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MAG 2012 FIVE PERCENT PLAN FOR PM-10 FOR THE MARICOPA COUNTY NONATTAINMENT AREA

MARCH 2012

MARICOPA ASSOCIATION of GOVERNMENTS

MAG 2012 FIVE PERCENT PLAN FOR PM-10 FOR THE MARICOPA COUNTY NONATTAINMENT AREA

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MAG 2012 FIVE PERCENT PLAN FOR PM-10 FOR THE MARICOPA COUNTY NONATTAINMENT AREA

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MAG 2012 FIVE PERCENT PLAN FOR PM-10 FOR THE MARICOPA COUNTY NONATTAINMENT AREA

EXECUTIVE SUMMARY

MARICOPA ASSOCIATION of GOVERNMENTS

MAG 2012 FIVE PERCENT PLAN FOR PM-10
EXECUTIVE SUMMARY

Within the Maricopa County nonattainment area, the National Ambient Air Quality Standard has not yet been attained for PM-10 particulate pollution. The area is classified as a Serious Area under the Clean Air Act. The Maricopa Association of Governments (MAG) was designated by the Governor of Arizona in 1978 and recertified by the Arizona Legislature in 1992 to serve as the Regional Air Quality Planning Agency to develop plans to address air pollution problems. The plans are prepared through a coordinated effort with the Arizona Department of Environmental Quality (ADEQ), Arizona Department of Transportation, and Maricopa County Air Quality Department (MCAQD).

To meet the requirements of Section 189 (d) of the Clean Air Act, the MAG 2007 Five Percent Plan for PM-10 was submitted to the Environmental Protection Agency (EPA) by the federal deadline of December 31, 2007. Collectively, the Five Percent Plan included fifty-three control measures from the State, Maricopa County, and local governments. The plan demonstrated that the measures would reduce PM-10 emissions by at least five percent per year and demonstrated attainment of the PM-10 standard in 2010. The region needed three years of clean data at the monitors in 2008, 2009 and 2010 in order for the region to be in attainment of the PM-10 standard in 2010. There have been no violations of the standard during stagnant conditions since the plan was submitted in 2007.

On September 9, 2010, EPA had published a notice of proposed partial approval and disapproval of the plan in the Federal Register. There were two major reasons for the proposed disapproval: the EPA nonconcurrence with four high wind exceptional events at the West 43rd Avenue monitor in 2008 resulted in a violation, which negated the attainment demonstration, and that the 2005 baseline emissions inventory was inaccurate since it overestimated construction and other emissions.

On January 25, 2011, the Arizona Department of Environmental Quality voluntarily withdrew the MAG 2007 Five Percent Plan for PM-10 to address technical approvability issues and include new information, such as the new EPA equation for paved road dust emissions. While the plan was withdrawn, the measures continue to be implemented to reduce PM-10.

Consequently, the MAG 2012 Five Percent Plan for PM-10 has been prepared to meet the requirements in Section 189 (d) of the Clean Air Act and improve air quality in the Maricopa County nonattainment area. The plan is required to reduce PM-10 emissions by at least five percent per year until the standard is attained as measured by the monitors. The Clean Air Act specifies that the plan must be based upon the most recent emissions inventory for the area and also include a modeling demonstration of attainment. The 2012 Five Percent Plan is designed to be a replacement for the 2007 plan that was withdrawn.

The formation of PM-10 particulate pollution is dependent upon several factors. Among

these factors are stagnant air masses, severe temperature inversions in the winter, high winds from thunderstorms and frontal systems, and fine, silty soils characteristic of desert locations. In the nonattainment area, high PM-10 concentrations generally occur in September through March, on days with stagnant or near-stagnant conditions. High PM-10 concentrations can also occur during thunderstorm outflows and frontal systems which create high winds that entrain soil particles from bare surfaces.

The trend in PM-10 levels for the Maricopa County nonattainment area is presented in Figure ES-1. The 24-hour PM-10 standard is 150 micrograms per cubic meter. In 2008, there were 11 exceedance days of the 24-hour standard. Most of these exceedances were exceptional events. However, EPA did not concur with four high wind exceptional event days at the West 43rd Avenue monitor in 2008, resulting in a violation of the PM-10 standard. All of the seven exceedance days in 2009 have been flagged as exceptional events and EPA concurrence is pending. In 2010, only one exceedance day of the PM-10 standard occurred, which did not constitute a violation of the standard. Figure ES-2 indicates the monitors where exceedances have occurred.

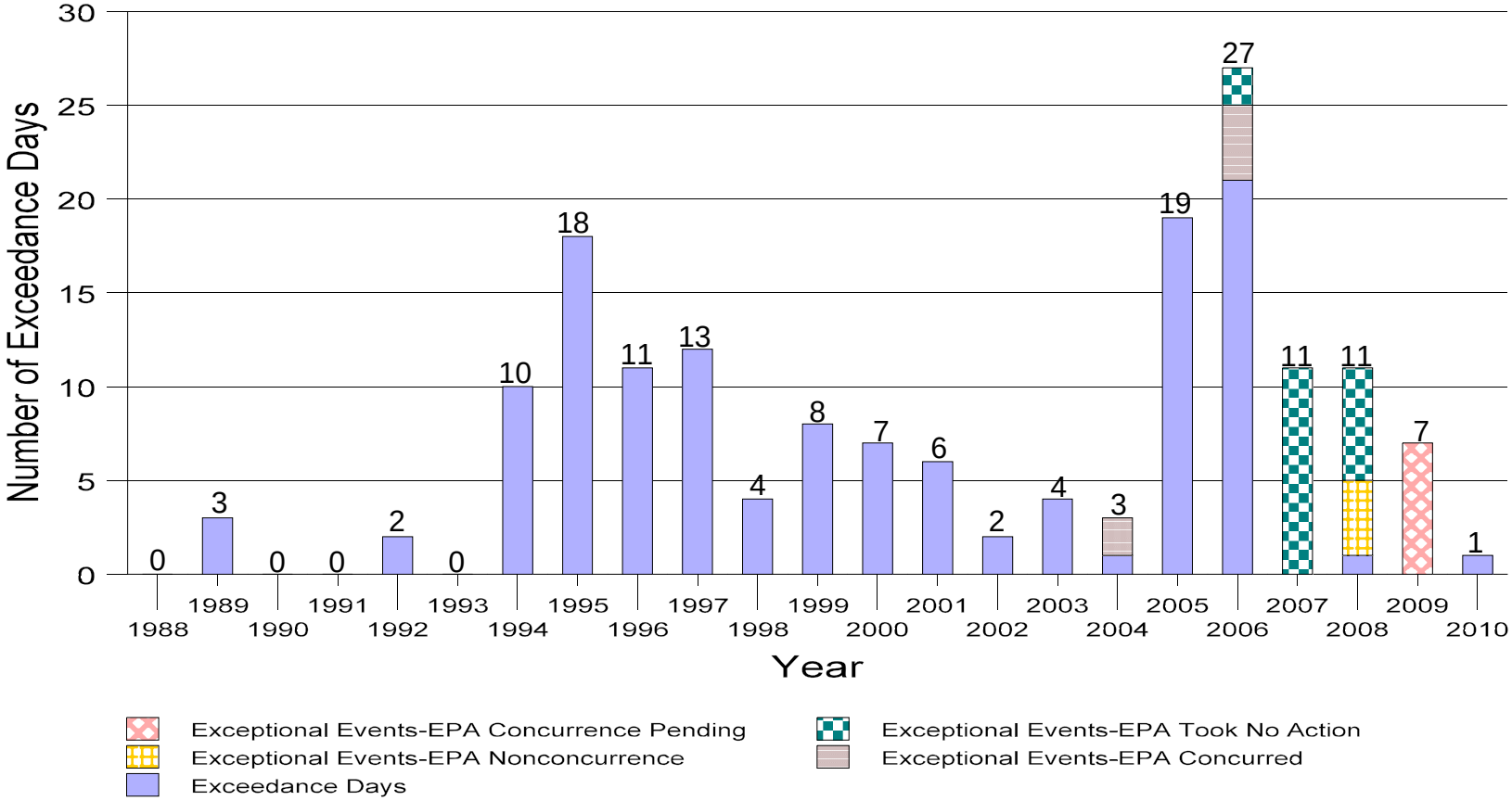
It is important to note that beginning in 2004, the Arizona Department of Environmental Quality began flagging exceptional events. These are uncontrollable natural events (e.g., high winds, wildfires) or human-caused events that are not expected to recur at a given location (e.g., fireworks). The data and a demonstration of the exceptional event are submitted to EPA for concurrence.

Based upon the Maricopa County Air Quality Department 2008 Periodic Emissions Inventory (PEI) for PM-10 for the Maricopa County Nonattainment Area, the primary sources of PM-10 are: Unpaved Road Fugitive Dust - 24 percent; Construction Activities (residential, commercial, road, and other earthmoving) - 17 percent; Paved Road Fugitive Dust - 14 percent; Windblown Dust - 10 percent; and Onroad Mobile Vehicle Exhaust, Tire Wear and Brake Wear - 7 percent. The remaining categories in the inventory individually contribute 6 percent or less to the total annual emissions. The sources are depicted in Figure ES-3.

The 2007 and 2009-2012 base case emissions were derived from the 2008 PEI emissions, using annual population and employment growth factors published in August 2011 by Marshall Vest of the Economic and Business Research Center at the University of Arizona. These projections are based on the 2010 U.S. Census and the latest economic forecasts for the Phoenix-Mesa metropolitan area. Since the economic outlook for Arizona remains extremely unstable, the actual population and employment levels in 2011 and 2012 may differ somewhat from the projections. However, the University of Arizona growth factors represent the most reliable data currently available.

The annual five percent reduction target was calculated by multiplying the total 2007 PM-10 emissions in Table ES-1 (59,218 tons) by five percent, which results in 2,961 tons. To meet the 189(d) requirement, the 2008 emissions must be at least 2,961 tons less than

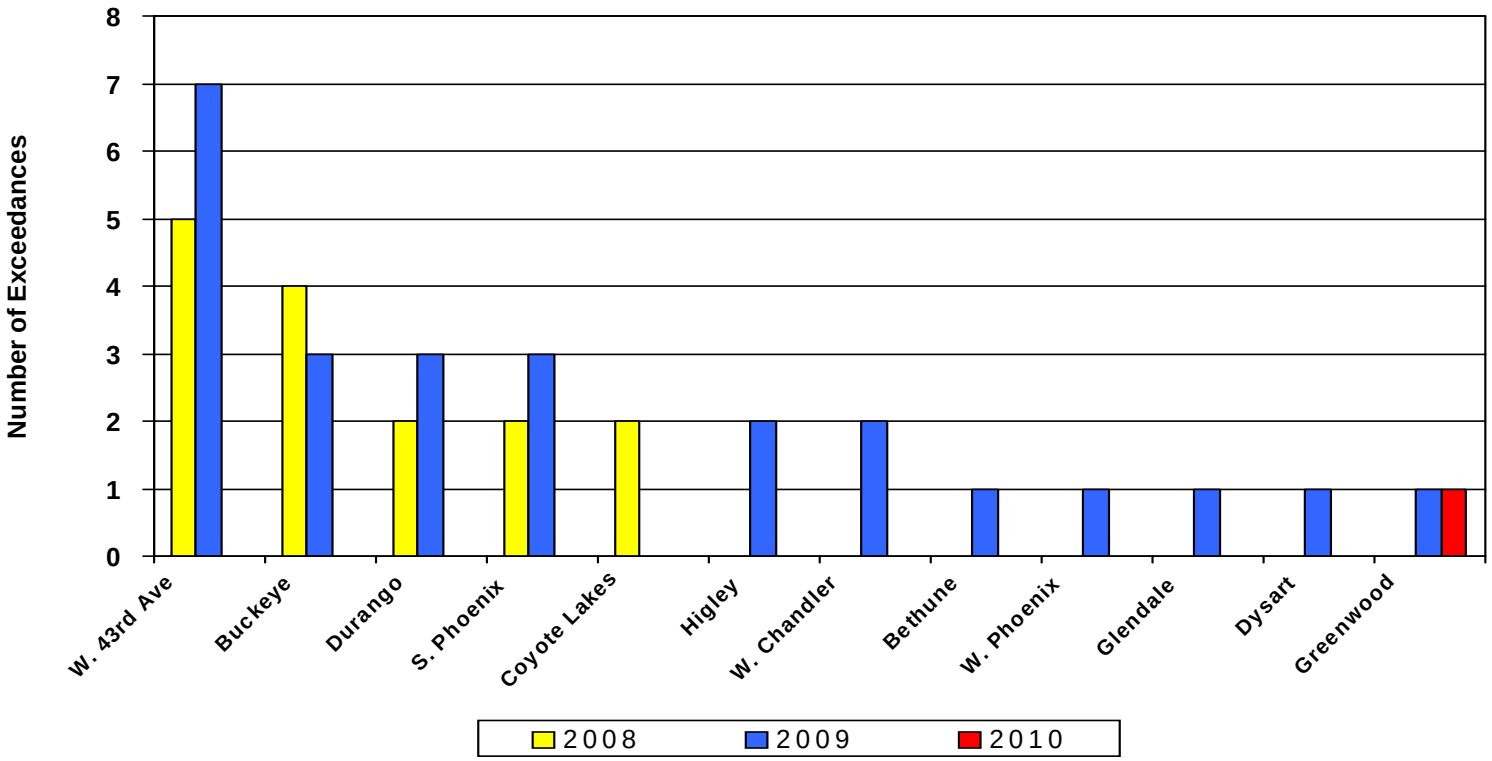
Figure ES-1
Number of 24-Hour PM-10 Exceedance Days



Notes: -The Arizona Department of Environmental Quality began flagging exceptional events in 2004.
-The chart includes exceedance days at the Buckeye monitor, which is located outside the PM-10 nonattainment area.
-On July 19, 2007, the exceedance at the Buckeye monitor was not associated with the exceptional event that also occurred on that day.

Sources: 1988 - 1997 - Revised MAG 1999 Serious Area Particulate Plan for PM-10 for the Maricopa County Nonattainment Area, February 2000.
1998 - 2010 - EPA Air Quality System.

Figure ES-2
Exceedances of the 24-Hour PM-10 Standard at Monitors in Maricopa County

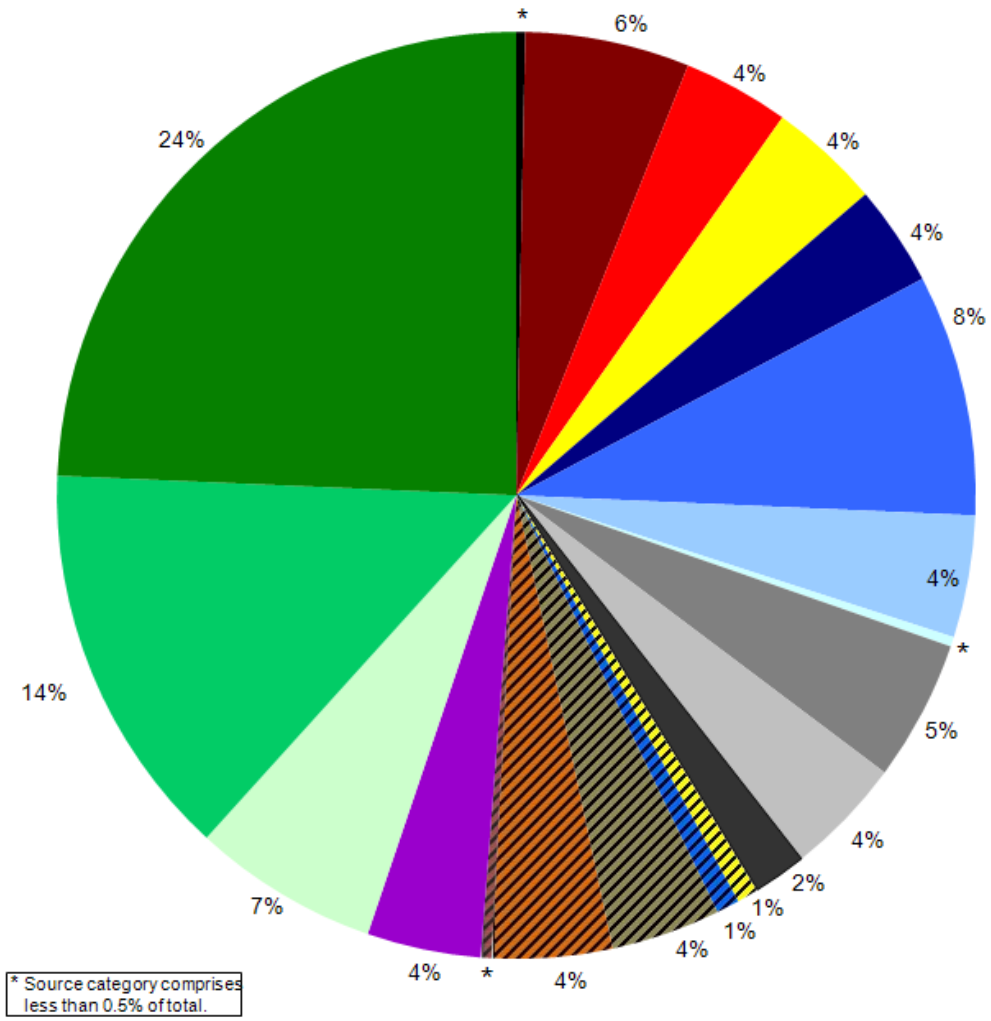


Notes:
1. Exceedances are based on data from the EPA Air Quality System (AQS).
2. All exceedances in 2008 except for one at the Durango Complex monitor have been flagged as exceptional events. EPA did not concur with four exceptional events at the West 43rd Avenue monitor and has not taken action on the remaining events.
3. All exceedances in 2009 have been flagged as exceptional events. EPA concurrence is pending.
4. The one exceedance in 2010 was not flagged as an exceptional event.
5. The chart includes exceedances from the Buckeye monitor, which is outside the PM-10 nonattainment area.

Figure ES-3

2008 PM-10 Emissions Inventory

PM-10 Nonattainment Area Total = 48,148 tons/yr



Source Categories	%
Major stationary point sources	(<0.5%)
All other industrial processes	(6%)
Fuel combustion and fires	(4%)
Agricultural tilling/harvesting	(4%)
Construction, residential	(4%)
Construction, commercial	(8%)
Construction, road	(4%)
Other earthmvg: trenching, weed control	(<0.5%)
Travel on unpaved parking lots	(5%)
Offroad recreational vehicles fugitive dust	(4%)
Leaf blowers fugitive dust	(2%)
Windblown: agricultural land	(1%)
Windblown: developing land	(1%)
Windblown: vacant land	(4%)
Windblown: open areas	(4%)
Windblown: S&G, landfills, test tracks	(<0.5%)
Nonroad mobile sources	(4%)
Vehicle exhaust, tire wear, brake wear	(7%)
Paved road fugitive dust, including trackout	(14%)
Unpaved road fugitive dust	(24%)

Table ES-1
2007-2012 Base Case PM-10 Emissions in the PM-10 Nonattainment Area

Source Category	2007	2008	2009	2010	2011	2012
	(tons/year)					
POINT	159	150	133	127	128	135
AREA						
Fuel combustion	1,276	1,301	1,307	1,311	1,316	1,328
Commercial cooking	974	993	998	1,001	1,005	1,014
Construction (includes windblown dust)	16,672	13,811	9,692	8,359	8,102	8,223
Tilling, harvesting and cotton ginning	936	893	893	893	893	893
Travel on unpaved farm roads	769	731	731	731	731	731
Livestock	261	261	261	261	261	261
Travel on unpaved parking lots	2,376	2,422	2,434	2,441	2,451	2,473
Offroad recreational vehicles	2,139	2,180	2,191	2,198	2,206	2,226
Leaf blowers	878	895	899	902	906	914
Windblown agriculture	448	448	448	448	448	448
Other windblown sources	5,430	5,430	5,430	5,430	5,430	5,430
Fires	497	497	497	497	497	497
Mining/quarrying (includes windblown dust)	752	721	661	641	643	667
Travel on industrial paved/unpaved roads	771	728	645	618	621	654
Other industrial sources	1,033	976	865	828	832	877
NONROAD						
Aircraft	194	184	152	142	143	146
Airport ground support equipment	29	27	23	21	20	20
Locomotives	34	34	34	34	34	34
Other nonroad equipment	1,710	1,683	1,661	1,641	1,595	1,513
ONROAD						
Exhaust	2,943	2,836	2,647	2,371	1,843	1,407
Tire wear	246	256	257	257	258	261
Brake wear	728	758	767	771	773	787
Paved roads	7,749	8,155	8,214	8,289	8,323	8,422
Unpaved roads and alleys	10,218	10,312	10,284	10,284	10,284	10,312
Totals	**59,218**	**56,681**	**52,123**	**50,497**	**49,743**	**49,673**

the 2007 base case emissions. Each year after 2008 imposes yet another 2,961 ton reduction requirement. Thus, the cumulative reduction requirements (relative to 2007 base case emissions) are at least 5,922 tons in 2009, 8,883 tons in 2010, 11,844 tons in 2011, and 14,805 tons in 2012.

The new MAG 2012 Five Percent Plan for PM-10 contains a wide variety of existing control measures and projects that have been implemented to reduce PM-10 and a new measure designed to reduce PM-10 during high risk conditions, including high winds. While the 2007 Five Percent Plan was withdrawn, a wide range of control measures in that plan continue to be implemented to reduce PM-10 and are being resubmitted. Table ES-2 includes the Arizona Statutes, Maricopa County Rules, a Maricopa County Ordinance, and Appendices for the resubmitted measures and a new high risk measure to be approved into the MAG 2012 Five Percent Plan for PM-10 for the Maricopa County Nonattainment Area. The 2012 Five Percent Plan also includes contingency measures that were implemented early such as PM-10 certified street sweeping on freeways and arterials, as well as the projects completed in 2008-2011 that paved and stabilized unpaved roads, alleys and shoulders; reduced speed limits; and overlaid highways with rubberized asphalt.

As described in Table ES-2, the Arizona Statutes, Maricopa County Rules, and Maricopa County Ordinance include requirements to reduce PM-10 emissions from a broad range of sources. The requirements apply to unpaved roads and shoulders, leaf blowers, unpaved parking lots, vacant lots, sweeping streets with certified sweepers, off-road vehicle use, open and recreational burning, residential woodburning, covered vehicle loads, dust generating operations, nonmetallic mineral processing, and other unpermitted sources.

To meet the annual five percent reduction requirement in Section 189 (d) of the Clean Air Act, the MAG 2012 Five Percent Plan takes credit for increases in rule effectiveness for Maricopa County Rules 310 (Fugitive Dust from Dust-Generating Operations), 310.01 (Fugitive Dust from Non-Traditional Sources of Fugitive Dust) and 316 (Nonmetallic Mineral Processing). The increases in rule effectiveness are attributable to strengthened enforcement and increased compliance with these rules. EPA has approved Rules 310 and 310.01 in 2010 and Rule 316 in 2009, as part of the State Implementation Plan. Compliance with these rules has increased every year since 2007.

These Maricopa County rules also reduce emissions from a wide variety of sources and apply to the Maricopa County area. Maricopa County Rule 310 (Fugitive Dust from Dust-Generating Operations) regulates fugitive dust emissions from sources and activities such as: land clearing, earthmoving, weed abatement, excavating, construction, demolition, bulk material handling, storage and transporting operations, outdoor equipment, motorized machinery, staging areas, parking areas, material storage areas, haul roads, disturbed surface areas, initial landscapes and trackout onto paved surfaces from these sources.

Maricopa County Rule 310.01 (Fugitive Dust from Non-Traditional Sources of Fugitive Dust) regulates fugitive dust emissions from sources and activities such as: vehicle use in

Table ES-2
Arizona Statutes, Maricopa County Rules, Maricopa County Ordinance, and Appendices to be Approved into the MAG 2012 Five Percent Plan for PM-10 for the Maricopa County Nonattainment Area

Arizona Revised Statutes (A.R.S.)	Description	Effective Dates
A.R.S. § 9-500.04. Only A.3., A.5., A.6., A.7., A.8., A.9. and H.	Air quality control; definitions [city and town requirements in Area A regarding targeting unpaved roads and shoulders; leaf blower restrictions; restrictions related to parking, maneuvering, ingress and egress areas and vacant lots; requirement for certified street sweepers]	9/19/07
A.R.S. § 9-500.27.	Off-road vehicle ordinance; applicability; violation; classification	9/19/07
A.R.S. § 11-871. Only A., B. and D.4.	Emissions control; no burn; exemptions; penalty [no burn restriction for any HPA day, increased civil penalty]	9/19/07
A.R.S. § 11-877.	Air quality control measures [county leaf blower restrictions]	9/19/07
A.R.S. § 28-1098. Only A. and C.1.	Vehicle loads; restrictions; civil penalties [for safety or air pollution prevention purpose]	9/19/07
A.R.S. § 49-424. Only 11.	Duties of department [develop and disseminate air quality dust forecasts for the Maricopa County PM-10 nonattainment area]	7/20/11
A.R.S. § 49-457.01.	Leaf blower use restrictions and training; leaf blower equipment sellers; informational material; outreach; applicability	9/19/07
A.R.S. § 49-457.03.	Off-road vehicles; pollution advisory days; applicability; penalties	9/19/07
A.R.S. § 49-457.04.	Off-highway vehicle and all-terrain vehicle dealers; informational material; outreach; applicability	9/19/07
A.R.S. § 49-457.05. Only A., B., C., D. and I.	Dust action general permit; best management practices; applicability; definitions	7/20/11
A.R.S. § 49-474.01. Only A.4., A.5., A.6., A.7., A.8., A.11., B. and H.	Additional board duties in vehicle emissions control areas; definitions [county requirements for stabilization of targeted unpaved roads, alleys and shoulders; restrictions related to parking, maneuvering, ingress and egress areas and vacant lots; requirement for certified street sweepers]	9/19/07
A.R.S. § 49-474.05.	Dust control; training; site coordinators	9/19/07
A.R.S. § 49-474.06.	Dust control; subcontractor registration; fee	9/19/07
A.R.S. § 49-501. Only A.2., B.1., C., F. and G.	Unlawful open burning; exceptions; civil penalty; definitions [ban on outdoor fires from May 1 to September 30; deletion of recreational purpose exemption; no burn day restrictions; penalty provision]	9/19/07
A.R.S. § 49-541. Only 1.	Definitions [Area A]	8/9/01

Table ES-2 Continued

Maricopa County Air Quality Department Rules	Description	Effective Dates
310	Fugitive Dust from Dust-Generating Operations Adopted 1/27/10 and submitted to EPA 4/12/10 [Notice of Final Rulemaking 75 FR 78167; 12/15/10]	EPA approved effective 1/14/11
310.01	Fugitive Dust From Non-Traditional Sources of Fugitive Dust Adopted 1/27/10 and submitted to EPA 4/12/10 [Notice of Final Rulemaking 75 FR 78167; 12/15/10]	EPA approved effective 1/14/11
314	Open Outdoor Fires and Indoor Fireplaces at Commercial and Institutional Establishments Adopted 3/12/08 and submitted to EPA 7/10/08 [Notice of Final Rulemaking 74 FR 57612; 11/9/09]	EPA approved effective 1/8/10
316	Nonmetallic Mineral Processing Adopted 3/12/08 and submitted to EPA 7/10/08 [Notice of Final Rulemaking 74 FR 58553; 11/13/09]	EPA approved effective 1/8/10
Appendix C	Fugitive Dust Test Methods Adopted 3/26/08 and submitted to EPA 7/10/08 [Notice of Final Rulemaking 75 FR 78167; 12/15/10]	EPA approved effective 1/14/11
Maricopa County Ordinance	Description	Effective Dates
P-26	Residential Woodburning Restriction Adopted 3/26/08 and submitted to EPA 7/10/08; [Notice of Final Rulemaking 74 FR 57612; 11/9/09]	EPA approved effective 1/8/10
Appendices	Description	Effective Dates
Appendix C, Exhibit 1	Arizona Revised Statutes Listed in Table 4-1	
Appendix C, Exhibit 2	Maricopa County Resolution to Evaluate Measures in the MAG 2012 Five Percent Plan for PM-10 for the Maricopa County Nonattainment Area	11/16/11
Appendix C, Exhibit 3	Arizona Department of Environmental Quality Dust Action General Permit	12/30/11
Appendix C, Exhibit 4	Arizona Department of Environmental Quality Commitment to Revise the MAG 2012 Five Percent Plan for PM-10 for the Maricopa County Nonattainment Area if Necessary for the Emerging and Voluntary Measure	

open areas and vacant lots, open areas, vacant lots, unpaved parking lots, unpaved roadways (including alleyways), easements, rights-of-way, access roads and trackout onto paved surfaces from these activities.

