



MONTHLY AIR QUALITY REPORT FOR
JULY 2011

AOI COLOR SCALE

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

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

*Preliminary data

SAMPLE POLLUTANT REPORTING BOX

1 (day of month)	O3	CO
	PM10	PM2.5

SUN		MON		TUES		WED		THU		FRI		SAT								
										1	80	07	2	58	13					
											48	40								
3	54	06	4	122	05	5	93	06	6	111	05	7	101	05	8	104	06	9	77	06
	244	97		122	42		212	151		99	52		157	67		93	91		97	44
10	80	05	11	48	06	12	50	05	13	41	05	14	43	05	15	80	08	16	87	09
	56	38		33	37		27	26		27	18		44	27		43	27		35	30
17	71	06	18	84	06	19	100	06	20	54	06	21	77	06	22	67	06	23	49	05
	76	36		169	102		60	36		93	65		70	53		44	33		58	35
24	47	05	25	74	07	26	43	09	27	45	03	28	50	05	29	93	06	30	100	07
	48	30		21	24		23	22		24	14		30	15		31	21		33	28
31	90	05																		
	63	29																		

Calendar of High Pollution Advisories and Health Watches issued during July 2011

SUN	MON	TUE	WED	THU	FRI	SAT
					1	2
					F	C
3	4	5	6	7	8	9
			F			
10	11	12	13	14	15	16
						F
17	18	19	20	21	22	23
F	F					
24	25	26	27	28	29	30
	F					
31						

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 July 2011

SUN	MON	TUE	WED	THU	FRI	SAT
					1	2
						D
3	4	5	6	7	8	9
A B D	A B D	A B D	D E	D E	D E	A B D
10	11	12	13	14	15	16
A B D	A B C D					
17	18	19	20	21	22	23
D	B D		D			D
24	25	26	27	28	29	30
A B C D	A B			D	D	A B D
31						

LEGEND

ELECTROMETEORS
A = Thunderstorm

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

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

Non-Ozone Exceedance days during JUL 2011-

Total=	<u>Date</u>	<u>Max AQI</u>	<u>Pollutant</u>	<u>Site/s</u>
5	7/03	244	PM-10	Buckeye
		163	PM-10	Central Phoenix
		163	PM-10	South Phoenix
		162	PM-10	Durango
		153	PM-10	Zuni Hills
		150	PM-10	Greenwood
		148	PM-10	West Forty Third
		145	PM-10	West Phoenix
		144	PM-10	Glendale
		143	PM-10	Dysart
		138	PM-10	Phx Supersite
		123	PM-10	West Chandler
		121	PM-10	Higley
	7/04	122	PM-10	Higley
	7/05	212	PM-10	Higley
		208	PM-10	West Chandler
		189	PM-10	Phx Supersite
		162	PM-10	Central Phoenix
		157	PM-10	West Phoenix
		133	PM-10	Dysart
		120	PM-10	South Phoenix
		107	PM-10	Glendale
		105	PM-10	Buckeye
		101	PM-10	Durango
		101	PM-10	Greenwood
		151	PM-2.5	South Phoenix
		143	PM-2.5	Durango
		133	PM-2.5	Phx Supersite
		128	PM-2.5	Vehicle Emissions Lab
		105	PM-2.5	Glendale
		102	PM-2.5	West Phoenix
	7/07	157	PM-10	Higley
		126	PM-10	West Chandler
	7/18	169	PM-10	South Phoenix
		157	PM-10	Durango
		146	PM-10	West Forty Third
		129	PM-10	Central Phoenix
		128	PM-10	Greenwood
		121	PM-10	Buckeye
		105	PM-10	Dysart
		101	PM-10	West Phoenix
		102	PM-2.5	Durango

