	PM-2.5	Phoenix Supersite
		108	PM-2.5	Tempe

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**Non-Ozone Health Watches issued during JUNE 2012-**

Total=	<u>Date</u>	<u>Max AQI</u>	<u>Pollutant</u>	<u>Site/s</u>
2	6/20	99	PM-10	West Chandler
	6/20	99	PM-2.5	West Phoenix

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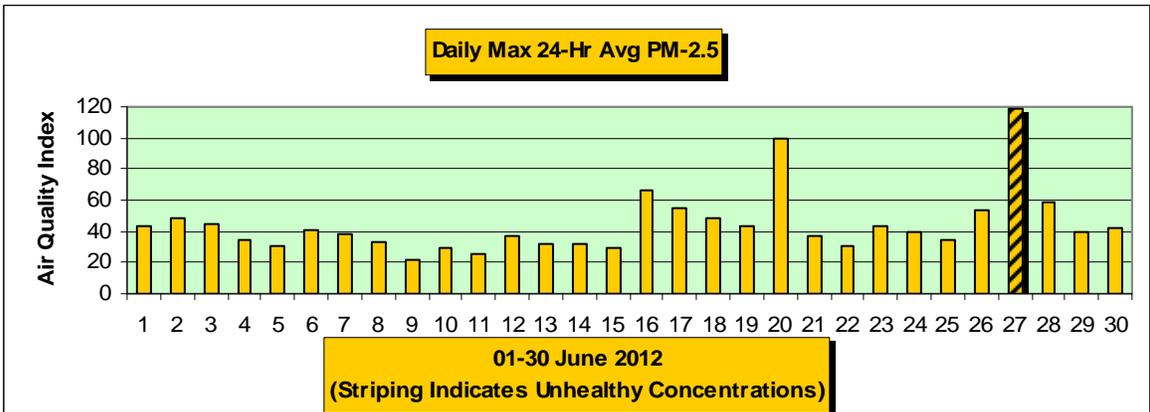
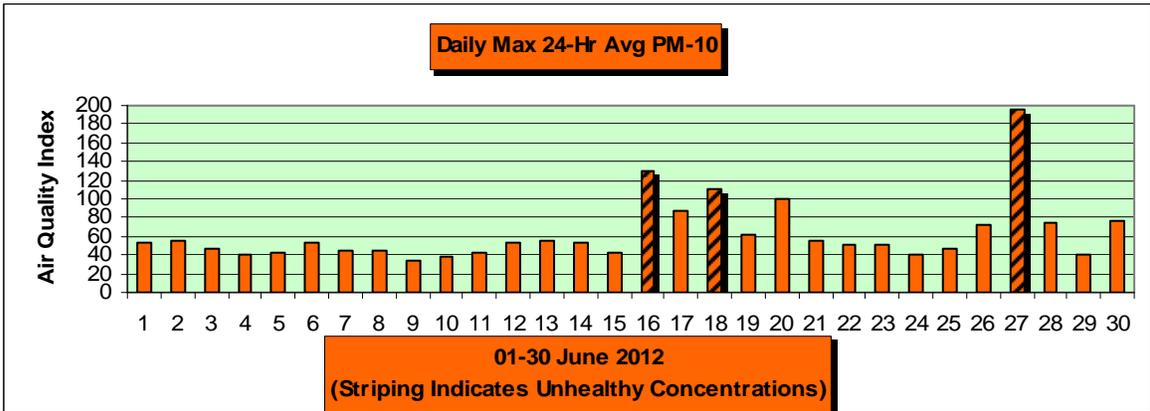
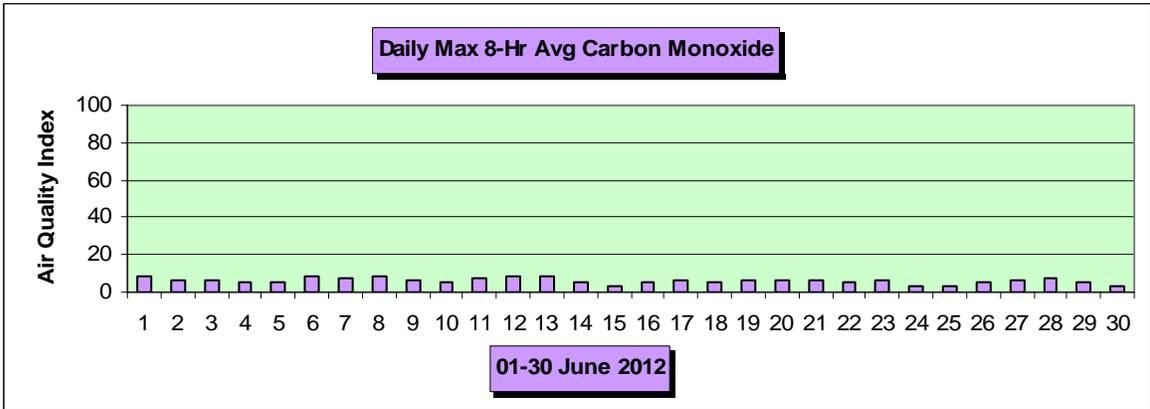
**Non-Ozone High Pollution Advisories issued during JUNE 2012-**

Total=	<u>Date</u>	<u>Max AQI</u>	<u>Pollutant</u>	<u>Site/s</u>
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<b><u>Concentration Recap:</u></b>	Days in the <b>Good</b> category:	6
	Days in the <b>Moderate</b> category:	18
	Days in the <b>Unhealthy for Sensitive Groups</b> category:	5
	Days in the <b>Unhealthy</b> category:	1
	Days in the <b>Very Unhealthy</b> category:	0
	Days in the <b>Hazardous</b> category:	0
	Total Forecast Days:	30

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**Narrative:** During the first half of June 2012 daily PM-10 (coarse particle) and PM-2.5 (fine particle) pollution levels over the Phoenix metro area were either in the good or low-moderate range of the Air Quality Index (AQI) with no strong wind events during this period. This would abruptly change on the 16th when atmospheric moisture increased over Arizona on southerly flow aloft between an upper level low situated to the west and a high to the east. This intrusion of moisture resulted in the formation of a sizeable cluster of showers and thunderstorms over the southeast portion of the state by late afternoon ([Figure 1](#)). Doppler radar data from the National Weather Service office in Phoenix at nearly the same time ([Figure 2](#)) showed several strong cells over Pinal County and this activity was moving toward the northwest. Over the years this type of weather situation has contributed to numerous severe dust events over the Valley due to strong winds generated by strong thunderstorm outflow boundaries; unfortunately, this one would soon be added to them. What occurred next was the issuance of a short term forecast by the NWS for areas southeast of the Phoenix metro area ([Figure 3](#)), followed by a Significant Weather Advisory for this same area as well as adjoining areas of the Valley ([Figure 4](#)), followed by a Dust Storm Warning for the metro area ([Figure 5](#)).

