



PROPOSED

Arizona State Implementation Plan Revision

West Central Pinal County 2006 PM_{2.5} Nonattainment Area

**Air Quality Division
February 2014**

(This page is intentionally blank)

Table of Contents

EXECUTIVE SUMMARY	1
1.0 INTRODUCTION	5
1.1 Statement of Introduction and Purpose.....	5
1.2 National Ambient Air Quality Standards.....	6
1.3 U.S. EPA's Particulate Matter NAAQS	6
1.4 Regulatory Background	7
1.5 Nonattainment Area Description	8
1.5.1 Geography and Climate	10
1.5.2 Population	12
1.5.3 County Economy	13
1.6 General SIP Approach - Regulatory Requirements and Guidance	16
2.0 AIR QUALITY MONITORING	24
2.1 Monitoring Site, Equipment, and Quality Assurance Procedures	24
2.2 24-Hour PM _{2.5} NAAQS Compliance.....	26
2.3 PM _{2.5} Data Summary	26
3.0 NONATTAINMENT AREA EMISSIONS INVENTORY.....	29
3.1 Summary of Emissions Inventory Methodology	29
3.2 Fugitive Dust Sources.....	29
3.3 Mobile Source Gaseous Pollutants	33
3.3.1 On-Road Emissions	33
3.3.2 Nonroad Emissions.....	35
3.3.3 Railroad Emission.....	35
3.3.4 Other Source Emissions.....	36
3.4 Summary of Annual Emissions Inventory.....	37
4.0 PREVENTION OF SIGNIFICANT DETERIORATION/NEW SOURCE REVIEW	44
4.1 State and County Programs.....	44
5.0 CONFORMITY	47
5.1 General Conformity	47
5.2 Transportation Conformity	47
5.3 Background.....	47
5.4 Pinal County Nonattainment Areas	48
5.4.1 Conformity Test Results for the Pinal PM ₁₀ Nonattainment Area.....	49
5.4.2 Conformity Test Results for the Pinal PM _{2.5} Nonattainment Area	49
6.0 CONCLUSION	51

List of Tables

Table ES-1	Arizona Administrative Code (AAC) and Pinal County Air Quality Control District (PCAQCD) Rules Approved into the Arizona SIP	2
Table 1.1	Names and Elevations of Pinal County Cities	11
Table 1.2	1990-2012 Population Trend	13
Table 1.3	Annual New Privately-Owned Residential Building Permits Pinal County (Reported Only)	15
Table 1.4	Clean Air Act (CAA) Regulatory Requirements	16
Table 2.1	Pinal County PM _{2.5} Active Monitor within EPA's Final Boundaries.....	26
Table 2.2	2010-2012 Maximum 24-Hour Average PM _{2.5} Compliance	26
Table 3.1	Annual PM _{2.5} Emission Inventory Calculation Values (Windblown Dust Sources).....	30
Table 3.2	2008 and 2011 Paved Road Activity and Fugitive Emissions for PM _{2.5} Nonattainment Area.....	31
Table 3.3	2008 Unpaved Road Emissions for the West Pinal PM _{2.5} Nonattainment Area.....	31
Table 3.4	2011 Unpaved Road Emissions for the Pinal PM _{2.5} Nonattainment Area	32
Table 3.5	Annual PM _{2.5} Emission Inventory Calculation Values	32
Table 3.6	Annual PM _{2.5} Emission Inventory for Windblown Dust Sources in the West Pinal County PM _{2.5} Nonattainment Area (tons per year).....	33
Table 3.7	2008 PM _{2.5} Nonattainment Area Paved Road Exhaust Emissions.....	34
Table 3.8	2011 PM _{2.5} Nonattainment Area Paved Road Exhaust Emissions.....	34
Table 3.9	2008 PM _{2.5} Nonattainment Area Unpaved Road Exhaust Emissions	34
Table 3.10	2011 PM _{2.5} Nonattainment Area Unpaved Road Exhaust Emissions	35
Table 3.11	2008 and 2011 NONROAD Emissions Pinal County PM _{2.5} Nonattainment Area	35
Table 3.12	Summary of the 2008 Annual Emissions and Typical Daily Emissions for Railroads in Pinal County PM ₁₀ Nonattainment Area.....	36
Table 3.13	Summary of the 2011 Annual Emissions and Typical Daily Emissions for Railroads in Pinal County PM _{2.5} Nonattainment Area	36
Table 13.14	Summary of the 2008 Annual Emissions for Other Sources in the Pinal County PM _{2.5} Nonattainment Area (tons/year).....	36
Table 3.15	Table 13.15: Summary of the 2011 Annual Emissions for Other Sources in the Pinal County PM _{2.5} Nonattainment Area (tons/year).....	37
Table 3.16	Comparison of the 2008 & 2011 Annual PM _{2.5} Emissions in the Pinal County PM _{2.5} Nonattainment Area (tons per year).....	38
Table 3.17	Summary of the 2008 Annual PM _{2.5} Emissions in the Pinal County PM _{2.5} Nonattainment Area.....	39
Table 3.18	Summary of the 2011 Annual PM _{2.5} Emissions in the Pinal County PM _{2.5} Nonattainment Area.....	40
Table 3.19	Summary of the 2008 Typical Daily PM _{2.5} Emissions in the Pinal County PM _{2.5} Nonattainment Area.....	41
Table 3.20	Summary of the 2011 Typical Daily PM _{2.5} Emissions in the Pinal County PM _{2.5} Nonattainment Area.....	42

List of Figures

Figure ES-1	Pinal County at a Glance	1
Figure 1.1	Map of West Central Pinal County PM _{2.5} Nonattainment Area.....	9
Figure 1.2	PM _{2.5} Nonattainment Area in West Central Pinal County, Arizona	10
Figure 1.3	1981-2010 Summary of Monthly Normals at Maricopa 4N Station.....	11
Figure 1.4	PM _{2.5} Nonattainment (NA) Area and Arizona Annual Mean Precipitation.....	12
Figure 1.5	Population Distribution - Pinal County and W.C. Pinal County PM _{2.5} NA.....	13
Figure 1.6	Pinal County Civilian Employed Population 16 Years and Over	14
Figure 1.7	Summary of Median Household Income for Pinal County, Arizona, and U.S.....	15
Figure 1.8	Summary of the House Values for Pinal County, Arizona, and U.S.	15
Figure 2.1	West Central Pinal County PM _{2.5} Nonattainment Area.	25
Figure 2.2	24-Hour PM _{2.5} Three-Year Average Design Value	27

Appendices

Appendix A	Inventory Preparation Plan
------------	----------------------------

(This page is intentionally blank.)

I EXECUTIVE SUMMARY

The West Central Pinal County PM_{2.5} Nonattainment Area is in Central Arizona, located within a basin between the Phoenix and Tucson metropolitan areas. The nonattainment area covers approximately 460 square miles, which is about nine percent of the Pinal County land (78 FR 54394; Effective October 4, 2013). 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.¹ Figure ES-1 illustrates the geographical location of the West Central Pinal County PM_{2.5} nonattainment area in Pinal County within the State of Arizona.

Figure ES-1: Pinal County at a Glance



Source: Arizona Department of Environmental Quality

In October of 2009, the U.S. Environmental Protection Agency (EPA) notified the Governor of the State of Arizona that the new air data in Pinal County was in violation of the 2006 24-hour PM_{2.5} National Ambient Air Quality Standard (NAAQS).² Based on 2006-2008 air quality data, EPA took final action on January 26, 2011, to designate a portion of Pinal County as “nonattainment” for 2006 24-hour PM_{2.5} NAAQS (76 FR 6056; Effective March 7, 2011).

¹ Pinal County Economic Development - *Pinal County at a Glance*. Date Accessed: November 18, 2013. Retrieved from: <http://www.pinalcountyaz.gov/ed/businessconnections/Pages/PinalCountyStatistics.aspx>

² Letter from Laura Yoshii, EPA Acting Regional Administrator – *Designation for the 2006 24-hour PM_{2.5}*. Date of the Letter: October 14, 2009.

On October 4, 2013, the U.S. EPA determined that the West Central Pinal County nonattainment area attained the 2006 24-hour fine particle (PM_{2.5}) NAAQS (78FR 54394; Effective Date October 4, 2013). EPA’s determination was based upon complete, quality assured, and certified ambient air monitoring data from 2010 – 2012, showing that the area had attained the 2006 24-hour PM_{2.5} NAAQS.

Based on EPA’s clean data determination, the requirements for this area to submit an attainment demonstration, together with Reasonably Available Control Measures (RACM), a Reasonable Further Progress (RFP) plan, contingency measures, and attainment deadlines are suspended for so long as the area continues to attain the 2006 24-hour PM_{2.5} NAAQS.³ Clean data determination suspends most of the State Implementation Plan (SIP) planning requirements but do not redesignate areas as “attainment.”

This SIP for the West Central Pinal County PM_{2.5} Nonattainment Area consists of six chapters that present background information, air quality monitoring network, emissions inventory, prevention of significant deterioration/new source review, conformity, and conclusion.

Chapter 1 – Provides a general background to discuss the physical, demographic, economic description of the area, and regulatory background of the PM_{2.5} National Ambient Air Quality Standard in Pinal County.

Chapter 2 - Describes how the Pinal County Ambient Monitoring Network meets the Clean Air Act (CAA) and U.S. EPA regulatory requirements.

Chapter 3 – Provides the emission inventory for the nonattainment area. It includes a summary of methodologies used to develop the inventory as required by the CAA Section 172(c)(3) and identifies significant sources of emissions within the West Central Pinal County PM_{2.5} Nonattainment Area.

Chapter 4 – Addresses prevention of significant deterioration/new source review for new major sources or major sources making a major modification in a nonattainment area.

Chapter 5 – Presents a general overview on conformity regulations as required by Section 176(c) of the CAA.

Chapter 6 – Delivers a conclusion for this PM_{2.5} State Implementation Plan.

Table ES-1 lists the rules that have been submitted to the U.S. EPA and that have been approved into the Arizona State Implementation Plan (SIP) to regulate emissions of PM_{2.5}.

Table ES-1: Arizona Administrative Code (AAC) and Pinal County Air Quality Control District (PCAQCD) Rules Approved into the Arizona SIP			
Rule	Title	FR Date	FR Citation
R9-3-404	AAC - 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

³ 78 FR 54394; Effective Date: October 4, 2013 - Determination of Attainment for the West Central Pinal Nonattainment Area for the 2006 Fine Particle Standard.

Table ES-1: Arizona Administrative Code (AAC) and Pinal County Air Quality Control District (PCAQCD) Rules Approved into the Arizona SIP

Rule	Title	FR Date	FR Citation
R9-3-522	Standards of Performance for Existing Gravel and Stone Crushing Operations	9/28/1982	47 FR 42572
R18-2-702*	General Provisions	8/24/2004	69 FR 51952
Code 4-2-020	PCAQCD Fugitive Dust - General	4/6/2010	75FR 17307
Code 4-2-030	PCAQCD Fugitive Dust - Definitions	4/6/2010	75FR 17307
Code 4-2-040	PCAQCD Fugitive Dust - Standards	8/1/2007	72 FR 41896
Code 4-2-050	PCAQCD Fugitive Dust – Monitoring and Records	8/1/2007	72 FR 41896
<p>* 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. Source: Arizona Administrative Code and Pinal County Code</p>			

(This page is intentionally blank.)

1.0 INTRODUCTION

Chapter 1 describes the purpose of the State Implementation Plan (SIP) for the West Central Pinal County PM_{2.5} nonattainment area, summarizes the regulatory background of the area, includes a description of the federal PM_{2.5} standard, and provides a general overview of the nonattainment area and county.

1.1 Statement of Introduction and Purpose

In October of 2009, Environmental Protection Agency (EPA) notified the Governor of the State of Arizona that the “Cowtown” monitor in Pinal County was violating the 24-hour PM_{2.5} National Ambient Air Quality Standards (NAAQS). Based on the 2006-2008 air quality data, EPA took final action on January 26, 2011, to designate a portion of Pinal County as a “nonattainment” for 2006 24-hour PM_{2.5} NAAQS (76 FR 6056; Effective March 7, 2011).

The basis for EPA’s partial designation is monitored air quality data for 2006-2008 indicating a violation of the NAAQS design value of 48 µg/m³. On its notice of final rule making (NFRM), EPA also designated the remainder of Pinal County as “unclassifiable/attainment” and deferred designation of other areas in Pinal County to allow additional time to collect data and evaluate the area to determine an appropriate nonattainment area boundary (76 FR 6056; Effective March 7, 2007).

Based on the most recent three years of complete, quality-assured, and certified data in the Air Quality System (AQS) for 2010-2012, EPA determined that the nonattainment area in West Central Pinal County has attained the 2006 24-hour PM_{2.5} NAAQS. EPA’s final rule did not constitute a redesignation of the West Central Pinal nonattainment area to attainment for the 2006 24-hour PM_{2.5} NAAQS. The classification and designation of West Central Pinal County remains as a nonattainment until such time as EPA determines this area meets the CAA for redesignation (78 FR 54394; Effective, October 4 2013).

At this time, the State of Arizona is required to develop a State Implementation Plan (SIP) that demonstrates attainment of the PM_{2.5} NAAQS as expeditiously as practicable, in accordance with the requirements of the Clean Air Act (CAA) and applicable EPA regulations. The State must submit its SIP to EPA within three years of the effective date of the Agency’s nonattainment designation, or by March 7, 2014. Pinal County nonattainment area is required to meet the standards no later than five years from the effective date of nonattainment designation.

On November 21, 2013, EPA published a proposed new deadline for the areas that need more time to comply with additional provisions of subpart 1 and subpart 4 of the CAA⁴. The proposed rule intends to assist states to understand and efficiently discharge any remaining responsibilities. Additionally, the rule will facilitate the processing of requests to designate 1997 and 2006 nonattainment, since clear deadlines will provide means for identifying applicable requirements for purposes to evaluate redesignation requests.

For the West Central Pinal County PM_{2.5} Nonattainment SIP, EPA is proposing that the State of Arizona submit a plan to include an attainment demonstration of subpart 4 for the 2006 24-hour PM_{2.5} standard by December 31, 2014. If the NPRM is approved, the new submission date will replace the March 7, 2014 date by which the state was previously required to submit the plan (78 FR 69806).

⁴ Clean Air Act – Plan requirements for Nonattainment Areas are described under Title 1(Air Pollution Prevention and Control), Part D (Plan requirements for Nonattainment Areas): Subpart 1(Nonattainment Areas in General) and Subpart 4 (Additional Provisions for Particulate Matter Nonattainment).

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 that the West Central Pinal County nonattainment area continues to attain the 2006 24-hour PM_{2.5} NAAQS.

1.2 National Ambient Air Quality Standards

Title I of the CAA requires EPA to set NAAQS for pollutants that are considered harmful to both the public health and the environment. Standards are set for six criteria pollutants: ground-level ozone, particulate matter, carbon monoxide, nitrogen dioxide, sulfur dioxide, and lead. EPA sets two types of NAAQS that includes primary and secondary standards. 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.⁵

The standard for each pollutant is set at a maximum concentration in either parts per million (ppm), parts per billion (ppb), 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.⁶ These standards are reviewed every five years and are 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.⁷ These particles can also be formed in the atmosphere when gaseous pollutants such as sulfur dioxides and nitrogen dioxides react to form fine particles.⁸

Particles that are less than 2.5 micrometers in diameter are referred as “fine” particles or PM_{2.5}. The CAA requires EPA to set air quality standards for such small particles in order to protect both public health and welfare. EPA is also required to periodically review the standards to ensure that they provide adequate health and environmental protection, and to update those standards as necessary.

In 1997, EPA promulgated revisions to the PM₁₀ NAAQS; most significantly, the agency added a new standard using PM_{2.5} as a separate indicator from the thoracic particles PM₁₀. EPA established annual PM_{2.5} standard of 150 $\mu\text{g}/\text{m}^3$, based on the three-year average of annual arithmetic mean of PM_{2.5} concentrations from single or multiple monitors. The 24-hour standard was set to 65 $\mu\text{g}/\text{m}^3$, based on the three-year average of the 98th percentile of 24-hour PM_{2.5} concentrations at each population-oriented monitor within an area (62 FR 38652; Effective September 16, 1997). With regards to secondary standards, EPA revised the standards by making them identical in all respects to the primary standards (78 FR 3086; Effective March 18, 2013).

In 2006, EPA completed its last review of the particle matter (PM) NAAQS and took three actions: revised the level of the primary 24-hour PM_{2.5} standard from 65 to 35 $\mu\text{g}/\text{m}^3$ and retained the level of the annual primary standard to 12.0 $\mu\text{g}/\text{m}^3$, retained the primary 24-hour PM₁₀ standard and revoked the primary annual PM₁₀ standard, and revised the secondary standards to be identical in all respects to

⁵ U.S. EPA - *National Ambient Air Quality Standards*. Date Accessed: October 29, 2013. Retrieved from: <http://www.epa.gov/air/criteria.html>

⁶ Ibid.

⁷ U.S. Environmental Protection Agency, <http://www.epa.gov/airquality/particlepollution/basic.html>. Date Accessed October 29, 2013.

⁸ Ibid

primary standards (71 FR 61144; Effective December 18, 2006). On January 15, 2013, EPA published a notice of final rule making to retain current suite of PM standards, except for change to the current secondary 24-hour PM_{2.5} and PM₁₀ standards (78 FR 3086; Effective March 18, 2013).