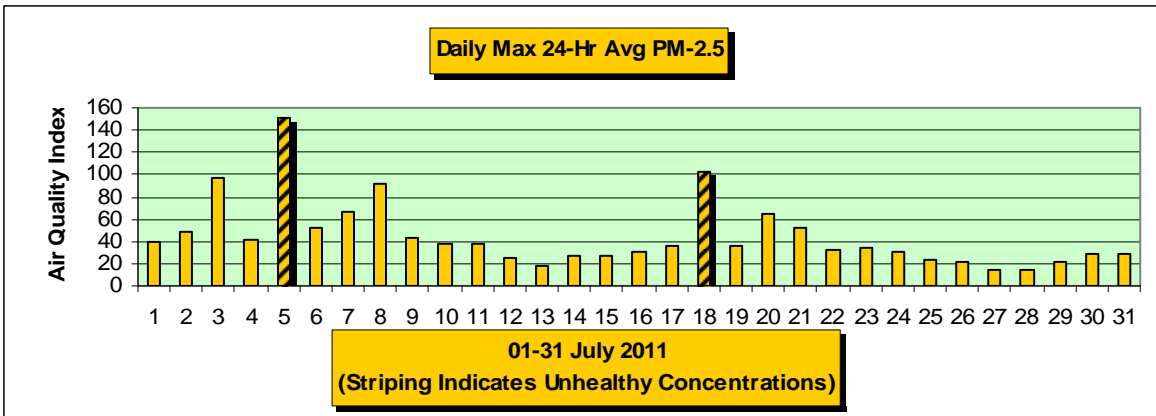
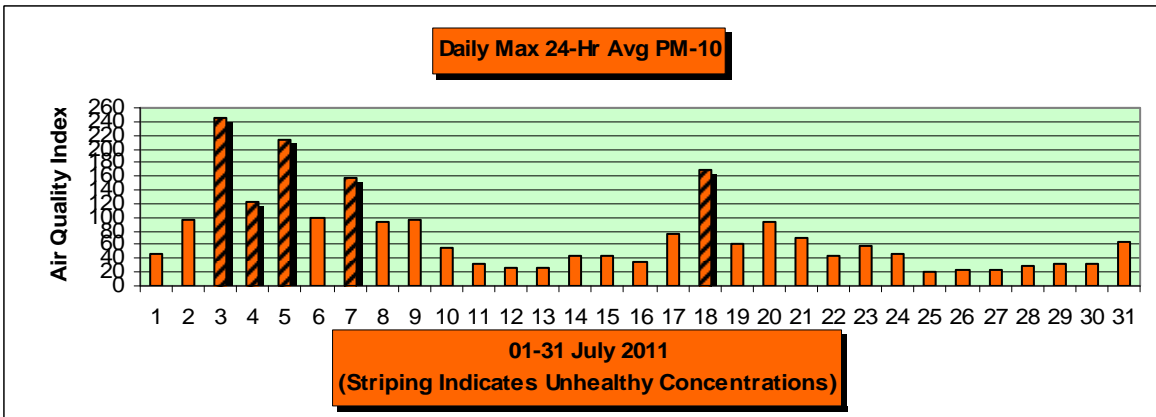
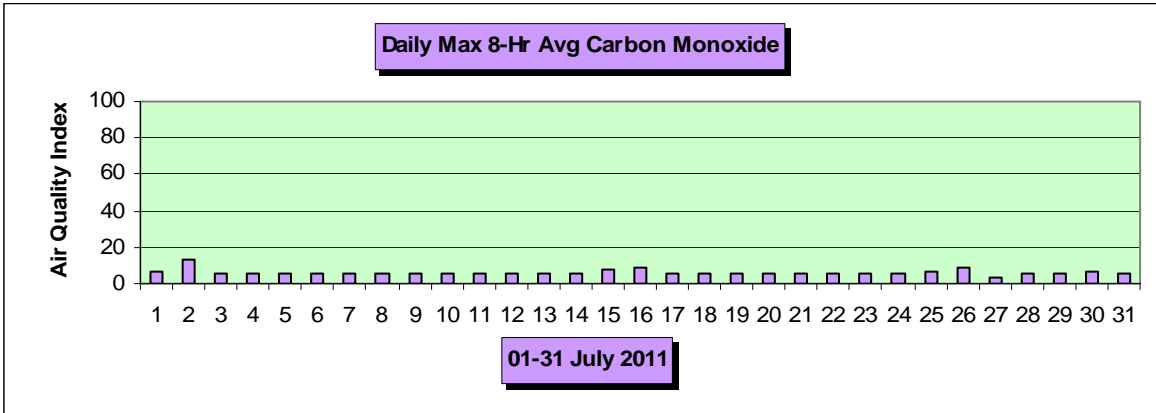
Non-Ozone Health Watches issued during JUL 2011-