Maricopa County Rule 316 (Nonmetallic Mineral Processing) regulates fugitive dust and process dust emissions from sources and activities such as: mining, excavating, separating, combining, crushing and grinding any nonmetallic mineral, asphaltic concrete plants, raw material storage and distribution, concrete plants, bagging operations, open storage piles, material handling, haul roads, and trackout onto paved surfaces from these sources.

Emissions reduction credit is also taken for one new measure, the Dust Action General Permit, which was passed by the Arizona Legislature in April 2011. In accordance with A.R.S. § 49-457.05, this Dust Action General Permit identifies a series of Best Management Practices (BMPs) for specific dust generating operations. When ADEQ's Maricopa County Dust Control Forecast predicts that day is at high risk for dust generation, those dust generating operations that are not already required to control dust through a permit issued by the Arizona Department of Environmental Quality or the Maricopa County Air Quality Department are expected to choose and implement at least one BMP to reduce or prevent PM-10 emissions. Implementation of a BMP is expected to occur as soon as practicable before and during the high risk event. Although the BMPs in the Dust Action General Permit only apply to those sources that do not already have a permit, even dust generating operations with an air quality permit are also expected to implement the dust controls in their permit at the same time.

According to state statute, BMPs identified in the Dust Action General Permit are expected to be employed absent the requirement to obtain an air quality permit. If the owner or operator of a dust-generating operation is found by ADEQ's Director to have failed to choose and implement an applicable BMP as soon as practicable before and during a day that is forecast to be at high risk of dust generation, then the owner or operator can be required to obtain an Authorization to Operate under the Dust Action General Permit.

This new measure is expected to raise rule effectiveness for Rule 310.01 by one percent during high wind hours and was fully implemented by January 1, 2012. Credit for this measure is allowed under the EPA guidance, *Incorporating Emerging and Voluntary Measures in a State Implementation Plan*. The measures used to demonstrate the annual five percent reductions are also necessary to model attainment of the PM-10 standard under high wind conditions at all monitors as expeditiously as practicable, which is 2012.

Table ES-3 shows the impact of the increases in rule effectiveness on PM-10 emissions in 2008 through 2012. This table also quantifies the annual five percent reductions for 2008 through 2012. The total reduction in PM-10 emissions between 2007 and 2012 with the increases in rule effectiveness is 16,089 tons, which represents a 27.2 percent reduction in total 2007 base case emissions.

Table ES-3
2008-2012 PM-10 Emissions with Increased Rule Effectiveness

Source Category	2008	2009	2010	2011	2012
	(tons/year)				
POINT	150	133	127	128	135
AREA					
Fuel combustion	1,301	1,307	1,311	1,316	1,328
Commercial cooking	993	998	1,001	1,005	1,014
Construction (includes windblown dust)	8,355	5,333	4,139	4,014	4,073
Tilling, harvesting and cotton ginning	893	893	893	893	893
Travel on unpaved farm roads	731	731	731	731	731
Livestock	261	261	261	261	261
Travel on unpaved parking lots	2,422	2,434	2,441	2,451	2,473
Offroad recreational vehicles	2,180	2,191	2,198	2,206	2,226
Leaf blowers	895	899	902	906	914
Windblown agriculture	448	448	448	448	448
Other windblown sources	3,938	3,788	3,788	3,788	3,639
Fires	497	497	497	497	497
Mining/quarrying (includes windblown dust)	476	401	355	356	369
Travel on industrial paved/unpaved roads	472	382	331	333	351
Other industrial sources	976	865	828	832	877
NONROAD					
Aircraft	184	152	142	143	146
Airport ground support equipment	27	23	21	20	20
Locomotives	34	34	34	34	34
Other nonroad equipment	1,683	1,661	1,641	1,595	1,513
ONROAD					
Exhaust	2,836	2,647	2,371	1,843	1,407
Tire wear	256	257	257	258	261
Brake wear	758	767	771	773	787
Paved roads	8,155	8,214	8,289	8,323	8,422
Unpaved roads and alleys	10,312	10,284	10,284	10,284	10,312
Totals	**49,231**	**45,600**	**44,062**	**43,438**	**43,130**
5% Reduction Targets (tons/year)	**2,961**	**5,922**	**8,883**	**11,844**	**14,805**
Actual Plan Reductions (tons/year)	**9,987**	**13,618**	**15,157**	**15,781**	**16,089**

Table ES-4 confirms that the annual five percent reduction requirements are met in 2008-2012 and there is a surplus margin of benefit in each year. The total surplus in 2012 is 1,284 tons. This surplus is needed to model attainment at all monitors in the PM-10 nonattainment area by December 31, 2012.

In accordance with the Clean Air Act, the MAG 2012 Five Percent Plan for PM-10 also includes contingency measures. The contingency measures are required to achieve emissions reductions beyond those measures relied upon to model attainment of the standard and demonstrate progress toward attainment (five percent reductions, reasonable further progress, and milestones). They are required to be undertaken without further action by the State or the EPA Administrator if the area fails to make reasonable further progress or meet the standard by the attainment date. EPA encourages early implementation of contingency measures to reduce emissions as expeditiously as practicable.

EPA guidance indicates that contingency measures should provide emissions reductions equivalent to one year of reasonable further progress. For the Five Percent Plan, one year of reasonable further progress is equivalent to a reduction in PM-10 emissions of 3,218 tons.

The contingency requirement is met in the MAG 2012 Five Percent Plan by quantifying projects that were completed in 2008-2011. A summary of the miles of roads, alleys and shoulders impacted by the paving and stabilization, speed limit reduction, and rubberized asphalt overlay projects that were quantified to meet the contingency requirement is presented in Table ES-5. These PM-10 reduction projects were implemented in the PM-10 nonattainment area by twenty-one cities and towns, Maricopa County, Pinal County, Arizona Department of Transportation and the Gila River Indian Community. All of the projects for which credit was taken were open to traffic by September 2011.

The emissions reductions for all measures quantified to meet the contingency requirement are summarized in Table ES-6. Table ES-6 includes the benefits of the PM-10 certified street sweeping on freeways and arterials, as well as the projects completed in 2008-2011 that paved and stabilized unpaved roads, alleys and shoulders; reduced speed limits; and overlaid highways with rubberized asphalt. The total PM-10 emissions reduction in 2012 is 3,439 tons, which exceeds the contingency target of 3,218 tons by 221 tons.

The total 2012 PM-10 emissions, with the air quality benefits from the wide variety of control measures and contingency projects applied, are 39,691 tons per year (see Table ES-7). Together, these measures reduce the 2007 base case PM-10 emissions by 19,527 tons or by 33 percent. A pie chart of the 2012 nonattainment area PM-10 emissions with the five percent measures and contingency projects applied is shown in Figure ES-4.

For conformity analyses, the onroad mobile source emissions budget includes reentrained dust from travel on paved roads; vehicular exhaust, tire wear, and brake wear; travel on unpaved roads; and road construction. In 2012, the PM-10 emissions from these four source categories total 54.9 metric tons per day for the PM-10 nonattainment area. This represents the onroad mobile source emissions budget for conformity.

Table ES-4
PM-10 Emission Reductions and Five Percent Reduction Requirements

Year	5% Reduction Requirement (tons/year)	Total PM-10 Emission Reductions due to Increases in Rule Effectiveness (tons/year)	Excess Benefit = Total PM-10 Emission Reductions minus 5% Reduction Requirement (tons/year)	(%)
2008	2,961	9,987	7,026	237%
2009	5,922	13,618	7,696	130%
2010	8,883	15,157	6,274	71%
2011	11,844	15,781	3,937	33%
2012	14,805	16,089	1,284	9%

Table ES-5
Miles of Roads/Alleys/Shoulders in PM-10 Reduction Projects

Miles Impacted by Project Type	2008	2009	2010	2011	Total 2008-2011
Miles of dirt roads paved	41	18	8	16	83
Miles of dirt roads stabilized	39	39	36	31	145
Miles of dirt alleys paved	66	4	0	63	134
Miles of dirt alleys stabilized	164	106	124	106	501
Total miles of roads/alleys paved & stabilized	310	168	168	216	862
Miles of dirt shoulders paved	70	107	49	6	233
Miles of curb and gutter paved	19	0	0	0	19
Miles of dirt shoulders stabilized	235	236	236	200	906
Total miles of shoulders paved & stabilized	324	343	285	207	1,158
Miles of roads/alleys with lower speed limits	7	11	3	0	20
Miles of highway overlaid w/rubberized asphalt	13	0	0	0	13

Table ES-6
2008-2012 PM-10 Reductions to Meet Contingency Requirements

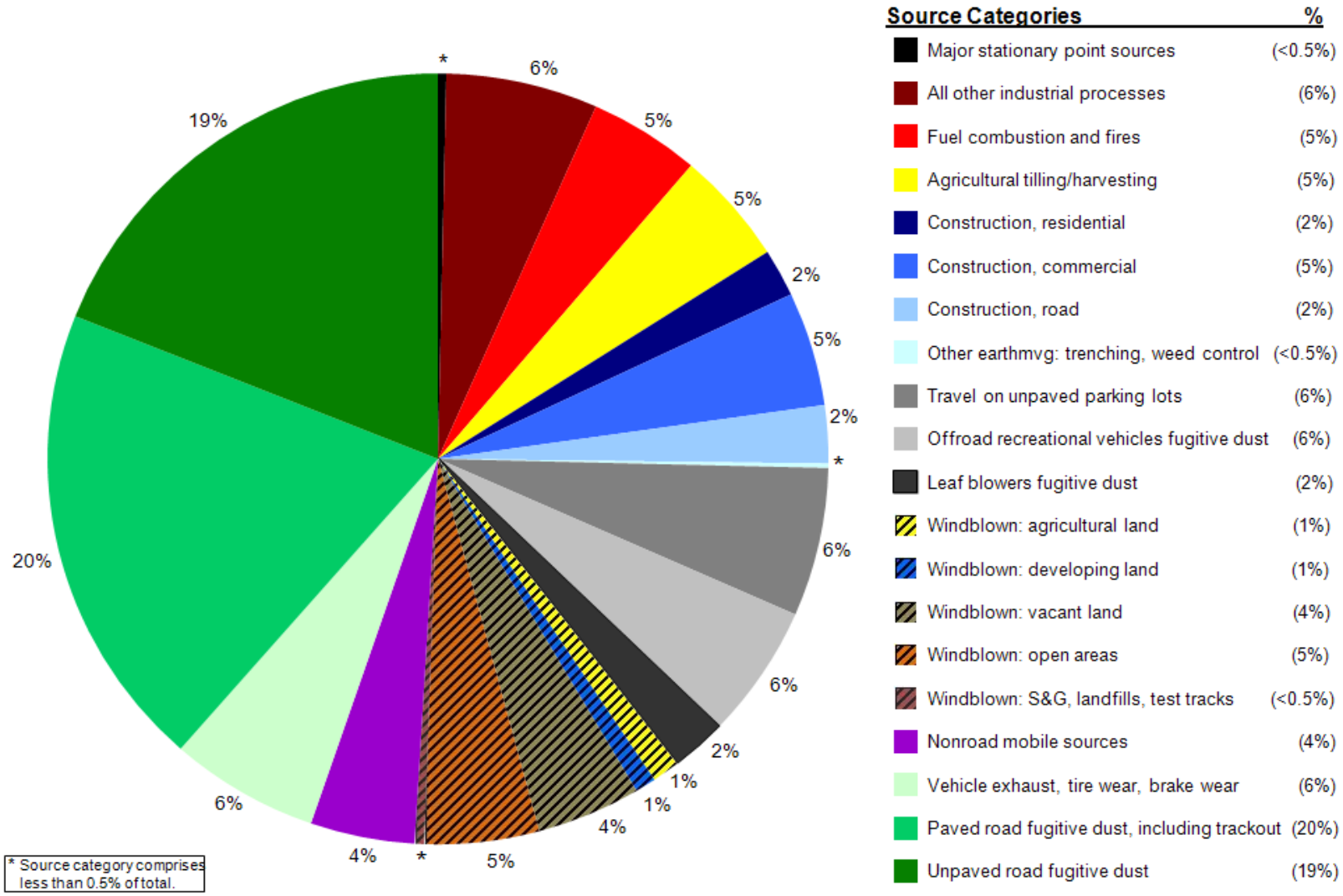
Completed Projects	Implementing Entities	2008	2009	2010	2011	2012
		(tons/year)				
Sweep streets with PM-10 certified sweepers Contracted sweeping of freeways, ramps and frontage roads - 100% compliant, effective 2/20/10 27 PM-10 certified sweepers purchased with CMAQ funds: 1/1/07-12/31/09	ADOT	0	0	294	342	344
	Cities, towns	59	116	153	154	155
	Total for Street Sweeping	**59**	**116**	**447**	**495**	**499**
Pave or stabilize existing public dirt roads and alleys Paving/stabilization projects completed in 2008-2011	Cities, towns, Maricopa and Pinal County Gila River Indian Community	461	1,352	2,124	2,662	2,625
	Total for Road/Alley Paving/Stabilization	**461**	**1,352**	**2,124**	**2,662**	**2,625**
Lower speed limits on dirt roads and alleys Speed limits lowered in 2008-2011	Cities, towns, Maricopa County	4	78	161	161	161
	Total for Lower Speed Limits	**4**	**78**	**161**	**161**	**161**
Pave or stabilize unpaved shoulders Paving/stabilization projects completed in 2008-2011	Cities, towns, Maricopa County	173	242	265	293	150
	Total for Shoulder Paving/Stabilizing	**173**	**242**	**265**	**293**	**150**
Repave or overlay paved roads with rubberized asphalt Rubberized asphalt overlays completed in 2008-2011	ADOT	0	3	3	3	3
	Total for Overlays	**0**	**3**	**3**	**3**	**3**
	Total for Completed Projects	**697**	**1,790**	**2,999**	**3,614**	**3,439**

Table ES-7
2008-2012 PM-10 Emissions with Five Percent Plan Measures and Contingency Projects

Source Category	2008	2009	2010	2011	2012
POINT	150	133	127	128	135
AREA					
Fuel combustion	1,301	1,307	1,311	1,316	1,328
Commercial cooking	993	998	1,001	1,005	1,014
Construction (includes windblown dust)	8,355	5,333	4,139	4,014	4,073
Tilling, harvesting and cotton ginning	893	893	893	893	893
Travel on unpaved farm roads	731	731	731	731	731
Livestock	261	261	261	261	261
Travel on unpaved parking lots	2,422	2,434	2,441	2,451	2,473
Offroad recreational vehicles	2,180	2,191	2,198	2,206	2,226
Leaf blowers	895	899	902	906	914
Windblown agriculture	448	448	448	448	448
Other windblown sources	3,938	3,788	3,788	3,788	3,639
Fires	497	497	497	497	497
Mining/quarrying (includes windblown dust)	476	401	355	356	369
Travel on industrial paved/unpaved roads	472	382	331	333	351
Other industrial sources	976	865	828	832	877
NONROAD					
Aircraft	184	152	142	143	146
Airport ground support equipment	27	23	21	20	20
Locomotives	34	34	34	34	34
Other nonroad equipment	1,683	1,661	1,641	1,595	1,513
ONROAD					
Exhaust	2,836	2,647	2,371	1,843	1,407
Tire wear	256	254	255	255	259
Brake wear	758	767	771	773	787
Paved roads	7,922	7,857	7,578	7,534	7,772
Unpaved roads and alleys	9,847	8,854	7,999	7,461	7,525
Totals	**48,534**	**43,810**	**41,062**	**39,823**	**39,691**
Total PM-10 Emissions Reduction 2007-2012:				**19,527 tons, 33.0%**	

Figure ES-4

2012 PM-10 Emissions Inventory with Five Percent Plan Measures and Contingency Projects
PM-10 Nonattainment Area Total = 39,691 tons/yr



CHAPTER ONE

INTRODUCTION

Within the Maricopa County nonattainment area, the National Ambient Air Quality Standard has not yet been attained for PM-10 particulate pollution. The area is classified as a Serious Area under the Clean Air Act. On February 7, 1978, the Governor of Arizona designated the Maricopa Association of Governments (MAG) as the lead planning organization for Maricopa County that, together with the State is responsible for determining which elements of the State Implementation Plan revision will be planned, implemented, and enforced by State and local governments in Arizona. This designation was made in accordance with the Clean Air Act Section 174 (a). In 1992, the Arizona Legislature recertified MAG as the regional planning agency in accordance with Section 174 of the 1990 Clean Air Act Amendments (A.R.S. Section 49-406 A.).

To meet the requirements of Section 189 (d) of the Clean Air Act, the MAG 2007 Five Percent Plan for PM-10 was submitted to the Environmental Protection Agency (EPA) by the federal deadline of December 31, 2007. Collectively, the Five Percent Plan included fifty-three control measures from the State, Maricopa County, and local governments. The plan demonstrated that the measures would reduce PM-10 emissions by at least five percent per year and demonstrated attainment of the PM-10 standard in 2010. The region needed three years of clean data at the monitors in 2008, 2009 and 2010 in order for the region to be in attainment of the PM-10 standard in 2010. There have been no violations of the standard during stagnant conditions since the plan was submitted in 2007.

On September 9, 2010, EPA had published a notice of proposed partial approval and disapproval of the plan in the Federal Register. There were two major reasons for the proposed disapproval: the EPA nonconcurrence with four high wind exceptional events at the West 43rd Avenue monitor in 2008 resulted in a violation, which negated the attainment demonstration, and that the 2005 baseline emissions inventory was inaccurate since it overestimated construction and other emissions.

On January 25, 2011, the Arizona Department of Environmental Quality (ADEQ) voluntarily withdrew the MAG 2007 Five Percent Plan for PM-10 to address technical approvability issues and include new information, such as the new EPA equation for paved road dust emissions. While the plan was withdrawn, the measures continued to be implemented to reduce PM-10.

Consequently, the MAG 2012 Five Percent Plan for PM-10 has been prepared to meet the requirements in Section 189 (d) of the Clean Air Act and improve air quality in the Maricopa County nonattainment area. The plan is required to reduce PM-10 emissions by at least five percent per year until the standard is attained as measured by the monitors. The Clean Air Act specifies that the plan must be based upon the most recent emissions inventory for the area and also include a modeling demonstration of attainment. The 2012

Five Percent Plan is designed to be a replacement for the 2007 plan that was withdrawn. The following narrative describes the historical background preceding the preparation of the MAG 2012 Five Percent Plan for PM-10.

HISTORICAL BACKGROUND

Based upon the 1990 Clean Air Act Amendments, the Maricopa County nonattainment area was initially classified as Moderate for PM-10 particulate pollution. However, on May 10, 1996, the nonattainment area was reclassified to Serious due to failure to attain the particulate standard by December 31, 1994. The Serious Area reclassification was effective on June 10, 1996.

The Revised MAG 1999 Serious Area Particulate Plan for PM-10 for the Maricopa County Nonattainment Area was submitted to the Environmental Protection Agency in February 2000. On July 25, 2002, EPA published a notice of final approval for the plan. Collectively, the plan contained approximately seventy-seven control measures from the State and local governments. The plan demonstrated attainment of the PM-10 standard by December 31, 2006.

In order to be in attainment, the region needed three years of clean data at the monitors for 2004, 2005, and 2006. However, there were numerous exceedances of the standard in 2005 and 2006. On June 6, 2007, EPA published a final notice with its findings that the Maricopa County nonattainment area had failed to attain the PM-10 standard by the federal deadline of December 31, 2006. It then became necessary for MAG to prepare a Five Percent Plan for PM-10.

In accordance with Section 189 (d) of the Clean Air Act, a Five Percent Plan for PM-10 was due to the Environmental Protection Agency by December 31, 2007. The plan was required to reduce PM-10 emissions by at least five percent per year until the standard was attained as measured by the monitors. The Clean Air Act specified that the plan must be based upon the most recent emissions inventory for the area and also include a modeling demonstration of attainment.

The MAG 2007 Five Percent Plan for PM-10 was submitted to EPA by the federal deadline of December 31, 2007. Collectively, the Five Percent Plan for PM-10 included fifty-three control measures from the State, Maricopa County, and local governments. The plan demonstrated that the measures would reduce PM-10 emissions by at least five percent per year and demonstrated attainment of the PM-10 standard in 2010. The region needed three years of clean data at the monitors in 2008, 2009 and 2010 in order for the region to be in attainment of the PM-10 standard in 2010. There have been no violations of the standard during stagnant conditions since the plan was submitted in 2007.

In 2008, there were a number of exceedances of the twenty-four hour PM-10 standard due to high winds in the Maricopa County nonattainment area. In June 2009, the Arizona Department of Environmental Quality (ADEQ) had submitted a preliminary demonstration

to EPA on the 2008 high wind events, since high wind exceptional events should not count against the region. In November 2009, the ADEQ submitted final demonstrations for the exceedances, including five at the West 43rd Avenue monitor.

On December 2, 2009, the Arizona Center for Law in the Public Interest filed a lawsuit against EPA for failure to take action on the plan by June 30, 2009 in accordance with the Clean Air Act. The Environmental Protection Agency reviewed the plan that had been submitted two years ago and issues began to emerge. The plan was based upon a 2005 emissions inventory that was outdated with the downturn in the economy; the contribution of emissions from the sources had changed. EPA had concerns with the Arizona Department of Environmental Quality exceptional events documentation of four high wind exceedances in 2008 at the West 43rd Avenue monitor.

On May 21, 2010, the Environmental Protection Agency sent a letter to the ADEQ indicating that EPA did not concur with the ADEQ documentation for the four high wind exceptional events at the West 43rd Avenue monitor. As a result, the four exceedances would constitute a violation at the monitor and the region would not have its first of three years of clean data needed to attain the standard by 2010.

On September 3, 2010, the Environmental Protection Agency signed a notice to propose partial approval and disapproval of the MAG 2007 Five Percent Plan for PM-10 based on the timetable in the consent decree with the Arizona Center for Law in the Public Interest. On September 9, 2010, the notice was published in the Federal Register. EPA proposed disapproval of the emissions inventories, attainment demonstration, five percent annual reductions in emissions, reasonable further progress and milestones, contingency measures, and the 2010 motor vehicle emissions budget. EPA proposed limited approval and disapproval for agricultural regulations. EPA proposed approval of the Arizona Revised Statutes that mandated twenty measures in the plan and the Agricultural Best Management Practices Guidance Booklet and Pocket Guide. Based upon the consent decree, EPA indicated that a notice of final action would be signed by January 28, 2011.

According to EPA, there were two major reasons for the proposed partial disapproval of the plan:

1. EPA contended that the modeling attainment demonstration in the plan cannot be approved if actual monitor data show that the area cannot attain the standard by the attainment date of December 31, 2010. This was directly resultant from the EPA nonconcurrence with the four high wind exceptional events at the West 43rd Avenue monitor in 2008. The four exceedances constituted a violation of the standard. EPA further indicated that it was not necessary to review the exceptional event claims for 2009 since the region did not have its first year of clean data in 2008 needed to attain the standard by 2010.

2. EPA contended that the 2005 baseline emissions inventory was inaccurate since it overestimated construction emissions and other emissions. The 2005 emissions

inventory prepared by the Maricopa County Air Quality Department was the foundation upon which the plan was developed. The emissions inventory was the basis for the air quality modeling prepared by MAG for the five percent reductions in emissions; impact of the plan measures and contingency measures; reasonable further progress (annual incremental emissions reductions to ensure attainment); milestone demonstrations every three years; and the attainment demonstration.

On January 25, 2011, the Arizona Department of Environmental Quality withdrew the MAG 2007 Five Percent Plan for PM-10 to address the technical approvability issues identified by EPA and include new information, such as the new EPA equation for paved road dust emissions. The new EPA equation was more accurate and would improve the emissions inventory. Although the plan was withdrawn, the measures continued to be implemented to reduce PM-10.

On February 14, 2011, the Environmental Protection Agency published a final notice in the Federal Register to make a Finding of Failure to Submit as a result of the withdrawal of the 2007 Five Percent Plan for PM-10. The Finding of Failure to Submit was effective on February 14, 2011. If a new complete plan is not submitted within eighteen months of the finding, the Clean Air Act sanction of tighter controls on major industries (two to one offsets) would be imposed by August 14, 2012. If a complete plan is not submitted within twenty-four months of the finding, the federal highway sanction and a federal implementation plan would be imposed by February 14, 2013. The submittal of a new plan and a completeness determination by EPA will stop the sanctions clocks. A plan approval action by EPA will stop the imposition of a federal plan.

OUTLINE OF THE MAG 2012 FIVE PERCENT PLAN FOR PM-10

The purpose of this document is to present the MAG 2012 Five Percent Plan for PM-10 for the Maricopa County Nonattainment Area. The plan contains a variety of existing control measures and projects that have been implemented to reduce PM-10 and a new measure designed to reduce PM-10 during high winds.

The MAG 2012 Five Percent Plan for PM-10 is composed of the following major sections:

1. Introduction (This Chapter) - Includes a general discussion of historical background and the outline of the MAG 2012 Five Percent Plan for PM-10.

2. Description of the Nonattainment Area - Includes a description of the nonattainment area; geography and climatic conditions.

3. Assessment of Air Quality Conditions - Includes a discussion of the formation of particulate pollution; PM-10 emissions inventory; and air quality monitoring data and trend analysis.

4. The Adopted Plan - Includes a table of statutes, rules, ordinance, and

appendices for the plan; Maricopa County Resolution to Evaluate Measures in the MAG 2012 Five Percent Plan for PM-10 for the Maricopa County Nonattainment Area; Arizona Department of Environmental Quality Dust Action General Permit; Arizona Department of Environmental Quality Commitment to Revise the MAG 2012 Five Percent Plan for PM-10 for the Maricopa County Nonattainment Area if Necessary for the Emerging and Voluntary Measure; tracking plan implementation; and assurances that the State has the authority to implement the measures in the plan.

5. Demonstration of Annual Five Percent Reductions in PM-10 Emissions - Includes a discussion of the measures quantified to meet the annual five percent requirement and demonstration for the five percent reduction requirement.