Under 40 CFR Part 50 (“Interpretation of the NAAQS for PM_{2.5}”) and Appendix N of 40 CFR part 50 (“Interpretation of the NAAQS for PM_{2.5}”), the 2006 PM_{2.5} NAAQS is met when each monitoring site in the area has a design value at or below the standard.

1.4 Regulatory Background

On October 14, 2009, EPA notified the Governor of Arizona that an additional area in Pinal County appears to violating the 2006 24-hour PM_{2.5} NAAQS based on the 2006-2008 air quality monitoring data.⁹ Due to the need for additional time to collect data and evaluate the area, EPA decided to defer the area designation of Pinal County and other areas outside the county. On May 10, 2010, EPA notified the Governor of Arizona of its intent to designate a portion of Pinal County nonattainment for the 24-hour PM_{2.5} NAAQS thereby modifying the recommendation for an attainment designation for Pinal previously made by Arizona.¹⁰

On November 13, 2009, EPA promulgated initial air quality designation for most areas in the United States including some areas in Pinal County, Arizona. In particular, EPA identified the geographic boundaries of areas that violate, or contribute to violation of the 2006 24-hour PM_{2.5} NAQQS. As a result of the designation, all states that are designated as nonattainment are required to develop and submit a SIP to demonstrate attainment of the 2006 PM_{2.5} standard (74 FR 58688; Effective December 14, 2009).

In a letter dated July 19, 2010, the Governor of Arizona responded to EPA’s letter dated May 10, 2010, and stated the intention of modifying the State’s initial boundary recommendation. The Governor argued that a nonattainment designation was unwarranted, given the evidence that exceedances of the PM_{2.5} NAAQS are an artifact of high concentration of the PM₁₀, and Arizona is making progress in reducing PM₁₀ concentrations. According to Pinal County Technical Support Document, EPA noted these arguments did not address the fact that there are monitored violations of the 2006 24-hour PM_{2.5} NAAQS in the area, nor negate EPA’s obligation under Section 107(d) to designate as nonattainment.¹¹

The Governor offered a “counter-proposal” to EPA’s recommended nonattainment area boundary that was significantly smaller than the boundary EPA originally proposed in its TSD.¹² In support of the Governor’s recommended alternative boundary, ADEQ submitted a technical report entitled “Arizona Air Quality Designations, Technical Support Document, Boundary Recommendation for the Pinal County 24-hour Standard PM_{2.5} Nonattainment Area (July 13, 2010),” herein referred to as ADEQ’s “Technical Report.”

After reviewing the Governor’s July 19, 2010 letter and ADEQ’s Technical Report, EPA revised their initial proposed nonattainment boundary. EPA determined that the Table Top Wilderness Area, which occupies most of the southwestern corner of the proposed nonattainment area, along with state lands to the south of wilderness area, are not likely to be contributing to the exceedances measured at the

⁹ U.S. EPA’s October 14, 2009 letter from Laura Yoshii to Governor Janice Brewer – Designation for the 2006 24 PM_{2.5} NAAQS.

¹⁰ U.S. EPA’s May 10, 2010 letter from Jared Blumfeld to Governor Janice Brewer - Designation for the 2006 24 PM_{2.5}.

¹¹ U.S. EPA - December 2010 Addendum to EPA’s May 5, 2010 Technical Support Document. Pinal County, Arizona Area Designation for the 2006 24-hour Fine Particle national Ambient Air Quality Standards.

¹² Governor Janice Brewer’s July 19, 2010, letter to EPA – Pinal County PM_{2.5} Area Designation Recommendation

Cowtown monitor due to the absence of sources of emissions of PM_{2.5} or PM_{2.5} precursors in the wilderness area. With these considerations, EPA revised its proposed boundary for the nonattainment area to exclude the Table Top Wilderness Area and state lands to the south of the final nonattainment area.¹³

On September 4, 2013, EPA took final action to determine that the area in West Central Pinal nonattainment area in Pinal County, Arizona has attained the 2006 24-hour PM_{2.5} (78 FR 54394; Effective October 4, 2013). EPA's determination was based on the most recent three years of completed, quality-assured, and certified data in Air Quality System (AQS) for 2010-2012. Based on the same determination, EPA also took a final action to suspend the following requirements for the West Central Pinal nonattainment area: submission of an attainment demonstration pursuant to Section 189(a)(1)(B), the RACM provisions of Section 189(a)(1)(C), the RFP provisions of Section 189(c), and related attainment demonstration, RACM, RFP and contingency measure provisions requirements of subpart 1, Section 172, for so long as the area continues to attain the 2006 PM_{2.5} NAAQS.

EPA's determination of attainment for the West Central Pinal County nonattainment area does not establish a redesignation of the County nonattainment area to attainment for the 2006 24-PM_{2.5} NAAQS. Until EPA approves the State of Arizona nonattainment plan, the West Central Pinal County remains as a nonattainment area for the 2006 24-hour PM_{2.5} NAAQS. Within three years of the effective date of designations, states with areas designated as nonattainment for the 2006 PM_{2.5} NAAQS are required to submit SIP revisions as expeditiously as practicable, but no later than five years from the attainment designation. In this instance, the West Central Pinal nonattainment SIP should be submitted no later than March 7, 2014 (78 FR 41901).

On November 21, 2013, EPA promulgated a proposed rule with regard to identification of nonattainment classification and deadlines for submission of SIP provisions for the 1997 and 2006 PM_{2.5} NAAQS. EPA proposed to identify the initial classification of areas currently designated nonattainment for the 1997 and the 2006 PM_{2.5} standard as "moderate" and to set a deadline of December 4, 2014, for submission of any attainment-related and New Source Review (NSR) SIP elements that may be due for these areas in consideration of the requirements under subpart 4. For the 2006 PM_{2.5} nonattainment areas, the clearly affected areas by this proposed rule are those that did not submit a SIP under subpart 1 and areas that do not have a clean data determination or have not yet submitted a redesignation request.¹⁴

1.5 Nonattainment Area Description

The West Central Pinal County PM_{2.5} nonattainment area covers approximately nine percent of the total Pinal County land area. EPA's final designation defined the boundaries of the nonattainment area to encompass the following townships and ranges:

T4S, R2E – R4E, except Indian Country; T5S, R2E – R4E, except Indian Country; T6S, R2E – R4E; T7S, R2E, except sections 13 - 36; T7S, R3E, except-NW ¼, NW ¼ of section 15, SW ¼, NW ¼ of section 15, NW ¼, SW ¼ of section 15, SW ¼, SW ¼ of section 15; sections 16 – 21; NW ¼, NW ¼ of section 22, SW ¼, NW ¼ of section 22, NW ¼, SW ¼ of section 22, SW ¼, SW ¼ of section 22; NW ¼, NW ¼ of section 27, SW ¼, NW ¼ of section 27, NW ¼, SW ¼ of section 27, SW ¼, SW ¼ of

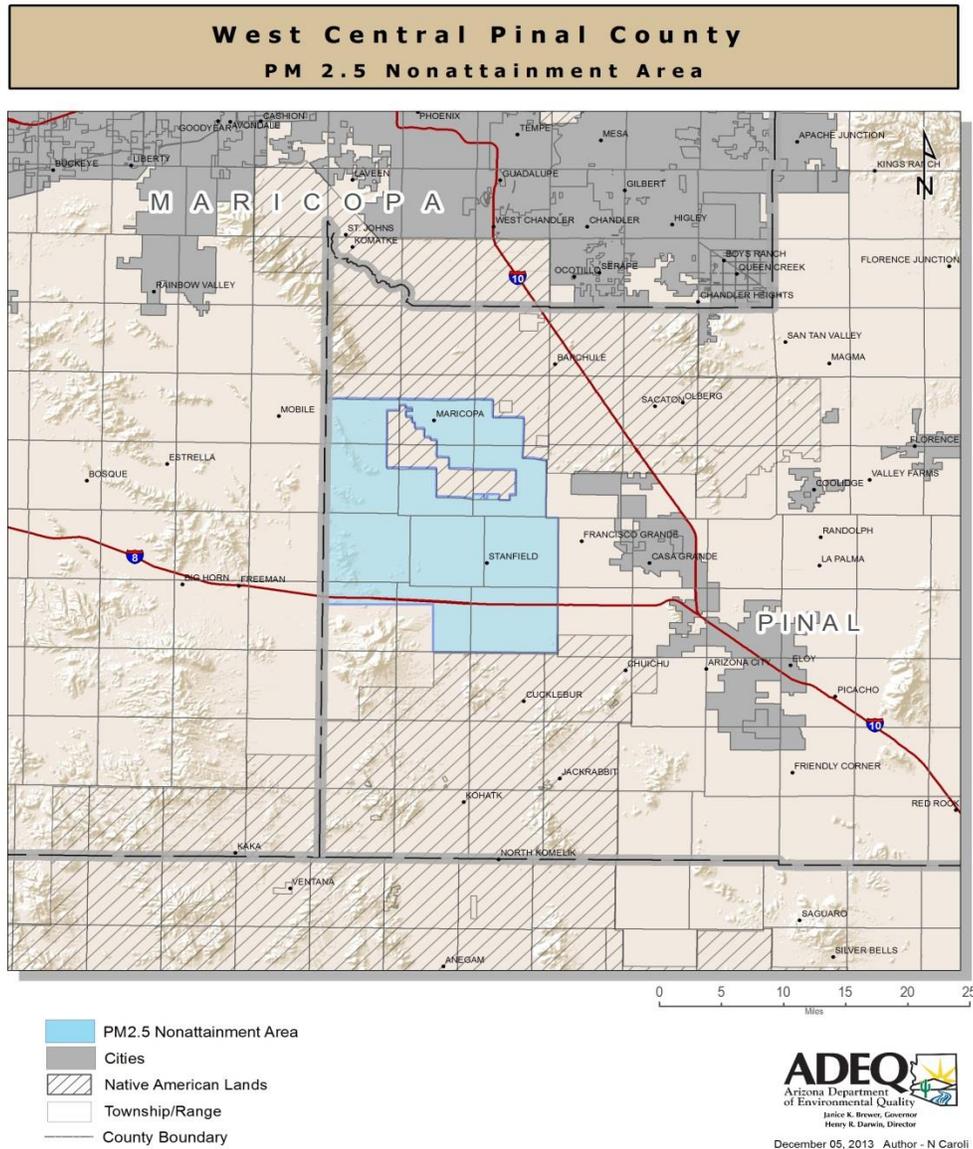
¹³ .S. EPA - December 2010 Addendum to EPA's May 5, 2010 Technical Support Document. Pinal County, Arizona Area Designation for the 2006 24-hour Fine Particle national Ambient Air Quality Standards.

¹⁴ 78 FR 69806 - Notice of Proposed Rule Making, Published on Thursday, November 21, 2013.

section 27; sections 28-33; and NW ¼, NW ¼ of section 34, SW ¼, NW ¼ of section 34, NW ¼, SW ¼ of section 34, SW ¼, SW ¼ of section 34; T7S, R4E.¹⁵

Figure 1.1 below shows the geographical location of the West Central Pinal County PM_{2.5} nonattainment area.

Figure 1.1: Map of West Central Pinal County PM_{2.5} Nonattainment Area



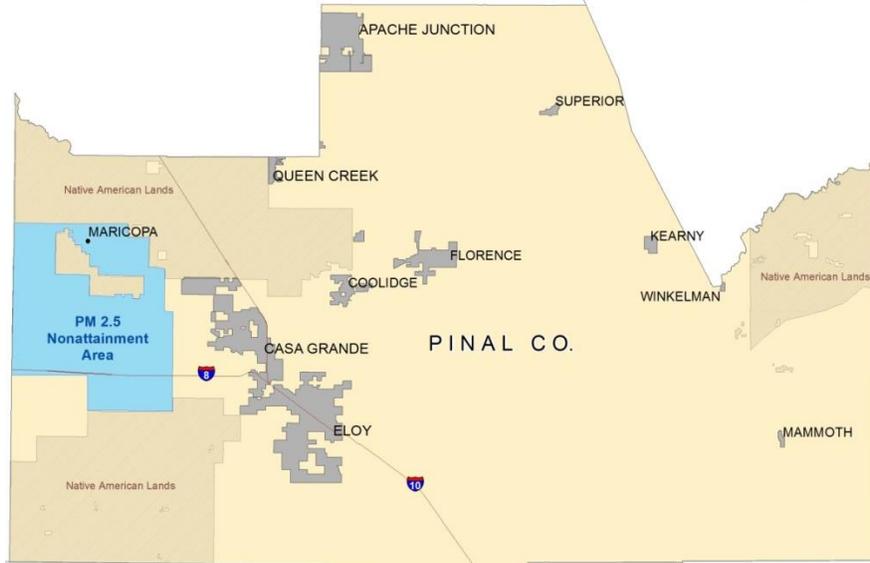
Source: Arizona Department of Environmental Quality

¹⁵ United State Environmental Protection Agency – *Area Designations for 2006 24-Hour Fine Particle (PM_{2.5}) Standards*. Date Accessed: November 7, 2013. Retrieved from: http://www.epa.gov/pmdesignations/2006standards/rec/letters/09_AZ_EPAMOD4.pdf

1.5.1 Geography and Climate

The nonattainment area is situated within Pinal County, which is located in Central Arizona. Pinal County lies between the Phoenix and Tucson metropolitan areas and encompasses approximately 5,374 square miles.¹⁶ The eastern portion of Pinal County is mountainous with elevations up to 6,000 feet, whereas the western region primarily consists of low desert valleys. Pinal County consists of several cities that sit on various elevations. Figure 1.2 shows the PM_{2.5} nonattainment area and other cities in Pinal County, Arizona and Table 1.1 provides a list of names and elevations of Pinal County cities.

Figure 1.2: PM_{2.5} Nonattainment Area in West Central Pinal County, Arizona



Source: Arizona Department of Environmental Quality

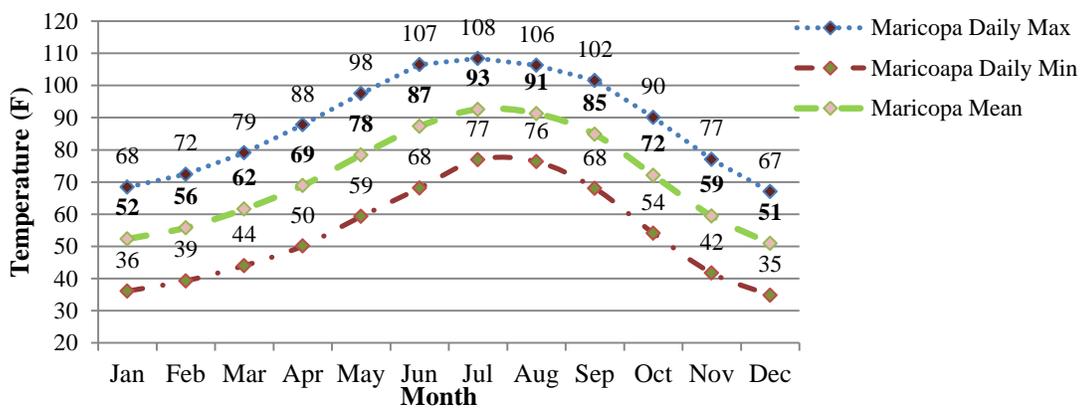
¹⁶ Pinal County Economic Development - *Pinal County at Glance*. Date Accessed: November 18, 2013. Retrieved from: <http://www.pinalcountyaz.gov/ed/businessconnections/Pages/PinalCountyStatistics.aspx>

Table 1.1 – Names and Elevations of Pinal County Cities		
City Name	Elevation (ft.)	County Name
Apache Junction	1,721.68	Pinal
Casa Grande	1,396.64	Pinal
Coolidge	1,426.12	Pinal
Eloy	1,556.74	Pinal
Florence	1,489.75	Pinal
Mammoth	2,359.24	Pinal
Maricopa	1,173.96	Pinal
Superior	2,842.00	Pinal

Source: USGS – Science for Changing¹⁷

The climate in Pinal County is arid with an annual mean temperature of approximately 71°F, which is higher than the Arizona annual mean temperature of approximately 61°F.¹⁸ The mean maximum temperature reaches to 93°F in July and the mean minimum temperature drops to 51°F in December.¹⁹ Figure 1.3 provides a summary of monthly normal temperatures to show daily maximum, daily minimum, and mean temperatures measured at Maricopa County 4N station. This is the nearest available data to the PM_{2.5} nonattainment area.