Total= 0 Date Max AQI Pollutant Site/s

Non-Ozone High Pollution Advisories issued during JUL 2011-

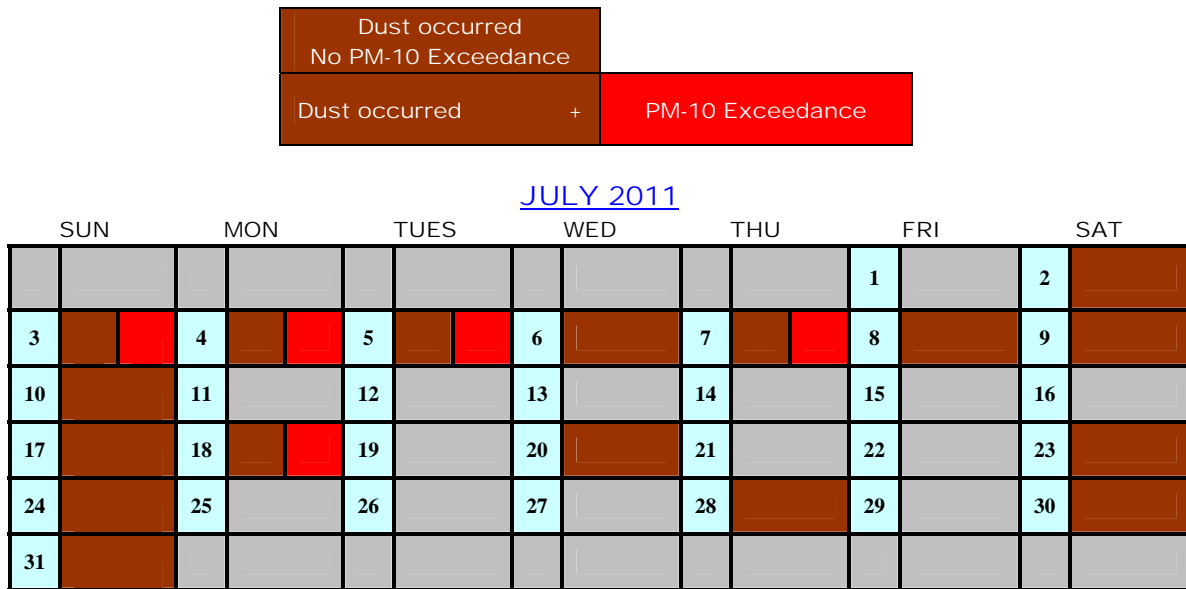
Total= 0 Date Max AQI Pollutant Site/s

Concentration Recap: Days in the **Good** category: **8**
Days in the **Moderate** category: **16**
Days in the **Unhealthy for Sensitive Groups** category: **3**
Days in the **Unhealthy** category: **2**
Days in the **Very Unhealthy** category: **2**
Total Forecast Days: **31**



Narrative: July, August, and September 2011 may forever be remembered in the Phoenix metro area as the “Summer of Dust”. As [Figure 1](#) below shows, during July 2011 there were 17 days during which blowing or suspended dust was reported. On five of these days PM-10 (coarse particle) exceedances occurred and on two of those days unhealthy levels of PM-2.5 (fine particle) were also measured. The severity of these dust events can not be understated; during the five days (3rd thru 5th, 7th, and 18th) **42** site exceedances occurred between the two pollutants.

Figure 1



The origins of the dust began with a very dry spring season with only four local rainfall events during the months of April, May and June, record heat during late June, and lots of open and disturbed desert areas and farm fields southeast and south of the Phoenix metro area. The weather pattern also played a significant role in that the summer monsoon circulation pattern during July featured the sub-tropical high in a position that favored easterly, southeasterly, or southerly thunderstorm steering winds. Downdrafts from desert thunderstorms can reach in excess of 50 mph and depending on the trajectory, this velocity can be enhanced or sustained by the forward speed of the outflow boundary. On several occasions during July sizeable clusters of thunderstorms propagated toward the Valley over said dirt-laden areas and in the process generated large columns of dense blowing dust that were carried over the metro area. By far the most severe of the dust events occurred on the 5th as this excerpt from the National Weather Service Office suggests:

