



PROPOSED

Arizona State Implementation Plan Revision

West Pinal County PM₁₀ Nonattainment Area

**Air Quality Division
November 2013**

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EXECUTIVE SUMMARY

The West Pinal County PM₁₀ Nonattainment Area is in Central Arizona, located within a basin between the Phoenix and Tucson metropolitan areas. The county encompasses 5,374 square miles and has two distinct regions: the eastern portion which is characterized by mountains with elevations up to 6,000 feet and the western region primarily comprised of low desert valleys and irrigated agriculture. Figure ES-1 illustrates the geographical location of Pinal County within the State of Arizona.

Figure ES-1: Pinal County at a Glance



Source: Pinal County Economic Development.¹

Effective July 2, 2012, the U.S. Environmental Protection Agency redesignated a portion of western Pinal County from "unclassifiable" to "nonattainment" area for the 1987 24-hour PM₁₀ National Ambient Air Quality Standards. The 24-hour PM₁₀ standard was promulgated in 1987 to be 150 micrograms per cubic meter ($\mu\text{g}/\text{m}^3$).

The designation of the West Pinal County PM₁₀ nonattainment area is based on recorded violations of the PM₁₀ standard at various monitoring sites within the county. The boundaries of the nonattainment area encompass land that is located within Pinal County north of the east-west line defined by the southern line of Township 9 South, Gila and Salt River Baseline and Meridian, and west of the north-south line defined

¹ Pinal County Economic Development - *Pinal County at Glance*. Date Accessed: October 22, 2013. Retrieved from: <http://www.pinalcountyaz.gov/ed/Pages/Home.aspx>

by the eastern line of Range 8 East, except for Indian Country, certain federal land, and where the boundary extends farther east in the Florence and Picacho Peak areas.²

This State Implementation Plan for the West Pinal County PM₁₀ Nonattainment Area consists of five chapters that present background information, monitoring network, emissions inventory, base year modeling, and commitments to comply with additional Clean Air Act requirements.

Chapter 1 – Provides an introduction to discuss the physical, demographic, economic description of the area, as well as the regulatory background of the PM₁₀ National Ambient Air Quality Standard in Pinal County.

Chapter 2 - Describes how the Pinal County Ambient Monitoring Network meets the Clean Air Act and U.S. Environmental Protection Agency regulatory requirements.

Chapter 3 – Provides the base year emission inventory for the nonattainment area. It includes a summary of methodologies used to develop the inventory as required by the Clean Air Act Section 172(c)(3) and identifies significant sources of emissions within the West Pinal County Nonattainment Area.

Chapter 4 – Presents a summary of the 2008 base year modeling for selected design days and modeling domains. This analysis shows each source's contribution to PM₁₀ emissions for 2008.

Chapter 5 – Describes the Arizona Department of Environmental Quality's commitment to complete all Clean Air Act requirements for the nonattainment area. A timeline is provided with tentative dates for the remaining tasks including: control measure selection and analysis, attainment demonstration, reasonable further progress, prevention of significant deterioration/new source review, transportation conformity, contingency measures, and additional commitments (if necessary).

² 77 FR 32024; *Designation of Areas for Air Quality Planning Purposes; State of Arizona; Pinal County; PM₁₀*. Date Accessed: October 22, 2013. Retrieved from: <http://www.gpo.gov/fdsys/pkg/FR-2012-05-31/pdf/2012-13185.pdf>

Table ES-1 lists the rules that have been submitted to the U.S. Environmental Protection Agency and that have been approved into the Arizona State Implementation Plan to regulate emissions of PM₁₀.

Table ES-1: Arizona Administrative Code Rules Approved into the Arizona SIP			
Rule	Title	FR Date	FR Citation
R9-3-404	Open Areas, Dry Washes, or Riverbeds	4/23/1982	47 FR 17485
R9-3-405	Roadways and Streets	4/23/1982	47 FR 17485
R9-3-406	Material Handling	4/23/1982	47 FR 17485
R9-3-407	Storage Piles	4/23/1982	47 FR 17485
R9-3-4010	Evaluation of Nonpoint Source Emissions	4/23/1982	47 FR 17485
R9-3-502	Standards of Performance for Unclassified Sources	10/19/1984	49 FR 41026
R9-3-522	Standards of Performance for Existing Gravel and Stone Crushing Operations	9/28/1982	47 FR 42572
R18-2-702 ³	General Provisions	8/24/2004	69 FR 51952
Source: Arizona Administrative Code			

³ R18-2-702, General Provision, reflect the current R18 Arizona Administrative Code numbering format. The R9 series of rules were subsequently renumbered, but have only been approved by EPA in the original numbering format.

1.0 INTRODUCTION

Chapter 1 describes the purpose of the state implementation plan for the West Pinal County PM₁₀ Nonattainment Area, summarizes the regulatory background of the area, including a description of the federal PM₁₀ standard, and provides a general overview of the nonattainment area and county.

1.1 Statement of Introduction and Purpose

Pursuant to Section 107(d)(3) of the Clean Air Act (CAA), the U.S. Environmental Protection Agency (EPA) redesignated an area in western Pinal County from “unclassifiable to “moderate nonattainment area” for the 1987 24-hour PM₁₀ National Ambient Air Quality Standards (NAAQS). EPA based its redesignation on numerous recorded violations from various monitoring sites within the County. An area is considered in violation of the 24-hour PM₁₀ NAAQS if it exceeds the standard more than once per year on average over three years.

Under the authority granted by the Governor and the State of Arizona, the Arizona Department of Environmental Quality (ADEQ) is responsible for the preparation and submittal of the State Implementation Plan (SIP). The purpose of the SIP is to demonstrate how the nonattainment area will attain the 1987 24-hour PM₁₀ NAAQS.

1.2 National Ambient Air Quality Standards

Title I of the CAA requires EPA to set National Ambient Air Quality Standards (NAAQS) for those pollutants that are considered harmful to both the public health and the environment. EPA sets standards for six air pollutants: ground-level ozone, particulate matter, carbon monoxide, nitrogen dioxide, sulfur dioxide, and lead. There are two types of NAAQS: primary and secondary. Primary standards are set to protect human health and secondary standards are established to protect public welfare, such as decreased visibility and damage to animals, crops, vegetation, and buildings.⁴

The standard for each pollutant is set at a maximum concentration in either parts per million (ppm) by volume, parts per billion (ppb) by volume, or micrograms per cubic meter of air (μm^3). Each standard also has a distinct averaging time in order to provide the necessary level of protection.⁵ These standards are reviewed every five years and are either retained or revised based on review of scientific literature and analyses.

1.3 U.S. EPA's Particulate Matter NAAQS

Particulate matter, or particle pollution, is a complex mixture of small particles and liquid droplets found in the air. Particulate matter (PM) can be directly emitted by a source such as smokestacks, fires, unpaved roads, or construction sites.⁶ These particles can also be formed in the atmosphere when gaseous pollutants such as sulfur dioxides and nitrogen dioxides react to form fine particles.⁷

On July 1, 1987, EPA revised the NAAQS for PM, replacing Total Suspended Particulates as the indicator for particulate matter with new indicator, PM₁₀ (52 FR 24634). This new indicator included particles with an aerodynamic diameter less than or equal to 10 micrometers. In order to attain the

⁴ U.S. Environmental Protection Agency, <http://www.epa.gov/air/criteria.html>. Date Accessed: October 29, 2013.

⁵ Ibid.

⁶ U.S. Environmental Protection Agency, <http://www.epa.gov/airquality/particlepollution/basic.html>. Date Accessed: October 29, 2013.

⁷ Ibid

NAAQS for the 24-hour PM₁₀ standard, an air quality monitor cannot measure levels of PM₁₀ greater than 150 micrograms per cubic meter (µg/ m³) more than once per year on average over a consecutive three-year period. Most of Pinal County was designated as “unclassifiable” for PM₁₀ by operation of law upon enactment of the 1990 amendments of the CAA.

1.4 Regulatory Background

On October 14, 2009, EPA notified the Governor of Arizona and tribal leaders of four Indian Tribes (whose Indian Country is located entirely, or in part, within Pinal County) that air quality monitoring data for PM₁₀ for the period 2006 to 2008, was violating the 24-hour PM₁₀ NAAQS. EPA then began the process to redesignate the area as nonattainment for the 24-hour PM₁₀ NAAQS.

Under Section 107(d) of the CAA, governors must submit boundary recommendations for violating areas. ADEQ conducted a nine factor analysis based on the analytical approach established in EPA’s guidance for the 1997 8-hour ozone, the 1997 PM_{2.5} NAAQS, and the 2006 PM_{2.5} NAAQS.⁸ ADEQ assessed the nine factors, the default under EPA guidance, with respect to Pinal County. ADEQ also evaluated neighboring counties with respect to their potential contribution to nonattainment. On March 23, 2010, the Governor of Arizona submitted to EPA a partial county boundary recommendation, excluding Indian Country.⁹

On May 31, 2012, EPA redesignated an area in western Pinal County, Arizona, from “unclassifiable” to “nonattainment” for the 1987 PM₁₀ NAAQS (77 FR 32024; effective July 2, 2012). Establishment of the new PM₁₀ nonattainment area, referred to as the “West Pinal County PM₁₀ Nonattainment Area” was based on recorded violations of the PM₁₀ standard at various monitoring sites within the county. EPA imposes certain planning requirements in order to reduce PM₁₀ concentrations within this area.

1.5 Nonattainment Area Description

EPA’s final designation of the West Pinal County PM₁₀ nonattainment area defined the boundaries of the nonattainment area to encompass the land located within Pinal County north of the east-west line defined by the southern line of Township 9 South, Gila and Salt River Baseline and Meridian, and west of the north-south line defined by the eastern line of Range 8 East, except where the boundary extends farther east in the Florence and Picacho Peak areas.¹⁰ Because the State of Arizona does not have jurisdiction on any of the Indian Country, it has not been included in the EPA’s nonattainment area boundary re-designation. Figure 1.1 below shows the location of the West Pinal County PM₁₀ nonattainment area.

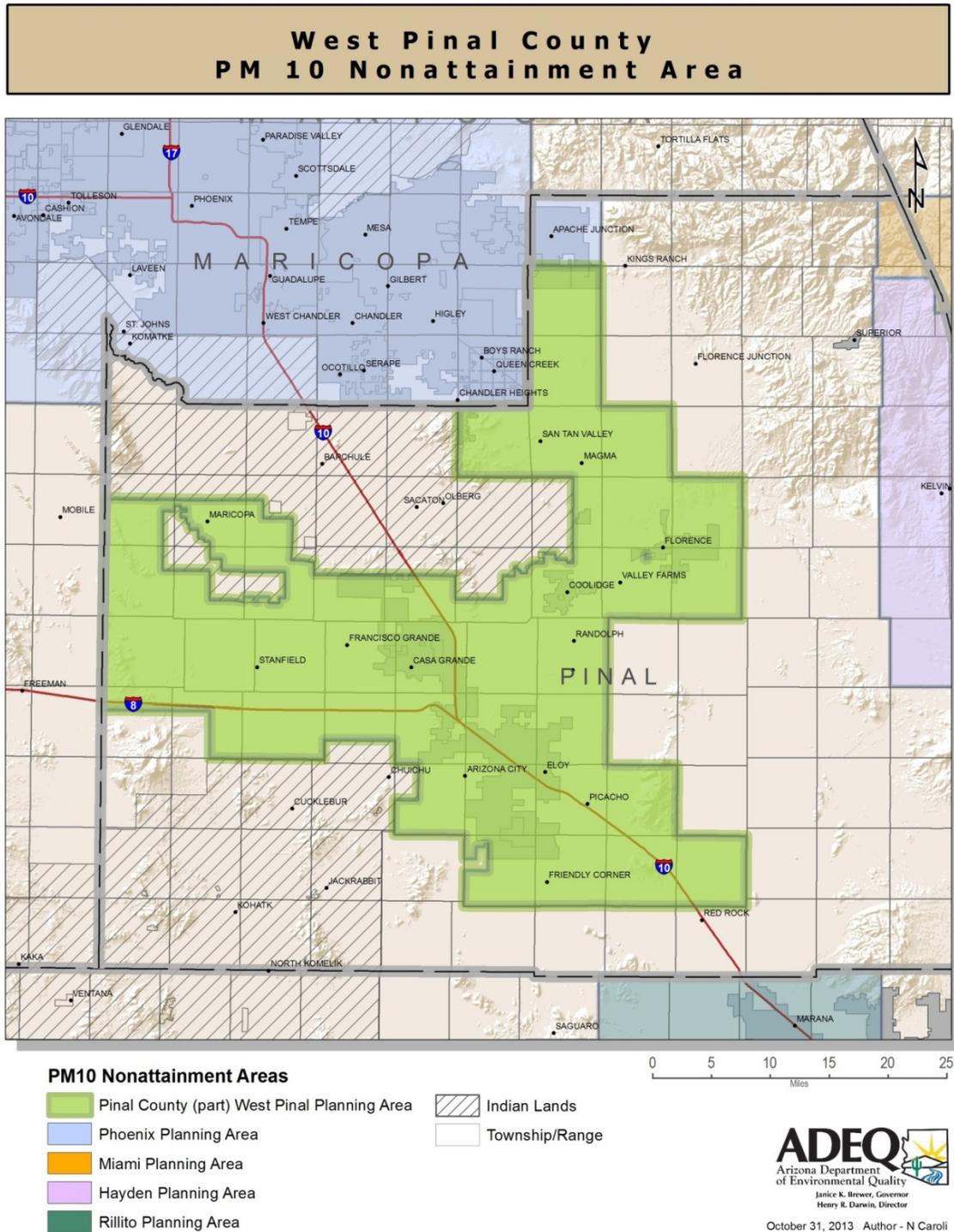
This section discusses the geography, climate, population, and the economy of Pinal County and the nonattainment area. Figure 1.1 below shows the location of the West Pinal County PM₁₀ nonattainment area.

⁸ Memorandum from Robert J. Meyers, Acting Assistant Administrator, “Area Designations for the Revised 24-Hour Particle National Ambient Air Quality Standard,” June 8, 2007.