6. Attainment Demonstration - Includes a discussion of the Salt River area modeling; PM-10 nonattainment area modeling; reasonable further progress, contingency requirements; onroad mobile source emissions budget for conformity; expeditious attainment; and attainment date.

CHAPTER TWO

DESCRIPTION OF THE NONATTAINMENT AREA

The Maricopa County nonattainment area for particulates was formally designated in April 1974. As defined in the 1977 Clean Air Act, the term nonattainment area refers to locations which exceed any national ambient air quality standard for any pollutant based upon the data collected through air quality monitoring. A general description of the Maricopa County nonattainment area, including a discussion of the boundaries of the area and the geography and climatic conditions is provided below.

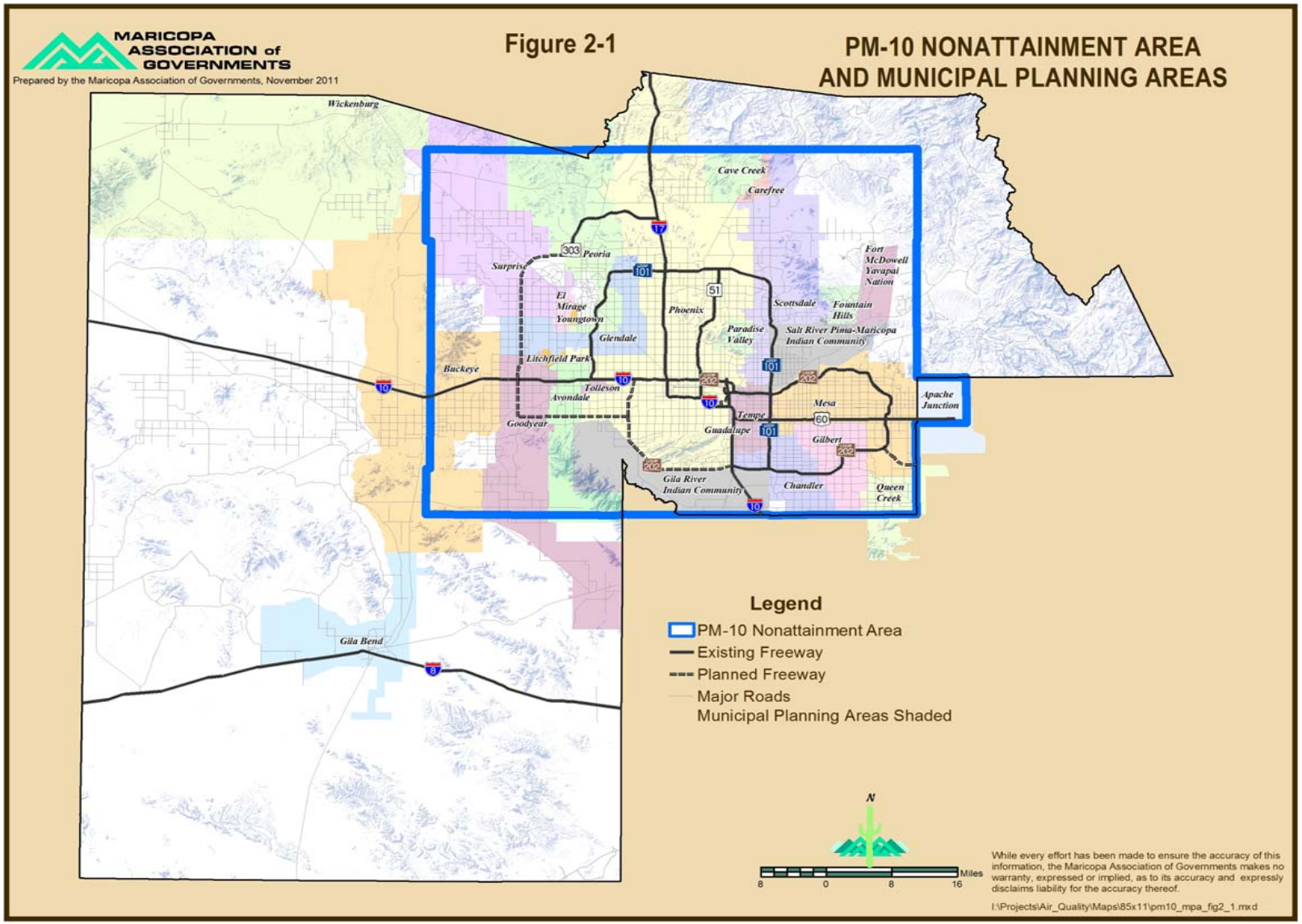
NONATTAINMENT AREA BOUNDARIES

When the Environmental Protection Agency promulgated the PM-10 National Ambient Air Quality Standard on July 1, 1987, there was little PM-10 monitoring data available for EPA to use in determining the nonattainment area boundaries. In the August 7, 1987 Federal Register, EPA promulgated its policy of categorizing areas of the country into three groups based on the probability that an area's existing State Implementation Plan (SIP) would need to be revised to protect or attain the new PM-10 standard. Group I areas were those areas which EPA identified as having a strong likelihood of violating the PM-10 standard and requiring substantial SIP revisions.

In the August 7, 1987 Federal Register, EPA identified the Group I area in Maricopa County, Arizona as the Phoenix Planning Area. In the October 31, 1990 Federal Register, EPA published technical corrections modifying the boundaries of certain areas of concern. The designation of the nonattainment area boundary is documented in the EPA letter dated September 11, 1991.

In the October 1990 Federal Register the area was defined as "The rectangle determined by, and including, T6N, R3W; T6N, R7E; T2S, R3W; T2S, R7E; T1N, R8E." The nonattainment area is generally encompassed by 259th Avenue on the west, Hunt Highway on the south, Meridian Road on the east and a boundary approximately six miles north of Carefree Highway on the north (see Figure 2-1). This area contains portions of the municipal planning areas for twenty-two cities and towns in Maricopa County, the Fort McDowell, Gila River, and Salt River Pima-Maricopa Indian Communities, as well as unincorporated areas under the jurisdiction of Maricopa County. The PM-10 nonattainment area also contains a six by six mile section in Pinal County that encompasses a portion of the Apache Junction Municipal Planning Area which includes unincorporated areas under the jurisdiction of Pinal County.

When determining the new PM-10 nonattainment area in 1987, the Environmental Protection Agency included the City of Apache Junction, a small eastern portion of Apache Junction lies in Maricopa County and the western portion lies in Pinal County. Pinal County


MARICOPA ASSOCIATION of GOVERNMENTS
Prepared by the Maricopa Association of Governments, November 2011
Figure 2-1
PM-10 NONATTAINMENT AREA AND MUNICIPAL PLANNING AREAS
Wickenburg
Cave Creek
Carefree
Peoria
Surprise
El Mirage
Youngtown
Glendale
Litchfield Park
Buckeye
Tolleson
Avondale
Goodyear
Phoenix
Paradise Valley
Scottsdale
Fountain Hills
Fort McDowell Yavapai Nation
Salt River Pima-Maricopa Indian Community
Tempe
Guadalupe
Mesa
Gilbert
Chandler
Queen Creek
Apache Junction
Gila River Indian Community
Gila Bend
Legend
PM-10 Nonattainment Area
Existing Freeway
Planned Freeway
Major Roads
Municipal Planning Areas Shaded
N
Miles
8
0
8
16
While every effort has been made to ensure the accuracy of this information, the Maricopa Association of Governments makes no warranty, expressed or implied, as to its accuracy and expressly disclaims liability for the accuracy thereof.
I:\Projects\Air_Quality\Maps\85x11\pm10_mpa_fig2_1.mxd

worked with the Arizona Department of Environmental Quality on a separate PM-10 plan for that portion of the nonattainment area.

GEOGRAPHY AND CLIMATIC CONDITIONS

Due to its valley location, the nonattainment area has an elevation of 1,105 feet above mean sea level (MSL) and is almost completely surrounded by mountains. The Salt River Mountains are located on the southern border of the nonattainment area and rise to an elevation of 2,507 feet above MSL. To the northwest, the Phoenix Mountains have an elevation of 2,310 feet above MSL. The Estrella Mountains are located to the southwest and have an elevation of 3,320 feet above MSL. On the western boundary, the White Tank Mountains rise to an elevation of 4,026 feet above MSL and on the eastern boundary, the Superstition Mountains rise to an elevation of 4,620 feet above MSL.

There are five main rivers that run through the nonattainment area: the Salt River, Agua Fria River, Gila River, New River, and Verde River. These river beds are generally dry, except during torrential rainfall, which happens infrequently.

The climate in the nonattainment area is arid continental, experiencing extreme ranges in daily temperatures. Temperatures range from a mean of 55.5 degrees Fahrenheit in December to a mean of 94.8 degrees Fahrenheit in July; the annual mean temperature is 74.2 degrees Fahrenheit. The sun shines approximately 85 percent of the time and the annual average rainfall is 8.29 inches. Most of the rainfall occurs from December through March and during the months of July and August. (Source: National Oceanic & Atmospheric Administration National Data Centers.)

In general, the morning direction for the prevailing winds in the nonattainment area is from east (southeast) to west (southwest). However, wind direction can change in the afternoon to a more westerly direction. The average annual wind speed is 6.2 miles per hour.

CHAPTER THREE

ASSESSMENT OF AIR QUALITY CONDITIONS

Within the Maricopa County nonattainment area, PM-10 is a problem throughout the year. Particulate air pollution is composed of solid particles or liquid droplets which are small enough to remain suspended in the air. The smaller the size, the more likely the particles are to reach the innermost portions of the lungs and cause damage. Major concerns for human health from exposure to particle pollution include: increased respiratory symptoms, such as irritation of the airways, coughing, or difficulty breathing; decreased lung function; aggravated asthma; development of chronic bronchitis; irregular heartbeat; nonfatal heart attacks; and premature death in people with heart or lung disease. The elderly, children, and people with heart and lung disease are especially sensitive to the effects of particulate matter. Particles that are 2.5 micrometers in diameter and smaller (PM-2.5) can lodge deep in the lungs and are believed to be the largest health risk. The EPA designated Maricopa County as an attainment area for PM-2.5 in September 2005.

In order to effectively reduce PM-10, it is important to assess air quality conditions in the PM-10 nonattainment area. This chapter presents a discussion of PM-10 formation, the Maricopa County Air Quality Department 2005 Periodic Emissions Inventory for PM-10 for the Maricopa County, Arizona, Nonattainment Area, and air quality monitoring data.

FORMATION OF PM-10 PARTICULATE POLLUTION

The formation of PM-10 particulate pollution is dependent upon several factors. Among these factors are stagnant air masses, severe temperature inversions in the winter, high winds from thunderstorms and frontal systems, and fine, silty soils characteristic of desert locations. In the nonattainment area, high PM-10 concentrations generally occur in September through March, on days with stagnant or near-stagnant conditions. High PM-10 concentrations can also occur during thunderstorm outflows and frontal systems which create high winds that entrain soil particles from bare surfaces.

The PM-10 in the arid Southwest largely consists of coarse particles (i.e., aerodynamic diameter greater than 2.5 microns but less than or equal to 10 microns) which are typically crustal in nature and derive mainly from windblown dust, resuspended road dust (from paved and unpaved roads), unpaved parking lots, disturbed vacant land, mining operations, construction, and agricultural activities (e.g., tilling and harvesting, travel on unpaved farm roads). Other components of particulate matter, such as sulfates, nitrates, and organic and elemental carbons, are typically found in the fine fraction of particulate matter (i.e., aerodynamic diameter less than or equal to 2.5 microns), but can also contribute to coarse particulate matter. Previous analyses of PM-2.5 data in the Phoenix area have shown that mobile source exhaust, burning, and industrial sources are important constituents of PM-2.5. The co-located PM-10 and PM-2.5 monitors at the Durango Complex site indicate that PM-2.5 readings on days with high PM-10 concentrations range from 6 to 15 percent of the

PM-10 on high wind days and 14 to 22 percent on low wind days. Therefore, the PM-10 problem in the nonattainment area is largely attributable to coarse particles, comprised primarily of geologic material (MAG, 2008).

PM-10 EMISSIONS INVENTORY

The Clean Air Act requires a comprehensive, accurate, and current inventory of actual emissions from all sources. In June 2011, the Maricopa County Air Quality Department compiled a revised 2008 periodic emissions inventory which includes primary emissions of PM-10 and PM-2.5 as well as three particulate matter precursors: nitrogen oxides (NOx), sulfur dioxides (SOx) and ammonia (NH3). The inventory provides emission estimates for Maricopa County and the PM-10 nonattainment area. Maricopa County encompasses approximately 9,223 square miles and the PM-10 nonattainment area is about 2,888 square miles.

Emission sources included in the 2008 Periodic Emissions Inventory for PM-10 are Point Sources, Area Sources, Nonroad Mobile Sources, Onroad Mobile Sources, and Biogenic Sources. The inventory provides the typical daily emissions and annual emissions for these categories. Table 3-1 includes a breakdown of annual emissions for the PM-10 nonattainment area.

The point source category includes stationary sources which emit a significant amount of pollution into the air. Examples of point sources include power plants, industrial processes, and large manufacturing facilities. Area sources are stationary sources which are too small or too numerous to be treated as point sources. Examples include residential wood burning, commercial cooking, waste incineration, and wildfires. Nonroad mobile sources include off-highway vehicles and engines that move or are moved in a 12-month period such as construction and mining equipment, lawn and garden equipment, and aircraft. The onroad mobile sources category includes exhaust, paved road fugitive dust, unpaved road fugitive dust, tire wear, and break wear. Biogenic sources (plant life) were estimated using the Model of Emissions of Gases and Aerosols from Nature (MEGAN) Biogenic Emissions Inventory System. Among the chemical species included in the MEGAN Model, only NOx is attributable to particulate matter formation and therefore only NOx emissions are included in the 2008 inventory.

Collectively, the source categories are estimated to have contributed 48,148.00 (English) tons of PM-10; 13,512.16 tons of PM-2.5; 109,662.87 tons of NOx; 1,808.84 tons of SOx; and 12,458.87 tons of NH3 in calendar year 2008 within the PM-10 nonattainment area. A complete description of these sources and the corresponding methodology used to calculate the emissions for 2008 are included in the 2008 Periodic Emissions Inventory for PM-10 for the Maricopa County, Arizona, Nonattainment Area, Revised June 2011. This inventory is provided in Appendix A, Exhibit 1. Projected emission inventories for years 2007 through 2012 are based upon the 2008 periodic inventory for PM-10 and are provided in Chapter Five.

Table 3-1
Annual Emissions for the PM-10 Nonattainment Area from All Source Categories Included in the 2008 Periodic Emissions Inventory for PM-10
(English Tons/Year)

Source Category	PM-10	PM-2.5	NOx	SOx	NH3
POINT TOTAL	**149.84**	**132.94**	**1,317.85**	**28.76**	**132.18**
AREA					
Fuel Combustion	1,300.65	1,268.35	12,248.07	895.83	51.11
Industrial Processes	10,655.39	2,771.19	360.48	129.58	1,724.27
Waste Treatment/Disposal	120.77	95.42	50.30	56.85	1,494.12
Miscellaneous Area Sources	12,444.36	2,143.52	115.94	29.74	7,693.04
AREA TOTAL	**24,521.17**	**6,278.48**	**12,774.79**	**1,112.00**	**10,962.54**
NONROAD MOBILE					
Agricultural	15.13	14.67	161.35	0.06	0.30
Airport Ground Support	26.99	26.48	578.95	26.22	---
Commercial	117.66	112.69	1,391.61	2.39	21.06
Construction and Mining	1,249.88	1,210.00	14,666.42	6.55	27.85
Industrial	101.42	98.71	2,586.39	3.21	56.09
Lawn and Garden	183.02	169.48	801.41	3.17	19.71
Pleasure Craft	7.02	6.48	59.03	0.64	1.32
Railway Maintenance	1.13	1.10	9.26	0.00	0.02
Recreational	7.68	7.08	10.76	0.07	0.35
Aircraft	183.80	177.61	2,620.31	316.00	---
Locomotives	34.16	31.88	907.76	9.11	2.16
NONROAD MOBILE TOTAL	**1,927.89**	**1,856.18**	**23,793.26**	**367.42**	**128.87**
ONROAD MOBILE					
Exhaust, Tire Wear and Brake Wear	3,144.17	2,300.80	71,444.20	300.66	1,235.28
Paved Road Fugitive Dust	6,694.22	1,774.76	---	---	---
Unpaved Road Fugitive Dust	11,710.70	1,169.00	---	---	---
ONROAD MOBILE TOTAL	**21,549.09**	**5,244.56**	**71,444.20**	**300.66**	**1,235.28**
BIOGENIC TOTAL	---	---	**332.77**	---	---
TOTAL ALL SOURCES	**48,148.00**	**13,512.16**	**109,662.87**	**1,808.84**	**12,458.87**

Notes: Totals shown may not equal the sum of individual values due to independent rounding.

A pie chart of the 2008 PM-10 annual emissions in the PM-10 nonattainment area is shown in Figure 3-1. The largest single source category is unpaved road fugitive dust at 24 percent. Construction activities contribute a combined 17 percent (residential, commercial, road, and other earthmoving), while paved road fugitive dust contributes 14 percent. Windblown dust accounts for 10 percent of the annual inventory. Onroad mobile vehicle exhaust, tire wear and brake wear contribute seven percent. The remaining categories in the figure individually contribute six percent or less to the total annual emissions.

AIR QUALITY MONITORING DATA AND TREND ANALYSIS

In addition to identifying sources of PM-10 emissions, it is important to examine the impact of these emissions on the ambient concentrations. This section includes discussions of the National Ambient Air Quality Standards (NAAQS) for PM-10 and the air quality data recorded by the areawide monitoring network.

The 24-hour PM-10 standard is 150 micrograms per cubic meter (ug/m^3). The standard is attained when the expected number of exceedances per year at each monitoring site is less than or equal to one. The number of expected exceedances at a site is determined by recording the number of exceedances in each calendar year and then averaging them over the past three years. At some sites, PM-10 sampling is scheduled less frequently than every day. To account for this, an adjustment must be made to the data collected at each site to estimate the number of exceedances in a calendar year. Due to possible seasonal imbalance, the adjustment is made quarterly. The estimate of the expected number of exceedances for the quarter is equal to the observed number of exceedances plus an increment associated with the missing data. The expected number of exceedances is then estimated by averaging the annual estimates over the three-year period. Due to the rounding criteria used by EPA, a recorded average PM-10 concentration must be under 155 ug/m^3 to not be considered an exceedance and the three-year expected exceedance rate for any site must be less than 1.05 for the region to be in attainment of the 24-hour standard. The annual PM-10 standard of 50 ug/m^3 was revoked by EPA effective December 18, 2006.

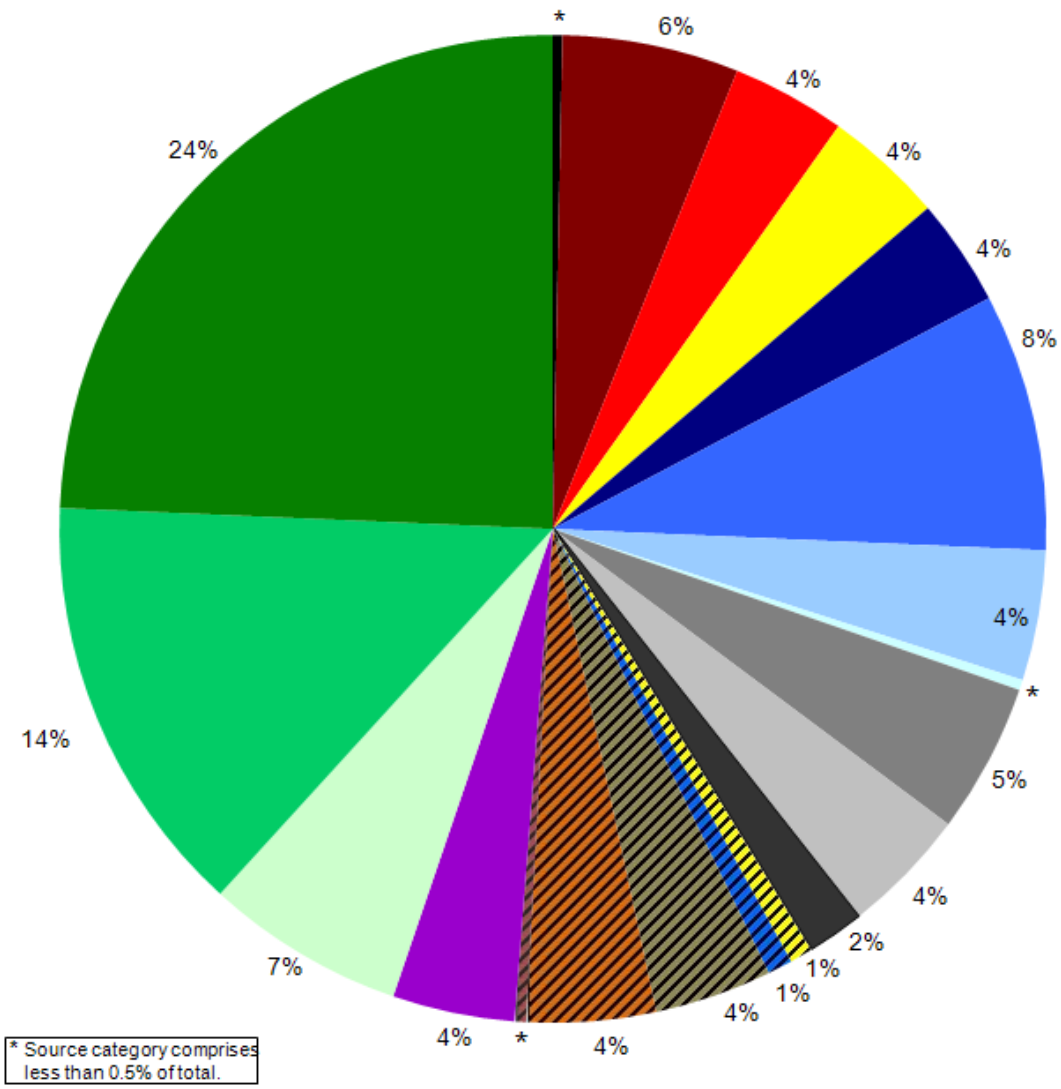
In order to determine the extent of the regional PM-10 pollution problem, it is necessary to examine the air quality data collected by the areawide monitoring network. A total of 27 criteria pollutant monitoring stations are currently operated by the Maricopa County Air Quality Department (MCAQD), Pinal County Air Quality Control District (PCAQCD), and Arizona Department of Environmental Quality (ADEQ) in the PM-10 nonattainment area. Sixteen of these sites monitor PM-10. The Buckeye monitoring site is located just outside the western boundary of the nonattainment area and also monitors PM-10. Site-specific information regarding the PM-10 monitoring stations is provided in Table 3-2, and the geographic location of each site is indicated in Figure 3-2.

As mentioned previously, not all PM-10 samples are collected every day. Most of the exceedances prior to 2004 were recorded by filter-based monitors that measured PM-10

Figure 3-1

2008 PM-10 Emissions Inventory

PM-10 Nonattainment Area Total = 48,148 tons/yr



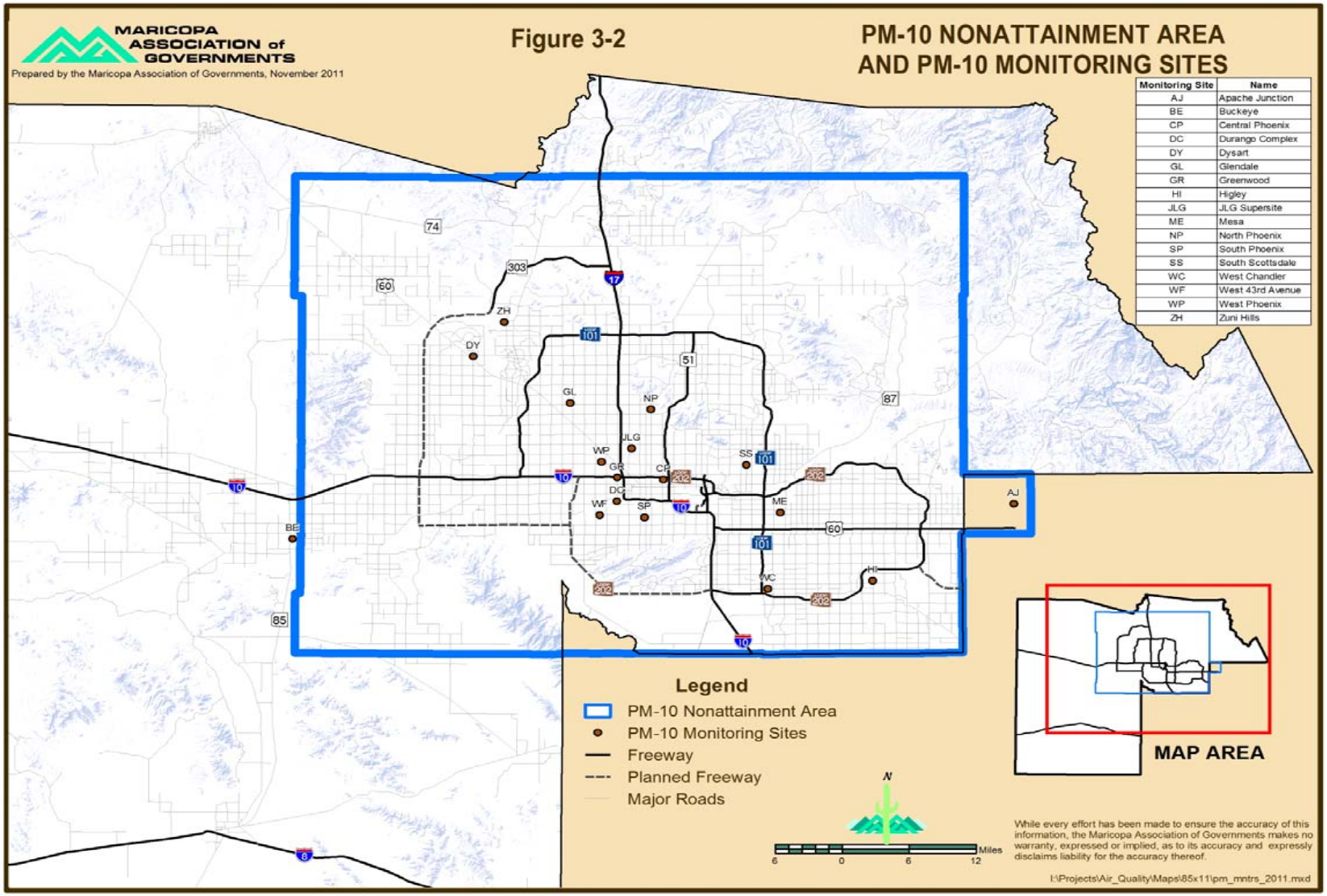
Source Categories	%
Major stationary point sources	(<0.5%)
All other industrial processes	(6%)
Fuel combustion and fires	(4%)
Agricultural tilling/harvesting	(4%)
Construction, residential	(4%)
Construction, commercial	(8%)
Construction, road	(4%)
Other earthmvg: trenching, weed control	(<0.5%)
Travel on unpaved parking lots	(5%)
Offroad recreational vehicles fugitive dust	(4%)
Leaf blowers fugitive dust	(2%)
Windblown: agricultural land	(1%)
Windblown: developing land	(1%)
Windblown: vacant land	(4%)
Windblown: open areas	(4%)
Windblown: S&G, landfills, test tracks	(<0.5%)
Nonroad mobile sources	(4%)
Vehicle exhaust, tire wear, brake wear	(7%)
Paved road fugitive dust, including trackout	(14%)
Unpaved road fugitive dust	(24%)

Table 3-2
PM-10 Monitoring Stations

FIGURE 3-2 MAP INDEX	SITE	ADDRESS	OPERATING AGENCY	SAMPLING SCHEDULE
AJ	Apache Junction Fire Station	3955 E. Superstition Blvd.	PCAQCD	Continuous
BE*	Buckeye	26449 W. 100th Dr.	MCAQD	Continuous
CP	Central Phoenix	1645 E. Roosevelt	MCAQD	Continuous
DC	Durango Complex	2702 RC Esterbrooks Blvd.	MCAQD	Continuous
DY	Dysart	16825 N. Dysart Rd.	MCAQD/ADEQ	Continuous
GL	Glendale	6001 W. Olive	MCAQD	Continuous
GR	Greenwood	1128 N. 27th Ave.	MCAQD	Continuous
HI	Higley	15400 S. Higley Rd.	MCAQD	Continuous
JLG	JLG Supersite	4530 N. 17th Ave.	ADEQ	Continuous
ME	Mesa	310 S. Brooks	MCAQD	1 in 6 day
NP	North Phoenix	601 E. Butler Dr.	MCAQD	Continuous
SP	South Phoenix	33 W. Tamarisk	MCAQD	Continuous
SS	South Scottsdale	2857 N. Miller Rd.	MCAQD	1 in 6 day
WC	West Chandler	275 S. Ellis	MCAQD	Continuous
WF	West 43rd Avenue	3940 W. Broadway	MCAQD	Continuous
WP	West Phoenix	3847 W. Earll	MCAQD	Continuous
ZH	Zuni Hills	10851 W. Williams Rd.	MCAQD	Continuous

* The Buckeye monitor is located outside the western boundary of the PM-10 nonattainment area.

