



MONTHLY AIR QUALITY REPORT FOR DECEMBER 2012

AQI 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 December 2012*

*Preliminary data

SAMPLE POLLUTANT REPORTING BOX

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

SUN			MON			TUES			WED			THU			FRI			SAT		
																		1	40	17
																			55	77
2	42	20	3	40	15	4	38	18	5	41	23	6	41	25	7	40	25	8	41	23
	53	79		58	66		60	68		65	104		72	73		68	89		67	85
9	39	27	10	41	10	11	37	16	12	41	24	13	40	16	14	36	07	15	36	07
	68	81		48	47		58	66		59	69		65	56		10	43		07	42
16	36	11	17	37	16	18	36	15	19	34	09	20	42	15	21	42	25	22	39	26
	16	59		31	82		31	75		16	29		30	50		44	62		51	79
23	42	27	24	41	18	25	40	15	26	40	16	27	38	18	28	36	16	29	38	16
	51	115		51	129		24	67		37	77		39	76		36	79		35	80
30	37	16	31	36	10															
	31	74		31	92															

Calendar of High Pollution Advisories and Health Watches issued during December 2012

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

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 December 2012

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

LEGEND

ELECTROMETEORS

A = Thunderstorm

HYDROMETEORS

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

LITHOMETEORS

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

Exceedance days during DEC 2012-

Total= 3	<u>Date</u>	<u>Max AQI</u>	<u>Pollutant</u>	<u>Site/s</u>
	12/05	104	PM-2.5	Durango
	12/23	115	PM-2.5	West Phoenix
	12/24	129	PM-2.5	South Phoenix
		118	PM-2.5	West Phoenix

