Arizona Air Quality Designations
Technical Support Document

Boundary Recommendation for the Pinal County 24-hour PM_{10} Nonattainment Area

Air Quality Division

March 15, 2010

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EXECUTIVE SUMMARY

In July 1987, the U.S. Environmental Protection Agency (EPA) revised the existing National Ambient Air Quality Standard (NAAQS) for particulate matter 10 microns or less (PM_{10}) setting a 24-hour average standard of 150µg/m^3. Ambient monitoring data for PM_{10} collected throughout Pinal County by the Pinal County Air Quality Control District (PCAQCD) documents numerous violations of the PM_{10} NAAQS in the western portion of Pinal County. In a letter dated October 14, 2009, EPA notified the Governor that Pinal County was being redesignated for nonattainment of the 1987 24-hour PM_{10} NAAQS and requested the State to submit PM_{10} nonattainment area boundary recommendations for Pinal County within 120 days. The portion of Pinal County recommended for nonattainment consists of the western and central regions of the County where violations of the 24-hour PM_{10} NAAQS have occurred and where emissions sources and activities contributing to those violations are located, as shown in Figure ES-1. The Arizona Department of Environmental Quality (ADEQ) recommends the remainder of the County outside of the existing Hayden PM_{10} Nonattainment Area and the Apache Junction portion of the Phoenix Planning Area PM_{10} nonattainment area be designated as attainment/unclassifiable.

This recommendation is based on consideration of the PM_{10} standard, requirements for designation of nonattainment areas, and options available for implementing the standard. This document demonstrates the impracticability of and lack of environmental benefit from designating the nonattainment area boundary based on EPA's default definition of all of Pinal County.

As a new 24-hour PM_{10} nonattainment planning area, the State is recommending those portions of Pinal County shown in Figure ES-1 as the nonattainment planning area for the 24-hour PM_{10} NAAQS. This area excludes Indian Country in the affected portion of Pinal County.

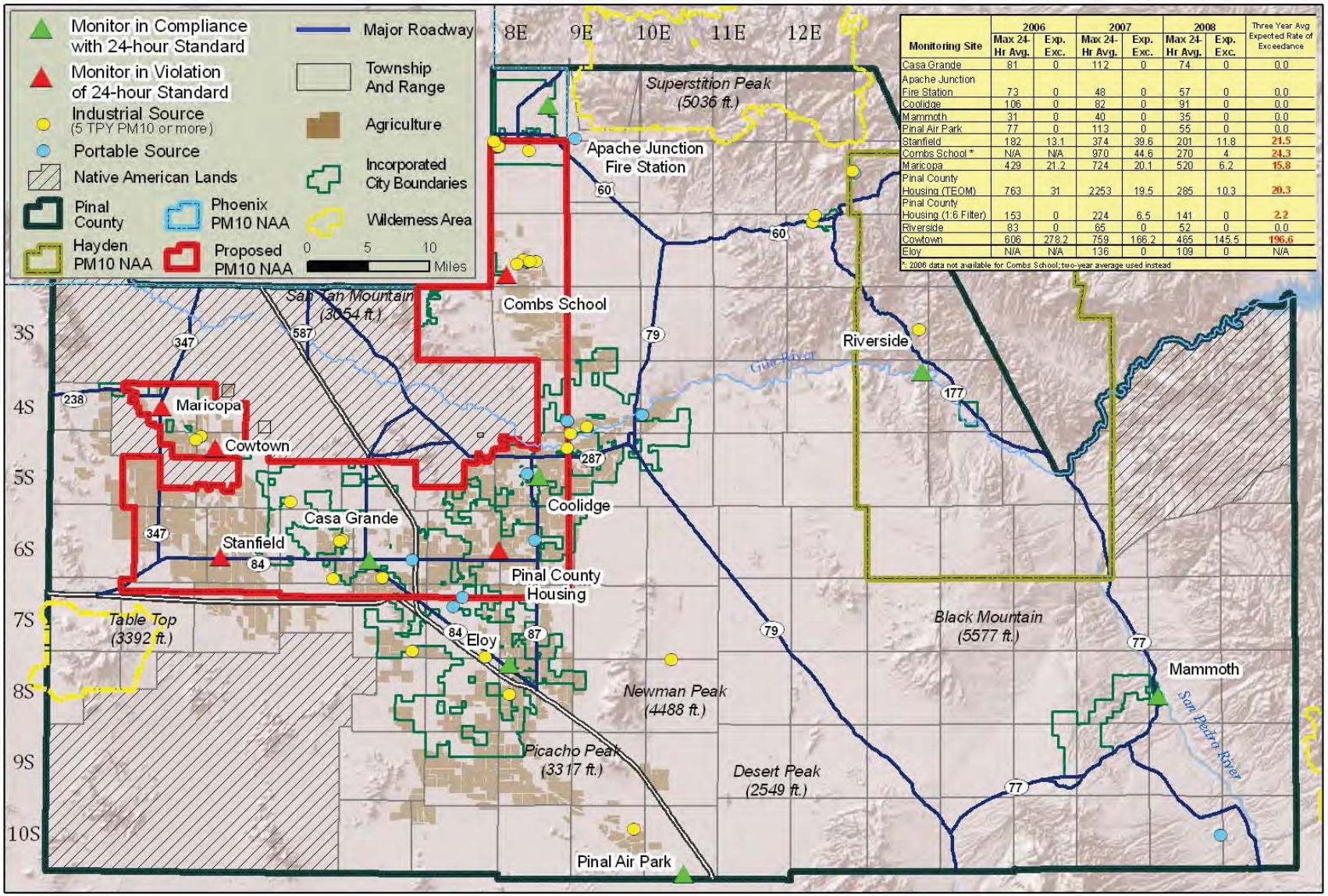
T1S, R8E
T2S, R8E
T3S, R7E
T3S, R8E
T4S, R3E-R4E (excluding all lands within the Gila River and Ak-Chin Indian Communities)
T4S, R8E (excluding all lands within the Gila River Indian Community)
T5S, R3E (excluding all lands within the Ak-Chin Indian Community)
T5S, R4E – R8E (excluding all lands within the Gila River and Ak-Chin Indian Communities)
T6S, R3E – R8E
T7S, R3E – R8E Sections 1-6

Table ES-1 Summary of Nine Criteria Analysis for the Proposed Pinal County PM_{10} Nonattainment Area		
Criteria	**Factors Supporting the Recommended Nonattainment Area Boundary**	**Factors Supporting the Exclusion of Eastern Portions of Pinal County**
Air Quality Data	The proposed nonattainment area includes the locations of the monitors that recorded concentrations exceeding the NAAQS.	Ambient air quality monitors located in the eastern and southern region of the County are not violating the PM_{10} NAAQS.
Emissions Data	The preliminary emissions inventory prepared by ADEQ and PCAQD determined that the majority of PM_{10} emissions originate in the western and central regions of the County.	The preliminary emissions inventory determined that sources in the eastern and southern regions of the County do not significantly contribute to violations in other regions of the County.
Population Density and Degree of Urbanization	The urbanized areas in the western and central regions of the County are where 95 percent of the County's population resides.	The eastern and southern portions of the County are largely undeveloped and have very low population densities.
Traffic and Commuting Patterns	The recommended nonattainment area includes the rapidly growing urbanized and developed areas, the high-traffic Interstate corridors, and areas with the highest employment densities.	The number of employers in the eastern portion of the County is low and is not projected to substantially increase during the potential maintenance period (2011-2031).
Growth Rates and Patterns	Significant growth is projected for communities near I-10 and I-8 during the potential maintenance period (2011-2031).	The eastern region of the county has experienced limited growth and is not projected significantly increase.
Meteorology	The recommended nonattainment area includes the agricultural basin region of the County where stagnation conditions are known to impact PM_{10} concentrations.	There are no known meteorology conditions specific to the eastern portion of the County known to affect PM_{10} concentrations.
Geography/ Topography	The recommended nonattainment area is predominately located in the basin region of the County characterized by open-ended valleys with few topographic barriers.	The eastern portion of the County is characterized by rough terrain, steep mountain ranges reaching over 7,000 feet in elevation.
Jurisdictional Boundaries	ADEQ's recommendation maintains jurisdictional cohesiveness and requires no new institutional arrangements for accomplishing required tasks.	The eastern portions of Pinal County recommended as attainment/unclassifiable designation lack significant emission sources or are in the existing Hayden PM_{10} nonattainment area. Inclusion of these areas would not help bring the western region of the county into attainment.
Level of Control of Emission Sources	The Apache Junction area of the County included in the Phoenix PM_{10} Nonattainment Area is subject to stringent PM_{10} control strategies included in the Maricopa Association of Governments Five Percent Reduction Plan.	The number of PM_{10} generating sources in eastern Pinal County is minimal. The largest point source in the area, ASARCO's Ray Mine, is included in the existing Hayden PM_{10} Nonattainment Area. The operating permit issued by PCAQCD for the mine contains control measures sufficient for attaining the PM_{10} NAAQS. Emissions from the mine are highly localized and do not affect the recommended nonattainment area.

Figure ES-1

Recommended Pinal County PM_{10} Nonattainment Area Boundaries

ADEQ
Arizona Department of Environmental Quality
Janice K. Brewer, Governor
Benjamin H. Grumbles, Director



Monitoring Site	2006 Max 24-Hr Avg.	2006 Exp. Exc.	2007 Max 24-Hr Avg.	2007 Exp. Exc.	2008 Max 24-Hr Avg.	2008 Exp. Exc.	Three Year Avg Expected Rate of Exceedance
Casa Grande	81	0	112	0	74	0	0.0
Apache Junction Fire Station	73	0	48	0	57	0	0.0
Coolidge	106	0	82	0	91	0	0.0
Mammoth	31	0	40	0	35	0	0.0
Pinal Air Park	77	0	113	0	55	0	0.0
Stanfield	182	13.1	374	39.6	201	11.8	21.5
Combs School *	N/A	N/A	970	44.6	270	4	24.3
Maricopa	429	21.2	724	20.1	520	6.2	15.8
Pinal County Housing (TEOM)	763	31	2253	19.5	285	10.3	20.3
Pinal County Housing (1:6 Filter)	153	0	224	6.5	141	0	2.2
Riverside	83	0	65	0	52	0	0.0
Cowtown	606	278.2	759	166.2	465	145.5	196.6
Eloy	N/A	N/A	136	0	109	0	N/A

*: 2006 data not available for Combs School; two-year average used instead

12 March 2010

Data and Cartography: Juan Declet & Phil Denee, Nancy Caroli, AQD-ADEQ

Arizona Air Quality Designations Technical Support Document Boundary Recommendation for the Pinal County 24-hour PM_{10} Nonattainment Area

1.0 BACKGROUND

The U.S. Environmental Protection Agency (EPA) is charged with developing air quality standards for the protection of human health and the environment. As required by the Clean Air Act (CAA), EPA sets primary and secondary National Ambient Air Quality Standards (NAAQS) for six common air pollutants, one of which is PM_{10}. Maximum pollution levels or limits that are based on human health are called primary standards. Limits intended to prevent environmental and property damage are called secondary standards. The CAA requires EPA to assess the latest scientific information and review the NAAQS every five years.

The original exceedance-based 24-hour PM_{10} standard was adopted in 1987, along with an annual PM_{10} standard that compared the PM_{10} average over 3-calendar years against the numerical standard. The 1987 24-hour PM_{10} NAAQS is an "exceedance based" standard, which looks to a 3-calendar-year monitoring history and assesses the number of historical exceedances of the 150 microgram-per-cubic-meter ($\mu g/m^3$) PM_{10} standard. A monitor that measured three or fewer exceedances based on daily sampling and over a three-year period complies with the standard, while one that measures four or more exceedances in a 3-year period violates the standard. In 1997, the EPA left the annual PM_{10} standard unchanged, but revised the approach to assessing compliance with the 24-hour PM_{10} standard. The EPA adopted a deterministic approach, comparing a 3-year average of the 98th percentile highest 24-hour average from each year against the 150 $\mu g/m^3$ standard. Subsequent litigation, however, resulted in overturning the 1997 PM_{10} revisions and EPA reverted to assessing compliance based on the 1987 exceedance-based algorithm.

In September 2006, EPA reviewed the latest scientific information on the health effects of exposure to PM_{10}. During the 2006 review period, EPA received comments from external scientific advisors and the general public about the science and policy review reports. On September 27, 2006, EPA revised the 1987 PM_{10} standards by retaining the existing 24-hour PM_{10} standard and revoking the Annual PM_{10} standard; accordingly, this nonattainment area boundary recommendation addresses EPA's 24-hour PM_{10} standard.

Table 1-1
History of EPA's Particulate Matter NAAQS

Date	EPA Action
1971	Established Total Suspended Particles Standard (45 microns or less)
1987	Established 24-hour and Annual PM_{10} Standards
1997	Established 24-hour and Annual $PM_{2.5}$ Standards
2006	Revoked the Annual PM_{10} Standard, retained the 24-hour PM_{10} Standard, and lowered the 24-hour $PM_{2.5}$ Standard from 65 $\mu g/m^3$ to 35 $\mu g/m^3$.

2.0 AREA DESIGNATION CRITERIA

Section 107(d)(1)(A)(i) of the Clean Air Act (CAA) defines a nonattainment area as "*any area that does not meet (or that contributes to ambient air quality in a nearby area that does not meet) the national primary or secondary ambient air quality standard for the pollutant.*"

In a letter dated October 14, 2009, EPA requested that the State of Arizona determine nonattainment area boundaries for a Pinal County PM_{10} Nonattainment Area. ADEQ conducted a nine factor analysis based on the analytical approach established by EPA's guidance pertaining to the 1997 8-hour ozone NAAQS, the 1997 $PM_{2.5}$ NAAQS, and the 2006 $PM_{2.5}$ NAAQS.[1] ADEQ assessed these nine factors with respect to Pinal County, the default under EPA guidance. ADEQ did consider neighboring counties with respect to their potential contribution to nonattainment when evaluating the boundaries of the proposed nonattainment area; ADEQ's analysis of those counties is discussed in Section 3.0.

To refine nonattainment boundaries to be either larger or smaller boundaries than EPA's default, the State must perform an area-specific analysis that addresses the nine criteria discussed in the EPA guidance cited above and listed below in Table 2-1. In addition, the State should affirm that the nonattainment area analysis demonstrates that: 1) violations are not occurring in nearby portions that are excluded from the recommended area, and 2) the excluded nearby portions do not contain emission sources that contribute meaningfully to the observed violations.[2]

Table 2-1 **Criteria for Nonattainment Boundary Recommendations**
1. Emissions data (location of sources and contribution to PM_{10} concentrations)
2. Air quality data
3. Population density and degree of urbanization (including commercial development)
4. Traffic and commuting patterns
5. Growth rates and patterns
6. Meteorology (weather and air movement patterns)
7. Geography/topography (mountain ranges or other air basin boundaries)
8. Jurisdictional boundaries (e.g., counties, air districts, existing nonattainment areas, etc.)
9. Level of control of emission sources

[1] Memorandum from Robert J. Meyers, Acting Assistant Administrator, ``*Area Designations for the Revised 24Hour Fine Particle National Ambient Air Quality Standard,"* June 8, 2007.

3.0 ANALYSIS OF FACTORS FOR DETERMINING NONATTAINMENT AREA BOUNDARIES

According to EPA's guidance, the default nonattainment area boundary for areas violating the air quality standard or contributing to a violation in a nearby area is the county in which the violating monitor(s) is located or where the contributing sources are located. The central and western portions of Pinal County recommended as nonattainment are where ambient air monitors have recorded PM_{10} concentrations that violate the 24-hour PM_{10} NAAQS; and emissions sources that contribute to those violations or were contributing to violations in areas without monitors. No sources within the recommended area were identified as contributing to an external violation, and no external sources were identified as contributing to violations within the recommended area.

In northern Pinal County, the Apache Junction Township already falls within the Phoenix PM_{10} planning area. Although ADEQ recommends that the surrounding portion of Pinal County be newly designated as nonattainment for PM_{10}, ADEQ recommends that no change in the designation status for Apache Junction, which will remain regulated as part of the Phoenix urban area.

Eastern Pinal County, however, contains vast expanses of undeveloped public lands and isolated rural communities where violations of the NAAQS have not occurred. Those rugged and sparsely populated townships in eastern Pinal County form a buffer between the growing urban and exurban areas in the western and central portions of the County that are recommended for PM_{10} nonattainment, and the existing Hayden PM_{10} Nonattainment Area. ADEQ therefore recommends that those portions of eastern Pinal County that are not already designated nonattainment be designated as attainment/unclassifiable.

What follows is an explanation of how each criterion was addressed in Arizona's recommendation. Figure 3-1 (see page 5) illustrates the major features considered when assessing the nine factors for Pinal County.

3.1 Air Quality Data

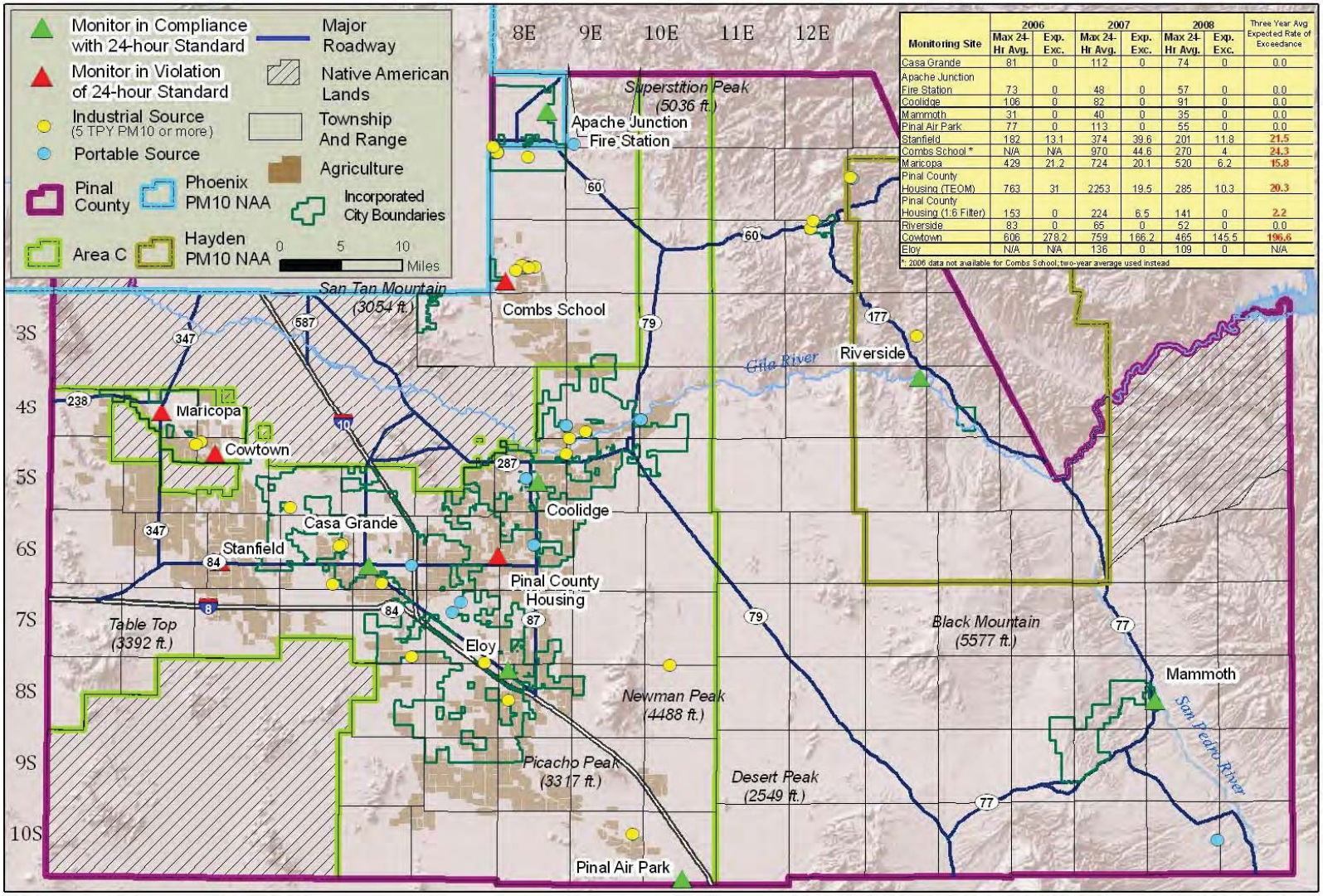
This factor considers the 24-hour PM_{10} concentrations recorded by air quality monitors in Pinal County during 2006-2008. The PM_{10} NAAQS is an exceedance-based standard which is attained when the expected number of days per calendar year with a PM_{10} 24-hour average above 150 $\mu g/m^3$ is equal to or less than 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 calendar years; if a monitoring site has 3.1 or more observed or estimated exceedances in a three-year period, the monitor is in violation of the 24-hour PM_{10} NAAQS. If PM_{10} sampling is scheduled less than every day, EPA requires the adjustment of observed exceedances to account for those days when a sample was not collected; the procedure for this process is described in 40 CFR Part 50, Appendix K, Section 3.1. If less than 75 percent valid data completeness occurs in one or more calendar quarters, the monitor can not be classified as violating the NAAQS. In the case where there are collocated monitors and the primary monitor has data completeness below 75 percent, data substitution from the secondary monitor can not be done and compliance with the NAAQS can not be determined.