Figure 1.3: 1981-2010 Summary of Monthly Normals at Maricopa 4N Station



Source: NOAA National Climatic Data Center and Earth System Research Laboratory.²⁰

The driest time of the year for the PM_{2.5} nonattainment area (Maricopa 4N Station) is typically April through June followed by September through November. According to NOAA, the highest monthly mean precipitation recorded at the Maricopa 4N station reached 1 inch during the month of March and typically

¹⁷ USGS. Science for a Changing World – *The National Map Viewer and Download Platform*. Date Accessed: November 19, 2013. Retrieved from: <http://www.usgs.gov/pubprod/>

¹⁸ The National Oceanic and Atmospheric Administration (NOAA) - *Summary of the Monthly Normals (1981-2010)*. Date Accessed: November 25, 2013. Retrieved from: <http://www.ncdc.noaa.gov/cdo-web/search>

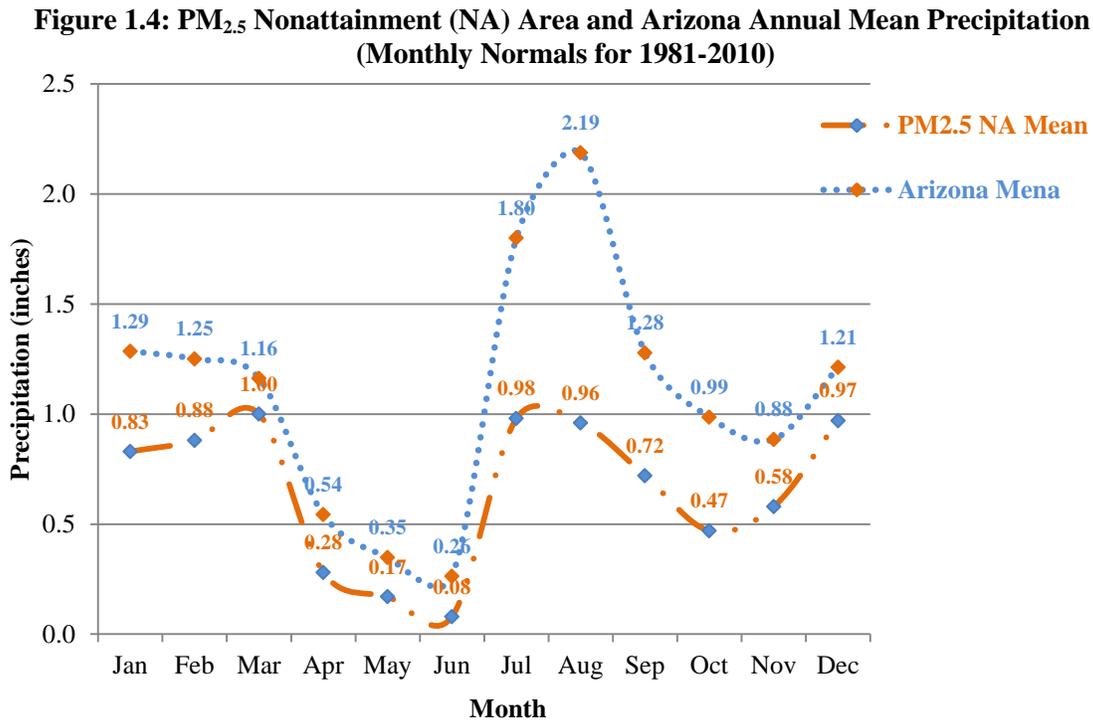
¹⁹ Mean temperatures for Maricopa 4N station were extracted from NOAA National Climatic Data. Date Accessed: November 25, 2013. Retrieved from:

<http://www.ncdc.noaa.gov/cdo-web/search>

²⁰ Ibid

ranges between 0.08 to 1 inches annually.²¹ These data represent a summary of monthly normal rainfall amounts for 1981-2010.

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 1.4 compares the total annual mean precipitation for the PM_{2.5} nonattainment area and the State of Arizona.



Source: NOAA National Climatic Data Center and Earth System Research Laboratory.²²

1.5.2 Population

According to the 2011 Arizona Department of Administration (ADOA) population estimates, the West Central Pinal PM_{2.5} nonattainment area has a total population of 52,974. The estimate indicates that 44,477 of the population live in the incorporated areas, 7,581 people live in unincorporated (non-CDP) areas, and 898 live within the Census Designated Places (CDP).²³ Figure 1.5 compares population distribution between Pinal County and West Central Pinal County nonattainment area between the year of 1990 and 2012. Table 1.2 provides a seven-year historic trend (1990-2012) to show the total population for the PM_{2.5} nonattainment area, population distribution for each area within PM_{2.5} nonattainment area, and total population for Pinal County and State of Arizona.

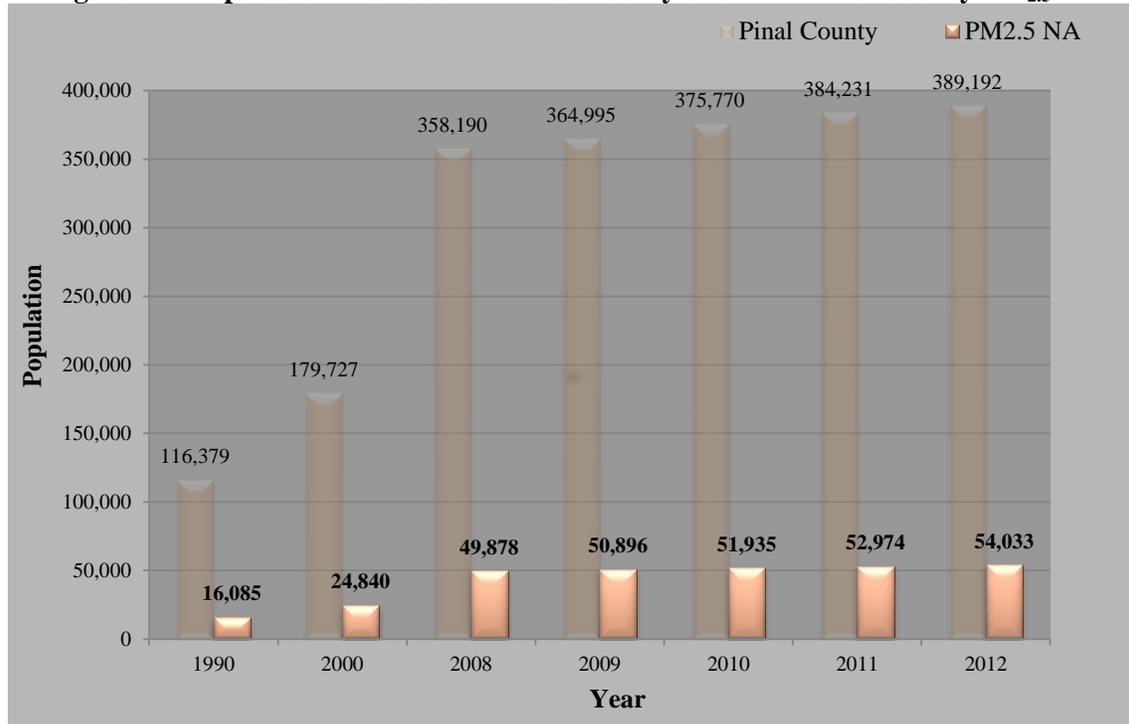
²¹ NOAA National Climatic Data Center – 1981-2010 *Summary of Monthly*. Date Accessed: November 19, 2013. Retrieved from: <http://www.ncdc.noaa.gov/cdo-web/search>

²² Mean temperatures for Maricopa were extracted directly from NOAA National Climatic Data Center while the Arizona mean temperatures were only available in the form of State averaged data from NOAA Earth System Research Laboratory. ADEQ computed the mean temperatures for thirty year period (1981-2010) to obtain the presented monthly mean temperatures and precipitations for the State of Arizona. Date Accessed: November 25, 2013. Retrieved from:

<http://www.ncdc.noaa.gov/cdo-web/search> and <http://www.esrl.noaa.gov/psd/data/timeseries/>

²³ Internal Report from the Arizona Department of Administration. November 18, 2013

Figure 1.5: Population Distribution - Pinal County and W.C. Pinal County PM_{2.5} NA



Source: Source: Arizona Department of Administration - November 18, 2013, Internal Report

Table 1.2: 1990-2012 Population Trend							
Places	1990	2000	2008	2009	2010	2011	2012
Ak-Chin Village CDP	49	76	152	155	158	161	164
Casa Grande city	8	12	24	25	26	27	28
City of Maricopa *	X	X	38,794	41,309	43,482	44,450	44,946
Stanfield CDP	654	651	711	725	740	755	770
Unincorporated area	15,374	24,101	10,198	8,682	7,529	7,581	8,125
PM_{2.5} NA	16,085	24,840	49,878	50,896	51,935	52,974	54,033
Pinal County	116,379	179,727	358,190	364,995	375,770	384,231	389,192
Arizona	3,682,790	5,130,632	6,368,649	6389081	6392017	X	X
*City of Maricopa in Arizona --- Incorporated in 2003. X – Data Not Available							
Source: Arizona Department of Administration - November 18, 2013, Internal report							

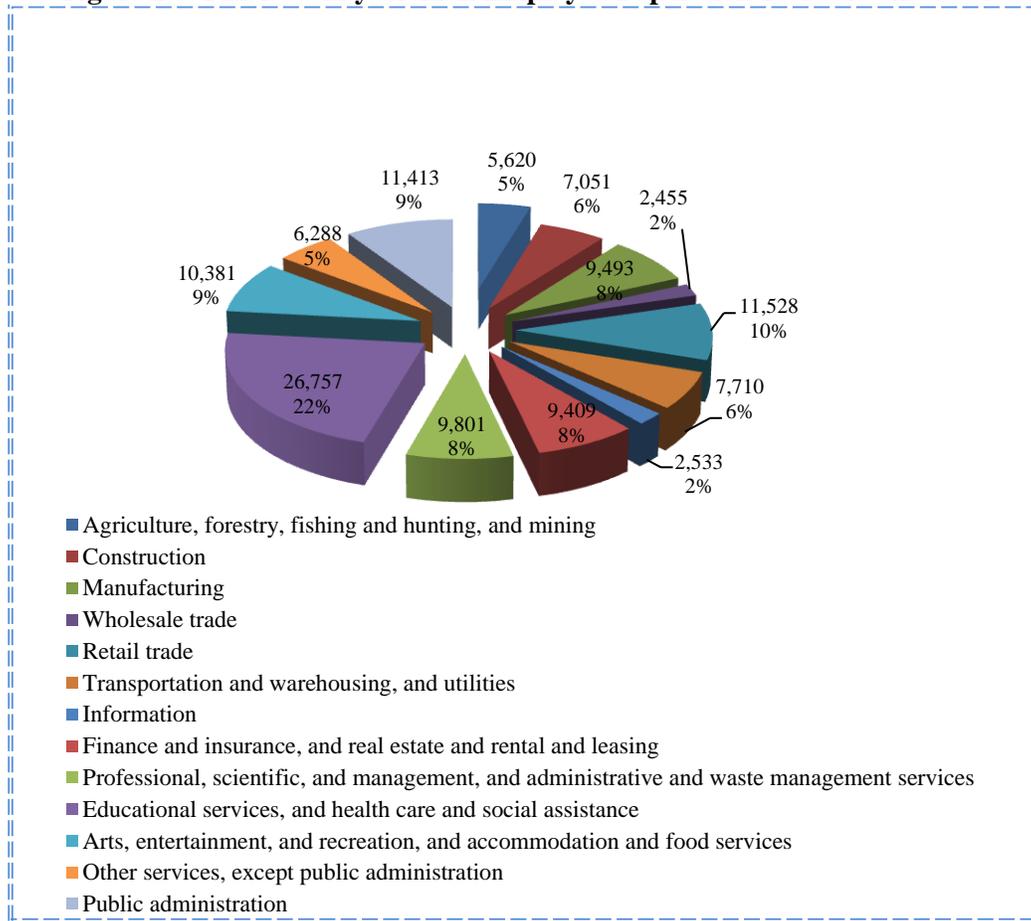
1.5.3 County Economy

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.²⁴ 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.²⁵ Enterprise Zones are areas designed to encourage growth and development. Businesses located in a state Enterprise Zone can claim an income tax credits for new jobs created on its Arizona corporate income tax. Approximately twenty two percent of the employed population is engaged in educational services, healthcare, and social services. Figure 1.6 provides a percentage distribution of the total employed population by various sectors.

Figure 1.6: Pinal County Civilian Employed Population 16 Years and Over



Source: U.S. Census Bureau, 2011. American Community Survey²⁶

The median household income in Pinal County was \$50,160 from 2008 to 2012, which has increased by approximately 40 percent since 2000. Based on the 2008-2012 data, the median income growth rate is

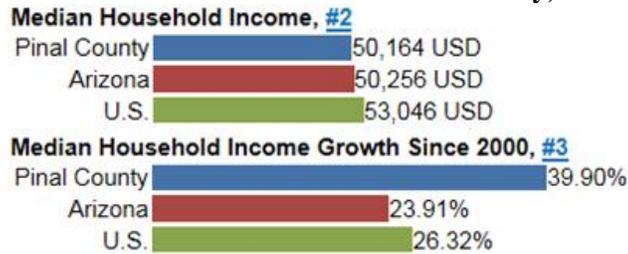
²⁴Business Connections – *Pinal County Statistics*. Date Accessed: October 22, 2013. Retrieved from: <http://www.pinalcountyaz.gov/ed/businessconnections/Pages/PinalCountyStatistics.aspx>

²⁵ Ibid

²⁶ 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

much higher than the state average rate of 24 percent and is much higher than the national average rate of 26 percent. Figure 1.7 compares the median household income for Pinal County, Arizona, and the U.S.

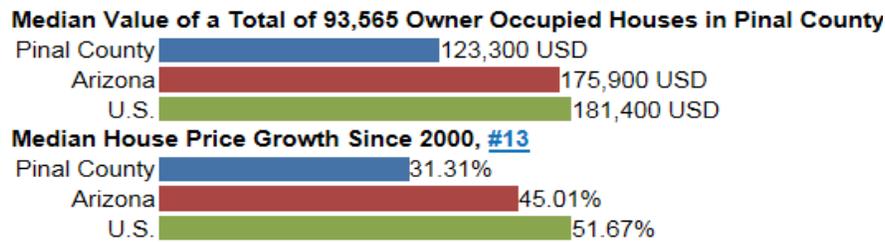
Figure 1.7: Summary of Median Household Income for Pinal County, Arizona, and U.S (2008-2012)



Source: USA.COM Local data Search – Pinal County Housing²⁷

House values in Pinal County have also increased. From 2008 to 2012, the median house value in Pinal County was \$123,300, which is lower than the state average of \$175,900 and lower than the national average of \$181,400. The growth rate in house value has increased by approximately 31 percent since the year 2000 as compared to the state average of 45 percent and the national average of 52 percent. Figure 1.8 presents a summary of the house values for Pinal County, State of Arizona, and the U.S.

Figure 1.8: Summary of the House Values for Pinal County, Arizona, and U.S. (2008-2012)



Source: USA.COM Local data Search – Pinal County Housing²⁸

In 2011, the number of permits issued for buildings and units were 975 and 978, respectively. By 2012, the number of permits issued for buildings and units increased to 1,776 and 1,823, respectively.²⁹ Table 1.3 provides a four-year annual summary of the issued building permits in Pinal County.

Table 1.3: 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

²⁷ USA. COM Local Data Search – Pinal County Housing. Date Accessed: January 28, 2014. Retrieved from: <http://www.usa.com/pinal-county-az-income-and-careers.htm>

²⁸ Ibid

²⁹ U.S. Census of Bureau – *Building Permits*. Date Accessed: October 22, 2013. Retrieved from: <http://censtats.census.gov/bldg/bldgprmt.shtml?>

Table 1.3: Annual New Privately-Owned Residential Building Permits Pinal County (Reported Only)			
Year	Buildings	Units	Cost
2009	2,182	2,182	\$284,576,575
Source: Building Permits - U.S. Census Bureau ³⁰			

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 1.4 includes the SIP requirements and explains how this document meets them. Pollutant specific requirements for PM_{2.5} 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 1.4: 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	<p>“...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.”</p> <p>RACT is defined for PM_{2.5} as that technology which is necessary to achieve the NAAQS (40 CFR 51.100(o)).</p> <p>EPA has determined that the nonattainment area has attained the 2006 24-hour PM_{2.5} NAAQS and has suspended the requirements of this section. (78 FR 54394; Effective October 4, 2013).</p>	
172(c)(2) – Reasonable Further Progress (RFP)	<p>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.”</p> <p>EPA has determined that the nonattainment area has attained the 2006 24-hour PM_{2.5} NAAQS and has suspended the requirements of this section. (78 FR 54394; Effective October 4, 2013).</p>	

³⁰ Ibid

Table 1.4: Clean Air Act (CAA) Regulatory Requirements		
CAA Citation	Action to Meet Requirement	Location in Document
172(c)(3) – Emissions Inventory	<p>The plan provisions “... shall include a comprehensive, accurate, current inventory of actual emissions from all sources of the relevant pollutant(s)...”</p> <p>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.</p>	Chapter 3
172(c)(4) – Identification and Quantification	<p>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 attainment of the applicable national ambient air quality standard ...”</p> <p>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 to emit or has potential to emit considering controls, in the aggregate, 10 tons per year or more of any hazardous air pollutant or 25 tons per year or more of any combination of hazardous air pollutants. (Section 112(a)(1).</p>	
172(c)(5) – Permits for New and Modified Major Stationary Sources	<p>The plan provisions “...shall require permits for the construction and operation of new or modified major stationary sources anywhere in the nonattainment area...”</p> <p>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</p>	Chapter 4