Major Dust Storm Moves Through Arizona
Updated: 3:30 PM July 7, 2011

A very large and historic dust storm moved through a large swath of Arizona during the late afternoon and evening hours of July 5, 2011. Widespread reports of near zero visibility and winds gusting over 50 MPH (80 kph) were received by the NWS Phoenix office. Based on radar data, it is estimated that this dust storm reached a peak height of at least 5000 to 6000 ft (1500 to 1800 m). The aerial coverage was very expansive, with the leading edge stretching for almost 100 mi (160 km). The distance traveled was at least 150 mi (240 km).

On the following pages are photographs ([Figures 2-11](#)) from various sources showing the July 5 dust wall during its path toward and over the greater Phoenix area:

[Figure 2](#)



[Figure 3](#)



[Figure 4](#)



[Figure 5](#)



[Figure 6](#)



[Figure 7](#)

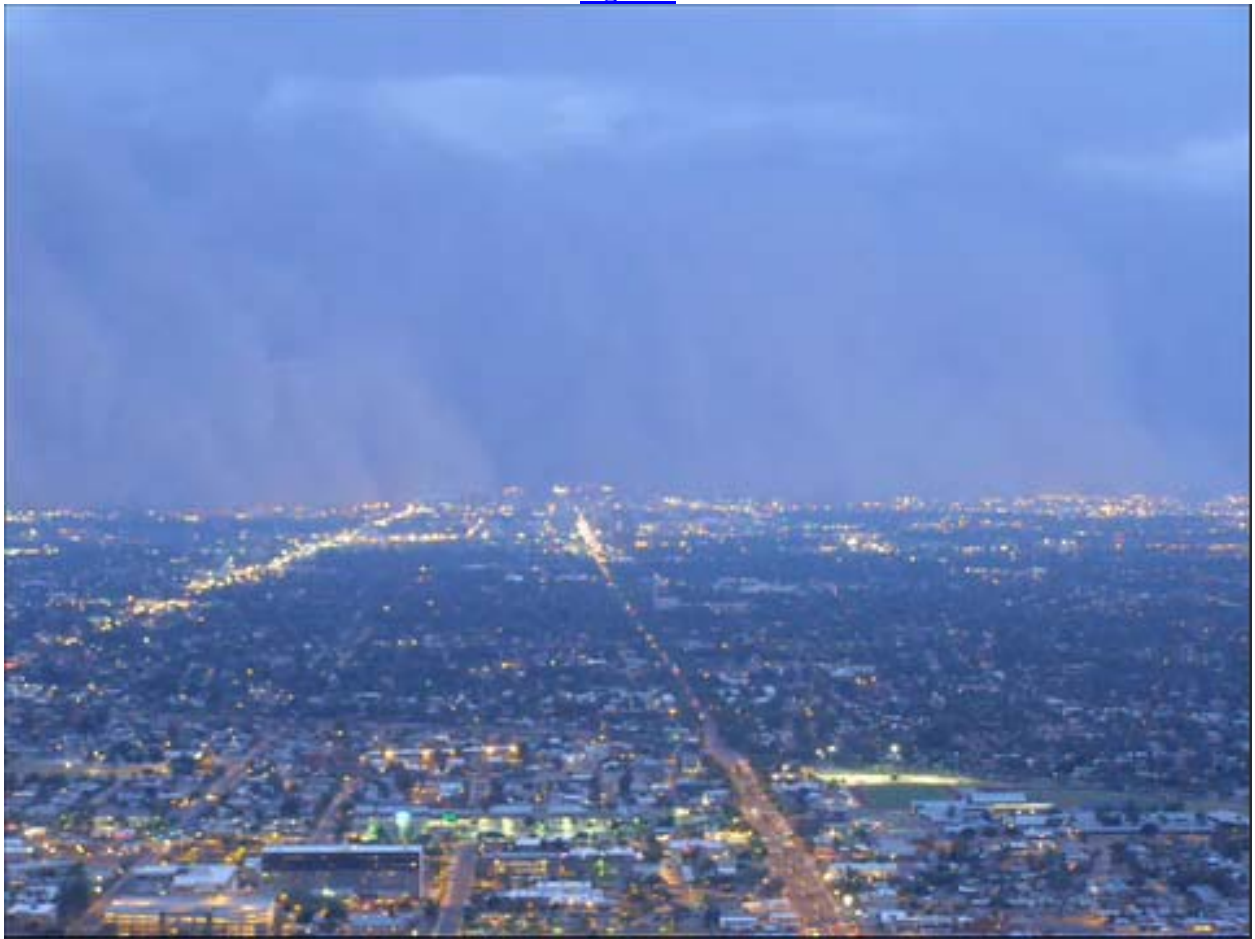