Monitoring data for 2006-2008 show that six Pinal County monitors were in violation of the PM_{10} NAAQS, although outstanding requests for EPA concurrence regarding exceptional events could reduce the number of violating monitors to five for the 2006-2008 reference period. These violating monitors are clustered in the agricultural basin, which includes the urban and exurban high-growth areas contiguous with the Phoenix metropolitan area and along Interstates 8 and 10. Table 3-1 contains monitor data for 2006-2008; Appendix A contains site summary air quality data record for 2006-2008.

Figure 3-1

Major Features Related to PM_{10} NAA Designation

ADEQ
Arizona Department of Environmental Quality
Janice K. Brewer, Governor
Benjamin H. Grumbles, Director



Monitoring Site	2006 Max 24-Hr Avg.	2006 Exp. Exc.	2007 Max 24-Hr Avg.	2007 Exp. Exc.	2008 Max 24-Hr Avg.	2008 Exp. Exc.	Three Year Avg Expected Rate of Exceedance
Casa Grande	81	0	112	0	74	0	0.0
Apache Junction Fire Station	73	0	48	0	57	0	0.0
Coolidge	106	0	82	0	91	0	0.0
Mammoth	31	0	40	0	35	0	0.0
Pinal Air Park	77	0	113	0	55	0	0.0
Stanfield	182	13.1	374	39.6	201	11.8	21.5
Combs School *	N/A	N/A	970	44.6	270	4	24.3
Maricopa	429	21.2	724	20.1	520	6.2	15.8
Pinal County Housing (TEOM)	763	31	2253	19.5	285	10.3	20.3
Pinal County Housing (1.6 Filter)	153	0	224	6.5	141	0	2.2
Riverside	83	0	65	0	52	0	0.0
Cowtown	606	278.2	759	166.2	465	145.5	196.6
Eloy	N/A	N/A	136	0	109	0	N/A

*: 2006 data not available for Combs School; two-year average used instead

13 January 2010

Data and Cartography: Juan Declet & Phil Denee, AQD-ADEQ

All of the violating monitors are within the portion of Pinal County that the State is recommending as the nonattainment area for the 24-hour PM_{10} NAAQS. Figure 3-2 (see page 7) depicts the locations of PM_{10} monitors in Maricopa, Pinal, and Pima Counties.

Table 3-1
2006-2008 Maximum 24-Hour PM_{10} Monitoring Data

Site Name	Maximum 24-hour Averages in µg/m³			Expected Number of Exceedances			
	2006	2007	2008	2006	2007	2008	3-year Average
Apache Junction Fire Station	73	48	57	0	0	0	0
Casa Grande Downtown	81	112	74	0	0	0	0
Casa Grande Downtown [b] (opened March 2007)	N/A	**983**[a]	**203**	N/A	**7.0**	**3.0**	N/A
Combs School (opened 3/20/2007)	N/A	**970**[a]	**270**	N/A	**44.6**	**4.0**	N/A
Coolidge Maintenance Yard	106	82	55	0	0	0	0
Cowtown (opened August 2005)	**606**	**759**	**465**	**278.2**	**166.2**	**145.5**	**196.6**
Cowtown [b]	**1,079**	**1,014**	**609**	**238.9**	**190.4**	**175.3**	**202.9**
Eloy - County Complex	99	136	109	0	0	0	0
Mammoth - County Complex	31	40	35	0	0	0	0
Maricopa - County Complex [b]	**429**	**724**	**520**	**21.2**	**20.1**	**6. 1**	**15.1**
Pinal Air Park	77	113	53	0	0	0	0
Pinal County Housing Complex	153	**224**	141	0	**6.5**	0	**2.2**
Pinal County Housing Complex [b]	**913**	**2,253**	**285**	**33.6**	**19.5**	**10.3**	**20.3**
Riverside Maintenance Yard	83	65	44	0	0	0	0
Stanfield - County Complex	**182**	**374**	**201**	**13.1**	**39.6**	**11.8**	**21.5**
Stanfield - County Complex [b] (opened February 2006)	**727**[a]	**1,062**	**375**	**26.5**	**25.2**	**14.2**	N/A

[a] indicates the data do not satisfy EPA's summary criteria, usually meaning less than 75 percent valid data recovery available in one or more calendar quarters.
[b] Indicates every day/continuous monitoring.
N/A Indicates data are not available.
Note: exceedances due to exceptional events that have been concurred on by the EPA are excluded from annual statistics.

Figure 3-2

PM_{10} Monitors in Maricopa, Pinal & Pima Counties

ADEQ
Arizona Department of Environmental Quality
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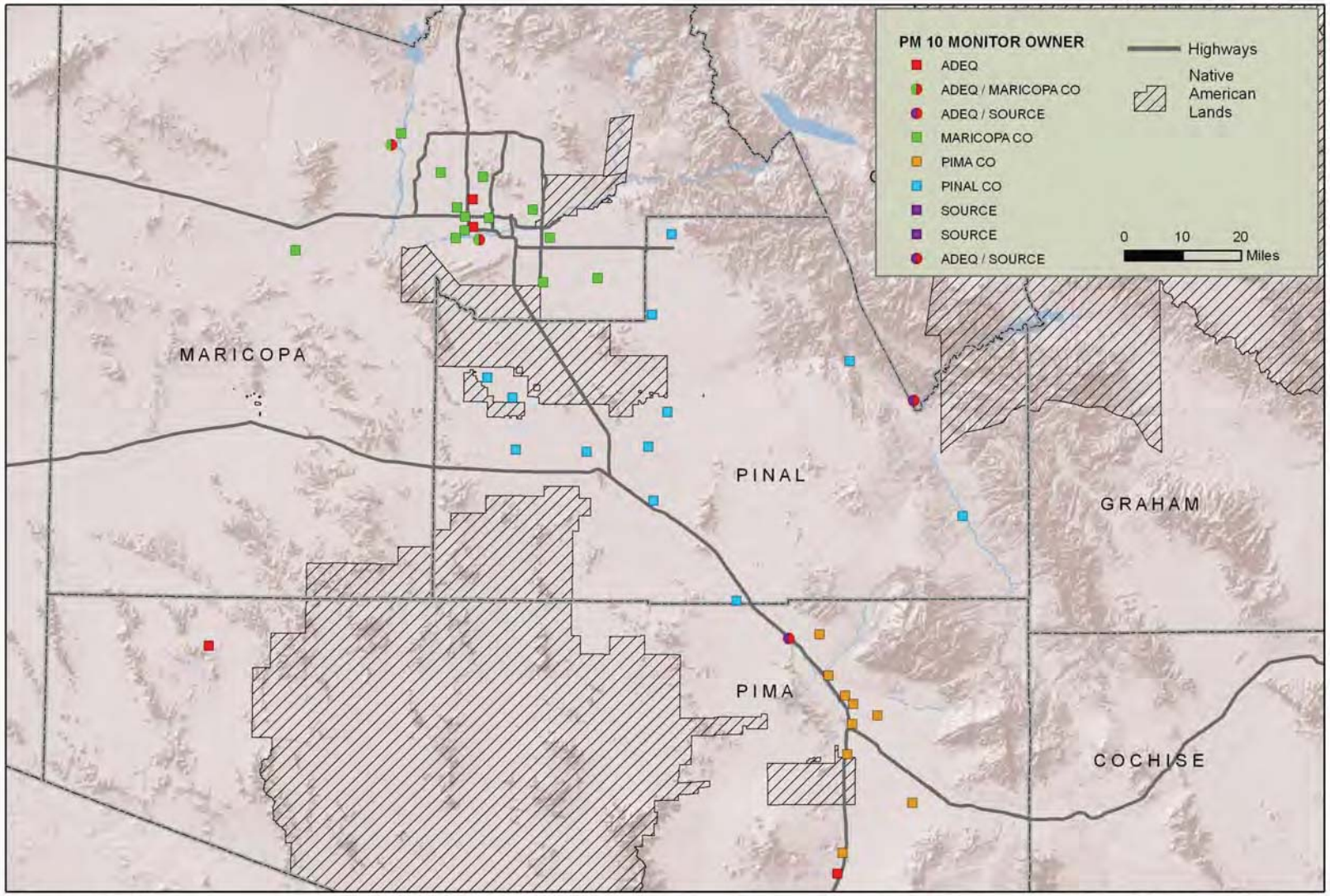


18 December 2009

Data and Cartography: Juan Declet & Phil Denee, AQD-ADEQ

3.2 Emissions Data

For this factor, ADEQ developed a preliminary emissions inventory for all of Pinal County. Table 3-2, below, contains estimates for each category in tons per year. An analysis of the methodologies used to calculate emissions for each category follows in the order as they appear below. Figure 3-3 illustrates the distribution of emissions from all sources in Pinal County.

The preliminary annual emission inventory presented in this document was developed for the purpose of defining the boundaries for a proposed nonattainment area. The eventual development of a State Implementation Plan (SIP) will require additional, more detailed, inventory development, including short-term inventory data reflecting the 24-hour span of the controlling PM_{10} standard. ADEQ found making credible estimates for disturbed soils on undeveloped lands and windblown dust difficult to determine for the preliminary emissions inventory. The State will characterize and quantify estimates for this category when developing an emissions inventory for the PM_{10} SIP.

Table 3-2
Pinal County Preliminary 2007 PM_{10} Emissions Inventory

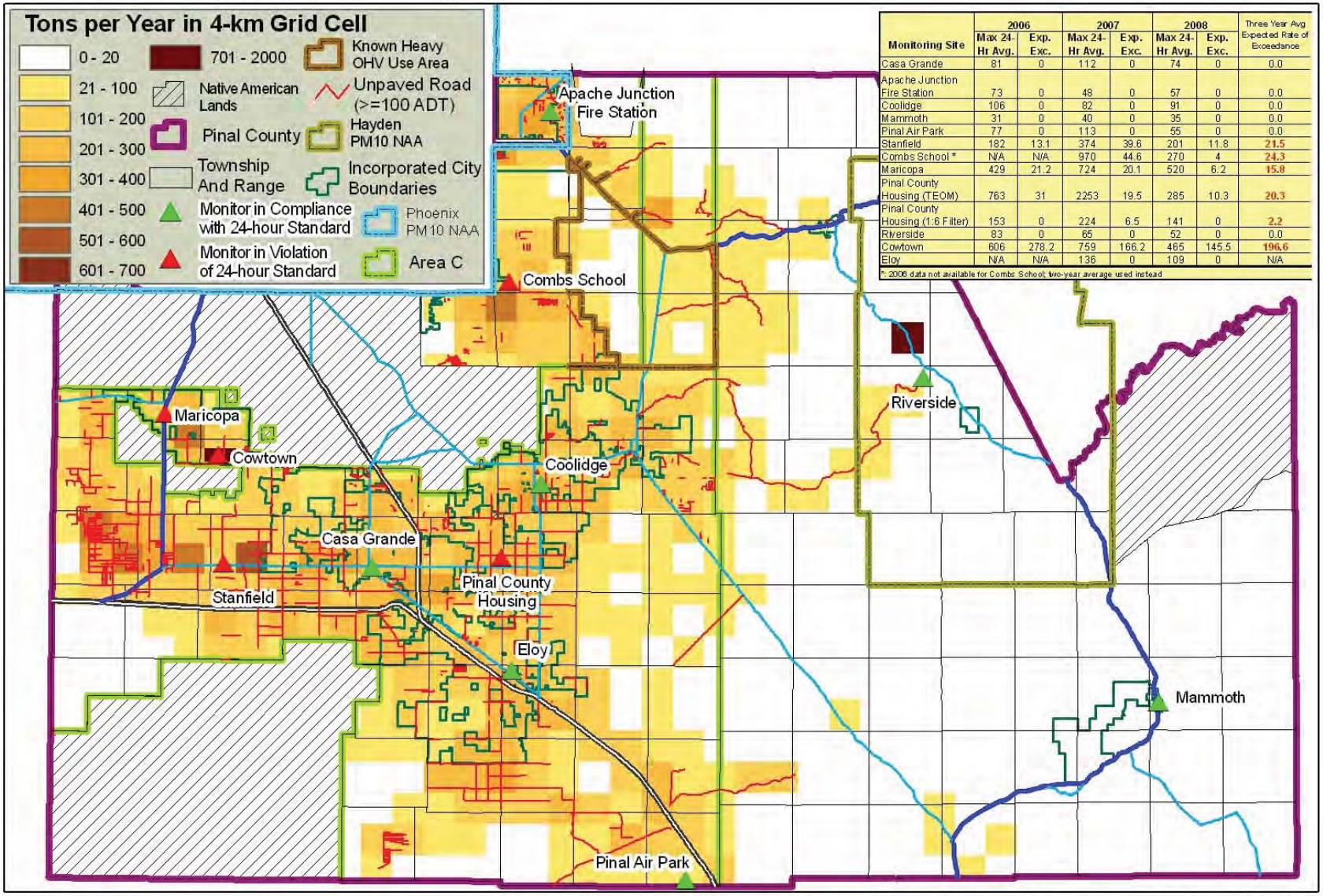
Emission Categories	Tons per Year	Addressed in Section
Onroad	42,130	3.2.1
Tilling, Harvesting, and Agriculture	2,538	3.2.2
Stationary Industrial Sources	2,342	3.2.3
Concentrated Animal Feeding Operations	2,045	3.2.4
Construction Emissions	1,757	3.2.5
Portable Industrial Sources	38	3.2.3
Off-highway Vehicles	23	3.2.6
Total	**50,873**	

Decisions on nonattainment boundaries can not be made solely on area wide emissions inventories because of the influence that localized sources can have on PM_{10} concentrations. It is possible for source categories that represent a small portion of the area-wide inventory to have a significant impact on either a violating monitor or the ambient air in areas where there are no monitors.

Figure 3-3

Preliminary PM10 Emissions Inventory for Pinal County (2007) All Sources (Tons per Year)

ADEQ Arizona Department of Environmental Quality



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*: 2006 data not available for Combs School; two-year average used instead

12 March 2010

Data and Cartography: Juan Declet & Phil Denee, AQD-ADEQ

3.2.1 Onroad Emissions

Emissions from onroad sources include three categories 1) emissions from exhaust, tire and brake wear on paved and unpaved roads; 2) fugitive emissions on paved and unpaved roads; and 3) emissions from unpaved shoulders on paved roads. Emission factors for each category and the number of vehicle miles traveled (VMT) for all the roads in Pinal County are required in order to estimate emissions.

The inventory of all the roads in Pinal County come from two sources, Arizona Department of Transportation's (ADOT) Highway Performance Monitoring System (HPMS) and a road inventory supplied by PCAQCD. The HPMS database provides the annual average daily traffic (AADT) for each road segment, which can be used to calculate VMT. The road inventory compiled by PCAQCD was developed from the County's internal records, available municipal records, and from inspection of aerial photographs. The unpaved roads covered by that inventory included private roads, agricultural roads, and trails.

For County-supplied roads, ADT volumes were assumed as shown in Table 3-3. For example, for County-maintained unpaved roads an average daily volume of 100 trips was used to develop estimates. This figure was selected based on traffic counts conducted by PCAQCD on highly-traveled unpaved roads and a study conducted near the violating Pinal County Housing (PCH) monitor in 2009.

For private unpaved roads, an ADT volume of 50 was selected using an estimate of five residential dwellings per private unpaved road; the number of trips per dwelling was derived from a study conducted by the Texas Traffic Institute which determined that one residence equals an average of 10 trips per day. The emissions for each category will be described next.

Table 3-3
Pinal County-Supplied Road Inventory and Average Daily Traffic

Surface Type	ADT
Paved	100
County-maintained Unpaved	100
Asphalt Rock Dust Palliative	100
Trail	10
Private Unpaved	50
Agricultural	4

1. Emissions from exhaust, tire and brake wear:

EPA's MOBILE6 was used to determine the appropriate emission factors for this category. The emission factor was calculated for each road segment in the HPMS database based on the road classification and the vehicle mix. For County-supplied roads, the average emission factor of HPMS road segments was assumed.

The emission factor for each road segment was then multiplied by its VMT to derive exhaust, tire and brake wear emissions.

2. Fugitive emissions on paved and unpaved roads:

To estimate fugitive PM_{10} emissions for paved and unpaved roads in the HPMS database, the State utilized the methods described in EPA's AP-42 guidance to determine the emission factors for this

category. The emission factor for each paved road segment in the HPMS database was determined based on silt loading and vehicle weight derived from the vehicle mix. The emission factor for each unpaved road segment in the HPMS database was calculated based on silt content and average speed.

The fugitive emission factor for each road segment was then multiplied by its VMT to derive the fugitive emissions. The silt loading value for paved roads was extracted from the Maricopa Association of Governments' (MAG) 2007 *Five Percent Plan for PM_{10} for the Maricopa County PM_{10} Nonattainment Area.* The silt content value for unpaved roads was extracted from ADOT's 2006 *Final Report: Identification of Emissions Sources for Pinal County*.

For the paved roads data supplied by PCAQCD, the average emission factor of paved HPMS segments was assumed, while the average emission factor of unpaved HPMS segments was assumed for the unpaved roads supplied by PCAQCD.

The emission factor for each road segment was then multiplied by the VMT to derive the fugitive emissions.

3. Emissions from unpaved shoulders on paved roads

Fugitive emission estimates for unpaved shoulders on paved roads were calculated based on the percentage of heavy-duty vehicles traveling on the road segments and the VMT.

