



# **Draft Attainment Demonstration for MAG 2012 Five Percent Plan**

**MAG Air Quality Technical Advisory Committee**

**November 29, 2011**



## OVERVIEW

- n **Attainment in 2012 is modeled in the Salt River Area and regionally throughout the nonattainment area**
- n **Only high wind days are modeled**
- n **Modeled high wind days are separated into high and low wind hours (12 mph cut point)**
- n **High wind hours are modeled with distance-weighted rollback along hourly back trajectories**
- n **Low wind hours are modeled with simple rollback in defined low wind domains**



# Measures in 2012 Five Percent Plan

**The MAG 2012 Five Percent Plan takes credit for the following measures in the MAG 2007 Five Percent Plan that have been implemented:**

- | Increased rule effectiveness for Maricopa County Rules 310, 310.01 and 316
- | PM-10 certified street sweeping of freeways
  - n ADOT contract dated 2/20/10
- | PM-10 certified street sweepers purchased with CMAQ funds between 1/1/07 and 12/31/09
- | Road, alley, and shoulder paving/stabilization projects completed in 2008-2011
- | Speed limit reductions implemented in 2008-2011
- | Rubberized asphalt overlays completed by ADOT

**New for 2012 Plan: Dust Action General Permit and other provisions of HB 2208**

# 2007 Exceedance Days

Monitor	Date	PM-10 Conc. ( $\mu\text{g}/\text{m}^3$ )	Meteorological Conditions
Buckeye	July 19	195.0	Low Winds
	November 15	166.2	Irregular Winds
Coyote Lakes	July 19	273.4	Thunderstorm Outflow
	October 21	312.9	Frontal System High Winds
Central Phoenix	July 19	267.8	Thunderstorm Outflow
Durango Complex	November 15	155.7	Irregular Winds
Higley	<b><i>June 6</i></b>	<b><i>181.0</i></b>	<b><i>Frontal System High Winds</i></b>
	July 19	199.5	Thunderstorm Outflow
	August 16	195.6	Thunderstorm Outflow
	August 23	230.4	Thunderstorm Outflow
	October 24	174.8	Frontal System High Winds
South Phoenix	April 12	171.1	Frontal System High Winds
	August 13	159.5	Thunderstorm Outflow
West 43 <sup>rd</sup> Avenue	March 27	227.9	Frontal System High Winds
	April 12	202.7	Frontal System High Winds
	<b><i>May 4</i></b>	<b><i>197.3</i></b>	<b><i>Frontal System High Winds</i></b>
	<b><i>June 6</i></b>	<b><i>225.7</i></b>	<b><i>Frontal System High Winds</i></b>
	July 19	178.0	Thunderstorm Outflow
	August 16	215.1	Thunderstorm Outflow

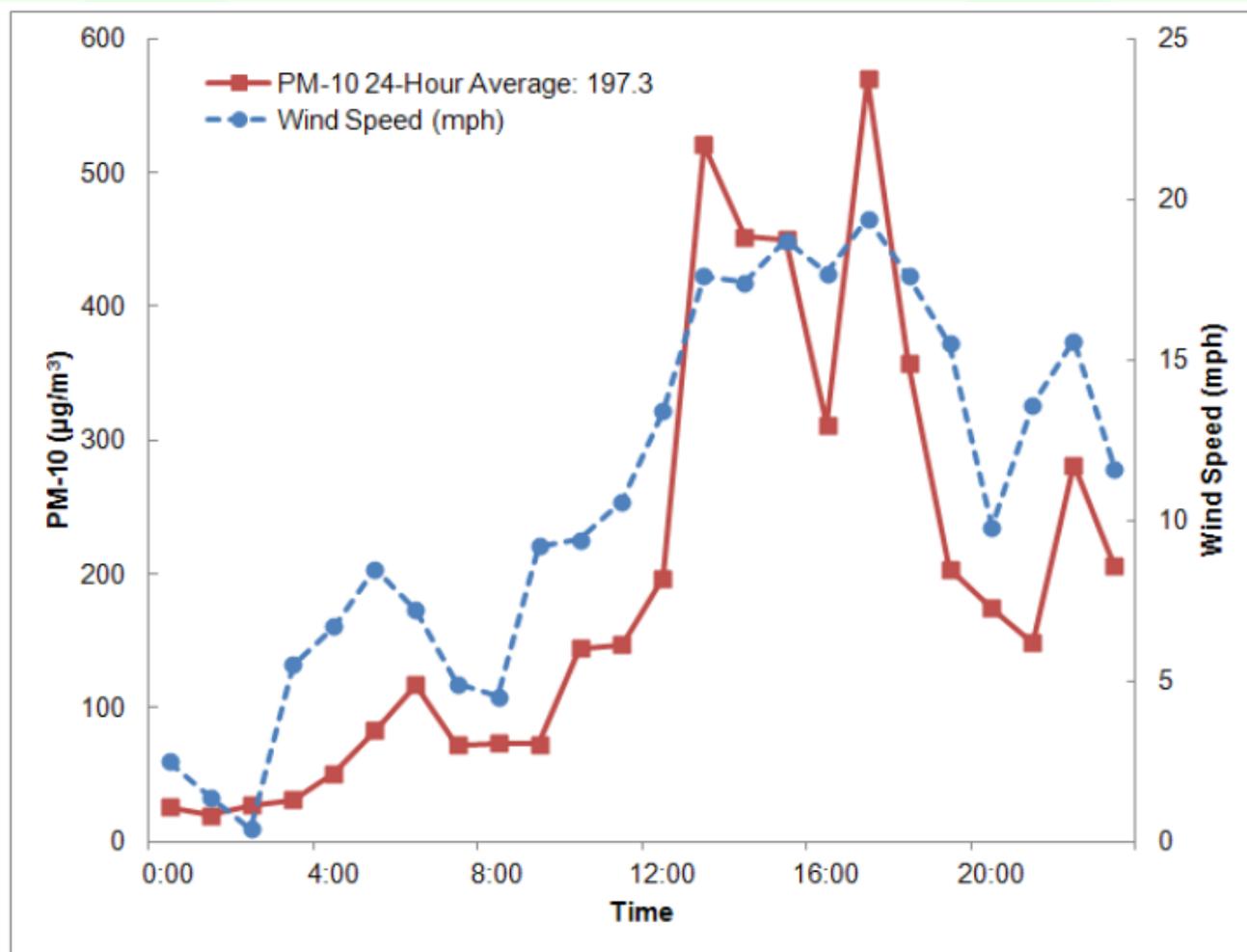
Design days are highlighted in bold italics.