⁹ Letter from Jan Brewer, Governor of Arizona, to Jared Blumenfeld, Regional Administrator, EPA Region IX. Dated March 23, 2010

¹⁰ 77 FR 32024

Figure 1.1 – Map of West Pinal County PM₁₀ Nonattainment Area



Source: Arizona Department of Environmental Quality

1.5.1 Geography and Climate

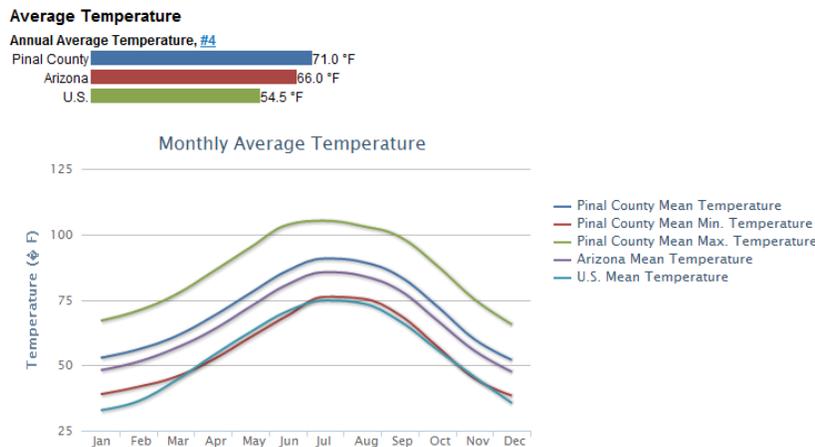
Pinal County is located in Central Arizona, lying within a basin between the Phoenix and Tucson metropolitan areas and encompasses approximately 5,374 square miles. The eastern portion of the county is mountainous with elevations up to 6,000 feet, whereas the western region primarily consists of low desert valleys. The county consists of several cities that sit on various elevations. Table 1.1 provides a list of incorporated cities and elevations that are located within the Pinal County jurisdiction.

Table 1.1 – Names and Elevations of Pinal County Cities		
City Name	Elevation (ft.)	County Name
Apache Junction	1,754	Pinal
Casa Grande	1,403	Pinal
Coolidge	1,428	Pinal
Eloy	1,555	Pinal
Florence	1,473	Pinal
Maricopa	1,171	Pinal
Superior	2,842	Pinal

Source: How High is Greater Phoenix?³

The climate is arid with an annual average temperature of 71°F, which is higher than the Arizona annual average temperature of 65.97°F, and is much higher than the annual national average temperature of 54.45°F. The mean maximum temperature reaches to 105°F in July and the mean minimum temperature drops to 38.5 °F in December.¹¹ Figure 1.2 compares Pinal County’s monthly average temperatures with Arizona and national mean temperatures.¹²

Figure 1.2 – Pinal County, Arizona, and U.S. Monthly Average Temperatures



Source: USA.COM-Local Data Power Search.¹³

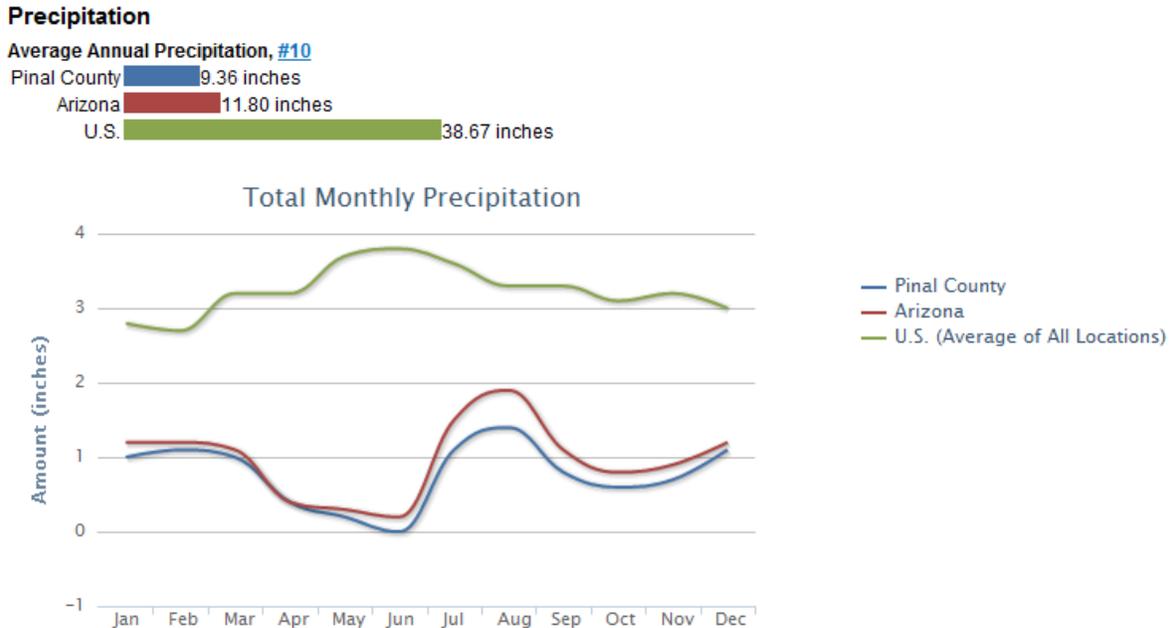
¹¹ About.Com – *How High is Greater Phoenix?* Date Accessed: October 22, 2013. Retrieved from: http://phoenix.about.com/od/natureandenvironment/a/elevation_4.htm

¹² USA.Com – *Pinal County Weather.* Date Accessed: October 22, 2013. Retrieved from: <http://www.usa.com/pinal-county-az-weather.htm#HistoricalPrecipitation>

¹³ Ibid

The driest time of the year for the County is typically April through June followed by September through November. Figure 1.3 depicts the annual average precipitation for Pinal County, Arizona, and the U.S. Rainfall in Pinal County typically ranges between 5 to 10 inches annually. The county has two distinct rain seasons that occur during the winter (associated with low pressure systems and cold fronts) and summer (due to monsoon wind shift with increase moisture from Mexico).

Figure 1.3 – Total Monthly Precipitation for Pinal County, Arizona, and U.S.



Source: USA.COM-Local Data Power Search.¹⁴

1.5.2 Population

According to the Arizona Department of Administration (ADOA), the West Pinal PM₁₀ Nonattainment Area has a total population of 259,141 for the emissions inventory base year 2008. Residence data shows that 136,790 of the population live in the incorporated areas, 34,937 people live in unincorporated (non-CDP) areas, and 87,414 live within the Census Designated Places (CDP).¹⁵ Table 1.2 demonstrates population distribution for each area within the West Pinal County PM₁₀ Nonattainment Area.

The general population of Pinal County is estimated at 389,192, which is approximately 109 percent higher than the population in the year 2000. The growth rate is much higher than the state average of 24.59 percent and is much higher than the national average rate of 9.71 percent. The population density is approximately 70 people per square mile, which is higher than the state average density of about 56 people per square mile and is lower than the national average density of 82 people per square mile.¹⁶ Table 1.2 includes population estimate for each city, town, and other areas in Pinal County.

¹⁴ Ibid

¹⁵ Internal Report from the Arizona Department of Administration. Received on October 31, 2013

¹⁶ USA.Com – *Pinal County Weather*. Date Accessed: October 22, 2013. Retrieved from: <http://www.usa.com/pinal-county-az-weather.htm#HistoricalPrecipitation>

Table 1.2: West Pinal County PM₁₀ Nonattainment Area Population Distribution – 2008 Emissions Inventory Base Year		
Place	Type	Population
Apache Junction City	Incorporated	4
Casa Grande City	Incorporated	48,096
Coolidge City	Incorporated	12,236
Eloy City	Incorporated	14,620
Florence Town	Incorporated	22,574
Maricopa City	Incorporated	38,794
Queen Creek Town	Incorporated	467
Total Incorporated (Cities/Towns):		136,790
Total Unincorporated (non-CDP area):		34,937
Ak-Chin Village CDP	CDP	5
Arizona City CDP	CDP	9,781
Blackwater CDP	CDP	0
Cactus Forest CDP	CDP	555
Chuichu CDP	CDP	0
Gold Canyon CDP	CDP	11
Picacho CDP	CDP	440
Red Rock CDP	CDP	0
San Tan Valley CDP	CDP	75,932
Stanfield CDP	CDP	691
Total SDP:		87,414
Total Population within the Nonattainment Area:		259,141
Source: Arizona Department of Administration - October, 2013, Internal Report		

Table 1.3: General Population of Pinal County and Cities		
City/Town/Area	County Name	Population
Apache Junction*	Pinal	36,632
Casa Grande	Pinal	50,296
Coolidge	Pinal	12,039
Eloy	Pinal	17,433
Florence	Pinal	26,773
Kearny	Pinal	1,979
Mammoth	Pinal	1,452
Maricopa	Pinal	44,946

Table 1.3: General Population of Pinal County and Cities		
City/Town/Area	County Name	Population
Queen Creek*	Pinal	459
Superior	Pinal	2,880
Winkelman*	Pinal	0
Unincorporated	Pinal	194,303
Total:		389,192
* Population for Places in Two Counties: Apache Junction (Pinal & Maricopa) - 35,828; Winkelman (Gila + Pinal) - 350; Queen Creek (Pinal + Maricopa) - 26,448		
Source: Arizona Department of Administration (ADOA), Office of Employment and Population Statistics – July 1, 2012 Population Estimates. ¹⁷		

1.5.3 County Economy

The eastern portion of Pinal County is characterized as a copper mining community. The communities of Mammoth, Oracle, San Manuel, and Kearny have traditionally been active in copper mining, smelting, milling and refining. The towns of Apache Junction, Arizona City, Coolidge, Eloy, and particularly Casa Grande have expanded and diversified their economic base to include manufacturing, trade, and services.¹⁸ This expansion of the economy has been facilitated by the location of the area in the major growth corridor between Phoenix and Tucson.

Most of southern Pinal County, and a small portion of Apache Junction, are designated as Enterprise Zones.¹⁹ Enterprise Zones are areas designed to encourage growth and development. Businesses located in a state Enterprise Zone may receive tax credits on its Arizona corporate income tax by creating net new quality jobs. A total of 22.2% of the employed population is engaged in educational services, healthcare, and social services. Table 1.4 provides a percentage distribution of the total employed population by various sectors.

Table 1.4: Pinal County Civilian Employed Population 16 Years and Over		
Industry	Population	Percentage
Agriculture, forestry, fishing and hunting, and mining	5,620	4.7%
Construction	7,051	5.9%
Manufacturing	9,493	7.9%
Wholesale trade	2,455	2.0%
Retail trade	11,528	9.6%
Transportation and warehousing, and utilities	7,710	6.4%
Information	2,533	2.1%
Finance and insurance, and real estate and rental and leasing	9,409	7.8%

¹⁷ Arizona Department of Administration – *The Source of Labor Market and Demographic Information*. Date Accessed: October 22, 2013. Retrieved from: <http://www.azstats.gov/population-estimates.aspx>

¹⁸ Business Connections – *Pinal County Statistics*. Date Accessed: October 22, 2013. Retrieved from: <http://www.pinalcountyaz.gov/ed/businessconnections/Pages/PinalCountyStatistics.aspx>

¹⁹ Ibid

Table 1.4: Pinal County Civilian Employed Population 16 Years and Over		
Industry	Population	Percentage
Professional, scientific, and management, and administrative and waste management services	9,801	8.1%
Educational services, and health care and social assistance	26,757	22.2%
Arts, entertainment, and recreation, and accommodation and food services	10,381	8.6%
Other services, except public administration	6,288	5.2%
Public administration	11,413	9.5%
Total	120,439	100.0%
Source: U.S. Census Bureau, 2011. American Community Survey ²⁰		

The median household income in Pinal County was \$51,310 from 2006 to 2010 and has grown by 43.10 percent since 2000. The income growth rate is much higher than the state average rate of 15.36 percent and is much higher than the national average rate of 19.17 percent. On the other hand, from 2006 to 2010, the median house value in Pinal County was \$164,000. Pinal County has shown much higher house value growth rate of 74.65 percent increase since 2000 compare to the state average rate of 39.16 percent and national average rate of 50 percent.²¹

In 2011, the number of permits issued for buildings and units issued were 975 and 978, respectively. By 2012, the number of permits issued for buildings and units increased to 1,776 and 1,823, respectively.²² Table 1.5 provides a four-year annual summary of the issued building permits in Pinal County.

Table 1.5: Annual New Privately-Owned Residential Building Permits Pinal County (Reported Only)			
Year	Buildings	Units	Cost
2012	1,776	1,823	\$244,641,995
2011	975	978	\$126,271,132
2010	1,597	1,597	\$206,850,342
2009	2,182	2,182	\$284,576,575
Source: Building Permits - U.S. Census Bureau ²³			

²⁰ 2012 American Community Survey 1-Year Estimates - *Selected Economic Characteristics*. Date Accessed: October 22, 2013. Retrieved from: http://factfinder2.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=ACS_12_1YR_DP03&prodType=table

²¹ Business Connection – *Pinal County Statistics*. Date Accessed: October 22, 2013. Retrieved from: <http://www.pinalcountyaz.gov/ed/businessconnections/Pages/PinalCountyStatistics.aspx>

²² U.S. Census of Bureau – *Building Permits*. Date Accessed: October 22, 2013. Retrieved from: <http://censtats.census.gov/bldg/bldgprmt.shtml?>

²³ Ibid

1.6 General SIP Approach - Regulatory Requirements and Guidance

The 1990 CAA amendments were enacted by Congress to improve air quality across the nation. One of the primary goals of this comprehensive revision to the CAA was to expand and clarify the planning provisions for those areas not currently meeting the NAAQS. The amendments identify specific emission reduction goals, require both a demonstration of Reasonable Further Progress (RFP) and attainment, and incorporate more stringent sanctions for failure to attain or to meet interim milestones. Title I Part A, and Title I Part D, Subparts 1 and 4 of the CAA are applicable to this SIP. Table 1.6 includes the SIP requirements and explains how this document meets them. Pollutant specific requirements for moderate PM₁₀ nonattainment areas are found in section 189 of the CAA, and the general planning and control requirements for nonattainment area plans are found in CAA sections 110 and 172.