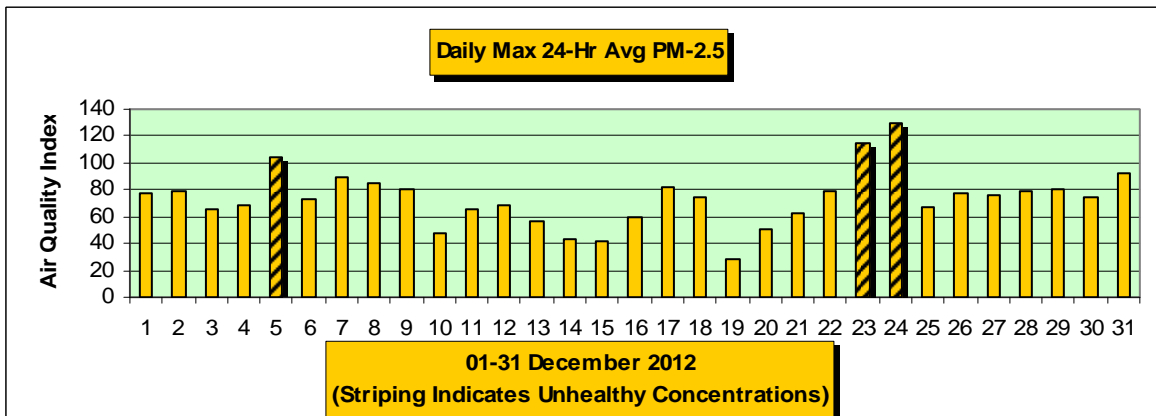
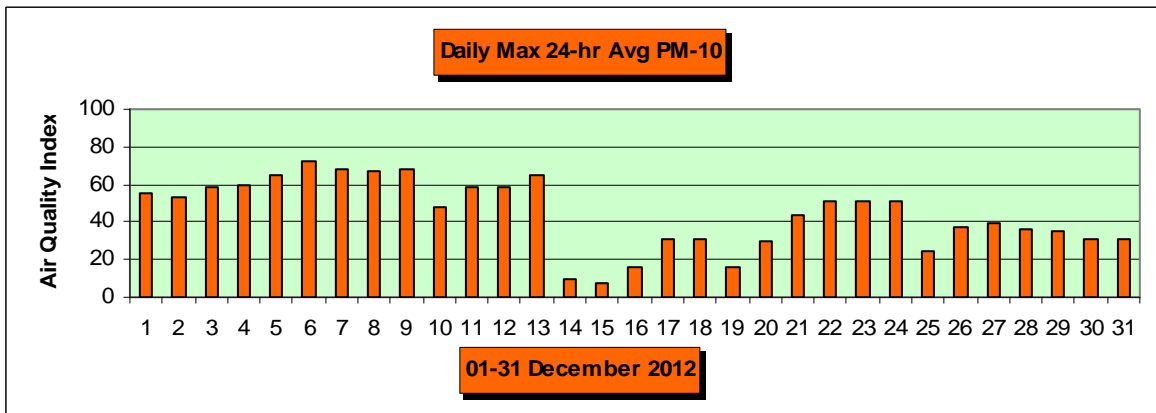
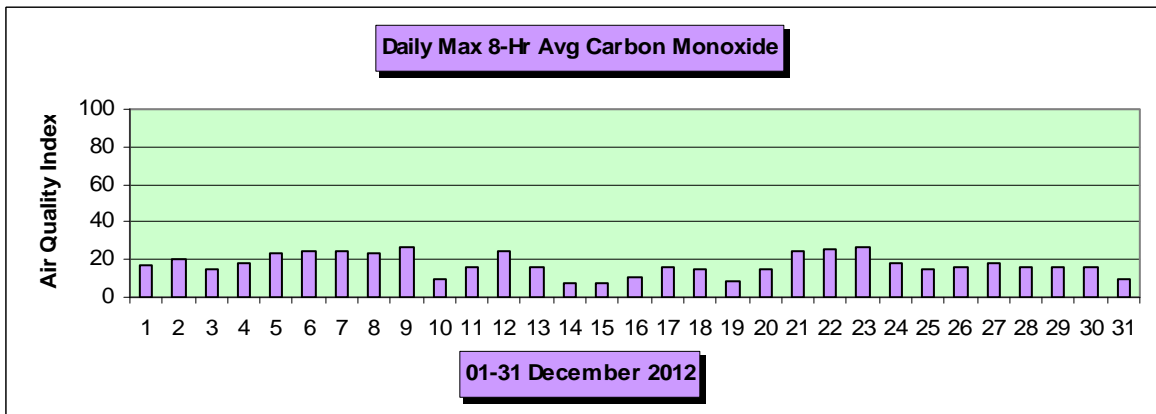
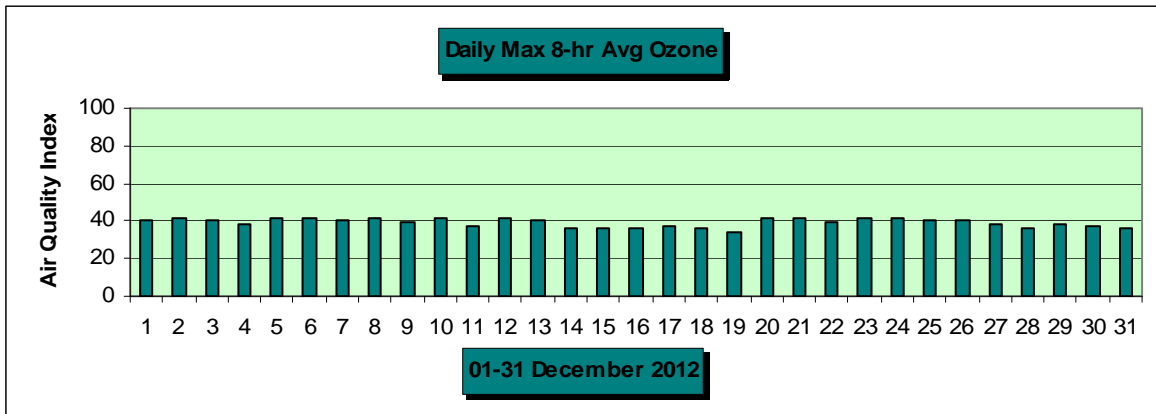
Health Watches issued during DEC 2012-

Total= 5	<u>Date</u>	<u>Max AQI</u>	<u>Pollutant</u>	<u>Site/s</u>
	12/11	66	PM-2.5	West Phoenix
	12/21	62	PM-2.5	West Phoenix
	12/22	79	PM-2.5	West Phoenix
	12/23	115	PM-2.5	West Phoenix
	12/31	92	PM-2.5	West Phoenix

