ARIZONA DEPARTMENT OF ENVIRONMENTAL QUALITY
1110 West Washington Street • Phoenix, Arizona 85007
(602) 771-2300 • www.azdeq.gov
Janice K. Brewer
Governor
Benjamin H. Grumbles
Director

Assessment of Qualification for Treatment under the Arizona Natural and Exceptional Events Policy for the High Particulate (PM_{10}) Concentration Events in the Phoenix Area on March 14, 2008

Background

The Arizona Department of Environmental Quality (ADEQ) issues Dust Control Action Forecasts as part of the Natural Events Action Plan for the Phoenix area. On Thursday, March 13, 2008, in response to a tightening pressure gradient ahead of a low pressure system and associated cold front approaching Arizona from the west, ADEQ air quality forecasters issued the Maricopa County Dust Control Action Forecast which called for a moderate risk of wind-blown dust for Friday, March 14th. In addition, ADEQ air quality forecasters issued a PM_{10} Health Watch for March 14, 2008, due to the possibility of strong winds and blowing dust throughout the Maricopa County area. The forecasts and advisories satisfy the requirement in 40 CFR 51.930(a)(1).

The forecast for March 14th called for strong winds capable of producing wind-blown dust. This potential wind-blown dust event equated to a moderate risk of exceeding the PM_{10} National Ambient Air Quality Standards (NAAQS) in Maricopa County. During the late morning / early afternoon hours of March 14th, strong, gusty winds moved into the Phoenix Metro area from the west. All appropriate State Implementation Plan (SIP) control measures were in place during the event demonstrating, per 40 CFR 50.1(j), that the event "is not reasonably controllable or preventable." A discussion of commonly employed Best Available Control Measures (BACM) for dust in Maricopa and Yuma counties can be found in "High Wind Exceptional Events and Control Measures for PM_{10} Areas" (see "References").

Strong winds were observed throughout portions of Maricopa County and the Phoenix Metro area on March 14, 2008. The initialization of the wind-blown dust event is evident in the Phoenix visible camera images as well as the Arizona Meteorological Network (AzMET), Maricopa County (MC), and National Weather Service (NWS) monitors (see Fig. 1). Gusty winds greater than 20 and 30 mph were reported between the 10:00 a.m. and 5:00 p.m. hours at several Phoenix area monitoring locations. In addition, Phoenix Goodyear Airport reported reduced visibility and a wind gust of 43 mph during the event.

This significant event brought elevated ambient concentrations of PM_{10} to the Phoenix area. Due to the spatial variability of PM sources both within and outside of the Phoenix urban core, the PM_{10} NAAQS was only exceeded at the West 43rd Ave. monitor operated by Maricopa County (see Section 2 for more detail). The fact that ambient concentrations exceeded the NAAQS satisfies the criteria in 40 CFR 50.1(j) that the event "affects air quality."

The following are the key PM_{10} monitor readings for the monitors examined in this report:

Monitor (Operator/Type)	AQS ID	24-hr Avg PM_{10}	1-hr Max PM_{10}	Max Time	Flag**
PHOENIX METRO AREA					
West 43rd Ave (MC/TEOM)	**04-013-4009***	**251**	**1286**	**1300**	**RJ**
South Phoenix (MC/TEOM)	**04-013-4003***	**119**	**461**	**1300**	None
Durango Complex (MC/TEOM)	**04-013-9812***	**92**	**310**	**1300**	None
Greenwood (MC/TEOM)	**04-013-3010***	**71**	**151**	**1300**	None
Higley (MC/TEOM)	**04-013-4006***	**51**	**140**	**0700**	None
West Phoenix (MC/TEOM)	**04-013-0019***	**57**	**126**	**1300**	None
Central Phoenix (MC/TEOM)	**04-013-3002***	**69**	**231**	**1300**	None
JLG Supersite (ADEQ/TEOM)	**04-013-9997***	**40**	**62**	**1300**	None
Coyote Lakes (MC/TEOM)	**04-013-4014***	**47**	**107**	**0700**	None

* EPA Air Quality System Identification Number
** 24-hr PM_{10} concentration influenced by natural or exceptional event to be flagged
Type Abbreviations: TEOM – Tapered Element Oscillating Microbalance Monitor (Continuous monitor)

The preliminary findings from this analysis were presented at stakeholders meetings on November 19, 2008, and March 19, 2009, in Phoenix, Arizona. Following the stakeholders meetings, ADEQ supplemented and finalized the analysis and a public comment period was held from October 15, 2009 through November 13, 2009. This finalized document and any comments received are being submitted to EPA to satisfy the requirements in 40 CFR 50.14(c)(3)(i).

NWS-Goodyear Airport

Hr	T(F)	VR	Dust	Spd	Gust	Dir
1	0	0		0	0	N/A
2	0	0		0	0	N/A
3	0	0		0	0	N/A
4	0	0		0	0	N/A
5	0	0		0	0	N/A
6	0	0		0	0	N/A
7	0	0		0	0	N/A
8	61	60		9	9	W
9	66	40		9	9	SW
10	70	30		7	7	W
11	73	20		5	5	SW
12	82	15		14	29	W
1	86	10		18	34	W
2	86	15		25	43	W
3	84	20		14	23	W
4	84	20		17	17	SW
5	82	40		17	17	SW
6	81	40		11	11	W
7	75	40		6	6	*VR
8	0	0		0	0	N/A
9	70	20		11	11	SW
10	0	0		0	0	N/A
11	0	0		0	0	N/A
12	0	0		0	0	N/A

NWS-Glendale Airport

Hr	T(F)	VR	Dust	Spd	Gust	Dir
1	0	0		0	0	N/A
2	0	0		0	0	N/A
3	0	0		0	0	N/A
4	0	0		0	0	N/A
5	0	0		0	0	N/A
6	0	0		0	0	N/A
7	0	0		0	0	N/A
8	0	0		0	0	N/A
9	0	0		0	0	N/A
10	70	20		15	23	SW
11	73	20		16	23	SW
12	79	20		18	23	W
1	81	20		20	26	W
2	82	20		21	26	W
3	82	20		20	25	W
4	81	20		14	23	SW
5	82	20		11	21	W
6	81	20		11	11	SW
7	75	20		5	5	W
8	0	0		0	0	N/A
9	0	0		0	0	N/A
10	0	0		0	0	N/A
11	0	0		0	0	N/A
12	0	0		0	0	N/A

NWS-Phx Sky Harbor

Hr	T(F)	VR	Dust	Spd	Gust	Dir
1	63	10		6	6	E
2	62	10		6	6	E
3	60	10		6	6	E
4	59	10		7	7	E
5	59	10		5	5	E
6	57	10		8	8	E
7	57	10		0	0	N
8	61	10		0	0	N
9	65	10		6	6	E
10	70	10		5	5	SW
11	77	10		11	20	W
12	79	10		21	29	W
1	81	10		21	30	W
2	82	10		25	30	W
3	82	10		23	23	W
4	82	10		17	24	W
5	81	10		13	23	W
6	80	10		14	14	W
7	77	10		7	7	W
8	76	10		9	9	SW
9	72	10		11	11	SW
10	73	10		10	10	W
11	69	10		10	10	W
12	67	10		7	7	W

Event Contrib. Analysis

Hourly PM_{10} Conc. ($\mu g/m^3$)

MONITORS:

1-W43RD

Hr	1
1	26.1
2	28.9
3	22.2
4	28.4
5	64.6
6	155
7	146
8	134
9	188
10	329
11	355
12	1052
1	1270
2	1286
3	374
4	87
5	57.1
6	23.6
7	37.1
8	40.8
9	86.4
10	93.1
11	73.4
12	72.9

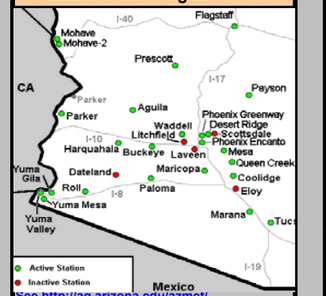
24-Hr. Avg PM_{10}

Monitor:	with Event	w/o Event
1-W43RD	251	69

> NAAQS | < NAAQS | Pink=Event Contrib.