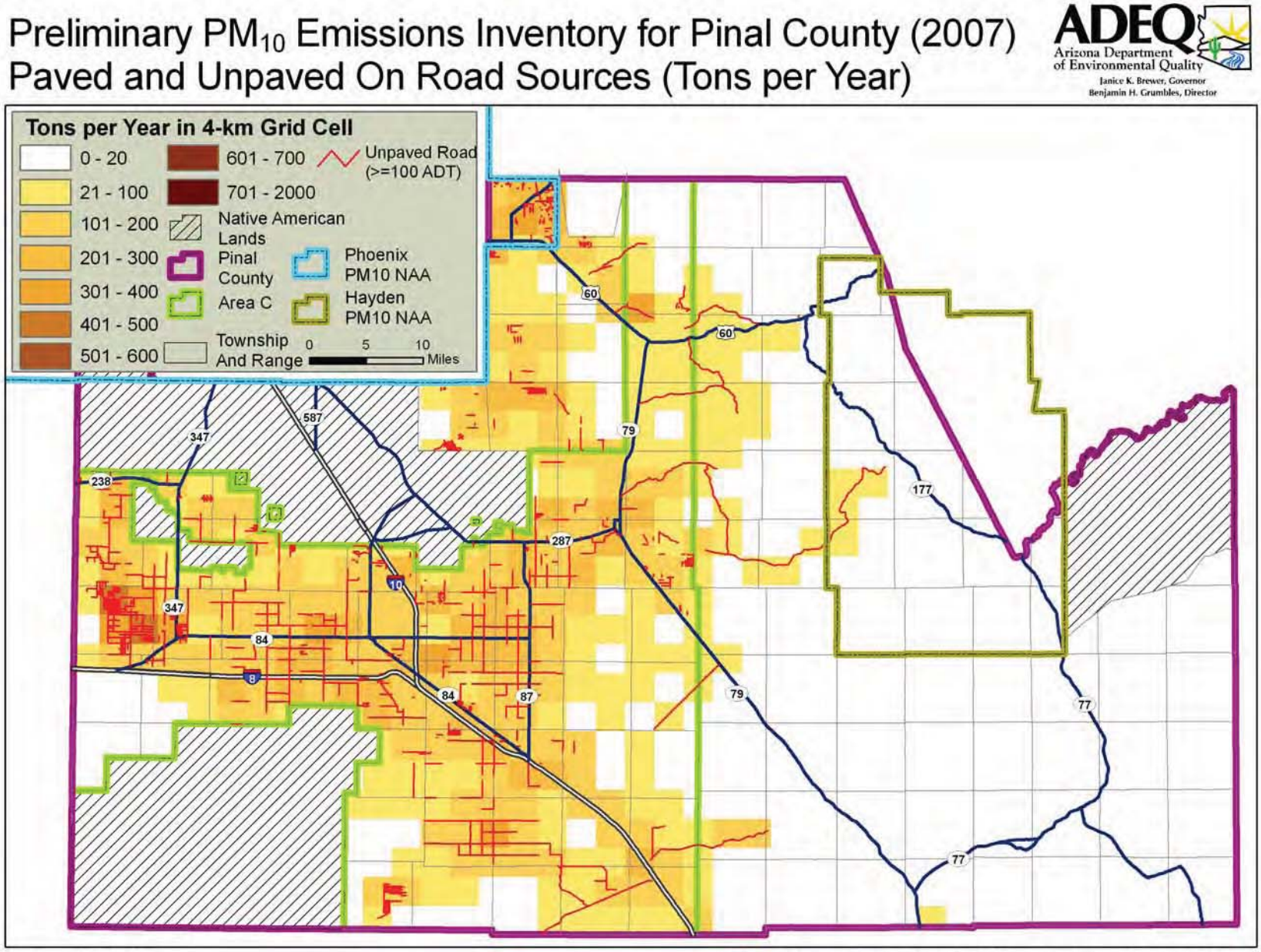
Conclusion

The State's analysis determined that onroad emissions are the largest emission category in Pinal County. Most of the emissions from paved and unpaved roads occur in the western and central regions of the County, as shown in Figures 3-4, 3-5, and 3-6. Emissions for this category in 2007 are estimated to be **41,615 tons per year.** Table 3-4 provides a complete summary of emissions estimates for Pinal County.

Table 3-4
Vehicle Miles Traveled and Emissions for HPMS and Pinal County Roads

	HPMS Roads	Pinal Roads	Total
No. of Segments	980	30,647	31,627
Total Daily VMT	6,612,409	270,439	6,882,848
Daily Paved VMT	6,591,011	32,359	6,623,370
Daily Unpaved VMT	21,398	238,080	259,478
Exhaust, Tire and Brake Wear (tpy)	158	5	163
Fugitive Emissions - Paved Roads (tpy)	4,600	27	4,627
Fugitive Emissions - Unpaved Roads (tpy)	3,140	33,589	36,729
Fugitive Emissions - Unpaved Shoulders (tpy)	97		97
Total Emissions (tpy)	7,994	33,621	41,615

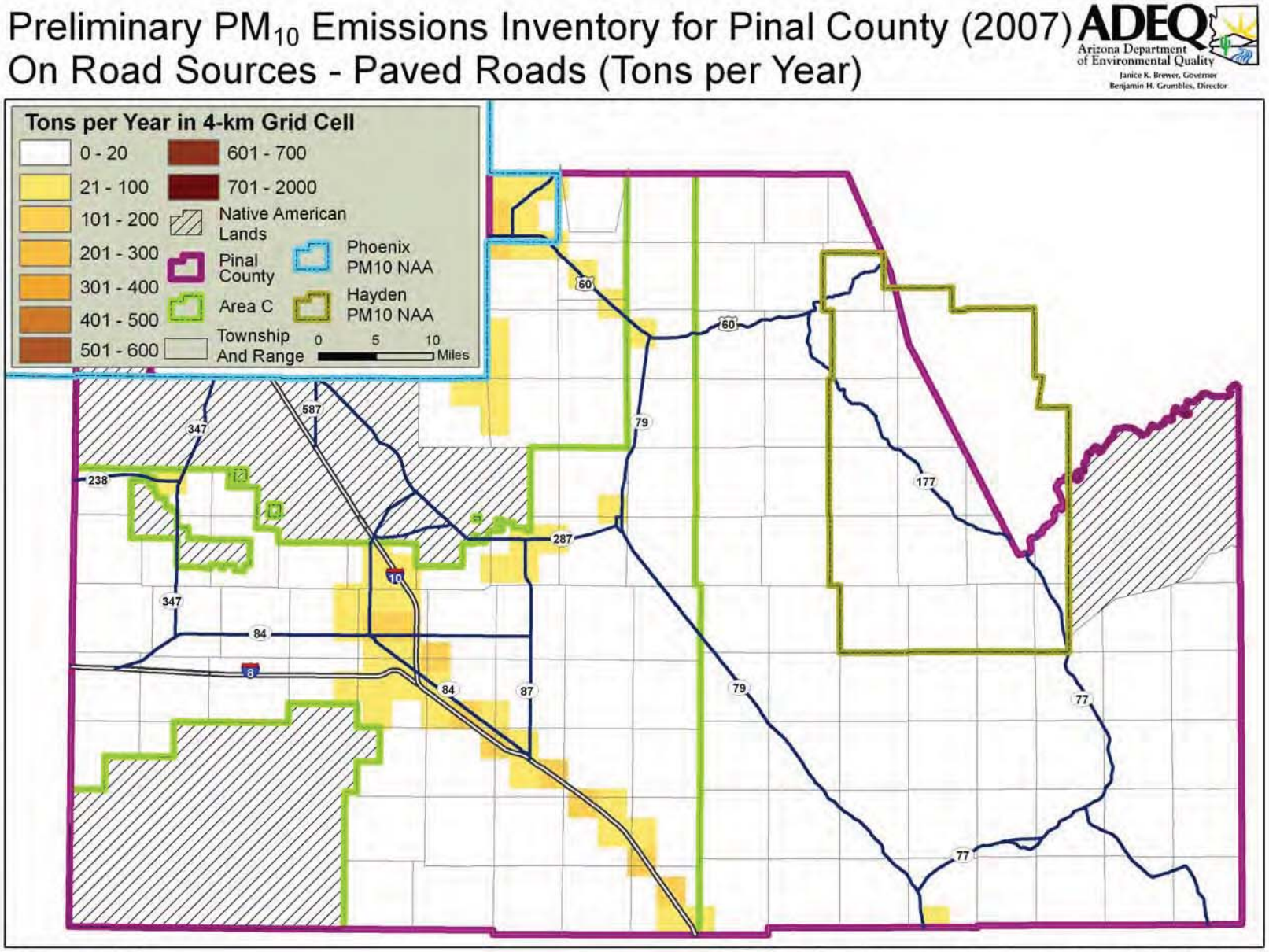
Figure 3-4



23 December 2009

Data and Cartography: Juan Declet, Phil Denee, and Nancy Caroli, AQD-ADEQ

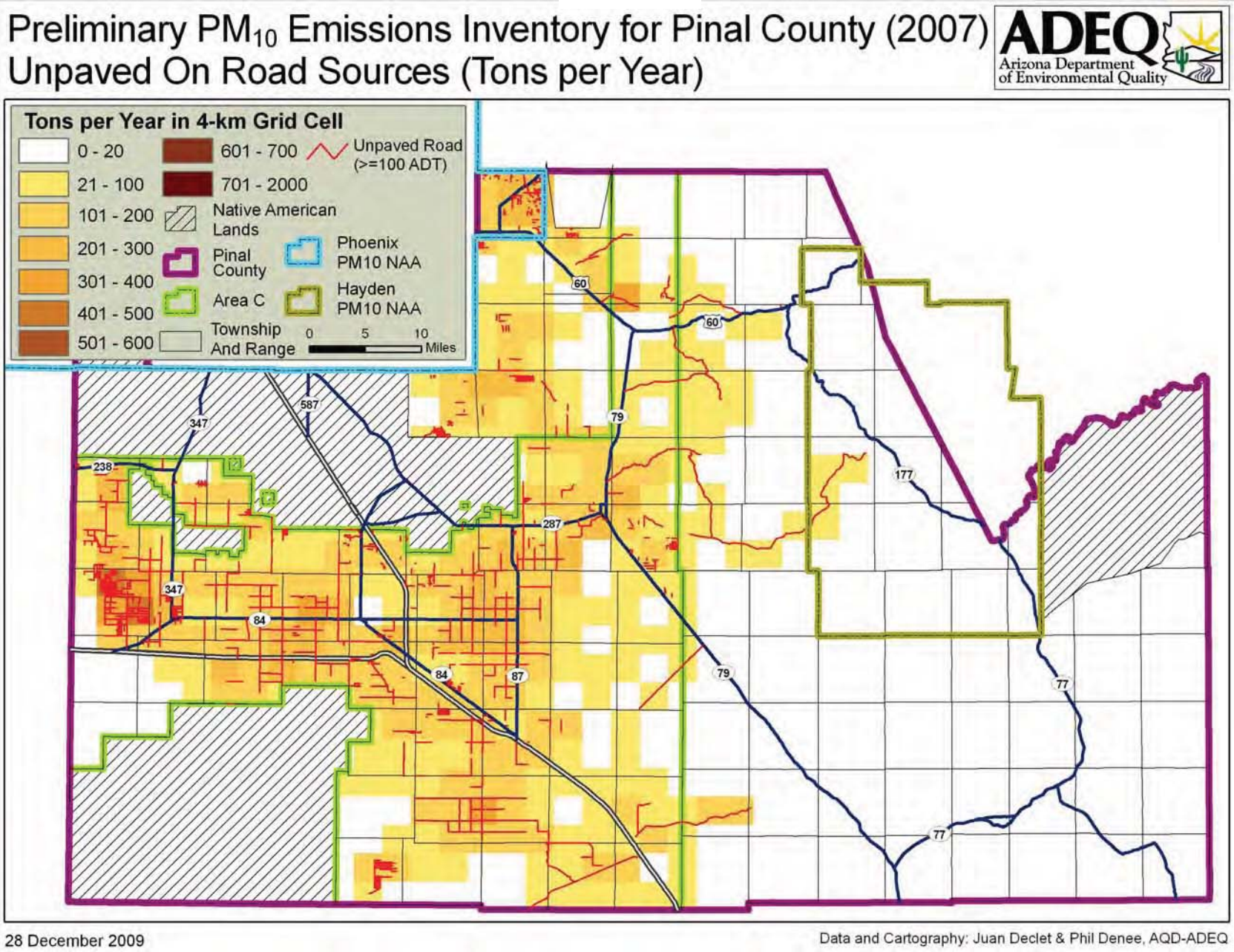
Figure 3-5



23 December 2009

Data and Cartography: Juan Declet, Phil Denee, and Nancy Caroli, AQD-ADEQ

Figure 3-6



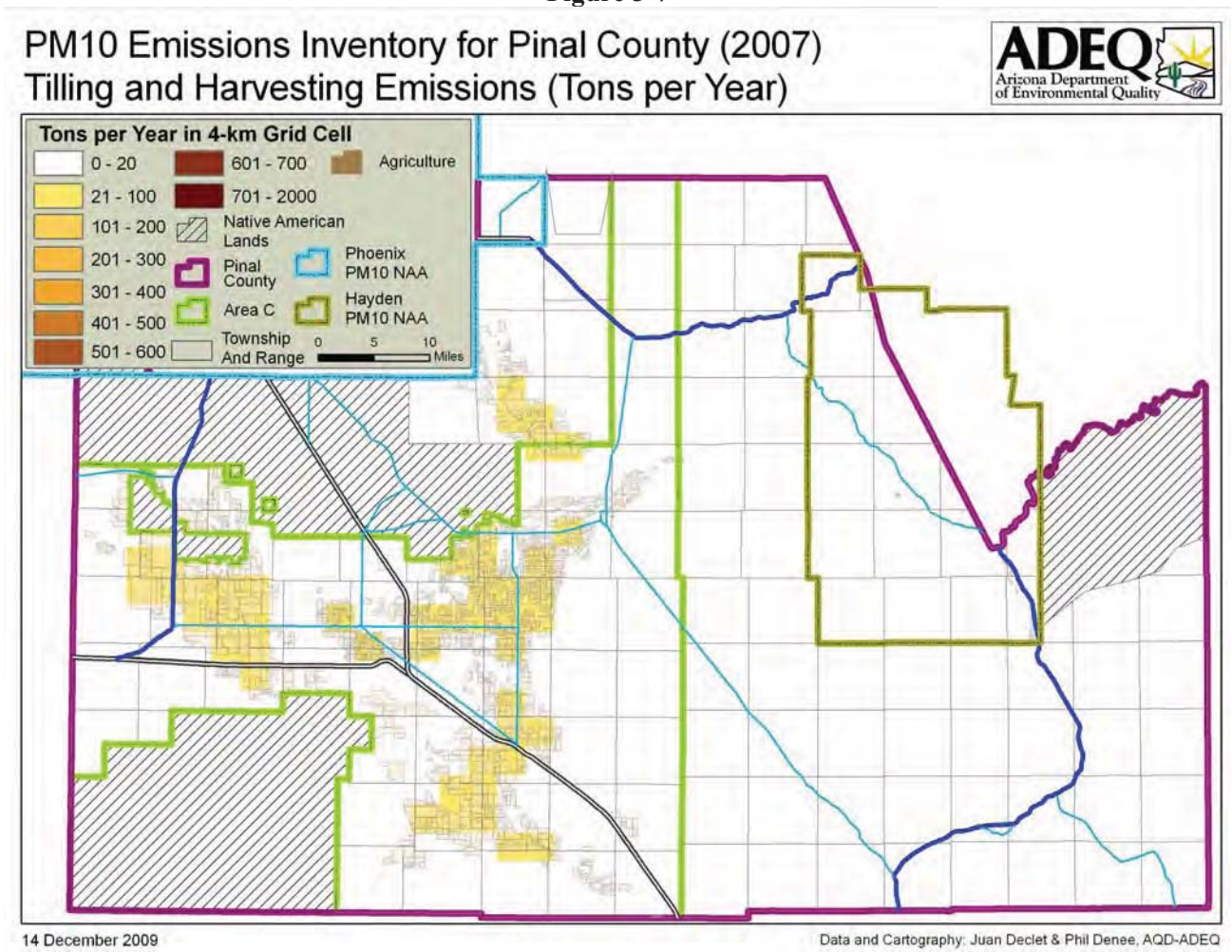
28 December 2009

Data and Cartography: Juan Declet & Phil Denee, AQD-ADEQ

3.2.2 Cultivated Agriculture Emissions

In order to estimate emissions for this category, ADEQ analyzed land use throughout the County by conducting field surveys and reviewing the most recently available satellite images. GIS was employed to calculate the area of agricultural fields. ADEQ used emissions factors developed by the United States Department of Agriculture (USDA); PM_{10} emissions for tilling and harvesting were based on the data from the USDA National Agriculture Statistics Service. Total emissions were spatially apportioned to each agricultural field based on area size. As shown below in Figure 3-7, most agricultural emissions are located in the western and central regions of the County. Agricultural emissions in other regions of the County were less than 20 tons per grid cell. Emissions for this category in 2007 are estimated to total 2,538 tons per year.

Figure 3-7



3.2.3 Portable and Stationary Industrial Source Emissions

To determine emissions for portable and stationary industrial sources, ADEQ reviewed the Arizona Emissions Inventory System (AEIS) for operating permits issued by ADEQ and PCAQCD. The emissions limits established in the operating permits helped ADEQ determine annual emissions for these categories in 2007. ADEQ was unable to calculate credible process emissions for portable sources. Due to the relatively small quantity of emissions estimated for portable sources, when spatially allocated do not meet the threshold for depiction in Figure 3-8; for that reason the locations of the sources are depicted on the map. Emissions for this category are estimated to total **38 tons per year**. The industrial source emitting the greatest volume of PM_{10} emissions in Pinal County is ASARCO's Ray Mine located near the County's eastern border, as shown in Figure 3-9. This source is permitted by PCAQCD and is located within the existing Hayden PM_{10} Nonattainment Area. Emissions for this category are estimated to total **2,342 tons per year**, the majority of which are assigned to the ASARCO Ray Mine in eastern Pinal County.