Figure 8



Figure 9



[Figure 10](#)



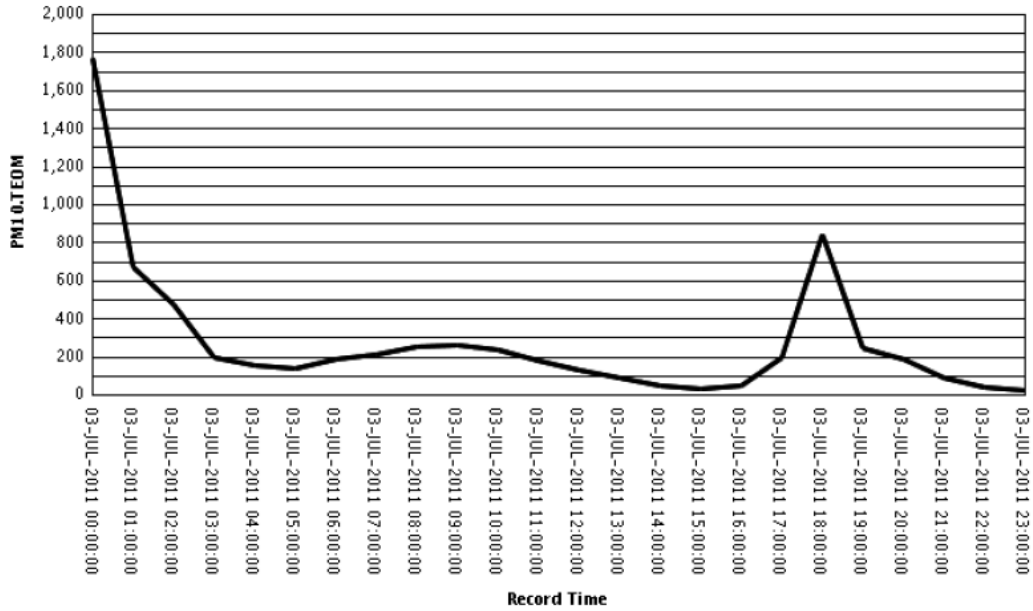
[Figure 11](#)



Obviously, this type of event can impose significant health impacts on the at-risk population, especially given the incredibly high volumes of dust. Despite spotty daily rainfall totals of up to 3/4" between the 3rd and the 5th and additional daily rainfall totals of up to 0.98" between the 9th and the 11th, highest hourly PM-10 concentrations during the July 3 episode still reached 1,771ug/m3 at the Central Phoenix monitoring site, on July 5 hit 6,348ug/m3 at Phoenix Supersite, and for the July 18 episode peaked at 2,861ug/m3 at the South Phoenix monitoring site. All of these are located within the most highly populated areas of the city. [Figures 12-14](#) are the PM-10 time-series graphs for the above-mentioned sites:

[Figure 12](#)

Name: CENTRAL PHOENIX



[Figure 13](#)