**Figure 1**

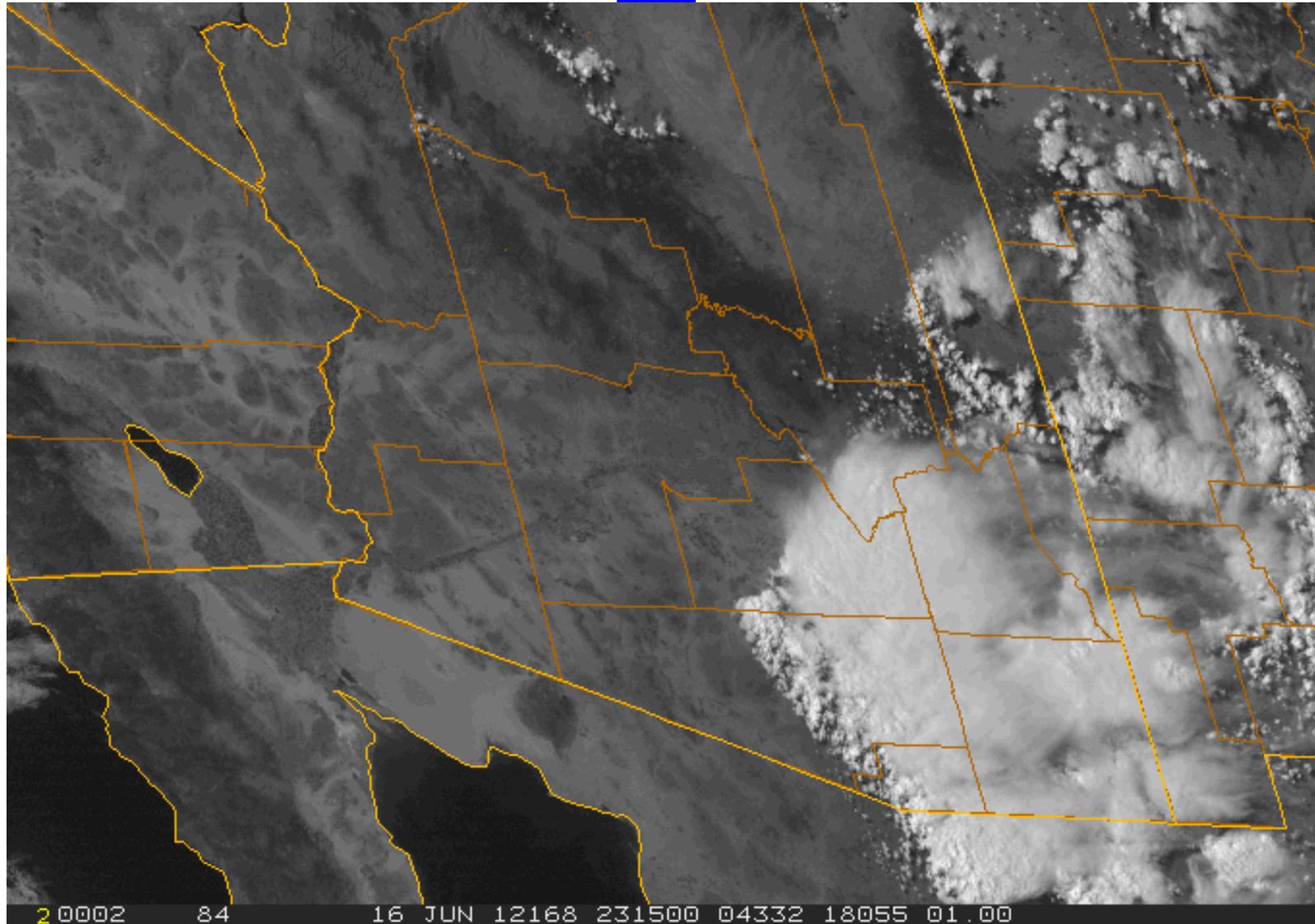
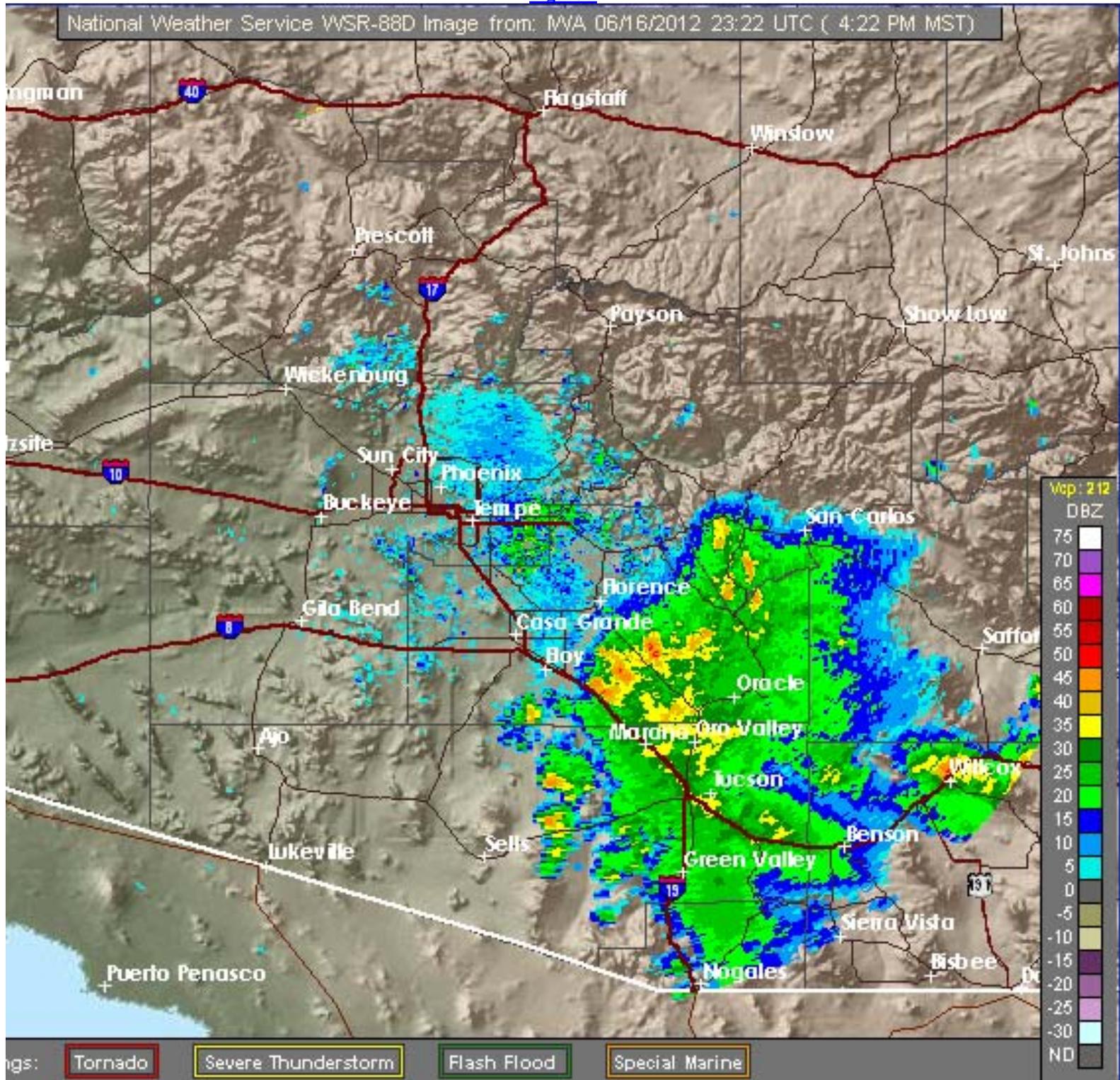