Figure 3-8

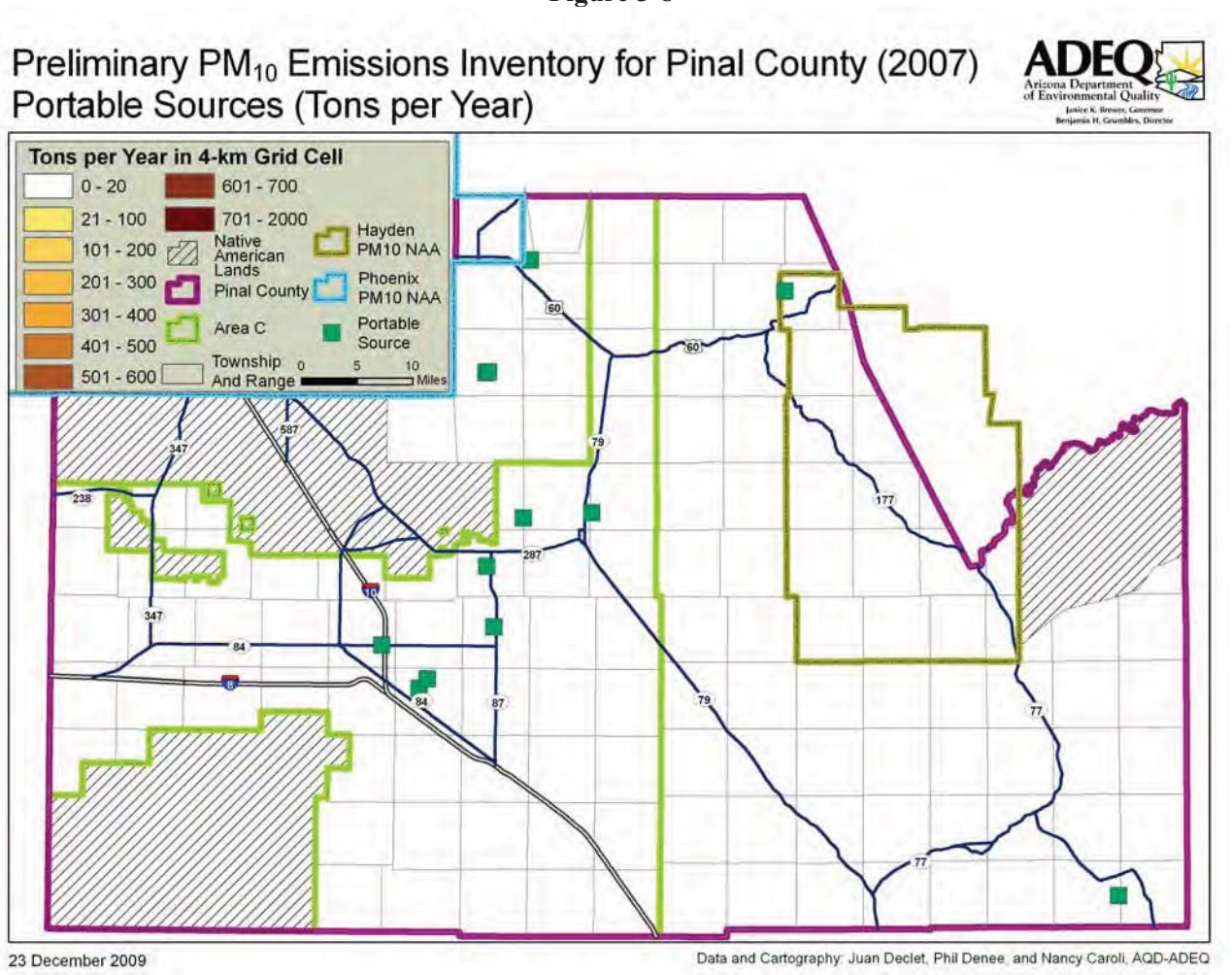
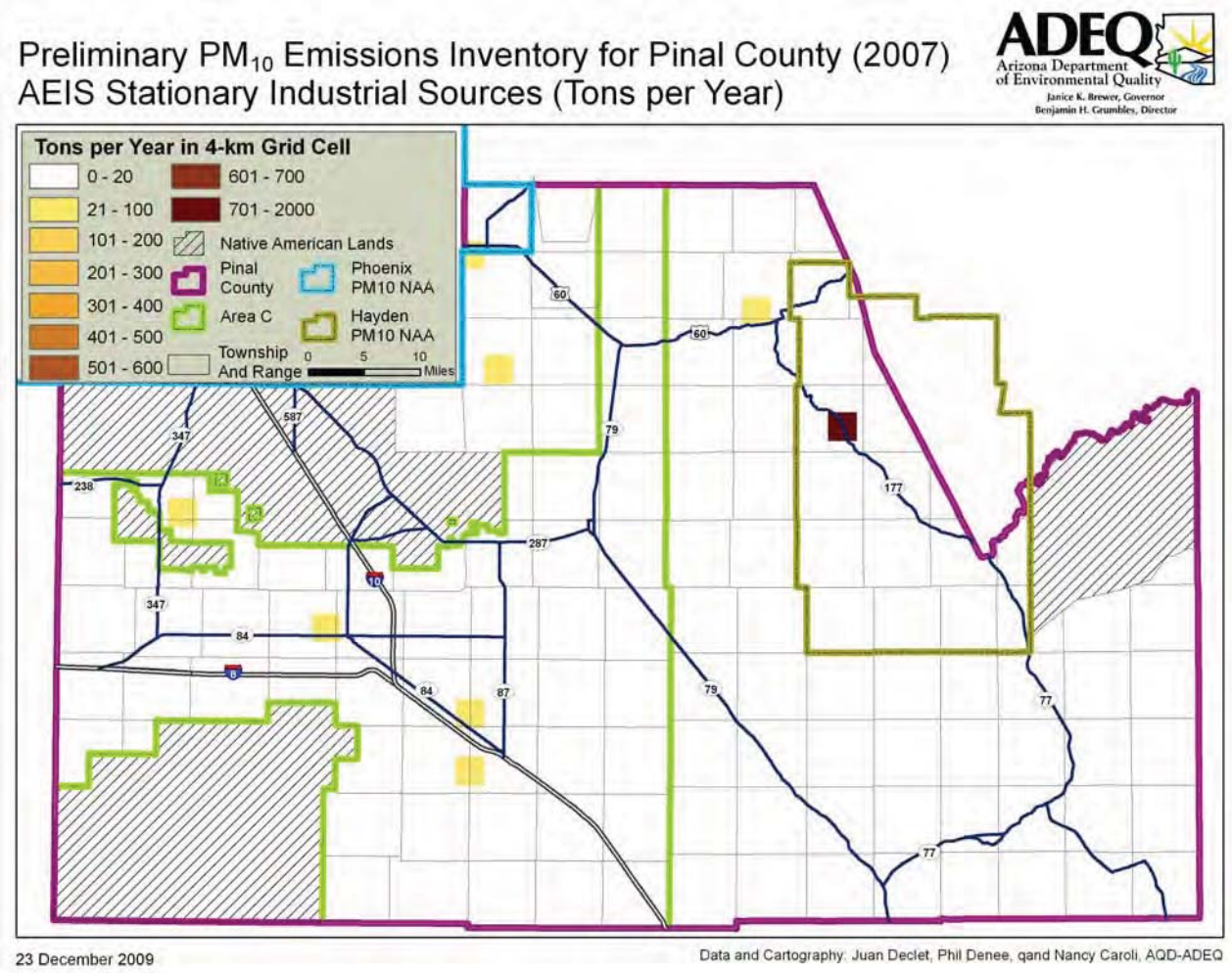


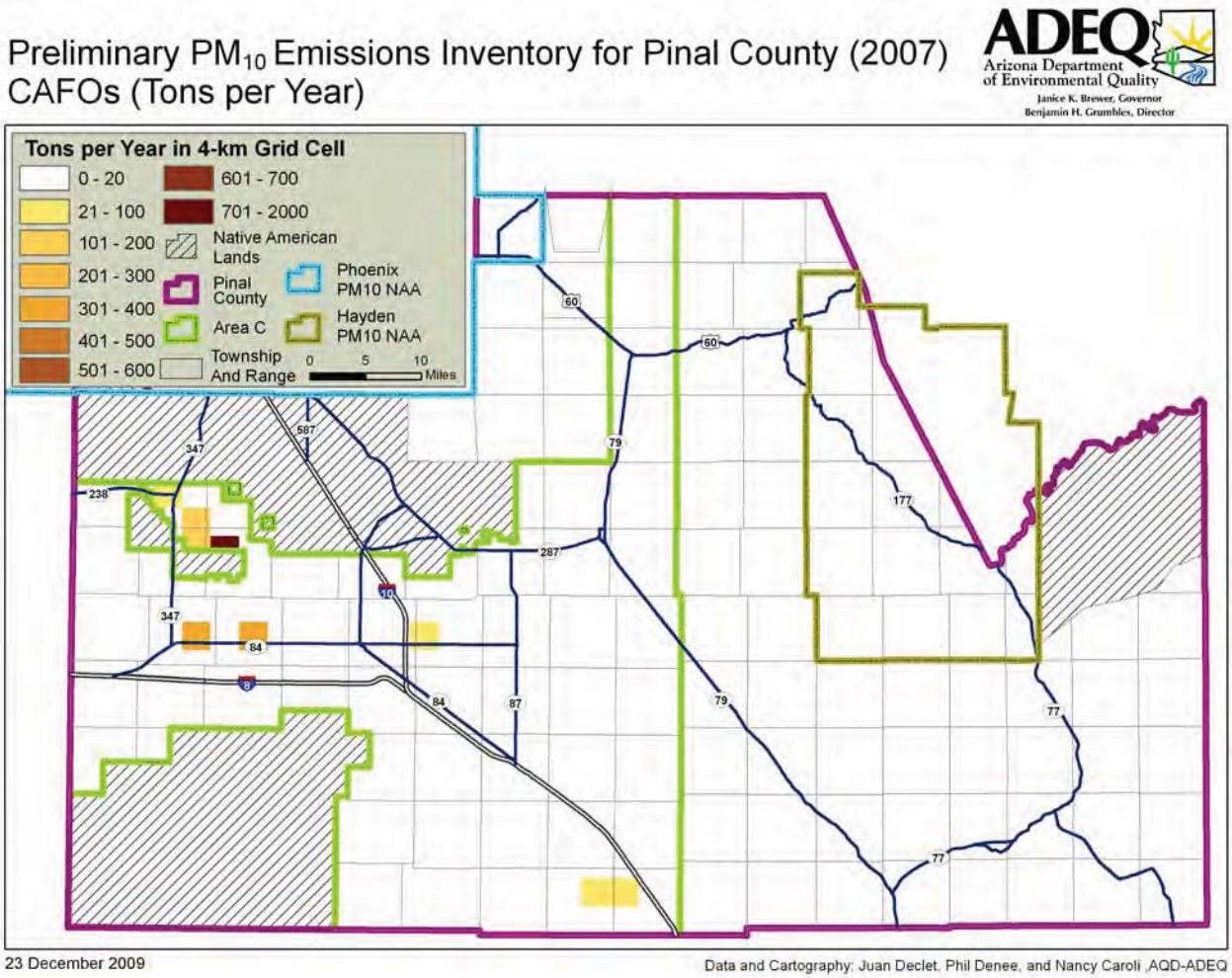
Figure 3-9


Preliminary PM10 Emissions Inventory for Pinal County (2007)
AEIS Stationary Industrial Sources (Tons per Year)
ADEQ
Arizona Department of Environmental Quality
Janice K. Brewer, Governor
Benjamin H. Grumbles, Director
Tons per Year in 4-km Grid Cell
0 - 20
21 - 100
101 - 200
201 - 300
301 - 400
401 - 500
501 - 600
601 - 700
701 - 2000
Native American Lands
Pinal County
Phoenix PM10 NAA
Area C
Hayden PM10 NAA
Township And Range
0 5 10 Miles
23 December 2009
Data and Cartography: Juan Declet, Phil Denee, qand Nancy Caroli, AQD-ADEQ

3.2.4 Concentrated Animal Feeding Operations (CAFOs) Emissions

To estimate emissions for this category, ADEQ obtained emission factors from the Western Regional Air Partnership's Fugitive Dust Handbook. Activity levels were obtained from ADEQ's Water Quality Division. An emissions factor of 10.59 pounds per-head per-year (lb/head-yr) was used for beef or calf operations; 4.182 lb/head-yr was the emission factor used for dairy, egg layer, and ostrich farm operations. After consultation with PCAQCD staff, the activity levels for some feedlots were adjusted for realistic emissions levels. ADEQ based these adjustments on field observations and inspections by PCAQCD staff. The CAFOs that emit the greatest quantity of emissions are located in the western and central regions of the County, as shown in Figure 3-10. Emissions for this category in 2007 are estimated to be **2,045 tons per year.**

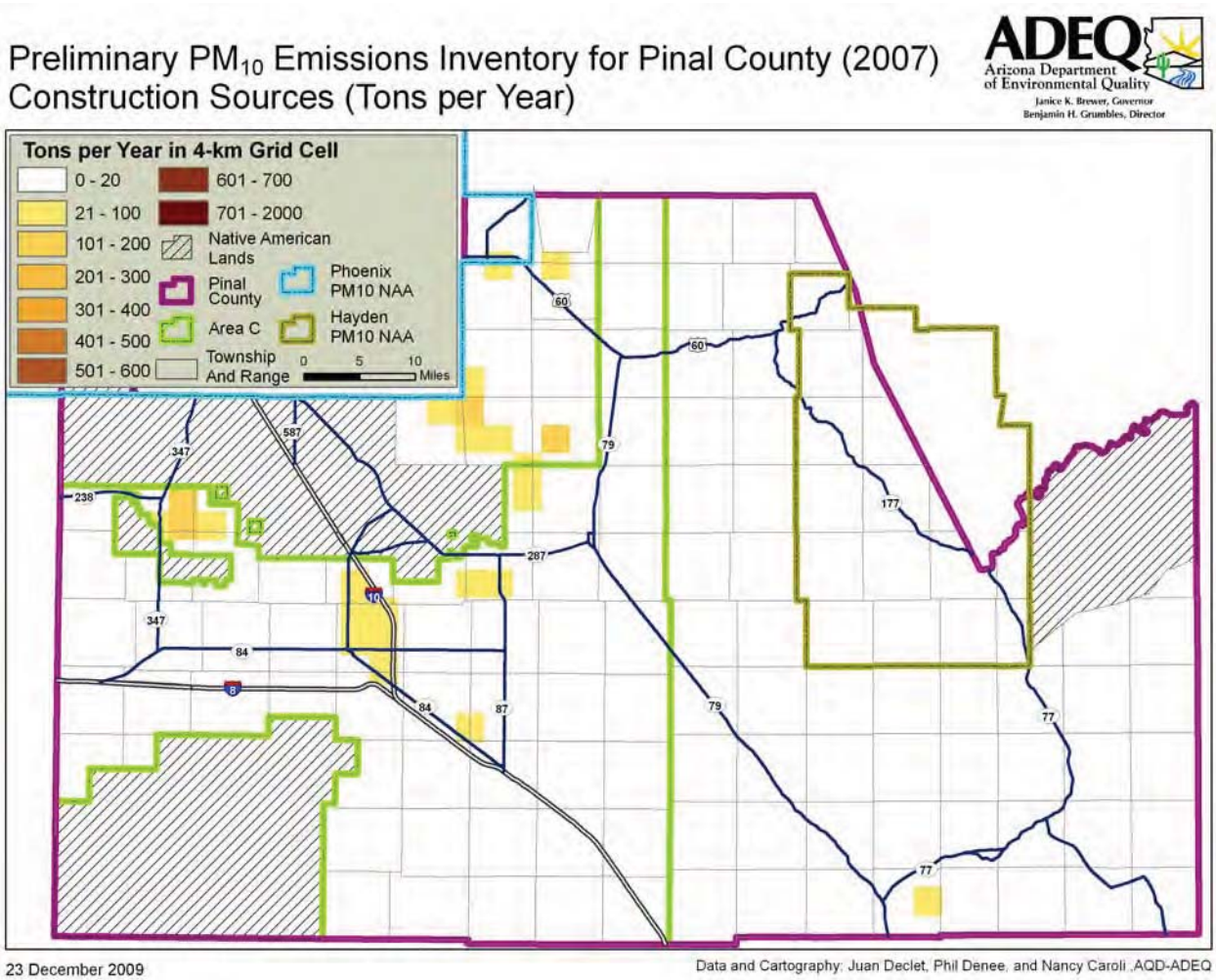
Figure 3-10



3.2.5 Construction Emissions

Pinal County's air quality permits database was used to identify 1,148 dust control permits issued during 2007. The size and scope of earthmoving activities were also obtained by reviewing the permits database. ADEQ used aerial photography to verify earthmoving activities. Construction sites were then coded in ADEQ's GIS database and each site was calculated in total acres. The emissions factors used by ADEQ for this category were derived from a 2005 PM_{10} emissions inventory completed by the Maricopa County Air Quality Department.[2] As shown in Figure 3-11, the majority of construction emissions were located in high growth areas of the County. Emissions for this category in 2007 are estimated to be **1,757 tons per year**.

Figure 3-11

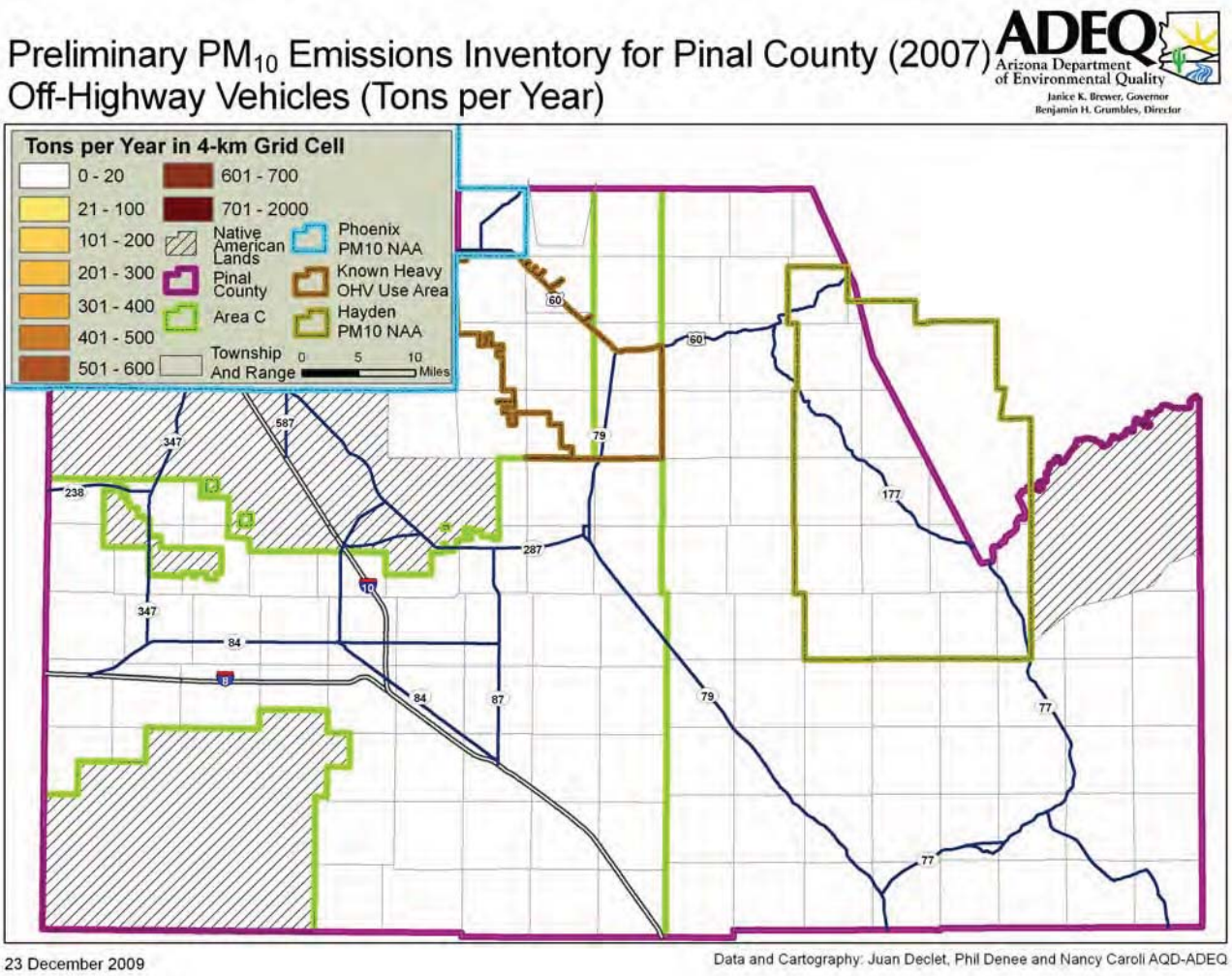


[2] http://www.maricopa.gov/aq/divisions/planning_analysis/docs/2005_PM10/05_PM_CH_3_Area.pdf

3.2.6 Off-highway Vehicle Emissions

To estimate emissions for this category, ADEQ obtained the number of titled off-highway vehicles (OHVs) in Pinal County from the Arizona Department of Transportation's Motor Vehicles Division. Emission factors were obtained from EPA's NONROAD model for 2007. Due to the relatively low volume of emissions for this category, when spatially allocated there were no grid cells over the 20 tons per year threshold; accordingly, ADEQ chose to depict the locations of designated OHV recreation areas, as shown below in Figure 3-12. Emissions for this category in 2007 are estimated to be **23 tons per year**.