Conclusion: As shown above, the PM_{10} concentration would have been below the NAAQS "BUT FOR" the event contribution (hours highlighted in pink).

AZMET Monitoring Locations



See http://ag.arizona.edu/azmet/

wnd @3m agl / Dir corrected to true north

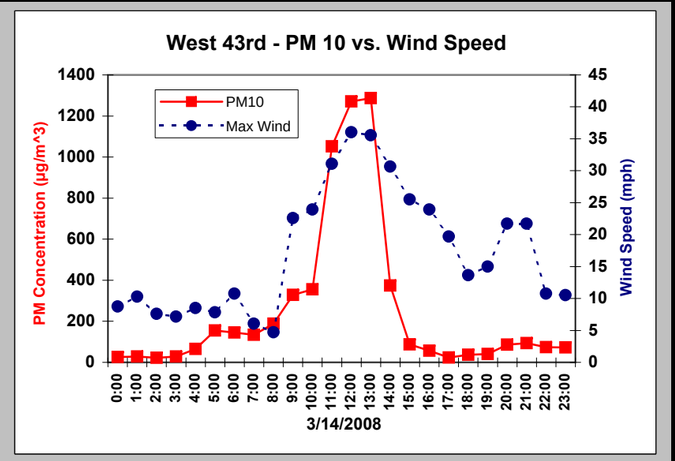
HIGHLIGHTING	Col.	Parameter
Max Wind	T(F)	Temp. (Deg. F.)
> 15 mph	RH	Rel Humidity %
>25 mph	Rn	Rain (Inches/hr)
HR - Time (End)	Spd	Avg Speed mph
A.M.	Max	Max Speed mph
P.M.	Dir	Wind Dir. (from)

Figure 1. Key Data for Event of March 14, 2008

WIND & PM10 DATA	ECA	KEY	PM10 & WIND PLOT
	HIST		Wx IMAGERY
	DIST		PHX VIS. CAMERAS

SUMMARY OF EVENT

A low pressure system caused strong west-southwesterly winds on 3/14 throughout portions of the valley. Sky Harbor Int'l Airport reported gusts to 30 m.p.h. while Goodyear Airport had gusts as high as 43 m.p.h. These gusty winds coincided with elevated PM10 levels at West 43rd Ave.



16659 (112.14Wx33.41N)

MC - WEST FORTY THIR

Hr	T(F)		PM	Spd	Max	Dir
1	69		26	5	9	SW
2	68		28	6	10	SW
3	66		22	5	8	W
4	64		28	5	7	SW
5	58		64	3	9	NE
6	57		154	5	8	E
7	57		145	4	11	E
8	59		133	2	6	E
9	64		187	2	5	NE
10	73		328	7	23	W
11	77		355	12	24	W
12	79		1051	16	31	W
1	82		1270	18	36	W
2	83		1286	19	36	W
3	84		374	14	31	W
4	84		87	12	26	W
5	83		57	12	24	W
6	81		23	10	20	W
7	77		37	6	14	W
8	75		40	8	15	SW
9	74		86	11	22	SW
10	72		93	10	22	SW
11	67		73	6	11	W
12	66		72	5	11	SW

16375 (112.12Wx33.43N)

MC - DURANGO COMPLEX

Hr	T(F)		PM	Spd	Max	Dir
1	63		63	1	4	W
2	64		66	3	10	SW
3	66		43	6	11	W
4	62		30	1	7	SW
5	58		63	2	6	E
6	56		67	2	6	E
7	56		68	2	8	E
8	62		132	2	4	E
9	71		80	0	3	NE
10	74		117	8	20	W
11	76		90	13	24	W
12	78		216	15	29	W
1	80		205	15	34	W
2	81		310	19	36	W
3	82		127	15	41	W
4	84		32	13	27	W
5	83		28	12	30	W
6	81		27	9	19	W
7	77		35	6	14	W
8	73		67	7	14	W
9	72		92	9	18	SW
10	70		89	7	16	W
11	66		81	6	11	W
12	62		80	4	7	W

16477 (112.14Wx33.48N)

MC - WEST PHOENIX

Hr	T(F)		PM	Spd	Max	Dir
1	70		19	5	12	SW
2	68		28	4	11	SW
3	67		22	4	11	SW
4	64		24	3	8	SW
5	60		35	1	6	E
6	58		46	2	5	E
7	56		61	2	6	E
8	59		82	1	4	SE
9	65		49	2	11	SW
10	70		75	9	22	SW
11	73		66	12	23	W
12	76		72	11	28	W
1	79		106	13	28	W
2	81		125	14	31	W
3	81		121	14	36	W
4	81		36	11	25	W
5	80		25	11	24	SW
6	80		27	9	21	W
7	78		35	4	10	W
8	75		50	4	15	SW
9	73		66	5	18	SW
10	70		65	4	14	W
11	68		67	5	13	W
12	67		66	5	10	W

Historical Distribution

5-Yr. Dist. of Values ($\mu g/m^3$)

MONITORS:

1-W43RD

Column Index

Yr - All Data (5-Yrs)

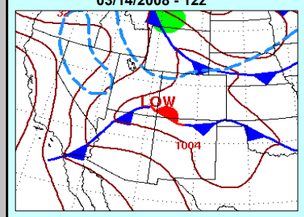
Sea - Data for Spring season only (5-Yrs)

Cum. Freq.	Mon 1 Yr	Mon 1 Sea
Min	5	8
0.5%	9	9
1.0%	11	11
2.5%	15	13
5%	19	19
10%	29	28
25%	44	46
50%	65	63
75%	91	82
90%	121	107
95%	139	125
97.5%	157	134
99.0%	192	194
99.5%	227	220
Max	313	313
Flagged Value	251	

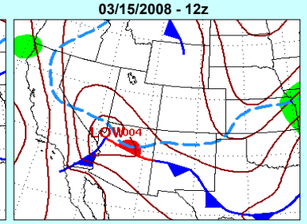
Conclusion: Flagged Value is exceptional in nature (ie greater than 95% of all data)

NOAA - Surface Analysis Maps

03/14/2008 - 12z

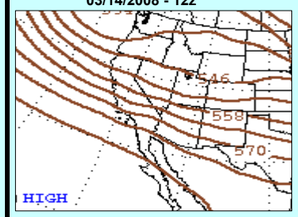


03/15/2008 - 12z

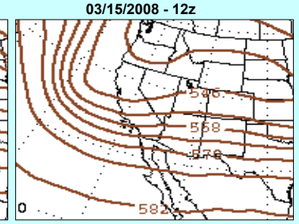


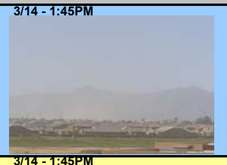
500 mb Analysis Charts

03/14/2008 - 12z



03/15/2008 - 12z



	3/14 - 10:45AM	3/14 - 11:45AM	3/14 - 12:45PM	3/14 - 1:45PM	3/14 - 2:45PM
WHITE TANK MTN (looking west)					
ESTRELLA MTN (looking south)					
CAMELBACK MTN (looking northeast)					
SOUTH MOUNTAIN (looking south)					