Sources: Pinal County Air Quality Website; Arizona Department of Environmental Quality State of Arizona Air Monitoring Network Plan for the Year 2011; Maricopa County Air Quality Department 2010 Air Monitoring Network Review.


MARICOPA ASSOCIATION of GOVERNMENTS
Prepared by the Maricopa Association of Governments, November 2011
Figure 3-2
PM-10 NONATTAINMENT AREA AND PM-10 MONITORING SITES
Monitoring Site | Name
AJ | Apache Junction
BE | Buckeye
CP | Central Phoenix
DC | Durango Complex
DY | Dysart
GL | Glendale
GR | Greenwood
HI | Higley
JLG | JLG Supersite
ME | Mesa
NP | North Phoenix
SP | South Phoenix
SS | South Scottsdale
WC | West Chandler
WF | West 43rd Avenue
WP | West Phoenix
ZH | Zuni Hills
Legend
PM-10 Nonattainment Area
PM-10 Monitoring Sites
Freeway
Planned Freeway
Major Roads
MAP AREA
N
Miles
6 0 6 12
While every effort has been made to ensure the accuracy of this information, the Maricopa Association of Governments makes no warranty, expressed or implied, as to its accuracy and expressly disclaims liability for the accuracy thereof.
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concentrations every sixth day. Since 2004, the filter-based monitors that have exceeded the PM-10 standard have been replaced with monitors that measure PM-10 concentrations continuously. Currently, within the nonattainment area samples are collected every sixth day at two of the PM-10 monitoring stations while 14 sites now sample continuously. The sampling schedule for each site is provided in Table 3-2.

One method of assessing the overall air quality of a region is to examine the concentrations measured at the monitoring stations. The trend in the number of 24-hour PM-10 exceedance days is presented in Figure 3-3. Tables 3-3 and 3-4 provide detailed information on exceedances of the 24-hour PM-10 standard for the past six years.

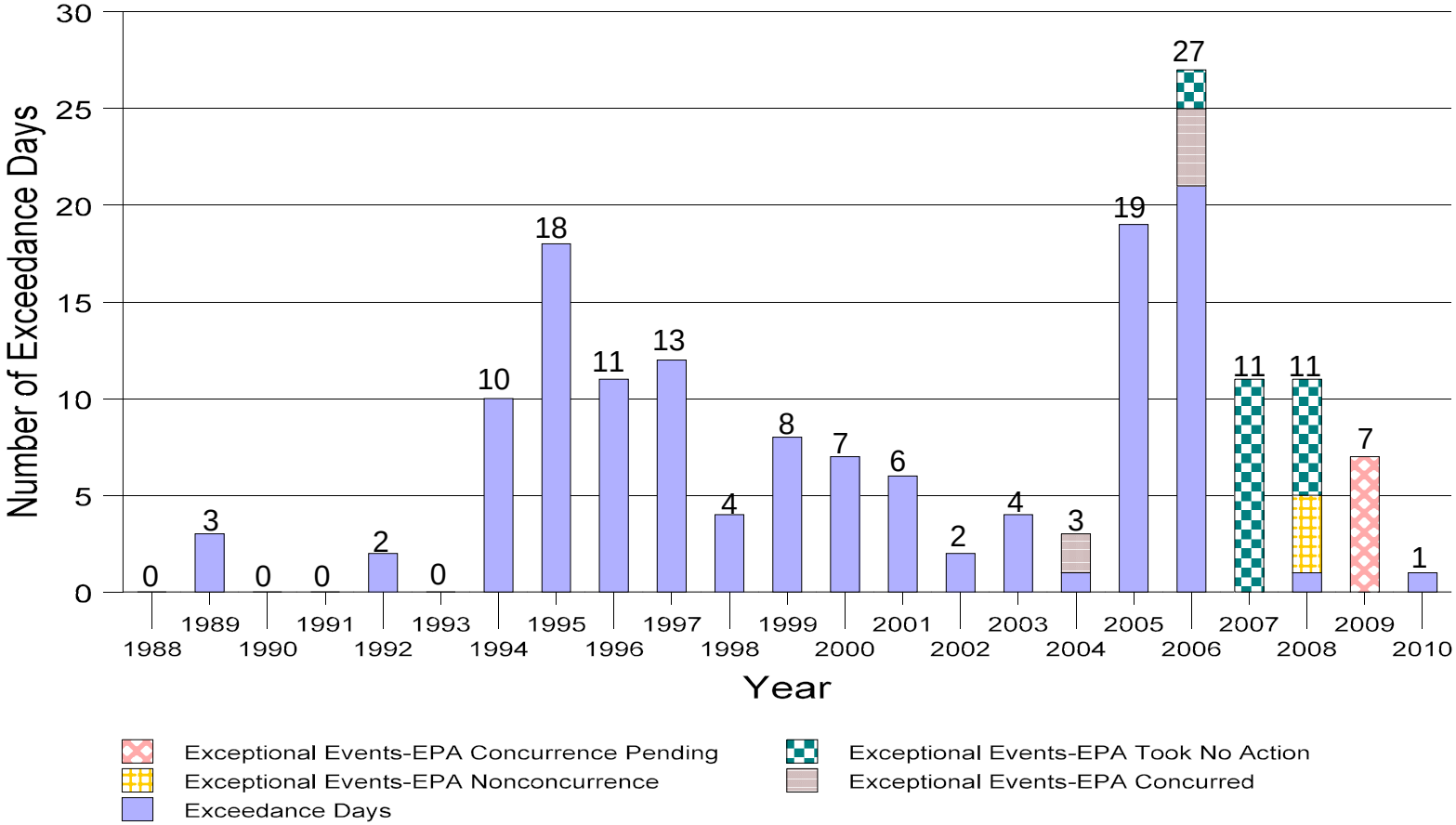
It is important to note that beginning in 2004, the Arizona Department of Environmental Quality (ADEQ) began flagging exceptional events. This is an uncontrollable natural event (e.g., high winds, wildfires) or a human-caused event that is not expected to recur at a given location (e.g., fireworks). The data and a demonstration of the event are submitted to EPA for concurrence. Once approved, the data is not used in determining compliance with the PM-10 standard. Tables 3-3 and 3-4 note the exceptional events that have occurred since 2005.

Figure 3-3, which presents the trend in number of exceedance days of the 24-hour standard from 1988 to 2010, shows a noticeable increase in the number of exceedance days since 1994. Between 1988 and 1993, there were zero to three exceedance days per year. The number of exceedance days increased from zero in 1993 to 10 in 1994. This increase in 1994 is attributable to the installation of a new site (Salt River monitor). This site was located in the Salt River Area and sources nearby included sand and gravel, metal recycling, precast manufacturing, and paved and unpaved haul road. The Salt River site was shut down as of December 31, 2002. Efforts were made to find a suitable replacement site with comparable PM-10 concentrations and industrial emissions. The West 43rd Avenue site was identified and began operating in the Salt River Area in the second quarter of 2002.

There was also an increase in the number of exceedance days from November 2005 through March 2006. During this period, the region experienced stagnant conditions and an unusually long period with no rain, which may have contributed to the exceedances. Exceedances have also occurred since 2006; however, the majority of these have been flagged as high wind exceptional events.

Tables 3-3 and 3-4 list the date, day, reading, and location of each exceedance of the 24-hour PM-10 standard recorded from 2005 to 2010, including the data flagged as exceptional events. In 2005, there were 19 exceedance days in the region. The number increased to 27 exceedance days in 2006 with six being exceptional events. The EPA concurred with four of the exceptional event days and took no action on the remaining two. In both 2007 and 2008 there were 11 days where the region exceeded the PM-10 standard. Most of these exceedances were exceptional events where EPA has yet to take

Figure 3-3
Number of 24-Hour PM-10 Exceedance Days



Notes: -The Arizona Department of Environmental Quality began flagging exceptional events in 2004.
-The chart includes exceedance days at the Buckeye monitor, which is located outside the PM-10 nonattainment area.
-On July 19, 2007, the exceedance at the Buckeye monitor was not associated with the exceptional event that also occurred on that day.

Sources: 1988 - 1997 - Revised MAG 1999 Serious Area Particulate Plan for PM-10 for the Maricopa County Nonattainment Area, February 2000.
1998 - 2010 - EPA Air Quality System.

Table 3-3
Exceedances of the 24-Hour PM-10 Standard, 2005 to 2007

2005				2006				2007			
DATE	DAY	READING	LOCATION	DATE	DAY	READING	LOCATION	DATE	DAY	READING	LOCATION
4/4/05	Mon	172	WF	1/10/06	Tue	155	DC	3/27/07	Tue	227+	WF
6/21/05	Tue	157	BE[1]	1/10/06	Tue	190	WF	4/12/07	Thu	171+	SP
11/1/05	Tue	166	WF	1/11/06	Wed	168	DC	4/12/07	Thu	202+	WF
11/2/05	Wed	173	WF	1/11/06	Wed	165	WF	5/4/07	Fri	196+	WF
11/3/05	Thu	163	DC	1/12/06	Thu	169	DC	6/6/07	Wed	180+	HI
11/10/05	Thu	165	WF	1/12/06	Thu	169	WF	6/6/07	Wed	225+	WF
11/17/05	Thu	155	DC	1/13/06	Fri	156	WF	7/19/07	Thu	194	BE[1]
11/18/05	Fri	169	BE[1]	1/19/06	Thu	183	DC	7/19/07	Thu	267+	CP
11/22/05	Tue	189	DC	1/19/06	Thu	183	WF	7/19/07	Thu	272+	CL[2]
11/22/05	Tue	173	WF	1/24/06	Tue	170	HI	7/19/07	Thu	199+	HI
11/23/05	Wed	164	DC	2/8/06	Wed	183	WF	7/19/07	Thu	521+	JLG
11/23/05	Wed	175	WF	2/9/06	Thu	171	DC	7/19/07	Thu	177+	WF
12/1/05	Thu	158	DC	2/9/06	Thu	204	WF	8/13/07	Mon	159+	SP
12/2/05	Fri	164	DC	2/13/06	Mon	159	BE[1]	8/16/07	Thu	195+	HI
12/2/05	Fri	194	WF	2/14/06	Tue	272	BE[1]	8/16/07	Thu	214+	WF
12/12/05	Mon	198	BN	2/15/06	Wed	157	DC	8/23/07	Thu	230+	HI
12/12/05	Mon	206	DC	2/15/06	Wed	201	WF	10/21/07	Sun	312+	CL[2]
12/12/05	Mon	172	GR	2/17/06	Fri	191	BE[1]	10/24/07	Wed	174+	HI
12/12/05	Mon	232	WF	3/10/06	Fri	240+	DC	11/15/07	Thu	165+	BE[1]
12/12/05	Mon	155	WP	3/10/06	Fri	166+	GR	11/15/07	Thu	155+	DC
12/13/05	Tue	165	DC	3/10/06	Fri	260+	WF				
12/13/05	Tue	167	WF	4/14/06	Fri	211++	BE[1]				
12/14/05	Wed	180	DC	4/14/06	Fri	189++	CP				
12/14/05	Wed	176	WF	4/14/06	Fri	253++	DC				
12/15/05	Thu	155	DC	4/14/06	Fri	212++	GR				
12/21/05	Wed	200	DC	4/14/06	Fri	221++	HI				
12/21/05	Wed	200	WF	4/14/06	Fri	312++	WF				
12/22/05	Thu	178	DC	4/14/06	Fri	177++	WP				
12/22/05	Thu	167	WF	4/15/06	Sat	187++	CP				
12/23/05	Fri	157	DC	4/15/06	Sat	179++	DC				
12/23/05	Fri	156	WF	4/15/06	Sat	170++	GR				
				4/15/06	Sat	274++	HI				
				4/15/06	Sat	191++	WF				
				5/22/06	Mon	174++	WF				
				6/2/06	Fri	159	WF				
				6/6/06	Tue	155++	HI				
				10/5/06	Fri	165+	HI				
				11/16/06	Thu	163	WF				
				11/17/06	Fri	174	WF				
				11/27/06	Mon	164	WF				
				12/5/06	Tue	173	WF				
				12/6/06	Wed	167	DC				
				12/6/06	Wed	159	WF				
				12/7/06	Thu	174	DC				
				12/7/06	Thu	159	WF				
				12/14/06	Thu	163	WF				
				12/15/06	Thu	177	WF				

[1] The Buckeye monitor is located outside the PM-10 nonattainment area.
[2] The Coyote Lakes monitor was a special purpose monitoring site that was shut down in February 2009.
+ Exceptional events where EPA took no action.
++ Exceptional events with EPA concurrence.

Source: EPA Air Quality System.

Table 3-4
Exceedances of the 24-Hour PM-10 Standard, 2008 to 2010

2008				2009				2010			
DATE	DAY	READING	LOCATION	DATE	DAY	READING	LOCATION	DATE	DAY	READING	LOCATION
3/2/08	Sun	159+	BE[1]	3/22/09	Sun	198**	WF	10/15/10	Fri	158	GR
3/14/08	Fri	250*	WF	3/26/09	Thu	209**	WF				
4/30/08	Wed	172*	WF	4/3/09	Fri	213**	WF				
5/21/08	Wed	278*	WF	7/17/09	Fri	400**	BE[1]				
6/4/08	Wed	203+	BE[1]	7/17/09	Fri	161**	DC				
6/4/08	Wed	186+	CL[2]	7/17/09	Fri	275**	HI				
6/4/08	Wed	193*	WF	7/17/09	Fri	169**	SP				
7/1/08	Tue	172+	BE[1]	7/17/09	Fri	185**	WF				
7/4/08	Fri	223+	BE[1]	7/18/09	Sat	213**	BN				
10/11/08	Sat	161+	SP	7/18/09	Sat	439**	BE[1]				
10/22/08	Wed	167+	CL[2]	7/18/09	Sat	277**	DC				
11/7/08	Fri	247	DC	7/18/09	Sat	227**	DY				
11/9/08	Sun	169+	DC	7/18/09	Sat	196**	GL				
11/9/08	Sun	230+	SP	7/18/09	Sat	229**	GR				
11/9/08	Sun	247+	WF	7/18/09	Sat	250**	SP				
				7/18/09	Sat	185**	WC				
				7/18/09	Sat	317**	WF				
				7/18/09	Sat	210**	WP				
				9/3/09	Thu	160**	SP				
				9/3/09	Thu	174**	WF				
				10/27/09	Tue	166**	BE[1]				
				10/27/09	Tue	157**	DC				
				10/27/09	Tue	177**	HI				
				10/27/09	Tue	220**	WC				
				10/27/09	Tue	188**	WF				

[1] The Buckeye monitor is located outside the PM-10 nonattainment area.
[2] The Coyote Lakes monitor was a special purpose monitoring site that was shut down in February 2009.
+ Exceptional events where EPA took no action.
* Exceptional events where EPA did not concur.
** Exceptional events where EPA concurrence is pending.

Source: EPA Air Quality System.

action. However, EPA has indicated that it does not concur with four high wind exceptional vents at the West 43rd Avenue site in 2008, resulting in a violation of the PM-10 standard. All of the exceedances in 2009 have been flagged as exceptional events and EPA concurrence is pending. In 2010, only one exceedance of the 24-hour PM-10 standard occurred, which did not constitute a violation.

In summary, the region has experienced a number of exceptional events in recent years. However, due to EPA nonconcurrence with four events at the West 43rd Avenue monitor in 2008, the region was unable to attain the PM-10 standard in 2010. The exceedances in 2009 have been flagged as exceptional events and only one exceedance occurred in 2010. Therefore, approval of the 2009 exceptional events would give the region two years of clean data.

REFERENCES

MAG, 2008. *PM-10 Source Attribution and Deposition Study.* March, 2008.

CHAPTER FOUR

THE ADOPTED PLAN AND IMPLEMENTATION SCHEDULE FOR THE MAG 2012 FIVE PERCENT PLAN FOR PM-10

The new MAG 2012 Five Percent Plan for PM-10 contains a wide variety of existing control measures and projects that have been implemented to reduce PM-10 and a new measure designed to reduce PM-10 during high risk conditions, including high winds. While the 2007 Five Percent Plan was withdrawn, a wide range of control measures in that plan continue to be implemented to reduce PM-10 and are being resubmitted. Table 4-1 includes the Arizona Statutes, Maricopa County Rules, a Maricopa County Ordinance, and Appendices for the resubmitted measures and a new high risk measure to be approved into the MAG 2012 Five Percent Plan for PM-10 for the Maricopa County Nonattainment Area. The Arizona Revised Statutes listed in Table 4-1 are included in Appendix C, Exhibit 1. The 2012 Five Percent Plan also includes contingency measures that were implemented early such as PM-10 certified street sweeping on freeways and arterials, as well as the projects completed in 2008-2011 that paved and stabilized unpaved roads, alleys and shoulders; reduced speed limits; and overlaid highways with rubberized asphalt.

As described in Table 4-1, the Arizona Statutes, Maricopa County Rules, and Maricopa County Ordinance include requirements to reduce PM-10 emissions from a broad range of sources. The requirements apply to unpaved roads and shoulders, leaf blowers, unpaved parking lots, vacant lots, sweeping streets with certified sweepers, off-road vehicle use, open and recreational burning, residential woodburning, covered vehicle loads, dust generating operations, nonmetallic mineral processing, and other unpermitted sources.

It is also important to note that the Environmental Protection Agency (EPA) has approved Maricopa County Rules 310 and 310.01 in 2010 and Rule 316 in 2009, as part of the State Implementation Plan. Compliance with these rules has increased every year since 2007. These Maricopa County rules reduce emissions from a wide variety of sources and apply to the Maricopa County area. Maricopa County Rule 310 (Fugitive Dust from Dust-Generating Operations) regulates fugitive dust emissions from sources and activities such as: land clearing, earthmoving, weed abatement, excavating, construction, demolition, bulk material handling, storage and transporting operations, outdoor equipment, motorized machinery, staging areas, parking areas, material storage areas, haul roads, disturbed surface areas, initial landscapes and trackout onto paved surfaces from these sources.

Maricopa County Rule 310.01 (Fugitive Dust from Non-Traditional Sources of Fugitive Dust) regulates fugitive dust emissions from sources and activities such as: vehicle use in open areas and vacant lots, open areas, vacant lots, unpaved parking lots, unpaved roadways (including alleyways), easements, rights-of-way, access roads and trackout onto paved surfaces from these activities.

Table 4-1
Arizona Statutes, Maricopa County Rules, Maricopa County Ordinance, and Appendices to be Approved into the MAG 2012 Five Percent Plan for PM-10 for the Maricopa County Nonattainment Area

Arizona Revised Statutes (A.R.S.)	Description	Effective Dates
A.R.S. § 9-500.04. Only A.3., A.5., A.6., A.7., A.8., A.9. and H.	Air quality control; definitions [city and town requirements in Area A regarding targeting unpaved roads and shoulders; leaf blower restrictions; restrictions related to parking, maneuvering, ingress and egress areas and vacant lots; requirement for certified street sweepers]	9/19/07
A.R.S. § 9-500.27.	Off-road vehicle ordinance; applicability; violation; classification	9/19/07
A.R.S. § 11-871. Only A., B. and D.4.	Emissions control; no burn; exemptions; penalty [no burn restriction for any HPA day, increased civil penalty]	9/19/07
A.R.S. § 11-877.	Air quality control measures [county leaf blower restrictions]	9/19/07
A.R.S. § 28-1098. Only A. and C.1.	Vehicle loads; restrictions; civil penalties [for safety or air pollution prevention purpose]	9/19/07
A.R.S. § 49-424. Only 11.	Duties of department [develop and disseminate air quality dust forecasts for the Maricopa County PM-10 nonattainment area]	7/20/11
A.R.S. § 49-457.01.	Leaf blower use restrictions and training; leaf blower equipment sellers; informational material; outreach; applicability	9/19/07
A.R.S. § 49-457.03.	Off-road vehicles; pollution advisory days; applicability; penalties	9/19/07
A.R.S. § 49-457.04.	Off-highway vehicle and all-terrain vehicle dealers; informational material; outreach; applicability	9/19/07
A.R.S. § 49-457.05. Only A., B., C., D. and I.	Dust action general permit; best management practices; applicability; definitions	7/20/11
A.R.S. § 49-474.01. Only A.4., A.5., A.6., A.7., A.8., A.11., B. and H.	Additional board duties in vehicle emissions control areas; definitions [county requirements for stabilization of targeted unpaved roads, alleys and shoulders; restrictions related to parking, maneuvering, ingress and egress areas and vacant lots; requirement for certified street sweepers]	9/19/07
A.R.S. § 49-474.05.	Dust control; training; site coordinators	9/19/07
A.R.S. § 49-474.06.	Dust control; subcontractor registration; fee	9/19/07
A.R.S. § 49-501. Only A.2., B.1., C., F. and G.	Unlawful open burning; exceptions; civil penalty; definitions [ban on outdoor fires from May 1 to September 30; deletion of recreational purpose exemption; no burn day restrictions; penalty provision]	9/19/07
A.R.S. § 49-541. Only 1.	Definitions [Area A]	8/9/01

Table 4-1 Continued

Maricopa County Air Quality Department Rules	Description	Effective Dates
310	Fugitive Dust from Dust-Generating Operations Adopted 1/27/10 and submitted to EPA 4/12/10 [Notice of Final Rulemaking 75 FR 78167; 12/15/10]	EPA approved effective 1/14/11
310.01	Fugitive Dust From Non-Traditional Sources of Fugitive Dust Adopted 1/27/10 and submitted to EPA 4/12/10 [Notice of Final Rulemaking 75 FR 78167; 12/15/10]	EPA approved effective 1/14/11
314	Open Outdoor Fires and Indoor Fireplaces at Commercial and Institutional Establishments Adopted 3/12/08 and submitted to EPA 7/10/08 [Notice of Final Rulemaking 74 FR 57612; 11/9/09]	EPA approved effective 1/8/10
316	Nonmetallic Mineral Processing Adopted 3/12/08 and submitted to EPA 7/10/08 [Notice of Final Rulemaking 74 FR 58553; 11/13/09]	EPA approved effective 1/8/10
Appendix C	Fugitive Dust Test Methods Adopted 3/26/08 and submitted to EPA 7/10/08 [Notice of Final Rulemaking 75 FR 78167; 12/15/10]	EPA approved effective 1/14/11
Maricopa County Ordinance	Description	Effective Dates
P-26	Residential Woodburning Restriction Adopted 3/26/08 and submitted to EPA 7/10/08; [Notice of Final Rulemaking 74 FR 57612; 11/9/09]	EPA approved effective 1/8/10
Appendices	Description	Effective Dates
Appendix C, Exhibit 1	Arizona Revised Statutes Listed in Table 4-1	
Appendix C, Exhibit 2	Maricopa County Resolution to Evaluate Measures in the MAG 2012 Five Percent Plan for PM-10 for the Maricopa County Nonattainment Area	11/16/11
Appendix C, Exhibit 3	Arizona Department of Environmental Quality Dust Action General Permit	12/30/11
Appendix C, Exhibit 4	Arizona Department of Environmental Quality Commitment to Revise the MAG 2012 Five Percent Plan for PM-10 for the Maricopa County Nonattainment Area if Necessary for the Emerging and Voluntary Measure	

Maricopa County Rule 316 (Nonmetallic Mineral Processing) regulates fugitive dust and process dust emissions from sources and activities such as: mining, excavating, separating, combining, crushing and grinding any nonmetallic mineral, asphaltic concrete plants, raw material storage and distribution, concrete plants, bagging operations, open storage piles, material handling, haul roads, and trackout onto paved surfaces from these sources.

MARICOPA COUNTY RESOLUTION TO EVALUATE MEASURES IN THE MAG 2012 FIVE PERCENT PLAN FOR PM-10 FOR THE MARICOPA COUNTY NONATTAINMENT AREA

Maricopa County indicates that the Maricopa Board of Supervisors adopted a resolution on November 16, 2011 that included a commitment for the Evaluation of New Innovative Control Measures and Existing Maricopa County Control Measures. Maricopa County indicates that the Maricopa County Air Quality Department will develop and assess the effectiveness of the innovative control program implemented through the dust generation forecast and Dust Action General Permit on permitted and unpermitted sources of PM-10 in Maricopa County on forecast high risk days. Maricopa County will perform a rule effectiveness study on the implementation of existing dust control rules.

The Maricopa County Board of Supervisors is authorized by A.R.S. § 49-479 to adopt rules for air pollution control and by A.R.S. § 49-480 to establish, administer and enforce a program for air quality permits. The Board adopted rules establishing an air quality permit program and pursuant to A.R.S. § 49-473, designated the Air Quality Department to issue permits and administer and enforce the permit program. In the Memorandum of Agreement developed in 1992 under A.R.S. § 49-406 (F), Maricopa County is responsible for tracking emissions from point, area and non-road mobile sources and for tracking the implementation of control measures. By operation of A.R.S. § 49-471, the executive head of the department designated under A.R.S. § 49-473 serves as the Air Pollution Control Officer. The Air Pollution Control Officer is specifically authorized to take the enforcement actions set forth in A.R.S. §§ 49-502, 49-511, 49-512 and 49-513. A.R.S. § 474.01 (A) (11) requires adoption of rule provisions by March 31, 2008, and enforcement of the provisions by October 1, 2008, regarding stabilization of disturbed surfaces of vacant lots.