Table 1.6: Clean Air Act (CAA) Regulatory Requirements		
CAA Citation	Action to Meet Requirement	Location in Document
CAA Section 172 Nonattainment Plan Provisions		
172(c)(1) – General	“...Such plan provisions shall provide for the implementation of all reasonably available control measures (RACM) as expeditiously as practicable (including such reductions in emissions from existing sources in the area as may be obtained through the adoption, at a minimum, of reasonably available control technology (RACT)) and shall provide for attainment of the national primary ambient air quality standards.” RACT is defined for PM ₁₀ as that technology which is necessary to achieve the NAAQS (40 CFR 51.100(o)).	See Chapter 5 for a timeline to complete these requirements.
172(c)(2) – Reasonable Further Progress (RFP)	Plan provisions shall demonstrate reasonable further progress or “annual incremental reductions in emissions ... for the purpose of ensuring attainment of the applicable national ambient air quality standards by the applicable date.”	See Chapter 5 for a timeline to complete these requirements.
172(c)(3) – Emissions Inventory	The plan provisions “... shall include a comprehensive, accurate, current inventory of actual emissions from all sources of the relevant pollutant(s)...” ADEQ maintains a historical and current database of actual emissions from State permitted point and area sources. The Pinal County Air Quality Control District and Pima County Department of Environmental Quality maintain a similar database of actual emissions from County permitted sources. All non permitted source emissions data (i.e.: mobile sources) are obtained from EPA's national emissions inventory.	Chapter 3
172(c)(4) – Identification and Quantification	Plan provisions “... shall expressly identify and quantify the emissions, if any, of any such pollutant or pollutants which will be allowed, in accordance with Section 173(a)(1)(B), from the construction and operation of major new or modified stationary sources in each such area. The plan shall demonstrate to the satisfaction of the Administrator that the emissions quantified for this purpose will be consistent with the achievement of reasonable further progress and will not interfere with	

Table 1.6: Clean Air Act (CAA) Regulatory Requirements		
CAA Citation	Action to Meet Requirement	Location in Document
	attainment of the applicable national ambient air quality standard ...” The permit requirements of CAA Section 173(a)(1)(B) are applicable to sources located in a targeted economic development zone as determined by the Administrator under consultation with the Secretary of Housing and Urban Development. Within the West Pinal County Nonattainment Area, no such zones have been designated by EPA and there is no anticipation of major sources.	
172(c)(5) – Permits for New and Modified Major Stationary Sources	The plan provisions “...shall require permits for the construction and operation of new or modified major stationary sources anywhere in the nonattainment area...” All new sources and modifications to existing sources in Arizona are subject to state requirements for preconstruction review and permitting pursuant to AAC, Title 18, Chapter 2, Articles 3 and 4. All new major sources and major modifications to existing major sources in Arizona are subject to the nonattainment New Source Review (NSR) provisions of these rules or Prevention of Significant Deterioration (PSD) for maintenance areas. On October 29, 2012 ADEQ submitted a SIP revision to update its program to comply with all current federal major NSR requirements, including NSR reform. ADEQ submitted certified clean copies of the relevant statutes and rules as an update to this revision on September 6, 2013. ADEQ currently has full approval of its Title V permit program. Sources under Pinal County jurisdiction are subject to the Pinal County Air Quality Control District, NSR program in Code of Regulations, Chapter 3.	
172(c)(6) – Other Measures	The plan “... shall include enforceable emissions limitations, and such other control measures, means or techniques ..., as well as schedules and timetables for compliance, as may be necessary or appropriate to provide for attainment of such standard in such area by the applicable attainment date...”.	See Chapter 5 for a timeline to complete these requirements.
172(c)(7) – Compliance with Section 110(a)(2), Implementation Plans	The plan provisions “... shall also meet the applicable provisions of Section 110(a)(2).” The requirements of Section 110(a)(2) are detailed elsewhere in this Table.	
172(c)(8) – Equivalent Techniques	The plan may include upon application by the state “... the use of equivalent modeling, emission inventory, and planning procedures ...” as allowed by the administrator. Equivalent techniques utilized in the preparation of the emission inventory in this SIP were approved by EPA through ADEQ’s IPP submission.	See Appendix A

Table 1.6: Clean Air Act (CAA) Regulatory Requirements		
CAA Citation	Action to Meet Requirement	Location in Document
172(c)(9) – Contingency Measures	The plan “... shall provide for the implementation of specific measures to be undertaken if the area fails to make reasonable further progress, or to attain the national primary ambient air quality standard ... Such measures shall be included in the plan revision as contingency measures to take effect in any such case without further action by the State or the Administrator.”	See Chapter 5 for a timeline to complete these requirements.
CAA Sections 176 – Transportation Conformity and General Conformity Regulations		
176(c) Transportation Conformity	<p>“Transportation conformity is required by the Clean Air Act section 176(c) (42 U.S.C. 7506(c)) to ensure that federal funding and approval are given to highway and transit projects that are consistent with ("conform to") the air quality goals established by a state air quality implementation plan (SIP).</p> <p>Conformity, to the purpose of the SIP, means that transportation activities will not cause new air quality violations, worsen existing violations, or delay timely attainment of the national ambient air quality standards.”²⁴</p>	See Chapter 5 for a timeline to complete these requirements.
176(c) - General Conformity Regulations	<p>“Section 176(c) of the Clean Air Act prohibits Federal entities from taking actions in nonattainment or maintenance areas which do not conform to the State implementation plan (SIP) for the attainment and maintenance of the national ambient air quality standards (NAAQS). Therefore, the purpose of conformity is to (1) ensure Federal activities do not interfere with the budgets in the SIPs; (2) ensure actions do not cause or contribute to new violations, and (3) ensure attainment and maintenance of the NAAQS.”²⁵</p> <p>General Conformity for the West Pinal County Nonattainment Area must be addressed to assure PM₁₀ emissions from any federal actions or plans do not exceed the rates outlined in 40 CFR 93.153(b)(See 58 FR 63253; November 30, 1993). Criteria for making determinations and provisions for general conformity are located in R18-2-1438 of the Arizona Administrative Code. ADEQ and Pinal County commits to review and command as appropriate, on any federal agency draft general conformity determination it receives pursuant to 40 CFR 93.155 for activities planned for this air quality planning area.</p>	See Chapter 5 for a timeline to complete these requirements.

²⁴ US EPA - *State and Local Transportation Resources*. Date Accessed: October 22, 2013. Retrieved from: <http://www.epa.gov/OMS/stateresources/transconf/generalinfo.htm>

²⁵ US EPA – *General Conformity Regulations*. Date Accessed: November 1, 2013. Retrieved from: <http://www.epa.gov/ttn/caaa/genconformity.html>

Table 1.6: Clean Air Act (CAA) Regulatory Requirements		
CAA Citation	Action to Meet Requirement	Location in Document
CAA Sections 188, 189, and 190 – Additional Provisions for Particulate Matter Nonattainment		
188(c)(1) - Attainment Dates	<p>“Except as provided under subsection (d) of this section, the attainment dates for PM₁₀ nonattainment areas shall be as follows:</p> <p>(1) Moderate Areas For a Moderate Area, the attainment date shall be as expeditiously as practicable but no later than the end of the sixth calendar year after the area’s designation as nonattainment, except that, for areas designated nonattainment for PM₁₀ under section 107(d)(4) of this title CAA, the attainment date shall not extend beyond December 31, 1994.”</p> <p>The requirement to submit, within 18 months of redesignation, a revision to the Arizona state implementation plan that provides for attainment of the PM₁₀ standard as expeditiously as practicable but no later than the end of the sixth calendar year after redesignation. DATES: This rule is effective on July 2, 2012 (77 FR 32024; Thursday, May 31, 2013).</p>	See Chapter 5 for a timeline to complete these requirements.
188(d) - Extension of Attainment Date for Moderate Areas	<p>Administrator may extend for 1 additional year if “(1)the State has complied with all requirements and commitments pertaining to the area in the applicable implementation plan; and</p> <p>(2)no more than one exceedance of the 24-hour national ambient air quality standard level for PM₁₀ has occurred in the area in the year preceding the Extension Year, and the annual mean concentration of PM₁₀ in the area for such year is less than or equal to the standard level.”</p> <p>ADEQ is not requesting an extension at this time.</p>	
189(a)(1) A) - Moderate Areas	<p>Moderate Area plans shall include:</p> <p>“(A)For the purpose of meeting the requirements of section 7502(c)(5) of this title, a permit program providing that permits meeting the requirements of section 7503 of this title are required for the construction and operation of new and modified major stationary sources of PM–10.</p> <p>(B) Either</p> <p>(i) a demonstration (including air quality modeling) that the plan will provide for attainment by the applicable attainment date; or</p> <p>(ii) a demonstration that attainment by such date is impracticable.</p> <p>(C)Provisions to assure that reasonably available control measures for the control of PM–10 shall be implemented no later than December 10, 1993, or 4 years after designation in the case of an area classified as moderate after November 15, 1990. “</p>	See Chapter 5 for a timeline to complete these requirements.

Table 1.6: Clean Air Act (CAA) Regulatory Requirements		
CAA Citation	Action to Meet Requirement	Location in Document
189(a)(1)(B) – Moderate Areas	“(B)Either: (i) a demonstration (including air quality modeling) that the plan will provide for attainment by the applicable attainment date; or (ii) a demonstration that attainment by such date is impracticable.”	See Chapter 5 for a timeline to complete these requirements.
189(a)(1)(C) – Moderate Areas	“(C) Provisions to assure that reasonably available control measures for the control of PM ₁₀ shall be implemented no later than December 10, 1993, or 4 years after designation in the case of an area classified as moderate after November 15, 1990.”	See Chapter 5 for a timeline to complete these requirements.
189(c)(1) - Milestones	“(1) Plan revisions demonstrating attainment submitted to the Administrator for approval under this subpart shall contain quantitative milestones which are to be achieved every 3 years until the area is redesignated attainment and which demonstrate reasonable further progress, as defined in section 171(1) of this title, toward attainment by the applicable date.”	See Chapter 5 for a timeline to complete these requirements.
189(c)(2) - Milestones	(2) Not later than 90 days after the date on which a milestone applicable to the area occurs, each State in which all or part of such area is located shall submit to the Administrator a demonstration that all measures in the plan approved under this section have been implemented and that the milestone has been met. A demonstration under this subsection shall be submitted in such form and manner, and shall contain such information and analysis, as the Administrator shall require. The Administrator shall determine whether or not a State’s demonstration under this subsection is adequate within 90 days after the Administrator’s receipt of a demonstration which contains the information and analysis required by the Administrator.	See Chapter 5 for a timeline to complete these requirements.
189(c)(3) - Milestones	“(3) If a State fails to submit a demonstration under paragraph (2) with respect to a milestone within the required period or if the Administrator determines that the area has not met any applicable milestone, the Administrator shall require the State, within 9 months after such failure or determination to submit a plan revision that assures that the State will achieve the next milestone (or attain the national ambient air quality standard for PM ₁₀ , if there is no next milestone) by the applicable date.”	See Chapter 5 for a timeline to complete these requirements.
189(e) - Precursors	“The control requirements applicable under plans in effect under this part for major stationary sources of PM ₁₀ shall also apply to major stationary sources of PM ₁₀ precursors, except where the Administrator determines that such sources do not contribute significantly to PM ₁₀ levels which exceed the standard in the area. The Administrator shall issue guidelines regarding the application of the preceding sentence.”	See Chapter 5 for a timeline to complete these requirements.

Table 1.6: Clean Air Act (CAA) Regulatory Requirements		
CAA Citation	Action to Meet Requirement	Location in Document
190 – Issuance of RACM and BACM Guidance	“The Administrator shall issue, in the same manner and according to the same procedure as guidance is issued under section 108(c) of this title, technical guidance on reasonably available control measures and best available control measures for urban fugitive dust, and emissions from residential wood combustion...”	
CAA Section 110(a)(2) – Implementation Plans		
110(a)(2)(A) – Control Measures and Emission Limits	Section 110(a)(2)(A) requires that states provide for enforceable emission limitations and other control measures, means, or techniques, as well as schedules for compliance necessary to meet applicable requirements of the CAA. .	

2.0 AIR QUALITY MONITORING

The primary goal of the PM₁₀ monitoring network in Pinal County is to collect data necessary to determine compliance with the PM₁₀ NAAQS and fulfill the regulatory requirements for PM₁₀ monitoring in the nonattainment area.

This chapter provides a general description of the monitoring site, equipment, quality assurance procedures, data summary and 24-hour NAAQS compliance.

2.1 Monitoring Site, Equipment, and Quality Assurance Procedures

The monitors in Pinal County were installed and are maintained in accordance with federal siting and design criteria²⁶ and are consistent with *Pinal County Air Quality Control District's 2012 Ambient Monitoring Network Plan*.

EPA's comment on the 2012 network plan noted that Pinal's network lacked at least one collocated site with side-by-side monitors for every one of the several filter based monitoring methods. In response, Pinal County will standardize PM₁₀ and PM_{2.5} filter-based monitoring methods so that the existing sites will satisfy the requirement.²⁷

Historically, a PM₁₀ monitor was located at the Riverside site but was discontinued on May 15, 2011.²⁸ The Riverside monitoring site was outside the nonattainment area but the site was located within the Pinal County ambient monitoring network area. Within the same monitoring network area, there is a Queen Valley monitoring site which is operated by ADEQ. This site's primary purpose is to provide data pertaining to ozone transport from the Phoenix urban area.

Pinal County Air Quality uses Federal Reference Methods (FRMs) to collect filter based PM₁₀ and automated FEMs for continuous PM₁₀ and Ozone. There are three types of PM₁₀ monitors that are used throughout the Pinal County monitoring network: (1) the filter-based, high-volume sampler, (2) filter based medium volume sampler, and (3) the Tapered Element Oscillating Microbalance (TEOM) which measures PM₁₀ on a continuous basis.