Table 1.4: Clean Air Act (CAA) Regulatory Requirements		
CAA Citation	Action to Meet Requirement	Location in Document
	District, NSR program in Code of Regulations, Chapter 3.	
172(c)(6) – Other Measures	<p>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...”</p> <p>EPA has determined that the nonattainment area has attained the 2006 24-hour PM_{2.5} NAAQS and has suspended the requirements of this section. (78 FR 54394; Effective October 4, 2013).</p>	
172(c)(7) – Compliance with Section 110(a)(2), Implementation Plans	<p>The plan provisions “... shall also meet the applicable provisions of Section 110(a)(2).”</p> <p>The requirements of Section 110(a)(2) are detailed elsewhere in this Table.</p>	
172(c)(8) – Equivalent Techniques	<p>The plan may include upon application by the state “... the use of equivalent modeling, emission inventory, and planning procedures ...” as allowed by the administrator.</p> <p>This Section of the CAA is not applicable for this submission.</p>	
172(c)(9) – Contingency Measures	<p>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.”</p> <p>EPA has determined that the nonattainment area has attained the 2006 24-hour PM_{2.5} NAAQS and has suspended the requirements of this section. (78 FR 54394; Effective October 4, 2013).</p>	
CAA Sections 176 – Transportation Conformity and General Conformity Regulations		

Table 1.4: Clean Air Act (CAA) Regulatory Requirements		
CAA Citation	Action to Meet Requirement	Location in Document
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). 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.”³¹</p> <p>Criteria for making determinations and provisions for general conformity are located in R18-2-1438 of the Arizona Administrative Code. There are no known federal plans or actions affecting air quality currently in the West Central Pinal County PM_{2.5} nonattainment area.</p>	Chapter 5
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.”³²</p> <p>General Conformity for the West Central Pinal County Nonattainment Area must be addressed to assure PM_{2.5} 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>	Chapter 5
CAA Sections 188, 189 and 190 – Additional Provisions for Particulate Matter Nonattainment		

³¹ US EPA - *State and Local Transportation Resources*. Date Accessed: October 22, 2013. Retrieved from: <http://www.epa.gov/OMS/stateresources/transconf/generalinfo.htm>

³² US EPA – *General Conformity Regulations*. Date Accessed: November 1, 2013. Retrieved from: <http://www.epa.gov/ttn/caaa/genconformity.html>

Table 1.4: Clean Air Act (CAA) Regulatory Requirements		
CAA Citation	Action to Meet Requirement	Location in Document
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</p> <p>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 West Central Pinal County PM 2.5 area was designated as nonattainment in February 2011 and must show attainment by December 2017.</p>	
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;...”</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 PM₁₀.</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 PM₁₀ 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> <p>EPA has determined that the nonattainment area has attained the 2006 24-hour PM_{2.5} NAAQS and has suspended the requirements of this section. (78 FR 54394; Effective October 4, 2013).</p>	
189(a)(1)(B) – Moderate Areas	<p>State shall</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>Due to the clean data determination, this requirement has been suspended.</p>	

Table 1.4: Clean Air Act (CAA) Regulatory Requirements		
CAA Citation	Action to Meet Requirement	Location in Document
189(a)(1)(C) – Moderate Areas	<p>“C) Provisions to assure that reasonably available control measures for the control of PM₁₀ 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> <p>EPA has determined that the nonattainment area has attained the 2006 24-hour PM_{2.5} NAAQS and has suspended the requirements of this section. (78 FR 54394; Effective October 4, 2013).</p>	
189(a)(2)(B) Schedule for Plan Submissions	<p>Plans should be submitted within</p> <p>“(B)18 months after the designation as nonattainment, for those areas designated nonattainment after the designations prescribed under section 7407(d)(4) of this title.”</p> <p>The current due date for submitting this plan is Marc 7, 2014; however, EPA had proposed a new submittal date to be December 31, 2014 (78 FR 69806).</p>	
189(c)(1) - Milestones	<p>“(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.”</p> <p>EPA has determined that the nonattainment area has attained the 2006 24-hour PM_{2.5} NAAQS and has suspended the requirements of this section. (78 FR 54394; Effective October 4, 2013).</p>	
189(c)(2) - Milestones	<p>“(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.”</p>	
189(c)(3) - Milestones	<p>“(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...”</p>	
189(e) - Precursors	<p>“The control requirements applicable under plans in effect under this part for major stationary sources of PM₁₀ shall also apply to major stationary sources of PM₁₀ precursors, except where the Administrator determines that such sources do not contribute significantly to PM₀ levels which exceed the standard in the area. The Administrator shall issue guidelines regarding the application of the preceding sentence.”</p> <p>EPA has determined that the nonattainment area has attained the 2006 24-hour PM_{2.5} NAAQS and has suspended the requirements of this section. (78 FR 54394;</p>	

Table 1.4: Clean Air Act (CAA) Regulatory Requirements		
CAA Citation	Action to Meet Requirement	Location in Document
	Effective October 4, 2013).	
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.	

(This page is intentionally blank.)

2.0 AIR QUALITY MONITORING

The primary goal of the PM_{2.5} monitoring network in Pinal County is to collect data necessary to determine compliance with the PM_{2.5} NAAQS and fulfill the regulatory requirements for PM_{2.5} monitoring. The Code of Federal Regulations (CFR) defines minimum monitoring requirements based on the population of the Metropolitan Statistical Area (MSA) and the design value for each NAAQS (40 CFR, Part 58 Appendix D).

This chapter provides a general description of the monitoring site, equipment, and quality assurance procedures; 24-hour fine particle (PM_{2.5}) NAAQS compliance; and data summary. The Cowtown monitoring site is the only station in the West Central Pinal County nonattainment area that monitors PM_{2.5} concentrations. Other Pinal County PM_{2.5} monitoring sites include the Apache Junction and Casa Grande monitoring sites.

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 criteria and are consistent with *Pinal County Air Quality Control District 2012 Ambient Monitoring Network Plan and 2011 data Summary*, approved by EPA on March 1, 2013.³³

EPA's comment on the 2012 network plan noted that Pinal's network lacked at least one collocated filter based monitoring for comparison of all 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.³⁴

Filter based Anderson FRM PM₁₀ and FRM PM_{2.5} units were installed at Cowtown Road monitoring site in August of 2005. The units were both operated on a one in six-day schedule to allow PM₁₀, PM_{2.5}, and surrogate coarse data to be collected. The surrogate coarse data are extrapolated by subtracting the PM_{2.5} concentration from the PM₁₀ concentration. On January 15, 2009, the PM₁₀ and PM_{2.5} Anderson samplers were replaced by Thermo PM₁₀ and PM_{2.5} Partisol samplers, which also operated on a one in six-day schedule.

On December 31, 2011, the filter based PM₁₀ sampler at the site was discontinued in order to convert the sampler to PM_{2.5} to collect more frequent PM_{2.5} samples using two units. Effective January 1, 2012, PM_{2.5} sample frequency changed to a one in three-day schedule.

The State and Local Air Monitoring Station (SLAMS) network consists of monitoring stations that provide data to meet the requirements of 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 and used for comparison to the NAAQS.

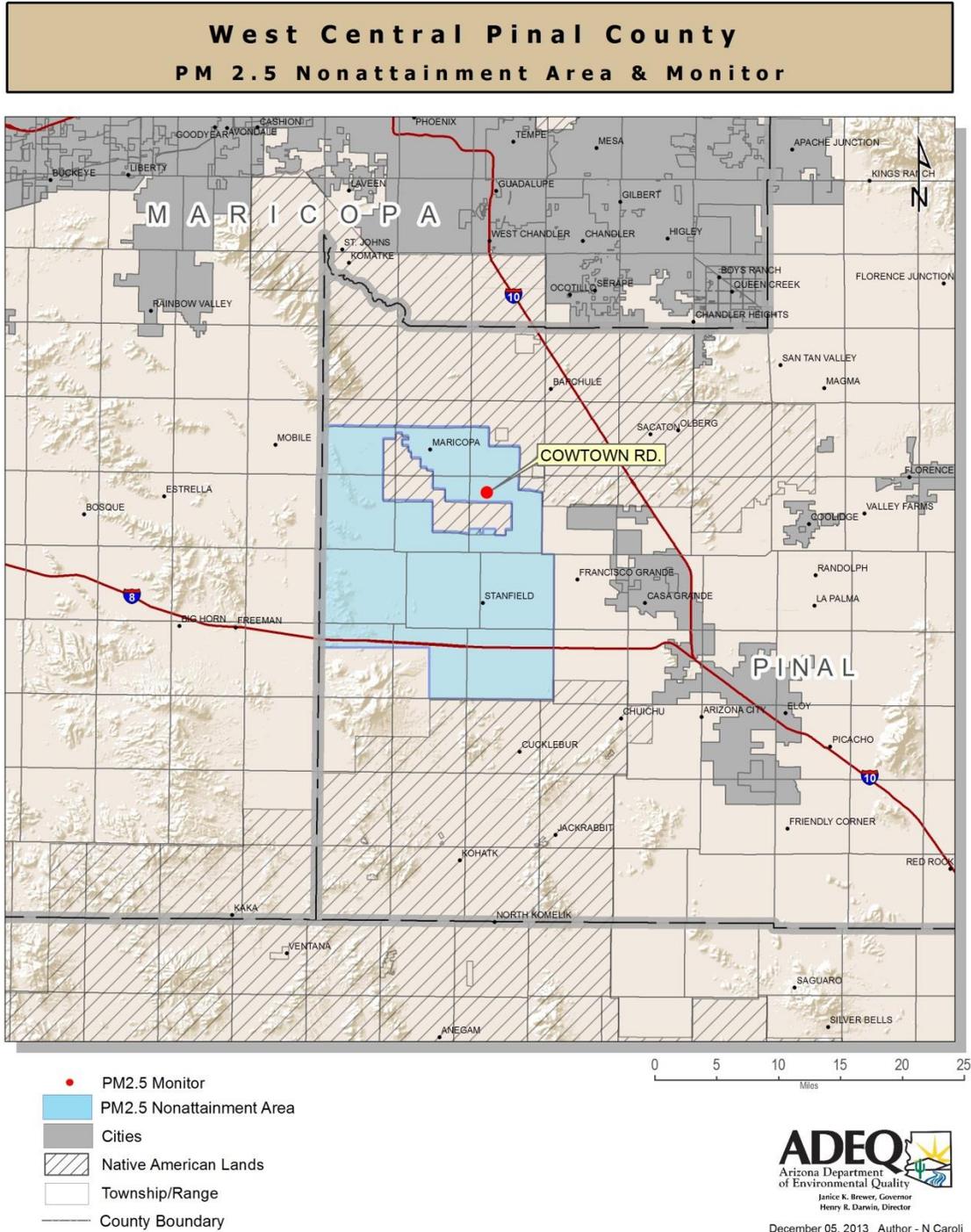
In order to meet EPA requirements, monitored air data must be quality assured. Under Arizona Revised Statute (A.R.S.) 49-473 and Pinal County Air Quality Control District (PCAQCD) code 1-1-040, PCAQCD is authorized to operate and maintain monitoring networks and Air Quality System (AQS) reporting for monitors located within Pinal County.

³³ 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)).

³⁴ 2013 Ambient Monitoring Network Plan and 2012 Data Summary - Pinal County Air Quality Control District Report.

Figure 2.1 shows the physical location of the PM_{2.5} monitor that is located within the nonattainment area. The Table 2.1 provides the site description for the Pinal County PM_{2.5} active monitoring site located in the nonattainment area.

Figure 2.1: West Central Pinal County PM_{2.5} Nonattainment Area



Source: Arizona Department of Environmental Quality

Table 2.1: Pinal County PM_{2.5} Active Monitor within EPA's Final Boundaries							
AQS ID	Site Name	Latitude	Longitude	Classification	Monitor Type	Street Address	City
04-021-3013	Cowtown Road	+33.010530	111.972050	SLAMS	FRM	37580 W Maricopa	Maricopa
Source: U.S. EPA Site Description Report – October 17, 2013							

2.2 24-Hour PM_{2.5} NAAQS Compliance

The CAA requires EPA to set national air quality standards for particulate matter and other pollutants considered harmful to public health and the environment. EPA is also required to periodically review and update those standards to ensure that they provide adequate public health (primary standards) and environmental (secondary standards) protections. Particulate matter with diameters larger than 2.5 micrometers and smaller than 10 micrometers are categorized as PM₁₀. Fine particles with diameters that are 2.5 micrometers and smaller are referred to as PM_{2.5}.

Effective December 18, 2006, EPA revised the primary and secondary standards of the PM_{2.5} 24-hour NAAQS to 35 µg/m³ (74 FR 58688; Effective December 14, 2009). With regard to the annual primary and secondary standards, EPA retained the PM_{2.5} NAAQS at 15 µg/m³. Based on the most recent and complete quality-assured data for 2010-2012, the West Central Pinal County nonattainment area has attained the 2006 24-hour PM_{2.5} NAAQS. Historic trend also indicates there has been three consecutive three-year average periods that have been in compliance with the 2006 24-hour PM_{2.5} NAAQS. Section 2.3 provides a data summary that includes historic trend between 2008-2012. Table 2.2 provides a summary of the 24-hour three-year average air monitoring data for 2010-2012.

Table 2.2: 2010-2012 Maximum 24-Hour Average PM_{2.5} Compliance Continuous PM_{2.5} FRM (2006 24-Hour PM_{2.5} NAAQS = 35 µg/m³)				
Site Name / ID	2010	2011	2012	24-Hour Three-Year Average
	98th Percentile	98th Percentile	98th Percentile	
Cowtown Road / 04-021-3013	27.1	27.2	28.9	28
Source: Air Quality System ³⁵				

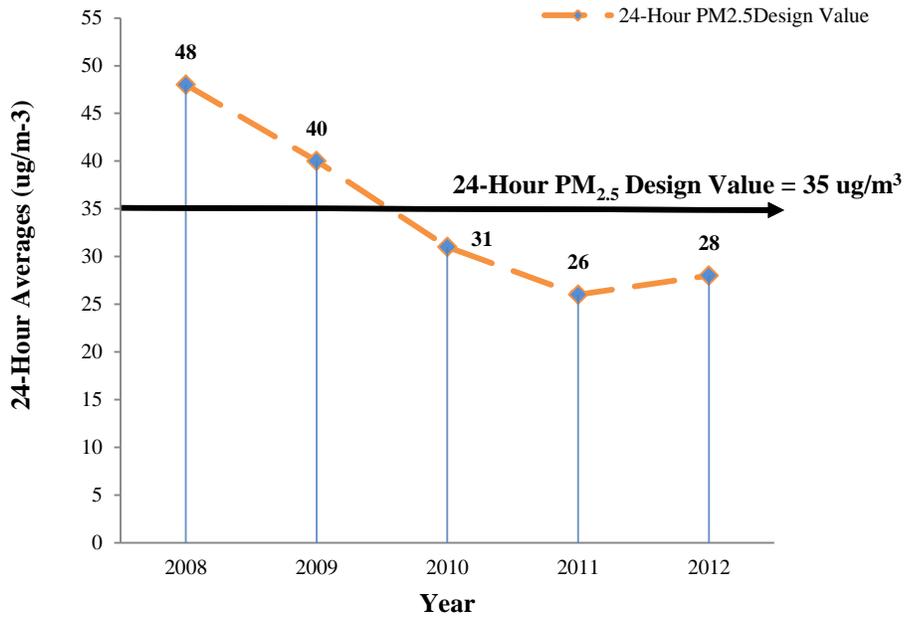
2.3 PM_{2.5} Data Summary

The data summary in this section presents the design values for the 2006 24-hour PM_{2.5} NAAQS for the last five years. ADEQ obtained air data from the EPA Preliminary Design Value Report that excludes measurements with regionally concurred event flags. Attainment of the 2006 24-hour PM_{2.5} NAAQS is reached when the design value is not greater than 35 µg/m³, based on a three-year average of the annual 98th percentile of 24-hour PM_{2.5} concentrations.

³⁵ 2007 Preliminary Design Value - Report and data obtained on October 17, 2013, excluded regional events concurred by EPA. As of December 2013, no regional events have EPA concurrence.

Figure 2.2 shows the historic trend in PM_{2.5} 24-hour design value concentrations, calculated as the three-year average of the annual 98th percentile between the year 2008 and 2012. This trend shows that Cowtown monitor has been in compliance with 24-hour PM_{2.5} NAAQS or three consecutive three-year periods.

**Figure 2.2: 24-Hour PM_{2.5} Three-Year Average Design Value (2008-2012)
Cowtown Road FRM**



Source: Air Quality System ³⁶

³⁶ 2007 Preliminary Design Value: Report and data obtained on October 17, 2013; excluded regional events concurred by EPA. As of December 2013, no regional events have EPA concurrence.

(This page is intentionally blank.)

3.0 NONATTAINMENT AREA EMISSIONS INVENTORY

This chapter discusses the development of the emissions inventory as required by CAA Section 172(c)(3). In general, an emissions inventory is used to determine significant sources of air pollutants, establish emission trends, and estimate air quality for a specific geographical area.

ADEQ contracted with Sierra Research Inc. (Sierra Research) to calculate the emission inventories for the nonattainment area. To ensure compliance with EPA requirements for emissions inventories, Sierra Research developed the *Pinal County PM_{2.5} Nonattainment Area 2008 and 2011 Annual Emissions Inventory* that provides a summary of PM_{2.5} emissions and PM_{2.5} precursor emissions.

3.1 Summary of Emissions Inventory Methodology

Sierra Research employed several methodologies to estimate emissions for the PM_{2.5} nonattainment area in West Central Pinal County. The PM_{2.5} emission inventory relies heavily upon methodologies used for development of the annual PM₁₀ emission inventory for the PM₁₀ nonattainment area.³⁷ The PM_{2.5} inventory utilizes PM_{2.5}:PM₁₀ conversion factors to estimate PM_{2.5} fugitive emissions.