Figure 3-12



3.2.7 Conclusion

After completing the preliminary emissions inventory, ADEQ determined that most ambient PM_{10} emissions are concentrated in the more developed areas of western Pinal County - with the exception of the Ray Mine, which is already included in the Hayden PM_{10} Nonattainment Area. ADEQ's determination is supported by ambient monitoring data collected by air quality monitors violating the NAAQS in the western region of the county.

3.3 Population Density and Degree of Urbanization

Table 3-5 features population estimates for municipalities within Pinal County for 2000 and 2008.[3] The population of the County has grown dramatically – 95.1 percent – in the intervening years. Development in Pinal County is limited to privately owned areas; most of the land available for development is located along the I-8 and I-10 corridors, as shown in Figure 3-15. Approximately 95 percent of the Pinal County population lives within this region. Figure 3-13 depicts the population density of Pinal County in 2005; Figure 3-14 depicts the County's projected population density in 2030. It must be noted that the residential housing market in Pinal County has been particularly affected by the national economic recession, with 1 in 35 homes in foreclosure in 2009.[4] Construction of new homes and commercial buildings has slowed considerably.

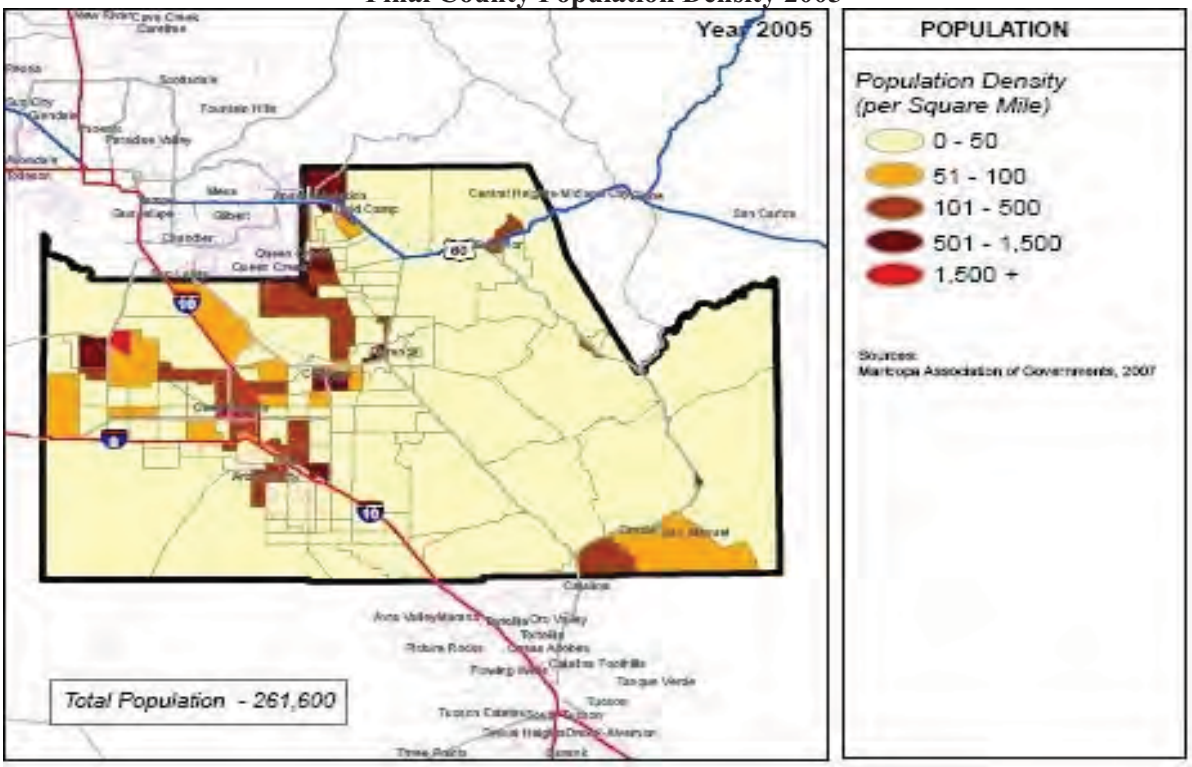
Table 3-5
Population Growth and Density within Pinal County

Entity	Area in Square Miles 2000	Area in Square Miles 2009/2010[5]	2000 Population Density	2008 Population Density	2000 Population	2008 Population
Pinal County Total	5,369.6	5,369.6	33.5	65.3	179,727	350,558
Apache Junction	34.2	34.2	930.2	1,08.7	31,814	37,917
Casa Grande	53.1	109	475.0	433	25,224	45,116
Coolidge	5.03	65	1,548.5	189.4	7,789	12,311
Eloy	71.7	110	144.7	146.9	10,375	16,163
Florence	8.3	50	1,742.9	481.9	14,466	24,096
City of Maricopa	31.9	43	46.5	831.9	1,482	35,770
Queen Creek[6]	n/a	26	n/a	214.5	1,010	5,576

Sources: Arizona Department of Economic Security – Population Statistics Unit.

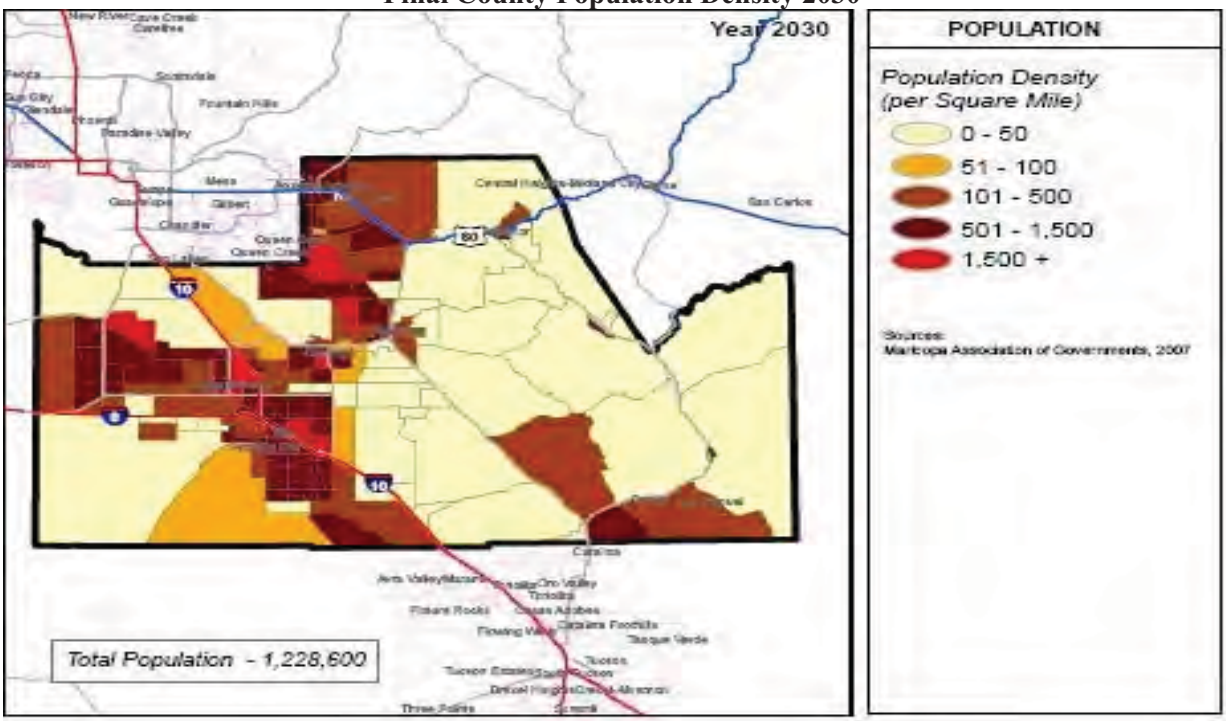
[3] Population estimates were obtained from the Arizona Department of Commerce, Arizona Population Estimates 1980 thru 2009, because all State agencies are required to use them pursuant to the Governor's Executive Order 2009-01, superseding Executive Order 95-2.
[4] Josh Brodesky. "Foreclosure Filings Show No Letup." Arizona Daily Star 16 October 2009, morning ed.: A17.
[5] Square mileages for 2009/2010 were obtained from municipality websites.
[6] Queen Creek straddles the Maricopa/Pinal County border; approximately 23.4 percent of the city's square miles are within Pinal County. To estimate a population for the Pinal County portion of Queen Creek, ADEQ divided the 2000 and 2008 population estimates by 23.4 percent.

Figure 3-13
Pinal County Population Density 2005



Source: Arizona Department of Transportation.

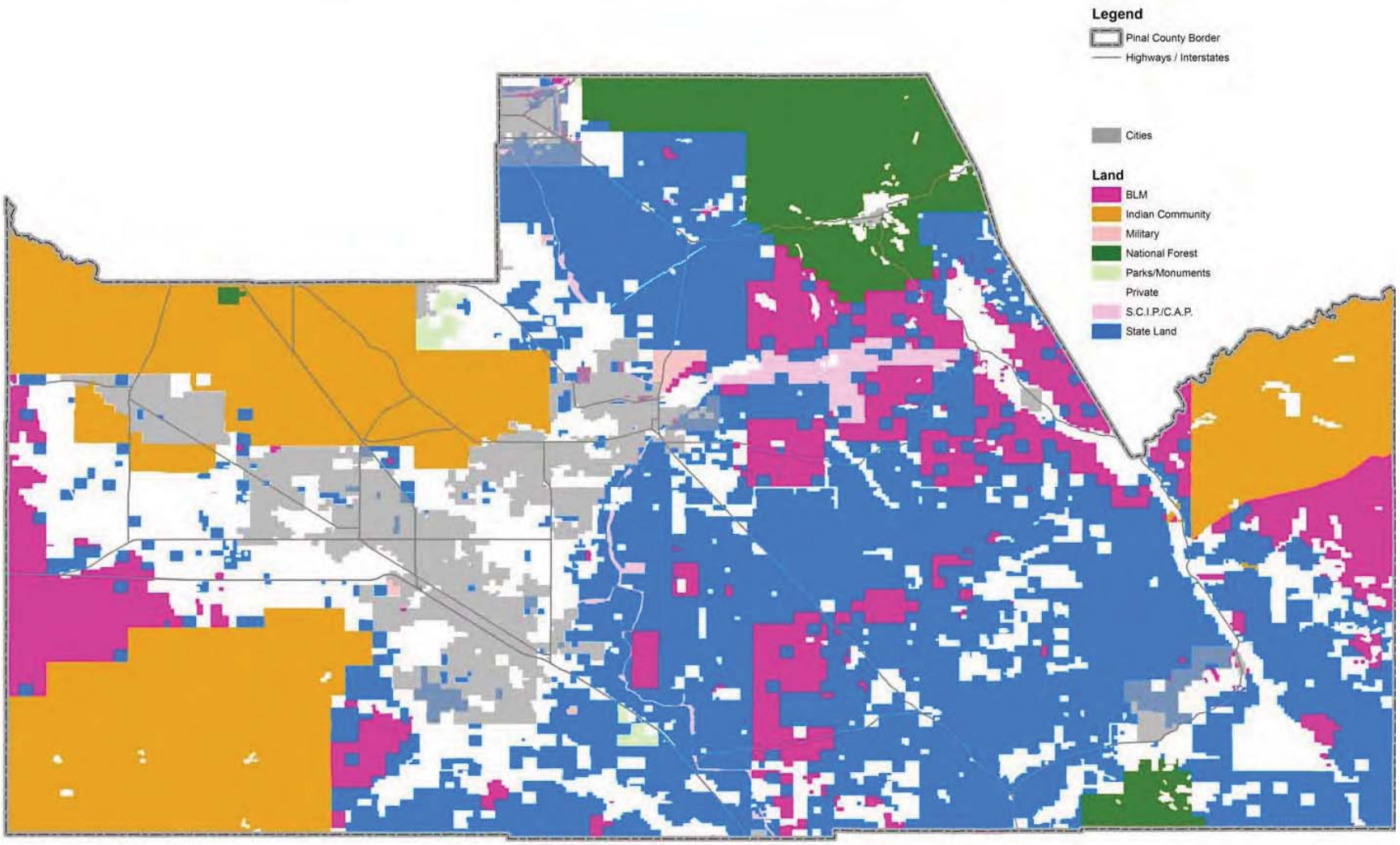
Figure 3-14
Pinal County Population Density 2030



Ibid.

Figure 3-15

Land Ownership in Pinal County



Source: PCAQCD.

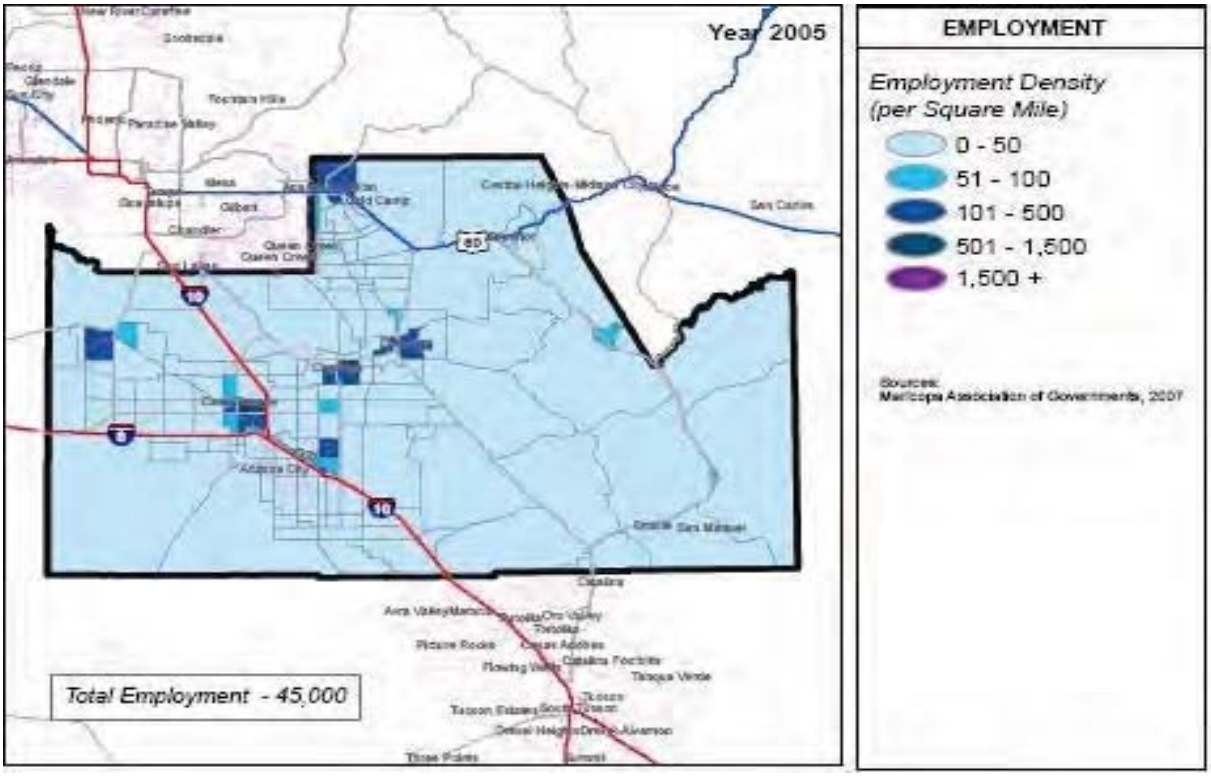
3.4 Traffic and Commuting Patterns

This factor considers commuting patterns of residents and commuters to Pinal County. Nearly 80 percent of those commuting to work in Pinal County are residents. For the 2006-2008 period, the U.S. Census Bureau estimated that Pinal County had a work force population of 101,887. As of July 2008, 226,208 vehicles were registered in Pinal County; this figure represents an increase of 7 percent from 2007. Table 3-6 contains data on the number and percentage of those commuting to and within Pinal, Pima, and Maricopa Counties; these statistics may be dramatically higher in the 2010 decennial census. Figure 3-16 depicts Pinal County employment density in 2005; Figure 3-17 depicts projected employment density for Pinal County in 2030. The highest employment densities are located in the western region of the county.

Table 3-6
Inter-County Employment Commute Statistics for Maricopa and Pinal Counties from U.S. Census Bureau, April, 2000 Census

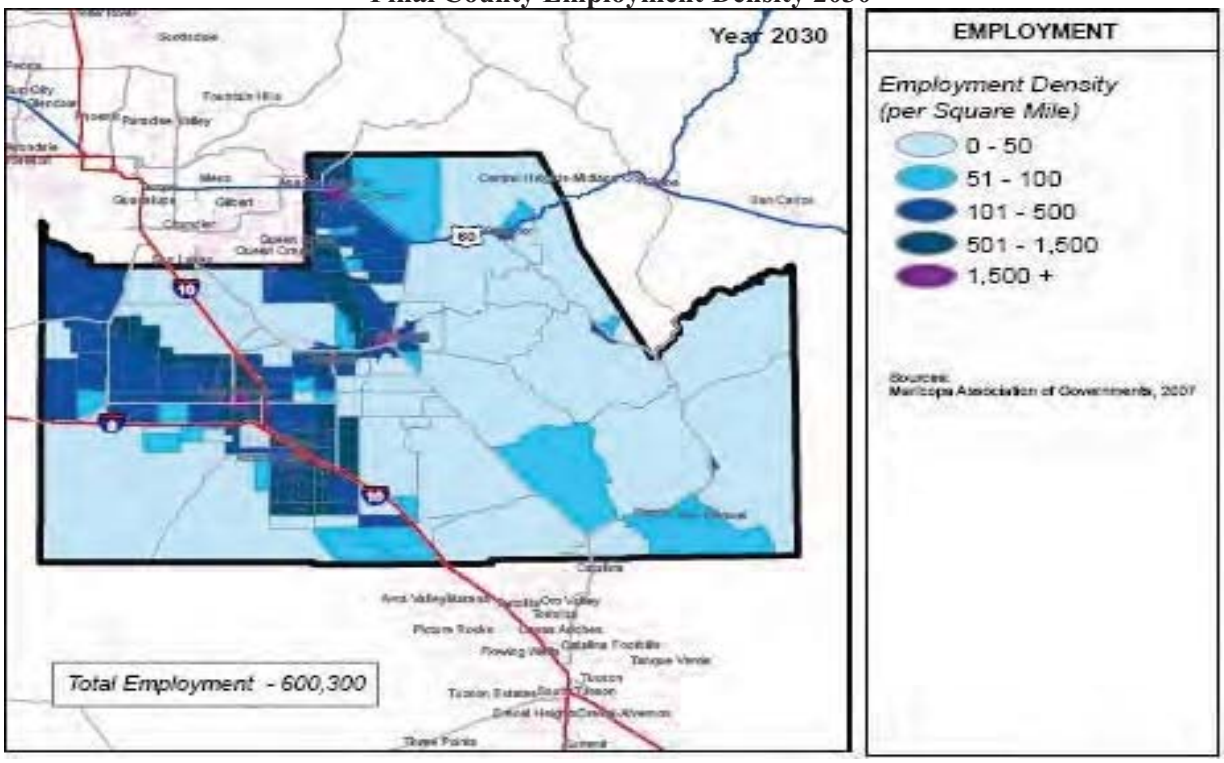
Employment County	Residence County	Number of Commuters
Maricopa	Pinal	19,918
Pinal	Apache	7
	Cochise	43
	Coconino	0
	Gila	333
	Graham	3
	Greenlee	6
	La Paz	0
	Maricopa	7,751
	Mohave	7
	Navajo	7
	Pima	1,974
	Pinal	35,961
	Santa Cruz	11
	Yavapai	25
	Yuma	13
	Total	46,141
Pima	Pinal	2,601

Figure 3-16
Pinal County Employment Density 2005



Source: ADOT.