The state and local air monitoring station (SLAMS) network consists of monitoring stations that provide data to meet the requirements of an Ambient Air Quality Monitoring Network as listed in Appendix D of 40 CFR Part 58. The data obtained from these monitors are reported to EPA to be compared to the NAAQS.

In order to meet EPA requirements, monitored air data must be quality assured. The Arizona Department of Environmental Quality entrusted Pinal County Air Quality Control District with a delegation of authority for their monitoring networks and air quality system (AQS) reporting.

Figure 2.1 shows physical locations of the monitoring sites that are located within the nonattainment area. Table 2.1 provides the site descriptions for the Pinal County PM₁₀ active monitoring sites located within the nonattainment area. The list excludes two active PM₁₀ sites that are part of the Pinal County

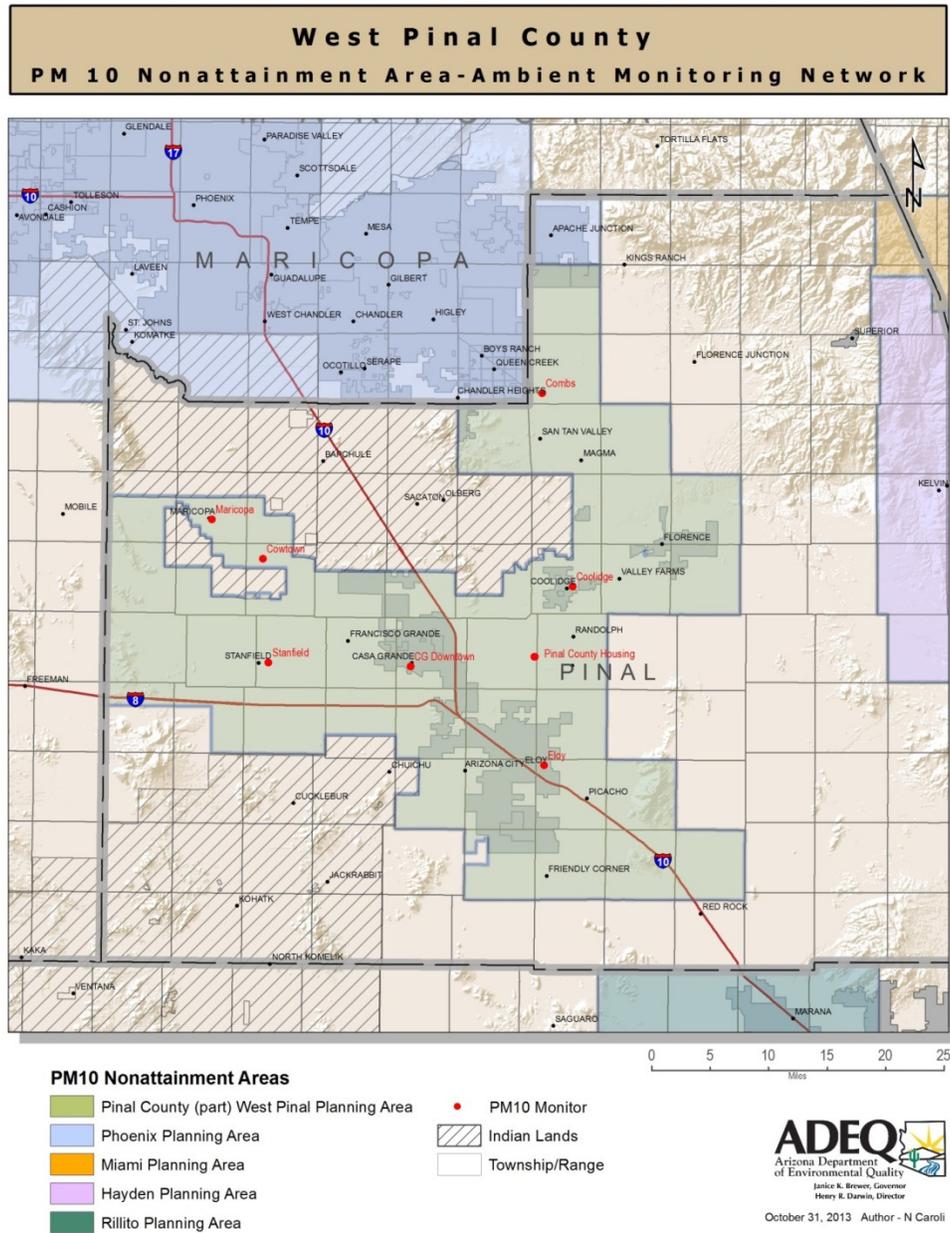
²⁶ Network Design Criteria for Ambient Air Quality Monitoring (40 CFR Part 58, Appendix D) and Probe and Monitoring Path Siting Criteria for Ambient Air Quality Monitoring (40 CFR Part 58, A (Appendix)).

²⁷ 2013 Ambient Monitoring Network Plan and 2012 Data Summary - Pinal County Air Quality Control District Report.

²⁸ Ibid

monitoring network: Apache Junction Fire and Pinal Air Park. These monitors are located within the Pinal County monitoring network but are outside of the final boundaries for the PM₁₀ nonattainment area.

Figure 2.1: West Pinal County PM₁₀ Nonattainment Area



Source: Arizona Department of Environmental Quality

Table 2.1: Pinal County PM₁₀ Active Monitors within EPA's Final Boundaries							
AQS ID	Site Name	Latitude	Longitude	Classification	Monitor Type	Street Address	City
04-021-0001	Casa Grande Downtown	+32.877583	111.752222	SLAMS	TEOM	401 N Marshall St.	Casa Grande
04-021-3009	Combs School	+33.219111	111.561111	SPM	TEOM	301 E Combs Rd	Queen Creek
04-021-3004	Coolidge Maintenance Yard ²⁹	+32.978556	111.514833	SLAMS	Medium Volume	212 E Broadway	Coolidge
04-021-3013	Cowtown Road	+33.010530	111.972050	SLAMS	TEOM	37580 W Maricopa	Maricopa
04-021-3014	Eloy County Complex ³⁰	+32.757639	111.554861	SLAMS	Medium Volume	801 N Main St	Eloy
04-021-3010	Maricopa Complex	+33.058500	112.047219	SLAMS	TEOM	44625 W Garvey Rd	Maricopa
04-021-3011	Pinal County Housing	+32.891056	111.570500	SLAM	TEOM	970 N 11 Mile Rd	Casa Grande
04-021-3008	Stanfield County Complex	+32.881194	111.962000	SLAMS	TEOM	36697 W Papago Rd	Stanfield
Source: US EPA Site Description Report - May 7, 2013							

²⁹ 2013 The site consists of a High-Volume PM₁₀ sampler, which collects samples on a one in six-day schedule – 2013 Pinal County Network Plan.

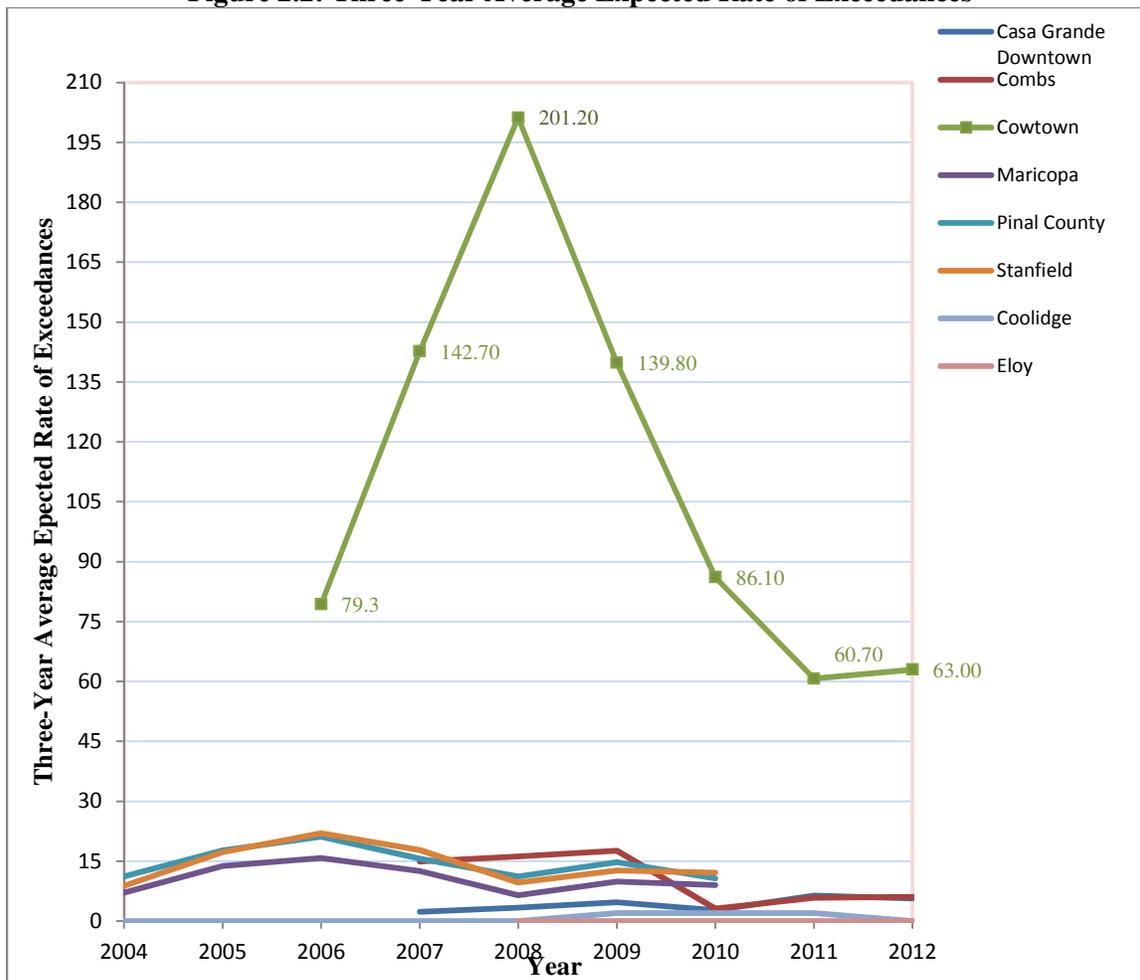
³⁰ Ibid

2.2 PM₁₀ Data Summary

The data summary presented in this section observes the three-year average expected rate of exceedances derived from the EPA Preliminary Design Value Report that includes measurements with exceptional event flags.

Figure 2.2 shows the historic trend to demonstrate the PM₁₀ three-year average expected rate of exceedances between the years 2004 and 2012. The values presented from the Coolidge and Eloy monitoring sites are the results from the High-Volume PM₁₀ samplers which collect samples on a one in six-day schedule. Six other monitoring sites from Casa Grande Downtown, Combs, Cowtown, Maricopa, Pinal County Housing, and Stanfield represent continuous air data that were processed by PM₁₀ TEOM air monitoring instrumentation.

Figure 2.2: Three-Year Average Expected Rate of Exceedances



Source: Air Quality System Report³¹

³¹ 2007 Preliminary Design Value: Report Excludes Measurements with Regionally Concurred Event Flags. Report Date: October 17, 2013.

2.3 24-Hour PM₁₀ NAAQS Compliance

The primary (health) and secondary (welfare) 24-hour PM₁₀ standards are met when the expected number of exceedances per year at each monitoring site, averaged over a three-year period, is less than or equal to one.

Based on complete quality-assured data for 2010-2012, the nonattainment area did not comply with the PM₁₀ NAAQS. The findings indicate that all six monitoring stations that use continuous PM₁₀ TEOM samplers yielded a three-year average expected rate of exceedance greater than one. The monitoring station at Cowtown recorded the highest three-year average expected rate of exceedances of 63 followed by the Stanfield monitor, which has a three-year average exceedance rate of 12.1. Because the three-year average expected exceedance rate is greater than one, the West Pinal County area is not currently meeting the PM₁₀ National Ambient Air Quality Standards.

Table 2.2 below includes a summary of the three-year average expected rate of exceedances derived from six monitoring sites that utilized continuous PM₁₀ TEOM samplers. And two monitoring sites (Eloy and Coolidge) that utilized High-Volume PM₁₀ samplers, which collect samples on a one in six-day schedule.

Table 2.2: 2010 to 2012 Maximum 24-Hour Average PM₁₀ Compliance – Continuous PM₁₀ TEOM							
Site Name	2010		2011		2012		Three-Year Avg Exp. Rate of Exc.
	Max-24-Hr Avg	Exp. Exc.	Max-24-Hr Avg	Exp. Exc.	Max-24-Hr Avg	Exp. Exc.	
Casa Grande Downtown	569	1	479	14.1	235	2	5.7
Combs	366	1	419	12.1	205	5.1	6.1
Coolidge ³²	87	0	110	0	134	0	0
Cowtown	497	29.4	2316	99	698	60.7	63
Eloy ³³	87	0	154	0	120	0	0
Maricopa	172	2	531	16.4	256	8.6	9
Pinal County Housing	128	6	212	21.2	131	5	10.7
Stanfield	205	1	586	23	339	12.1	12.1

Source: EPA AQS Report (Quick Look Criteria Parameters). Report Date: 10/17/2013
Key: Max –Maximum. Hr – Hour. Avg – Average. Exp – Expected. Exc - Exceedance

³² The site consists of a High-Volume PM₁₀ sampler, which collects samples on a one in six-day schedule – 2013Pinal County Network Plan.

³³ Ibid

3.0 EMISSIONS INVENTORY

This chapter discusses the development of the emissions inventory as required by CAA Section 172(c)(3). ADEQ contracted with Sierra Research Inc. to develop the emissions inventory for the 2008 base year. To ensure compliance with EPA requirements for emissions inventories, Sierra Research developed an inventory preparation plan (IPP) outlining the planning procedures and quality assurance steps (see Appendix A, Inventory Preparation Plan). Sierra Research subsequently prepared the *Pinal County PM₁₀ Nonattainment Area 2008 Base Year Emissions for Selected Design Days and Modeling Domains* (see Appendix B). Separate inventories were produced for individual design days and modeling domains (“modeling inventories”) to assess each source’s contribution to exceedances of the NAAQS (see Appendix C and Chapter 4). In addition to the design day inventories, a comprehensive annual inventory was developed for the West Pinal nonattainment area.