Emissions of gaseous pollutants released from motor vehicles operated on paved and unpaved roads were estimated by using EPA's mobile source emission factor model known as Motor Vehicle Emissions Simulator (MOVES) for 2008 and 2011. Sierra Research estimated emissions of the remaining sources of gaseous pollutants from EPA's 2008 National Emission Inventory (NEI) submission for Pinal County.

The following sections provide a summary of the emissions for the following source categories: fugitive dust sources, mobile source gaseous pollutants, and other source emissions.

3.2 Fugitive Dust Sources

Sierra research utilized PM_{2.5} fractions of source-specific PM₁₀ emissions published in AP-42 to convert an annual PM₁₀ inventory to an annual PM_{2.5} inventory. Fugitive dust emissions are significant contributors to PM₁₀ and PM_{2.5} emissions in the Pinal nonattainment area, thus making them integral in the development of the PM_{2.5} emission inventory for the nonattainment area.

Annual windblown PM₁₀ emissions reported by land use and nonattainment area were independently calculated for the PM₁₀ and PM_{2.5} nonattainment areas using a High Wind Fugitive Dust Methodology and High Wind Emission Inventory of the PM₁₀ emissions inventory. The approach involves computation of hourly PM₁₀ emission rates by wind speed bins for wind speeds exceeding 12 miles per hour, multiplying these rates by the number of annual hours within the speed bins, and multiplying the results by the wind erosion PM_{2.5}/PM₁₀ conversion factor of 0.15 to derive annual windblown PM_{2.5} emissions in 2008 and 2011. Table 3.1 includes a summary of the annual PM_{2.5} emissions based on windblown dust sources.

³⁷ A summary of the PM₁₀ Emission Inventory is presented in the 2013 West Pinal County PM₁₀ Nonattainment SIP. A comprehensive annual emission inventory for this nonattainment area was prepared by Sierra Research Inc. and attached to the West Pinal County PM₁₀ plan as an Appendix B.

Table 3.1: Annual PM_{2.5} Emission Inventory in the West Central Pinal County PM_{2.5} Nonattainment Area - Windblown Dust Sources (tons per year)		
Source Category	2008 Emissions	2011 Emissions
Developed Urban Lands	7	8
Developed Rural Lands	131	157
Unpaved Roads	198	239
Cleared Areas	37	44
Residential Construction	77	42
CAFOs and Dairies	113	137
Desert Shrubland	1,221	1,471
Agricultural Croplands	1,399	1,685
Commercial Construction	17	9
Other	33	40
Site Development	20	11
Windblown Dust Subtotal	3,253	3,842
Source: Sierra Research Inc. - Pinal County PM _{2.5} Nonattainment Area 2008 and 2011 Annual Emissions		

Paved road fugitive dust emissions associated with PM_{2.5} were estimated using similar methods as used in estimating PM₁₀ emissions for the West Pinal County with two exceptions. First, for estimating PM_{2.5} emissions, vehicle miles travelled (VMT) were extracted from links in the PM_{2.5} nonattainment area. Second, emissions rates were revised by changing the size allocation factor to reflect the proportion of PM_{2.5} particles to PM₁₀ used in previous model runs. A detailed computation is discussed further in Appendix A.

The VMT and emissions were calculated over three road types used in the modeling episode calculations for fugitive dust that include pollutants from freeways, low-traffic arterials, and high-traffic arterials. While emission factors were held constant between the 2008 and 2011 levels, the VMT values were extracted from the Arizona Department of transportation (ADOT) Transportation Demand Model (TDM) for the PM_{2.5} nonattainment area for 2008 and extrapolated to 2011 levels based on activity changes resulting from population growth in the PM_{2.5} nonattainment area.

Nissan and Volkswagen vehicle manufactures operate test tracks within the PM_{2.5} nonattainment area. ADEQ contacted these two manufactures to obtain information on the mix of vehicles operated on the paved roads located at their facilities, average speeds, and annual VMT. Considering the high speed of up to 100 miles per hour (mph) at the manufacturers' facilities and daily usage of the tracks, a dust emission rate was determined based on the silt loading factor for freeways and vehicle weights. Table 3.2 summarizes total emissions from paved roads in the PM_{2.5} nonattainment area for the 2008 and 2011 years.

Table 3.2: 2008 and 2011 Paved Roads Fugitive Dust Emissions for PM_{2.5} Nonattainment Area (tons per year)		
Road Types	2008 Emissions	2011 Emissions
Freeways	0.76	0.81
Low Traffic Arterials	29.33	31.15
High Traffic Arterials	3.30	3.51
Test Tracks	0.07	0.07
Total:	33.47	35.54
Source: Sierra Research Inc. - Pinal County PM _{2.5} Nonattainment Area 2008 and 2011 Annual Emissions		

Fugitive dust emissions from unpaved roads were calculated using the guidance in Section 13.2.2 of AP-42. The method employed emissions factors from AP-42 and applied to unpaved road VMT values to estimate fugitive PM₁₀ emissions in the nonattainment area. Four categories of unpaved roads have been identified in Pinal County: agricultural, public, private, and trails. These were further broken down into agricultural, public, and private unpaved subcategories to account for variations in average vehicle speeds and annual Average Daily Traffic (ADT). The speed, ADT, and total mileage for each subcategory are also identified in the PM₁₀ emission inventory technical document. ADT is multiplied by total mileage to calculate daily VMT and the PM_{2.5} emissions factors were multiplied by the daily VMT estimates to provide unpaved road PM_{2.5} emissions for the nonattainment area. Table 3.3 below summarizes the unpaved road emissions for 2008.

Nissan and Volkswagen are known to operate test tracks within the PM_{2.5} nonattainment area and operate vehicles on unpaved roads. Permitted information indicates that emission controls are applied to the unpaved roads at both vehicle facilities. Because of that, the silt contents for the roads within the facilities are assumed to be the same as the public unpaved roads. The unpaved road emissions for PM_{2.5} were then calculated by multiplying the VMT estimates by the PM_{2.5} emission factors. Table 3.4 summarizes the 2011 unpaved road emissions for the PM_{2.5} nonattainment area.

Table 3.3: 2008 Unpaved Road Fugitive Dust Emissions for the West Central Pinal County PM_{2.5} Nonattainment Area		
Unpaved Roads	Typical Daily Emissions (tons/day)	Annual Emissions (tons/year)
Agricultural	2,543	465
Public	4,180	765
Private	1,346	246
Trails	60	11
Test Tracks	260	48
Total:	8,388	1,535
Source: Sierra Research Inc. - Pinal County PM _{2.5} Nonattainment Area 2008 and 2011 Annual Emissions		

Table 3.4: 2011 Unpaved Road Emissions for the Pinal PM_{2.5} Nonattainment Area		
Unpaved Road Category	Typical Daily Emissions (lbs/day)	Annual Emissions (tons/yr)
Agricultural	2,536	465
Public	4,126	755
Private	1,342	246
Trails	60	11
Test Tracks	259	48
Total:	8,323	1,525
Source: Sierra Research Inc. - Pinal County PM _{2.5} Nonattainment Area 2008 and 2011 Annual Emissions		

There are no forecasts of travel activity available for unpaved roads within either the PM_{2.5} or the PM₁₀ nonattainment areas; therefore, the 2008 VMT estimates for unpaved roads were held constant through 2011. ADEQ had a discussion with Pinal County's Public Works Department and local municipalities to determine if controls were applied to selected unpaved roads in both 2010 and 2011. Based on this discussion, unpaved-road dust control projects implemented in these years that affected roads located within the PM_{2.5} nonattainment area were identified. Table 3.5 and Table 3.6 summarize the 2008 and 2011 PM_{2.5} emissions from fugitive dust for non-windblown and windblown source activity, respectively.

Table 3.5: Annual PM_{2.5} Emission Inventory for Non-Windblown Dust Sources in the West Pinal County PM_{2.5} Nonattainment Area (tons per year)		
Source Category	2008 Emissions	2011 Emissions
Agricultural Operations	158	158
CAFOs	387	231
Dairies	14	14
Construction	105	48
Paved Road	42	43
Unpaved Roads	1,535	1,525
Non-Windblown Dust Subtotal	2,241	2,019
Source: Sierra Research Inc. - Pinal County PM _{2.5} Nonattainment Area 2008 and 2011 Annual Emissions		

Table 3.6: Annual PM_{2.5} Emission Inventory for Windblown Dust Sources in the West Pinal County PM_{2.5} Nonattainment Area (tons per year)		
Source Category	2008 Emissions	2011 Emissions
Developed Urban Lands	7	8
Developed Rural Lands	131	157
Unpaved Roads	198	239
Cleared Areas	37	44
Residential Construction	77	42
CAFOs and Dairies	113	137
Desert Shrubland	1,221	1,471
Agricultural Croplands	1,399	1,685
Commercial Construction	17	9
Other	33	40
Site Development	20	11
Windblown Dust Subtotal	3,253	3,842
Source: Sierra Research Inc. - Pinal County PM _{2.5} Nonattainment Area 2008 and 2011 Annual Emissions		

3.3 Mobile Source Gaseous Pollutants

Mobile sources are responsible for direct emissions and contribute to precursor emissions that react in the formation of secondary pollutants. There are number of tools that are available to model emissions, as well as databases providing information on emission levels. Sierra Research utilized these available tools to estimate: on-road emissions, railroad emissions, and other source emissions.

3.3.1 On-Road Emissions

Emissions from mobile sources on both paved and unpaved roads were modeled by using Motor Vehicle Emission Simulator (MOVES) 2010b configuration. MOVES 2010b is the latest available EPA's air model for estimating all emissions from mobile source. Exhaust emissions calculations for paved and unpaved roads were computed based on the source types, speed, and hour for each of the following pollutants: carbon monoxide (CO), nitrogen oxide (NO), nitrogen dioxide (NO₂), sulfur dioxide (SO₂), ammonia (NH₃), volatile organic compounds (VOC), and primary PM_{2.5}. Rate-per-distance hourly emissions factors were extracted to a lookup table that allowed emissions to be calculated.

PM_{2.5} emissions from the nonattainment area were calculated using the travel demand model (TDM) outputs for speed, time, and vehicle miles travelled (VMT) by source types. A detailed description of this methodology has been included in Appendix A.

Emissions rates due to evaporative losses and starting and idling activities were calculated based on the emission factors extracted from MOVES multiplied by the vehicle population in the PM_{2.5} nonattainment area. The test track emissions were derived in the same manner. VMT on the track was assumed to come only from light-duty passenger vehicles. Table 3.7 and 3.8 provide summaries of the 2008 and 2011 PM_{2.5} annual emissions for different source categories.

Table 3.7: 2008 PM_{2.5} Nonattainment Area Paved Road Exhaust Emissions					
Activity	NO_x (tons/year)	SO₂ (tons/year)	NH₃ (tons/year)	VOC (tons/year)	PM_{2.5} (tons/year)
Running Exhaust	283.71	9.08	1.70	92.84	7.25
Start & Idle Exhaust	135.49	0.10	0.00	226.85	1.45
Evaporative	0.00	0.00	0.00	80.20	0.00
Test Track	4.09	0.16	0.02	1.66	0.07
Total:	423.30	9.35	1.72	401.55	8.77

Source: Sierra Research Inc. - Pinal County PM_{2.5} Nonattainment Area 2008 and 2011 Annual Emissions

Table 3.8: 2011 PM_{2.5} Nonattainment Area Paved Road Exhaust Emissions					
Activity	NO_x (tons/year)	SO₂ (tons/year)	NH₃ (tons/year)	VOC (tons/year)	PM_{2.5} (tons/year)
Running Exhaust	213.50	8.15	1.76	70.41	5.84
Start & Idle Exhaust	134.72	0.10	0.00	194.52	1.28
Evaporative	0.00	0.00	0.00	71.86	0.00
Test Track	2.99	0.13	0.02	1.11	0.07
Total:	351.21	8.39	1.78	337.89	7.18

Source: Sierra Research Inc. - Pinal County PM_{2.5} Nonattainment Area 2008 and 2011 Annual Emissions

Additional unpaved exhaust emissions for the 2008 and 2011 annual inventories were estimated using the same methods applied in the PM₁₀ modeling episodes inventories. Hourly average emission rates were extracted from MOVES by pollutant and speed bin. Test track emissions were calculated based on daily estimates of VMT and speed; and vehicle characteristics provided by the operators of the test facilities. Table 3.9 provides a summary of the 2008 emissions by road type and pollutant and Table 3.10 includes the 2011 control inventory for unpaved road exhaust emissions.

Table 3.9: 2008 PM_{2.5} Nonattainment Area Unpaved Road Exhaust Emissions					
Activity	NO_x (tons/year)	SO₂ (tons/year)	NH₃ (tons/year)	VOC (tons/year)	PM_{2.5} (tons/year)
Agricultural	8.06	0.26	0.05	4.64	0.22
Public	14.89	0.48	0.09	6.75	0.35
Private	3.53	0.11	0.02	1.84	0.09
Trails	0.16	0.00	0.00	0.00	0.00
Test Tracks	0.78	0.03	0.00	0.27	0.01
Total:	27.41	0.88	0.16	13.49	0.68

Table 3.9: 2008 PM_{2.5} Nonattainment Area Unpaved Road Exhaust Emissions					
Activity	NO_x (tons/year)	SO₂ (tons/year)	NH₃ (tons/year)	VOC (tons/year)	PM_{2.5} (tons/year)
Source: Sierra Research Inc. - Pinal County PM _{2.5} Nonattainment Area 2008 and 2011 Annual Emissions					

Table 3.10: 2011 PM_{2.5} Nonattainment Area Unpaved Road Exhaust Emissions					
Activity	NO_x (tons/year)	SO₂ (tons/year)	NH₃ (tons/year)	VOC (tons/year)	PM_{2.5} (tons/year)
Agricultural	6.51	0.23	0.05	3.66	0.20
Public	10.63	0.39	0.08	4.53	0.28
Private	2.59	0.09	0.02	1.27	0.08
Trails	0.01	0.00	0.00	0.00	0.00
Test Tracks	0.56	0.02	0.00	0.18	0.01
Total:	20.31	0.74	0.16	9.64	0.56
Source: Sierra Research Inc. - Pinal County PM _{2.5} Nonattainment Area 2008 and 2011 Annual Emissions					

3.3.2 Nonroad Emissions

Nonroad emissions in Pinal County were determined by using EPA's NONROAD model. The model calculates emissions from each source to yield results in grams per year, which then the model converts the units to tons per year. Nonroad emissions were allocated from the previously calculated PM₁₀ nonattainment area to the PM_{2.5} nonattainment area using human population ratios. The ratios were obtained from U.S. census block data.

Table 3.11 summarizes the 2008 and 2011 nonroad emissions for the PM_{2.5} nonattainment area.

Table 3.11: 2008 and 2011 NONROAD Emissions Pinal County PM_{2.5} Nonattainment Area				
Year	PM_{2.5}	NO_x	SO₂	VOC
	(tons/year)	(tons/year)	(tons/year)	(tons/year)
2008	20.6	249.6	0.14	161.0
2011	21.9	265.1	0.15	171.0
Source: Sierra Research Inc. - Pinal County PM _{2.5} Nonattainment Area 2008 and 2011 Annual Emissions				

3.3.3 Railroad Emission

Emission factors for PM_{2.5}, nitrogen oxides (NO_x), sulfur dioxide (SO₂), ammonia (NH₃), and volatile organic compounds (VOCs) were used to calculate the annual railroad emissions by assuming two trains traveling through the nonattainment area each hour, 366 days per year for 2008 and 365 days per year for 2011. Table 3.12 and 3.13 summarize the annual emissions and typical daily emissions in the PM_{2.5} nonattainment area for 2008 and 2011.

Pollutants	Annual Emissions (tons/yr)	Typical Daily Emissions (lbs/day)
NO _x	428	2341
PM _{2.5}	13	69
SO ₂	42	229
NH ₃	0.2	1
VOC	23	125

Source: Sierra Research Inc. - Pinal County PM_{2.5} Nonattainment Area 2008 and 2011 Annual Emissions

Pollutants	Annual Emissions (tons/yr)	Typical Daily Emissions (lbs/day)
NO _x	349	1913
PM _{2.5}	10	55
SO ₂	3	19
NH ₃	0.2	1
VOC	18	99

Source: Sierra Research Inc. - Pinal County PM_{2.5} Nonattainment Area 2008 and 2011 Annual Emissions

3.3.4 Other Source Emissions

Emissions from other source categories within the PM_{2.5} nonattainment area were estimated by applying appropriate emission allocation factors to the Pinal County PM_{2.5} and precursor emission inventories. The 2008 National Emissions Inventory (NEI) for Pinal County was used as the starting point for calculating both PM_{2.5} emissions and PM_{2.5} precursor emissions for the Pinal County nonattainment area.

Since ADEQ did not submit area source emissions to the 2011 NEI, as was performed in previous years, ADEQ determined the most consistent methodological 2011 inventory would be to project 2008 emissions to 2011 rather than rely on the 2011 NEI. Allocation projection factors derived from relative population, employment, area of agriculture land area, and other categories were utilized when projecting 2008 emissions to the year 2011. Tables 3.14 and 3.15 summarize the 2008 and 2011 annual emissions for other sources in the Pinal County PM_{2.5} nonattainment area.