127530 (112.31Wx33.67N)

MC - COYOTE LAKES

Hr	T(F)		PM	Spd	Max	Dir
1	58		82	2	6	N
2	57		68	2	6	N
3	55		58	2	5	N
4	53		24	3	8	N
5	52		32	2	6	N
6	51		45	3	7	NE
7	50		50	2	7	N
8	54		106	1	5	N
9	66		77	1	4	NE
10	71		55	1	6	N
11	76		35	1	10	SW
12	79		22	6	21	SW
1	81		52	11	25	W
2	82		61	11	30	W
3	82		98	14	32	W
4	82		31	12	28	W
5	82		17	10	26	W
6	81		13	10	21	W
7	74		13	4	14	W
8	66		41	0	2	NW
9	62		44	0	4	S
10	61		32	0	4	NE
11	57		33	0	3	N
12	55		42	2	4	N

16329 (112.05Wx33.46N)

MC - CENTRAL PHOENIX

Hr	T(F)		PM	Spd	Max	Dir
1	63		43	3	7	E
2	61		39	3	6	E
3	59		41	2	6	E
4	58		42	4	7	E
5	57		36	2	5	E
6	56		36	4	6	E
7	56		33	3	6	E
8	64		38	2	6	SE
9	71		54	3	6	E
10	76		55	2	17	SW
11	78		105	12	25	W
12	80		127	15	30	W
1	81		149	16	30	W
2	82		230	20	37	W
3	82		159	19	37	W
4	83		33	14	28	W
5	83		28	13	29	W
6	81		31	12	24	W
7	77		30	7	16	W
8	74		47	6	16	W
9	73		64	7	16	SW
10	71		77	6	15	W
11	69		75	8	19	W
12	68		74	8	16	W

AZMET - PHX METRO - MESA

29-Mesa

Hr	T(F)	RH	Rn	Spd	Max	Dir
1	63	34	-	3	6	SE
2	61	35	-	3	6	SE
3	60	34	-	3	6	E
4	60	33	-	3	5	E
5	58	34	-	3	6	E
6	58	34	-	3	6	E
7	58	33	-	5	7	SE
8	60	33	-	4	7	SE
9	64	29	-	4	7	SE
10	69	27	-	3	6	SE
11	73	22	-	2	6	N
12	78	12	-	9	18	W
1	79	10	-	11	21	W
2	81	7	-	13	23	W
3	81	7	-	12	23	W
4	82	9	-	9	18	W
5	81	11	-	9	16	W
6	80	11	-	8	14	W
7	78	12	-	4	10	W
8	75	12	-	4	10	SW
9	73	11	-	5	9	SW
10	73	11	-	4	9	SW
11	70	13	-	3	9	SW
12	43	65	-	3	7	E

AZMET - SOUTHEAST PHOENIX

22-Queen Creek

Hr	T(F)	RH	Rn	Spd	Max	Dir
1	53	49	-	5	6	SE
2	54	44	-	5	7	SE
3	56	36	-	5	7	E
4	55	38	-	6	8	E
5	52	45	-	6	8	SE
6	51	48	-	5	8	E
7	53	41	-	5	7	E
8	55	42	-	5	8	SE
9	60	43	-	7	10	SE
10	67	30	-	7	10	S
11	72	23	-	7	12	SW
12	76	15	-	10	20	W
1	78	10	-	13	20	W
2	80	9	-	13	25	W
3	80	9	-	13	21	W
4	80	9	-	12	20	W
5	79	10	-	14	23	W
6	77	11	-	12	19	W
7	73	13	-	8	15	W
8	69	14	-	5	9	W
9	65	15	-	5	9	W
10	64	16	-	6	11	W
11	63	16	-	5	10	SW
12	60	20	-	7	11	SW

Prepared by S. Kendall, A. Juniel, B. Busby and B. Paris/ ADEQ 3/19/09

Assessment under the Technical Criteria Document (TCD)

1. Properly qualify and validate the air quality measurement to be flagged. As this was not a filter sampling date (1-in-6 run day), only data from the continuous analyzers were examined. The air quality monitoring data were reviewed by the agency responsible for operation of the monitor. All hourly PM_{10} readings from the West 43rd Ave. monitoring site were valid for March 14th. Audits of the analyzers revealed operations were within acceptable tolerance. No local sources were reported as significantly contributing to the air quality episode. Exceedances of the NAAQS were recorded at the West 43rd Ave. monitoring site operated by Maricopa County.

2. Review suspected contributing sources. The NWS, AzMET, and MC surface data for Arizona, along with the visible camera images in Phoenix, provide a good explanation of the meteorological conditions that were in place on March 14th. Strong westerly winds were occurring in the Phoenix area due to a low pressure system approaching from the west with a cold front situated west of Arizona. The plot of hourly PM_{10} concentration data and max winds in the upper right corner of Figure 1 confirms the nearly identical timing of elevated PM_{10} and strong wind gusts at the West 43rd Ave. monitor. The high wind event was a regional phenomenon that affected the entire Phoenix Metro area. However, PM sources are highly variable across space; therefore, the locations of higher PM_{10} concentrations (namely the Salt River channel) are likely an indication that these locations (or areas upwind of these locations) contain greater sources of PM than other locations within the Phoenix Metropolitan area. While no specific source allocation can be determined for this particular day, the 2005 ADEQ revised PM_{10} SIP for the Salt River area (attached) contains modeled source contributions on high wind days (see section 4.2 – Source Categories). Results estimate that approximately 76% of PM_{10} concentrations can be attributed to windblown dust, of which 21% is from agricultural fields, 15% from alluvial channels, and 21% from vacant lots. It is not clear whether similar source allocations can be assumed for this March 14, 2008, high wind event.

3. Examine all air quality monitoring information. Data from all monitors in the network were reviewed. Monitors from the affected areas are summarized in the table in the Background section of this assessment. Pursuant to 40 CFR 50.14(c)(3)(iii)(C), the "Historical Distribution" Table in Figure 1 has been included to demonstrate that the event is associated with a measured concentration in excess of normal historical fluctuations, including background (i.e., concentrations greater than the 95th percentile). Additionally, the winds associated with the elevated PM_{10} concentrations may be characterized as unusual as described in "Impact of Exceptional Events' 'Unusual Winds' on PM_{10} Concentrations" (see "References").

4. Examine the meteorological conditions before and during the event. The meteorological data are summarized in Figure 1. The wind data are highlighted yellow if the max wind speed in the hour exceeds 15 mph and orange if it exceeds 25 mph. As can be seen in Figure 1, wind speeds did not pick up in central Arizona until approximately 10:00 or 11:00 a.m., when several stations reported gusty winds that approached 30 and even 40 mph at times. This timing corresponds to the onset of elevated PM_{10} concentrations recorded at the West 43rd Ave. monitoring site, which remained elevated through the afternoon hours until the winds decreased to below 20 mph.