3.1 Summary of Emissions Inventory Methodologies

This section presents a summary of the methodologies used to calculate the emission inventories for the nonattainment area. Analysis shows that two discrete meteorological scenarios produce elevated levels of PM₁₀ emissions and ambient concentrations: high wind conditions and stagnation/low wind conditions.

Stagnation/Low Wind

Sources of PM₁₀ emissions during low wind/stagnation events are commonly from mechanical or combustion processes and other anthropogenic activities. As a result, the emissions inventory during these conditions focused on specific source categories such as: agriculture, concentrated animal feeding operations, paved roads, unpaved roads, nonroad, railroad, construction, permitted sources, dairies and other source categories emitting PM₁₀ from the process listed above. Emissions calculations for point and mobile sources utilized standard methodologies and are discussed in Appendix B. The emission calculations were less straightforward and utilized research from previous studies. The calculations also required additional data from Pinal County, Arizona Department of Transportation, and individual sources.

High Wind

High wind emissions sources typically consist of disturbed soil surfaces that expose loose particles to wind entrainment and transport. In this analysis, high winds conditions are days with recorded high wind hours exceeding 12 miles per hour. Emissions are estimated as a function of wind speed, land use, and disturbance for each land parcel.

3.2 Stagnation/Low Wind Emissions Inventory for Selected Design Days

Because of the need to evaluate potential control measures under a range of meteorological conditions, baseline inventories were developed for selected design days during which exceedances of the NAAQS occurred. Section 3.3 of the IPP describes the selection process for the design days during stagnation/low wind conditions. October 29, 2008, was selected as representative of stagnant conditions. Three monitors exceeded the 24-hour PM₁₀ NAAQS on this date: Cowtown, Pinal County Housing, and Stanfield. Separate modeling domains were defined and emission inventories developed for each of the three monitoring sites. These inventories were used in modeling analyses to quantify source contributions and impacts at the exceeding monitors. Evaluation of source contribution is needed to inform the development of control strategies designed to attain the air quality standards. The base year emission inventories for the three modeling domains are presented in Tables 3.1 through 3.3 below. CAFOS, other

agricultural sources, and unpaved roads comprise more than 80 percent of emissions in all three domains. Construction sources are moderate contributors to the Cowtown inventory.

**Table 3.1
Emissions Inventory (lbs/hour) for the Stagnation Day Modeling Domain at Cowtown on 10/29/2008**

Hour	WSPD (mph)	WD (degree)	PM ₁₀ Observation (µg/m ³)	RailRoad	Permitted Point Sources	Paved Road	Construction	CAFOs	Agriculture		Unpaved Road				Total	
									County	Tribal Land	AG Road	Public Dirt	Private Dirt	Trail		Tribe road
1	2.2	153.0	402.3	1.2	10.0	2.0	0.0	37.1	0.0	0.0	0.0	12.6	3.5	0.0	2.2	68.6
2	2.9	178.0	343.0	1.2	10.0	1.9	0.0	37.1	0.0	0.0	0.0	12.5	17.5	0.0	4.7	84.8
3	3.4	133.0	417.8	1.2	10.0	1.8	0.0	74.2	0.0	0.0	0.0	12.5	8.7	0.0	2.7	111.2
4	3.8	153.0	125.4	1.2	10.0	2.2	0.0	148.4	0.0	0.0	0.0	10.7	0.0	0.0	1.4	173.9
5	2.0	152.0	248.4	1.2	10.0	4.3	0.0	370.9	0.0	0.0	0.0	20.9	10.5	0.0	5.0	422.7
6	0.9	198.0	156.5	1.2	10.0	14.0	0.0	370.9	0.0	0.0	0.0	52.3	36.7	0.0	13.3	498.5
7	2.9	198.0	294.2	1.2	10.0	24.0	0.0	370.9	19.3	0.8	318.6	115.3	73.4	2.3	154.5	1090.4
8	2.9	182.0	171.8	1.2	10.0	21.2	194.4	370.9	19.3	0.8	318.6	165.2	45.5	2.3	156.7	1306.1
9	2.5	184.0	136.3	1.2	10.0	17.8	194.4	370.9	19.3	0.8	318.6	143.0	61.2	2.3	157.8	1297.3
10	0.9	252.0	219.5	1.2	10.0	13.6	194.4	370.9	19.3	0.8	318.6	164.6	115.4	2.3	167.6	1378.8
11	1.6	327.0	165.8	1.2	207.4	14.7	194.4	296.7	19.3	0.8	318.6	144.1	76.9	2.3	160.4	1436.8
12	2.5	348.0	103.2	1.2	207.4	15.4	194.4	296.7	19.3	0.8	318.6	173.7	118.9	2.3	170.1	1518.8
13	2.7	13.0	76.3	1.2	10.0	14.4	194.4	222.5	19.3	0.8	318.6	152.3	85.7	2.3	163.9	1185.5
14	4.0	326.0	61.7	1.2	63.4	15.1	194.4	222.5	19.3	0.8	318.6	173.8	136.4	2.3	173.3	1321.1
15	3.1	328.0	38.5	1.2	63.4	19.1	194.4	222.5	19.3	0.8	318.6	192.3	108.4	2.3	170.4	1312.7
16	2.5	336.0	41.5	1.2	10.0	32.3	194.4	296.7	19.3	0.8	318.6	204.7	115.4	2.3	172.4	1368.1
17	1.8	4.0	103.2	1.2	10.0	30.3	194.4	370.9	19.3	0.8	318.6	182.0	83.9	2.3	165.4	1379.2
18	3.4	327.0	60.6	1.2	10.0	16.5	0.0	519.2	19.3	0.8	318.6	164.2	69.9	2.3	160.0	1282.0
19	1.1	347.0	67.2	1.2	10.0	8.9	0.0	667.6	0.0	0.0	0.0	91.5	73.4	0.0	24.1	876.7
20	1.8	286.0	300.9	1.2	10.0	7.1	0.0	667.6	0.0	0.0	0.0	51.6	56.0	0.0	15.8	809.3
21	2.7	131.0	383.6	1.2	10.0	6.1	0.0	519.2	0.0	0.0	0.0	53.7	63.0	0.0	17.2	670.4
22	1.6	158.0	194.8	1.2	10.0	4.4	0.0	370.9	0.0	0.0	0.0	45.8	17.5	0.0	8.7	458.5
23	3.4	149.0	228.4	1.2	10.0	3.3	0.0	111.3	0.0	0.0	0.0	31.7	15.7	0.0	6.3	179.5
24	4.0	149.0	189.2	1.2	10.0	2.5	0.0	111.3	0.0	0.0	0.0	21.0	5.2	0.0	3.5	154.7
Average			188.7	1.2	30.9	12.2	81.0	309.1	9.7	0.4	159.3	99.7	58.3	1.2	86.6	849.4
Percentage Contribution				0.1%	3.6%	1.4%	9.5%	36.4%	1.1%	0.0%	18.8%	11.7%	6.9%	0.1%	10.2%	100.0%

Table 3.2
Emissions Inventory (lbs/hour) for the Stagnation Day Modeling Domain at Stanfield on 10/29/2008

Hour	WSPD (mph)	WD (degree)	PM ₁₀ Observation (µg/m ³)	Paved Road	Neighbor-hood Paved Road	Neighbor-hood UnPaved Road	Construction	CAFOs	Agriculture	Unpaved Road				Total
										AG Road	Public Dirt	Private Dirt	Trail	
1	2.1	251.9	46.0	0.3	0.0	0.0	0.0	21.4	0.0	0.0	19.2	10.5	0.0	51.4
2	2.3	159.9	79.0	0.2	0.0	0.0	0.0	21.4	0.0	0.0	11.8	5.2	0.0	38.7
3	3.5	139.5	76.8	0.2	0.0	0.0	0.0	42.8	0.0	0.0	12.4	0.0	0.0	55.4
4	2.8	155.2	63.0	0.3	0.0	0.0	0.0	85.5	0.0	0.0	24.9	6.3	0.0	117.0
5	2.8	99.4	144.0	0.5	0.0	0.0	0.0	213.8	0.0	0.0	50.3	22.0	0.0	286.7
6	1.9	108.0	183.5	1.8	0.0	0.1	0.0	213.8	0.0	0.0	126.1	44.1	2.5	388.4
7	1.8	179.6	187.7	3.1	0.1	0.2	0.0	213.8	63.5	646.7	174.8	27.3	2.5	1132.1
8	1.8	171.9	307.2	2.7	0.1	0.1	1.3	213.8	63.5	646.7	164.0	36.7	2.5	1131.5
9	1.5	183.8	226.0	2.3	0.1	0.2	1.3	213.8	63.5	646.7	172.1	69.3	2.5	1171.8
10	3.6	82.4	133.2	1.8	0.0	0.3	1.3	213.8	63.5	646.7	158.9	46.2	2.5	1135.1
11	3.2	121.4	126.2	1.9	0.0	0.2	1.3	171.1	63.5	646.7	183.4	71.4	2.5	1142.0
12	2.9	129.8	116.1	2.0	0.1	0.3	1.3	171.1	63.5	646.7	164.5	51.4	2.5	1103.4
13	3.0	165.8	101.7	1.9	0.0	0.2	1.3	128.3	63.5	646.7	185.4	81.9	2.5	1111.8
14	2.0	112.1	69.7	2.0	0.0	0.4	1.3	128.3	63.5	646.7	205.8	65.1	2.5	1115.6
15	2.2	67.2	65.5	2.5	0.1	0.3	1.3	128.3	63.5	646.7	223.8	69.3	2.5	1138.2
16	2.4	94.3	43.8	4.0	0.1	0.3	1.3	171.1	63.5	646.7	221.2	50.4	2.5	1161.1
17	2.8	59.4	43.8	3.8	0.1	0.2	1.3	213.8	63.5	646.7	192.8	42.0	2.5	1166.7
18	2.6	5.3	509.1	2.1	0.1	0.2	0.0	299.4	63.5	646.7	111.5	44.1	0.0	1167.5
19	2.5	297.8	341.7	1.1	0.0	0.2	0.0	384.9	0.0	0.0	68.6	33.6	0.0	488.5
20	1.8	296.4	628.5	0.9	0.0	0.2	0.0	384.9	0.0	0.0	74.1	37.8	0.0	497.9
21	2.9	260.5	124.8	0.8	0.0	0.2	0.0	299.4	0.0	0.0	58.7	10.5	0.0	369.6
22	2.2	253.8	72.7	0.6	0.0	0.0	0.0	213.8	0.0	0.0	38.0	9.4	0.0	261.9
23	2.9	169.3	93.1	0.4	0.0	0.0	0.0	64.1	0.0	0.0	25.3	3.1	0.0	93.1
24	3.5	163.9	106.6	0.3	0.0	0.0	0.0	64.1	0.0	0.0	25.9	3.2	0.0	93.6
Average			162.1	1.6	0.0	0.2	0.5	178.2	31.8	323.4	112.2	35.0	1.3	684.1
Percentage Contribution				0.2%	0.0%	0.0%	0.1%	26.0%	4.6%	47.3%	16.4%	5.1%	0.2%	100.0%

Table 3.3
Emissions Inventory (lbs/hour) for the Stagnation Day Modeling Domain at PCH on 10/29/2008

Hour	WSPD (mph)	WD (degree)	PM ₁₀ Observation (µg/m ³)	Paved Road	Neighborhood Paved Road	Neighborhood UnPaved Road	Permitted Point Sources	Construction	Dairies	Agriculture	Unpaved Road				Total
											AG Road	Public Dirt	Private Dirt	Trail	
1	2.1	100.2	91.4	0.2	0.0	0.0	33.0	0.0	0.2	0.0	0.0	9.7	1.6	0.0	44.8
2	1.3	122.1	86.1	0.2	0.0	0.0	33.0	0.0	0.2	0.0	0.0	10.7	8.1	0.0	52.2
3	1.1	73.5	72.5	0.2	0.0	0.0	33.0	0.0	0.4	0.0	0.0	8.8	4.0	0.0	46.5
4	1.1	144.0	67.8	0.2	0.0	0.0	33.0	0.0	0.8	0.0	0.0	9.4	0.0	0.0	43.4
5	1.1	246.0	76.6	0.5	0.0	0.0	33.0	0.0	2.0	0.0	0.0	21.9	4.9	0.0	62.2
6	1.1	142.8	60.1	1.5	0.0	0.0	33.0	0.0	2.0	0.0	0.0	44.3	17.0	0.0	97.9
7	1.1	189.5	145.8	2.4	0.0	0.0	33.0	0.0	2.0	35.7	152.4	93.8	34.0	0.7	353.9
8	1.1	276.0	287.0	2.2	0.0	0.0	33.0	0.2	2.0	35.7	152.4	137.3	21.0	0.7	384.4
9	1.6	133.5	179.2	1.8	0.0	0.0	33.0	0.2	2.0	35.7	152.4	130.7	28.3	0.7	384.7
10	1.1	300.9	455.2	1.5	0.0	0.0	33.0	0.2	2.0	35.7	152.4	141.9	53.4	0.7	420.7
11	1.4	18.9	234.8	1.6	0.0	0.0	33.0	0.2	1.6	35.7	152.4	131.7	35.6	0.7	392.5
12	1.6	259.9	85.6	1.7	0.0	0.0	33.0	0.2	1.6	35.7	152.4	150.7	55.0	0.7	430.9
13	1.4	308.7	71.4	1.6	0.0	0.0	33.0	0.2	1.2	35.7	152.4	132.3	39.7	0.7	396.6
14	2.6	263.9	62.7	1.7	0.0	0.0	33.0	0.2	1.2	35.7	152.4	145.8	63.1	0.7	433.7
15	2.2	292.9	65.6	2.1	0.0	0.0	33.0	0.2	1.2	35.7	152.4	159.1	50.2	0.7	434.5
16	1.5	244.0	54.5	3.3	0.0	0.0	33.0	0.2	1.6	35.7	152.4	163.9	53.4	0.7	444.2
17	1.5	294.0	40.8	3.1	0.0	0.0	33.0	0.2	2.0	35.7	152.4	159.6	38.9	0.7	425.5
18	1.1	300.1	368.4	1.7	0.0	0.0	33.0	0.0	2.8	35.7	152.4	136.6	32.4	0.7	395.2
19	1.1	53.0	588.4	1.0	0.0	0.0	33.0	0.0	3.6	0.0	0.0	76.2	34.0	0.0	147.7
20	1.1	57.4	453.5	0.8	0.0	0.0	33.0	0.0	3.6	0.0	0.0	43.9	25.9	0.0	107.2
21	1.1	91.7	281.6	0.7	0.0	0.0	33.0	0.0	2.8	0.0	0.0	46.7	29.1	0.0	112.3
22	1.1	82.1	199.3	0.5	0.0	0.0	33.0	0.0	2.0	0.0	0.0	36.8	8.1	0.0	80.4
23	1.1	128.4	128.6	0.4	0.0	0.0	33.0	0.0	0.6	0.0	0.0	24.4	7.3	0.0	65.6
24	1.1	187.8	114.4	0.3	0.0	0.0	33.0	0.0	0.6	0.0	0.0	18.8	2.4	0.0	55.1
Average			188.7	1.3	0.0	0.0	33.0	0.1	1.6	17.9	76.2	84.8	27.0	0.3	242.2
Percentage Contribution				0.5%	0.0%	0.0%	13.6%	0.0%	0.7%	7.4%	31.5%	35.0%	11.1%	0.1%	100.0%