Name: JLG SUPERSITE

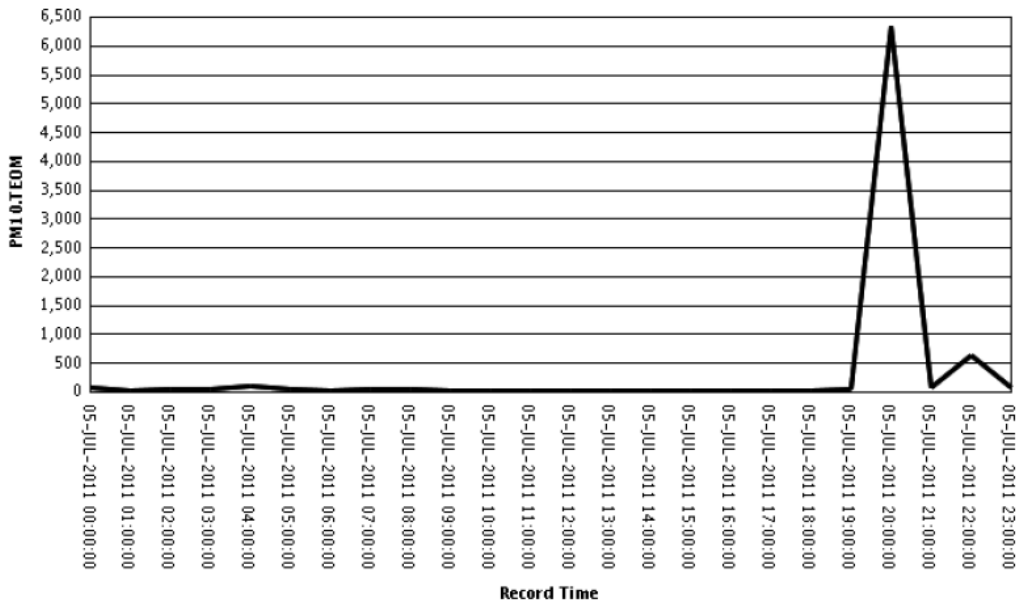
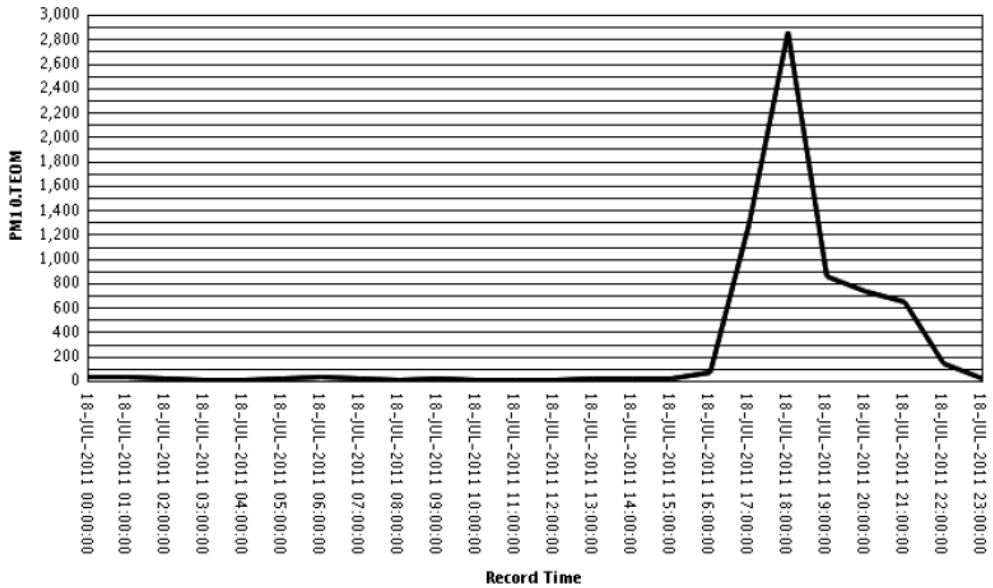


Figure 14

Name: SOUTH PHOENIX



Highest local wind gusts on these three days were 45 mph on the 3rd, 58 mph on the 5th, and 45 mph on the 18th and Valley airport visibilities dropped to as low as 3/4 mile on the 3rd, 1/16 mile on the 5th, and 1/4 mile on the 18th. The impacts from the July 5 event were unusually long-lived in that so much loose soil was deposited over the metro area that highest PM-10 levels nearly exceeded the health standard on the 6th and 8th and did exceed on the 7th. This was the case merely due to residual suspended dust as well as vehicular traffic and other activities causing the dirt deposits to again become airborne. Figure 15 is an image from the local VISNET camera array showing how poor the visibility was during the morning of the 7th. -Reith