High Pollution Advisories issued during DEC 2012-

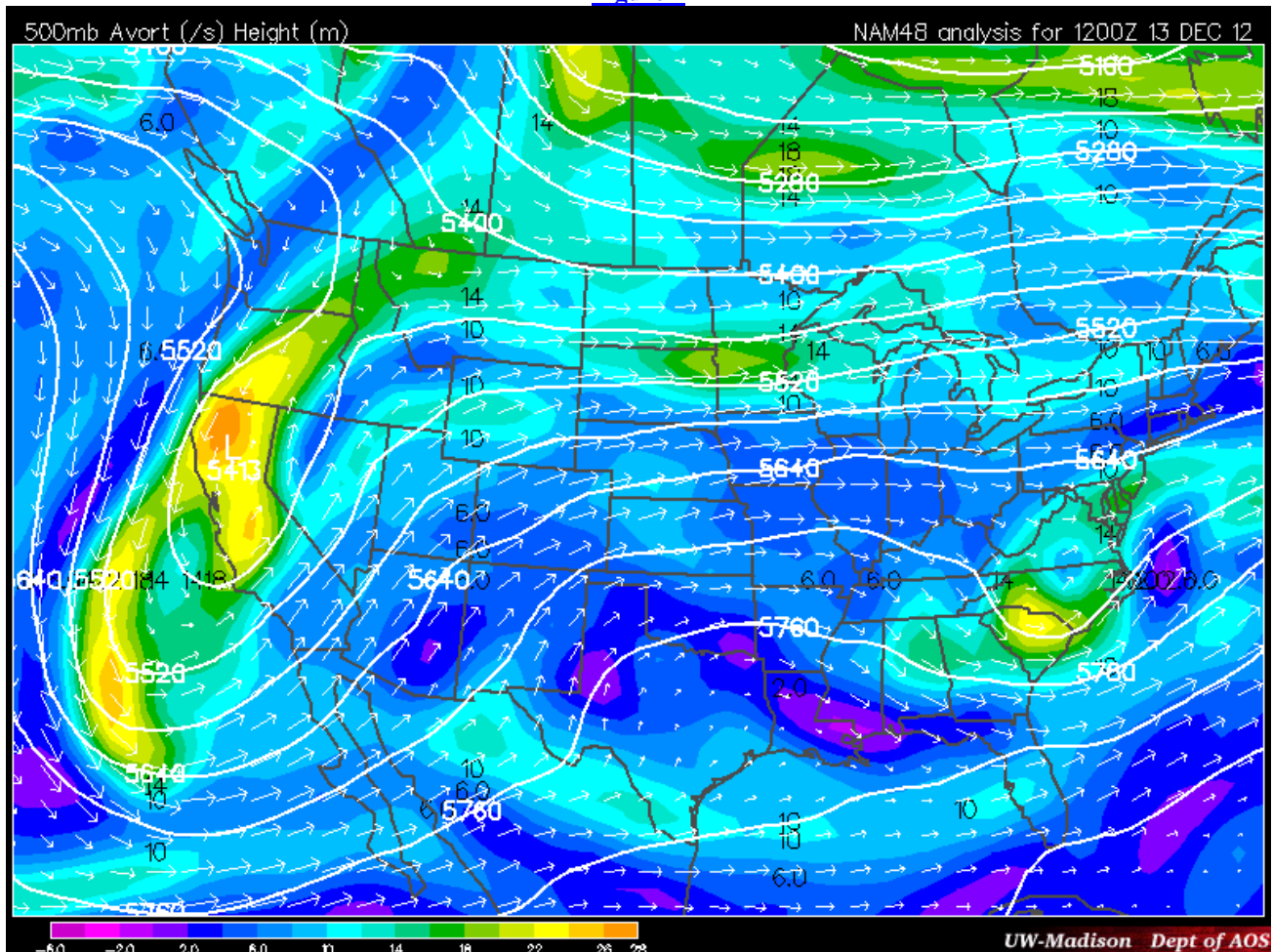
Total= 2	<u>Date</u>	<u>Max AQI</u>	<u>Pollutant</u>	<u>Site/s</u>
	12/24	129	PM-2.5	South Phoenix
	12/25	67	PM-2.5	West Phoenix