Figure 3-17
Pinal County Employment Density 2030



Ibid.

3.5 Growth Rates and Patterns

Most of the population growth in Pinal County since the year 2000 occurred in the central and western region of the County. The catalyst for the explosive growth can be attributed to reasonably priced housing near the I-10 corridor between the Phoenix and Tucson MSAs. With explosive growth came an increase in the number of vehicles and vehicle miles traveled (VMT) in Pinal County. Figure 3-2 (page 7) depicts onroad emissions throughout the County; the map demonstrates that the highest concentrations of onroad emissions occur in the proposed nonattainment area. The majority of the increase in VMT has occurred in the western half of the County where an estimated 95 percent of the County's population lives. Table 3-7 below contains population and VMT growth for Pinal County.

Table 3-7
Population Growth and Daily Vehicle Miles Traveled in Pinal County

	2000 Population	2007 Population Estimate	Population % change (2000 - 2007)	2000 VMT (1000s mi)	2007 VMT (1000s mi)	% Change
Pinal County	179,727	350,558	95.1%	6,917	10,259	48%

Sources: Census Bureau and ADOT.

3.6 Meteorology

Central Arizona experiences periods of significant winds associated with frontal passages, troughs of low pressure, summer monsoon storms, and occasional strong pressure gradients. The meteorology associated with winds in Pinal County ranges from synoptic scale systems such as frontal passages, strong pressure gradients, Mesoscale Convective System (MCS)[7] and regional monsoon storms to micro scale storm cells that form locally.

The frontal passages are typically associated with strong Pacific Northwest low pressure systems that develop over the northern Pacific Ocean and move southeast into the western United States. Strong winds in advance of cold fronts can reach speeds over 30 miles per hour (mph) which cause significant areas of blowing dust in central Arizona. The duration of the strong, gusty winds can last up to eight hours and result in elevated hourly PM_{10} concentrations. The hourly PM_{10} concentrations associated with frontal passages may not reach those precipitated by monsoonal thunderstorms – however – their temporal duration can create 24-hr PM_{10} concentrations which reach the 99th percentile of historical PM_{10} 24-hr average data.

Pressure gradient exceptional/natural events result from strong high pressure building over the western United States and low pressure to the east. As the high pressure builds, a pressure differential is created that causes strong winds over Arizona. The result is locally-developed blowing dust and dust transported from areas surrounding Pinal County. As with frontal passages, duration of strong, gusty winds can last several hours. The combination of the long duration of transported dust and locally derived dust overwhelm the PM_{10} monitors.

The monsoon is a seasonal wind that takes place in the southwestern United States and Northern Mexico during the summer months. The typical diurnal winds in central Arizona are 'drainage' in nature; in the morning, easterly winds that originate in the mountains switch direction to westerly winds in the afternoon due to the heating of the desert floor. During a monsoon, however, winds will shift to an easterly to southeasterly direction. This is due to a ridge of high pressure that sets up over the Four Corners region in northeastern Arizona. The result is an influx of atmospheric moisture from the south and east, and storm development, which can be synoptic in nature as large lines of storms form either over the northern Arizona or northern Mexico/southern Arizona and move into the central area of Pinal County.

Monsoon thunderstorms can also be local in nature, with the formation of localized monsoon supported storm cells. Both monsoon setups can pack significant winds (reaching gusts over 60 mph) that cause dust storms to develop, transporting a wall of dust (Haboob) up to hundreds of miles. These storms have dust-causing effects similar to frontal passages and strong pressure gradients. The monsoon "season", as defined by the National Weather Service, starts on June 15th and lasts through September 30th. Haboobs are frequent at the beginning of the monsoon and subside as the storm progresses, when measurable rainfall normally occurs. Monsoon storm cell(s), however, can create strong enough wind gusts to cause blowing dust even after recent precipitation.

Not all exceedances in Pinal County are wind related: stagnation conditions in the fall and winter occur when cold air and the absence of winds trap ambient PM_{10} in the lower atmosphere. The region of the county most impacted by stagnation conditions is the western agricultural basin area of the county. Stagnation exceedances tend to have lower PM_{10} concentrations than exceedances caused by wind events, as shown in Figure 3-18. Figure 3-19 illustrates the number of exceedances by month in Pinal County during 2006-2008. A complete history of exceedances during 2006-2008 is included in Appendix B.

[7] http://www.weather.gov/glossary/index.php?letter=m

Figure 3-18

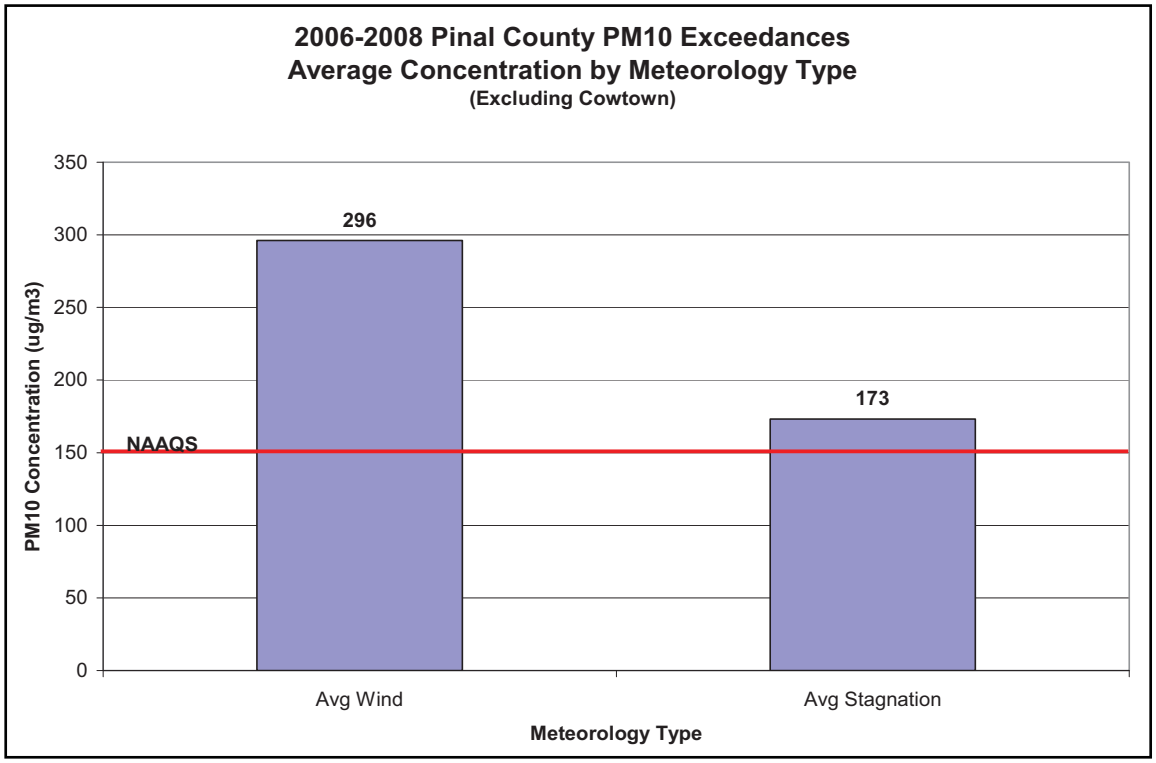
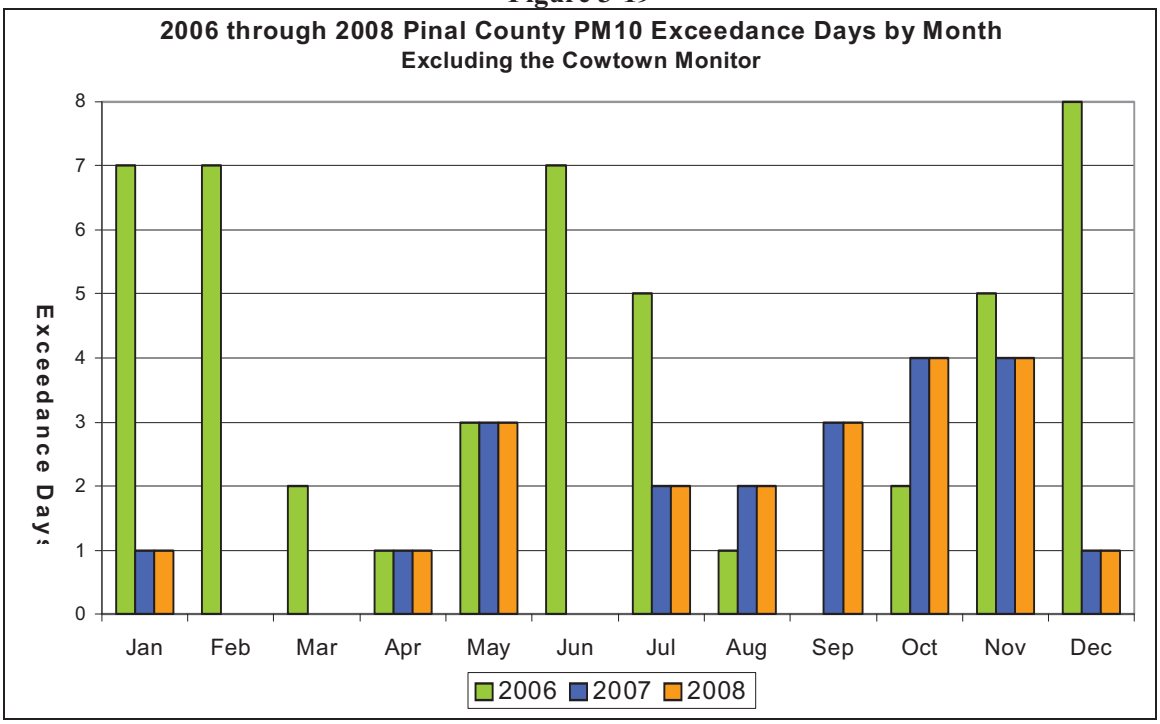


Figure 3-19



Handling of Exceptional Meteorological Events

EPA's 2007 Final Rule, *Treatment of Data Influenced by Exceptional Events* established guidelines for the review and handling of air quality monitoring data influenced by exceptional events. In this rule, the demonstration to exclude data includes a clear causal relationship between the measurement under consideration and the event that is claimed to have affected air quality in the area and the exceedance would not have occurred "but for" the event.

EPA notes in the Final Rule that natural events (one form of exceptional events according to the definition) may recur, sometimes frequently (e.g. western wildfires). For the purpose of this rule, EPA defines "natural event" as an event in which human activity plays little or no direct causal role to the event in question. The EPA recognizes that over time, certain human activities may have had some impact on the conditions which later give rise to a "natural" air pollution event. However, EPA does not believe that small historical human contributions should preclude an event from being deemed "natural.". The March 22, 2007, EPA-adopted rule supersedes all previous documentation regarding flagging and excluding data.

According to the final rule, exceptional events are events for which the normal planning and regulatory process established by the CAA is not appropriate. The rule gives authority to exclude air quality monitoring data from regulatory determinations related to exceedances or violations of the NAAQS and avoid designating an area as nonattainment, redesignating an area as nonattainment, or reclassifying an existing nonattainment area to a higher classification if a State adequately demonstrates than an exceptional event has caused an exceedance or violation of a NAAQS.

The EPA requires States to take reasonable measures to mitigate the impacts of an exceptional event. In accordance with the language in the rule, EPA defines the term "exceptional event" to mean an event that:

(i) Affects air quality;
(ii) Is not reasonably controllable or preventable;
(iii) Is an event caused by human activity that is unlikely to recur at a particular location or a natural event; and
(iv) Is determined by EPA through the process established in the regulations to be an exceptional event.

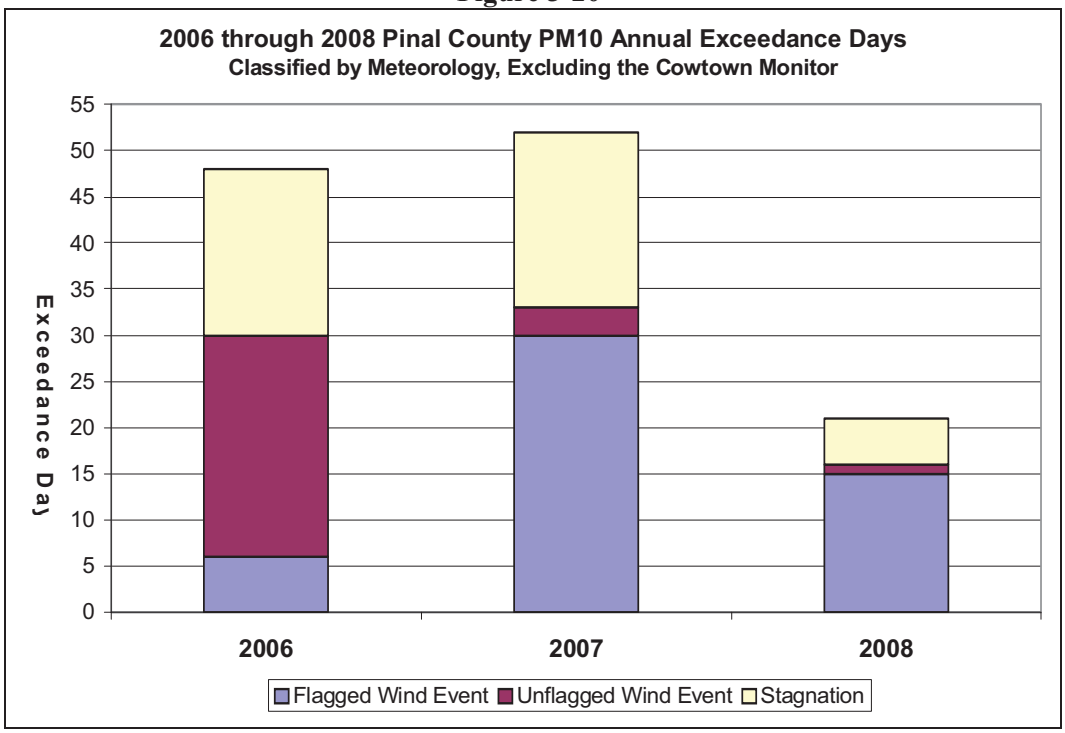
The PCAQCD reviews of PM_{10} data, meteorology records, the implementation of local fugitive dust rules, and the impact of potential local and regional sources when determining whether a PM_{10} exceedance(s) is covered under exceptional/natural event classification.

In June 2008, PCAQCD submitted documentation for PM_{10} exceedances that occurred in 2007 that the County considered exceptional events. EPA subsequently informed PCAQCD that the submitted documentation needed additional information in accordance with the existing rule. In response, PCAQCD is currently coordinating with EPA to develop more robust exceptional event demonstrations for events that occurred in Pinal County during 2007 and 2008. If EPA concurs with the revised demonstrations, the monitoring data flagged in AQS will be excluded from regulatory determinations related to exceedances or violations of the 24-hour PM_{10} NAAQS. PCAQCD is currently reviewing the PM_{10} exceedances flagged in AQS to determine if the events from 2007 and 2008 meet EPA's criteria for exclusion under the 2007 Final Rule.

The number of exceedance days in Pinal County attributed to high winds in 2007 was 35; the total for 2008 was 17. Of those wind events, PCAQCD has or will be submitting technical demonstrations for 30 exceedance dates in 2007 and 15 in 2008. It is important to note that even if EPA were to concur with

every exceptional event demonstration submitted by PCAQCD, Pinal County would still qualify as nonattainment for violating the 1987 PM_{10} NAAQS. Exceedances of the NAAQS attributed to stagnation conditions do not qualify for exclusion under the exceptional events final rule. Figure 3-20 shows the number of exceedance days in Pinal County during 2006-2008; Figure 3-20 also exhibits the number of exceedance days that PCAQCD flagged for exclusion in AQS and the number of stagnation exceedances for each year.

Figure 3-20



3.7 Geography/Topography (Mountain Ranges or other Air Basin Boundaries)

The topography of Pinal County can best be described as a broad basin, low in elevation, surrounded in each direction by mountain ranges. Open-ended valleys characterize the topography of western Pinal County. The area does not have geographical or topographical barriers limiting air-pollution transport within its airshed. Because PM_{10} is primarily crustal, transport from outside the valleys is unlikely, excluding occasional exceptional events. The elevation of the basin area of Pinal County is approximately 1,200 feet above sea level.

The mountain ranges that surround the basin area create complex mountain-valley wind patterns. The Estrella Mountains in the northwest portion of the County reach 4,125 feet in elevation and provide a buffer between Pinal and Maricopa Counties. In the northern portion of Pinal County, the Superstition and San Tan Mountains rise to a height of 5,036 and 3,054 feet, respectively. Near the western border of the County, the Table Top Mountains reach 3,392 feet in elevation. To the south, the Black Mountains reach 5,577 feet. The Pinal Mountains in western Gila County, near Pinal County's eastern border, reach 7,848 feet in elevation.

3.8 Jurisdictional Boundaries (e.g., existing PM_{10} non-attainment areas)

When recommending PM_{10} nonattainment area boundaries, EPA recommends that the State consider sources contributing emissions from a broad geographic area. Accordingly, the State chose all of Pinal County as a starting point for evaluating boundaries of the proposed nonattainment area. In evaluating the jurisdictional boundary factor, the State gave special consideration to nearby areas that are already designated as nonattainment for violating the 1987 PM_{10} NAAQS: the Hayden Moderate PM_{10} Nonattainment Area and the metropolitan Phoenix Serious PM_{10} Nonattainment Area. The State also considered the authorities of PCAQCD and its responsibilities to facilitate air quality planning and implement control measures to attain the standard. It is also important to note that neither the Pima Association of Governments (PAG) nor MAG has jurisdiction in Pinal County. Those metropolitan planning organizations (MPOs) have been certified to develop air quality plans within those counties only.

Five cities and towns are located in central and western Pinal County: Casa Grande, Coolidge, Eloy, Florence and Maricopa. In addition, the Town of Queen Creek straddles Maricopa and Pinal Counties. Since all the violating monitors are located in or near all of these towns, the incorporated boundaries of these municipalities were taken into account.