Implementation Schedule:

The Air Quality Department in consultation with the U. S. Environmental Protection Agency completed a rule effectiveness study analyzing the impact of Rules 310, 310.01 and 316 for the 2008 PM-10 Periodic Emissions Inventory contained in Appendix A, Exhibit 1 of the MAG 2012 Five Percent Plan for PM-10 for the Maricopa County Nonattainment Area. The department in consultation with EPA will use a similar approach and process with an appropriate temporal period to evaluate the new innovative control measures such as the dust generation forecast and Dust Action General Permit. The Air Quality Department will conduct the program evaluations as follows:

Initial Evaluation:

January 2013	Initiate evaluation process for new innovative control measures and existing rule effectiveness studies.
March 2013	Complete draft program evaluation reports.
April 2013	Complete final program evaluation reports.

Periodic Evaluation: The department will reevaluate the effectiveness of the new innovative control measures as part of the periodic emissions inventory required by EPA every three years.

Program evaluations will be accommodated as part of the air quality compliance, enforcement and planning processes and will be coordinated by the Maricopa County Air Quality Department's existing Planning and Analysis Division.

The Maricopa County Air Quality Department administers the air quality program in Maricopa County. Currently the department has 140.6 employees. The Maricopa County Air Quality Department's FY 2010-11 revenue was approximately $15.3 million. No change in funding is anticipated for these program evaluations.

The Air Quality Department's enforcement options for regulatory programs include orders of abatement, civil actions for injunctive relief or civil penalties, and filing a class 1 misdemeanor citation. Senate Bill 1552 authorizes the county to enter the lot to stabilize the disturbed surface, issue notices of violation, and collect monetary penalties that include the cost of stabilization.

As noted above, the Air Quality Department will assess and evaluate the effectiveness of the new innovative measures as well as the complete rule effectiveness studies for the existing Rules 310, 310.01 and 316 (see Appendix C, Exhibit 2).

ARIZONA DEPARTMENT OF ENVIRONMENTAL QUALITY DUST ACTION GENERAL PERMIT

The Arizona Department of Environmental Quality indicates that since the start of Calendar Year 2008, the majority of exceedances of the PM-10 National Ambient Air Quality Standard (NAAQS) in the Maricopa County Serious PM-10 Nonattainment Area have been related to high wind events. High wind events, along with a number of other meteorological conditions that can lead to the generation of dust can be predicted through meteorological forecasts.

In accordance with A.R.S. § 49-424 (11), ADEQ is developing and disseminating an air quality dust forecast for the Maricopa County Serious PM-10 Nonattainment Area. Based upon knowledge of historical and recent meteorological conditions, and the prediction of

such factors as wind speed and wind direction, forecasts identify the potential risk of dust entrainment as “Low”, “Moderate” or “High” for the next five consecutive days. ADEQ updates this five-day Maricopa County Dust Control Forecast every Sunday through Friday, and posts it on its website at http://www.azdeq.gov/environ/air/ozone/mcdust.pdf.

In accordance with A.R.S. § 49-457.05, this Dust Action General Permit identifies a series of Best Management Practices (BMPs) for specific dust generating operations. When ADEQ’s Maricopa County Dust Control Forecast predicts that day is at high risk for dust generation, those dust generating operations that are not already required to control dust through a permit issued by the Arizona Department of Environmental Quality (ADEQ) or the Maricopa County Air Quality Department (MCAQD) are expected to choose and implement at least one BMP to reduce or prevent PM-10 emissions. Implementation of a BMP is expected to occur as soon as practicable before and during the high risk event. Although the BMPs in the Dust Action General Permit only apply to those sources that do not already have a permit, even dust generating operations with an air quality permit are also expected to implement the dust controls in their permit at the same time.

According to state statute, BMPs identified in the Dust Action General Permit are expected to be employed absent the requirement to obtain an air quality permit. If the owner or operator of a dust-generating operation is found by ADEQ’s Director to have failed to choose and implement an applicable BMP as soon as practicable before and during a day that is forecast to be at high risk of dust generation, then the owner or operator can be required to obtain an Authorization to Operate under the Dust Action General Permit. The process by which ADEQ’s Director makes such a finding is identified within the Dust Action General Permit. Violations of the Dust Action General Permit are subject to the enforcement requirements of Arizona Revised Statutes Title 49, Chapter 3, Article 2, including civil penalties of up to ten thousand dollars per day, per violation, pursuant to Section 463.

In accordance with A.R.S. § 49-457.05 (E) this Dust Action General Permit was subject to a 30-day public comment period and shall be effective for a period of five-years (see Appendix C, Exhibit 3).

ARIZONA DEPARTMENT OF ENVIRONMENTAL QUALITY COMMITMENT TO REVISE THE MAG 2012 FIVE PERCENT PLAN FOR PM-10 FOR THE MARICOPA COUNTY NONATTAINMENT AREA IF NECESSARY FOR THE EMERGING AND VOLUNTARY MEASURE

The Arizona Department of Environmental Quality indicates that A.R.S. § 49-404 requires ADEQ to maintain a State Implementation Plan that provides for the implementation, maintenance and enforcement of national ambient air quality standards. Should it be demonstrated through Maricopa County's April 2013 final program evaluation reports that the emerging and voluntary measure contained within the Five Percent Plan did not achieve the necessary emissions reductions, the Arizona Department of Environmental Quality commits to submitting a SIP revision that contains replacement measures to reduce

PM-10 emissions by an amount equal to or more than the total PM-10 emissions reductions that were not achieved by these measures. An implementation schedule for the submission of this revised plan is as follows:

May 2013	ADEQ will consult with MAG to determine if additional emissions reductions are necessary.
June 2013	If additional controls are required, ADEQ will work with MAG to identify potential replacement measures.
April 2014	If additional controls are required, ADEQ will submit a SIP revision that contains the necessary replacement measure(s).

ADEQ does not anticipate the need for additional personnel or funding to comply with this commitment as any required SIP revisions will be accommodated as part of its normal air quality planning process (see Appendix C, Exhibit 4).

CONTINGENCY REQUIREMENT

The 2012 Five Percent Plan also includes contingency measures that were implemented early such as PM-10 certified street sweeping on freeways and arterials, as well as the projects completed in 2008-2011 that paved and stabilized unpaved roads, alleys and shoulders; reduced speed limits; and overlaid highways with rubberized asphalt. These PM-10 reduction projects were implemented in the PM-10 nonattainment area by twenty-one cities and towns, Maricopa County, Pinal County, Arizona Department of Transportation and the Gila River Indian Community. All of the projects for which credit was taken were open to traffic by September 2011. EPA encourages early implementation of contingency measures to reduce emissions as expeditiously as practicable. The contingency measures and projects are described in Chapter 6.

ASSURANCES THAT THE STATE HAS THE AUTHORITY TO IMPLEMENT THE MEASURES IN THE PLAN

In order to comply with Section 110(a)(2)(E) of the Clean Air Act, a State law was passed in 1992 which provides an approach for assurances that State and local measures will be adequately implemented (A.R.S. § 49-406 I. and J.). If any person (includes State, County, local governments, regional agencies, and other entities) fails to implement a measure as described in the resolution adopted pursuant to A.R.S. § 49-406 G., the County would file an action in Superior Court to have the Court order that the measure be implemented. Likewise, the Director of the Arizona Department of Environmental Quality will backstop the County if it fails to implement a measure or if the County fails to backstop the local governments and regional agencies.

Regarding measures, A.R.S. § 49-406 G. (passed by the Legislature in 1992) requires that each agency which commits to implement any control measure contained in the State

Implementation Plan must describe the commitment in a resolution. The resolution must be adopted by the appropriate governing body of the agency. State law also requires the entity to specify the following information in the resolutions: (1) its authority for implementing the limitation or measure as provided in statute, ordinance, or rule; (2) a program for the enforcement of the limitation or measure; and (3) the level of personnel and funding allocated to the implementation of the measure.

As noted in the MAG regional air quality plans, the action taken by the MAG Regional Council to approve the Suggested Measures and Adopted Plan Measures does not commit each jurisdiction to implement those measures. As indicated in the resolutions and commitments, each jurisdiction determines which measures are reasonably available for implementation by that jurisdiction.

TRACKING PLAN IMPLEMENTATION

The Maricopa County Air Quality Department determines reasonable further progress and reviews the implementation status of the various measures contained in the air quality plans. The Maricopa County Air Quality Department will also continue to have the responsibility for conducting ambient air quality monitoring.

Supplemental to these tracking efforts, the Maricopa Association of Governments publishes regional traffic flow maps and calculates regional vehicle miles of travel from these flow maps. MAG also conducts vehicle occupancy studies and performs special traffic volume and speed studies, as needed. Phoenix Public Transit continuously monitors transit ridership for each month. The Regional Public Transportation Authority will also be collecting transit and carpooling ridership information. The Arizona Department of Environmental Quality continuously monitors the number of vehicles inspected in the Vehicle Emissions Inspection Maintenance Program, the number of vehicles failing the test, and the improvement in tail pipe emissions after failed vehicles are repaired.

In addition, the MAG Air Quality Technical Advisory Committee will review the information pertaining to the implementation of measures. The committee will also review the air quality monitoring data to assist in tracking air quality improvement over time.

CHAPTER FIVE

DEMONSTRATION OF ANNUAL FIVE PERCENT REDUCTIONS IN PM-10 EMISSIONS

Chapter Five demonstrates that the MAG 2012 Five Percent Plan for PM-10 meets the Clean Air Act requirement that PM-10 emissions be reduced by five percent per year until attainment is demonstrated. Section 189(d) of the Clean Air Act requires that the Five Percent Plan provide for an annual reduction in PM-10 emissions of not less than five percent of the total emissions in the most recent inventory prepared for the area.

This chapter describes the increases in rule effectiveness that achieve annual reductions of at least five percent of the emissions inventory for 2007, the base year for the plan. The 2007 emissions inventory is based on the revised 2008 PM-10 Periodic Emission Inventory for the Maricopa County, Arizona, Nonattainment Area (PEI), which is the most recent inventory prepared for the area (Appendix A, Exhibit 1). Since the attainment date for this Plan is December 31, 2012, annual five percent reductions are required for five years, 2008 through 2012. As discussed in detail in Chapter Six, attainment can not be achieved prior to December 31, 2012, because there have been several exceedances of the 24-hour PM-10 standard in 2009 and 2011 which may be due to exceptional events and the required documentation for these events has not yet been submitted to EPA for concurrence. Additionally, modeled attainment cannot be achieved without the credit achieved through the new Dust Action General Permit measure (described below) which is not fully implemented until January 1, 2012.

MEASURES QUANTIFIED TO MEET THE FIVE PERCENT REDUCTION REQUIREMENT

Fifty-three control measures were submitted to EPA in December 2007 as part of the MAG 2007 Five Percent Plan for PM-10. The 2007 Plan was withdrawn by the Arizona Department of Environmental Quality in January 2011. Most of the measures in the 2007 Plan were implemented during the three years before the Plan was withdrawn. The measures submitted in the MAG 2012 Five Percent Plan for approval into the Arizona State Implementation Plan are listed in Table 4-1. Many of the measures from the 2007 Plan have been included in Table 4-1.

To meet the annual five percent reduction requirement in Section 189(d) of the Clean Air Act, the MAG 2012 Five Percent Plan takes credit for increases in rule effectiveness for Maricopa County Rules 310 (Fugitive Dust from Dust-Generating Operations), 310.01 (Fugitive Dust from Non-Traditional Sources of Fugitive Dust) and 316 (Nonmetallic Mineral Processing). The increases in rule effectiveness are attributable to strengthened enforcement and increased compliance with these rules. EPA has approved Rules 310 and 310.01 (EPA, 2010) and Rule 316 (EPA, 2009), as part of the State Implementation Plan. Compliance with these rules has increased every year since 2007, as shown in Table 5-1.

These Maricopa County rules reduce emissions from a wide variety of sources and apply to the Maricopa County area. Maricopa County Rule 310 (Fugitive Dust from Dust-Generating Operations) regulates fugitive dust emissions from sources and activities such as: land clearing, earthmoving, weed abatement, excavating, construction, demolition, bulk material handling, storage and transporting operations, outdoor equipment, motorized machinery, staging areas, parking areas, material storage areas, haul roads, disturbed surface areas, initial landscapes and trackout onto paved surfaces from these sources.

Maricopa County Rule 310.01 (Fugitive Dust from Non-Traditional Sources of Fugitive Dust) regulates fugitive dust emissions from sources and activities such as: vehicle use in open areas and vacant lots, open areas, vacant lots, unpaved parking lots, unpaved roadways (including alleyways), easements, rights-of-way, access roads and trackout onto paved surfaces from these activities.

Maricopa County Rule 316 (Nonmetallic Mineral Processing) regulates fugitive dust and process dust emissions from sources and activities such as: mining, excavating, separating, combining, crushing and grinding any nonmetallic mineral, asphaltic concrete plants, raw material storage and distribution, concrete plants, bagging operations, open storage piles, material handling, haul roads, and trackout onto paved surfaces from these sources.

Emission reduction credit is also taken for one new measure, the Dust Action General Permit, which will be fully implemented by January 1, 2012, as discussed in Chapter Four. Credit for this measure is allowed under the EPA guidance, *Incorporating Emerging and Voluntary Measures in a State Implementation Plan* (EPA, 2004). The measures used to demonstrate the annual five percent reductions are also used in modeling for the attainment demonstration, as described in Chapter Six.

In addition to demonstrating five percent reductions and modeling attainment, this Plan must meet contingency requirements of the Clean Air Act. It is important to note that the contingency requirements must be satisfied by quantifying the benefit of different measures than those used to meet the five percent and attainment demonstration requirements. The contingency requirements met by this Plan are also discussed in Chapter Six.

Strengthened enforcement and increased compliance with Maricopa County Rules 310, 310.01 and 316 have raised compliance rates significantly since 2007. The benefits of increased compliance with these rules have been quantified to show the annual five percent reductions in PM-10 emissions. The rule effectiveness (RE) rates have been calculated for 2007 through 2010, using actual inspection data and a methodology developed by the Maricopa County Air Quality Department (MCAQD), in consultation with EPA.

Table 5-1 shows the rule effectiveness rates calculated for 2007 through 2010. The RE

Table 5-1
Impact of Increased Rule Effectiveness on 2008-2012 PM-10 Emissions

Categories Affected by Rule Effectiveness	Base Case Emissions (tons/year) 2007	2008	2009	2010	2011	2012	Rule Effectiveness Rates 2007	2008	2009	2010 -2011	2012
Residential Construction	3,423	2,815	1,939	1,656	1,602	1,627	76%	90%	92%	94%	94%
Commercial Construction	8,205	6,748	4,649	3,971	3,839	3,901	76%	90%	92%	94%	94%
Road Construction	4,150	3,412	2,351	2,008	1,942	1,973	76%	90%	92%	94%	94%
All Other Earthmoving	328	270	186	159	154	156	76%	90%	92%	94%	94%
Non-metallic mineral mining	306	290	257	246	247	260	40%	65%	69%	73%	73%
Mining & Quarrying	256	242	214	205	206	217	40%	65%	69%	73%	73%
Industrial paved/unpaved road travel	771	728	645	618	621	654	40%	65%	69%	73%	73%
Windblown Agriculture	448	448	448	448	448	448	n/a	n/a	n/a	n/a	n/a
Windblown Construction	566	566	566	566	566	566	76%	90%	92%	94%	94%
Windblown Vacant, Open, Landfill, Test Tracks	5,430	5,430	5,430	5,430	5,430	5,430	85%	95%	96%	96%	97%
Windblown Sand & Gravel, Mining	190	190	190	190	190	190	40%	65%	69%	73%	73%
TOTALS:	24,073	21,139	16,876	15,497	15,244	15,422					

Categories Affected by Rule Effectivenss	Controlled Emissions (tons/year) 2007	2008	2009	2010	2011	2012	Benefits from RE Increases (tons/year) 2008	2009	2010	2011	2012
Residential Construction	3,423	1,692	1,056	807	780	793	1,122	884	849	821	834
Commercial Construction	8,205	4,057	2,531	1,935	1,871	1,901	2,691	2,119	2,036	1,968	2,000
Road Construction	4,150	2,052	1,280	979	946	961	1,361	1,071	1,029	995	1,011
All Other Earthmoving	328	162	101	77	75	76	108	85	81	79	80
Non-metallic mineral mining	306	188	152	132	132	139	102	105	114	114	121
Mining & Quarrying	256	157	127	110	110	116	85	87	95	96	101
Industrial paved/unpaved road travel	771	472	382	331	333	351	256	263	287	288	304
Windblown Agriculture	448	448	448	448	448	448	0	0	0	0	0
Windblown Construction	566	391	366	341	341	341	175	200	225	225	225
Windblown Vacant, Open, Landfill, Test Tracks	5,430	3,938	3,788	3,788	3,788	3,639	1,492	1,642	1,642	1,642	1,791
Windblown Sand & Gravel, Mining	190	132	123	113	113	113	58	68	77	77	77
TOTALS:	24,073	13,689	10,353	9,062	8,939	8,879	7,450	6,523	6,435	6,305	6,543

Note: The increase of 1% for the 2012 higlighted rule effectiveness rate for windblown vacant and open lands is the result of the new Dust Action General Permit Measure.

rates have been applied to the base case emissions for the source categories shown in Table 5-1 to quantify the PM-10 emission reductions attributable to strengthened enforcement and increased compliance with Rules 310, 310.01 and 316. The RE rate increases are held constant after 2010.

As mentioned earlier, the five percent reductions also include the benefits of one new measure, the Dust Action General Permit, which was passed by the Arizona Legislature in April 2011. This new measure is expected to raise rule effectiveness for Rule 310.01 by one percent during high wind hours, resulting in the RE rate highlighted in Table 5-1 for windblown vacant land, open space, landfills and test tracks in 2012. Additional details regarding the calculation of the PM-10 emissions reduction associated with the increases in rule effectiveness are provided in the TSD (Chapter III of Appendix B, Exhibit 1).

EPA allows an emission reduction benefit to be taken for the new Dust Action General Permit, as an emerging measure (EPA, 2004). According to EPA guidance, emerging measures do not have the same high level of certainty as traditional measures for quantification purposes in a State Implementation Plan (SIP). The PM-10 emission reduction increment necessary to demonstrate attainment in 2012 (i.e., total 2012 base case emissions (in Table 5-2) minus total 2012 emissions with increased rule effectiveness (in Table 5-3), is 6,543 tons. EPA allows emerging and voluntary measures to account for up to six percent of this increment (in this case, a maximum of 393 tons). The one percent increase in RE during high wind hours will reduce PM-10 emissions by 149 tons in 2012. Since this reduction is less than 393 tons, benefit for this new measure may be used in meeting the annual five percent reduction requirement and demonstrating attainment in this Plan.

As required by EPA's emerging and voluntary measure guidance, Maricopa County has made a commitment to retrospectively assess the performance of the Dust Action General Permit. MCAQD will evaluate the effectiveness of Rules 310, 310.01 and 316 to ensure that this measure achieves at least a 149 ton reduction during calendar year 2012. The County's commitment and the method to be used in calculating rule effectiveness are described in Chapter Four and Appendix C, Exhibit 2.

DEMONSTRATION FOR THE FIVE PERCENT REDUCTION REQUIREMENT

As discussed above, increases in Rule Effectiveness (RE) for Rules 310, 310.01 and 316 have been quantified to meet the annual five percent reductions required in Section 189(d) of the Clean Air Act. Table 5-2 provides the base case emissions used to calculate the annual five percent reductions. The 2008 emissions in this table are based on the most recent version of the 2008 PEI, published in June 2011 (Appendix A, Exhibit 1).

The 2007 and 2009-2012 base case emissions were derived from the 2008 PEI emissions, using annual population and employment growth factors published in August 2011 by Marshall Vest of the Economic and Business Research Center at the University of Arizona. These projections are based on the 2010 U.S. Census and the latest economic forecasts

Table 5-2
2007-2012 Base Case PM-10 Emissions in the PM-10 Nonattainment Area

Source Category	2007	2008	2009	2010	2011	2012
	(tons/year)					
POINT	159	150	133	127	128	135
AREA						
Fuel combustion	1,276	1,301	1,307	1,311	1,316	1,328
Commercial cooking	974	993	998	1,001	1,005	1,014
Construction (includes windblown dust)	16,672	13,811	9,692	8,359	8,102	8,223
Tilling, harvesting and cotton ginning	936	893	893	893	893	893
Travel on unpaved farm roads	769	731	731	731	731	731
Livestock	261	261	261	261	261	261
Travel on unpaved parking lots	2,376	2,422	2,434	2,441	2,451	2,473
Offroad recreational vehicles	2,139	2,180	2,191	2,198	2,206	2,226
Leaf blowers	878	895	899	902	906	914
Windblown agriculture	448	448	448	448	448	448
Other windblown sources	5,430	5,430	5,430	5,430	5,430	5,430
Fires	497	497	497	497	497	497
Mining/quarrying (includes windblown dust)	752	721	661	641	643	667
Travel on industrial paved/unpaved roads	771	728	645	618	621	654
Other industrial sources	1,033	976	865	828	832	877
NONROAD						
Aircraft	194	184	152	142	143	146
Airport ground support equipment	29	27	23	21	20	20
Locomotives	34	34	34	34	34	34
Other nonroad equipment	1,710	1,683	1,661	1,641	1,595	1,513
ONROAD						
Exhaust	2,943	2,836	2,647	2,371	1,843	1,407
Tire wear	246	256	257	257	258	261
Brake wear	728	758	767	771	773	787
Paved roads	7,749	8,155	8,214	8,289	8,323	8,422
Unpaved roads and alleys	10,218	10,312	10,284	10,284	10,284	10,312
Totals	**59,218**	**56,681**	**52,123**	**50,497**	**49,743**	**49,673**

for the Phoenix-Mesa metropolitan area. Since the economic outlook for Arizona remains extremely unstable, the actual population and employment levels in 2011 and 2012 may differ somewhat from the projections. However, the University of Arizona growth factors represent the most reliable data currently available. Details regarding the population and employment projections and other technical assumptions used in generating the base case emissions are provided in the TSD (Chapter II of Appendix B, Exhibit 1).

The annual five percent reduction target was calculated by multiplying the total 2007 PM-10 emissions in Table 5-2 (59,218 tons) by five percent, which results in 2,961 tons. To meet the 189(d) requirement, the 2008 emissions with increased rule effectiveness must be at least 2,961 tons less than the 2007 base case emissions. Each year after 2008 imposes yet another 2,961 ton reduction requirement. Thus, the cumulative reduction requirements (relative to 2007 base case emissions) are at least 5,922 tons in 2009, 8,883 tons in 2010, 11,844 tons in 2011, and 14,805 tons in 2012.

Table 5-3 shows the impact of the increases in rule effectiveness on PM-10 emissions in 2008 through 2012. This table also quantifies the annual five percent reductions for 2008 through 2012. The total reduction in PM-10 emissions between 2007 and 2012 with the increases in rule effectiveness is 16,089 tons, which represents a 27.2 percent reduction in total 2007 base case emissions.

Table 5-4 confirms that the annual five percent reduction requirements are met in 2008-2012 and there is a surplus margin of benefit in each year. The total surplus in 2012 is 1,284 tons. This surplus is needed to model attainment at all monitors in the PM-10 nonattainment area by December 31, 2012. The modeling attainment demonstration is discussed in Chapter Six.

Table 5-3
2008-2012 PM-10 Emissions with Increased Rule Effectiveness

Source Category	2008	2009	2010	2011	2012
	(tons/year)				
POINT	150	133	127	128	135
AREA					
Fuel combustion	1,301	1,307	1,311	1,316	1,328
Commercial cooking	993	998	1,001	1,005	1,014
Construction (includes windblown dust)	8,355	5,333	4,139	4,014	4,073
Tilling, harvesting and cotton ginning	893	893	893	893	893
Travel on unpaved farm roads	731	731	731	731	731
Livestock	261	261	261	261	261
Travel on unpaved parking lots	2,422	2,434	2,441	2,451	2,473
Offroad recreational vehicles	2,180	2,191	2,198	2,206	2,226
Leaf blowers	895	899	902	906	914
Windblown agriculture	448	448	448	448	448
Other windblown sources	3,938	3,788	3,788	3,788	3,639
Fires	497	497	497	497	497
Mining/quarrying (includes windblown dust)	476	401	355	356	369
Travel on industrial paved/unpaved roads	472	382	331	333	351
Other industrial sources	976	865	828	832	877
NONROAD					
Aircraft	184	152	142	143	146
Airport ground support equipment	27	23	21	20	20
Locomotives	34	34	34	34	34
Other nonroad equipment	1,683	1,661	1,641	1,595	1,513
ONROAD					
Exhaust	2,836	2,647	2,371	1,843	1,407
Tire wear	256	257	257	258	261
Brake wear	758	767	771	773	787
Paved roads	8,155	8,214	8,289	8,323	8,422
Unpaved roads and alleys	10,312	10,284	10,284	10,284	10,312
Totals	**49,231**	**45,600**	**44,062**	**43,438**	**43,130**
5% Reduction Targets (tons/year)	**2,961**	**5,922**	**8,883**	**11,844**	**14,805**
Actual Plan Reductions (tons/year)	**9,987**	**13,618**	**15,157**	**15,781**	**16,089**

Table 5-4
PM-10 Emission Reductions and Five Percent Reduction Requirements

Year	5% Reduction Requirement (tons/year)	Total PM-10 Emission Reductions due to Increases in Rule Effectiveness (tons/year)	Excess Benefit = Total PM-10 Emission Reductions minus 5% Reduction Requirement (tons/year)	(%)
2008	2,961	9,987	7,026	237%
2009	5,922	13,618	7,696	130%
2010	8,883	15,157	6,274	71%
2011	11,844	15,781	3,937	33%
2012	14,805	16,089	1,284	9%

REFERENCES

EPA, 2004. *Incorporating Emerging and Voluntary Measures in a State Implementation Plan*. Prepared by the EPA Office of Air Quality Standards. September 2004.

EPA, 2009. *Revisions to the Arizona State PM-10 Implementation Plan, Maricopa County Air Quality Department. Final Rule*. Federal Register, Volume 74, Number 218, Pages 58553-58554. November 13, 2009.

EPA, 2010. *Revisions to the State Implementation Plan, Maricopa County, Arizona. Final Rule*. Federal Register, Volume 75, Number 240, Pages 78167-78168. December 15, 2010.

CHAPTER SIX

ATTAINMENT DEMONSTRATION

Chapter Six describes the modeling that was performed to demonstrate that attainment of the 24-hour PM-10 standard will be achieved in 2012. The modeling was conducted to show attainment under high wind conditions since violations of the standard under stagnant conditions have not occurred since 2006 (see Chapter 3 for monitoring data information).

A modeling attainment demonstration was performed for a 36 square mile area in the Salt River area, which includes the West 43rd Avenue monitor that has recorded the most exceedances of the PM-10 standard under high wind conditions during 2005-2010. A regional attainment demonstration for the entirety of the nonattainment area is also provided in this chapter. Both the modeling demonstration in the Salt River area and the entire nonattainment area are based upon a distance-weighted rollback approach. Windblown PM-10 emission estimates during high wind hours are calculated from back trajectories while low wind hour emission estimates are derived from land use distribution within each modeling domain. The benefits of the control measures described in Chapter Five provide the reductions necessary to model attainment.

In addition to the modeling attainment demonstrations, this chapter addresses other requirements of a nonattainment area plan, including reasonable further progress, contingency measures, and the onroad motor vehicle emissions budget for conformity. The chapter concludes with a discussion of the control measures in the Five Percent Plan that will reduce PM-10 emissions sufficiently to achieve attainment as expeditiously as practicable and the need for an extension of the attainment date deadline to December 31, 2012.