# Design Days Wind Speeds

Hour	5/4/2007		6/6/2007					
	West 43 <sup>rd</sup>	West 43 <sup>rd</sup>	Central Phoenix	Durango	Greenwood	Higley	State SuperSite	West Phoenix
	<i>(Hourly Average Wind Speed in mph)</i>							
0	2.5	<b>13.3</b>	<b>12.5</b>	8.9	8.1	7.4	7.6	7.1
1	1.4	9.9	<b>13.1</b>	6.3	5.7	5.8	6.3	7.8
2	0.4	9.1	8.6	5.0	4.9	8.8	5.4	8.4
3	5.5	7.8	8.0	1.0	2.9	9.0	5.4	4.2
4	6.7	10.6	10.9	2.6	2.1	9.1	6.7	5.1
5	8.5	<b>14.5</b>	10.3	7.3	5.4	7.4	7.2	6.1
6	7.2	<b>14.9</b>	<b>12.4</b>	9.1	6.7	9.4	7.2	8.5
7	4.9	11.4	<b>12.8</b>	8.7	7.7	9.4	6.5	10.3
8	4.5	11.3	11.1	10.5	8.3	10.8	7.2	8.7
9	9.2	12.0	11.3	11.2	10.0	11.6	6.7	8.6
10	9.4	<b>13.8</b>	<b>12.1</b>	11.9	11.0	<b>14.6</b>	6.9	8.8
11	10.6	<b>16.0</b>	<b>13.9</b>	<b>12.5</b>	10.8	<b>15.2</b>	9.4	<b>12.1</b>
12	<b>13.4</b>	<b>16.6</b>	<b>15.3</b>	<b>13.9</b>	<b>12.7</b>	<b>17.6</b>	8.9	<b>13.6</b>
13	<b>17.6</b>	<b>15.1</b>	<b>15.4</b>	<b>13.5</b>	<b>12.6</b>	<b>15.3</b>	9.8	<b>15.1</b>
14	<b>17.4</b>	<b>17.6</b>	<b>16.9</b>	<b>15.7</b>	<b>15.4</b>	<b>15.8</b>	10.5	<b>15.1</b>
15	<b>18.7</b>	<b>18.1</b>	<b>17.8</b>	<b>17.9</b>	<b>13.9</b>	<b>15.6</b>	11.4	<b>13.5</b>
16	<b>17.7</b>	<b>17.0</b>	<b>15.7</b>	<b>14.5</b>	11.9	<b>15.3</b>	10.1	12.0
17	<b>19.4</b>	<b>14.5</b>	<b>14.0</b>	<b>12.9</b>	11.7	<b>13.5</b>	9.2	11.7
18	<b>17.6</b>	<b>14.9</b>	<b>14.0</b>	10.3	11.4	10.1	11.2	10.0
19	<b>15.5</b>	12.0	11.9	8.9	8.7	6.9	9.6	9.3
20	9.8	8.8	11.1	6.4	7.4	6.6	7.8	9.1
21	<b>13.6</b>	9.3	11.7	7.5	7.0	7.1	6.3	6.8
22	<b>15.6</b>	7.0	8.8	6.3	5.1	2.9	3.8	5.3
23	11.6	6.8	8.5	5.2	4.0	3.2	3.6	4.8