Source Categories	PM_{2.5}	NH₃	NO_x	SO₂	VOC
Chemical & Allied Product Mfg	0.5	0.0	0.0	0.0	5.8
Fuel Comb. Residential	5.9	1.9	9.6	0.2	6.6
Metals Processing	1.5	0.0	0.0	0.0	0.0
Biogenic	0.0	0.0	289.1	0.0	25,349.2
Other Industrial Processes	36.6	0.9	6.8	0.6	73.9
Petroleum & Related Industries	1.0	0.0	0.9	0.5	0.7

Table 13.14: Summary of the 2008 Annual Emissions for Other Sources in the Pinal County PM_{2.5} Nonattainment Area (tons/year)					
Source Categories	PM_{2.5}	NH₃	NO_x	SO₂	VOC
Solvent Utilization	0.0	0.0	0.3	0.0	348.5
Storage & Transport	6.2	0.1	0.0	0.0	262.0
Waste Disposal & Recycling	132.8	11.5	35.7	1.0	108.0
Source: Sierra Research Inc. - Pinal County PM _{2.5} Nonattainment Area 2008 and 2011 Annual Emissions					

Table 13.15: Summary of the 2011 Annual Emissions for Other Sources in the Pinal County PM_{2.5} Nonattainment Area (tons/year)					
Source Categories	PM_{2.5}	NH₃	NO_x	SO₂	VOC
Chemical & Allied Product Mfg	0.3	0.0	0.0	0.0	3.8
Fuel Comb. Residential	6.2	2.1	10.2	0.2	7.0
Metals Processing	1.0	0.0	0.0	0.0	0.0
Biogenic	0.0	0.0	289.1	0.0	25,349.2
Other Industrial Processes	28.4	0.9	5.9	0.6	49.3
Petroleum & Related Industries	0.6	0.0	0.6	0.4	0.5
Solvent Utilization	0.0	0.0	0.2	0.0	231.3
Storage & Transport	4.1	0.1	0.0	0.0	173.9
Waste Disposal & Recycling	88.2	7.6	23.7	0.7	71.7
Source: Sierra Research Inc. - Pinal County PM _{2.5} Nonattainment Area 2008 and 2011 Annual Emissions					

3.4 SUMMARY OF ANNUAL EMISSIONS INVENTORY

The analysis of the 2008 and 2011 annual emissions inventories for the 2006 24-hour PM_{2.5} in West Central Pinal County nonattainment area reveals that the PM_{2.5} precursor emissions are declining. Observation of directly PM_{2.5} emissions shows 5.3% increase in total emissions between 2008 and 2011 is due to the increase in windblown emissions caused by higher number of high wind hours in 2011. Despite this significant increase, no exceedances of the 24-hour PM_{2.5} NAAQS were recorded at the Cowtown monitoring site.

This finding supports ADEQ's determination that PM_{2.5} exceedances at Cowtown monitoring site were primarily the result of local activity-related dust entrainment. While primary PM_{2.5} windblown emissions in the PM_{2.5} nonattainment area increased 589 tons between 2008 and 2011, non-windblown emissions decreased 286 tons between 2008 and 2011. As the result, the recorded emissions from the Cowtown monitoring site show compliance with the 2006 24-hour PM_{2.5} NAAQS.

Table 3.16 compares the 2008 and 2011 annual total emissions estimates for the PM_{2.5} nonattainment area while Table 3.17 and Table 3.18 provides sources specific estimates for 2008 and 2011, respectively. Annual average daily emissions estimates are presented in Table 3.19 and Table 3.120 for 2008 and 2011, respectively.

Table 3.16: Comparison of the 2008 & 2011 Annual PM_{2.5} Emissions in the Pinal County PM_{2.5} Nonattainment Area(tons per year)					
Years	PM_{2.5} Primary Emissions	NH₃ Emissions	NO_x Emissions	SO₂ Emissions	VOC Emissions
2008	5,741	1,060	1,580	55.7	26,873
2011	6,044	703	1,369	14.7	26,507
Source: Sierra Research Inc. - Pinal County PM _{2.5} Nonattainment Area 2008 and 2011 Annual Emissions					

Table 3.17: Summary of the 2008 Annual PM_{2.5} Emissions in the Pinal County PM_{2.5} Nonattainment Area

Source Category	PM _{2.5} Primary		NH ₃ Emissions		NO _x Emissions		SO ₂ Emissions		VOC Emissions	
	(tons/year)	% of Total	(tons/year)	% of Total						
Agriculture Harvesting	17	0.30%	170	16.03%	0	0.00%	0	0.00%	0	0.00%
Agriculture Tilling	141	2.46%			0	0.00%	0	0.00%	0	0.00%
CAFOs	387	6.74%	873	82.34%	0	0.00%	0	0.00%	0	0.00%
Paved Road	42	0.73%	2	0.19%	423	26.77%	9	16.16%	402	1.50%
Unpaved Road	1,536	26.75%	0.2	0.02%	27	1.71%	0.9	1.62%	13	0.05%
Non-Road	26	0.45%	0	0.00%	250	15.82%	0.1	0.18%	161	0.60%
Railroad	13	0.23%	0	0.00%	428	27.09%	42	75.40%	23	0.09%
Construction	105	1.83%	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Dairy	14	0.24%	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Permitted Sources	21	0.37%	1	0.09%	109	6.90%	1.4	2.51%	119	0.44%
Windblown Emissions	3,253	56.66%	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Chemical & Allied Product Mfg	1	0.02%	0	0.00%	0	0.00%	0	0.00%	6	0.02%
Fuel Comb. Other	6	0.10%	2	0.19%	10	0.63%	0.2	0.36%	7	0.03%
Metals Processing	2	0.03%	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Biogenic	0	0.00%	0	0.00%	289	18.29%	0	0.00%	25,349	94.33%
Other Industrial Processes	37	0.64%	1	0.09%	7	0.44%	0.6	1.08%	74	0.28%
Petroleum & Related Industries	1	0.02%	0	0.00%	1	0.06%	0.5	0.90%	1	0.00%
Solvent Utilization	0	0.00%	0	0.00%	0	0.00%	0	0.00%	348	1.29%
Storage & Transport	6	0.10%	0	0.00%	0	0.00%	0	0.00%	262	0.97%
Waste Disposal & Recycling	133	2.32%	11	1.04%	36	2.28%	1	1.80%	108	0.40%
Total Emissions:	5,741	100%	1,060	100%	1,580	100%	55.7	100%	26,873	100%

Source: Sierra Research Inc. - Pinal County PM_{2.5} Nonattainment Area 2008 and 2011 Annual Emissions

Table 3.18: Summary of the 2011 Annual PM_{2.5} Emissions in the Pinal County PM_{2.5} Nonattainment Area

Source Category	PM _{2.5} Emissions		NH ₃ Emissions		NO _x Emissions		SO ₂ Emissions		VOC Emissions	
	(tons/year)	% of Total	(tons/year)	% of Total	(tons/year)	% of Total	(tons/year)	% of Total	(tons/year)	% of Total
Agriculture Harvesting	17	0.28%	170	24.18%	0	0.00%	0	0.00%	0	0.00%
Agriculture Tilling	141	2.33%			0	0.00%	0	0.00%	0	0.00%
CAFOs	231	3.82%	520	73.95%	0	0.00%	0	0.00%	0	0.00%
Paved Road	43	0.71%	2	0.28%	351	25.64%	8	54.42%	338	1.28%
Unpaved Road	1,526	25.25%	0.2	0.03%	20	1.46%	0.7	4.76%	10	0.04%
Non-Road	27	0.45%	0	0.00%	265	19.36%	0.1	0.68%	171	0.65%
Railroad	10	0.17%	0	0.00%	349	25.49%	3	20.41%	18	0.07%
Construction	48	0.79%	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Dairy	14	0.23%	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Permitted Sources	17	0.28%	0	0.00%	54	3.94%	1	6.80%	84	0.32%
Windblown Emissions	3,842	63.57%	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Chemical & Allied Product Mfg	0	0.00%	0	0.00%	0	0.00%	0	0.00%	4	0.02%
Fuel Comb. Residential	6	0.10%	2	0.28%	10	0.73%	0.2	1.36%	7	0.03%
Metals Processing	1	0.02%	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Biogenic	0	0.00%	0	0.00%	289	21.11%	0	0.00%	25,349	95.63%
Other Industrial Processes	28	0.46%	1	0.14%	6	0.44%	0.6	4.08%	49	0.18%
Petroleum & Related Industries	1	0.02%	0	0.00%	1	0.07%	0.4	2.72%	0	0.00%
Solvent Utilization	0	0.00%	0	0.00%	0	0.00%	0	0.00%	231	0.87%
Storage & Transport	4	0.07%	0	0.00%	0	0.00%	0	0.00%	174	0.66%
Waste Disposal & Recycling	88	1.46%	8	1.14%	24	1.75%	0.7	4.76%	72	0.27%
Total Emissions:	6,044	100%	703	100.00%	1,369	100%	14.7	100%	26,507	100%

Source: Sierra Research Inc. - Pinal County PM_{2.5} Nonattainment Area 2008 and 2011 Annual Emissions

**Table 3.19:
Summary of the 2008 Typical Daily PM_{2.5} Emissions in the Pinal County PM_{2.5} Nonattainment Area**

Source Category	PM _{2.5} Primary		NH ₃ Emissions		NO _x Emissions		SO ₂ Emissions		VOC Emissions	
	(lbs/day)	% of Total	(lbs/day)	% of Total						
Agriculture Harvesting	93	0.30%	929	16.03%	0	0.00%	0	0.00%	0	0.00%
Agriculture Tilling	770	2.46%			0	0.00%	0	0.00%	0	0.00%
CAFOs	2,115	6.74%	4,770	82.34%	0	0.00%	0	0.00%	0	0.00%
Paved Road	230	0.73%	11	0.19%	2,311	26.77%	49	16.16%	2,197	1.50%
Unpaved Road	8,392	26.75%	1	0.02%	148	1.71%	5	1.62%	71	0.05%
Non-Road	142	0.45%	0	0.00%	1,366	15.82%	1	0.18%	880	0.60%
Railroad	71	0.23%	0	0.00%	2,339	27.09%	230	75.40%	126	0.09%
Construction	574	1.83%	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Dairy	77	0.24%	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Permitted Sources	115	0.37%	5	0.09%	596	6.90%	8	2.51%	650	0.44%
Windblown Emissions	17,776	56.66%	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Chemical & Allied Product Mfg	5	0.02%	0	0.00%	0	0.00%	0	0.00%	33	0.02%
Fuel Comb. Other	33	0.10%	11	0.19%	55	0.63%	1	0.36%	38	0.03%
Metals Processing	11	0.03%	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Biogenic	0	0.00%	0	0.00%	1,579	18.29%	0	0.00%	138,519	94.33%
Other Industrial Processes	202	0.64%	5	0.09%	38	0.44%	3	1.08%	404	0.28%
Petroleum & Related Industries	5	0.02%	0	0.00%	5	0.06%	3	0.90%	5	0.00%
Solvent Utilization	0	0.00%	0	0.00%	0	0.00%	0	0.00%	1,902	1.29%
Storage & Transport	33	0.10%	0	0.00%	0	0.00%	0	0.00%	1,432	0.97%
Waste Disposal & Recycling	727	2.32%	60	1.04%	197	2.28%	5	1.80%	590	0.40%
Total Emissions:	31,372	100%	5,793	100%	8,634	100%	304	100%	146,847	100%

Source: Sierra Research Inc. - Pinal County PM_{2.5} Nonattainment Area 2008 and 2011 Annual Emissions

Table 3.20: Summary of the 2011 Typical Daily PM_{2.5} Emissions in the Pinal County PM_{2.5} Nonattainment Area

Source Category	PM _{2.5} Emissions		NH ₃ Emissions		NO _x Emissions		SO ₂ Emissions		VOC Emissions	
	(lbs/day)	% of Total	(lbs/day)	% of Total	(lbs/day)	% of Total	(lbs/day)	% of Total	(lbs/day)	% of Total
Agriculture Harvesting	93	0.28%	932	24.23%	0	0.00%	0	0.00%	0	0.00%
Agriculture Tilling	773	2.33%			0	0.00%	0	0.00%	0	0.00%
CAFOs	1,266	3.82%	2,842	73.90%	0	0.00%	0	0.00%	0	0.00%
Paved Road	236	0.71%	11	0.28%	1,923	25.64%	44	54.42%	1,852	1.28%
Unpaved Road	8,362	25.25%	1	0.03%	110	1.46%	4	4.76%	55	0.04%
Non-Road	148	0.45%	0	0.00%	1,452	19.36%	1	0.68%	937	0.65%
Railroad	55	0.17%	0	0.00%	1,912	25.49%	16	20.41%	99	0.07%
Construction	263	0.79%	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Dairy	77	0.23%	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Permitted Sources	93	0.28%	0	0.00%	296	3.94%	5	6.80%	460	0.32%
Windblown Emissions	21,052	63.57%	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Chemical & Allied Product Mfg	0	0.00%	0	0.00%	0	0.00%	0	0.00%	22	0.02%
Fuel Comb. Residential	33	0.10%	11	0.28%	55	0.73%	1	1.36%	38	0.03%
Metals Processing	5	0.02%	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Biogenic	0	0.00%	0	0.00%	1,584	21.11%	0	0.00%	138,899	95.63%
Other Industrial Processes	153	0.46%	5	0.14%	33	0.44%	3	4.08%	268	0.18%
Petroleum & Related Industries	5	0.02%	0	0.00%	5	0.07%	2	2.72%	0	0.00%
Solvent Utilization	0	0.00%	0	0.00%	0	0.00%	0	0.00%	1,266	0.87%
Storage & Transport	22	0.07%	0	0.00%	0	0.00%	0	0.00%	953	0.66%
Waste Disposal & Recycling	482	1.46%	44	1.14%	132	1.75%	4	4.76%	395	0.27%
Total Emissions:	33,118	100%	3,845	100%	7,501	100%	81	100%	145,244	100%

Source: Sierra Research Inc. - Pinal County PM_{2.5} Nonattainment Area 2008 and 2011 Annual Emissions

(This page is intentionally blank.)

4.0 PREVENTION OF SIGNIFICANT DETERIORATION/NEW SOURCE REVIEW

CAA Section 172(c)(5) requires SIPs to contain information regarding permits for all new major sources and major modifications to existing major sources in Arizona that are subject to the nonattainment New Source Review (NSR) provisions or Prevention of Significant Deterioration (PSD).

4.1 State and County Programs

The state permitting programs for major and minor sources are contained in: Arizona Administrative Code (AAC) Title 18, Chapter 2, Articles 3 and 4.

ADEQ implements a SIP-approved PSD program for all regulated NSR pollutants except for PM₁₀ and GHGs (48 FR 19878, effective May 3, 1983). For PM₁₀ and GHGs, ADEQ implements the Federal PSD program in 40 CFR 52.21 pursuant to delegation agreements executed in 1999 and 2011, respectively (40 CFR 52.37; “Agreement for Delegation of Authority of the PM₁₀ Regulations for Prevention of Significant Deterioration of Air Quality (40 CFR 52.21) between EPA and Arizona DEQ,” executed March 12, 1999”; “U.S. EPA - Arizona Department of Environmental Quality Agreement for Delegation of Authority to Issue and Modify Greenhouse Gas Prevention of Significant Deterioration Permits Subject to 40 CFR 52.21,” executed March 30, 2011).

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 (PCAQD), NSR program in Code of Regulations, Chapter 3.

The PCAQCD implements a SIP-approved PSD program for all regulated NSR pollutants except for GHGs (61 FR 15717, effective April 9, 1996; amended by 65 FR 79742, effective December 20, 2000). For GHGs, Pinal County implements the Federal PSD program in 40 CFR 52.21 pursuant to a delegation agreement executed in 2011 (40 CFR 52.37; “U.S. EPA— Pinal County Air Quality Control District Agreement for Delegation of Authority to Issue and Modify Greenhouse Gas Prevention of Significant Deterioration Permits Subject to 40 CFR 52.21,” executed August 10, 2011). In addition, the County’s Program does not identify PM_{2.5} or its precursors (NO_x and SO₂) as regulated NSR pollutants as well as NO_x as an ozone precursor.

The four agencies in Arizona with permitting authority have a SIP-approved minor NSR program under CAA Section 110(a)(2)(C). ADEQ’s SIP-approved minor NSR rules are contained in R9-3-301 and R9-3-101. See 48 FR 19879 (May 3, 1983) and 53 FR 30220 (August 10, 1988). PCAQCD’s SIP-approved minor NSR rules are contained in Pinal County rules 3-1-040, 1-3-140, 3-1-060.2.d, and 3-1-070.A.1 (65 FR 79742, effective December 20, 2000; 67 FR 68764, effective November 13, 2002). The State and EPA have relied on these approved minor NSR program to assure that new and modified sources not captured by the major NSR permitting programs do not interfere with attainment and maintenance of the NAAQS.