SALT RIVER AREA MODELING

This section describes the modeling and results for the attainment demonstration in the Salt River Area. A detailed discussion of the technical methods and assumptions used to perform the modeling for the Salt River Area is provided in the TSD (Chapter V of Appendix B, Exhibit 1).

Design Day Selection

PM-10 monitors in the Maricopa County nonattainment area recorded 17 exceedances of the 24-hour average PM-10 national ambient air quality standard in 2007 (the last year before the control measures in this plan were implemented). Exceedances were recorded at six monitoring sites in the nonattainment area: Coyote Lakes, Central Phoenix, Durango, Higley, South Phoenix and West 43rd Avenue. The Buckeye monitor also exceeded the standard on two days in 2007, but this monitor is outside the nonattainment area and therefore was not modeled in this plan.

Of the 17 exceedances recorded within the nonattainment area in 2007, the West 43rd Avenue monitor recorded the highest number of exceedances with six. The Higley monitor was next highest with five. The remaining exceeding monitors in the nonattainment area recorded two or less exceedances in 2007. All but one of the exceedances in 2007 occurred under high wind conditions. For the purposes of this attainment demonstration, high wind conditions are defined as days when five-minute or hourly average wind speeds are greater than 12 miles per hour. This value is identical to the threshold for windblown dust production as identified in the 2008 PM-10 Periodic Emissions Inventory (Appendix A, Exhibit 1). Table 6-1 provides a tabulation by monitor of the exceedance days, 24-hour average concentrations and the general meteorological conditions associated with the exceedances.

The following primary criteria were applied in selecting the design days for PM-10 modeling:

1. Exceedance days with five-minute or hourly average wind speeds > 12 miles per hour; and

2. Exccedance days that are unlikely to be considered as a high wind exceptional event.

The West 43rd Avenue monitor recorded six exceedances when hourly average winds were greater than 12 miles per hour in 2007. Four of the six exceedance days were associated with high winds from a frontal storm system, while the remaining two days were associated with high winds from monsoon season thunderstorm outflows. Days on which thunderstorm outflow activity occurs have been excluded as candidate days for modeling, as these days are almost always flagged as uncontrollable exceptional events.

Two of the four frontal system exceedances days recorded at the West 43rd Avenue monitor were days in which only the West 43rd Avenue monitor exceeded the standard (March 27 and May 4). These days suggest that the local sources around the West 43rd Avenue monitor may have been important contributors to the exceedance value. Of these two dates, May 4, 2007 was chosen as the design day as wind speeds on March 27th were significantly higher making it a candidate for an exceptional event demonstration.

For a demonstration of regional attainment across the nonattainment area, the other exceedance days in 2007 were evaluated using the same criteria employed to select May 4, 2007 for the Salt River area modeling. All high wind days associated with thunderstorm outflows were removed for consideration due to their designation as uncontrollable exceptional events. Of the remaining days with high wind days, two days (April 12 and June 6) recorded exceedances at multiple monitors, indicating that the high winds had a more regional effect on PM-10 concentrations. Of the these two dates, June 6, 2007 was chosen as the design day as April 12, 2007 presented very strong state-wide high winds indicating this date was also a candidate for an exceptional event demonstration. A more

Table 6-1
Maricopa County and PM-10 Nonattainment Area 24-Hour Average PM-10 Standard Exceedance Dates, Measured Concentrations and Associated Meteorological Conditions in 2007

Monitor	Date	PM-10 Conc. ($\mu g/m^3$)	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	***June 6***	***181.0***	***Frontal System High Winds***
	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 43rd Avenue	March 27	227.9	Frontal System High Winds
	April 12	202.7	Frontal System High Winds
	May 4	***197.3***	***Frontal System High Winds***
	June 6	***225.7***	***Frontal System High Winds***
	July 19	178.0	Thunderstorm Outflow
	August 16	215.1	Thunderstorm Outflow

Note: The selected design days are highlighted in bold italics. The Buckeye monitor is located outside the PM-10 nonattainment area and is not part of the attainment demonstration. The Coyote Lakes monitor was a special purpose monitor that no longer operates and has since been replaced by the Zuni Hills monitor in late 2009. As such, the Coyote Lakes monitor is not a good candidate for producing a design day.

detailed discussion on design day selection is presented in the TSD (Chapter V of Appendix B, Exhibit 1).

Plots of hourly wind speed and PM-10 concentration for the high wind design days of May 4, 2007 and June 6, 2007 at the West 43rd Avenue and Higley monitors are shown in Figure 6-1 through 6-3.

Modeling Domain

On a high wind design day, the areal extent impacting monitors is largely a function of wind speed. As such it is necessary to divide the selected design days into high and low wind hours. High wind hours are represented by sources located along back trajectories and low wind hours are represented by sources within a modeling domain surrounding the selected monitoring site. The basis for distinguishing between high and low wind hours is the 12 mph windblown dust aerodynamic entrainment threshold established in the 2008 PM-10 Periodic Emissions Inventory (Appendix A, Exhibit 1).

Five-minute average wind speed and direction as measured at the West 43rd Avenue monitor is employed to construct the back trajectories for each high wind hour. Past modeling of back trajectories indicate that the lands significantly contributing to elevated PM-10 concentrations recorded at the monitor lie generally within a mile of either side of the path of the upwind back trajectories (see Section entitled "Establishing the Boundaries of a High Wind Domain" in Chapter V of Appendix B, Exhibit 1).

The modeling domain used during the low wind hours for the West 43rd Avenue monitor is similar to the area initially defined in the ADEQ TSD for the 2005 PM-10 attainment plan and is bounded by Van Buren Street to the north, Baseline Road to the south, 59th Avenue to the west and 7th Street to the east. Due to the diversity and number of PM-10 sources in the Salt River area, it is considered to be a worst-case representation of sources throughout the nonattainment area.

Figure 6-4 shows the low wind domain and the high wind back trajectories on May 4, 2007 as originating from the West 43rd Avenue monitor. The highlighted area surrounding the back trajectories represent the land use domain used for calculating windblown PM-10 emissions during the high wind hours.

Inventory Development

For the high wind hours, hourly windblown PM-10 emissions are calculated based upon the land uses that fall within the hourly back trajectory. Emissions from the land uses within each hourly back trajectory are calculated per the methodology described in the 2008 PM-10 Periodic Emissions Inventory. Initially, the land uses within each back trajectory are evaluated for their potential to emit windblown dust. Some land uses are assumed to have no windblown dust emissions (office/retail), some are partially emissive (commercial/industrial) and others are assumed to be 100% emissive (vacant lands).

Figure 6-1
Summary of the Monitoring Conditions at West 43rd Avenue
on the High Wind Design Day
(May 4, 2007)

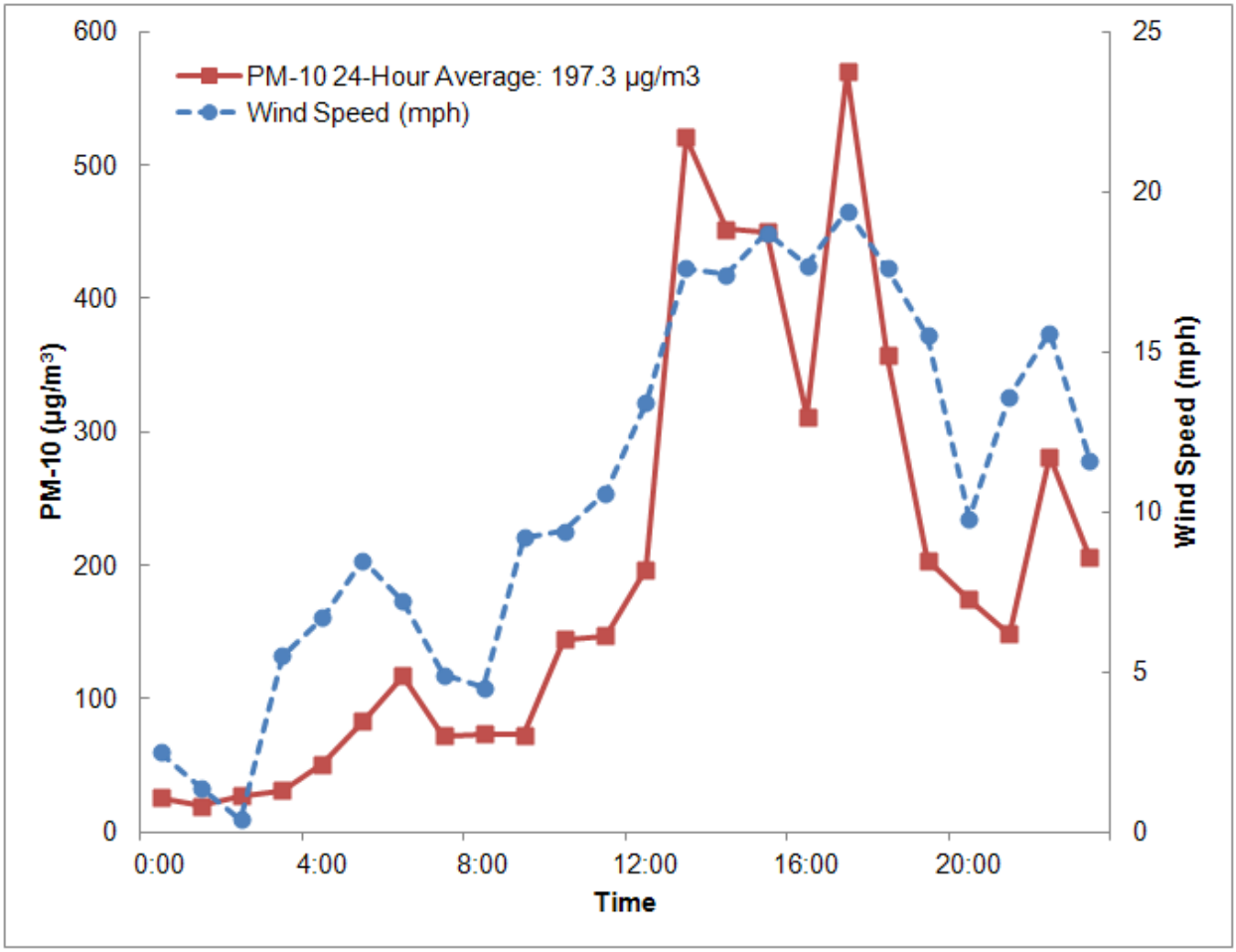


Figure 6-2
Summary of the Monitoring Conditions at West 43rd Avenue on the High Wind Design Day (June 6, 2007)

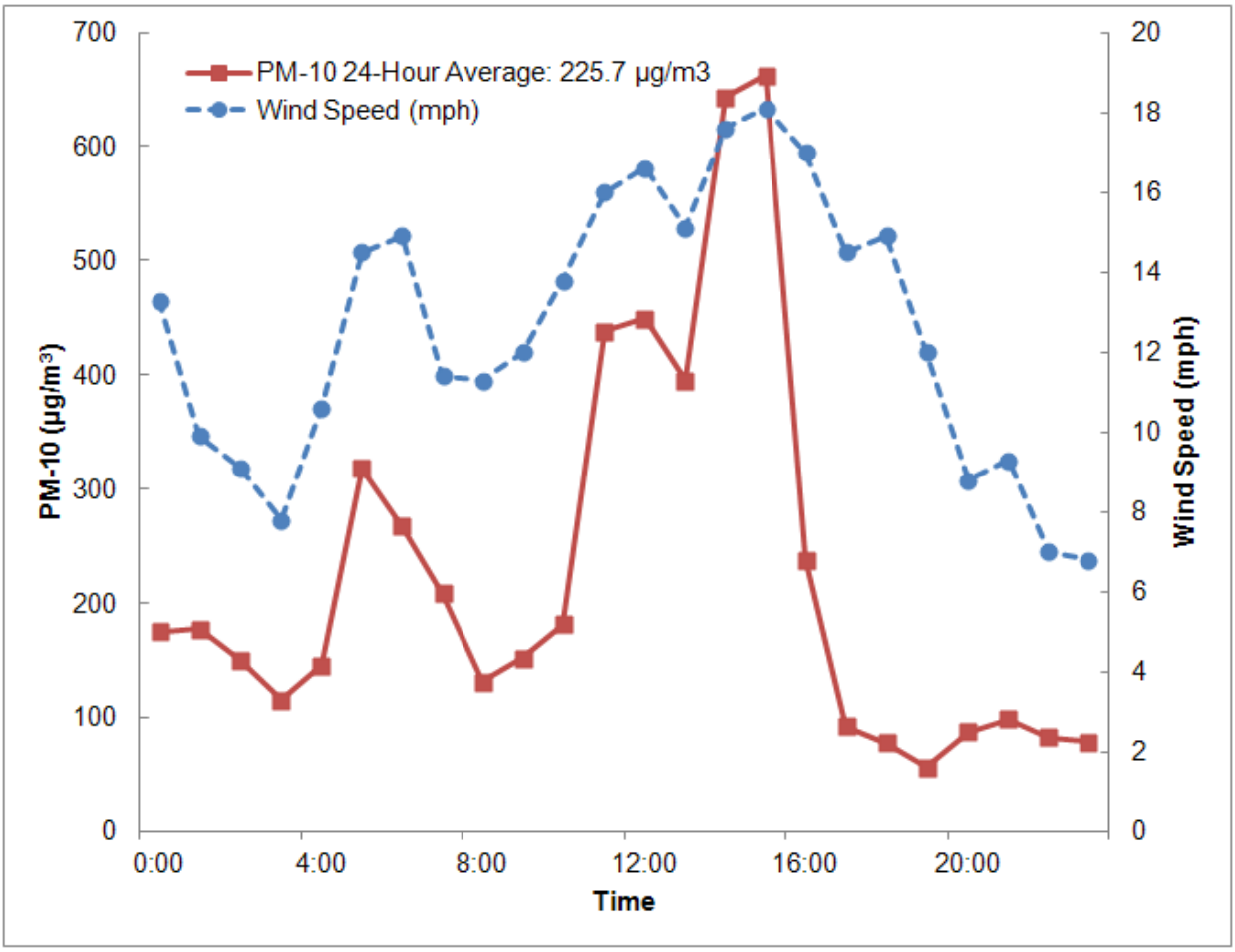


Figure 6-3
Summary of the Monitoring Conditions at Higley
on the High Wind Design Day
(June 6, 2007)

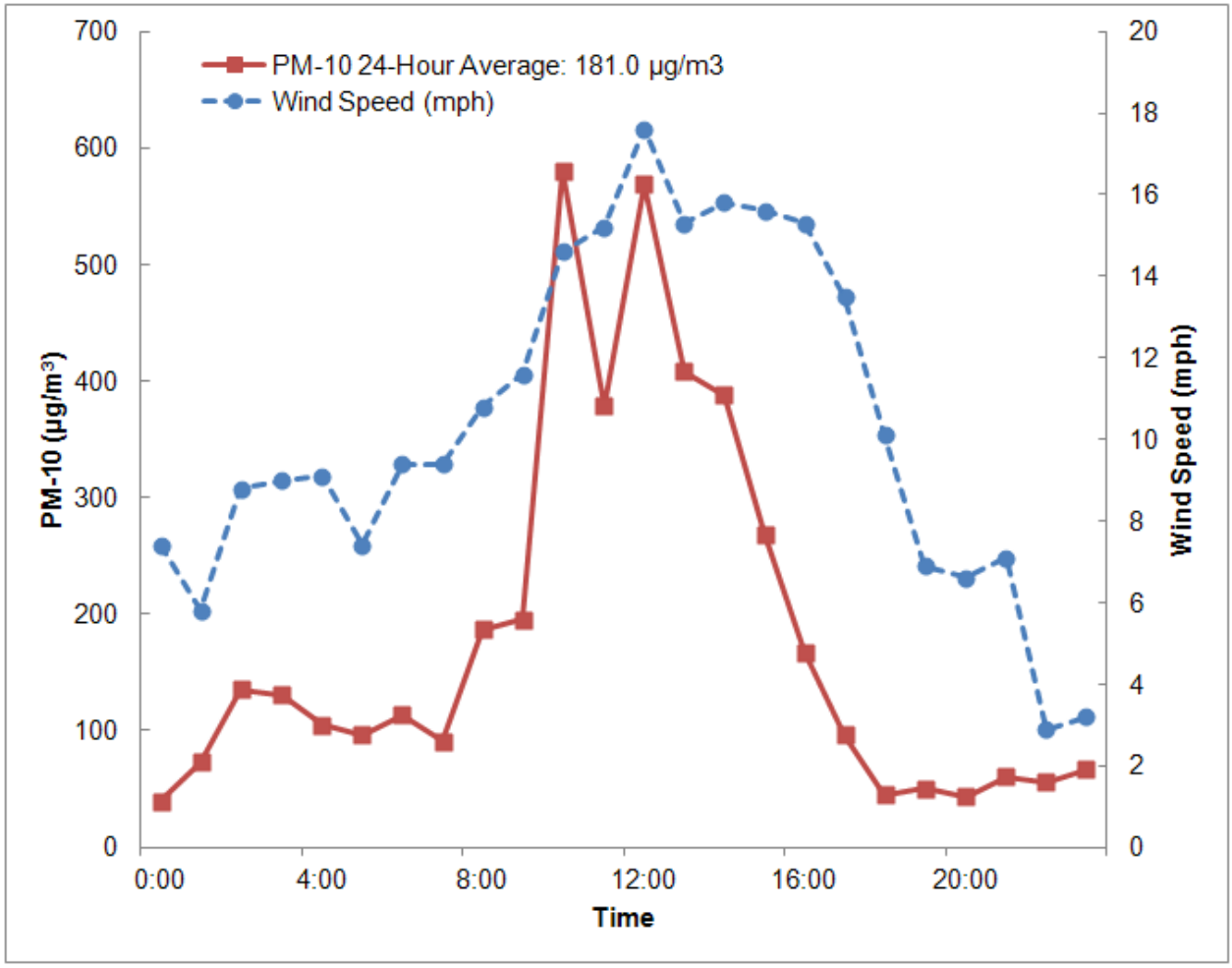
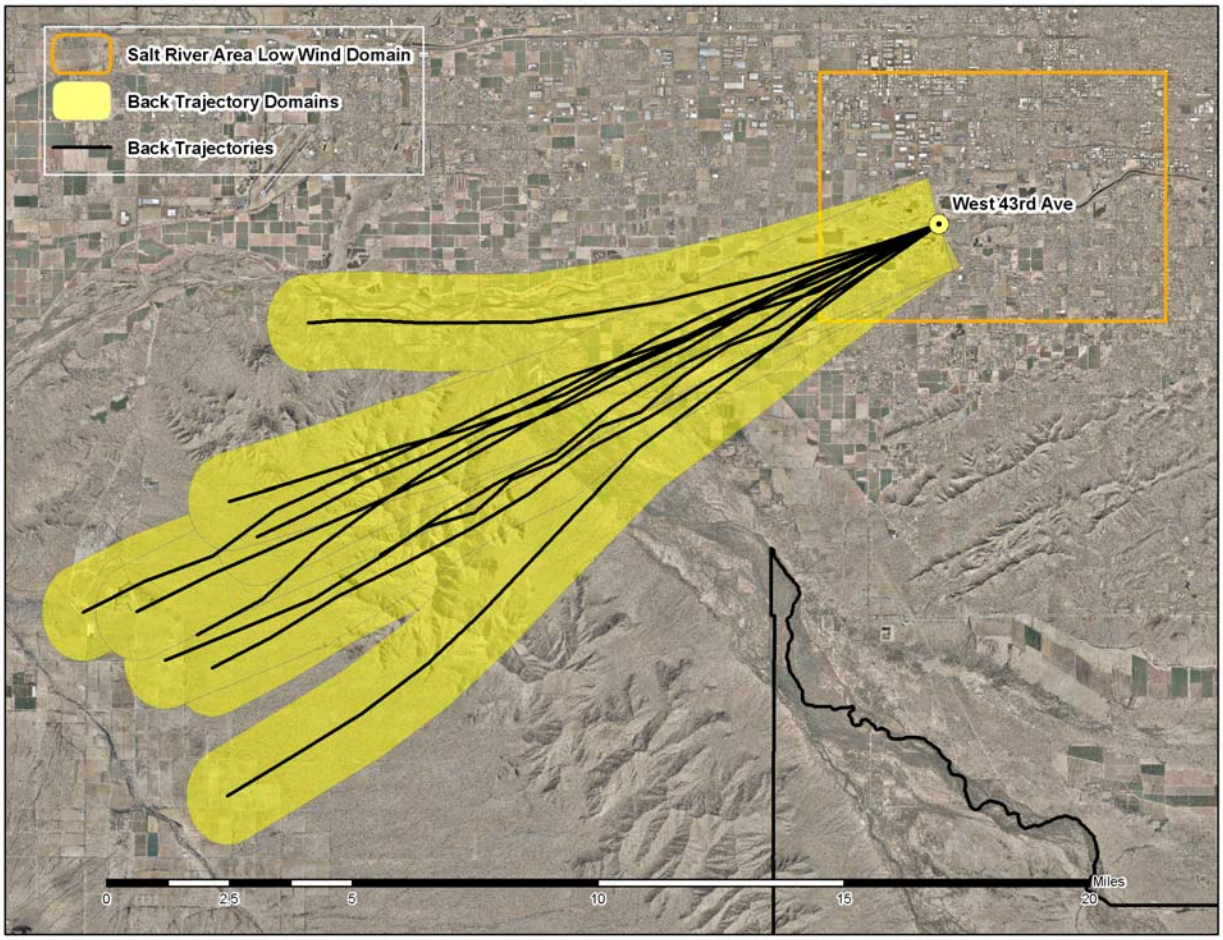


Figure 6-4
Salt River Area Low Wind Domain and
May 4, 2007 Hourly High Wind Back Trajectories
and Associated Domains as Originating from West 43rd Avenue Monitor



Land uses that are conservatively assumed to have 100% of their acreage available for windblown dust production include: vacant and open lands, sand and gravel/mining lands, lands under development, landfills and unpaved automotive test tracks. Land uses where only portions of the acreage is available for windblown dust production include: agricultural lands, industrial lands, commercial lands and large public lands.

Windblown PM-10 emissions from these land uses are calculated by use of emission factors based upon wind speed and the disturbance level of each land use. The disturbance level of each land use is derived from rule effectiveness studies of the fugitive dust rules that regulate the various land uses. The effectiveness of the rule is assumed to be an approximate surrogate for the average level of disturbance of each regulated land use. The details of the calculation of the windblown PM-10 emissions are provided in the TSD (Chapter V of Appendix B, Exhibit 1).

Since there have been no stagnation violations of the 24-hour PM-10 standard since 2006, detailed low wind design-day specific emission inventories are not needed. However, emissions reductions achieved as a result of controls in this plan during the low wind hours of the high wind design days are quantifiable and a necessary part of the attainment demonstration. In order to account for these emissions reductions, annual low wind emission inventories for the PM-10 nonattainment area are allocated to the Salt River area domain based upon land use distribution. This allows for representation of the low wind emissions, and associated control measure benefits, in the Salt River area domain without having to create a design day inventory. The details on how low wind emissions are allocated to the Salt River area domain based upon land use is included in the TSD (Chapter V of Appendix B, Exhibit 1).

Distance-Weighted Rollback Modeling

The fundamental assumption underlying any rollback method is that pollutant concentrations are directly proportional to total emissions over the area of interest. A weighted rollback approach applies a distance reduction factor to the emissions of each source in the modeling domain to help assess the impact of emissions as distance from the monitor increases. The reduction factor is calculated based upon the distance between each source and the impacting monitor.

An investigation of results from a limited-term (2010-mid 2011) saturation monitoring study conducted in the Salt River area and beyond under high wind conditions suggested the need to account for distance between emission sources and the impacted monitor. Further testing of different weighting factors through the analysis of dispersion model AERMOD confirmed that a 1/d weighting factor proved to be the best form of weight to use in adjusting PM-10 emissions developed through the back trajectory domains (See section entitled “Source Weighting” in Chapter V of Appendix B, Exhibit 1 for more information). Thus, all high wind design day emissions inventories were weighted to account for a 1/d distance from the modeled monitor.

Distance weighting was not applied to the low wind domain, as the low wind domain primarily serves to identify the predominant land uses near the monitor and thus the predominant low wind emissions associated with the land uses. The overall reduction in low wind emissions gained through the implementation of control measures was applied as the reduction factor to the low wind hourly concentrations without the need to weight these reductions by distance.

A detailed explanation of the saturation monitoring study and the AERMOD evaluation can be found in the TSD (Chapter V of Appendix B, Exhibit 1).

Background Concentrations

The temporary saturation monitoring study also provided insights into non-anthropogenic levels of PM-10 within the nonattainment area. These background values were established by comparing monitored readings under high and low wind conditions at the temporary, rural Arlington School monitor and the existing Buckeye monitor located just outside the western edge of the nonattainment area. The Arlington School monitor was located approximately 11 miles west of the Buckeye monitor, surrounded by mostly natural desert land.

Under high wind conditions (> 12 mph), when the wind is coming primarily from the west, the Arlington monitor consistently recorded lower PM-10 concentrations than the Buckeye monitor, which is primarily impacted by PM-10 emissions from agricultural activities. The median value under high wind conditions at the Arlington monitor was found to be 21.9 $\mu g/m^3$ and is assumed to be the non-anthropogenic background PM-10 concentration for the PM-10 nonattainment area under high wind conditions. A similar comparison under low wind conditions yielded a median value of 14.9 $\mu g/m^3$ and is assumed to be the non-anthropogenic background PM-10 concentration for the PM-10 nonattainment area under low wind conditions. A detailed explanation of the methods and data used to develop the background values can be found in the TSD (Chapter V of Appendix B, Exhibit 1).

Control Measure Analysis

To assess the benefits of the control measures under high wind conditions, separate hourly windblown PM-10 inventories were developed along back trajectory domains using base case soil disturbance rates in 2007 and then compared against inventories developed using the predicted soil disturbance rates in 2012. The high wind inventories are then weighted by distance from the monitor to more accurately represent the lessening impact of emission sources that are farther away from the modeled monitor. The reductions seen during the high wind hours is strictly due to the benefits of control measures in this plan, as land use is held constant between 2007 and 2012. Table 6-2 provides a summary of the hourly high wind inventories for 2007 and 2012.

Table 6-2
Base Case 2007 and Controlled 2012 High Wind PM-10 Emissions Inventories for May 4, 2007 Design Day at the West 43rd Avenue 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%

Under low wind conditions, emissions inventories for the Salt River area domain were developed based upon land use distribution within the Salt River area. Annual 2007 base case and 2012 controlled low wind emissions were each allocated to the land uses within the domain for comparison of the benefits of the control measures in this plan. The reductions seen during the low wind hours are a result of the control measures in this plan along with adjustments to source categories based upon observed and expected economic and social growth factors. Table 6-3 provides a summary of the low wind inventories by land use for 2007 and 2012. Detailed discussions of the creation of high and low wind inventories is provided in the TSD (Chapter V of Appendix B, Exhibit 1).