Figure 2



**Figure 3**

**SHORT TERM FORECAST**

NATIONAL WEATHER SERVICE PHOENIX AZ  
339 PM MST SAT JUN 16 2012

AZZ028-170030-  
NORTHWEST AND NORTH CENTRAL PINAL COUNTY-  
INCLUDING THE CITIES OF...APACHE JUNCTION...CASA GRANDE...COOLIDGE...  
AND FLORENCE  
339 PM MST SAT JUN 16 2012

.NOW...  
...STRONG GUSTY WINDS AND BLOWING DUST...  
STRONG THUNDERSTORMS THAT DEVELOPED NEAR TUCSON HAVE GENERATED A  
NORTHWESTWARD MOVING OUTFLOW BOUNDARY. A LARGE AREA OF GUSTY WINDS IN  
THE 25 TO 35 MPH RANGE...WITH ISOLATED GUSTS TO 40 MPH...WILL LIKELY  
SWEEP THROUGH LOCATIONS NEAR FLORENCE...COOLIDGE...AND CASA GRANDE  
BETWEEN 425 AND 530 PM. THIS INCLUDES PORTIONS OF INTERSTATES 8 AND  
10. AREAS OF BLOWING DUST ARE ALSO LIKELY...WITH VISIBILITIES LESS  
THAN ONE MILE AT TIMES.

**Figure 4**

SPECIAL WEATHER STATEMENT  
NATIONAL WEATHER SERVICE PHOENIX AZ  
450 PM MST SAT JUN 16 2012

AZZ023-024-028-170100-  
PINAL AZ-MARICOPA AZ-  
450 PM MST SAT JUN 16 2012

**...SIGNIFICANT WEATHER ADVISORY...**

THE NATIONAL WEATHER SERVICE IN PHOENIX HAS ISSUED A  
SIGNIFICANT WEATHER ADVISORY FOR...  
CENTRAL MARICOPA COUNTY IN SOUTH CENTRAL ARIZONA  
NORTH CENTRAL PINAL COUNTY IN SOUTH CENTRAL ARIZONA

UNTIL 600 PM MST

AT 446 PM MST...A LARGE AREA OF GUSTY WINDS...GENERATED FROM EARLIER  
THUNDERSTORMS NEAR TUCSON...WILL SWEEP THROUGH THE PHOENIX EAST  
VALLEY BETWEEN 515 PM AND 630 PM. SOUTH WINDS IN THE 25 TO 35 MPH  
RANGE...WITH AREAS OF VISIBILITIES LESS THAN 2 MILES IN BLOWING  
DUST...WILL MOVE THROUGH THE EAST VALLEY COMMUNITIES OF QUEEN  
CREEK...APACHE JUNCTION...CHANDLER...GILBERT...MESA...AND TEMPE.

A FEW ISOLATED WIND GUSTS UP TO 40 MPH ARE EXPECTED.

LOCALLY DENSE BLOWING DUST IS POSSIBLE AND MAY HAMPER VEHICULAR  
TRAVEL...ESPECIALLY ALONG INTERSTATE 10. IF YOU ENCOUNTER BLOWING  
DUST WHILE DRIVING...PULL OVER AS FAR OFF THE ROADWAY AS POSSIBLE  
AND PARK. TURN OFF YOUR HEADLIGHTS AND KEEP YOUR FOOT OFF THE BRAKE.

**Figure 5**

GREATER PHOENIX AREA-

INCLUDING THE CITIES OF...MESA...PHOENIX

554 PM MST SAT JUN 16 2012

...**DUST STORM WARNING** NOW IN EFFECT UNTIL 7 PM MST THIS EVENING...

THE DUST STORM WARNING IS NOW IN EFFECT UNTIL 7 PM MST THIS EVENING.

\* AFFECTED AREA...THE PHOENIX METRO AREA...INCLUDING DOWNTOWN PHOENIX AND THE EAST VALLEY.

\* TIMING...THROUGH 6 PM MST.

\* WINDS...SOUTH WIND 25 TO 35 MPH WITH ISOLATED GUSTS TO 45 MPH.