<u>Concentration Recap:</u>	Days in the Good category:	5
	Days in the Moderate category:	23
	Days in the Unhealthy for Sensitive Groups category:	3
	Days in the Unhealthy category:	0
	Days in the Very Unhealthy category:	0
	Days in the Hazardous category:	0
	Total Forecast Days:	31



Narrative: The synoptic weather pattern over Arizona during the first week of December 2012 consisted of a ridge aloft that was not particularly strong but nonetheless contributed to a very stagnant air mass over the Valley due to warm air aloft, overnight inversion formation, and a lengthy mostly light or calm wind regime. Phoenix Sky Harbor Airport reported a record maximum temperature of 82 degrees F on the 5th. Highest PM-10 (coarse) and PM-2.5 (fine) particle concentrations during the period were elevated to high and on the 5th a PM-2.5 exceedance occurred at the Durango monitoring site. It should be noted that since 2005 local PM-2.5 concentrations during the month of December have been enhanced due to smoke from recreational wood burning. This situation tends to become acute close to the holidays – as will be shown later in this report. Late in the day on the 9th an upper level trough and dry surface cold front managed to penetrate the ridge as they passed by mainly to the north of Arizona. Northwest to northeasterly gradient winds gusted up to 36 mph between 7:00 and 11:00 p.m. and blowing dust was reported that briefly lowered the visibility at Deer Valley Airport to four miles. A stagnant air mass then re-developed over the metro area and lasted thru the 12th. On the 13th a significant weather pattern change occurred as a major short-wave trough and surface cold front in the mid-latitude storm track approached from the northwest (see [Figure 1](#) below).

Figure 1



This system appeared so strong that the National Weather Service issued several statements regarding its potential impacts as seen on the following page.

Hazardous Weather Outlook

HAZARDOUS WEATHER OUTLOOK...UPDATED
NATIONAL WEATHER SERVICE PHOENIX AZ
620 AM MST THU DEC 13 2012

NORTHWEST MARICOPA COUNTY-GREATER PHOENIX AREA-
SOUTHWEST MARICOPA COUNTY-NORTHWEST AND NORTH CENTRAL PINAL COUNTY-
620 AM MST THU DEC 13 2012

WINDS WILL INCREASE TODAY AHEAD OF A LOW PRESSURE SYSTEM MOVING
THROUGH SOUTHERN CALIFORNIA. WIND GUSTS MAY REACH 35 MPH IN SPOTS
THIS AFTERNOON AND EVENING...PARTICULARLY ACROSS SOUTHERN ARIZONA
BETWEEN YUMA AND GILA BEND. WINDS THIS STRONG HAVE TO THE POTENTIAL
TO PRODUCE LOCALIZED AREAS OF BLOWING DUST AND LOCALLY REDUCED
VISIBILITIES.

THERE IS ALSO A SLIGHT CHANCE OF THUNDERSTORMS THIS EVENING. THE
STRONGEST STORMS WILL BE CAPABLE OF PRODUCING WIND GUSTS TO 45 MPH
AND SMALL HAIL.

Special Weather Statement

SPECIAL WEATHER STATEMENT
NATIONAL WEATHER SERVICE PHOENIX AZ
105 PM MST THU DEC 13 2012

PINAL AZ-MARICOPA AZ-
105 PM MST THU DEC 13 2012

...SIGNIFICANT WEATHER ADVISORY...

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

UNTIL 230 PM MST.

AT 1256 PM MST...NATIONAL WEATHER SERVICE METEOROLOGISTS DETECTED
AREAS OF BLOWING DUST OVER PORTIONS OF PINAL AND MARICOPA COUNTY.
REDUCED VISIBILITIES CAN BE EXPECTED OVER A BROAD AREA WITH
LOCALIZED SPOTS DROPPING BELOW 1 MILE.

MOTORISTS SHOULD BE PREPARED FOR HAZARDOUS DRIVING
CONDITIONS...ESPECIALLY NEAR AGRICULTURAL AREAS...DUE TO
SUDDENLY REDUCED VISIBILITIES. ROADWAYS THAT WILL BE AFFECTED
INCLUDE...BUT ARE NOT LIMITED TO...INTERSTATE 10...INTERSTATE
8...HIGHWAY 347...THE HUNT HIGHWAY...HIGHWAY 238...AND HIGHWAY 85.