On November 5, 2013, EPA disapproved the State’s Infrastructure SIP for Pinal County pertaining to the requirement in CAA Section 110(a)(2)(C) to include a program to provide for regulation of the modification and construction of stationary sources, including a PSD program under Part C of Title I, because the SIP-approved PSD program lacks “structural” PSD program elements (77 FR 66398). Specifically, EPA is disapproving Pinal County’s PSD program requirements of CAA sections 110(a)(2)(C), 110(a)(2)(D)(i)(II), 110(a)(2)(D)(ii), 110(a)(2)(J), and 110(a)(2)(K) regarding regulation of

nitrogen oxides (NO_x) as an ozone precursor, regulation of fine particulate matter (PM_{2.5}), interstate pollution abatement, and air quality models and modeling data.” (77 FR 66398).

During 2014, PCAQD plans on revising their rules to address the deficiencies outlined by EPA.

(This page is intentionally blank)

5.0 CONFORMITY

CAA Section 176(c)(1)(A) requires SIPs to contain information regarding the State's compliance with conformity requirements.

5.1 General Conformity

General conformity for the West Pinal County PM_{2.5} nonattainment area must be addressed to assure PM_{2.5} emissions from any federal actions or plans do not exceed the rates outlined in 40 CFR § 93.153(b) (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. There are no known federal plans or actions affecting air quality currently in the area. ADEQ commits to review and comment, 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.

5.2 Transportation Conformity

As stated in 40 CFR § 93.153(b), "Conformity determinations for federal actions related to transportation plans, programs and projects developed, funded, or approved under title 23 U.S.C. or the Federal Transit Act (40 U.S.C. § 1601 *et seq.*) must meet the procedures and criteria of 40 CFR Part 51, subpart T, in lieu of the procedures set forth in this subpart."

There are also federal requirements in CAA Section 93.105 regarding the consultation process for transportation conformity determinations. Metropolitan Planning Organizations are required to provide the opportunity for consultation with local and state air quality and transportation agencies, in addition to the U.S. Department of Transportation (USDOT) and EPA. There are also requirements to establish a proactive public involvement process that provides for public review and comment period prior to formal action on a conformity determination.

5.3 Background

The Maricopa Association of Governments (MAG) is the designated Metropolitan Planning Organization (MPO) for Maricopa County and portions of Pinal County (including Apache Junction, Florence, and Maricopa). MAG is responsible for preparing the Transportation Improvement Program (TIP) and Regional Transportation Plan (RTP), and the associated conformity analyses. The FY 2014-2018 MAG TIP and 2035 MAG RTP includes an expanded MAG region in 2013.

On May 9, 2013, the MAG Metropolitan Planning Area Boundary was expanded due to the 2010 Census urbanized area updates. The updated boundary for the MAG region included areas within Pinal County. The expansion required the MAG Regional Council to the MAG Bylaws in order to recognize the new boundary and to provide for new members from Pinal County. The boundary now includes the Town of Florence, City of Maricopa, the portion of the Gila River Indian Community (GRIC) within Pinal County, and unincorporated areas within Pinal County.

In addition to the expansion in the MAG planning area boundary, a new MPO was established in Pinal County. The Sun Corridor Metropolitan Planning Organization (SCMPO) was designated in the Pinal County area on May 6, 2013. The SCMPO Planning Area Boundary includes the cities of Casa Grande, Eloy, Coolidge, and unincorporated areas of Pinal County.

Both the MAG Metropolitan Planning Area Boundary and the SCMOP Planning Area Boundary include portions of the West Pinal County PM₁₀ Nonattainment Area and West Central Pinal County PM_{2.5}

Nonattainment Area, both of which are located in Pinal County. Since both nonattainment areas are covered by the boundaries of the two MPOs, transportation conformity is required to be demonstrated for both nonattainment areas by both metropolitan planning organizations.

The SCMPO has only been established since May 2013, and has not had the opportunity to develop the infrastructure and personnel necessary to develop a transportation conformity analysis. To provide assistance to the new SCMPO, MAG prepared the initial conformity analysis for the PM₁₀ and PM_{2.5} nonattainment areas to enable transportation projects in both MPOs to proceed. On June 17, 2013, MAG, ADOT, and the SCMPO concurred that MAG would prepare the initial conformity analysis.

The FY 2014-2018 MAG TIP serves as a detailed guide for preservation, expansion, and management of public transportation whereas the 2035 MAG RTP covers FY 2014 through FY 2035 and describes the details for future transportation investments in the region. The RTP includes funding for freeways and highways, streets, regional bus and high capacity transit, as well as bicycle and pedestrian facilities, commensurate with available funding. In addition, this conformity analysis supports a finding of conformity for both the TIP and RTP for MAG's planning area.

Under the interagency consultation process outlined in the CAA, MAG developed the RTP with guidance from the MAG Transportation Policy Committee, the MAG Management Committee, and the MAG Regional Council. To ensure proper consultation with state and federal agencies, MAG provided copies of the final draft to MAG member agencies and the Federal Transit Administration (FTA), Federal Highway Administration (FHWA), Arizona Department of Transportation (ADOT), ADEQ, Valley Metro/RPTA, City of Phoenix Public Transit Department, PCAQCD, Central Arizona Governments (CAG), Sun Corridor Metropolitan Planning Organization, Maricopa County Air Quality Department (MCAQD), and EPA. The RTP is required to be publicly available and an opportunity for public review and comment is provided.

The TIP was prepared by MAG staff with the assistance of the MAG modal committees, Transportation Review Committee, and Transportation Policy Committee. Copies of the Draft TIP were provided to MAG member agencies and others, including FTA, FHWA, ADOT, ADEQ, Valley Metro/RPTA, City of Phoenix Public Transit Department, MCAQD, CAG, PCAQCD, Sun Corridor Metropolitan Planning Organization, and EPA for review. As with the RTP, the TIP was made available to the public and an opportunity for public review and comment was provided.

5.4 Pinal County Nonattainment Areas

As described in Chapter 3, the PM_{2.5} emissions inventory was calculated using the PM₁₀ emissions inventory. Because PM₁₀ was used as the foundation for PM_{2.5} emissions inventory, the conformity analysis for the West Pinal County PM₁₀ nonattainment area is provided in addition to the analysis for PM_{2.5}.

For the Pinal County nonattainment areas, build/no-build tests were conducted for PM₁₀ and PM_{2.5} nonattainment area, as well NO_x. Required emissions estimates were developed using the transportation and emission modeling approaches required under the federal transportation conformity rule. The detailed analysis can be found in MAG's Conformity Analysis for the FY 2014-2018 Transportation Improvement Program and the 2035 Regional Transportation Plan, January 2014.

5.4.1 *Conformity Test Results for the Pinal PM₁₀ Nonattainment Area*

The PM₁₀ emissions were calculated for the nonattainment area for an annual average day. The projected emissions in 2015, 2025, and 2035 for the build scenario are 84,725, 86,163, and 88,250 kilograms per day, respectively. The projected PM₁₀ emissions in 2015, 2025 and 2035 for the no-build scenario are 84,733, 86,227, and 88,582 kilograms per day, respectively. The conformity modeling results are provided MAG's Conformity Analysis for the FY 2014-2018 Transportation Improvement Program and the 2035 Regional Transportation Plan, January 2014.

Since the PM₁₀ emissions predicted for the build scenarios are not greater than the PM₁₀ emissions predicted for the no-build scenarios in all conformity analysis years, it is also reasonable to expect the build emissions would not exceed the no-build emissions for the time periods between the analysis years.³⁸ These results support a finding of conformity.

5.4.2 *Conformity Test Results for the Pinal PM_{2.5} Nonattainment Area*

The PM_{2.5} and NO_x emissions were calculated for the PM_{2.5} nonattainment area for an annual average day. The projected PM_{2.5} emissions in 2015, 2025, and 2035 for the build scenario are 32, 23, and 29 kilograms per day, respectively. The projected PM_{2.5} emissions in 2015, 2025 and 2035 for the no-build scenario are 32, 24, and 31 kilograms per day, respectively. The conformity modeling results are provided MAG's Conformity Analysis for the FY 2014-2018 Transportation Improvement Program and the 2035 Regional Transportation Plan, January 2014.

The projected NO_x emissions in 2015, 2025, and 2035 for the build scenario are 1,233; 861; and 833 kilograms per day, respectively. The projected NO_x emissions in 2015, 2025 and 2035 for the no-build scenario are 1,235; 916; and 908 kilograms per day, respectively. The conformity modeling results are provided MAG's Conformity Analysis for the FY 2014-2018 Transportation Improvement Program and the 2035 Regional Transportation Plan, January 2014.

Since the PM_{2.5} and NO_x emissions predicted for the build scenarios are not greater than the PM_{2.5} and NO_x emissions predicted for the no-build scenarios in all conformity analysis years, it is also reasonable to expect the build emissions would not exceed the no-build emissions for the time periods between the analysis years.³⁹ These results support a finding of conformity.

³⁸ Section 93.119(d)(1) of the Transportation Conformity Regulations (EPA, 2012c), refers to “build” as the “action” scenario and “no-build” as the “baseline” scenario.

³⁹ Ibid.

(This page is intentionally blank)

6.0 CONCLUSION

A nonattainment area meets the NAAQS for the 24-hour $PM_{2.5}$ when concentrations do not exceed $35 \mu\text{g} / \text{m}^3$. The 2010-2012 air data and preliminary 2013 data available in the Air Quality System (AQS), confirm that the West Central Pinal County nonattainment area continues to demonstrate attainment for the 2006 24-hour $PM_{2.5}$ NAAQS. Emissions inventory prepared for the West Central Pinal County nonattainment area reveals that a comparison of the 2008 to the 2011 annual $PM_{2.5}$ emissions are continuing to decline.

Based on complete-assured data for 2010-2012, EPA has suspended the obligations for the State to submit an attainment demonstration, reasonable available control measures (RACM), reasonable further progress (RFP), contingency measures and other planning requirements related to attainment for as long as the area continues to attain the 2006 $PM_{2.5}$ NAAQS.

ADEQ is submitting this SIP for the West Central Pinal County $PM_{2.5}$ nonattainment area that consists of six chapters that present background information, air quality monitoring network, emissions inventory, prevention of significant deterioration/new source review, conformity, and conclusion. This SIP revision is in support of the Clean Air Act requirements for the 2006 24-hour $PM_{2.5}$ National Ambient Air Quality Standard for the West Central Pinal County nonattainment area.

(This page is intentionally blank)

Appendix A

Inventory Preparation Plan – Nonattainment Area Emissions Inventory

(This page is intentionally blank.)

FINAL

**Pinal County
PM_{2.5} Nonattainment Area 2008
and 2011 Annual Emissions**

prepared for:

**Arizona Department of Environmental
Quality**

January 2014

prepared by:

Sierra Research, Inc.
1801 J Street
Sacramento, California 95811
(916) 444-6666

**PINAL COUNTY PM_{2.5} NONATTAINMENT AREA 2008
AND 2011 ANNUAL EMISSIONS**

prepared for:

Arizona Department of Environmental Quality

January 2014

Principal authors:

Robert G. Dulla
Wei Liu
Mark Hixson

Sierra Research, Inc.
1801 J Street
Sacramento, CA 95811
(916) 444-6666

Earl Withycombe
Consultant

**PINAL COUNTY PM_{2.5} NONATTAINMENT AREA 2008
AND 2011 ANNUAL EMISSIONS**

Table of Contents

	<u>Page</u>
1. Introduction.....	1
2. Fugitive Dust Sources	4
3. Mobile Source Gaseous Pollutants	14
3.1 On-Road Emissions	14
3.2 Nonroad Emissions	17
3.3 Railroad Emissions	19
4. Other Source Emissions.....	21
5. Summary.....	24

List of Tables

<u>Table</u>	<u>Page</u>
Table 2-1 PM _{2.5} :PM ₁₀ Emission Ratios	5
Table 2-2 Allocation Factors and Projection Factors Used in Annual PM _{2.5} Emission Inventory (Non-Windblown Dust Sources)	6
Table 2-3 Comparisons of Disturbed Acres by Land Use and Nonattainment Area and of High Wind Hour Prevalence in 2008 and 2011	7
Table 2-4 PM _{2.5} Emission Factors for Paved Road Fugitive Dust.....	8
Table 2-5 2008 Paved Road Activity and Fugitive Emissions for PM _{2.5} Nonattainment Area	9
Table 2-6 2011 Paved Road Activity and Fugitive Emissions for PM _{2.5} Nonattainment Area	9
Table 2-7 2008 Unpaved Road Emissions for the West Pinal PM _{2.5} Nonattainment Area	11
Table 2-8 Summary of Unpaved Public Road Dust Control Projects Between 2008 and 2011 for the Pinal PM _{2.5} Nonattainment Area	11
Table 2-9 2011 Unpaved Road Emissions for the Pinal PM _{2.5} Nonattainment Area	12
Table 2-10 Annual PM _{2.5} Emission Inventory Calculation Values (Non-Windblown Dust Sources)	12
Table 2-11 Annual PM _{2.5} Emission Inventory Calculation Values (Windblown Dust Sources).....	13
Table 3-1 PM _{2.5} Nonattainment Area Vehicle Activity and Population.....	15
Table 3-2 2008 PM _{2.5} Nonattainment Area Paved Road Exhaust Emissions.....	16
Table 3-3 2011 PM _{2.5} Nonattainment Area Paved Road Exhaust Emissions.....	16
Table 3-4 2008 PM _{2.5} Nonattainment Area Unpaved Road Exhaust Emissions	17
Table 3-5 2011 PM _{2.5} Nonattainment Area Unpaved Road Exhaust Emissions	17
Table 3-6 2008 and 2011 NONROAD Emissions Pinal County PM _{2.5} Nonattainment Area	18
Table 3-7 Summary of the 2008 Annual Emissions and Typical Daily Emissions for Railroads in Pinal County PM ₁₀ Nonattainment Area	19
Table 3-8 Summary of the 2011 Annual Emissions and Typical Daily Emissions for Railroads in Pinal County PM _{2.5} Nonattainment Area.....	20
Table 4-1 Summary of the Population, Employment, and Other Emission Allocation Factors Used in PM _{2.5} Inventory Calculations	22

Table 4-2 Summary of the 2008 Annual Emissions for Other Sources in the Pinal County PM _{2.5} Nonattainment Area (tons/year).....	23
Table 4-3 Summary of the 2011 Annual Emissions for Other Sources in the Pinal County PM _{2.5} Nonattainment Area (tons/year).....	23
Table 5-1 Comparison of the 2008 & 2011 Annual PM _{2.5} Emissions in the Pinal County PM _{2.5} Nonattainment Area	24
Table 5-2 Summary of the 2008 Annual PM _{2.5} Emissions in the Pinal County PM _{2.5} Nonattainment Area	25
Table 5-3 Summary of the 2011 Annual PM _{2.5} Emissions in the Pinal County PM _{2.5} Nonattainment Area	26
Table 5-4 Summary of the 2008 Typical Daily PM _{2.5} Emissions in the Pinal County PM _{2.5} Nonattainment Area	27
Table 5-5 Summary of the 2011 Typical Daily PM _{2.5} Emissions in the Pinal County PM _{2.5} Nonattainment Area	28

List of Figures

<u>Figure</u>	<u>Page</u>
Figure 1-1 Comparison of Pinal County, Western Pinal County PM ₁₀ Nonattainment and PM _{2.5} Nonattainment Boundaries	2

1. INTRODUCTION

The U.S. Environmental Protection Agency (EPA) designated West Central Pinal County, excluding tribal lands, as nonattainment for the 2006 24-hour PM_{2.5} National Ambient Air Quality Standard (NAAQS) in 2011. Title I of the 1990 Clean Air Act Amendments requires the development of a baseline emission inventory and periodic revisions for areas that fail to meet the NAAQS. This report addresses the requirement to develop an annual PM_{2.5} baseline emissions inventory for the separately designated PM_{2.5} nonattainment area. As noted in the Inventory Preparation Plan,¹ also prepared earlier to guide compilation of these baseline inventories, an annual PM_{2.5} emissions inventory sets the starting point for tracking emission changes and is a necessary component of a future PM_{2.5} maintenance plan and request for redesignation. The Arizona Department of Environmental Quality (ADEQ) is eligible to submit a PM_{2.5} maintenance plan and redesignation request because recent air quality monitoring data show that Pinal County no longer records exceedances of the 24-hour PM_{2.5} ambient air quality standard; however, at this time ADEQ is only submitting those elements of a Nonattainment Area Plan that are required, given EPA's recent determination of Attainment for the West Central Pinal Nonattainment Area.²