\* VISIBILITY...AREAS OF LESS THAN 1/4 MILE IN BLOWING DUST.

\* IMPACTS...DANGERS TO VEHICULAR TRAVEL...ESPECIALLY ON VALLEY FREEWAYS.

A DUST STORM WARNING IS ISSUED WHEN WINDS HAVE GENERATED LARGE AREAS OF BLOWING DUST OR BLOWING SAND THAT HAVE SUBSTANTIALLY REDUCED VISIBILITIES...TO 1/4 MILE OR LESS...RESULTING IN HAZARDOUS DRIVING CONDITIONS IN SOME AREAS. BE READY FOR A SUDDEN DROP IN VISIBILITY TO NEAR ZERO. USE EXTRA CAUTION AND SLOW DOWN WHILE DRIVING...AS OBJECTS ON AND NEAR ROADWAYS WILL BE SEEN ONLY AT CLOSE RANGE. IF YOU ENCOUNTER BLOWING DUST OR BLOWING SAND ON THE ROADWAY OR SEE IT APPROACHING...PULL OFF THE ROAD AS FAR AS POSSIBLE AND PUT YOUR VEHICLE IN PARK. TURN THE LIGHTS ALL THE WAY OFF AND KEEP YOUR FOOT OFF THE BRAKE PEDAL.

Images from the local VISNET camera array showing the extent of the ensuing dust event over the Valley can be seen in [Figures 6 and 7](#).

**Figure 6**



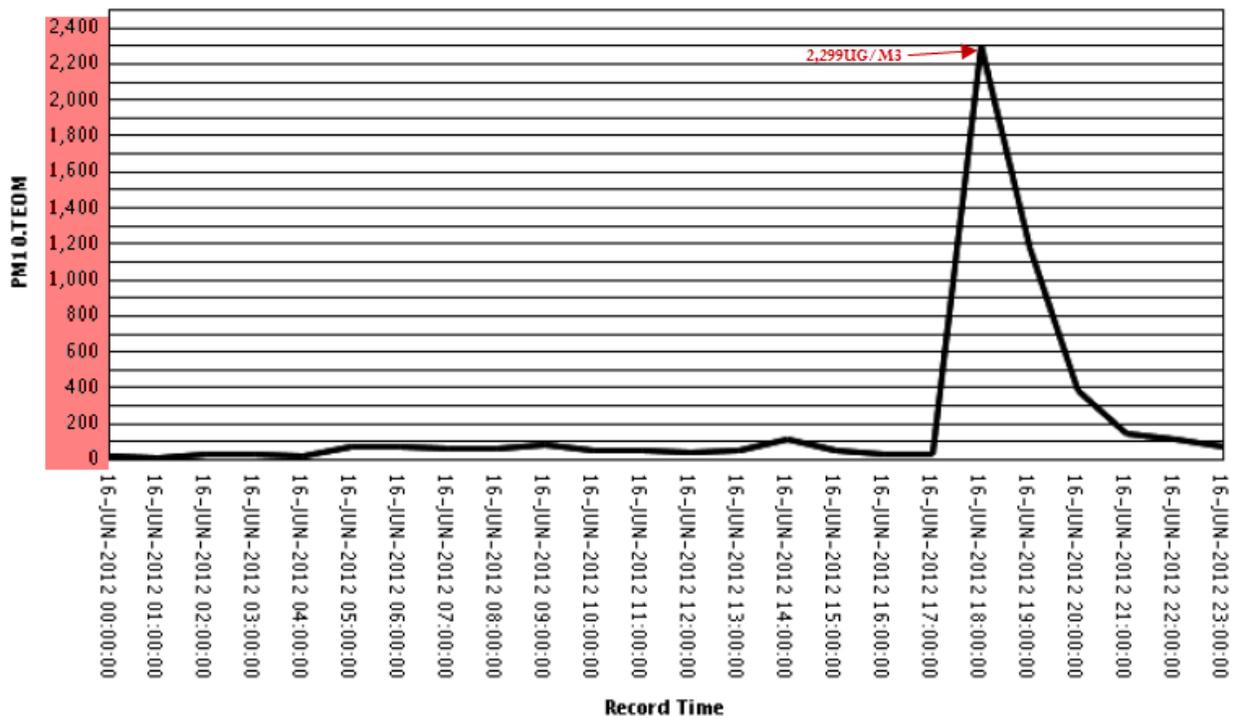
**Figure 7**



Between 6:00 and 8:00 p.m. winds gusted up to 45 mph and visibilities as low as 1/2 mile were recorded. Just as unfortunate, this incident also resulted in another round of unhealthy PM-10 concentrations for the Phoenix area with a total of seven monitoring site exceedances. [Figure 8](#) below shows the PM-10 time series graph for the West Forty Third monitoring site which had the highest hourly concentration of 2,299ug/m<sup>3</sup> and the max PM-10 AQI level reading of 129.