3.3 High Wind Emissions Inventory for Selected Design Days

Four dates were selected as representative of exceedances that occurred during high wind conditions.³⁴ The dates and associated monitoring sites are as follows:

January 1, 2008 – Pinal County Housing
April 27, 2008 – Cowtown
October 27, 2008 – Maricopa
November 21, 2008 – Stanfield

Similar to the evaluation of low wind days, separate modeling domains were defined and emission inventories developed for each of the four design days and monitoring sites. These inventories were used in modeling analyses to quantify source contributions and impacts at the exceeding monitors. The base inventories for the design days at the four modeling domains are presented in Tables 3.4 through 3.7 below. Dominant source categories vary between the four domains. In the Pinal County Housing inventory, agricultural emissions make up more than 70 percent of total emissions. Approximately 55 percent of emissions in the Cowtown inventory are comprised of desert shrubland, CAFOs, and agricultural sources. At Maricopa, construction, cleared areas, and agricultural sources are more than 65 percent of the total inventory. Lastly, for the Stanfield area, CAFOs, desert shrubland, agriculture, and unpaved roads account for approximately 99 percent of the inventory.

³⁴ Section 3.3, Pinal County PM₁₀ Nonattainment Area 2008 Base Year Emissions for Selected Design Days and Modeling Domains, February 11, 2013.

**Table 3.4
Emissions Inventory (lbs/hour) for the High wind Day at PCH on 1/1/2008**

Hour	WSPD (mph)	WD (degree)	PM ¹⁰ Observation (µg/m ³)	Paved Road	Permitted Point Sources	Dairies	Cleared Area	Desert Shrubland	Developed Rural Lands	Developed Urban Lands	Agriculture	Unpaved Road				Total
												AG Road	Public Dirt	Private Dirt	Trail	
1	1.6	303.8	28.2	0.5	33.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	12.8	2.0	0.0	48.5
2	1.5	318.0	21.0	0.5	33.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	10.4	9.8	0.0	53.8
3	2.0	335.4	22.2	0.4	33.0	0.4	0.0	0.0	0.0	0.0	0.0	0.0	12.3	4.9	0.0	51.1
4	2.5	333.7	24.5	0.5	33.0	0.8	0.0	0.0	0.0	0.0	0.0	0.0	11.5	0.0	0.0	45.8
5	5.9	352.2	16.4	1.0	33.0	2.0	0.0	0.0	0.0	0.0	0.0	0.0	26.8	5.9	0.0	68.7
6	3.2	299.6	19.1	3.4	33.0	2.0	0.0	0.0	0.0	0.0	0.0	0.0	60.8	20.6	0.0	119.8
7	3.9	339.3	16.2	5.5	33.0	2.0	0.0	0.0	0.0	0.0	88.2	182.6	119.4	41.3	2.8	474.8
8	5.7	5.0	22.7	4.9	33.0	2.0	0.0	0.0	0.0	0.0	88.2	182.6	177.7	25.5	2.8	516.8
9	4.8	53.9	34.7	4.1	33.0	2.0	0.0	0.0	0.0	0.0	88.2	182.6	162.1	34.4	2.8	509.2
10	16.3	41.2	871.2	0.0	0.0	2.0	119.0	297.2	42.6	11.0	2521.4	352.2	230.0	107.5	15.6	3698.5
11	21.4	46.3	919.3	0.0	0.0	1.6	355.2	823.7	118.2	37.3	8165.9	755.1	315.6	187.1	45.9	10805.6
12	25.1	49.6	1136.1	0.0	0.0	1.6	641.0	1486.2	213.3	67.3	14663.9	1215.6	463.7	326.4	80.5	19159.6
13	23.6	48.5	790.7	0.0	0.0	1.2	275.3	638.4	91.6	28.9	6348.8	626.3	284.8	159.6	36.2	8491.2
14	22.9	48.3	946.1	0.0	0.0	1.2	135.1	313.3	45.0	14.2	3160.4	400.3	245.5	131.3	19.2	4465.5
15	19.2	47.6	320.0	0.0	0.0	1.2	65.5	163.5	23.5	6.1	1427.0	275.9	229.5	84.4	9.9	2286.4
16	22.3	53.6	397.9	0.0	0.0	1.6	87.6	203.2	29.2	9.2	2081.0	323.8	245.1	100.3	13.5	3094.4
17	19.9	53.6	281.9	0.0	0.0	2.0	80.0	199.8	28.7	7.4	1724.6	296.7	219.5	75.8	11.4	2645.9
18	15.0	50.6	65.8	0.0	0.0	2.8	20.5	53.3	7.7	1.8	480.7	209.6	172.7	46.1	4.9	1000.0
19	15.5	54.6	50.9	0.0	0.0	3.6	14.6	38.1	5.5	1.3	280.3	19.3	95.4	46.1	1.5	505.7
20	19.4	58.1	61.5	0.0	0.0	3.6	18.2	45.4	6.5	1.7	371.9	25.9	55.8	37.9	1.9	568.8
21	19.3	56.7	70.6	0.0	0.0	2.8	21.8	54.5	7.8	2.0	446.3	31.1	58.8	43.2	2.3	670.6
22	19.2	57.4	67.6	0.0	0.0	2.0	21.8	54.5	7.8	2.0	446.3	31.1	49.5	17.6	2.3	635.0
23	17.2	55.7	32.7	0.0	0.0	0.6	6.6	16.6	2.4	0.6	135.5	9.4	31.4	11.2	0.7	215.0
24	14.9	54.6	139.3	0.0	0.0	0.6	13.0	33.9	4.9	1.1	249.3	17.2	27.0	7.3	1.3	355.6
Average			264.9	0.9	12.4	1.6	78.1	184.2	26.4	8.0	1782.0	214.1	138.3	63.6	10.7	2520.3
Percentage Contribution				0.0%	0.5%	0.1%	3.1%	7.3%	1.0%	0.3%	70.7%	8.5%	5.5%	2.5%	0.4%	100.0%

Shaded Area = High Wind Hours

**Table 3.5
Emissions Inventory (lbs/hour) for the High Wind Day Modeling Domain at Cowtown on 04/27/2008**

Hour	WSPD (mph)	WD (degree)	PM ₁₀ Observation (µg/m ³)	Rail Road	Permitted Point Sources	Paved Road	Construction	Cleared Area	Desert Shrubland		Developed Rural Lands	Developed Urban Lands	Unknown	CAFOs	Agriculture		Unpaved Road					Total
									County	Tribal					County	Tribal Land	AG Road	Public Dirt	Private Dirt	Trail	Tribal road	
1	6.1	332.4	68.3	1.2	10.0	0.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	37.1	3.5	1.5	0.0	19.6	3.0	0.0	2.3	79.0
2	0.7	320.5	73.0	1.2	10.0	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	37.1	3.5	1.5	0.0	22.2	14.8	0.0	4.8	96.0
3	5.9	314.7	88.1	1.2	10.0	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	74.2	3.5	1.5	0.0	18.1	7.4	0.0	2.8	119.5
4	3.9	84.4	59.7	1.2	10.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	148.4	3.5	1.5	0.0	18.3	0.0	0.0	1.5	185.3
5	2.2	25.7	92.3	1.2	10.0	1.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	370.9	3.5	1.5	0.0	39.7	8.9	0.0	5.1	442.8
6	2.4	156.6	492.9	1.2	10.0	6.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	370.9	3.5	1.5	0.0	84.1	31.2	0.0	13.7	522.5
7	1.6	229.1	326.4	1.2	10.0	10.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	370.9	63.5	52.1	246.7	185.9	62.3	2.2	138.1	1143.4
8	2.1	11.6	222.0	1.2	10.0	9.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	370.9	63.5	52.1	246.7	268.9	38.6	2.2	140.4	1203.6
9	10.9	33.2	372.4	1.2	10.0	7.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	370.9	63.5	52.1	246.7	249.1	51.9	2.2	141.5	1196.9
10	20.0	52.9	886.8	0.0	0.0	0.0	621.2	59.8	1156.3	451.0	101.0	3.5	0.2	370.9	2022.3	52.1	415.5	301.2	385.2	6.3	151.6	6098.2
11	17.6	44.4	107.7	0.0	0.0	0.0	164.7	15.8	306.5	119.5	26.8	0.9	0.1	296.7	582.7	52.1	291.4	256.7	141.5	3.3	144.2	2402.9
12	15.7	43.0	122.3	0.0	0.0	0.0	75.2	7.2	140.0	54.6	12.2	0.4	0.0	296.7	300.6	52.1	267.1	291.8	135.7	2.7	154.2	1790.8
13	17.7	37.0	72.0	0.0	0.0	0.0	153.7	14.8	286.0	111.5	25.0	0.9	0.1	222.5	548.0	52.1	288.5	261.6	143.8	3.3	147.8	2259.5
14	14.7	44.0	38.4	0.0	0.0	0.0	51.6	5.2	105.1	41.0	9.2	0.3	0.0	222.5	230.8	52.1	260.3	285.7	139.0	2.6	157.5	1562.9
15	16.1	49.6	36.4	0.0	0.0	0.0	76.2	7.3	141.8	55.3	12.4	0.4	0.0	222.5	303.7	52.1	267.4	315.6	127.3	2.7	154.4	1739.1
16	15.1	50.7	23.1	0.0	0.0	0.0	60.9	6.2	124.1	48.4	10.8	0.3	0.0	296.7	261.1	52.1	262.8	330.5	125.4	2.6	156.5	1738.5
17	12.1	59.4	69.7	0.0	0.0	0.0	11.6	1.2	23.7	9.2	2.1	0.1	0.0	370.9	101.2	52.1	249.8	314.0	76.5	2.3	149.3	1363.9
18	9.2	68.9	101.2	1.2	10.0	7.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	519.2	63.5	52.1	246.7	272.8	59.4	2.2	143.7	1378.2
19	5.2	40.9	230.1	1.2	10.0	4.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	667.6	3.5	1.5	0.0	152.8	62.3	0.0	24.8	927.8
20	4.0	8.0	72.9	1.2	10.0	3.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	667.6	3.5	1.5	0.0	88.7	47.5	0.0	16.3	839.6
21	2.9	37.2	79.7	1.2	10.0	2.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	519.2	3.5	1.5	0.0	94.2	53.4	0.0	17.8	703.6
22	3.0	35.3	42.6	1.2	10.0	2.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	370.9	3.5	1.5	0.0	76.2	14.8	0.0	9.0	489.2
23	3.8	111.6	232.5	1.2	10.0	1.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	111.3	3.5	1.5	0.0	50.7	13.4	0.0	6.5	199.5
24	4.7	9.3	127.5	1.2	10.0	1.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	111.3	3.5	1.5	0.0	36.6	4.5	0.0	3.6	173.3
Average			168.3	0.8	6.7	2.5	50.6	4.9	95.1	37.1	8.3	0.3	0.0	309.1	193.6	26.8	137.1	168.1	72.8	1.5	78.6	1194.0
Percentage Contribution				0.1%	0.6%	0.2%	4.2%	0.4%	8.0%	3.1%	0.7%	0.0%	0.0%	25.9%	16.2%	2.2%	11.5%	14.1%	6.1%	0.1%	6.6%	100.0%