Figure 15



DETAILED OZONE SECTION

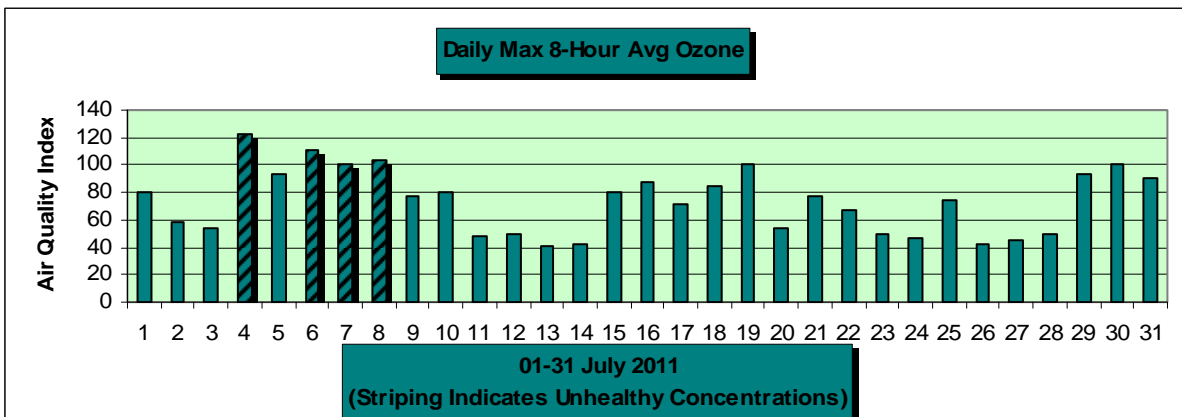
(Based on the 2008 EPA Revised 8-Hour Ozone Standard)

GOOD 0-50	MODERATE 51-100	UNHEALTHY FOR SENSITIVE GROUPS 101-150	UNHEALTHY 151-200
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SUMMARY OF MAXIMUM 8-HR OZONE AQI VALUES FOR JULY 2011*

*Preliminary data

SUN		MON		TUES		WED		THU		FRI		SAT	
										1	80	2	58
3	54	4	122	5	93	6	111	7	101	8	104	9	77
10	80	11	48	12	50	13	41	14	43	15	80	16	87
17	71	18	84	19	100	20	54	21	77	22	67	23	49
24	47	25	74	26	43	27	45	28	50	29	93	30	100
31	90												



<u>8-hr Ozone exceedance days in JUL:</u>	Total= 4	<u>Date</u>	<u>Max ppb/AQI</u>	<u>Site/s</u>
		7/04	84/122	Rio Verde
		7/06	80/111	Queen Valley
		7/07	76/101	Queen Valley
		7/08	77/104	Fountain Hills
			77/104	North Phoenix
			76/101	Phx Supersite

Total number of exceedance days since APR 01: 16
Total number of exceedance sites since APR 01: 69

<u>Ozone Health Watches in JUL:</u> (Forecast max value 72-75 ppb)	Total= 6	<u>Date</u>	<u>Max ppb/AQI</u>	<u>Site/s</u>
		7/01	69/80	Blue Point
			69/80	Fountain Hills
		7/06	80/111	Queen Valley
		7/16	71/87	Tonto Nat'l Mon
		7/17	66/71	Blue Point
				Phx Supersite
				North Phoenix
				Rio Verde
				Tonto Nat'l Mon
		7/18	70/84	Glendale
		7/25	67/74	Pinnacle Peak

Ozone Health Watches since APR 01: Total= 20

<u>High Pollution Advisories in JUL:</u> (Forecast max value 76+ppb)	Total= 1	<u>Date</u>	<u>Max ppb/AQI</u>	<u>Site/s</u>
		7/02	62/58	Glendale Humboldt Mtn.