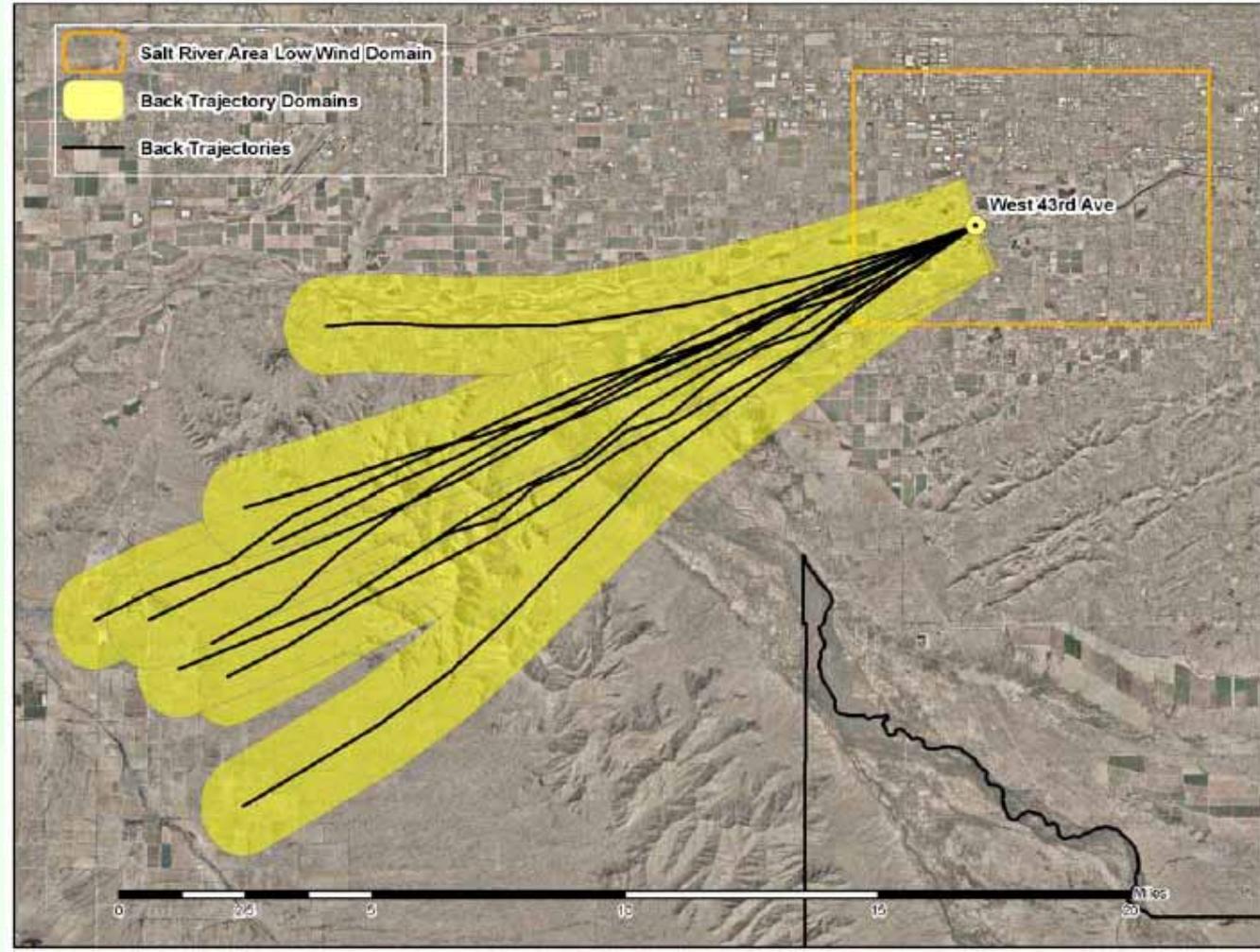
Note: High wind hours are highlighted in bold italics.

# 5/4/2007 Design Day West 43<sup>rd</sup> Avenue Only





# 5/4/2007 Design Day High and Low Wind Domains



# 5/4/2007 Design Day High Wind Hours

- Reductions based upon emissions within back trajectory domain, then weighted by distance from monitor

High Wind Hour	Un-weighted Emissions (tons)		Distance-Weighted Emissions (tons/feet from monitor)		% Reduction of Weighted Emissions
	2007	2012	2007	2012	
12	3.05	2.09	2.872E-04	1.900E-04	33.8%
13	9.49	6.36	6.529E-04	4.245E-04	35.0%
14	9.94	6.67	6.866E-04	4.454E-04	35.1%
15	13.94	9.19	8.721E-04	5.581E-04	36.0%
16	13.36	8.81	8.921E-04	5.699E-04	36.1%
17	19.01	12.39	1.190E-03	7.505E-04	36.9%
18	11.84	7.86	7.837E-04	5.033E-04	35.8%
19	6.58	4.44	5.158E-04	3.364E-04	34.8%
21	4.02	2.72	3.236E-04	2.129E-04	34.2%
22	6.63	4.48	5.104E-04	3.330E-04	34.8%
Total	97.86	65.02	6.714E-03	4.324E-03	35.6%

# 5/4/2007 Design Day Low Wind Hours

- n Reductions based upon low wind emissions in low wind domain (Salt River Area domain shown in table below)

Land Use	Acres	2007 Emissions (tons)	2012 Emissions (tons)	% Reduction
Residential	6,296	61.19	62.05	(1.4%)
Commercial	4,508	61.34	62.81	(2.4%)
Agriculture	1,180	29.19	28.57	2.1%
Vacant/Open	2,984	27.97	28.62	(2.3%)
Transportation	405	167.28	155.42	7.1%
Industrial	6,410	465.10	350.77	24.6%
Construction	1,073	437.70	132.98	69.6%
Total	22,856	1,249.76	821.23	34.3%



# 5/4/2007 Attainment Demonstration

- n Apply high and low wind hour reductions to design day concentrations, accounting for background