Three Indian Reservations occupy portions of Pinal County: Gila River Indian Community, covering 372,000 acres, 280,000 acres of which are located in the northwestern part of the County; the nearly 22,000 acre Ak Chin Indian Community, all of which is located near the Town of Maricopa in western Pinal County; and the 2.7 million acre Tohono O'odham Indian Nation, most of which is in Pima County, with approximately 275,000 acres in southwestern Pinal County. The State has no jurisdiction over Indian Country, and, as such, no recommendation is being made for designations relating to these three Indian Reservations.

3.9 Level of Control of Emission Sources

Pinal County

The expansion of "Area A" in 1999 and subsequent legislation adopted by the Arizona Legislature required State, County, and regional air quality planning agencies to implement measures for dealing with particulate pollution.

Pinal County is authorized under the Clean Air Act and Arizona Revised Statutes as one of three Arizona counties with designated authority for air quality monitoring and permitting. The County manages a permitting program that requires stringent control measures. Prior to issuing a permit, PCAQCD uses computer modeling to assess the impact of emissions on local ambient air quality. PCAQCD issues permits for industrial sources, open burning, dust producing activities, and has an approved Title V permitting program. The County also has an approved program in place for the prevention of significant deterioration (PSD). The County conducts routine field inspections to verify compliance with permit conditions and operates a Countywide monitoring network to determine if the ambient air is meeting the 24-hour PM_{10} NAAQS.

Those areas of Pinal County recommended by the State for designation as attainment/unclassifiable include the portions of the County where attainment of NAAQS has been demonstrated. For its analysis, ADEQ reviewed available ambient monitoring data and statistics for population density, degree of urbanization, traffic volume, commuting patterns, and jurisdictional boundaries. After analyzing these criteria, ADEQ concluded these areas of the County are not experiencing or likely causing or contributing

to an exceedance of the PM_{10} NAAQS. Including these portions of the County in the nonattainment area would not help the area reach attainment of the NAAQS. This recommendation for eastern Pinal County does not affect the status of the existing Hayden PM_{10} nonattainment area in that portion of the County; [8] nor does the recommendation for northern Pinal County affect the status of the portion of the County that is included in the existing Phoenix Planning Area for $PM_{10,}$ which includes only the 36 square mile Apache Junction Township commonly identified as Township 1 North, Range 8 East.

Pima County

Although Pima County has a larger population and higher population density, significantly more commuters and a greater number vehicle miles traveled than Pinal County, no monitors in the County violate the 1987 24-hour PM_{10} NAAQS. [9]

If PM_{10} emissions originating in Pima County were contributing to violations in Pinal County, the monitors closest to the County border would be the most likely to be affected; however, the Pinal monitors closest to Pima County are not violating the 24-hour PM_{10} NAAQS. The Pinal Air Park monitor is located directly on the border with Pima County and is not violating; the Mammoth monitor 20 miles north of the County border is not violating; and the Eloy monitor, 20 miles north of the County border is not violating; however, the Eloy monitor is located in a well developed area and does not appear to be affected by sources such as cultivated agriculture and unpaved roads in south Eloy.

Based on this information, ADEQ recommends leaving unchanged the designation of Pima County as attainment/unclassifiable. Including Pima County would not help Pinal County reach attainment of the NAAQS and could pose jurisdictional boundary complications. In addition, there are no topographical features or meteorological patterns affecting airflow that would support including Pima County in the proposed nonattainment area.

Maricopa County

One PM_{10} ambient air quality monitor near the border Maricopa/Pinal County border (the Combs School Monitor) has violated the 24-hour PM_{10} NAAQS, as shown in the major features map on Page ES-2. Emissions from Maricopa County may be contributing to violations at that monitor; however, the adjoining portion of Maricopa County lies within the Phoenix PM_{10} Planning Area, which was designated as serious nonattainment for PM_{10} in 1996 based on urbanized area emissions [61 FR 21372].[10]

The Maricopa Association of Governments (MAG) submitted a PM_{10} SIP for the Phoenix area in July 1999, and a revision of that plan in February 2000. At EPA's request, MAG submitted another revision, the Salt River PM_{10} SIP Revision, in 2002 that focused on achieving attainment in the Salt River bed area of Phoenix. After failing to achieve attainment of the PM_{10} NAAQS, in December 2007, MAG submitted the *Five Percent Plan for PM_{10} for the Maricopa County Nonattainment Area*. The Five Percent Plan contains 46 control measures designed to reduce PM_{10} emissions in Area A each successive year by five percent, in addition to the best available control measures (BACM) and most stringent measures (MSM) already in the serious area plan. In combination, these requirements impose the most stringent

[8] The Hayden PM_{10} nonattainment area was most recently defined in 72 FR 14422 (3/28/07).

[9] The Rillito portion of Pima County was designated as nonattainment for PM_{10} by operation of law following the CAA amendments of 1990. In October 2006, EPA gave the Rillito Nonattainment Area (RNA) a clean data finding based on several years of attaining the PM_{10} NAAQS. ADEQ submitted a Limited Maintenance Plan for the RNA in June 2008.

[10] The 36-square-mile Apache Junction area in the northernmost portion of Pinal County constitutes part of the Phoenix Planning Area and was designated with the Phoenix metro area as serious nonattainment for the 24-hour PM_{10} NAAQS in 1996. As with the urban areas of Maricopa County, inclusion of Apache Junction in a greater-Pinal nonattainment area would be redundant and would complicate jurisdictional boundaries.

combination of State implementation plan ("SIP") mandates that can be required under the CAA. The inclusion of Maricopa County in a Pinal County nonattainment area would be unnecessary, would complicate jurisdictional boundaries, and would not help Pinal County reach attainment of the PM_{10} NAAQS.

3.10 Nonattainment Area Summary of Criteria Analysis

ADEQ reviewed the nine criteria outlined in EPA's guidance and determined that the portions of Pinal County discussed in this section meet the criteria for inclusion in a PM_{10} nonattainment area. Table 3-8 summarizes the data and information supporting the nonattainment area recommendation.

Table 3-8 Summary of Nine Criteria Analysis for the Proposed Pinal County PM_{10} Nonattainment Area		
Criteria	**Factors Supporting the Recommended Nonattainment Area Boundary**	**Factors Supporting the Exclusion of Eastern Portions of Pinal County**
Air Quality Data	The proposed nonattainment area includes the locations of the monitors that recorded concentrations exceeding the NAAQS.	Ambient air quality monitors located in the eastern and southern region of the County are not violating the PM_{10} NAAQS.
Emissions Data	The preliminary emissions inventory prepared by ADEQ and PCAQD determined that the majority of PM_{10} emissions originate in the western and central regions of the County.	The preliminary emissions inventory determined that sources in the eastern and southern regions of the County do not significantly contribute to violations in other regions of the County.
Population Density and Degree of Urbanization	The urbanized areas in the western and central regions of the County are where 95 percent of the County's population resides.	The eastern and southern portions of the County are largely undeveloped and have very low population densities.
Traffic and Commuting Patterns	The recommended nonattainment area includes the rapidly growing urbanized and developed areas, the high-traffic Interstate corridors, and areas with the highest employment densities.	The number of employers in the eastern portion of the County is low and is not projected to substantially increase during the potential maintenance period (2011-2031).
Growth Rates and Patterns	Significant growth is projected for communities near I-10 and I-8 during the potential maintenance period (2011-2031).	The eastern region of the county has experienced limited growth and is not projected significantly increase.
Meteorology	The recommended nonattainment area includes the agricultural basin region of the County where stagnation conditions are known to impact PM_{10} concentrations.	There are no known meteorology conditions specific to the eastern portion of the County known to affect PM_{10} concentrations.
Geography/ Topography	The recommended nonattainment area is predominately located in the basin region of the County characterized by open-ended valleys with few topographic barriers.	The eastern portion of the County is characterized by rough terrain, steep mountain ranges reaching over 7,000 feet in elevation.
Jurisdictional Boundaries	ADEQ's recommendation maintains jurisdictional cohesiveness and requires no new institutional arrangements for accomplishing required tasks.	The eastern portions of Pinal County recommended as attainment/unclassifiable designation lack significant emission sources or are in the existing Hayden PM_{10} nonattainment area. Inclusion of these areas would not help bring the western region of the county into attainment.
Level of Control of Emission Sources	The Apache Junction area of the County included in the Phoenix PM_{10} Nonattainment Area is subject to stringent PM_{10} control strategies included in the Maricopa Association of Governments Five Percent Reduction Plan.	The number of PM_{10} generating sources in eastern Pinal County is minimal. The largest point source in the area, ASARCO's Ray Mine, is included in the existing Hayden PM_{10} Nonattainment Area. The operating permit issued by PCAQCD for the mine contains control measures sufficient for attaining the PM_{10} NAAQS. Emissions from the mine are highly localized and do not affect the recommended nonattainment area.

4.0 AREA DESIGNATION RECOMMENDATIONS

ADEQ demonstrated in the preceding analysis that the western and central regions of Pinal County should be designated as nonattainment for the 1987 24-hour PM_{10} NAAQS. The proposed Pinal County PM_{10} nonattainment area encompasses all or part of those townships listed below. Those sections of Pinal County not listed are recommended as attainment/unclassifiable.

As a new 24-hour PM_{10} nonattainment planning area, the State is recommending those portions of Pinal County shown in Figure 4-1 as the nonattainment planning area for the 24-hour PM_{10} NAAQS. This area excludes Indian Country in the affected portion of Pinal County.

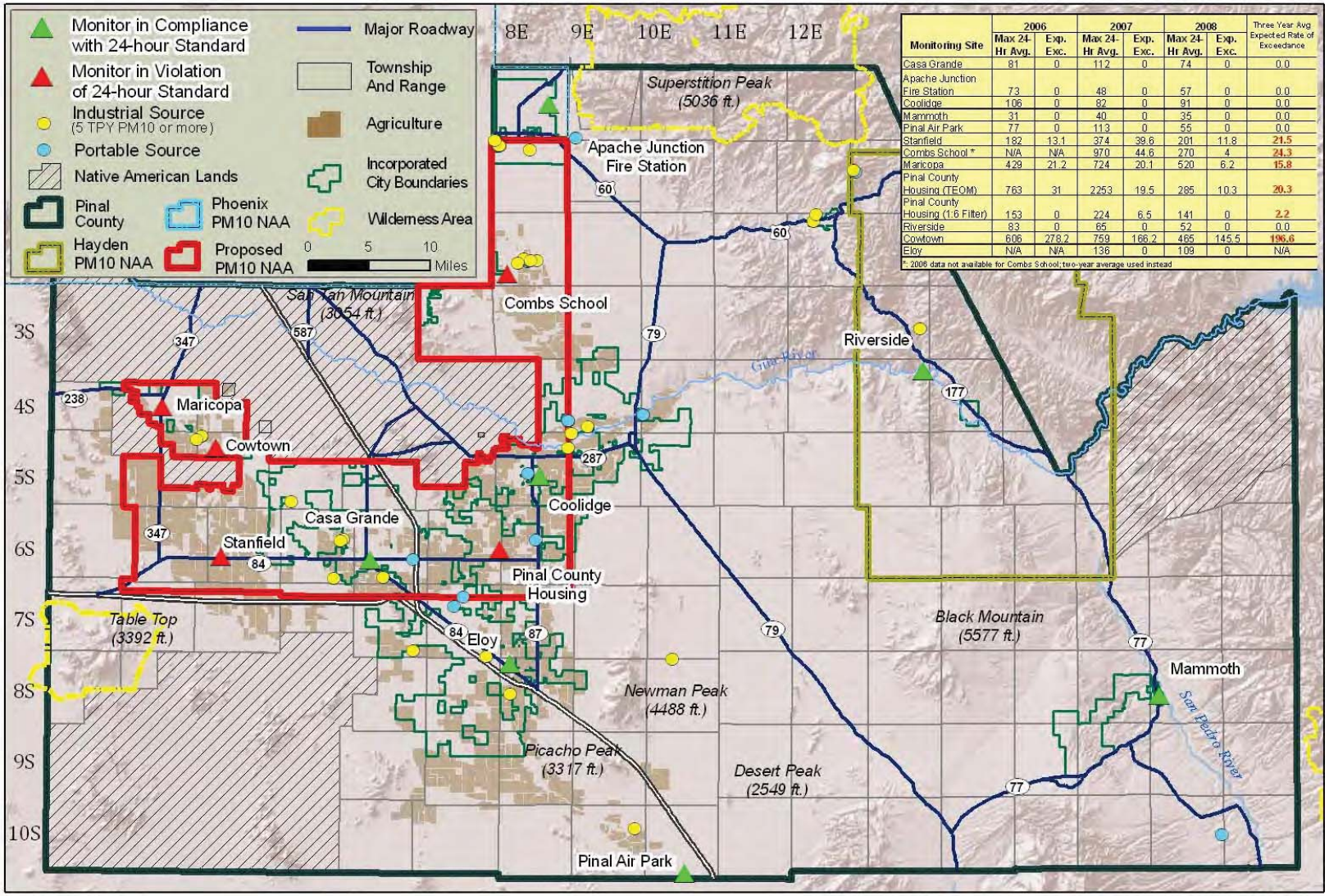
T1S, R8E
T2S, R8E
T3S, R7E
T3S, R8E
T4S, R3E-R4E (excluding all lands within the Gila River and Ak-Chin Indian Communities)
T4S, R8E (excluding all lands within the Gila River Indian Community)
T5S, R3E (excluding all lands within the Ak-Chin Indian Community)
T5S, R4E – R8E (excluding all lands within the Gila River and Ak-Chin Indian Communities)
T6S, R3E – R8E
T7S, R3E – R8E Sections 1-6

Figure 4-1

Recommended Pinal County PM_{10} Nonattainment Area Boundaries

ADEQ Arizona Department of Environmental Quality

Janice K. Brewer, Governor
Benjamin H. Grumbles, Director



Monitoring Site	2006 Max 24-Hr Avg.	2006 Exp. Exc.	2007 Max 24-Hr Avg.	2007 Exp. Exc.	2008 Max 24-Hr Avg.	2008 Exp. Exc.	Three Year Avg Expected Rate of Exceedance
Casa Grande	81	0	112	0	74	0	0.0
Apache Junction Fire Station	73	0	48	0	57	0	0.0
Coolidge	106	0	82	0	91	0	0.0
Mammoth	31	0	40	0	35	0	0.0
Pinal Air Park	77	0	113	0	55	0	0.0
Stanfield	182	13.1	374	39.6	201	11.8	21.5
Combs School *	N/A	N/A	970	44.6	270	4	24.3
Maricopa	429	21.2	724	20.1	520	6.2	15.8
Pinal County Housing (TEOM)	763	31	2253	19.5	285	10.3	20.3
Pinal County Housing (1:6 Filter)	153	0	224	6.5	141	0	2.2
Riverside	83	0	65	0	52	0	0.0
Cowtown	606	278.2	759	166.2	465	145.5	196.6
Eloy	N/A	N/A	136	0	109	0	N/A

*: 2006 data not available for Combs School; two-year average used instead

12 March 2010

Data and Cartography: Juan Declet & Phil Denee, Nancy Caroli, AQD-ADEQ

Appendix A
2006-2008 Summary of Pinal County Ambient PM_{10} Monitoring Data

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Appendix A – 2006-2008 Summary Pinal County PM_{10} Monitoring Data (in $\mu g/m^3$)							
Year	**Monitor**	**# of Observations**	**Max 24-hour Concentration**	**2nd Highest Concentration**	**3rd Highest Concentration**	**4th Highest Concentration**	**# of Exceedances**
2006	Apache Jct. Fire Station	59	73	53	43	42	0
	Casa Grande	60	81	81	81	72	0
	Coolidge	58	106	84	83	80	0
	Cowtown	**57**	**606**	**531**	**510**	**460**	**39**
	Eloy	55	99	96	94	79	0
	Mammoth	55	31	28	26	26	0
	Maricopa	**361**	**429**	**389**	**330**	**329**	**21**
	Pinal Air Park	57	77	67	67	62	0
	Pinal County Housing	**58**	**153**	**152**	**141**	**126**	**0**
	Pinal County Housing E.	**58**	**210**	**170**	**158**	**138**	**3**
	Pinal County Housing TEOM	**356**	**913**	**763**	**552**	**432**	**33**
	Riverside	56	83	45	43	38	0
	Stanfield	**58**	**182**	**161**	**148**	**140**	**2**
	Stanfield TEOM	**327**	**727**	**469**	**353**	**251**	**25**
2007	Apache Jct. Fire Station	54	48	40	39	29	0
	Casa Grande	57	112	80	69	64	0
	Combs School	**282**	**970**	**867**	**521**	**385**	**31**
	Coolidge	57	82	76	74	73	0
	Cowtown	**55**	**759**	**490**	**396**	**383**	**24**
	Eloy (620 N. Main St.)	10	46	36	33	33	0
	Eloy (801 N. Main St.)	50	136	127	96	95	0
	Mammoth	56	40	29	26	26	0
	Maricopa	**363**	**724**	**525**	**332**	**329**	**20**
	Pinal Air Park	57	113	61	60	57	0
	Pinal County Housing	**59**	**224**	**113**	**110**	**99**	**1**
	Pinal County Housing E.	**60**	**341**	**145**	**140**	**120**	**1**
	Pinal County Housing TEOM	**354**	**2,253**	**1,839**	**448**	**434**	**19**
	Riverside	56	65	53	49	49	0
	Stanfield	**58**	**374**	**350**	**292**	**249**	**6**
	Stanfield TEOM	**358**	**1,062**	**482**	**360**	**357**	**25**
2008	Apache Jct. Fire Station	45	57	32	32	31	0
	Casa Grande	44	74	54	42	40	0
	Combs School	**366**	**270**	**195**	**192**	**171**	**4**
	Coolidge	45	55	53	52	50	0
	Cowtown	**60**	**465**	**373**	**354**	**339**	**24**
	Eloy	40	109	63	61	58	0
	Mammoth	44	35	32	27	27	0
	Maricopa	**361**	**520**	**317**	**213**	**170**	**6**
	Pinal Air Park	46	53	42	42	42	0
	Pinal County Housing	44	141	75	69	68	0
	Pinal County Housing E.	46	245	99	83	82	1
	Pinal County Housing TEOM	357	285	274	265	221	10
	Riverside	44	44	37	36	36	0
	Stanfield	**61**	**201**	**185**	**149**	**128**	**2**
	Stanfield TEOM	**363**	**375**	**364**	**323**	**264**	**14**

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Appendix B
2006-2008 Summary of Pinal County PM_{10} Exceedances

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2006 Pinal County PM_{10} Exceedances