Demonstration of Attainment

Assessing the impact of the control measures in this plan on concentrations within the Salt River area at the West 43rd monitor in 2012 is accomplished through a distance-weighted rollback methodology. As per the methodology, the percent PM-10 emission reductions recorded between the 2007 and 2012 high and low wind inventories provide the percent reductions to the hourly concentrations on the design day. Non-anthropogenic background concentrations under high and low wind conditions are held steady and are not reduced by the benefits seen in the contrast between the 2007 base and 2012 controlled inventories. The resulting hourly concentrations in 2012 must then be summed and averaged across the design day in order to compare the 24-Hour value against the 24-hour PM-10 standard. The 24-hour value must be less the 155 $\mu g/m^3$ in order to demonstrate attainment of the standard.

Table 6-4 provides a summary of the results of the distance-weighted rollback attainment demonstration for West 43rd Avenue monitor in the Salt River area. A 24-hour value of 133.2 $\mu g/m^3$ attests that the control measures in this plan are sufficient to demonstrate that the West 43rd Avenue monitor will have concentrations below the 24-hour PM-10 standard in 2012. This indicates that attainment has been demonstrated under high wind conditions at the West 43rd Avenue monitor within the Salt River area domain.

Table 6-3
Annual Base Case 2007 and Controlled 2012 Low Wind PM-10 Emissions Inventories for the Salt River Area Low Wind Domain

Land Use	2007 Emissions (tons)	2012 Emissions (tons)	% Reduction
Residential	61.19	62.05	(1.4%)
Commercial	61.34	62.81	(2.4%)
Agriculture	29.19	28.57	2.1%
Vacant/Open	27.97	28.62	(2.3%)
Transportation	167.28	155.42	7.1%
Industrial	465.10	350.77	24.6%
Construction	437.70	132.98	69.6%
Total	1,249.76	821.23	34.3%

Table 6-4
2012 Attainment Demonstration
High Wind Design Day (May 4, 2007) at the West 43rd Avenue Monitor

Hour	Wind Speed (mph)	May 4, 2007 PM-10 Concentration ($\mu g/m^3$)	Background Concentration ($\mu g/m^3$)	2012 Controlled PM-10 Concentration ($\mu g/m^3$)
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	***13.4***	***196.6***	***21.9***	***137.5***
13	***17.6***	***521.0***	***21.9***	***346.4***
14	***17.4***	***451.6***	***21.9***	***300.6***
15	***18.7***	***449.9***	***21.9***	***295.8***
16	***17.7***	***311.2***	***21.9***	***206.7***
17	***19.4***	***570.0***	***21.9***	***367.7***
18	***17.6***	***357.2***	***21.9***	***237.2***
19	***15.5***	***204.0***	***21.9***	***140.7***
20	9.8	174.7	14.9	119.9
21	***13.6***	***148.8***	***21.9***	***105.4***
22	***15.6***	***281.1***	***21.9***	***191.0***
23	11.6	205.6	14.9	140.2
24-Hour Avg.		197.3		134.1

Note: High wind hours are highlighted in bold italics.

PM-10 NONATTAINMENT AREA MODELING

Similar to the modeling done for the Salt River area, attainment modeling for the entire nonattainment area is performed through the use of distance-weighted rollback modeling. The design day of June 6, 2007 was chosen for the regional attainment demonstration based upon the criteria discussed earlier in this chapter. A detailed discussion of the technical methods and assumptions used to perform the modeling for the nonattainment area is provided in the TSD (Chapter V of Appendix B, Exhibit 1).

Modeling Domain

On the high wind design day of June 6, 2007, both the West 43rd Avenue and the Higley monitor exceeded the 24-hour PM-10 standard. Five other monitors in the nonattainment area recorded elevated PM-10 concentrations but did not exceed the standard; these include: Central Phoenix, Durango Complex, Greenwood, State Super Site and West Phoenix monitors. Table 6-5 lists the modeled monitors and their 24-hour average concentrations on June 6, 2007. The other official active PM-10 monitors in the nonattainment area were all 1-in-6 filter monitors that did not have June 6, 2007 scheduled as a run day and therefore did not monitor 24-hour average PM-10 concentrations. All seven monitors that did record PM-10 concentrations have been modeled to assure attainment throughout the nonattainment area.

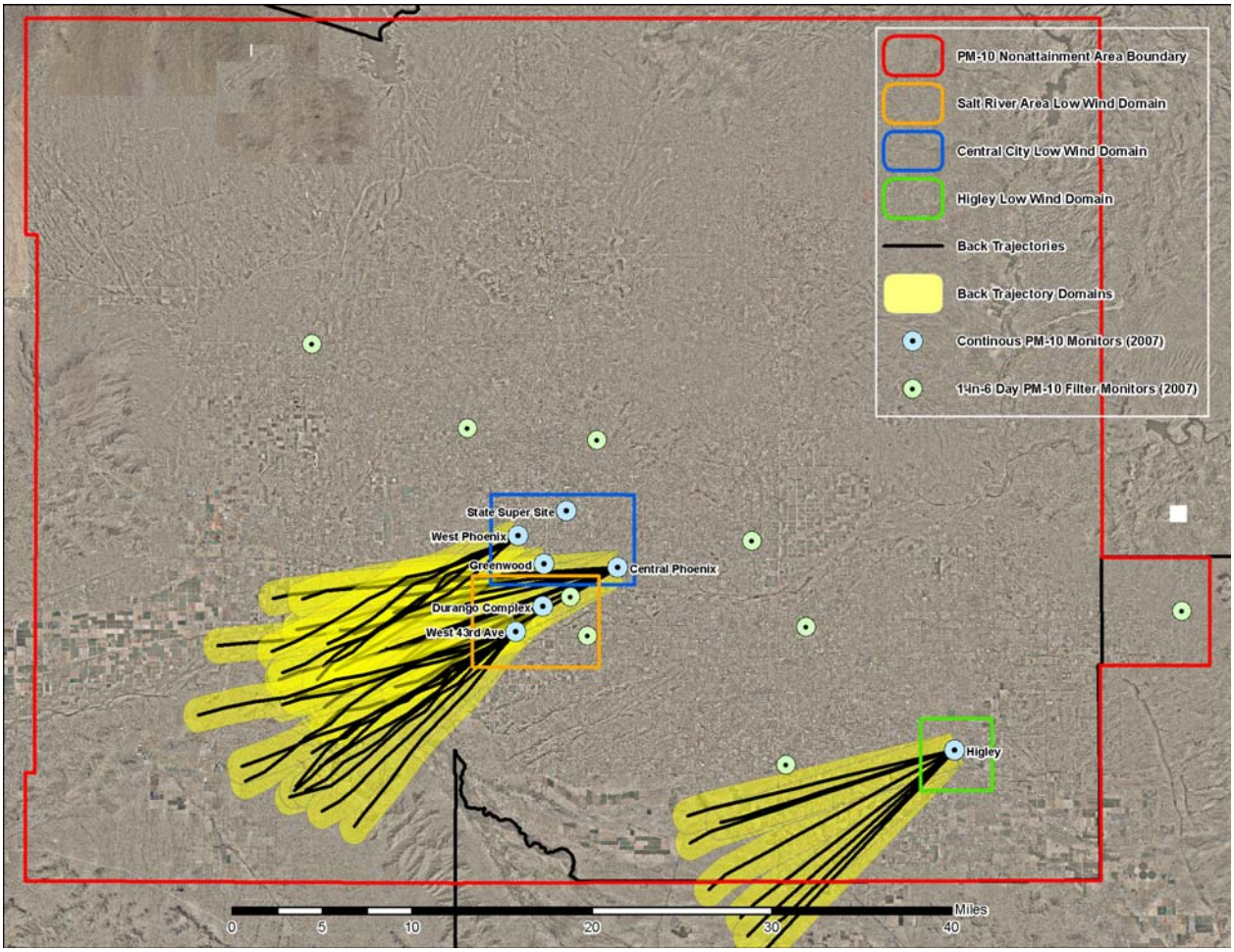
As was performed for the Salt River area modeling, a 1-mile buffer around each calculated back trajectory serve as the domain during high wind hours, as developed from each monitoring location in the nonattainment area. The number of high wind hours (> 12 mph) varies at each monitoring site depending on the unique physical characteristics of each site. In fact, the State Super Site which is located in a dense single-family and multi-family residential area had no high wind hours on June 6, 2007. Five-minute wind speed and direction was available to develop back trajectories for the Durango Complex, Greenwood, West Phoenix and West 43rd Avenue monitors. Hourly wind speed and direction was used to develop the back trajectories for the Central Phoenix and Higley monitors.

The large size of the nonattainment area requires that separate low wind domains around the modeled monitors be developed to capture the unique mix of land uses surrounding the monitors. In addition to the Salt River Area domain which includes the West 43rd Avenue and Durango Complex monitors, a new low wind domain was developed to represent the land uses around the Higley monitor located in the eastern portion of the nonattainment area. A third domain, labeled as the Central City domain, was developed to include central Phoenix monitors of Central Phoenix, Greenwood, State Super Site and West Phoenix. All four of these monitors are located in areas with dense residential and mixed retail/commercial/industrial land uses (see Table V-34 through V-36 in Chapter V of Appendix B, Exhibit 1, for distribution of land uses in low wind domains). Figure 6-5 displays the June 6, 2007 high wind back trajectory domains and the low wind domains used in the regional attainment modeling.

Table 6-5
24-Hour Average PM-10 Concentrations on the High Wind Design Day
(June 6, 2007)

Monitor	24-Hour PM-10 Concentration ($\mu g/m^3$)
Central Phoenix	107.0
Durango Complex	133.7
Greenwood	121.7
Higley	181.1
State Super Site	80.6
West Phoenix	108.8
West 43rd Avenue	225.7

Figure 6-5
PM-10 Nonattainment Area Low Wind Domains and
June 6, 2007 Hourly High Wind Back Trajectories and Associated Domains



Note: Emissions from the portions of back trajectory domains that are outside of the nonattainment area are not included as part of the attainment modeling.

Demonstration of Attainment

Both the hourly high wind back trajectory and low wind modeling domain inventories are developed using the same methodology employed in the development of the inventories for the Salt River area. Base case 2007 and controlled case 2012 inventories are thus compared to provide the high and low wind reductions to concentrations seen on the design day. Tables 6-6 through 6-11 provide a summary of the hourly high wind emission inventories and associated reduction percentages. Tables 6-12 through 6-13 provide a summary of the low wind domain inventories and associated reduction percentages for the Central City and Higley domains (the Salt River area domain has already been presented in Table 6-3).

The assumptions used to develop non-anthropogenic background values and analysis of control measure benefits in this plan carry over from the modeling demonstration for the Salt River area. Detailed discussion on all aspects of the regional nonattainment modeling can be found in the TSD (Chapter V of Appendix B, Exhibit 1).

Tables 6-14 through 6-20 provide a summary of the results of the distance-weighted rollback attainment demonstration for the seven monitors included in the regional nonattainment demonstration for the June 6, 2007 design day. All seven monitors have 24-hour average PM-10 values under 155 $\mu g/m^3$ which indicates that attainment has been demonstrated under high wind conditions throughout the PM-10 nonattainment area.

Table 6-6
Base Case 2007 and Controlled 2012 High Wind PM-10 Emissions Inventories for June 6, 2007 Design Day at the Central Phoenix Monitor

High Wind Hour	Un-weighted Emissions (tons)		Distance-Weighted Emissions (tons/feet from monitor)		% Reduction of Weighted Emissions
	2007	2012	2007	2012	
0	1.90	1.32	7.549E-05	5.230E-05	30.7%
1	0.99	0.74	5.184E-05	3.687E-05	28.9%
6	1.69	1.18	6.873E-05	4.797E-05	30.2%
7	0.99	0.74	5.254E-05	3.730E-05	29.0%
10	0.88	0.64	4.939E-05	3.485E-05	29.4%
11	2.01	1.41	7.319E-05	5.123E-05	30.0%
12	4.01	2.91	1.706E-04	1.166E-04	31.7%
13	7.52	5.04	2.448E-04	1.625E-04	33.6%
14	7.28	4.96	2.265E-04	1.520E-04	32.9%
15	4.33	3.04	1.657E-04	1.121E-04	32.3%
16	4.27	3.13	1.737E-04	1.192E-04	31.4%
17	2.29	1.60	8.494E-05	5.855E-05	31.1%
18	2.21	1.55	7.971E-05	5.545E-05	30.4%
Total	40.39	28.25	1.517E-03	1.037E-03	31.7%

Table 6-7
Base Case 2007 and Controlled 2012 High Wind PM-10 Emissions Inventories for June 6, 2007 Design Day at the Durango Complex Monitor

High Wind Hour	Un-weighted Emissions (tons)		Distance-Weighted Emissions (tons/feet from monitor)		% Reduction of Weighted Emissions
	2007	2012	2007	2012	
11	1.99	1.37	1.340E-04	9.011E-05	32.8%
12	3.69	2.55	2.267E-04	1.543E-04	31.9%
13	3.12	2.15	1.876E-04	1.281E-04	31.7%
14	8.02	5.49	4.672E-04	3.093E-04	33.8%
15	9.84	7.07	4.992E-04	3.379E-04	32.3%
16	5.62	3.79	3.247E-04	2.160E-04	33.5%
17	2.47	1.72	1.619E-04	1.110E-04	31.4%
Total	34.74	24.13	2.001E-03	1.347E-03	32.7%

Table 6-8
Base Case 2007 and Controlled 2012 High Wind PM-10 Emissions Inventories for June 6, 2007 Design Day at the Greenwood Monitor

High Wind Hour	Un-weighted Emissions (tons)		Distance-Weighted Emissions (tons/feet from monitor)		% Reduction of Weighted Emissions
	2007	2012	2007	2012	
12	1.05	0.77	5.872E-05	4.191E-05	28.6%
13	1.03	0.80	6.482E-05	4.701E-05	27.5%
14	3.03	2.16	1.618E-04	1.110E-04	31.4%
15	2.34	1.75	1.266E-04	8.868E-05	30.0%
Total	7.45	5.49	4.119E-04	2.886E-04	29.9%

Table 6-9
Base Case 2007 and Controlled 2012 High Wind PM-10 Emissions Inventories for June 6, 2007 Design Day at the Higley Monitor

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%

Table 6-10
Base Case 2007 and Controlled 2012 High Wind PM-10 Emissions Inventories for June 6, 2007 Design Day at the West Phoenix Monitor

High Wind Hour	Un-weighted Emissions (tons)		Distance-Weighted Emissions (tons/feet from monitor)		% Reduction of Weighted Emissions
	2007	2012	2007	2012	
11	0.65	0.53	2.164E-05	1.680E-05	22.4%
12	1.78	1.33	5.329E-05	3.930E-05	26.2%
13	3.35	2.45	8.177E-05	5.933E-05	27.4%
14	4.27	3.08	1.123E-04	8.105E-05	27.8%
15	1.63	1.21	4.623E-05	3.396E-05	26.5%
Total	11.67	8.60	3.152E-04	2.304E-04	26.9%

Table 6-11
Base Case 2007 and Controlled 2012 High Wind PM-10 Emissions Inventories for June 6, 2007 Design Day at the West 43rd Avenue Monitor

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%

Table 6-12
Annual Base Case 2007 and Controlled 2012 Low Wind PM-10 Emissions Inventories for the Central City Low Wind Domain

Land Use	2007 Emissions (tons)	2012 Emissions (tons)	% Reduction
Residential	118.19	119.87	(1.4%)
Commercial	87.33	89.43	(2.4%)
Agriculture	0.00	0.00	0.0%
Vacant/Open	25.73	26.33	(2.3%)
Transportation	102.23	93.67	7.1%
Industrial	262.58	198.03	24.6%
Construction	164.80	50.07	69.6%
Total	760.86	577.41	24.0%

Table 6-13
Annual Base Case 2007 and Controlled 2012 Low Wind PM-10 Emissions Inventories for the Higley Low Wind Domain

Land Use	2007 Emissions (tons)	2012 Emissions (tons)	% Reduction
Residential	40.97	41.55	(1.4%)
Commercial	15.28	15.65	(2.4%)
Agriculture	46.15	45.17	2.1%
Vacant/Open	16.62	17.01	(2.3%)
Transportation	162.98	149.34	7.1%
Industrial	2.58	1.95	24.6%
Construction	312.06	94.81	69.6%
Total	596.65	365.49	38.5%

Table 6-14
2012 Attainment Demonstration
High Wind Design Day (June 6, 2007) at the Central Phoenix Monitor

Hour	Wind Speed (mph)	June 6, 2007 PM-10 Concentration ($\mu g/m^3$)	Background Concentration ($\mu g/m^3$)	2012 Controlled PM-10 Concentration ($\mu g/m^3$)
0	***12.5***	***138.5***	***21.9***	***102.7***
1	***13.1***	***176.2***	***21.9***	***131.6***
2	8.6	133.6	14.9	105.1
3	8.0	109.7	14.9	86.9
4	10.9	92.9	14.9	74.2
5	10.3	81.5	14.9	65.5
6	***12.4***	***99.6***	***21.9***	***76.1***
7	***12.8***	***104.0***	***21.9***	***80.2***
8	11.1	80.2	14.9	64.5
9	11.3	73.2	14.9	59.2
10	***12.1***	***69.6***	***21.9***	***55.6***
11	***13.9***	***96.1***	***21.9***	***73.8***
12	***15.3***	***106.2***	***21.9***	***79.5***
13	***15.4***	***150.5***	***21.9***	***107.3***
14	***16.9***	***211.2***	***21.9***	***148.9***
15	***17.8***	***255.7***	***21.9***	***180.1***
16	***15.7***	***111.7***	***21.9***	***83.5***
17	***14.0***	***71.0***	***21.9***	***55.7***
18	***14.0***	***74.4***	***21.9***	***58.4***
19	11.9	72.5	14.9	58.7
20	11.1	59.8	14.9	49.0
21	11.7	70.6	14.9	57.2
22	8.8	63.0	14.9	51.5
23	8.5	66.9	14.9	54.4
24-Hour Avg.		107.0		81.7

Note: High wind hours are highlighted in bold italics.

Table 6-15
2012 Attainment Demonstration
High Wind Design Day (June 6, 2007) at the Durango Complex Monitor

Hour	Wind Speed (mph)	June 6, 2007 PM-10 Concentration ($\mu g/m^3$)	Background Concentration ($\mu g/m^3$)	2012 Controlled PM-10 Concentration ($\mu g/m^3$)
0	8.9	132.6	14.9	92.2
1	6.3	166.4	14.9	114.4
2	5.0	133.6	14.9	92.9
3	1.0	112.7	14.9	79.2
4	2.6	124.4	14.9	86.8
5	7.3	101.4	14.9	71.7
6	9.1	164.5	14.9	113.2
7	8.7	113.4	14.9	79.6
8	10.5	93.6	14.9	66.6
9	11.2	86.3	14.9	61.8
10	11.9	83.3	14.9	59.8
11	***12.5***	***130.3***	***21.9***	***94.8***
12	***13.9***	***168.1***	***21.9***	***121.4***
13	***13.5***	***202.7***	***21.9***	***145.4***
14	***15.7***	***405.5***	***21.9***	***275.9***
15	***17.9***	***398.1***	***21.9***	***276.5***
16	***14.5***	***119.9***	***21.9***	***87.1***
17	***12.9***	***70.0***	***21.9***	***54.9***
18	10.3	53.9	14.9	40.5
19	8.9	57.0	14.9	42.6
20	6.4	61.1	14.9	45.3
21	7.5	83.0	14.9	59.6
22	6.3	67.8	14.9	49.7
23	5.2	79.6	14.9	57.4
24-Hour Avg.		133.7		94.6

Note: High wind hours highlighted in bold italics.

Table 6-16
2012 Attainment Demonstration
High Wind Design Day (June 6, 2007) at the Greenwood Monitor

Hour	Wind Speed (mph)	June 6, 2007 PM-10 Concentration ($\mu g/m^3$)	Background Concentration ($\mu g/m^3$)	2012 Controlled PM-10 Concentration ($\mu g/m^3$)
0	8.1	138.4	14.9	108.8
1	5.7	159.9	14.9	125.1
2	4.9	123.4	14.9	97.4
3	2.9	105.2	14.9	83.5
4	2.1	105.6	14.9	83.8
5	5.4	86.5	14.9	69.3
6	6.7	112.6	14.9	89.2
7	7.7	103.8	14.9	82.5
8	8.3	77.9	14.9	62.8
9	10.0	79.0	14.9	63.6
10	11.0	74.7	14.9	60.3
11	10.8	103.2	14.9	82.0
12	***12.7***	***172.2***	***21.9***	***129.2***
13	***12.6***	***194.6***	***21.9***	***147.1***
14	***15.4***	***442.1***	***21.9***	***310.3***
15	***13.9***	***240.6***	***21.9***	***175.1***
16	11.9	93.5	14.9	74.6
17	11.7	96.9	14.9	77.2
18	11.4	82.5	14.9	66.3
19	8.7	68.3	14.9	55.5
20	7.4	61.3	14.9	50.2
21	7.0	67.9	14.9	55.2
22	5.1	63.5	14.9	51.8
23	4.0	68.3	14.9	55.5
24-Hour Avg.		121.7		94.0

Note: High wind hours highlighted in bold italics.

Table 6-17
2012 Attainment Demonstration
High Wind Design Day (June 6, 2007) at the Higley Monitor

Hour	Wind Speed (mph)	June 6, 2007 PM-10 Concentration ($\mu g/m^3$)	Background Concentration ($\mu g/m^3$)	2012 Controlled PM-10 Concentration ($\mu g/m^3$)
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
10	***14.6***	***580.2***	***21.9***	***431.9***
11	***15.2***	***379.0***	***21.9***	***266.3***
12	***17.6***	***568.8***	***21.9***	***406.7***
13	***15.3***	***408.1***	***21.9***	***290.5***
14	***15.8***	***387.9***	***21.9***	***271.1***
15	***15.6***	***268.9***	***21.9***	***190.5***
16	***15.3***	***167.5***	***21.9***	***120.8***
17	***13.5***	***96.4***	***21.9***	***75.3***
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
24-Hour Avg.		181.1		127.5

Note: High wind hours highlighted in bold italics.

Table 6-18
2012 Attainment Demonstration
High Wind Design Day (June 6, 2007) at the State Super Site Monitor

Hour	Wind Speed (mph)	June 6, 2007 PM-10 Concentration ($\mu g/m^3$)	Background Concentration ($\mu g/m^3$)	2012 Controlled PM-10 Concentration ($\mu g/m^3$)
0	7.6	99.3	14.9	79.0
1	6.3	149.6	14.9	117.3
2	5.4	112.2	14.9	88.8
3	5.4	95.8	14.9	76.4
4	6.7	92.4	14.9	73.8
5	7.2	80.6	14.9	64.8
6	7.2	80.2	14.9	64.5
7	6.5	82.7	14.9	66.4
8	7.2	63.5	14.9	51.8
9	6.7	60.8	14.9	49.8
10	6.9	53.6	14.9	44.3
11	9.4	65.5	14.9	53.4
12	8.9	77.8	14.9	62.7
13	9.8	107.8	14.9	85.5
14	10.5	142.1	14.9	111.6
15	11.4	109.4	14.9	86.7
16	10.1	62.3	14.9	50.9
17	9.2	54.4	14.9	44.9
18	11.2	57.5	14.9	47.3
19	9.6	53.9	14.9	44.5
20	7.8	60.9	14.9	49.9
21	6.3	62.5	14.9	51.1
22	3.8	55.1	14.9	45.5
23	3.6	54.8	14.9	45.2
24-Hour Avg.		80.6		64.8

Table 6-19
2012 Attainment Demonstration
High Wind Design Day (June 6, 2007) at the West Phoenix Monitor

Hour	Wind Speed (mph)	June 6, 2007 PM-10 Concentration ($\mu g/m^3$)	Background Concentration ($\mu g/m^3$)	2012 Controlled PM-10 Concentration ($\mu g/m^3$)
0	7.1	134.4	14.9	105.7
1	7.8	164.9	14.9	128.9
2	8.4	123.8	14.9	97.7
3	4.2	106.1	14.9	84.2
4	5.1	99.1	14.9	78.9
5	6.1	84.4	14.9	67.7
6	8.5	94.4	14.9	75.3
7	10.3	102.9	14.9	81.8
8	8.7	75.2	14.9	60.7
9	8.6	70.3	14.9	57.0
10	8.8	62.1	14.9	50.8
11	***12.1***	***122.2***	***21.9***	***99.7***
12	***13.6***	***169.6***	***21.9***	***130.8***
13	***15.1***	***256.6***	***21.9***	***192.2***
14	***15.1***	***259.8***	***21.9***	***193.6***
15	***13.5***	***132.1***	***21.9***	***102.9***
16	12.0	88.2	14.9	70.6
17	11.7	71.9	14.9	58.2
18	10.0	66.7	14.9	54.3
19	9.3	65.1	14.9	53.1
20	9.1	66.7	14.9	54.3
21	6.8	67.3	14.9	54.7
22	5.3	62.6	14.9	51.2
23	4.8	63.7	14.9	52.0
24-Hour Avg.		108.8		85.7

Note: High wind hours highlighted in bold italics.

Table 6-20
2012 Attainment Demonstration
High Wind Design Day (June 6, 2007) at the West 43rd Avenue Monitor

Hour	Wind Speed (mph)	June 6, 2007 PM-10 Concentration ($\mu g/m^3$)	Background Concentration ($\mu g/m^3$)	2012 Controlled PM-10 Concentration ($\mu g/m^3$)
0	***13.3***	***175.1***	***21.9***	***124.9***
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
5	***14.5***	***318.0***	***21.9***	***218.8***
6	***14.9***	***267.2***	***21.9***	***182.9***
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
10	***13.8***	***180.8***	***21.9***	***128.3***
11	***16.0***	***438.3***	***21.9***	***294.9***
12	***16.6***	***449.1***	***21.9***	***299.6***
13	***15.1***	***394.9***	***21.9***	***265.9***
14	***17.6***	***643.1***	***21.9***	***424.3***
15	***18.1***	***662.3***	***21.9***	***428.4***
16	***17.0***	***237.5***	***21.9***	***161.8***
17	***14.5***	***92.3***	***21.9***	***68.1***
18	***14.9***	***77.9***	***21.9***	***58.6***
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
24-Hour Avg.		225.7		153.8

Note: High wind hours highlighted in bold italics.

REASONABLE FURTHER PROGRESS

Section 189(c) of the Clean Air Act establishes a requirement that the plan include quantitative milestones that are to be achieved every three years until the area is redesignated to attainment and which demonstrate reasonable further progress toward attainment by the applicable date. Section 171(1) of the Clean Air Act defines reasonable further progress as annual incremental reductions in emissions for the purpose of ensuring attainment by the applicable date.

For the MAG 2012 Five Percent Plan, the applicable attainment date is December 31, 2012. The MAG 2007 Five Percent Plan included fifty-three control measures, most of which were implemented during the three years before the Plan was withdrawn in January 2011. The measures were first implemented in 2008 and continue to be implemented. The measures submitted in the MAG 2012 Five Percent Plan for PM-10 for approval into the Arizona SIP are listed in Table 4-1. Many of the measures from the 2007 Plan have been included in Table 4-1.

Although the 2007 Plan was withdrawn, EPA has approved Rules 310 and 310.01 (EPA, 2010) and Rule 316 (EPA, 2009), into the State Implementation Plan as permanent and enforceable measures. Increases in rule effectiveness are attributable to strengthened enforcement and increased compliance with these rules. Increased rule effectiveness resulted in major reductions in PM-10 emissions throughout the nonattainment area in 2008 through 2010.