5. Perform a qualitative attribution to emission source(s). All evidence indicates the elevated PM_{10} concentrations in the Phoenix area can be attributed to soil emissions that were transported over portions of the Phoenix Metro area in Maricopa County. No source specific emission allocation is possible based on the data available for analysis. The hourly concentration data do not show any significant source other than the wind-blown dust event occurring on March 14, 2008. Observational reports of reduced visibility throughout portions of Phoenix are further proof that the elevated PM_{10} concentrations were attributed to soil emissions transported by high winds. These reports, in addition to the visual evidence of reduced visibility seen in the lower right portion of Figure 1, provide proof that the elevated PM_{10} concentrations in Phoenix can be attributed to soil emissions.

6. Estimation of Contribution from Source or Event. The primary source appears to be wind-blown dust over central Arizona for which there is not an effective or efficient method to estimate the relative contributions from specific sources. The demonstration analysis contained in this report establishes the linkage between the measurements to be flagged and the event, thus satisfying the requirement in 40 CFR 50.14(c)(3)(iii)(B). Pursuant to 40 CFR 50.14(c)(3)(iii)(D), the "Event Contrib. Analysis" Table in Figure 1 has been included to demonstrate that there would have been no exceedance or violation but for the event (i.e., the contribution during the event overwhelmed the 24-hour average).

7. Determination that a Natural or Exceptional Event Contributed To an Exceedance. Based on this analysis, the event satisfies the requirement in 40 CFR 50.1(j) that the elevated concentration at West 43rd Ave. was attributed to a natural event.

Conclusion

Transport of dust from soils by high winds. The elevated PM_{10} event on March 14, 2008, in Maricopa County was the result of the transport of dust and soils from high winds that suspended natural soils and soils from areas where Best Available Control Measures are in place and should be flagged for air quality planning purposes. The "high wind" (RJ) flag should be applied to the monitor readings indicated in the table at the beginning of this report, as the monitor would have been below the NAAQS but for the contribution of the event.

ATTACHMENTS AND REFERENCES

FOR EXCEPTIONAL EVENTS ANALYSIS

The following are supplemental materials helpful in understanding the exceptional event summarized in the main report. In addition, the reader is referred to the following references.

REFERENCES

Arizona Department of Environmental Quality (ADEQ), *Air Quality Exceptional and Natural Events Policy*, Policy Number 2009.002 (April 28, 1999; revised January 10, 2006 and June 22, 2007).

Arizona Department of Environmental Quality (ADEQ), *Technical Criteria Document for Determination of Natural Exceptional Events for Particulate Matter Equal to or Less Than Ten Microns in Aerodynamic Diameter (PM_{10})* (May 31, 2000).

Arizona Department of Environmental Quality (ADEQ), *Technical Criteria Document for Determination of Natural and Exceptional Events* (December 12, 2005).

Arizona Department of Environmental Quality (ADEQ), *Impact of Exceptional Events 'Unusual Winds' on PM_{10} Concentrations* (October 14, 2009).

Arizona Department of Environmental Quality (ADEQ), *High Wind Exceptional Events and Control Measures for PM_{10} Areas* (October 14, 2009).

Environmental Protection Agency (EPA), *The Treatment of Data Influenced by Exceptional Events (Exceptional Event Rule)*, 73 FR 70597; 40 CFR Parts 50 and 51 (November 21, 2008).

ADEQ Arizona Department of Environmental Quality

Janet Napolitano, Governor
Stephen A. Owens, ADEQ Director

VERY UNHEALTHY (201-300)

UNHEALTHY (151-200)

UNHEALTHY FOR SENSITIVE GROUPS (101-150)

MODERATE (51-100)

GOOD (0-50)

For more information visit:
http://www.epa.gov/airnow/aqibroch

LINK TO EXCEEDANCE & HEALTH STATEMENT INFO FOR THE 2006-07 & 2007-08 FORECAST SEASONS

AIR QUALITY FORECAST FOR FRIDAY, MARCH 14, 2008

This report is updated by 1:00 p.m. Sunday thru Friday and is valid
for areas within and bordering Maricopa County in Arizona

FORECAST DATE	YESTERDAY WED 03/12/2008	TODAY THU 03/13/2008	TOMORROW FRI 03/14/2008	EXTENDED SAT 03/15/2008
NOTICES (*SEE BELOW FOR DETAILS)	**NONE**	**NONE**	**PM-10 HEALTH WATCH**	**NONE**
AIR POLLUTANT	Highest AQI Reading/Site (Preliminary data only)			
O3*	**42 APACHE JUNCTION**	**51 MODERATE**	**47 GOOD**	**35 GOOD**
CO*	**16 GREENWOOD**	**15 GOOD**	**11 GOOD**	**09 GOOD**
PM-10*	**58 WEST FORTY THIRD**	**68 MODERATE**	**94 MODERATE**	**74 MODERATE**
PM-2.5*	**38 PHOENIX SUPERSITE**	**31 GOOD**	**27 GOOD**	**24 GOOD**

* O3 = Ozone CO = Carbon Monoxide PM-10 = Particles 10 microns & smaller PM-2.5 = Particles smaller than 2.5 microns

*"Ozone Health Watch" means that the highest concentration of OZONE may approach the federal health standard.
"PM-10 or PM-2.5 Health Watch" means that the highest concentration of PM-10 or PM-2.5 may approach the federal health standard.
"High Pollution Advisory" means that the highest concentration of OZONE, PM-10, or PM-2.5 may exceed the federal health standard.
"DUST" means that short periods of high PM-10 concentrations caused by outflow from thunderstorms are possible.

Health message for Thursday, Mar 13: Unusually sensitive people should consider reducing prolonged or heavy exertion.

Health message for Friday, Mar 14: Unusually sensitive people should consider reducing prolonged or heavy exertion.

Synopsis and Discussion

A PM-10 HEALTH WATCH HAS BEEN ISSUED FOR FRIDAY MARCH 14

Major changes in local weather conditions are on tap the next few days as the mid-latitude storm track migrates south over the area. Westerly winds aloft over the Valley are advertised to reach 50+ mph at the 10K' level and near 100 mph at the 18K' level on Friday; since the predicted mixing depth is near 9K', some of this momentum will have an avenue for reaching the surface. Areas of blowing and suspended dust are therefore likely as is the potential for transported dust from desert areas upwind of the metro area. Since PM-10 (coarse particle) levels may approach unhealthy levels, a PM-10 Health Watch has been issued for Friday. After a very breezy day on Saturday, an upper level trough and surface cold frontal passage are forecast to occur on Sunday and will be accompanied by showers and a few thunderstorms – along with gusty winds and much colder temperatures. -Reith

MONITORING SITE MAPS: STATIC MAP – **http://www.azdeq.gov/environ/air/monitoring/images/winter.jpg**
INTERACTIVE MAPS – **http://aqwww.maricopa.gov/AirMonitoring/SitePollutionMap.aspx**
http://www.airnow.gov/

POLLUTION MONITOR READINGS FOR WEDNESDAY, MARCH 12, 2008

O3 (OZONE)

SITE NAME	MAX 8-HR VALUE (PPB)	MAX AQI	AQI COLOR CODE
Apache Junction	54	42	
Blue Point	42	33	
Central Phoenix	43	34	
Fountain Hills	49	38	
North Phoenix	32	25	
Phoenix Supersite	47	37	
Pinnacle Peak	45	35	
South Phoenix	50	39	
South Scottsdale	43	34	
West Phoenix	45	35	