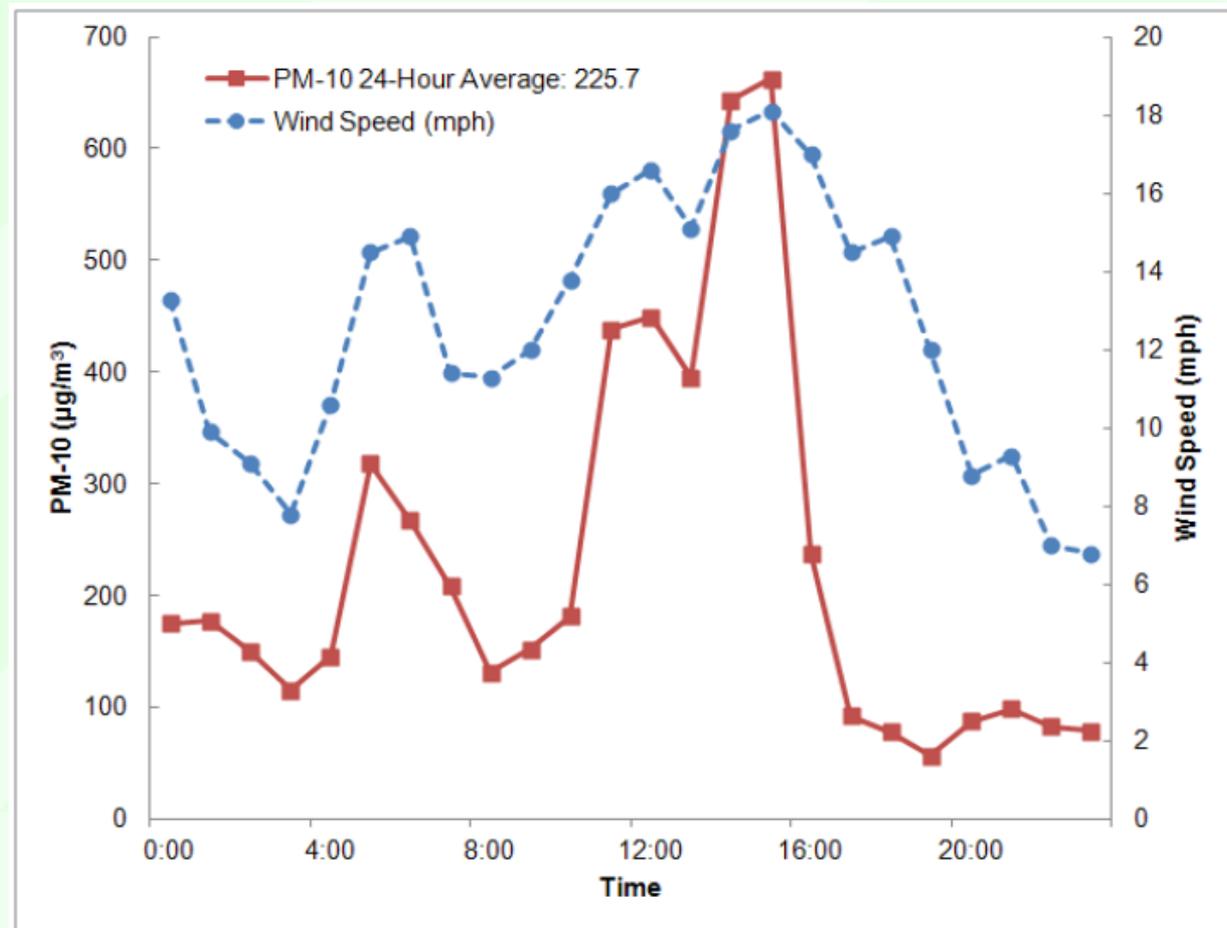
Hour	Wind Speed (mph)	May 4, 2007 PM-10 Concentration ( $\mu\text{g}/\text{m}^3$ )	Background Concentration ( $\mu\text{g}/\text{m}^3$ )	2012 Controlled PM-10 Concentration ( $\mu\text{g}/\text{m}^3$ )
0	2.5	25.9	14.9	22.1
1	1.4	19.8	14.9	18.1
2	0.4	27.0	14.9	22.8
3	5.5	31.5	14.9	25.8
4	6.7	50.7	14.9	38.4
5	8.5	82.7	14.9	59.4
6	7.2	117.3	14.9	82.2
7	4.9	71.9	14.9	52.3
8	4.5	73.5	14.9	53.4
9	9.2	73.0	14.9	53.1
10	9.4	144.2	14.9	99.9
11	10.6	147.0	14.9	101.7
12	<b>13.4</b>	<b>196.6</b>	<b>21.9</b>	<b>137.5</b>
13	<b>17.6</b>	<b>521.0</b>	<b>21.9</b>	<b>346.4</b>
14	<b>17.4</b>	<b>451.6</b>	<b>21.9</b>	<b>300.6</b>
15	<b>18.7</b>	<b>449.9</b>	<b>21.9</b>	<b>295.8</b>
16	<b>17.7</b>	<b>311.2</b>	<b>21.9</b>	<b>206.7</b>
17	<b>19.4</b>	<b>570.0</b>	<b>21.9</b>	<b>367.7</b>
18	<b>17.6</b>	<b>357.2</b>	<b>21.9</b>	<b>237.2</b>
19	<b>15.5</b>	<b>204.0</b>	<b>21.9</b>	<b>140.7</b>
20	9.8	174.7	14.9	119.9
21	<b>13.6</b>	<b>148.8</b>	<b>21.9</b>	<b>105.4</b>
22	<b>15.6</b>	<b>281.1</b>	<b>21.9</b>	<b>191.0</b>
23	11.6	205.6	14.9	140.2
Daily Avg.		197.3		134.1

Note: High wind hours highlighted in bold italics.