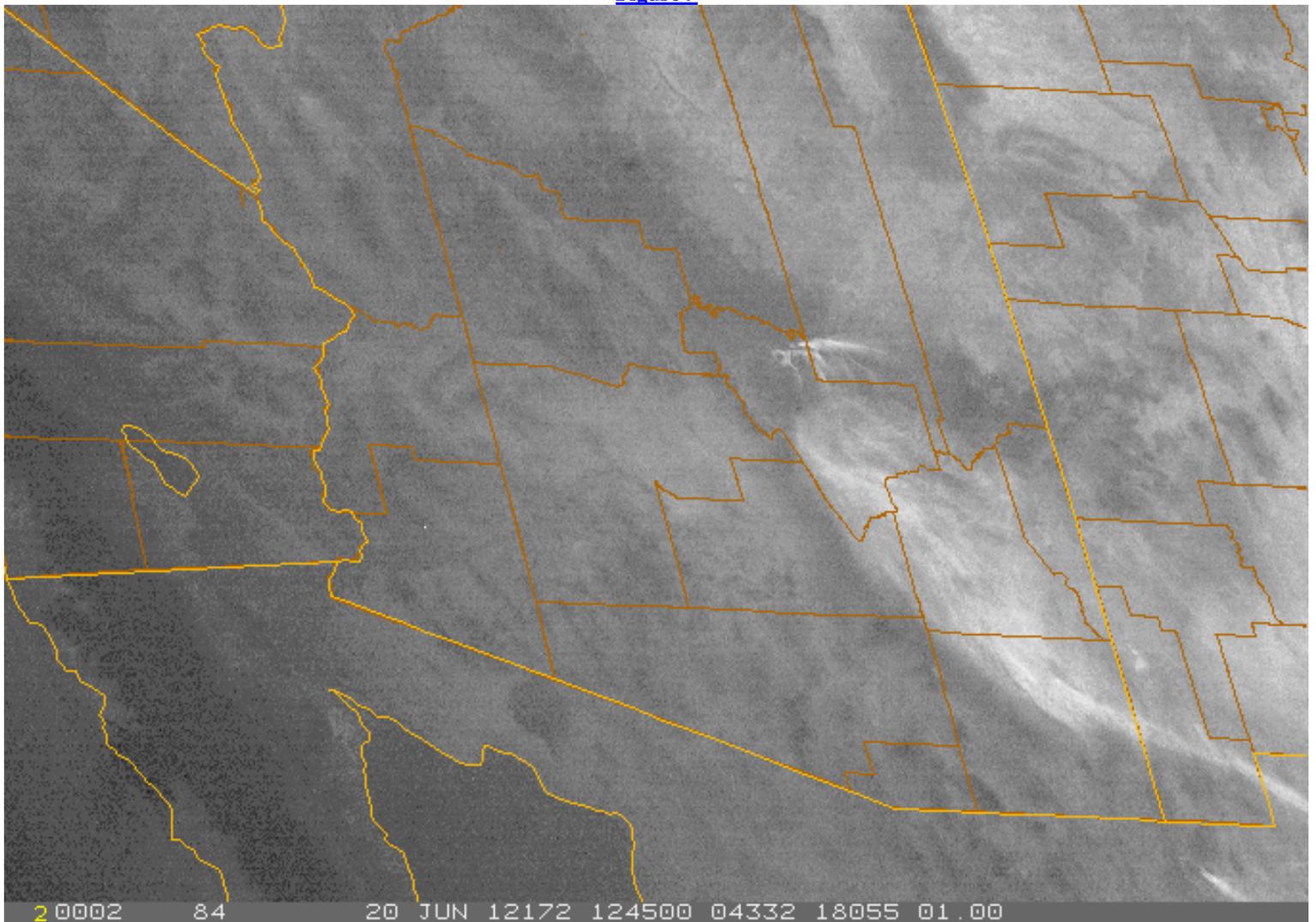
**Figure 8**

Name: WEST FORTY THIRD



Within a span of just four days two additional high air pollution events occurred. The first was relatively minor in that on the 18th only one monitoring site exceeded the PM-10 standard but was disquieting nonetheless in that gradient winds caused by a passing disturbance – that only gusted up to 33 mph – still managed to produce enough dust to cause unhealthy concentrations. The second event was much more problematic in that a combination of three pollutants – Ozone, PM-10, and PM-2.5 – all nearly reached unhealthy levels on the same day, the 20th. PM-2.5 (fine particle) levels skyrocketed upward on that day when the leading edge of a large plume of smoke from the POCO Wildfire ([Figure 9](#)) located in Gila County arrived overhead after midnight but was not identified visually until after daybreak.

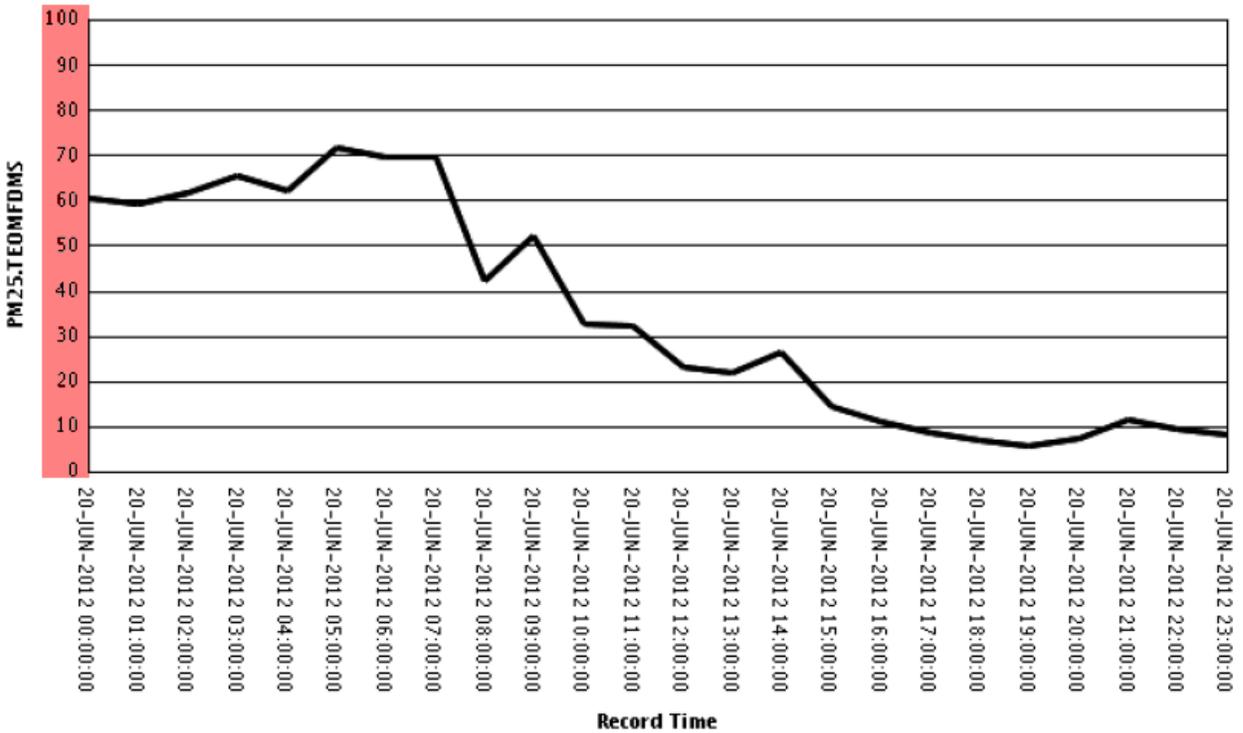
[Figure 9](#)



As can be seen in [Figure 10](#), hourly PM-2.5 concentrations at the West Phoenix monitoring site were already elevated at midnight and remained so for nearly the first half of the day. [Figures 11-13](#) from the VISNET camera array show the visual impact of the dense smoke over different portions of the Valley during the morning hours.