CO (CARBON MONOXIDE)

SITE NAME	MAX 8-HR VALUE (PPM)	MAX AQI	AQI COLOR CODE
Buckeye	0.3	04	
Central Phoenix	0.8	09	
Dysart	0.4	05	
Glendale	0.6	07	
Greenwood	1.4	16	
Mesa	0.5	06	
North Phoenix	0.6	07	
Phoenix Supersite	1.2	14	
South Phoenix	0.8	09	
South Scottsdale	0.4	05	
Tempe	0.7	08	
West Chandler	0.5	06	
West Indian School	1.3	15	
West Phoenix	1.0	11	

PM-10 (PARTICLES)

SITE NAME	MAX 24-HR VALUE (ug/m3)	MAX AQI	AQI COLOR CODE
Buckeye	48	44	
Central Phoenix	35	32	
Coyote Lakes	22	20	
Durango	56	51	
Greenwood	48	44	
Higley	42	39	
Maricopa (Pinal County)	70	58	
Phoenix Supersite	31	29	
Queen Creek (Pinal County)	54	50	
South Phoenix	46	43	
West Forty Third	70	58	
West Phoenix	40	37	

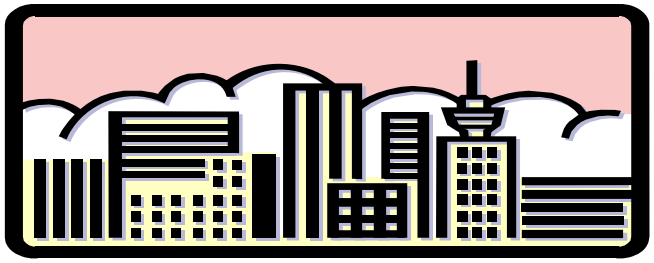
PM-2.5 (PARTICLES)

(Some data derived from light-scattering equipment)

For maps go to: http://www.airnow.gov/

SITE NAME	MAX 24-HR VALUE (ug/m3)	MAX AQI	AQI COLOR CODE
Durango	11.2	36	
Dysart	3.4	11	
Estrella Mountain Park	6.1	20	
Phoenix Supersite	11.8	38	
Vehicle Emissions Lab	NOT AVBL	NOT AVBL	NOT AVBL
West Phoenix	11.4	37	

LOCAL AIR POLLUTANTS IN DETAIL



O3 (OZONE):

Description – This is a secondary pollutant that is formed by the reaction of other primary pollutants (precursors) such as VOCs (volatile organic compounds) and NOx (Nitrogen Oxides) in the presence of heat and sunlight.

Sources – VOCs are emitted from motor vehicles, chemical plants, refineries, factories, and other industrial sources. NOx is emitted from motor vehicles, power plants, and other sources of combustion.

Potential health impacts – Exposure to ozone can make people more susceptible to respiratory infection, result in lung inflammation, and aggravate pre-existing respiratory diseases such as asthma. Other effects include decrease in lung function, chest pain, and cough.

Unit of measurement – Parts per billion (ppb).

Averaging interval – Highest eight-hour period within a 24-hour period (midnight to midnight).

Reduction tips – Curtail daytime driving, refuel cars and use gasoline-powered equipment as late in the day as possible.

CO (CARBON MONOXIDE):

Description – A colorless, odorless, poisonous gas formed when carbon in fuels is not burned completely.

Sources – In cities, as much as 95 percent of all CO emissions emanate from automobile exhaust. Other sources include industrial processes, non-transportation fuel combustion, and natural sources such as wildfires. Peak concentrations occur in colder winter months.

Potential health impacts – Reduces oxygen delivery to the body's organs and tissues. The health threat is most serious for those who suffer from cardiovascular disease.

Unit of measurement – Parts per million (ppm).

Averaging interval – Highest eight-hour period within a 24-hour period (midnight to midnight)

Reduction tips – Keep motor vehicle tuned properly and minimize nighttime driving.

PM-10 & PM-2.5 (PARTICLES):

Description – The term "particulate matter" (PM) includes both solid particles and liquid droplets found in air. Many manmade and natural sources emit PM directly or emit other pollutants that react in the atmosphere to form PM. Particles less than 10 micrometers in diameter tend to pose the greatest health concern because they can be inhaled into and accumulate in the respiratory system. Particles less than 2.5 micrometers in diameter are referred to as "fine" particles and are responsible for many visibility degradations such as the "Valley Brown Cloud" (see http://www.phoenixvis.net/). Particles with diameters between 2.5 and 10 micrometers are referred to as "coarse".

Sources – Fine = All types of combustion (motor vehicles, power plants, wood burning, etc.) and some industrial processes. Coarse = crushing or grinding operations and dust from paved or unpaved roads.

Potential health impacts – PM can increase susceptibility to respiratory infections and can aggravate existing respiratory diseases, such as asthma and chronic bronchitis.

Units of measurement – Micrograms per cubic meter (ug/m3)

Averaging interval – 24 hours (midnight to midnight).

Reduction tips – Stabilize loose soils, slow down on dirt roads, carpool, and use public transit.

{**Updated 09/24/2007**}

ADEQ
Arizona Department of Environmental Quality
Janet Napolitano, Governor
Stephen A. Owens, ADEQ Director

ADEQ AIR POLLUTION HEALTH WATCH ISSUANCE NOTICE

Issuance Date and Time:	Thursday, March 13, 2008 10:00 a.m.
Valid for Date(s):	Friday, March 14, 2008
Pollutant:	COARSE PARTICLES (PM-10)
Message:	Blowing and suspended dust due to strong and gusty winds may cause concentrations of coarse particles to approach unhealthy levels on Friday.

Detailed air quality forecast information is available on:

- The internet at www.azdeq.gov
- A telephone recording at 602-771-2367

Duty Forecaster:	Christopher Reith	520-770-3172
	Joe Paul	602-771-2363
	Bryan Paris	602/771-7665

CKR 12/06/2007

ADEQ Arizona Department of Environmental Quality

Janet Napolitano, Governor
Stephen A. Owens, ADEQ Director

MARICOPA COUNTY
DUST CONTROL ACTION FORECAST
ISSUED THURSDAY, MARCH 13, 2008

Three-day weather outlook:

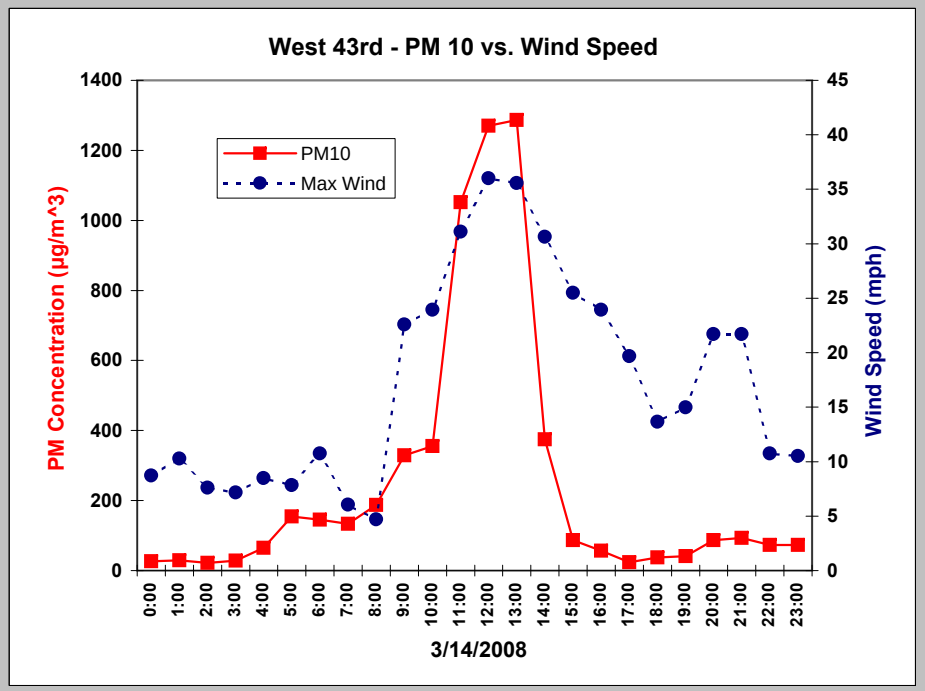
The broad low-amplitude ridge aloft currently over the local forecast area will give way to a strengthening and then amplifying mid-latitude storm track on Friday and thru the weekend. A strong westerly wind event looks likely on Friday and areas of blowing dust are possible by early afternoon; a MODERATE risk has been posted. A breezy to marginally windy day is expected on Saturday ahead of a strong trough and cold front; showers and thunderstorms are possible on Sunday with the frontal and trough passage.

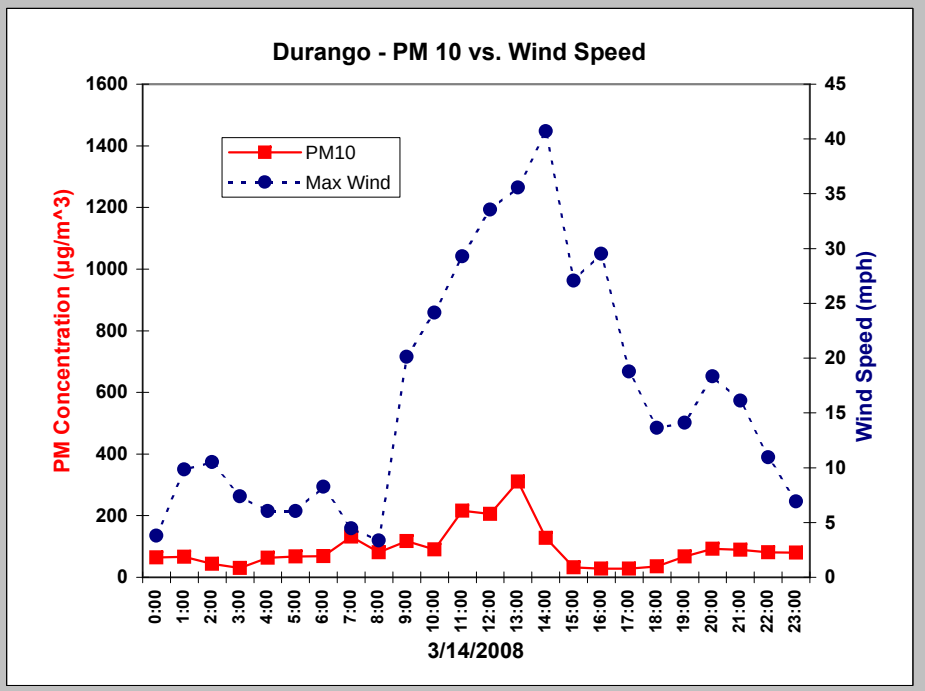
R I S K F A C T O R S

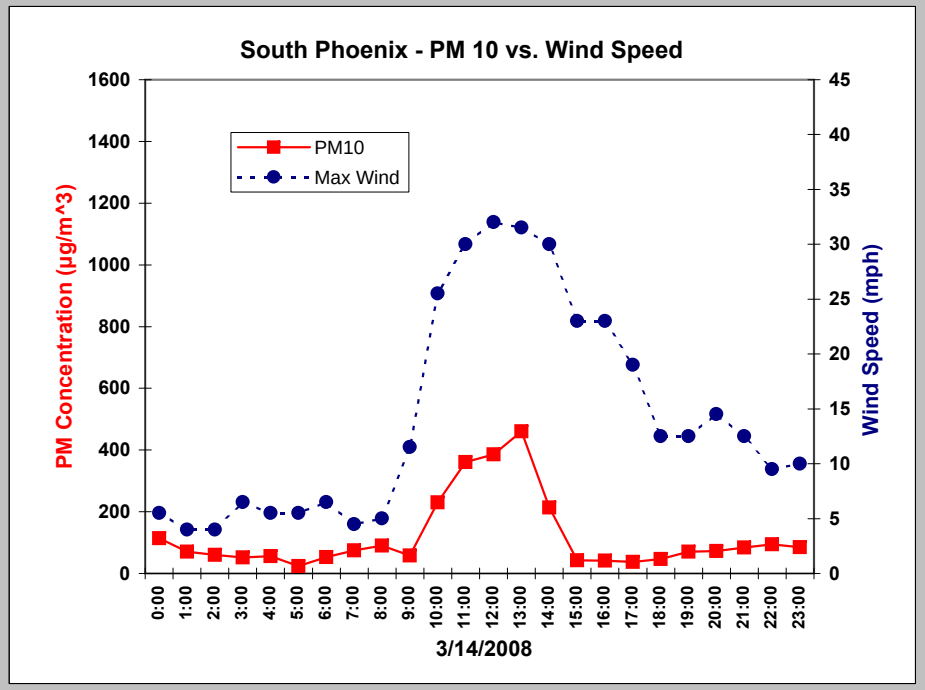
	WINDS		STAGNATION		RISK LEVEL
Day #1: Fri 03/14/2008	Westerly 20-30 mph with gusts near 40 mph.	+	Little if any stagnation expected.	=	**MODERATE**
Day #2: Sat 03/15/2008	South to southwesterly 15-25 mph.	+	Little if any stagnation expected.	=	**LOW**
Day #3: Sun 03/16/2008	Southwest to westerly 10-20 mph except strong and gusty near thunderstorms.	+	Little if any stagnation expected.	=	**MODERATE**