# 6/6/2007 Design Day; 7 Sites W43rd & Higley Exceeded

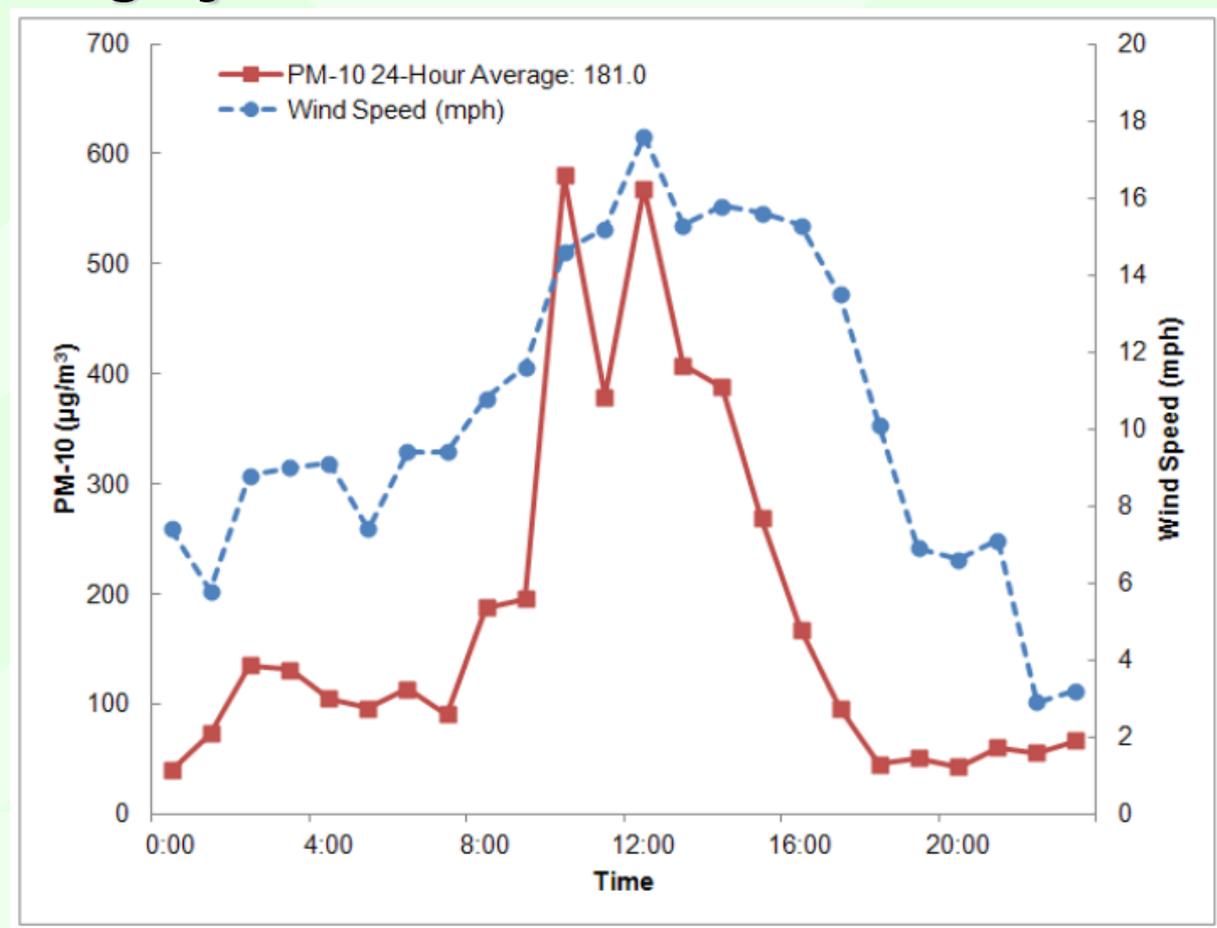
## n West 43<sup>rd</sup> Avenue Monitor