In fact, the local impacts from this disturbance were felt from the 13th thru the 15th and included thunderstorms, heavy rainfall, and fog. Unfortunately, prior to the onset of precipitation south to southwesterly wind gusts of up to 31 mph generated a significant dust event over the Phoenix area. The dust only lasted for a few hours, but managed to cause several high PM-10 concentration spikes at local monitors such as the one at South Mountain which can be seen [Figure 2](#). Even so, due to follow-up rainfall 24-hour average concentrations were only in the low-moderate range of the Air Quality Index. The blowing dust was also on full visual display as shown in [Figures 3-7](#) which are images from the Valley VISNET camera array.

Figure 2

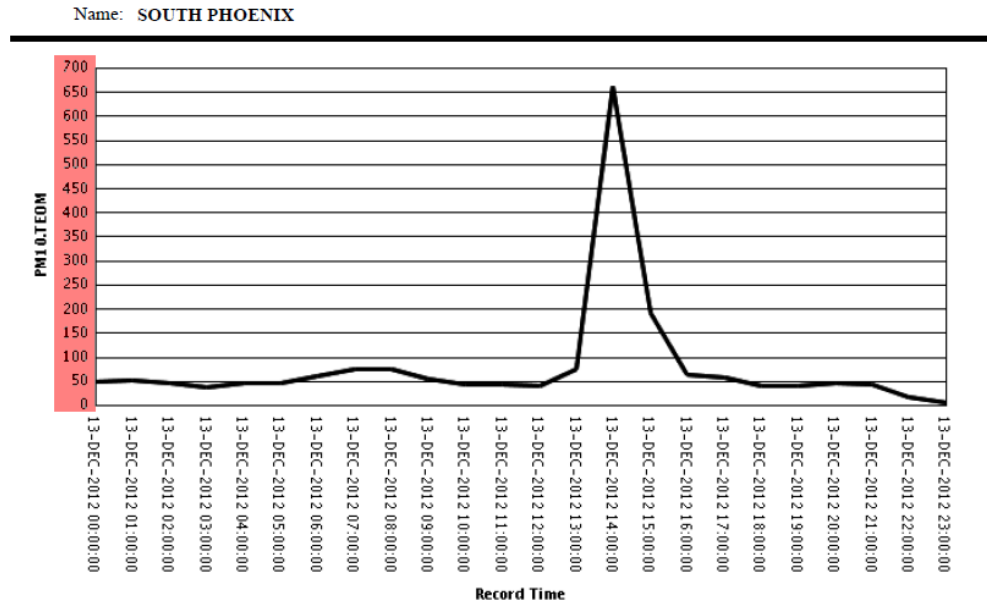


Figure 3



[Figure 4](#)



[Figure 5](#)



[Figure 6](#)



[Figure 7](#)



The rainfall provided by this and three much weaker disturbances by month's end helped to keep highest PM-10 levels in or near the good range of the AQI during the remainder of the month with no additional blowing dust. Unfortunately, the same can not be said of local PM-2.5 levels which are capable of rising rapidly and dramatically even after precipitation events. An exacerbating factor locally is large volumes of smoke from the aforementioned recreational wood burning that has become a seasonal concern in the metro area over the past few years. A ridge aloft arrived over the area by the 20th and dispersion characteristics were either marginal or fair on most days thru the 31st. Armed with the latest PM-2.5 climatology and seeing that the atmosphere was becoming more stable and stagnant, ADEQ forecasters issued a series of PM-2.5 Health Watches and High Pollution Advisories between the 21st and the 25th and again on the 31st that also automatically triggered Maricopa County No-Burn Day declarations. These steps were taken to try to avoid additional unhealthy air quality episodes that have become nearly inevitable during the holidays. Despite these efforts PM-2.5 exceedances occurred on both the 23rd and 24th with AQI values on the 24th well into the Unhealthy for Sensitive Groups range. Figures 8-12 show the visual impacts of smoke that were over the metro area on Christmas Eve Day and Figure 13 is the December 24 PM-2.5 time-series graph for the South Phoenix monitoring site where an hourly concentration of 280.8ug/m³ was recorded at 11:00 p.m.