48 Exceedance days
(19 – stagnation, 28 – wind, combo – 1)

Date	Day of Week	Site	AQS # (POC)	PM_{10} 24-hr Average Concentration (ug/m3)	Weather Type (Wind, Stagnation, Monsoon)
1/5/06	Thursday	PCH (TEOM)	04-021-3011 (3)	187.5	Wind
1/7/06	Saturday	PCH (TEOM)	04-021-3011 (3)	158.2	Stagnation
1/12/06	Thursday	PCH (TEOM)	04-021-3011 (3)	164.3	Stagnation
1/13/06	Friday	Maricopa	04-021-3010 (3)	174.6	Stagnation
1/18/06	Wednesday	PCH (TEOM)	04-021-3011 (3)	172.8	Stagnation
1/19/06	Thursday	Maricopa	04-021-3010 (3)	191.1	Wind
		PCH (TEOM)	04-021-3011 (3)	171.9	
1/25/06	Wednesday	PCH (TEOM)	04-021-3011 (3)	177.6	Wind
2/4/06	Saturday	PCH (TEOM)	04-021-3011 (3)	204.6	Stagnation
		PCH east	04-021-3011 (2)	158	
2/6/06	Monday	PCH (TEOM)	04-021-3011 (3)	366.2	Wind
		Stanfield	04-021-3008 (3)	198.7	
2/8/06	Wednesday	PCH (TEOM)	04-021-3011 (3)	157.7	Wind
2/9/06	Thursday	PCH (TEOM)	04-021-3011 (3)	222.3	Stagnation
2/15/06	Wednesday	PCH (TEOM)	04-021-3011 (3)	432.1	Wind
		Maricopa	04-021-3010 (3)	389	
		Stanfield	04-021-3008 (3)	248.4	
2/17/06	Friday	PCH (TEOM)	04-021-3011 (3)	164.3	Stagnation
2/18/06	Saturday	PCH (TEOM)	04-021-3011 (3)	164.1	Stagnation
3/8/06	Wednesday	Maricopa	04-021-3010 (3)	190.4	Wind
		PCH (TEOM)	04-021-3011 (3)	173.1	
3/10/06▲	Friday	Maricopa	04-021-3010 (3)	289.6	Wind
		PCH (TEOM)	04-021-3011 (3)	552.4	
		Maricopa	04-021-3010 (3)	329.6	

▲Included with ADEQ NEAP to EPA

2006 Pinal County PM_{10} Exceedances					
Date	**Day of Week**	**Site**	**AQS # (POC)**	**PM_{10} 24-hr Average Concentration (ug/m3)**	**Weather Type (Wind, Stagnation, Monsoon)**
5/16/06	Tuesday	PCH (TEOM)	04-021-3011 (3)	336.9	Wind
		Stanfield	04-021-3008 (3)	205.9	
		Maricopa	04-021-3010 (3)	187.1	
5/17/06	Wednesday	PCH (TEOM)	04-021-3011 (3)	203.3	Wind
5/22/06▲	Monday	Maricopa	04-021-3010 (3)	173.2	Wind
6/1/06	Thursday	Stanfield	04-021-3008 (3)	160.6	Stagnation
6/2/06▲	Friday	Maricopa	04-021-3010 (3)	231.7	Combo
6/4/06	Sunday	Stanfield	04-021-3008 (3)	164.9	Wind
6/6/06▲	Tuesday	Stanfield	04-021-3008 (3)	237.5	Wind
6/24/06	Saturday	Maricopa	04-021-3010 (3)	208.4	Wind
6/25/06▲	Sunday	PCH (TEOM)	04-021-3011 (3)	762.8	Wind
		Stanfield	04-021-3008 (3)	468.8	
		Maricopa	04-021-3010 (3)	329.1	
6/26/06	Monday	Maricopa	04-021-3010 (3)	429	Wind
		Stanfield	04-021-3008 (3)	167.3	
7/4/06	Tuesday	PCH (TEOM)	04-021-3011 (3)	393.7	Wind
		PCH east	04-021-3011 (2)	210	
7/15/06	Saturday	Stanfield	04-021-3008 (3)	237.4	Wind
		Maricopa	04-021-3010 (3)	204.5	
7/16/06	Sunday	PCH (TEOM)	04-021-3011 (3)	268.7	Wind
		PCH east	04-021-3011 (2)	170	
7/18/06	Tuesday	PCH (TEOM)	04-021-3011 (3)	186.7	Wind
7/25/06	Tuesday	PCH (TEOM)	04-021-3011 (3)	237.7	Wind
8/21/06	Monday	Maricopa	04-021-3010 (3)	218	Wind
10/5/06	Thursday	Maricopa	04-021-3010 (3)	159.5	Stagnation
10/19/06	Thursday	Stanfield	04-021-3008 (3)	162.5	Stagnation
11/6/06	Monday	Stanfield	04-021-3008 (3)	164.9	Stagnation
11/13/06	Monday	PCH (TEOM)	04-021-3011 (3)	158.1	Stagnation
11/17/06	Friday	PCH (TEOM)	04-021-3011 (3)	246.5	Stagnation

▲Included with ADEQ NEAP to EPA

2006 Pinal County PM_{10} Exceedances					
Date	**Day of Week**	**Site**	**AQS # (POC)**	**PM_{10} 24-hr Average Concentration (ug/m3)**	**Weather Type (Wind, Stagnation, Monsoon)**
11/18/06	Saturday	Maricopa	04-021-3010 (3)	155	Stagnation
11/29/06	Wednesday	PCH (TEOM)	04-021-3011 (3)	257.6	Wind
		Maricopa	04-021-3010 (3)	250.1	
12/3/06	Sunday	PCH (TEOM)	04-021-3011 (3)	294.3	Wind
12/4/06	Monday	Stanfield	04-021-3008 (3)	224.4	Wind
12/12/06	Tuesday	PCH (TEOM)	04-021-3011 (3)	167.4	Stagnation
12/13/06	Wednesday	PCH (TEOM)	04-021-3011 (3)	155.7	Stagnation
12/14/06	Thursday	PCH (TEOM)	04-021-3011 (3)	175.3	Stagnation
		Stanfield	04-021-3008 (3)	155.6	
12/15/06	Friday	PCH (TEOM)	04-021-3011 (3)	182.9	Stagnation
		Stanfield	04-021-3008 (3)	162.2	
		Maricopa	04-021-3010 (3)	156.7	
12/16/06	Saturday	Maricopa	04-021-3010 (3)	202.6	Wind
		PCH (TEOM)	04-021-3011 (3)	202.5	
		Stanfield	04-021-3008 (3)	194.1	
12/27/06	Wednesday	Stanfield	04-021-3008 (3)	170.8	Wind

▲ Included with ADEQ NEAP to EPA

2007 Pinal County PM_{10} Exceedances

52 Exceedance days
(17 – stagnation, 34 – wind, combo – 1)

Date	Day of Week	Site	AQS # (POC)	PM_{10} 24-hr Average Concentration (ug/m3)	Weather Type (Wind, Stagnation, Monsoon)
2/23/07*	Friday	Stanfield	04-021-3008 (3)	260	Wind
		Stanfield	04-021-3008 (1)	248.3	
		PCH (TEOM)	04-021-3011 (3)	189.4	
3/4/07*	Sunday	PCH (TEOM)	04-021-3011 (3)	241.7	Wind
3/21/07*	Wednesday	Combs	04-021-3009 (3)	273.2	Wind
		PCH (TEOM)	04-021-3011 (3)	184.3	
3/27/07*†	Tuesday	Stanfield	04-021-3008 (3)	482.3	Wind
		Maricopa	04-021-3010 (3)	268.7	
		Combs	04-021-3009 (3)	170.1	
4/12/07*†	Thursday	PCH (TEOM)	04-021-3011 (3)	447.7	Wind
		PCH_{east}	04-021-3011 (2)	341	
		PCH	04-021-3011 (1)	224.1	
		Stanfield	04-021-3008 (2)	349.9	
		Stanfield	04-021-3008 (3)	347.7	
		Maricopa	04-021-3010 (3)	259.9	
		Casa Grande	04-021-0001 (3)	221.1	
		Combs	04-021-3009 (3)	160.2	
4/15/07*	Sunday	PCH (TEOM)	04-021-3011 (3)	221.4	Wind
4/28/07*	Saturday	Maricopa	04-021-3010 (3)	525.1	Wind
		Stanfield	04-021-3008 (3)	360.1	
5/1/07*	Tuesday	PCH (TEOM)	04-021-3011 (3)	2,252.8	Wind
		Combs	04-021-3009 (3)	214.6	
5/8/07*	Tuesday	PCH (TEOM)	04-021-3011 (3)	434	Wind
		Combs	04-021-3009 (3)	326.2	
		Stanfield	04-021-3008 (3)	206.1	

*** PCAQCD flagged exceptional/natural event**
†ADEQ flagged exceptional/natural event

2007 Pinal County PM_{10} Exceedances					
Date	**Day of Week**	**Site**	**AQS # (POC)**	**PM_{10} 24-hr Average Concentration (ug/m3)**	**Weather Type (Wind, Stagnation, Monsoon)**
5/12/07	Saturday	PCH (TEOM)	04-021-3011 (3)	205.1	Wind?
5/16/07	Wednesday	Combs	04-021-3009 (3)	167.8	Wind
6/6/07*†	Wednesday	PCH (TEOM)	04-021-3011 (3)	414.2	Wind
		Combs	04-021-3009 (3)	360.5	
		Stanfield	04-021-3008 (3)	273.4	
		Maricopa	04-021-3010 (3)	213.4	
6/11/07*	Monday	Stanfield	04-021-3008 (2)	291.8	Wind
		Stanfield	04-021-3008 (3)	285.5	
		Combs	04-021-3009 (3)	237.4	
		Maricopa	04-021-3010 (3)	158.3	
6/14/07	Thursday	Stanfield	04-021-3008 (3)	170.3	Stagnation
6/15/07	Friday	Combs	04-021-3009 (3)	171.8	Stagnation
6/17/07	Sunday	Stanfield	04-021-3008 (2)	182.9	Combo (wind & stagnation)
6/18/07	Monday	Combs	04-021-3009 (3)	208.7	Stagnation
7/5/07*	Thursday	Combs	04-021-3009 (3)	211.6	Wind
		PCH (TEOM)	04-021-3011 (3)	196.7	
7/6/07*	Friday	Combs	04-021-3009 (3)	521.4	Wind
		Stanfield	04-021-3008 (3)	347.6	
		Casa Grande	04-021-0001 (3)	255.7	
		Maricopa	04-021-3010 (3)	232	
7/16/07*	Monday	Stanfield	04-021-3008 (3)	251	Wind
		Combs	04-021-3009 (3)	223.8	
		PCH (TEOM)	04-021-3011 (3)	199.3	
7/19/07*†	Thursday	PCH (TEOM)	04-021-3011 (3)	1,838.6	Wind
		Stanfield	04-021-3008 (3)	1,062.2	
		Casa Grande	04-021-0001 (3)	983.4	
		Combs	04-021-3009 (3)	866.9	
		Maricopa	04-021-3010 (3)	724.4	
7/23/07*	Monday	Combs	04-021-3009 (3)	160.9	Wind

*** PCAQCD flagged exceptional/natural event**
†ADEQ flagged exceptional/natural event

2007 Pinal County PM_{10} Exceedances					
Date	**Day of Week**	**Site**	**AQS # (POC)**	**PM_{10} 24-hr Average Concentration (ug/m3)**	**Weather Type (Wind, Stagnation, Monsoon)**
8/13/07*†	Monday	Maricopa	04-021-3010 (3)	331.7	Wind
		Combs	04-021-3009 (3)	248.4	
		PCH (TEOM)	04-021-3011 (3)	202.6	
8/16/07*†	Thursday	Combs	04-021-3009 (3)	969.5	Wind
		Maricopa	04-021-3010 (3)	249.4	
		Stanfield	04-021-3008 (2)	247.9	
		PCH (TEOM)	04-021-3011 (3)	184.4	
		Casa Grande	04-021-0001 (3)	163.6	
8/23/07*†	Thursday	Combs	04-021-3009 (3)	230.9	Wind
		Stanfield	04-021-3008 (3)	216.2	
		Maricopa	04-021-3010 (3)	203.8	
8/24/07*	Friday	Combs	04-021-3009 (3)	197.7	Carryover/wind
		Casa Grande	04-021-0001 (3)	188.2	
8/29/07*	Wednesday	PCH (TEOM)	04-021-3011 (3)	253.9	Wind
		Stanfield	04-021-3008 (3)	159.4	
8/30/07*	Thursday	Combs	04-021-3009 (3)	283	Wind
		Maricopa	04-021-3010 (3)	158.5	
9/1/07*	Saturday	Maricopa	04-021-3010 (3)	197.5	Wind
10/5/07*†	Friday	Combs	04-021-3009 (3)	296.9	Wind
		Stanfield	04-021-3008 (3)	177.4	
		Maricopa	04-021-3010 (3)	157.5	
10/8/07	Monday	Combs	04-021-3009 (3)	167	Stagnation
10/9/07	Tuesday	Combs	04-021-3009 (3)	166	Stagnation
10/10/07	Wednesday	Combs	04-021-3009 (3)	187.7	Stagnation
10/11/07	Thursday	Maricopa	04-021-3010 (3)	189.3	Stagnation
10/12/07	Friday	Maricopa	04-021-3010 (3)	170.6	Stagnation (PM_{10} hourly peak of 1,055 ug/m3 & peak wind was only 13 mph (both at 3 p.m.).
10/16/07	Tuesday	Maricopa	04-021-3010 (3)	213	Carryover/Wind

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Date	**Day of Week**	**Site**	**AQS # (POC)**	**PM_{10} 24-hr Average Concentration (ug/m3)**	**Weather Type (Wind, Stagnation, Monsoon)**
10/16/07*	Tuesday	Stanfield	04-021-3008 (3)	186.6	Wind
		Combs	04-021-3009 (3)	164.8	
10/19/07	Friday	Combs	04-021-3009 (3)	207.8	Combo
		Maricopa	04-021-3010 (3)	166.6	Stagnation
10/21/07*†	Sunday	Stanfield	04-021-3008 (2)	397.1	Wind
		Stanfield	04-021-3008 (3)	356.8	
		Maricopa	04-021-3010 (3)	328.9	
		Combs	04-021-3009 (3)	166.2	
10/23/07*	Tuesday	Stanfield	04-021-3008 (3)	184	Wind
10/24/07*†	Wednesday	Combs	04-021-3009 (3)	385.2	Wind
10/26/07	Friday	Combs	04-021-3009 (3)	157.3	Stagnation
10/29/07*	Monday	Maricopa	04-021-3010 (3)	156.2	Wind
11/3/07	Saturday	Stanfield	04-021-3008 (3)	176.9	Stagnation
11/5/07	Monday	Stanfield	04-021-3008 (3)	159.1	Stagnation
11/6/07	Tuesday	PCH (TEOM)	04-021-3011 (3)	164.8	Stagnation
11/15/07*	Thursday	Stanfield	04-021-3008 (3)	246.6	Wind
		PCH (TEOM)	04-021-3011 (3)	217.2	
		Combs	04-021-3009 (3)	190.6	
		Casa Grande	04-021-0001 (3)	172	
		Maricopa	04-021-3010 (3)	162.6	
11/21/07	Wednesday	PCH (TEOM)	04-021-3011 (3)	181.4	Stagnation
11/28/07	Wednesday	Combs	04-021-3009 (3)	170.2	Stagnation
12/7/07*	Friday	PCH (TEOM)	04-021-3011 (3)	272	Wind
		Stanfield	04-021-3008 (3)	257.1	
		Casa Grande	04-021-0001 (3)	156.5	
12/25/07*	Tuesday	Stanfield	04-021-3008 (3)	298.2	Wind

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2008 Pinal County PM_{10} Exceedances

21 Exceedance days [5 stagnation, 16 wind]

Date	Day of Week	Site	AQS # (POC)	PM_{10} 24-hr Average Concentration (ug/m3)	Weather Type (Wind, Stagnation, Monsoon)
1/1/08*	Tuesday	PCH (TEOM)	04-021-3011 (3)	264.9	Wind from Strong Pressure Gradient (Max. wind speed 31 mph)
		PCH East	04-021-3011 (2)	245	
		Stanfield	04-021-3008 (3)	255.3	
		Stanfield	04-021-3008 (1)	185	
4/26/08	Saturday	Stanfield	04-021-3008 (3)	207.5	Stagnation
5/10/08	Saturday	Stanfield	04-021-3008 (3)	161.7	Stagnation
5/15/08*	Thursday	PCH (TEOM)	04-021-3011 (3)	221.1	Storm Outflow Winds (Max. wind speed 32 mph)
5/21/08*†	Wednesday	Stanfield	04-021-3008 (3)	323.0	Cold Frontal Passage (Max. wind speed 39 mph)
		Maricopa	04-021-3010 (3)	317.7	
		PCH (TEOM)	04-021-3011 (3)	273.8	
		Combs	04-021-3009 (3)	170.7	
		Casa Grande	04-021-0001 (3)	164.2	
7/1/08*†	Tuesday	PCH (TEOM)	04-021-3011 (3)	159.2	Monsoon Storm Outflow (Max. wind speed 31 mph)
7/3/08*	Thursday	Stanfield	04-021-3008 (3)	157.8	Monsoon Storm Outflow (Max. wind speed 27 mph)
8/7/08*	Thursday	Stanfield	04-021-3008 (3)	364.3	Monsoon Storm Outflow (Max. wind speed 41 mph)
		Maricopa	04-021-3010 (3)	213.3	
8/15/08*	Friday	PCH (TEOM)	04-021-3011 (3)	204.1	Monsoon Storm Outflow (Max. wind speed 40 mph)
9/8/08*	Monday	Stanfield	04-021-3008 (3)	264.2	Monsoon Storm Outflow (Max. wind speed 40 mph)
9/11/08*	Thursday	PCH (TEOM)	04-021-3011 (3)	217.1	Monsoon Storms Outflow (Max. wind speed 43 mph)
		Casa Grande	04-021-0001 (3)	202.5	
		Combs	04-021-3009 (3)	194.7	
		Stanfield	04-021-3008 (3)	178.2	
		Maricopa	04-021-3010 (3)	170.4	
9/29/08*	Monday	Combs	04-021-3009 (3)	192.1	Wind from Strong Pressure Gradient (Max. wind speed 28 mph)
10/11/08*	Saturday	Maricopa	04-021-3010 (3)	157.0	Strong low pressure system Max. wind speed 23 mph

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2008 Pinal County PM_{10} Exceedances					
Date	**Day of Week**	**Site**	**AQS # (POC)**	**PM_{10} 24-hr Average Concentration (ug/m3)**	**Weather Type (Wind, Stagnation, Monsoon)**
10/27/08*	Monday	Stanfield	04-021-3008 (3)	212.6	Pressure gradient/back door cold front (Max. wind speed 28 mph)
		Stanfield	04-021-3008 (1)	201	
		Maricopa	04-021-3010 (3)	159.4	
10/29/08	Wednesday	PCH (TEOM)	04-021-3011 (3)	178.0	Stagnation
		Stanfield	04-021-3008 (3)	162.1	
10/31/08	Friday	PCH (TEOM)	04-021-3011 (3)	159.3	Stagnation
11/9/08*	Sunday	Maricopa	04-021-3010 (3)	520.3	Wind from strong cold front (Max. wind speed 38 mph)
		Stanfield	04-021-3008 (3)	375.1	
		PCH (TEOM)	04-021-3011 (3)	285.2	
		Combs	04-021-3009 (3)	270.0	
		Casa Grande	04-021-0001 (3)	182.9	
11/15/08*	Saturday	Stanfield	04-021-3008 (3)	240.7	Wind from strong pressure gradient (Max. wind speed 30 mph)
11/20/08	Thursday	PCH (TEOM)	04-021-3011 (3)	160.6	Stagnation
11/21/08*	Friday	Stanfield	04-021-3008 (3)	178.6	Wind from strong pressure gradient (Max. wind speed 29 mph)
12/13/08*	Saturday	Stanfield	04-021-3008 (3)	178.2	Wind from strong cold front (Max. wind speed 26 mph)

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