High Pollution Advisories since APR 01: Total= 9

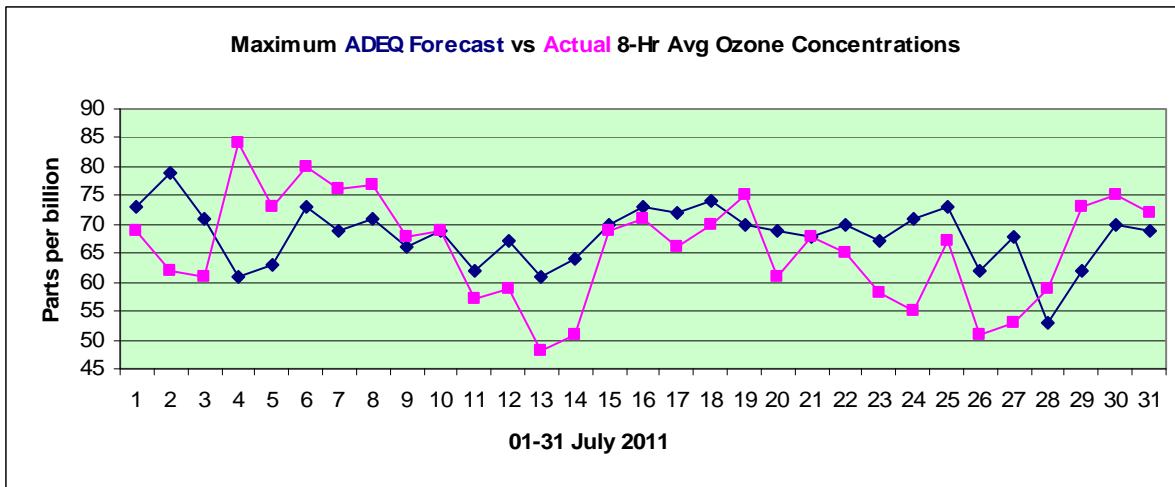
<u>Concentration Recap:</u>	Days in the Good category:	9			
	Days in the Moderate category:	18			
	Days in the Unhealthy for Sensitive Groups category:	4			
	Days in the Unhealthy category:	<u>0</u>			
	Total Forecast Days:	31			
Maximum 8-Hr value:	<u>Date</u>	<u>Hour</u>	<u>Site</u>	<u>ppb/AQI</u>	<u>DOW</u>
	7/04	0800	Rio Verde	84/122	Mon
Maximum 1-Hr value:	<u>Date</u>	<u>Hour</u>	<u>Site</u>	<u>ppb/AQI</u>	<u>DOW</u>
	7/09	1000	Rio Verde	101/84	Mon
	Average daily max 8-Hr concentration (ppb):	65.9			
	Deviation from the 1996-2010 average (ppb):	-5.0			

JUL Climatology:
(Period 1996-2007 using 1997 85ppb standard & 2008-2010 using 76ppb standard)

Average number of 8-Hr exceedance days: 3.9
 Maximum number of 8-Hr exceedance days: 10 in 1996
 Minimum number of 8-Hr exceedance days: 0 in 1997, 1999, 2007
 Average daily max 8-Hr concentration (ppb): 70.9
 Record high max 8-Hr concentration (ppb): 107 on the 9th, 2002
 Record low max 8-Hr concentration (ppb): 40 on the 29th, 1997

Forecast Verification:

of days maximum concentrations were over-forecast: 18
 # of days maximum concentrations were under-forecast: 11
 # of days maximum concentrations were correctly forecast: 2
 Jul average forecast accuracy (ppb): +/-7.7
 Jul average forecast bias (ppb): +3.2



Narrative:

From an air pollution point of view, the period of July 2-9 2011 was likely one of the worst in the Phoenix metro area in recent history. Figure 16 shows that not only did Valley residents have to contend with high to unhealthy particle pollutant levels due to dust storms, but local ozone levels were also a health issue at times.

Figure 16

DATE	O3 AOI	PM-10 AOI	PM-2.5 AOI
2-Jul-11	58	97	49
3-Jul-11	54	244	97
4-Jul-11	122	122	42
5-Jul-11	93	212	151
6-Jul-11	111	99	52
7-Jul-11	101	157	67
8-Jul-11	104	93	91
9-Jul-11	77	97	44

Unlike the month of June 2011, high ozone levels during July 2011 were not contributed to by low-level winds capable of importing additional ozone and its precursors from the west. During the summer monsoon period exceedances of the ozone health standard typically occur due to a combination of accumulation due to the prevailing wind component and efficient production due to hot daytime temperatures, a high sun angle, and long day-length. –Reith