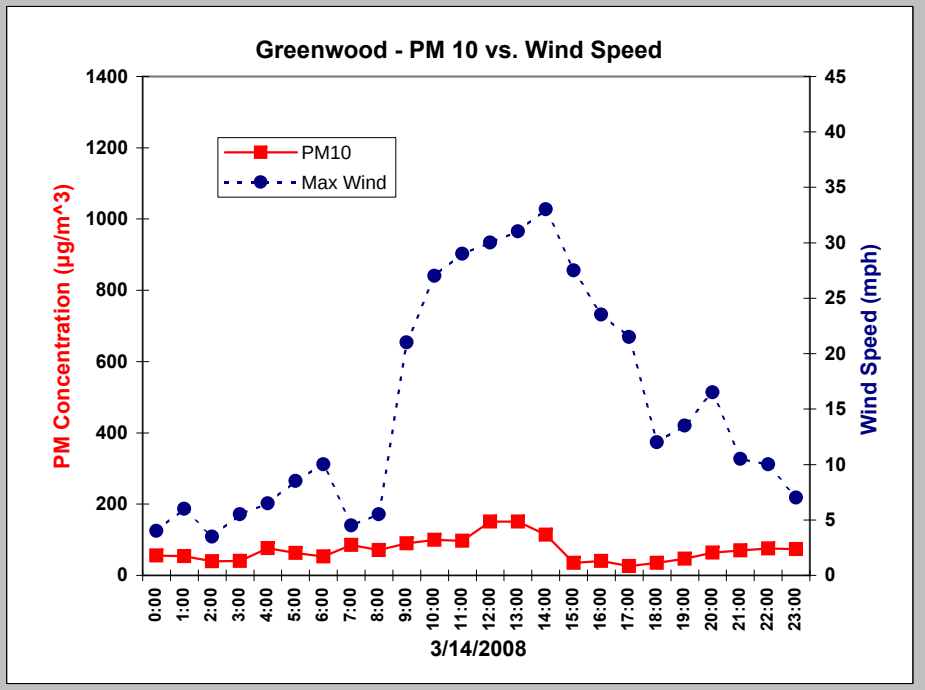
The Maricopa County Dust Control Action Forecast is issued to assist in the planning of work activities to help reduce dust pollution. To review the complete air quality forecast for the Phoenix metropolitan area and the health effects of air pollution, please see ADEQ's Air Quality Forecast at http://www.azdeq.gov/environ/air/ozone/ensemble.pdf, or call 602-771-2367 for recorded forecast information.