Figure 8



Figure 9



Figure 10



Figure 11

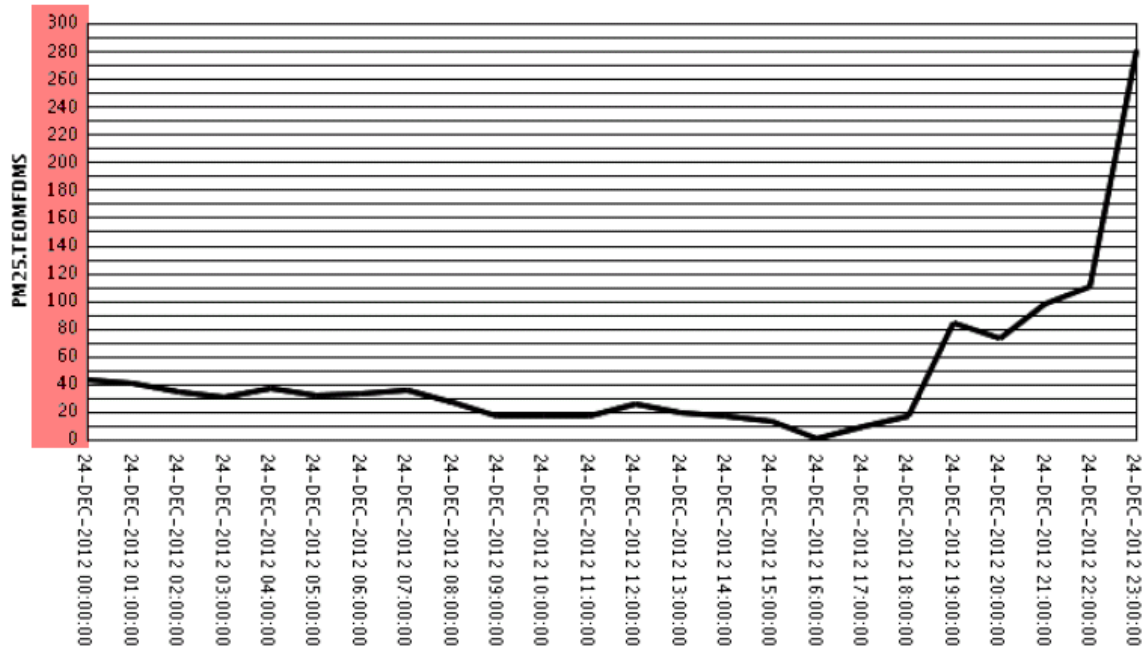


Figure 12



Figure 13

Name: SOUTH PHOENIX



Only an increase in winds during the early morning hours of the 25th prevented a third straight unhealthy air quality day. Despite two more trough passages during the final five days of the month, PM-2.5 levels remained elevated thru the remainder of the month including a near-exceedance on the 31st. Figure 14 shows the extent of the local PM-2.5 situation since 2005 which appears to have become a persistent and formidable problem with no easy solution. Figures 15 & 16 show air pollution exceedance summary data for all of 2012. -Reith

Figure 14

PHOENIX METRO HOLIDAY SEASON PM-2.5 MAX AQI CLIMATOLOGY								
(*preliminary data*)								
Date	2005	2006	2007	2008	2009	2010	2011	2012
20-Dec	73	56	78	94	61	50	64	50
21-Dec	106	83	44	116	75	52	51	62
22-Dec	76	77	57	88	54	38	54	79
23-Dec	83	109	101	54	30	43	40	115
24-Dec	111	140	129	65	111	137	141	129
25-Dec	120	157	154	57	168	165	157	67
26-Dec	59	82	58	16	84	45	54	77
27-Dec	48	71	35	66	69	58	70	76
28-Dec	57	48	43	84	63	71	77	79
29-Dec	64	64	75	82	56	53	85	80
30-Dec	74	97	106	67	62	30	80	74
31-Dec	84	125	118	115	54	63	155	92
HIGHEST HOURLY PM-2.5 CONCENTRATIONS								
(ug/m3)/hour & 24-hour Average AQI color (*preliminary data*)								
Date	2005	2006	2007	2008	2009	2010	2011	2012
24-Dec	176.3/2300	180.1/2300	195.5/2100	76.0/2300	199.3/2300	238.4/2100	190.9/2000	280.8/2300
25-Dec	179.7/2400	180.1/2400	273.8/0300	64.9/0200	232.8/0400	393.9/2400	237.4/2400	119.8/2400
31-Dec	102.7/2300	171.4/2300	97.5/1500	201.6/2300	54.5/2300	136.8/2300	322.2/2200	180.8/2300