Shaded Area = High Wind Hours

**Table 3.6
Emissions Inventory (lbs/hour) for the High Wind Day Modeling Domain at Maricopa on 10/27/2008**

Hour	WSPD (mph)	WD (degree)	PM ₁₀ Observation (µg/m ³)	Rail Road	Paved Road	Construction	CAFOs	Cleared Area	Desert Shrub-land	Developed Rural Lands	Developed Urban Lands	Unknown	Agriculture		Unpaved Road				Total	
													County	Tribal Land	AG Road	Public Dirt	Private Dirt	Trail		Tribal road
1	3.8	160.0	239.9	1.0	3.0	0.0	8.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.1	1.8	0.0	1.0	18.9
2	2.0	106.0	143.5	1.0	2.8	0.0	8.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.4	8.9	0.0	2.2	25.2
3	1.3	6.0	70.3	1.0	2.8	0.0	17.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.2	4.4	0.0	1.3	30.6
4	1.3	348.0	73.8	1.0	3.4	0.0	35.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.6	0.0	0.0	0.7	43.4
5	2.5	290.0	98.7	1.0	6.5	0.0	89.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	6.8	5.3	0.0	2.3	111.1
6	2.0	241.0	91.8	1.0	21.3	0.0	89.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	16.8	18.7	0.0	6.3	153.3
7	1.3	215.0	129.8	1.0	32.5	0.0	89.2	0.0	0.0	0.0	0.0	0.0	10.4	7.2	159.1	28.9	37.4	1.0	18.2	384.9
8	5.6	82.0	160.4	1.0	28.8	256.5	89.2	0.0	0.0	0.0	0.0	0.0	10.4	7.2	159.1	43.9	23.1	1.0	19.2	639.5
9	13.0	84.0	326.2	0.0	0.0	631.0	89.2	108.5	52.4	59.9	30.2	8.8	247.3	7.2	175.9	41.6	36.4	1.6	19.7	1509.8
10	16.1	85.0	852.9	0.0	0.0	2657.9	89.2	663.4	305.9	349.2	200.6	53.0	1428.2	7.2	270.5	63.4	94.0	5.0	24.3	6211.9
11	18.3	81.0	496.5	0.0	0.0	2401.5	71.3	592.5	273.3	311.9	179.2	47.3	1276.8	7.2	258.6	55.7	70.7	4.6	20.9	5571.4
12	16.3	82.0	293.2	0.0	0.0	1193.1	71.3	425.3	119.3	136.2	78.3	20.7	563.3	7.2	202.6	56.8	74.2	2.6	25.5	2976.4
13	17.0	79.0	176.0	0.0	0.0	1055.9	53.5	220.8	101.8	116.3	66.8	17.6	482.4	7.2	196.2	47.9	55.3	2.3	22.6	2446.6
14	16.8	74.0	141.9	0.0	0.0	878.3	53.5	171.8	79.2	90.4	51.9	13.7	377.5	7.2	188.0	52.1	78.5	2.0	27.0	2071.0
15	15.4	72.0	84.8	0.0	0.0	514.8	53.5	71.5	36.2	41.3	20.8	6.1	173.8	7.2	170.7	52.6	58.8	1.4	25.6	1234.4
16	13.6	71.0	76.6	0.0	0.0	350.1	71.3	27.1	13.1	15.0	7.6	2.2	69.6	7.2	163.3	50.3	60.0	1.2	26.6	864.7
17	13.0	72.0	68.6	0.0	0.0	318.9	89.2	18.1	8.7	10.0	5.0	1.5	49.9	7.2	161.9	42.3	43.6	1.1	23.3	780.6
18	8.7	62.0	60.4	1.0	23.1	0.0	124.8	0.0	0.0	0.0	0.0	0.0	10.4	7.2	159.1	36.7	35.6	1.0	20.7	419.7
19	7.2	61.0	56.2	1.0	13.5	0.0	160.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	19.6	37.4	0.0	11.3	243.3
20	7.4	68.0	45.1	1.0	10.7	0.0	160.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	9.6	28.5	0.0	7.5	217.7
21	9.6	70.0	36.1	1.0	9.2	0.0	124.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	9.5	32.0	0.0	8.1	184.6
22	9.8	80.0	30.8	1.0	6.8	0.0	89.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7.6	8.9	0.0	4.1	117.5
23	9.2	82.0	33.2	1.0	5.0	0.0	26.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.8	8.0	0.0	3.0	49.6
24	8.9	78.0	38.7	1.0	3.8	0.0	26.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.0	2.7	0.0	1.7	40.9
Average			159.4	0.6	7.2	427.4	74.3	95.8	41.2	47.1	26.7	7.1	195.8	3.6	94.4	27.6	34.3	1.0	13.5	1097.8
Percentage Contribution				0.1%	0.7%	38.9%	6.8%	8.7%	3.8%	4.3%	2.4%	0.6%	17.8%	0.3%	8.6%	2.5%	3.1%	0.1%	1.2%	100.0%

Shaded Area = High Wind Hours

Table 3.7
Emissions Inventory (lbs/hour) for the High Wind Day Modeling Domain at STF on 11/21/2008

Hour	WSPD (mph)	WD (degree)	PM ₁₀ Observation (µg/m ³)	Paved Road	Construc-tion	CAFOs	Cleared Area	Desert Shrubland	Developed Rural Lands	Developed Urban Lands	Agri-culture	Unpaved Road				Total
												AG Road	Public Dirt	Private Dirt	Trail	
1	4.1	119.2	112.4	0.2	0.0	13.5	0.0	0.0	0.0	0.0	0.0	0.0	18.0	2.2	0.0	33.9
2	3.5	161.6	59.4	0.2	0.0	13.5	0.0	0.0	0.0	0.0	0.0	0.0	22.4	10.9	0.0	47.0
3	3.9	117.3	157.4	0.2	0.0	26.9	0.0	0.0	0.0	0.0	0.0	0.0	16.7	5.5	0.0	49.3
4	4.3	125.4	158.4	0.3	0.0	53.8	0.0	0.0	0.0	0.0	0.0	0.0	16.7	0.0	0.0	70.8
5	3.7	274.2	102.3	0.5	0.0	134.5	0.0	0.0	0.0	0.0	0.0	0.0	33.6	6.6	0.0	175.2
6	4.0	240.9	234.2	1.7	0.0	134.5	0.0	0.0	0.0	0.0	0.0	0.0	72.2	23.0	0.0	231.5
7	15.9	85.5	357.4	0.0	0.0	215.9	2.1	112.8	9.5	0.1	697.8	668.3	181.7	49.3	2.5	1939.9
8	18.3	81.9	326.6	0.0	1.3	267.8	3.4	185.0	15.5	0.2	1112.4	692.6	261.2	33.9	2.9	2576.2
9	20.4	82.2	584.6	0.0	1.3	720.1	14.8	812.6	68.2	0.8	4719.2	904.2	304.6	62.4	5.7	7613.9
10	19.9	81.1	429.2	0.0	1.3	351.8	5.5	301.5	25.3	0.3	1782.0	731.9	269.3	81.1	3.4	3553.4
11	20.0	80.2	334.3	0.0	1.3	255.4	3.7	205.0	17.2	0.2	1227.5	699.3	238.5	54.2	3.0	2705.4
12	18.2	80.4	186.1	0.0	1.3	175.8	1.7	94.5	7.9	0.1	592.7	662.1	262.9	77.2	2.5	1878.7
13	14.7	79.2	93.9	0.0	1.3	104.3	0.6	36.0	3.0	0.0	239.1	641.0	228.7	54.5	2.2	1310.8
14	13.4	78.5	65.1	0.0	1.3	90.7	0.3	15.2	1.3	0.0	129.7	634.8	254.4	85.7	2.1	1215.5
15	12.3	75.3	64.8	0.0	1.3	84.8	0.1	6.2	0.5	0.0	90.3	632.1	282.0	68.0	2.1	1167.4
16	9.9	77.2	65.2	3.9	1.3	107.6	0.0	0.0	0.0	0.0	49.4	630.2	302.0	72.2	2.0	1168.7
17	7.1	74.7	87.1	3.7	1.3	134.5	0.0	0.0	0.0	0.0	49.4	630.2	289.0	52.5	2.0	1162.7
18	4.7	73.8	104.6	2.0	0.0	188.4	0.0	0.0	0.0	0.0	49.4	630.2	254.2	43.8	2.0	1170.0
19	6.3	75.1	88.3	1.1	0.0	242.2	0.0	0.0	0.0	0.0	0.0	0.0	143.5	45.9	0.0	432.7
20	5.6	86.2	56.1	0.9	0.0	242.2	0.0	0.0	0.0	0.0	0.0	0.0	85.0	35.0	0.0	363.0
21	2.6	158.4	98.3	0.7	0.0	188.4	0.0	0.0	0.0	0.0	0.0	0.0	90.5	39.4	0.0	319.0
22	2.2	230.2	249.6	0.5	0.0	134.5	0.0	0.0	0.0	0.0	0.0	0.0	74.5	10.9	0.0	220.5
23	2.9	270.1	171.6	0.4	0.0	40.4	0.0	0.0	0.0	0.0	0.0	0.0	49.1	9.8	0.0	99.8
24	2.4	291.4	99.5	0.3	0.0	40.4	0.0	0.0	0.0	0.0	0.0	0.0	33.4	3.3	0.0	77.4
Average			178.6	0.7	0.5	165.1	1.3	73.7	6.2	0.1	447.5	339.9	157.7	38.6	1.4	1232.6
Percentage Contribution				0.1%	0.0%	13.4%	0.1%	6.0%	0.5%	0.0%	36.3%	27.6%	12.8%	3.1%	0.1%	100.0%

Shaded Area = High Wind Hours

3.4 Summary of Annual Emissions Inventory for the West Pinal PM₁₀ Nonattainment Area

This section provides a summary of the 2008 annual emissions inventory for the nonattainment area. Table 3.8 presents the emissions for high wind days. As previously noted in this chapter, the number of hours classified as high wind is less than 10 percent per year. Even though this is a small amount of time, the emissions produced during those hours account for approximately 70 percent of the inventory and are estimated at 103,324 tons per year (tpy) (Table 3.9). Desert shrubland and agricultural croplands are estimated to produce 84,888 tpy and account for about 82 percent of the inventory.

Table 3.8 Summary of the 2008 Annual High Wind Emissions in Western Pinal County		
Land Use Category	Emissions (Tons/year)	Percentage
Developed Urban Lands	253	0.2%
Developed Rural Lands (low density residential)	2,482	2.4%
Unpaved Roads	5,855	5.7%
Cleared Areas	475	0.5%
Residential Construction	1,162	1.1%
CAFOs and Dairies	1,009	1.0%
Desert Shrubland	52,531	50.8%
Agricultural Croplands	32,357	31.3%
Commercial Construction	575	0.6%
Other	5,826	5.6%
Site Development	789	0.8%
Total High Wind Emissions	103,324	100%

Table 3.9 provides a summary of the total annual emissions inventory for 2008, including high wind emissions and the remaining low wind emissions. The low wind source category with the highest emissions is unpaved roads, about 28 percent of total annual emissions (Table 3.9). Combined unpaved road emissions during low winds and the total high wind emissions account for approximately 92 percent of the total annual emissions inventory.

Table 3.9 Summary of the 2008 Annual PM₁₀ Emissions in the Western Pinal County Nonattainment Area				
Source Category		PM₁₀ Emissions		
		(lbs/day)	(tons/year)	% of Annual Total
Agriculture	Harvesting	1,655	302	0.2%
	Tilling	13,436	2,452	1.5%
CAFOs		11,923	2,176	1.4%
Paved Road		6,225	1,136	0.7%

Table 3.9
Summary of the 2008 Annual PM₁₀ Emissions in the Western Pinal County Nonattainment Area

Source Category	PM ₁₀ Emissions		
	(lbs/day)	(tons/year)	% of Annual Total
Unpaved Road	241,644	44,100	27.6
Non-Road	586	107	0.1%
Railroad	471	86	0.1%
Construction	30,460	5,559	3.5%
Dairy	1,041	190	0.1%
Permitted Sources	2,827	516	0.3%
Sub-Total: Low Wind Emissions		56,624	35.4%
Windblown Emissions		103,324	64.6%
Total Emissions		159,948	100.0%

4.0 BASE YEAR MODELING

This section provides a summary of the base year modeling for the selected design days and modeling domains. This analysis quantified each source's contribution to PM₁₀ emissions for the 2008 base year.

Identifying the contribution of emissions sources to ambient concentrations allows sources to determine and select control strategies that are feasible and effective. Basecase modeling was performed for both stagnation/low wind and high wind conditions. More detailed information is contained in Appendix C (Modeling Technical Support Document).

4.1 Stagnation/Low Wind Modeling

In order to assess the contribution of each PM₁₀ source during stagnation/low wind conditions, Sierra Research Inc. evaluated various models to determine which would be most suitable to evaluate hourly source contributions and the conditions in Pinal County. AERMOD is a steady-state Gaussian plume dispersion model that assesses pollutant concentrations from a variety of source types. Adopted by EPA as a regulatory model on December 9, 2005, AERMOD contains improved algorithms for addressing low wind speed (near-calm conditions) and can provide estimates for conditions when wind speeds are less than 1 m/sec,^{35 36} which are common on the selected stagnation design day. Primary inputs include the emissions inventory and meteorological information.

As previously discussed in Chapter 3, October 29, 2008, was selected as being representative of meteorological conditions leading to PM₁₀ exceedances on stagnation days (Chapter 3 and Appendix B). Hourly concentrations were modeled for the Cowtown, Pinal County Housing, and Stanfield monitors for the selected stagnation design day. Figures 4.1 through 4.3 show the modeled source specific concentration at the Cowtown, Pinal County Housing, and Stanfield monitors.