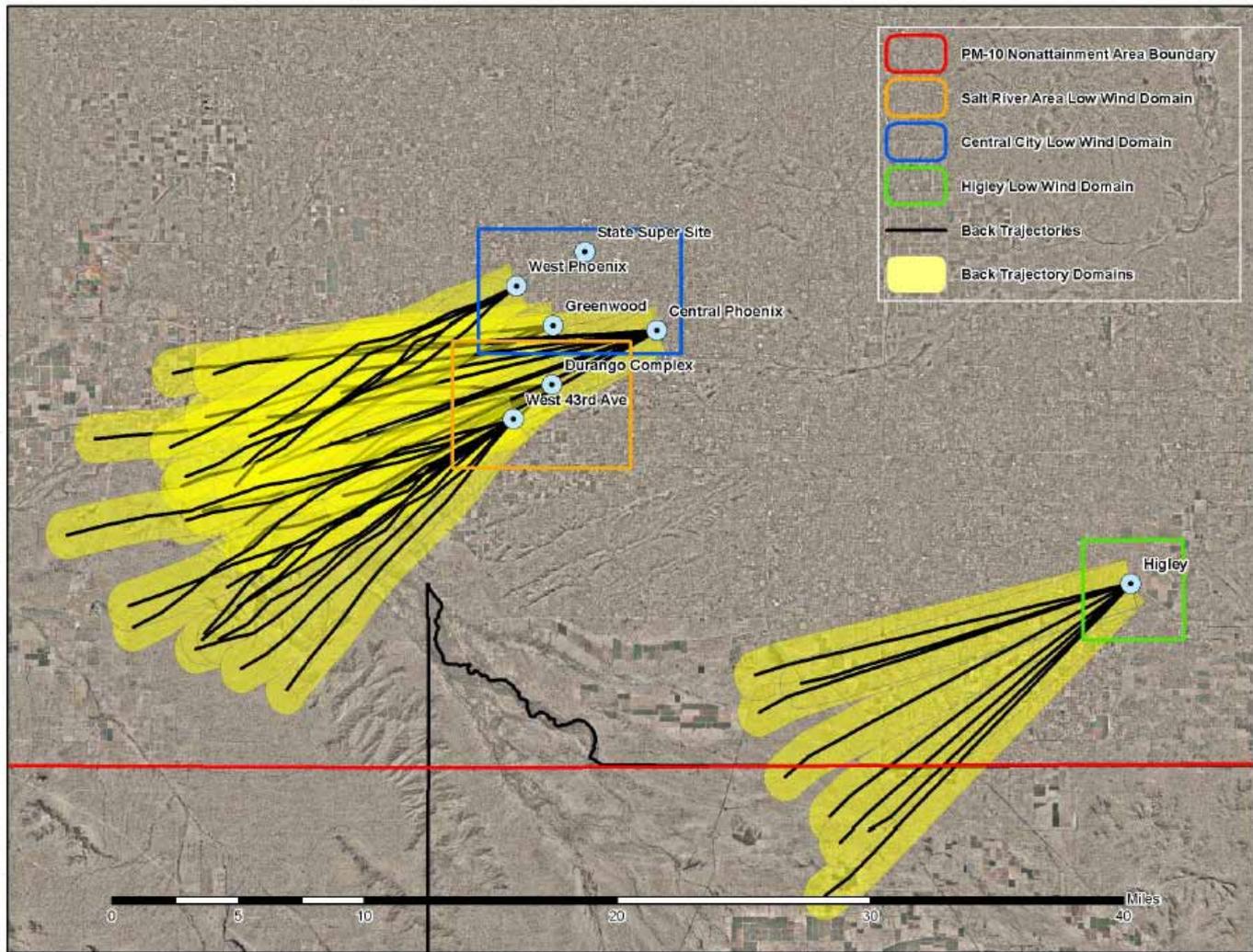
# 6/6/2007 Design Day; 7 Sites W43rd & Higley Exceeded

## n Higley Monitor





# 6/6/07 Design Day High and Low Wind Domains



# 6/6/07 Design Day High Wind Hours – W43rd

High Wind Hour	Un-weighted Emissions (tons)		Distance-Weighted Emissions (tons/feet from monitor)		% Reduction of Weighted Emissions
	2007	2012	2007	2012	
0	2.29	1.59	2.064E-04	1.388E-04	32.8%
5	3.31	2.29	2.894E-04	1.924E-04	33.5%
6	5.05	3.43	4.359E-04	2.860E-04	34.4%
10	3.44	2.38	2.835E-04	1.898E-04	33.1%
11	6.67	4.51	4.937E-04	3.237E-04	34.4%
12	6.02	4.06	5.697E-04	3.704E-04	35.0%
13	5.66	3.82	4.721E-04	3.088E-04	34.6%
14	9.67	6.48	6.830E-04	4.425E-04	35.2%
15	13.99	9.12	9.717E-04	6.168E-04	36.5%
16	9.67	6.48	6.630E-04	4.304E-04	35.1%
17	5.10	3.45	4.285E-04	2.812E-04	34.4%
18	4.94	3.34	3.857E-04	2.526E-04	34.5%
Total	75.81	50.97	5.883E-03	3.833E-03	34.8%

# 6/6/07 Design Day Low Wind Hours – W43rd

Land Use	Acres	2007 Emissions (tons)	2012 Emissions (tons)	% Reduction
Residential	6,296	61.19	62.05	(1.4%)
Commercial	4,508	61.34	62.81	(2.4%)
Agriculture	1,180	29.19	28.57	2.1%
Vacant/Open	2,984	27.97	28.62	(2.3%)
Transportation	405	167.28	155.42	7.1%
Industrial	6,410	465.10	350.77	24.6%
Construction	1,073	437.70	132.98	69.6%
<b>Total</b>	<b>22,856</b>	<b>1,249.76</b>	<b>821.23</b>	<b>34.3%</b>