03/14/2008 - ADDITIONAL GRAPHS

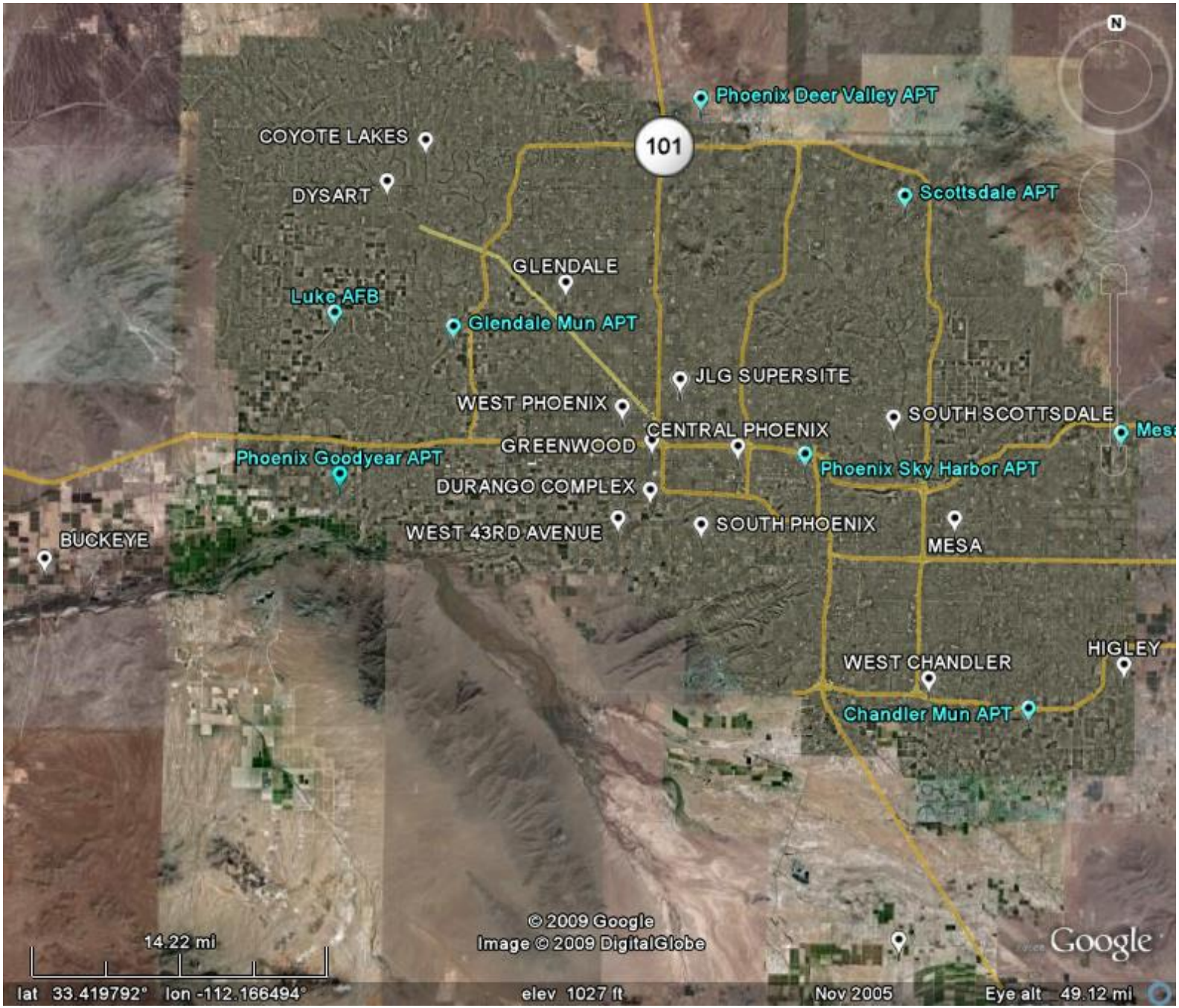






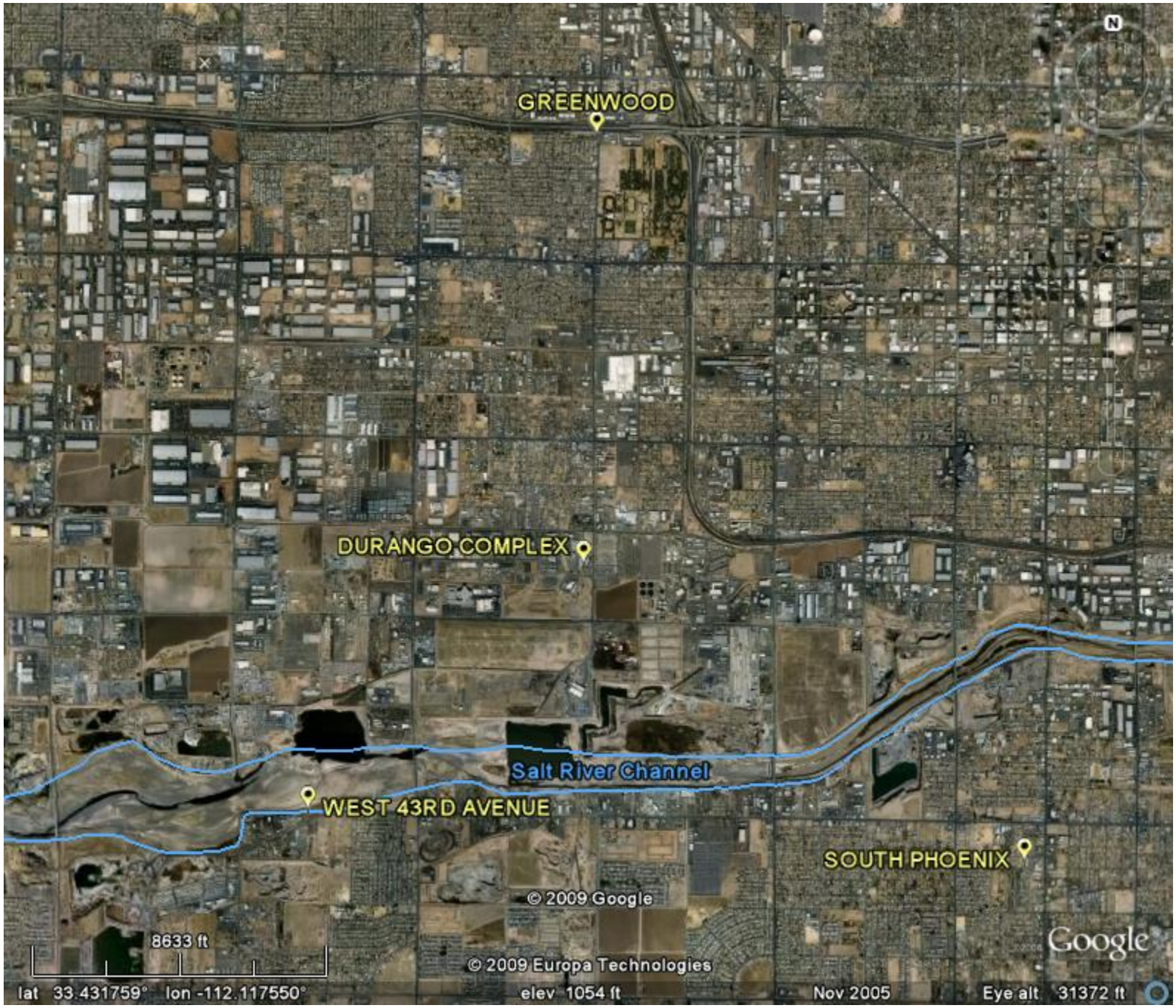


Phoenix Area PM_{10} and Meteorological Monitors



Source: US EPA, ADEQ, & Google Earth

Salt River Area PM_{10} and Meteorological Monitors



Source: US EPA, ADEQ, & Google Earth

CHAPTER 4: OVERVIEW OF PM_{10} CONTROL MEASURES

4.1 INTRODUCTION

Chapter 1.2.2 of this SIP ("Regulatory History of the Metropolitan Maricopa PM_{10} Nonattainment Area") notes that on July 25, 2002, EPA approved the Maricopa Serious PM_{10} Nonattainment Area, and granted Arizona's request, in accordance with CAA § 188(e), to extend the CAA deadline for attainment of the annual and 24-hour PM_{10} standards from December 31, 2001, to December 31, 2006 (67 FR 48718).

Because the attainment deadline for this plan revision is also December 31, 2006, and the measures must be applied to all similar sources throughout the Phoenix Nonattainment Area (see 67 FR 44369, July 2, 2002), the control strategies must meet the "Most Stringent Measures" test, as well as the “Best Available Control Measures/Technology” test. In its July 25, 2002, approval of the Maricopa County Plan, EPA defined “most stringent measures” (MSMs) as the most stringent measures included in any state implementation plan, or being implemented in any state, that are economically and technologically feasible for the nonattainment area in question. “Best Available Control Measures” (BACM) must be applied in serious nonattainment areas, also taking into account the economic and technological feasibility of each measure.

This chapter details the proposed BACM and MSM that were evaluated for each significant source category.

4.2 SOURCE CATEGORIES

The Salt River Study Area 2002 base year emissions inventory is described in Chapter 3.0 and the TSD’s Chapter 4.0. The 2002 emissions source category contributions to ambient PM_{10} are depicted in Table 4.2.1. The average concentrations are derived from the modeled concentrations outlined in the TSD, Chapter 6.

Assumptions used to calculate trackout emissions appear in Appendix K “Methodology for Weighting Trackout Emissions” and Appendix P “Mapping Weighted Trackout Emissions into Predicted Concentrations” of the October 2004 TSD. Calculation methodology for street sweeping emissions reductions appears in Appendix L “Street Sweeping Reductions” of the October 2004 TSD.

Table 4.2.1 2002 Salt River Study Area Source Category Contributions to Ambient PM_{10} Concentrations

Source Category	Average Low Wind Day Contribution	Average High Wind Day Contribution	Highest Contribution($\mu g/m^3$)	
	Percentage Contribution	Percentage Contribution	Low Wind Day	High Wind Day
Industrial Sources	**25.9%**	**8.3%**	**60.2**	**31.8**
Point Emissions	2.7%	1.1%	5.3	3.0
Area Emissions	23.2%	7.2%	54.9	28.8
Construction	**5.8%**	**0.9%**	**6.0**	**4.4**
Area Sources	**4.2%**	**0.7%**	**8.0**	**3.1**
Unpaved Parking Lots	1.7%	0.2%	0.8	1.4
Unpaved Shoulders	2.5%	0.4%	7.2	1.7

Table 4.2.1 2002 Salt River Study Area Source Category Contributions to Ambient PM_{10} Concentrations				
Source Category	**Average Low Wind Day Contribution**	**Average High Wind Day Contribution**	**Highest Contribution($\mu g/m^3$)**	
	Percentage Contribution	**Percentage Contribution**	**Low Wind Day**	**High Wind Day**
Roads & Trackout	**63.7%**	**13.5%**	**73.6**	**42.7**
Freeway	0.4%	0.2%	0.7	0.4
Primary Roads	43.6%	9.3%	44.8	33.3
Secondary Roads	7.5%	1.5%	6.9	1.5
Trackout	12.1%	2.5%	21.2	7.5
Agricultural Tillage	**0.4%**	**NA**	**0.2**	**NA**
Windblown Dust	**NA**	**76.7%**	**NA**	**290.1**
Agricultural Fields	NA	21.3%	NA	**84.9**
Alluvial Channels	NA	14.9%	NA	**79.5**
Construction	NA	3.5%	NA	**14.0**
Industrial	NA	7.3%	NA	**33.6**
Disturbed Areas	NA	5.2%	NA	**25.9**
Stockpiles	NA	3.6%	NA	**12.6**
Vacant Lots	NA	20.9%	NA	**39.6**

Note: Bold concentrations exceed the 5 $\mu g/m^3$ threshold for significant sources.

In Table 4.2.2, the modeled contributions for each of the source categories are given for the 2006 attainment case. These percentages are similar to the 2002 case, but with several significant differences. For example, the windblown contribution decreases from 77% to 59% from 2002 to 2006.

Table 4.2.2 Salt River Study Area Source Category Contributions to Ambient PM_{10} Concentrations for the 2006 Attainment Case		
Source Category	**Average Low Wind Day Contribution**	**Average High Wind Day Contribution**
	Percentage Contribution	**Percentage Contribution**
Industrial Sources	**29.7%**	**12.1%**
Point Source Emissions	4.4%	3.1%
Area Emissions	25.2%	8.9%
Construction	**5.2%**	**1.8%**
Area Sources	**7.1%**	**2.1%**
Unpaved Parking Lots	0.5%	0.6%
Unpaved Shoulders	6.6%	1.5%
Roads & Trackout	**58.0%**	**24.7%**
Freeway	0.9%	0.4%
Primary Roads	48.3%	21.6%
Secondary Roads	6.8%	1.9%
Trackout	2.0%	0.7%
Agricultural Tillage	**0.1%**	**NA**
Windblown Dust	**NA**	**59.4%**
Agricultural Fields	NA	8.9%
Alluvial Channels	NA	15.4%
Construction	NA	4.2%
Industrial	NA	6.7%
Disturbed Areas	NA	10.1%
Stockpiles	NA	5.9%
Vacant Lots	NA	8.4%