Attainment can not be achieved prior to December 31, 2012, because the Dust Action General Permit measure needed for attainment modeling was not fully implemented until January, 2012. Additionally, according to the form of the PM-10 standard, three years of clean data are needed in order to demonstrate attainment (e.g., 2009-2011). There were several exceedances of the 24-hour PM-10 standard in 2009 and 2011 which may be due to high wind exceptional events and the required documentation for these events has not yet been submitted to EPA for concurrence. It is unknown if three years of clean data will be available for attainment by December 31, 2011 until ADEQ submits and EPA acts upon the exceedances due to high wind exceptional events in 2009 and 2011. Because emission reductions from the Dust Action General Permit in 2012 are needed to model attainment and EPA concurrence on exceptional events in 2009 and 2011 is outstanding, the earliest attainment date achievable by this Plan is December 31, 2012.

According to the General Preamble, nonattainment area plans must include quantitative milestones which are to be achieved every three years until the area is redesignated to attainment. The quantitative milestones allow progress to be measured. Specifically, air quality plans should identify and submit quantitative milestones providing for the amount of emission reductions adequate to achieve the standard by the attainment date. The milestone date analyzed in this Plan is 2012. The modeling for the Salt River Area and the PM-10 nonattainment area has shown that the emissions reductions due

to increased rule effectiveness for Maricopa County Rules 310, 310.01 and 316 and implementation of the Dust Action General Permit measure are adequate to achieve attainment by 2012. The requirement for a 2012 milestone has been addressed by quantifying the emission reductions resulting from the implementation of the Dust Action General Permit measure and increases in rule effectiveness for Rules 310, 310.01 and 316. As shown in Table 5-3, the milestone PM-10 emissions reduction needed to achieve attainment in 2012 is 16,089 tons.

The annual incremental reductions that demonstrate reasonable further progress (RFP) between 2007 and 2012 are graphed in Figure 6-6. After 2007, the RFP line represents total emissions in the PM-10 nonattainment area after credit is applied for the increases in rule effectiveness described in Chapter Five. The RFP requirement is met by showing incremental emission reductions sufficient to maintain linear progress towards attainment. The annual emissions in Figure 6-6 show a downward linear trend. The slope of the line becomes less steep after 2008, because most of the increases in the rule effectiveness for Rules 310, 310.01 and 316 were achieved in 2008. Figure 6-6 demonstrates that RFP will be achieved between 2007 and the attainment date of 2012.

CONTINGENCY REQUIREMENTS

Measures in the MAG 2007 Five Percent Plan that strengthen and increase enforcement of Rules 310, 310.01 and 316, as well as the Dust Action General Permit, have been quantified to meet the annual five percent requirement, model attainment, and demonstrate reasonable further progress (RFP). Additional emission reduction benefits beyond those quantified in Chapter Five are needed to meet the contingency requirements of the Clean Air Act.

Section 172(c)(9) of the Clean Air Act requires that nonattainment plans contain contingency measures. Such measures are to be undertaken without further action by the State or the EPA Administrator if the area fails to make reasonable further progress or meet the standard by the attainment date.

The contingency measures must achieve emission reductions above and beyond those relied upon for progress (five percent reductions, milestones, and reasonable further progress) and the modeled attainment demonstration. The benefits of the contingency measures must not be required to show attainment and can not hasten attainment. Although there is no mandated emissions reduction level, EPA has recommended that contingency measures provide the emissions reduction equivalent of one year's average increment of RFP. EPA encourages early implementation of contingency measures to reduce emissions as expeditiously as practicable (EPA, 1993). The contingency requirement is met in the MAG 2012 Five Percent Plan by quantifying the benefits of PM-10 reduction projects that were completed in 2008-2011.

Figure 6-6
Demonstration of Reasonable Further Progress

A large number of PM-10 reduction projects have been implemented in the PM-10 nonattainment area since the MAG 2007 Five Percent Plan was submitted to EPA in December 2007. As required for contingency measures, the emission reductions attributable to these projects are above and beyond the credit taken for the measures in Chapter Five. In the Fall of 2011, MAG updated the inventory of PM-10 reduction projects in the nonattainment area that were completed in 2008-2011 by the cities, towns, Maricopa County, Pinal County, the Arizona Department of Transportation (ADOT) and the Indian communities. These projects included paving and stabilizing unpaved roads, alleys and shoulders; reducing speed limits on unpaved roads and alleys; and overlaying state highways with rubberized asphalt. In addition, MAG quantified the benefit for the freeways being swept by an ADOT contractor with PM-10 certified street sweepers and the arterials being swept by local jurisdictions with 27 PM-10 certified street sweepers purchased with Congestion Mitigation and Air Quality Improvement (CMAQ) funds in 2007 through 2009.

Figure 6-6 indicates that the total PM-10 emissions in 2007 are 59,218 tons; after reductions due to the increases in rule effectiveness discussed in Chapter Five, PM-10 emissions are reduced to 43,130 tons in 2012. Subtracting these two values and dividing by five years produces a contingency target of 3,218 tons. Therefore, completed projects that reduce total PM-10 emissions by at least 3,218 tons in 2012 must be quantified to meet the contingency target. A summary of the miles of roads, alleys and shoulders impacted by the paving and stabilization, speed limit reduction, and rubberized asphalt overlay projects that were quantified to meet the contingency requirement is presented in Table 6-21. These PM-10 reduction projects were implemented in the PM-10 nonattainment area by twenty-one cities and towns, Maricopa County, Pinal County, ADOT and the Gila River Indian Community. All of the projects for which credit was taken were open to traffic by September 2011.

The emission reductions for all measures quantified to meet the contingency requirement are summarized in Table 6-22. Table 6-22 includes the benefits of the PM-10 certified street sweeping on freeways and arterials, as well as the projects completed in 2008-2011 that paved and stabilized unpaved roads, alleys and shoulders; reduced speed limits; and overlaid highways with rubberized asphalt. A detailed discussion of the assumptions used in quantifying the PM-10 reductions needed to meet the contingency requirement is provided in Chapter IV of the TSD (Appendix B, Exhibit 1). The total PM-10 emissions reduction in 2012 is 3,439 tons, which exceeds the contingency target of 3,218 tons by 221 tons.

Table 6-23 shows the PM-10 emissions for 2008-2012 by source category after increases in rule effectiveness and contingency reductions are applied. The total tons quantified to meet the five percent reduction, attainment modeling, RFP and contingency requirements is 19,527 in 2012. This represents a 33 percent reduction, relative to 2007 emissions. A pie chart of the 2012 nonattainment area PM-10 emissions with the five percent measures and contingency projects is shown in Figure 6-7.

Table 6-21
Miles of Roads/Alleys/Shoulders in PM-10 Reduction Projects

Miles Impacted by Project Type	2008	2009	2010	2011	Total 2008-2011
Miles of dirt roads paved	41	18	8	16	83
Miles of dirt roads stabilized	39	39	36	31	145
Miles of dirt alleys paved	66	4	0	63	134
Miles of dirt alleys stabilized	164	106	124	106	501
Total miles of roads/alleys paved & stabilized	310	168	168	216	862
Miles of dirt shoulders paved	70	107	49	6	233
Miles of curb and gutter paved	19	0	0	0	19
Miles of dirt shoulders stabilized	235	236	236	200	906
Total miles of shoulders paved & stabilized	324	343	285	207	1,158
Miles of roads/alleys with lower speed limits	7	11	3	0	20
Miles of highway overlaid w/rubberized asphalt	13	0	0	0	13

Table 6-22
2008-2012 PM-10 Reductions to Meet Contingency Requirements

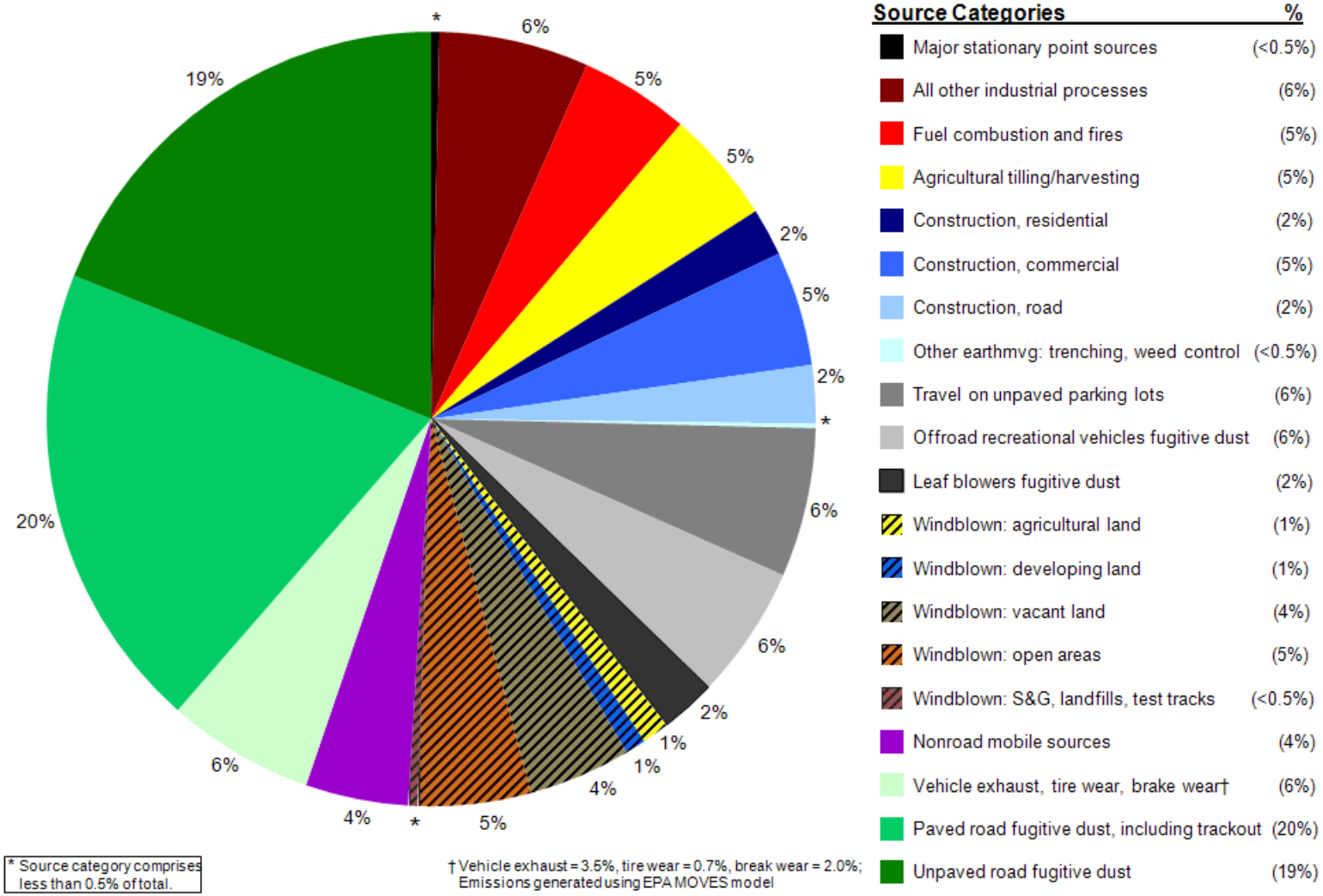
Completed Projects	Implementing Entities	2008	2009	2010	2011	2012
		(tons/year)				
Sweep streets with PM-10 certified sweepers Contracted sweeping of freeways, ramps and frontage roads - 100% compliant, effective 2/20/10 27 PM-10 certified sweepers purchased with CMAQ funds: 1/1/07-12/31/09	ADOT	0	0	294	342	344
	Cities, towns	59	116	153	154	155
	Total for Street Sweeping	**59**	**116**	**447**	**495**	**499**
Pave or stabilize existing public dirt roads and alleys Paving/stabilization projects completed in 2008-2011	Cities, towns, Maricopa and Pinal County Gila River Indian Community	461	1,352	2,124	2,662	2,625
	Total for Road/Alley Paving/Stabilization	**461**	**1,352**	**2,124**	**2,662**	**2,625**
Lower speed limits on dirt roads and alleys Speed limits lowered in 2008-2011	Cities, towns, Maricopa County	4	78	161	161	161
	Total for Lower Speed Limits	**4**	**78**	**161**	**161**	**161**
Pave or stabilize unpaved shoulders Paving/stabilization projects completed in 2008-2011	Cities, towns, Maricopa County	173	242	265	293	150
	Total for Shoulder Paving/Stabilizing	**173**	**242**	**265**	**293**	**150**
Repave or overlay paved roads with rubberized asphalt Rubberized asphalt overlays completed in 2008-2011	ADOT	0	3	3	3	3
	Total for Overlays	**0**	**3**	**3**	**3**	**3**
	Total for Completed Projects	**697**	**1,790**	**2,999**	**3,614**	**3,439**

Table 6-23
2008-2012 PM-10 Emissions with Five Percent Plan Measures and Contingency Projects

Source Category	2008	2009	2010	2011	2012
POINT	150	133	127	128	135
AREA					
Fuel combustion	1,301	1,307	1,311	1,316	1,328
Commercial cooking	993	998	1,001	1,005	1,014
Construction (includes windblown dust)	8,355	5,333	4,139	4,014	4,073
Tilling, harvesting and cotton ginning	893	893	893	893	893
Travel on unpaved farm roads	731	731	731	731	731
Livestock	261	261	261	261	261
Travel on unpaved parking lots	2,422	2,434	2,441	2,451	2,473
Offroad recreational vehicles	2,180	2,191	2,198	2,206	2,226
Leaf blowers	895	899	902	906	914
Windblown agriculture	448	448	448	448	448
Other windblown sources	3,938	3,788	3,788	3,788	3,639
Fires	497	497	497	497	497
Mining/quarrying (includes windblown dust)	476	401	355	356	369
Travel on industrial paved/unpaved roads	472	382	331	333	351
Other industrial sources	976	865	828	832	877
NONROAD					
Aircraft	184	152	142	143	146
Airport ground support equipment	27	23	21	20	20
Locomotives	34	34	34	34	34
Other nonroad equipment	1,683	1,661	1,641	1,595	1,513
ONROAD					
Exhaust	2,836	2,647	2,371	1,843	1,407
Tire wear	256	254	255	255	259
Brake wear	758	767	771	773	787
Paved roads	7,922	7,857	7,578	7,534	7,772
Unpaved roads and alleys	9,847	8,854	7,999	7,461	7,525
Totals	**48,534**	**43,810**	**41,062**	**39,823**	**39,691**
Total PM-10 Emissions Reduction 2007-2012:					**19,527 tons, 33.0%**

Figure 6-7

2012 PM-10 Emissions Inventory with Five Percent Plan Measures and Contingency Projects
PM-10 Nonattainment Area Total = 39,691 tons/yr



* Source category comprises less than 0.5% of total.

† Vehicle exhaust = 3.5%, tire wear = 0.7%, break wear = 2.0%; Emissions generated using EPA MOVES model

The emission reductions that have been quantified for contingency credit are not required to meet the five percent requirement, model attainment, or demonstrate reasonable further progress. In addition, these reductions will not hasten attainment. As discussed previously in this chapter, the earliest attainment date that can be achieved is December 31, 2012, due to the need to take PM-10 reduction credit for the new Dust Action General Permit in order to demonstrate attainment via rollback modeling. This chapter demonstrates that PM-10 emissions will be reduced by 3,439 tons more than the reductions achieved by measures used to show progress and model attainment. The early implementation of contingency projects in 2008-2011 is assisting in producing the three years of clean data necessary to attain the standard at all monitors by December 31, 2012.

ONROAD MOBILE SOURCE EMISSIONS BUDGET FOR CONFORMITY

In accordance with the 1990 Clean Air Act Amendments, conformity requirements are intended to ensure that transportation activities do not result in air quality degradation. Section 176 of the Amendments requires that transportation plans, programs, and projects conform to applicable air quality plans before the transportation action is approved by a Metropolitan Planning Organization (MPO). The designated MPO for the Maricopa area is MAG.

Section 176(c) of CAAA provides the framework for ensuring that Federal actions conform to air quality plans under section 110. Conformity to an implementation plan means that proposed activities must not (1) cause or contribute to any new violation of any standard in any area, (2) increase the frequency or severity of any existing violation of any standard in any area, or (3) delay timely attainment of any standard or any required interim emission reductions or other milestones in any area.

EPA transportation conformity regulations establish criteria involving comparison of projected transportation plan emissions with the motor vehicle emissions assumed in applicable air quality plans. The regulations define the term “motor vehicle emissions budget” as meaning “the portion of the total allowable emissions defined in a revision of the applicable implementation plan (or in an implementation plan revision which was endorsed by the Governor or his or her designee) for a certain date for the purpose of meeting reasonable further progress milestones or attainment or maintenance demonstrations, for any criteria pollutant or its precursors, allocated by the applicable implementation plan to highway and transit vehicles.”

On June 25, 2002, EPA approved the Revised MAG 1999 Serious Area Particulate Plan for PM-10 in the Maricopa County Nonattainment Area, including the transportation conformity budget for the attainment year of 2006. The 2006 onroad mobile source emissions budget established for PM-10 was 59.7 metric tons per day. The PM-10 emissions in the conformity budget included reentrained dust from paved roads, vehicle exhaust, travel on unpaved roads, and road construction.

The MAG 2012 Five Percent Plan establishes a transportation conformity budget based on the measures implemented for the attainment year of 2012. The PM-10 emissions with the measures that meet the five percent requirement, demonstrate modeled attainment, and show reasonable further progress in 2012 are summarized in the table below.

2012 PM-10 Emissions from Onroad Mobile Sources (tons/year)

Construction (road)	961
Exhaust/tire wear/brake wear	2,456
Paved roads (including trackout)	8,422
Unpaved roads	10,312
Total Onroad Mobile Source	**22,151**

Converting the annual tons per year to metric tons on an annual average day in 2012 produces PM-10 emissions of 54.9 metric tons per day for the PM-10 nonattainment area. This represents the onroad mobile source emissions budget for the attainment year of 2012.

MAG will use this new budget for conformity analyses that begin after the budget is found to be adequate or is approved by EPA as part of the MAG 2012 Five Percent Plan for PM-10. In conformity analyses that begin after the new budget is found to be adequate or is approved, onroad mobile source PM-10 emissions for 2012 or horizon years after 2012 can not exceed this budget.

The methods and assumptions used to estimate onroad mobile source emissions in 2012 are documented in Chapter II of the TSD (Appendix B, Exhibit 1). In future conformity analyses, the estimation of PM-10 emissions from onroad mobile sources may differ from the TSD estimates, because EPA requires use of the latest planning assumptions (e.g., new emissions models, vehicle registration data, vehicle speeds, population and travel projections) in effect at the time each conformity analysis begins.

EXPEDITIOUS ATTAINMENT

The measures that have been quantified are being implemented throughout the PM-10 nonattainment area. As shown in Table 6-23, the measures are already reducing PM-10 emissions from a variety of sources, including earthmoving, vacant lots, sand and gravel operations, and unpaved roads, alleys and shoulders. The attainment demonstration discussed earlier in this chapter indicates that the measures in the plan will achieve modeled attainment at all monitors in the nonattainment area in 2012. The current attainment date established by EPA's final notice of failure to attain is June 6, 2012 (72 FR 31183). However, because of the calendar year form of the PM-10 standard, a mid-year attainment date of June 6, 2012 in effect requires attainment at all monitors by December 31, 2011.

The attainment date can not be expedited (from June 6, 2012 to December 31, 2011), because the emissions reduction credit from the Dust Action General Permit needed to model attainment is not available in 2011, as this measure was not fully implemented until January 1, 2012. Expediting measures in the plan is also not feasible, because all measures except the Dust Action General Permit were already fully implemented by 2010.

In addition, the attainment modeling for the nonattainment area demonstrates that the 24-hour PM-10 standard will be met by a relatively narrow margin in 2012 (i.e., 153.8 ug/m^3 at the West 43rd Avenue monitor). The benefits of the measures in 2011 (i.e., without full implementation of the Dust Action General Permit) are not sufficient to model attainment in 2011.

For the reasons discussed above, the measures in the Five Percent Plan demonstrate attainment as expeditiously as practicable. The measures that were implemented throughout the nonattainment area in 2008-2011, along with the new Dust Action General Permit measure, (fully implemented on January 1, 2012) enables attainment of the 24-hour PM-10 standard at all monitors by December 31, 2012.

ATTAINMENT DATE

On July 25, 2002, EPA published a notice of final approval for the Revised MAG 1999 Serious Area Particulate Plan for PM-10 for the Maricopa County Nonattainment Area. In this notice EPA also approved a five-year extension of the attainment date from December 31, 2001 to December 31, 2006 (67 FR 48718).

On June 6, 2007, EPA published a final notice finding that the Maricopa County nonattainment area had failed to attain the PM-10 standard by the applicable attainment date of December 31, 2006 (72 FR 31183). The EPA finding was based upon air quality monitoring data for the years 2004 through 2006. There were numerous exceedances of the PM-10 standard during stagnant conditions in 2005 and 2006. As a result, plan provisions that reduce PM-10 emissions by five percent per year until the standard is met are required by Section 189(d) of the Clean Air Act. The MAG 2012 Five Percent Plan has been prepared to meet the five percent reduction requirements, discussed in Chapter Five, as well as the attainment modeling, reasonable further progress, and contingency requirements addressed earlier in this Chapter.

EPA's June 6, 2007 final notice of failure to attain establishes the attainment deadline for an area that misses the serious area attainment date,

> *"In accordance with CAA section 179(d)(3), the attainment deadline applicable to an area that misses the serious area attainment date is as soon as practicable, but no later than 5 years from the publication date of the nonattainment finding notice. EPA may, however, extend the attainment deadline to the extent it deems appropriate for a period no greater than 10 years from the publication*

date, 'considering the severity of nonattainment and the availability and feasability of pollution control measures.'" (72 FR 31184)

The attainment deadline based upon EPA's final notice is no later than June 6, 2012 unless EPA deems an extension is appropriate. Under stagnant conditions, the PM-10 standard has not been violated since 2006. The attainment modeling in this Chapter demonstrates that the standard will also be met under high wind conditions throughout the nonattainment area in 2012.

Attainment of the 24-hour PM-10 standard is measured in terms of the number of exceedances in a three-year period (no more than three exceedances at any monitor in the nonattainment area over a three-year period, e.g., 2010-2012). It is anticipated that attainment of the PM-10 standard will be achieved at all monitors in the nonattainment area by December 31, 2012, after three consecutive years (2010-2012) without monitored violations. As described earlier in this chapter, the MAG 2012 Five Percent Plan can not demonstrate attainment via modeling without taking credit for the Dust Action General Permit that will increase rule effectiveness for Rule 310.01 by one percent on high wind days. This emerging measure, which was fully implemented on January 1, 2012, will reduce PM-10 emissions during high wind conditions in 2012, enabling the Plan to demonstrate modeled attainment in 2012. Since modeled attainment can not be demonstrated until 2012 and three calendar years of clean data are needed to demonstrate attainment at all PM-10 monitors in the nonattainment area, the attainment date addressed by this Plan is December 31, 2012.

REQUEST FOR EXTENSION OF THE ATTAINMENT DATE FROM JUNE 6, 2012 TO DECEMBER 31, 2012

As discussed in the preceding sections, the current attainment deadline based upon EPA's final notice of failure to attain is June 6, 2012. In order to meet the current mid-year attainment date of June 6, 2012, the calendar year form of the 24-hour EPA PM-10 standard requires three years of clean data (2009-2011) at the monitors and modeled attainment by December 31, 2011. As demonstrated in the attainment modeling sections earlier in this chapter, modeled attainment can only be achieved in 2012, as the Dust Action General Permit measure does not become fully implemented until January 1, 2012. Modeled attainment cannot be demonstrated at all the monitors without taking emission reduction credit for this new measure. Also, it is unknown if clean data for years 2009-2011 will be available for attainment by December 31, 2011 until ADEQ submits and EPA acts upon documentation packages for several high wind exceptional events exceedances. As such, an extension of the attainment deadline from June 6, 2012 to December 31, 2012 is needed.

As stated in the June 6, 2007 final notice of failure to attain, authority to extend the attainment deadline beyond June 6, 2012 is available to EPA,

> *"EPA may, however, extend the attainment deadline to the extent it deems appropriate for a period no greater than 10 years from the publication date, 'considering the severity of nonattainment and the availability and feasability of pollution control measures.'"* (72 FR 31184)

For this Plan, the justification for an extension of the attainment deadline from June 6, 2012 to December 31, 2012 is centered around the availability of the new Dust Action General Permit measure, which was not fully implemented until January 1, 2012. Modeled attainment at all the monitors in the nonattainment area cannot be achieved under high wind conditions without the emissions reductions associated with the Dust Action General permit.

Development of the MAG 2012 Five Percent Plan was centered on addressing the technical approvability issues identified by EPA in their September 9, 2010 proposed partial disapproval of the MAG 2007 Five Percent Plan for PM-10 (75 FR 54806). These approvability issues established the need for a new emissions inventory and high wind modeling attainment demonstration in the MAG 2012 Five Percent Plan.

In February 2011, to begin addressing the technical approvability issues identified by EPA, a broad stakeholders group consisting of public and private entities was formed by ADEQ to discuss possible policy options for the MAG 2012 Five Percent Plan. Also meeting at the same time was a Five Percent Plan Technical Committee created to produce a new emissions inventory, conduct a high wind modeling attainment demonstration and address other technical issues as needed. EPA representatives participated regularly in both of these groups.

As of January 2012, the stakeholders group has met 16 times and the technical committee 20 times. The stakeholders group was involved in crafting a new measure to reduce fugitive dust on high wind days, the Dust Action General Permit. The Arizona Legislature passed House Bill 2208 in April 2011, which authorized the creation of the Dust Action General Permit. The Dust Action General Permit went through public notice and hearing and was signed and issued on December 30, 2011.

In order to model attainment during high winds at all the monitors in the PM-10 nonattainment area, the Five Percent Plan Technical Committee in consultation with EPA settled on the rollback modeling methodology for the MAG 2012 Five Percent Plan in August 2011. However, the high wind days to be modeled to demonstrate attainment were not agreed upon by the Five Percent Plan Technical Committee until October, 2011. After applying the rollback methodology to the selected days, it was determined that attainment could not be demonstrated without emissions reduction credit for the Dust Action General Permit. Since the Dust Action General Permit was signed on December 30, 2011, full implementation of this measure did not occur until 2012. As such, modeled attainment under high wind conditions at all monitors can only be shown in 2012, necessitating the need for an extension of the attainment deadline to December 31, 2012.

In summary, the process of addressing the technical approvability issues suggested by EPA resulted in the development of a new 2008 emissions inventory and the rollback conceptual model and design days selected for attainment modeling. These new technical pieces also identified the need for additional control of high wind fugitive dust beyond existing measures. Once identified, the feasability of fully implementing the new control in order to model attainment under high wind conditions in 2011 was not possible given the effective date of December 30, 2011 for the Dust Action General Permit. As such, an extension from June 6, 2012 to December 31, 2012 is needed to allow for a full year of implementation of the new Dust Action General Permit required to demonstrate attainment at all monitors in 2012.

REFERENCES

EPA, 1993. *Early Implementation of Contingency Measures for Ozone and Carbon Monoxide (CO) Nonattainment Areas.* August 13, 1993.

MAG, 2000. *Revised MAG 1999 Serious Area Particulate Plan for PM-10 for the Maricopa County Nonattainment Area.* February 2000.