 ENVIRONMENTAL  
PROGRAMS

# 6/6/2007 Attainment Demonstration – W43rd

Hour	Wind Speed (mph)	June 6, 2007 PM-10 Concentration ( $\mu\text{g}/\text{m}^3$ )	Background Concentration ( $\mu\text{g}/\text{m}^3$ )	2012 Controlled PM-10 Concentration ( $\mu\text{g}/\text{m}^3$ )
<b>0</b>	<b>13.3</b>	<b>175.1</b>	<b>21.9</b>	<b>124.9</b>
1	9.9	177.0	14.9	121.4
2	9.1	150.0	14.9	103.7
3	7.8	115.5	14.9	81.0
4	10.6	145.0	14.9	100.4
<b>5</b>	<b>14.5</b>	<b>318.0</b>	<b>21.9</b>	<b>218.8</b>
<b>6</b>	<b>14.9</b>	<b>267.2</b>	<b>21.9</b>	<b>182.9</b>
7	11.4	208.1	14.9	141.8
8	11.3	131.4	14.9	91.4
9	12.0	152.0	14.9	105.0
<b>10</b>	<b>13.8</b>	<b>180.8</b>	<b>21.9</b>	<b>128.3</b>
<b>11</b>	<b>16.0</b>	<b>438.3</b>	<b>21.9</b>	<b>294.9</b>
<b>12</b>	<b>16.6</b>	<b>449.1</b>	<b>21.9</b>	<b>299.6</b>
<b>13</b>	<b>15.1</b>	<b>394.9</b>	<b>21.9</b>	<b>265.9</b>
<b>14</b>	<b>17.6</b>	<b>643.1</b>	<b>21.9</b>	<b>424.3</b>
<b>15</b>	<b>18.1</b>	<b>662.3</b>	<b>21.9</b>	<b>428.4</b>
<b>16</b>	<b>17.0</b>	<b>237.5</b>	<b>21.9</b>	<b>161.8</b>
<b>17</b>	<b>14.5</b>	<b>92.3</b>	<b>21.9</b>	<b>68.1</b>
<b>18</b>	<b>14.9</b>	<b>77.9</b>	<b>21.9</b>	<b>58.6</b>
19	12.0	56.1	14.9	42.0
20	8.8	87.3	14.9	62.5
21	9.3	98.1	14.9	69.6
22	7.0	82.6	14.9	59.4
23	6.8	78.3	14.9	56.6
Daily Avg.		225.7		153.8

Note: High wind hours highlighted in bold italics.

# 6/6/07 Design Day High Wind Hours – Higley

High Wind Hour	Un-weighted Emissions (tons)		Distance-Weighted Emissions (tons/feet from monitor)		% Reduction of Weighted Emissions
	2007	2012	2007	2012	
10	0.74	0.55	6.103E-05	4.481E-05	26.6%
11	3.00	2.05	1.944E-04	1.330E-04	31.6%
12	2.15	1.54	1.805E-04	1.270E-04	29.6%
13	2.41	1.69	1.824E-04	1.268E-04	30.4%
14	5.61	3.83	2.282E-04	1.553E-04	31.9%
15	5.70	3.98	2.113E-04	1.442E-04	31.8%
16	5.65	3.90	2.065E-04	1.403E-04	32.1%
17	1.50	1.11	6.687E-05	4.791E-05	28.4%
Total	26.76	18.64	1.331E-03	9.195E-04	30.9%

# 6/6/07 Design Day Low Wind Hours – Higley

Land Use	Acres	2007 Emissions (tons)	2012 Emissions (tons)	% Reduction
Residential	4,216	40.97	41.55	(1.4%)
Commercial	1,123	15.28	15.65	(2.4%)
Agriculture	1,865	46.15	45.17	2.1%
Vacant/Open	1,774	16.62	17.01	(2.3%)
Transportation	389	160.74	149.34	7.1%
Industrial	36	2.58	1.95	24.6%
Construction	765	312.06	94.81	69.6%
Total	10,167	594.41	365.49	38.5%


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# 6/6/2007 Attainment Demonstration – Higley

Hour	Wind Speed (mph)	June 6, 2007 PM-10 Concentration ( $\mu\text{g}/\text{m}^3$ )	Background Concentration ( $\mu\text{g}/\text{m}^3$ )	2012 Controlled PM-10 Concentration ( $\mu\text{g}/\text{m}^3$ )
0	7.4	39.6	14.9	30.1
1	5.8	72.9	14.9	50.6
2	8.8	135.2	14.9	88.9
3	9.0	130.9	14.9	86.2
4	9.1	104.9	14.9	70.3
5	7.4	96.4	14.9	65.0
6	9.4	113.4	14.9	75.5
7	9.4	90.9	14.9	61.6
8	10.8	187.2	14.9	120.9
9	11.6	195.1	14.9	125.7
<b>10</b>	<b>14.6</b>	<b>580.2</b>	<b>21.9</b>	<b>431.9</b>
<b>11</b>	<b>15.2</b>	<b>379.0</b>	<b>21.9</b>	<b>266.3</b>
<b>12</b>	<b>17.6</b>	<b>568.8</b>	<b>21.9</b>	<b>406.7</b>
<b>13</b>	<b>15.3</b>	<b>408.1</b>	<b>21.9</b>	<b>290.5</b>
<b>14</b>	<b>15.8</b>	<b>387.9</b>	<b>21.9</b>	<b>271.1</b>
<b>15</b>	<b>15.6</b>	<b>268.9</b>	<b>21.9</b>	<b>190.5</b>
<b>16</b>	<b>15.3</b>	<b>167.5</b>	<b>21.9</b>	<b>120.8</b>
<b>17</b>	<b>13.5</b>	<b>96.4</b>	<b>21.9</b>	<b>75.3</b>
18	10.1	45.2	14.9	33.5
19	6.9	50.7	14.9	36.9
20	6.6	43.1	14.9	32.2
21	7.1	60.5	14.9	42.9
22	2.9	55.7	14.9	40.0
23	3.2	66.9	14.9	46.9
Daily Avg.		181.1		127.5

Note: High wind hours highlighted in bold italics.