[Figure 10](#)

Name: WEST PHOENIX



[Figure 11](#)



[Figure 12](#)



[Figure 13](#)



It was revealed later that at the same time smoke (PM-2.5) was moving over the Phoenix area from the east, PM-10 in the form of suspended dust particles was arriving from the southwest and west. Weather observational reports indicated that strong winds over the desert areas near Yuma produced a column of dust that then migrated eastward with time – first impacting Gila Bend in the far southwestern portion of Maricopa County and then reaching the Phoenix metro area. Since smoke can also contain some PM-10 particles, it may never be known what percentage of the total PM-2.5 levels were contributed by smoke versus dust; however, the end result was that the peak 24-hour average concentration of both pollutants was equivalent to a mark of 99 on the Air Quality Index. The final and most serious particle pollution event of the month occurred on the 27th of the month. On that date another but more powerful thunderstorm outflow boundary from the southeast arrived and between 6:00 and 9:00 p.m. produced wind gusts of up to 51 mph and visibilities as low as 1/4 mile. Figures 14-18 are a 5-minute sequence of photographs from the local VISNET camera array that show to good effect the approach and arrival of the very thick dust wall from the southeast. The ultimate outcome of this influx of dust was 12 PM-10 site exceedances and three PM-2.5 site exceedances. Figure 19 is the PM-10 time-series for the Central Phoenix monitoring site where the highest hourly PM-10 concentration was registered. -Reith

**Figure 14**

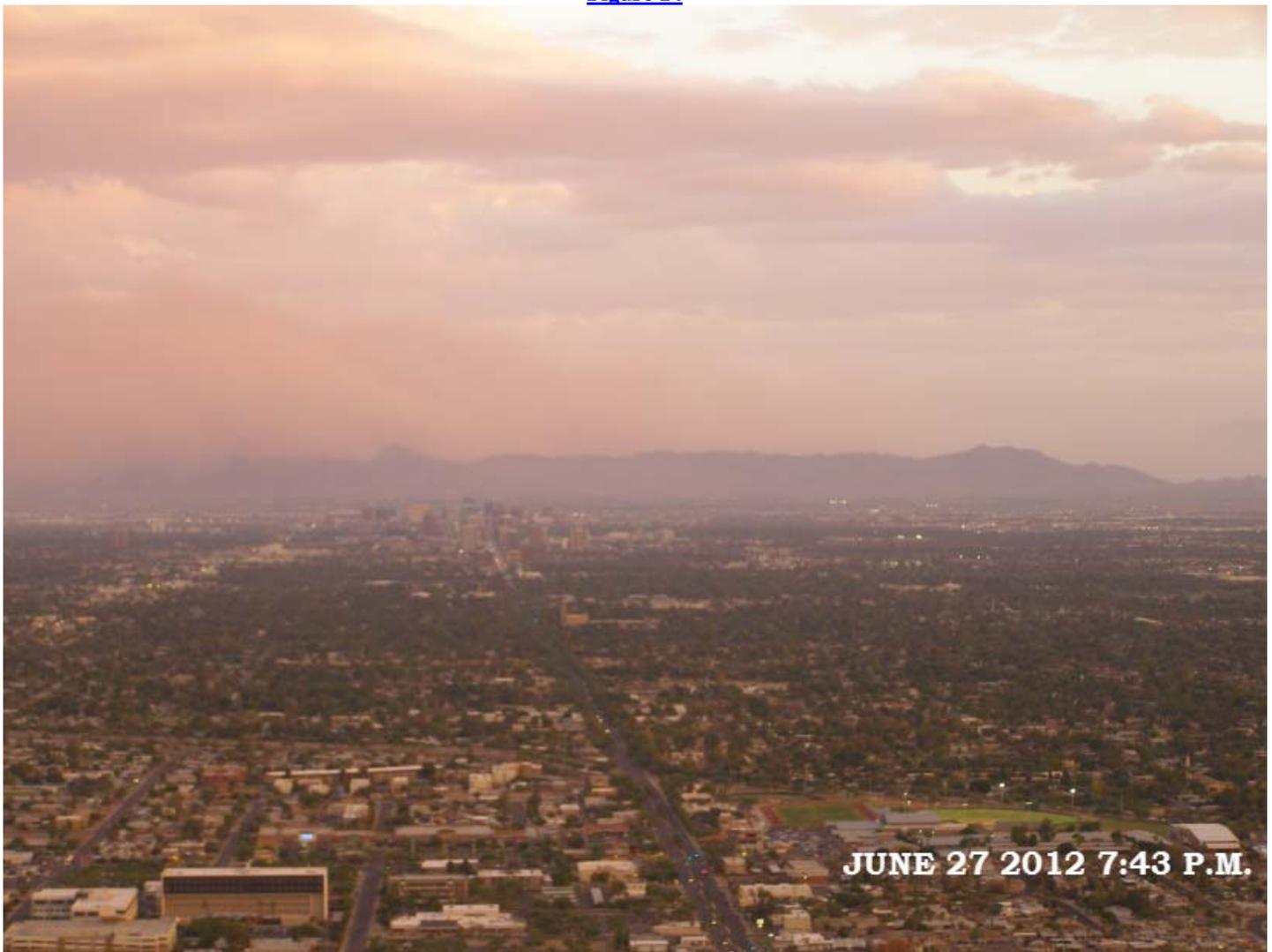


Figure 15



Figure 16



[Figure 17](#)