³⁵ "Revisions to the Guideline on Air Quality Models: Adoption of Preferred General Purpose (Flat and Complex Terrain) Dispersion Model and Other Revisions," U.S. Environmental Protection Agency, Federal Register, Vol. 70, No. 216, p. 68218, November 9, 2005 (Attachment IV)

³⁶ User's Guide for AERMET, EPA-454/B-03-002, November 2004

Figure 4.1
Modeled Stagnation Day Emission Source Apportionment (%) for the
Cowtown (CTW) Monitor on 10/29/2008

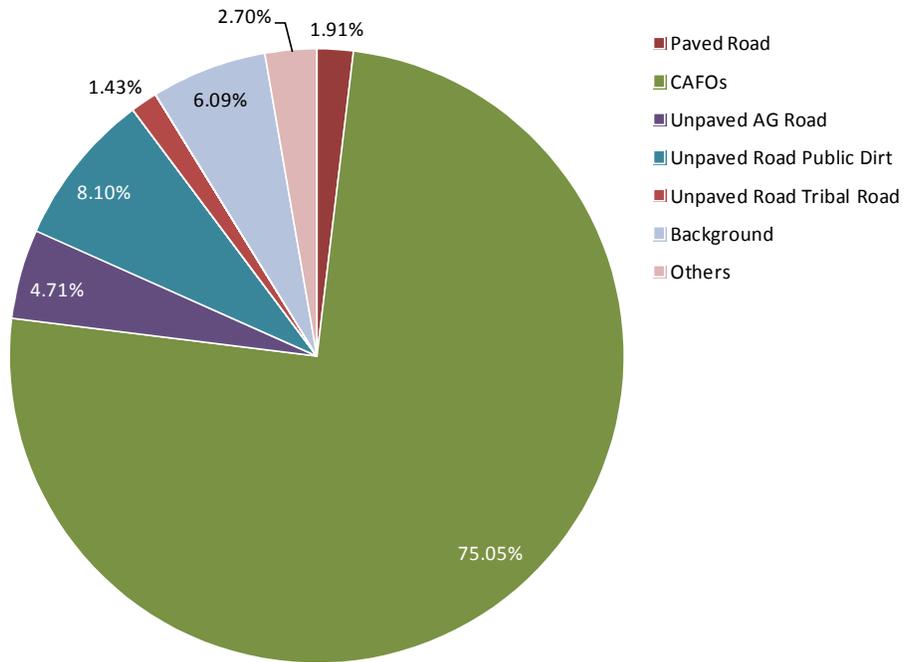


Figure 4.2
Modeled Stagnation Day Emission Source Apportionment (%) for the
Pinal County Housing (PCH) Monitor on 10/29/2008

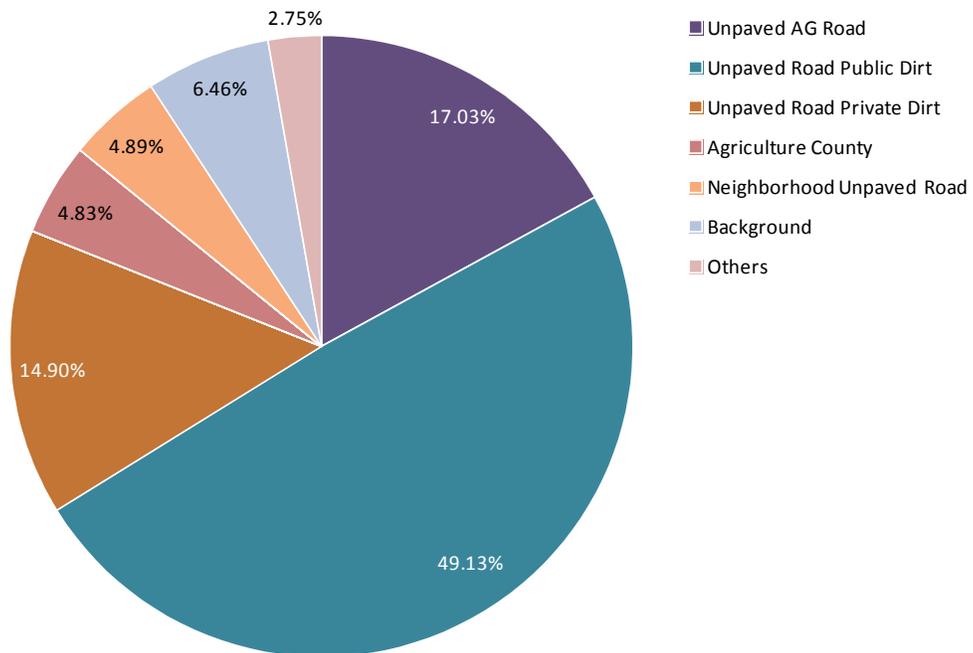
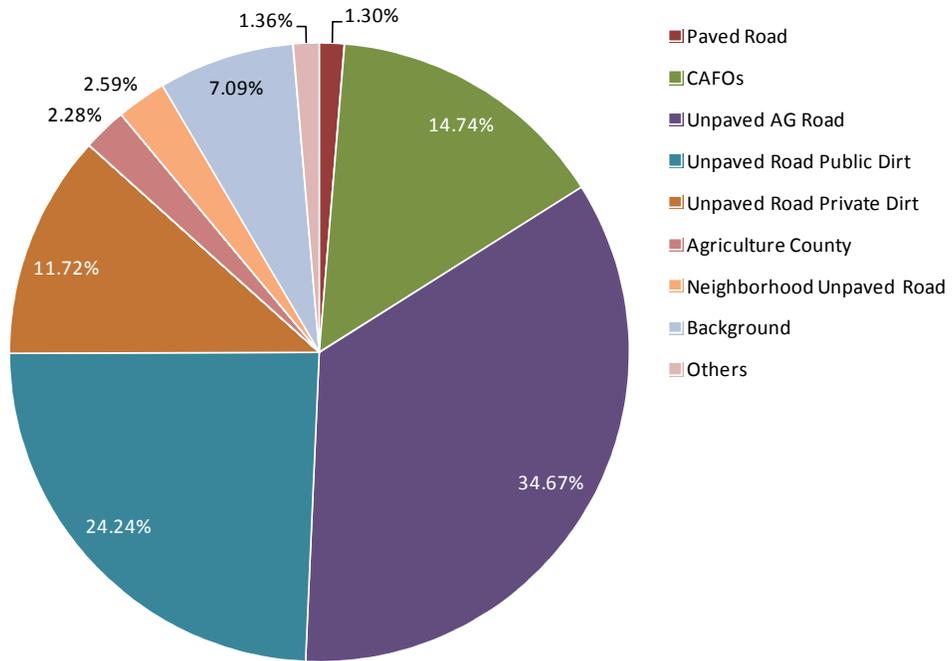


Figure 4.3
Modeled Stagnation Day Emission Source Apportionment (%) for the
Stanfield (STF) Monitor on 10/29/2008



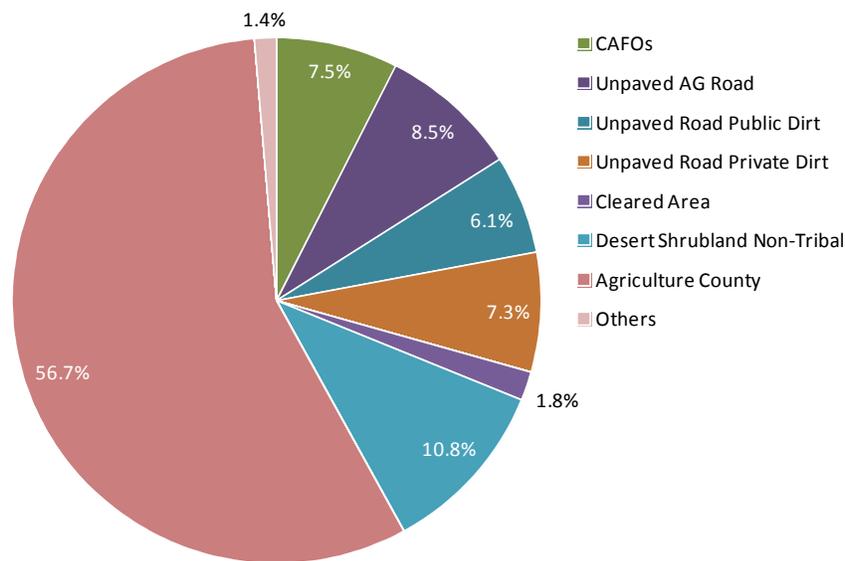
4.2 High Wind Modeling

Sierra Research Inc. assisted the Maricopa Association of Governments (MAG) prepare the Five Percent plan for the Maricopa County Serious PM₁₀ Nonattainment Area³⁷. As a result of this experience, Sierra Research determined that neither photochemical grid models nor AERMOD would perform well to quantify source contribution on high wind days. In order to appropriately model source contribution of PM₁₀ emissions in Pinal County, a weighted rollback model similar to the one in the Five Percent Plan was used for the high wind modeling in the nonattainment area. The model was altered to account for differences in the modeling domains and conditions in Pinal County.³⁸

The contribution of PM₁₀ emissions was separated into low and high wind hours during high wind conditions.³⁹ The primary reason for the separation is to account for differences in how PM₁₀ is emitted based on whether average hourly wind speeds exceeded 12 mph. The inventory preparation and the documentation for the emissions inventory provide detailed discussions regarding the apportionment modeling.

Figures 4.4 through 4.7 show the modeled high wind source apportionment for Stanfield, Pinal County Housing, Maricopa, and Cowtown monitors.

Figure 4.4
Modeled High Wind Day Emission Source Apportionment (%) for the Stanfield (STN) Monitor on 11/21/2008



³⁷ Chapter 6, Attainment Demonstration, “MAG Five Percent Plan for PM-10 for Maricopa County Nonattainment Area,” May 2012.

³⁸ Pinal County PM Inventory Preparation Plan, February 11, 2013.

³⁹ Ibid.

Figure 4.5
Modeled High Wind Day Emission Source Apportionment (%) for the
Pinal County Housing (PCH) Monitor on 1/1/2008

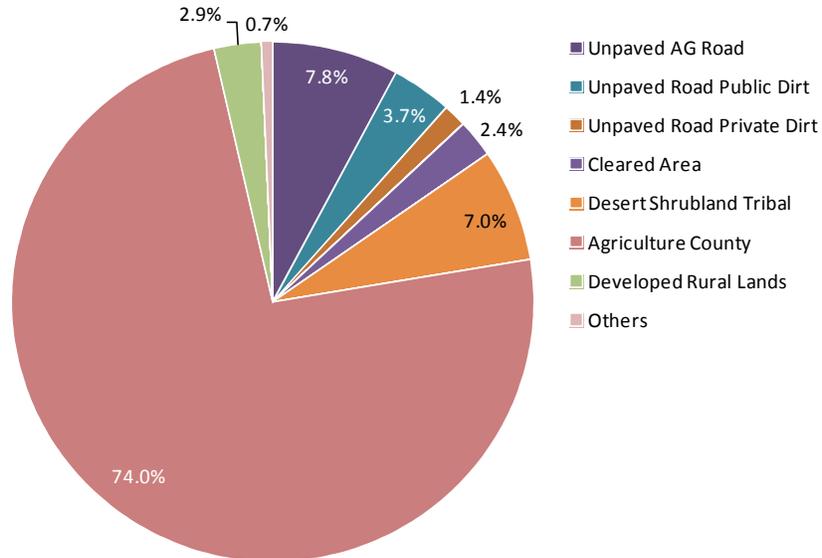


Figure 4.6
Modeled High Wind Day Emission Source Apportionment (%) for the
Maricopa Monitor on 10/27/2008

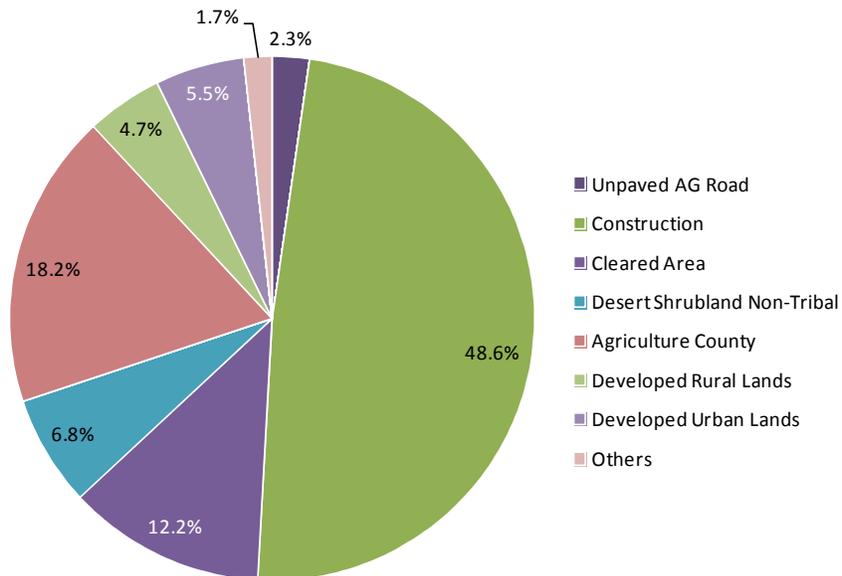
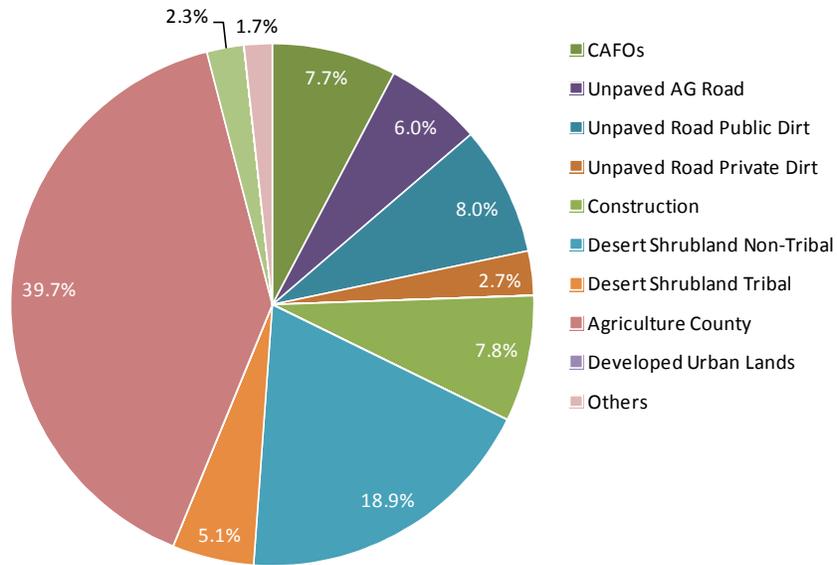


Figure 4.7
Modeled High Wind Day Emission Source Apportionment (%) for the
Cowtown (CTW) Monitor on 4/27/2008



5.0 COMMITMENTS

To comply with remaining CAA requirements, ADEQ commits to submitting the following: control measure selection and analysis, reasonable further progress, prevention of significant deterioration/new source review, transportation conformity, contingency measures, attainment demonstration, and commitments. Table 5.1 provides an expected timeline for completion of the outstanding CAA requirements.

Table 5.1 – TIMELINE West Pinal County PM₁₀ Nonattainment Area	
Date	Activity
January 1, 2014 – February 14, 2014	Finalize control measure modeling; reasonable further progress; attainment demonstration modeling; continue rulemaking process
February 17, 2014 – March 21, 2014	Finalize draft proposed SIP; incorporate rule/ordinance/policy revisions; PSD/NSR; control measure/RACM analysis; attainment demonstration; transportation conformity; contingency measures; commitments
March 24, 2014 – April 11, 2014	Management review of draft proposed SIP; prepare SIP and related documents for public comment period
April 14, 2014	Begin comment period
May 15, 2014	End comment period; public hearing
May 16, 2014 – June 1, 2014	Management review; prepare final SIP submittal
June 2, 2014	Submit full SIP to EPA