# 6/6/2007 Attainment Demonstration – Other Sites

- n **The other active monitoring sites on this design day did not exceed but were modeled as part of the region-wide nonattainment modeling**
- n **Results of rollback modeling on 24-hour PM-10 Concentrations at other sites:**
  - | Central Phoenix: From 107.0 to 81.7
  - | Durango: From 133.7 to 94.6
  - | Greenwood: From 121.7 to 94.0
  - | State Super Site: From 80.6 to 64.8
  - | West Phoenix: From 108.8 to 85.7

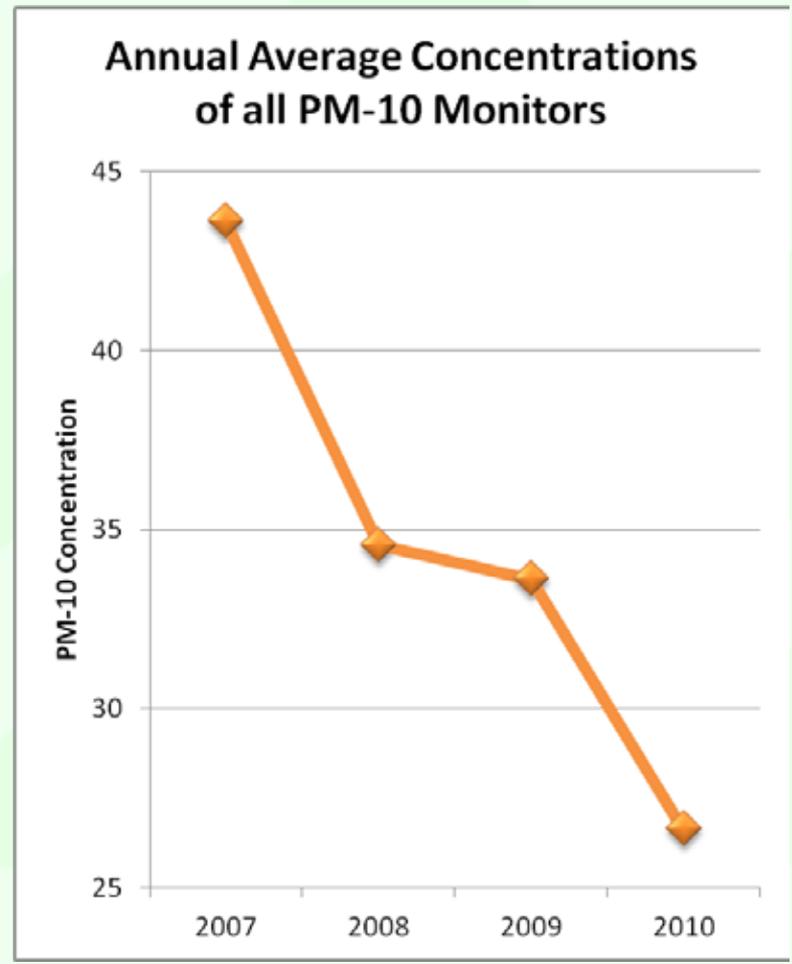
# SUMMARY

- n **Attainment in 2012 is modeled for two high wind design days:**
  - | Salt River Area Only – May 4, 2007
  - | Entire Nonattainment Area – June 6, 2007
- n **Results of attainment modeling on 24-hour average PM-10 concentrations:**
  - | 5/4/07 – W43rd: From 197.3 to 134.1
  - | 6/6/07 – W43rd: From 225.7 to 153.8
  - | 6/6/07 – Higley: From 181.1 to 127.5
  - | 6/6/07 – Central Phoenix: From 107.0 to 81.7
  - | 6/6/07 – Durango: From 133.7 to 94.6
  - | 6/6/07 – Greenwood: From 121.7 to 94.0
  - | 6/6/07 – State Super Site: From 80.6 to 64.8
  - | 6/6/07 – West Phoenix: From 108.8 to 85.7



# Reductions of PM-10 Concentrations at Monitors

Annual Average PM-10 Concentrations				
Monitor	2007	2008	2009	2010
Apache Junction	18	19	19	18
Bethune School	53	43	44	30
Buckeye	53	43	39	34
Central Phoenix	42	35	35	27
Durango Complex	60	48	45	36
Dysart	36	25	24	22
Glendale	34	27	29	23
Greenwood	50	43	41	35
Higley	53	40	38	30
Mesa	32	22	23	17
North Phoenix	34	25	24	19
South Phoenix	56	45	44	35
South Scottsdale	31	25	26	17
State Super Site	35	28	27	21
West Chandler	36	23	28	23
West 43rd Ave	72	57	51	39
West Phoenix	47	38	36	30
Zuni Hills	X	X	X	21
<b>All Monitors</b>	<b>44</b>	<b>35</b>	<b>34</b>	<b>27</b>





**For more information**

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