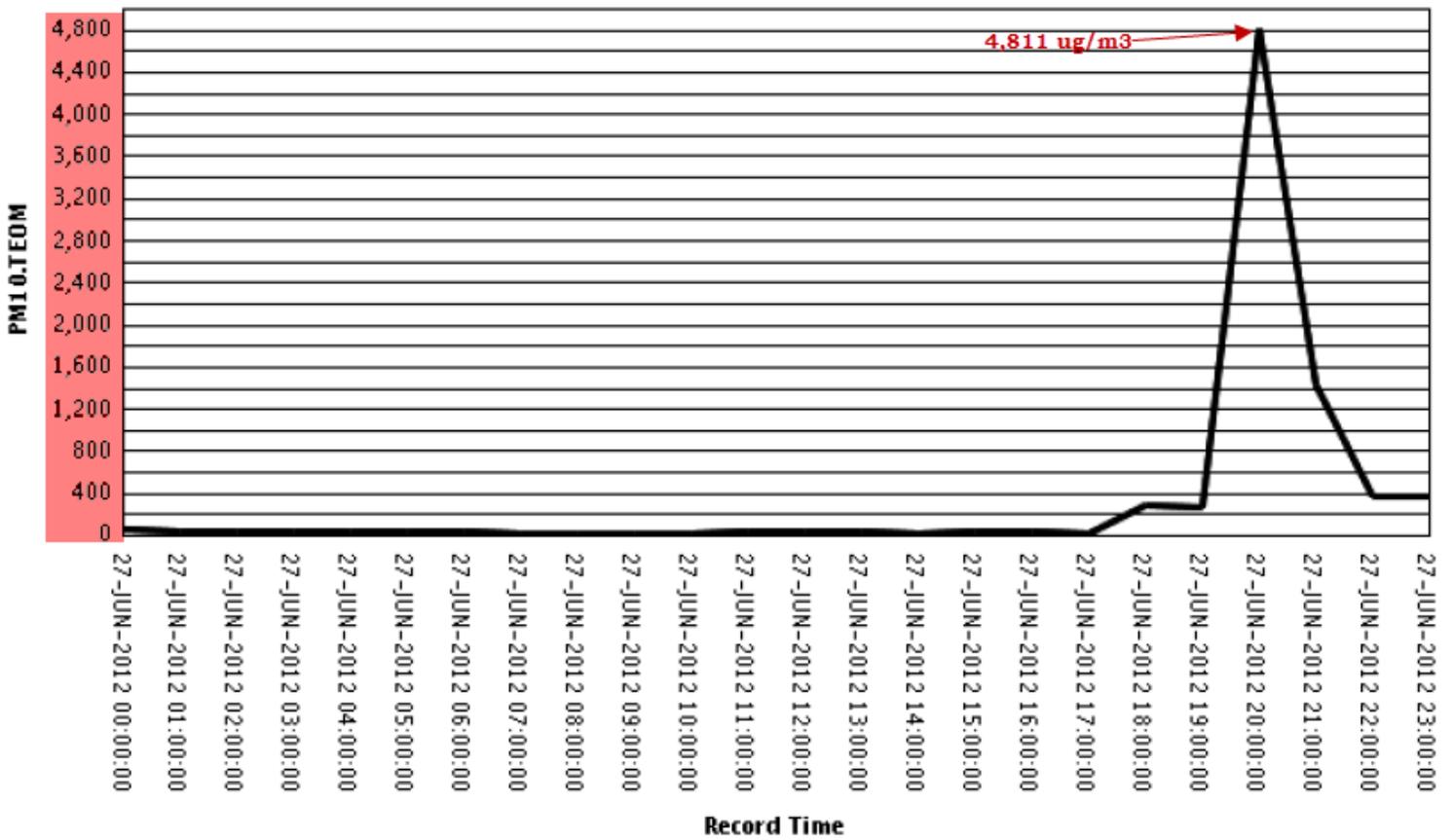


[Figure 18](#)



Figure 19

Name: CENTRAL PHOENIX



## DETAILED OZONE SECTION

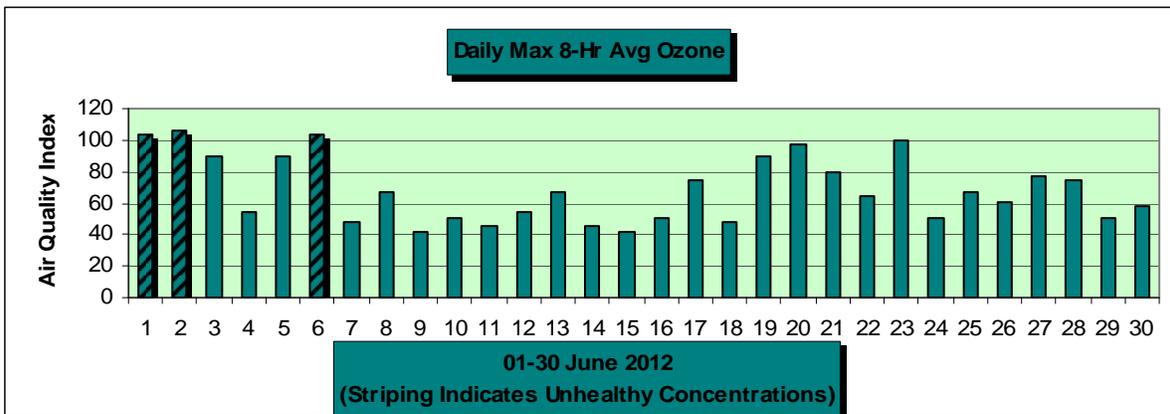
(Based on the 2008 EPA Revised 8-Hour Ozone Standard)

<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>

### SUMMARY OF MAXIMUM 8-HR OZONE AQI VALUES FOR JUNE 2012\*

\*Preliminary data

SUN		MON		TUES		WED		THU		FRI		SAT	
									1	<b>104</b>	2	<b>106</b>	
3	<b>90</b>	4	<b>54</b>	5	<b>90</b>	6	<b>104</b>	7	<b>48</b>	8	<b>67</b>	9	<b>42</b>
10	<b>51</b>	11	<b>45</b>	12	<b>54</b>	13	<b>67</b>	14	<b>45</b>	15	<b>42</b>	16	<b>51</b>
17	<b>74</b>	18	<b>48</b>	19	<b>90</b>	20	<b>97</b>	21	<b>80</b>	22	<b>64</b>	23	<b>100</b>
24	<b>50</b>	25	<b>67</b>	26	<b>61</b>	27	<b>77</b>	28	<b>74</b>	29	<b>50</b>	30	<b>58</b>



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<b>8-hr Ozone exceedance days in JUNE:</b>	Total= 3	<u>Date</u>	<u>Max ppb/AQI</u>	<u>Site/s</u>
		6/01	77/104	Humboldt Mtn.
			77/104	Tonto Nat'l Mon
		6/02	78/106	Humboldt Mtn.
			76/101	Cave Creek
		6/06	77/104	North Phoenix
			76/101	Humboldt Mtn.