Figure 15

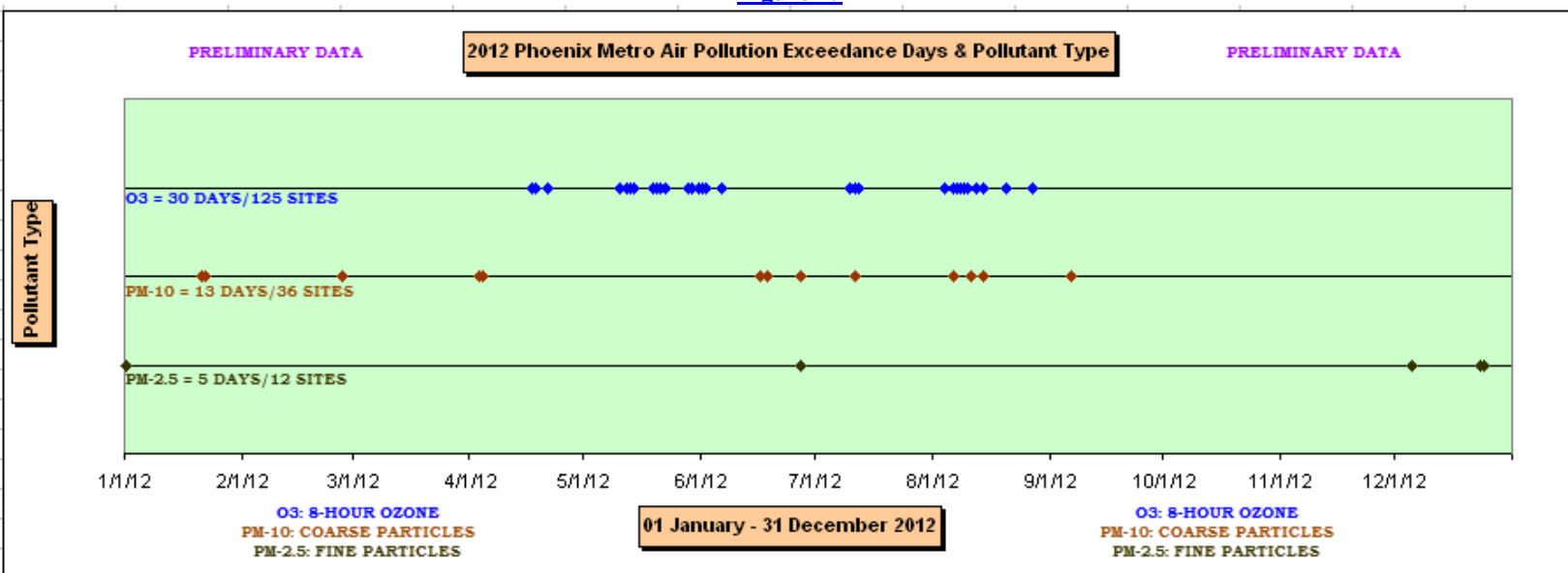


Figure 16

2012 PHOENIX METRO AIR POLLUTANT EXCEEDANCE DATES*

*Preliminary data

(Thru Monday, December 31, 2012)

POLLUTANT	O3 (Ozone)	PM-10 (coarse particles)	PM-2.5 (fine particles)
DATES	April 17	January 21	January 01
	April 18	January 22	June 27
	April 21	February 27	December 05
	May 10	April 03	December 23
	May 12	April 04	December 24
	May 13	June 16	TOTAL = 05
	May 14	June 18	
	May 19	June 27	
	May 20	July 11	
	May 21	August 06	
	May 22	August 11	
	May 28	August 14	
	May 29	September 06	
	May 31	TOTAL = 13	
	June 01		
	June 03		
	June 06		
	July 10		
	July 11		
	July 12		
	August 04		
	August 06		
	August 07		
	August 08		
	August 09		
	August 10		
	August 12		
	August 14		
	August 20		
	August 27		
	TOTAL = 30		