**Total number of exceedance days since APR 01:** 17  
**Total number of exceedance sites since APR 01:** 65

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<b>Ozone Health Watches in JUNE:</b> (Forecast max value 72-75 ppb)	Total= 7	<u>Date</u>	<u>Max ppb/AQI</u>	<u>Site/s</u>
		6/04	61/54	Cave Creek
				Humboldt Mtn.
		6/06	77/104	North Phoenix
		6/18	57/48	Queen Valley
				Tonto Nat'l Mon
		6/19	72/90	Tonto Nat'l Mon
		6/20	74/97	Humboldt Mtn.
		6/21	69/80	Humboldt Mtn.
		6/25	65/67	Blue Point

**Ozone Health Watches since APR 01:** Total= 21

<b>High Pollution Advisories in JUNE:</b> (Forecast max value 76+ppb)	Total= 1	<u>Date</u>	<u>Max ppb/AQI</u>	<u>Site/s</u>
		6/01	77/104	Humboldt Mtn.
				Tonto Nat'l Mon

**High Pollution Advisories since APR 01:** Total= 4

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**Concentration Recap:**

Days in the <b>Good</b> category:	8
Days in the <b>Moderate</b> category:	19
Days in the <b>Unhealthy for Sensitive Groups</b> category:	3
Days in the <b>Unhealthy</b> category:	0
Total Forecast Days:	30

<b>Maximum 8-Hr value:</b>	<u>Date</u>	<u>Hour</u>	<u>Site</u>	<u>ppb/AQI</u>	<u>DOW</u>
	6/02	1100	Humboldt Mtn.	78/106	Sat

<b>Maximum 1-Hr value:</b>	<u>Date</u>	<u>Hour</u>	<u>Site</u>	<u>ppb/AQI</u>	<u>DOW</u>
	6/23	1400	North Phoenix	95/79	Sat

Average daily max 8-Hr concentration (ppb):	64.4
Deviation from the 1996-2011 average (ppb):	<b>-6.2</b>

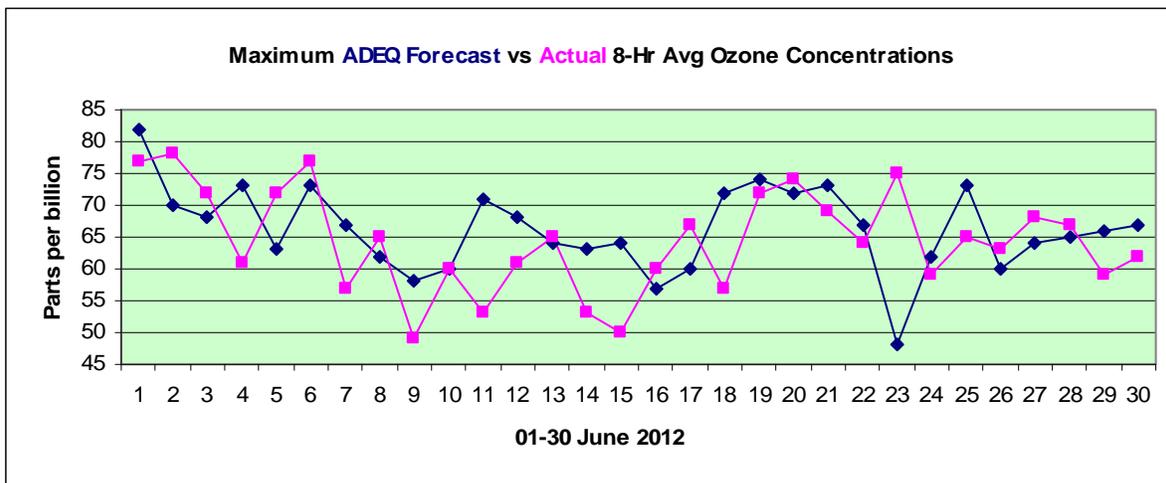
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**JUNE Climatology:**  
 (Period 1996-2007  
 using 1997 85ppb  
 standard & 2008-  
 2011 using 76ppb  
 standard)

Average number of 8-Hr exceedance days:	3.8
Maximum number of 8-Hr exceedance days:	10 in 2008
Minimum number of 8-Hr exceedance days:	0 in 2003, 2004, 2007
Average daily max 8-Hr concentration (ppb):	70.6
Record high max 8-Hr concentration (ppb):	102 on the 1st, 1996
Record low max 8-Hr concentration (ppb):	43 on the 9th, 2009

**Forecast Verification:**

# of days maximum concentrations were over-forecast:	16
# of days maximum concentrations were under-forecast:	12
# of days maximum concentrations were correctly forecast:	2
June average forecast accuracy (ppb):	+/-6.9
June average forecast bias (ppb):	+1.9



**Narrative:** After being above normal thru the first two months of the season, Valley ozone levels dropped off significantly during June – down nearly 8 parts per billion from those of May using the average daily maximum concentration. There were only three exceedance days during June 2012 versus 11 days in May 2012 and only six site exceedances during June 2012 versus 56 in May 2012. There were also eight days during June with highest ozone levels in the good range of the Air Quality Index – a fairly high number. Each day during the month Sky Harbor Airport in Phoenix recorded afternoon highs of 100 degrees F or higher so much below-average temperatures do not appear to be the reason for lower ozone production. Rainfall was recorded on only two days late in the month and considerable cloud cover was rare. The one obvious factor supporting lower ozone levels were persistent westerly upslope/gradient winds during the afternoon hours. When not laden with additional ozone and/or its precursors from upstream sources, this type of wind regime commonly results in much lower ozone levels than would be expected under the prevailing hot and sunny weather conditions. The reason for this appears to be its capacity to keep the Valley ozone plume from accumulating while also ushering in air with its source region over the large unpopulated desert areas to the west and southwest of the metro area. Such areas typically have very low ambient ozone precursor levels. –Reith