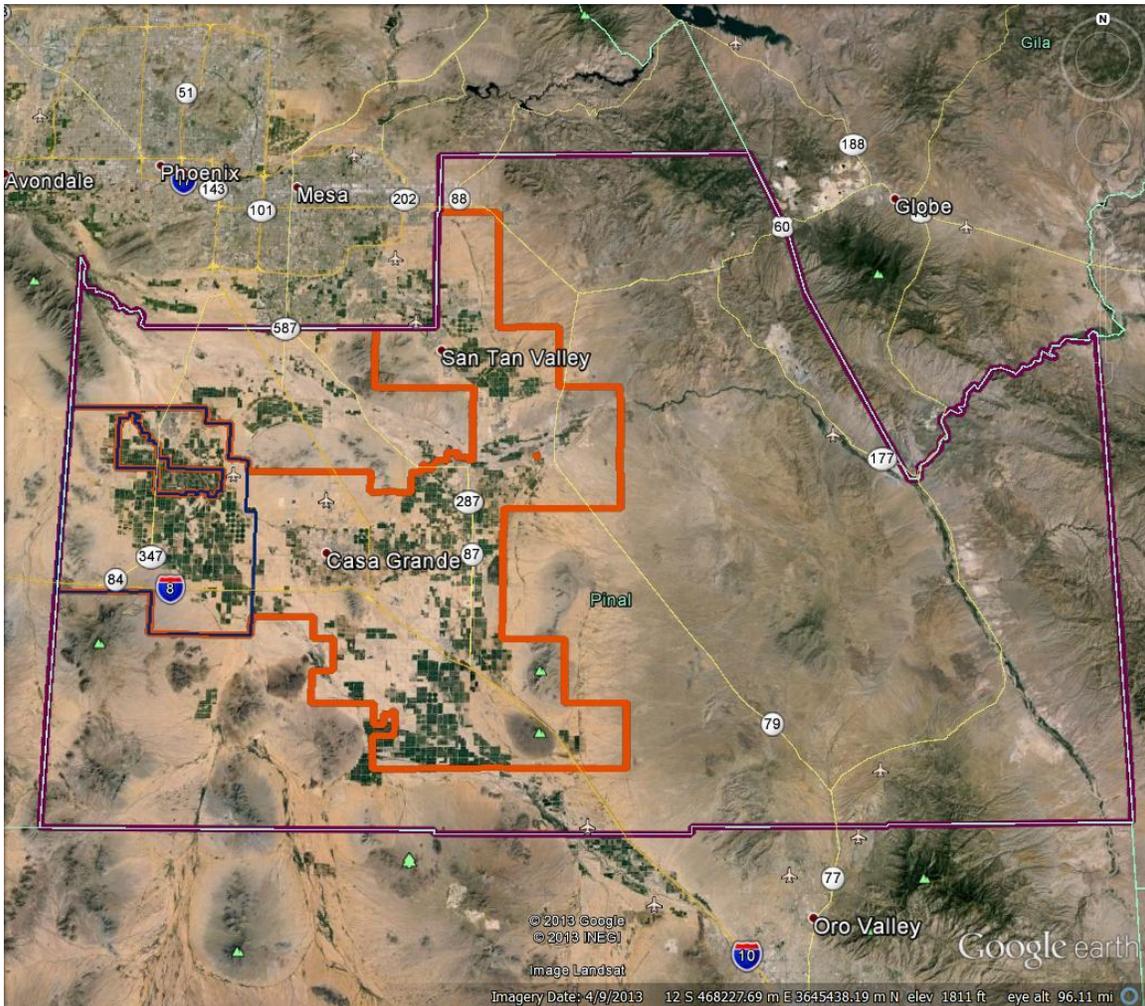
A map of Pinal County and the PM₁₀ and PM_{2.5} nonattainment areas is displayed in Figure 1-1. The County, as reported on its website,³ covers an area of about 5,400 square miles and is comprised of two distinct geographic regions: an eastern portion characterized by mountains reaching 6,000 feet in elevation, and a western area consisting primarily of low desert valleys hosting irrigated agricultural land. As can be seen in Figure 1-1, the PM₁₀ and PM_{2.5} nonattainment areas are of irregular shapes that cover portions of Western Pinal County with areas of 1,325.9 and 322.6 square miles, respectively. It should also be noted that while Indian lands are located within the boundaries of the nonattainment areas, and within the Maricopa and Cowtown monitoring station modeling domains, these lands are not designated nonattainment for either the 24-hour PM₁₀ or 24-hour PM_{2.5} NAAQS and therefore are not included in these annual emissions inventories.

¹ "Pinal County PM Inventory Preparation Plan," Report No. SR2013-01-01, prepared for the Arizona Department of Environmental Quality, by Sierra Research, February 2013.

² <http://www.gpo.gov/fdsys/pkg/FR-2013-09-04/pdf/2013-21366.pdf>.

³ <http://pinalcountyaz.gov/Departments/BudgetOffice/Documents/BB0607/countyoverview.pdf>.

**Figure 1-1
Comparison of Pinal County, West Pinal County PM₁₀ Nonattainment and West
Central Pinal County PM_{2.5} Nonattainment Boundaries**



Legend

- EPA_Pinal_PM2.5_NAA
- EPA_West_Pinal_PM10_NAA
- PinalCounty

The spatial distribution of estimated PM_{2.5} emissions within the nonattainment area was facilitated by GIS shapefiles provided by ADEQ and the Pinal County Air Quality Control District (PCAQCD) that document information on land use, population, and other determining factors. For several source categories (e.g., nonroad vehicles and equipment), emissions in the nonattainment area were estimated from available county-wide values adjusted by the ratio of nonattainment area population to the county total. For other source categories (e.g., construction, confined animal feeding operations

[CAFO], and railroads), estimates are based on activity rates of sources within the nonattainment area and emissions factors representative of these sources.

To take advantage of the recent work being done to prepare an annual PM₁₀ emission inventory for use in the development of a Western Pinal County PM₁₀ nonattainment plan, the annual PM_{2.5} inventory of emissions from area sources was developed by applying PM_{2.5}:PM₁₀ conversion factors to these categories of primarily fugitive PM₁₀ emissions in the annual PM₁₀ inventory for 2008.⁴ Estimates of gaseous pollutants for motor vehicles operated on paved and unpaved roads were estimated using EPA's mobile source emission factor model MOVES for 2008 and 2011. Estimates for the remaining sources of gaseous pollutants were extracted from EPA's 2008 National Emission Inventory (NEI) for Pinal County. Separate approaches were used to project PM_{2.5} emissions from 2008 to 2011 and are discussed in the sections presented below which describe the methods used to estimate emissions for each of the emission categories. A summary of the annual emission estimates for all of the source categories is presented in Section 5, along with estimates of the annual average day emissions.

###

⁴ Pinal County PM₁₀ Nonattainment Area 2008 Base Year Emissions for Selected Design Days and Modeling Domains, prepared for Arizona Department of Environmental Quality, by Sierra Research, December 2013.

2. FUGITIVE DUST SOURCES

Fugitive dust sources contribute the majority of emissions to the PM₁₀ inventory and are also significant in the compilation of a PM_{2.5} emission inventory for the Western Pinal County nonattainment area. The conversion of an annual PM₁₀ inventory to an annual PM_{2.5} inventory, as summarized above, is a relatively straightforward process. The steps undertaken in this conversion are described in more detail below.

Methodology – PM_{2.5} fractions of source-specific PM₁₀ emissions have been published in a number of reference sources. Primary among these is AP-42, which lists both PM_{2.5} and PM₁₀ emission factors by source category for those sources emitting particulate matter over size ranges that extend beyond 10 microns.⁵ The portions of AP-42 related to sources of mechanically generated geological PM₁₀, several of which are significant with respect to Pinal County nonattainment, were last updated in 2006 for PM_{2.5}:PM₁₀ ratios. The bases for the updates were the results of suspension chamber tests by Midwest Research Institute of soil samples collected in the Pacific Southwest by jurisdictional members of the Western Regional Air Partnership.⁶ The PM_{2.5}:PM₁₀ ratio for CAFOs operation was derived from the particle size distribution results published by Bonifacio et al.⁷

The PM_{2.5}:PM₁₀ ratio for paved road travel in AP-42 was further updated in 2011 as a consequence of EPA's interest in removing the contributions of vehicle exhaust and wear emissions from overall paved road travel factors and in incorporating additional new monitoring data and the results of a more sophisticated statistical analysis of the accumulated research data.⁸ Because the PM_{2.5}:PM₁₀ ratios published in AP-42 have undergone extensive internal and external review, this reference was selected as the primary source document for use in developing PM_{2.5} emission inventories for West Central Pinal County. The ratios listed in Table 2-1 below are applied directly to same-source PM₁₀ emission estimates calculated for the PM_{2.5} nonattainment area.

⁵ Compilation of Air Pollutant Emission Factors, Volume I: Stationary Point and Area Sources, AP-42, Fifth Edition, U.S. Environmental Protection Agency, January 1995.

⁶ Background Document for Revisions to Fine Fraction Ratios Used for AP-42 Fugitive Dust Emissions Factors, prepared for the Western Governors Association, Western Regional Air Partnership by Midwest Research Institute, November 2006, <http://www.epa.gov/ttn/chief/ap42/ch13/bgdocs/b13s02.pdf>, accessed on November 16, 2013.

⁷ Bonifacio, H.F, R.G. Maghirang, B.W. Auvermann, E.B. Razote, J.P. Murphy, and J.P. Harner III, "Particulate matter emission rates from beef cattle feedlots in Kansas – Reverse dispersion modeling," *Journal of the Air, Waste and Management Association* 62(3)350-361, 2012.

⁸ Emission Factor Documentation for AP-42, Section 13.2.1 Paved Roads, U.S. EPA, January 2011, <http://www.epa.gov/ttn/chief/ap42/ch13/bgdocs/b13s0201.pdf>, accessed on November 16, 2013.

Table 2-1 PM_{2.5}:PM₁₀ Emission Ratios	
Source Category	PM _{2.5} :PM ₁₀ Ratio
Construction	0.10
CAFOs	0.18
Agricultural Operations	0.20
Wind Erosion	0.15

A summary of the surrogates used to allocate fugitive dust emissions from the PM₁₀ nonattainment area to the PM_{2.5} nonattainment area is presented in Table 2-2 for the non-windblown sources. Also presented are changes in allocation factors forecast between 2008 and 2011. Table 2-3 reports the calculated PM₁₀ emissions by land use for the PM₁₀ and PM_{2.5} nonattainment areas and differences between 2008 and 2011 high wind hours.⁹ Footnotes provide insight into key data sources employed in the development of the adjustment factors. Since fugitive dust for paved and unpaved emissions were calculated from the miles of roads located within the nonattainment area, a brief description of the methods is presented below.

The data on total acres by land use and nonattainment area and high wind hour prevalence in 2008 and 2011 are shown in Table 2-3 for informational purposes only. Annual windblown PM₁₀ emissions reported by land use and nonattainment area were independently calculated for each nonattainment area using the methodology discussed in Sections 3.2 (High Wind Fugitive Dust Methodology) and 5.2 (High Wind Emission Inventory) of the PM₁₀ emission inventory report referenced above.¹⁰ This method computes hourly PM₁₀ emission rates by wind speed range for wind speeds exceeding 12 miles per hour, multiplies these rates by the number of annual hours within the speed bins, and then multiplies the results by the total areas within each land use classification. The resulting values were finally multiplied by the wind erosion PM_{2.5}/PM₁₀ conversion factor of 0.15 (Table 2-1) to derive annual windblown PM_{2.5} emissions in 2008 and 2011. These latter values are shown later in this section in Table 2-11.

⁹ A 2011 GIS land use map for the PM_{2.5} nonattainment area was not available. Therefore, the 2008 land use map acreage values derived from the 2008 PM₁₀ land use map were held constant for 2011.

¹⁰ The high wind emission factors are developed by wind speed bins for different monitors. For the detailed high wind emission factors calculation, please refer to Appendix 5 of the PM₁₀ emission inventory report.

**Table 2-2
Allocation Factors and Projection Factors Used in Annual PM_{2.5} Emission
Inventory (Non-Windblown Dust Sources)**

Source Category	Allocation Factor	2008 Emissions			2011 Emissions	
		Values In PM ₁₀ Nonattainment Area	Values In PM _{2.5} Nonattainment Area	Allocation ratio: (PM _{2.5} NAA /PM ₁₀ NAA)	Projected Value in PM _{2.5} NAA in 2011	Projected Ratio: (2011/2008)
Agricultural Operations	Ag Lands (Acres)	233,190	67,138	29%	67,138	100%
CAFOs	# of Cattle	180,742	180,742	100%	107,742	60%
Dairies	Dairy Lands (Acres)	1,334	557	42%	557	100%
Construction Residential	Area / # of Dust Permits	4,728	1,777	38%	806 ^a	45%
Construction Commercial	Area / # of Dust Permits	2,429	455	19%	206 ^a	45%
Construction Site Development	Area / # of Dust Permits	3,454	574	17%	260 ^a	45%
Paved Road ^b	N/A	N/A	N/A	N/A	N/A	N/A
Unpaved Ag Roads	Length of roads (miles)	4,175	1226 ^c	29%	1,226	100%
Unpaved Public Roads	Length of roads (miles)	598	234 ^c	39%	234 ^d (With controls on some of the roads)	98%
Unpaved Private Roads	Length of roads (miles)	1,785	488 ^c	27%	488	100%
Unpaved Trails	Length of roads (miles)	1,244	194 ^c	16%	194	100%

- a. Construction activity was determined by the location of permits issued in 2008. Changes in the number of permits issued between 2008 and 2011 for the County were used to scale the change in activity between those years for the nonattainment area (NAA).
- b. Paved road emissions were calculated for roads located within the nonattainment boundary; a description of the calculations is presented this section.
- c. There are three types of unpaved agricultural roads, five types of unpaved public roads, two types of unpaved private roads, and one type of unpaved trail. Unpaved road emissions were calculated for roads located within the nonattainment boundary; a description of the calculations is presented in this section.
- d. Some controls were applied to a small portion of public roads in the county, the projection factor accounts for the combined effect of these controls.

**Table 2-3
Comparisons of Disturbed Acres by Land Use and Nonattainment Area
and of High Wind Hour Prevalence in 2008 and 2011**

Source Category	Total Acres			High Wind Hour Prevalence		
	Within the PM ₁₀ Nonattainment Area	Within the PM _{2.5} Nonattainment Area	Area Ratio: PM _{2.5} NAA / PM ₁₀ NAA	Percentage of High Wind Hours in 2008	Percentage of High Wind Hours in 2011	High Wind Hour Ratio: 2011 / 2008
Developed Urban Lands	16,233	3,898	24%	8.03%	9.70%	121%
Developed Rural Lands	21,834	10,147	46%	8.03%	9.70%	121%
Unpaved Roads	13,040	3,630	28%	8.03%	9.70%	121%
Cleared Areas	3,654	1,846	51%	8.03%	9.70%	121%
Residential Construction	4,842	1,904	39%	8.03%	9.70%	121%
CAFOs and Dairies	3,999	3,086	77%	8.03%	9.70%	121%
Desert Shrubland	450,108	101,428	23%	8.03%	9.70%	121%
Agricultural Croplands	250,677	72,177	29%	8.03%	9.70%	121%
Commercial Construction	2,387	443	19%	8.03%	9.70%	121%
Other	41,797	1,847	4%	8.03%	9.70%	121%
Site Development	3,439	554	16%	8.03%	9.70%	121%

Paved Road Fugitive Dust Emissions – Paved road fugitive dust emissions were calculated using the same methods as used in calculating emissions for the PM₁₀ nonattainment area (see Pinal County PM₁₀ Nonattainment Area 2008 Base Year Emissions report referenced above) with two exceptions: first, VMT was extracted from only those links in the PM_{2.5} nonattainment area; second, the emission rates were revised by changing the size allocation factor in the equation below to reflect particles in the PM_{2.5} size fraction as opposed to the PM₁₀ fraction used in the previous modeling work. These rates are derived from an AP-42 equation shown below and described in detail in MAG’s 2012 Five Percent Plan.¹¹

$$E = k \times sL^{0.91} \times W^{1.02} \times \left(1 - \frac{P}{4N}\right)$$

where:

E = emission factor on an annual average basis;

k = particle size allocation factor (1.0 for PM₁₀ particles and 0.25 for PM_{2.5});

sL = silt loading for road surface type (freeways are 0.02 g/m², high-traffic arterials are 0.067 g/m², low-traffic arterials are 0.23 g/m²);

¹¹ “MAG 2012 Five Percent Plan For PM-10 for the Maricopa County Nonattainment Area,” Maricopa Association of Governments, March 2012 Appendix A, section 5.3, p. 117-119.

W = vehicle weight averaged over specific road ways (freeway vehicle averages are 3.53 tons and arterial vehicle averages are 2.65 tons);

P = number of days in a year with precipitation over 0.254 mm (0.01 in), determined to be 31 days for 2008¹²; and

N = the number of days in the year: 366 days for 2008 and 365 days for 2011.

Table 2-4 shows the resulting emission rates for $PM_{2.5}$ based on road types and traffic counts.

Table 2-4		
$PM_{2.5}$ Emission Factors for Paved Road Fugitive Dust		
Road Type ID	Emission Factor	Road Description
2,4	0.03 (g/mi)	Freeways
3,5 (Low Traffic)	0.17 (g/mi)	Low Traffic Arterials (counts < 10000)
3,5 (High Traffic)	0.06 (g/mi)	High Traffic Arterials (counts > 10000)

The VMT in the $PM_{2.5}$ nonattainment is summarized for the 2008 and 2011 years in Tables 2-5 and 2-6. The VMT and emissions are calculated over the three road types used in the modeling episode calculations for fugitive dust: freeways, low-traffic arterials, and high-traffic arterials. The VMT values are extracted from the Arizona Department of Transportation (ADOT) Transportation Demand Model (TDM) for the $PM_{2.5}$ nonattainment area for 2008 and extrapolated to 2011 levels based on activity changes resulting from population growth in the $PM_{2.5}$ nonattainment area. Emission factors are held constant between the 2008 and 2011 levels.

Two vehicle manufacturers operate test tracks within the $PM_{2.5}$ nonattainment area. ADEQ contacted Nissan and Volkswagen and obtained information on the mix of vehicles operated on the paved roads located at their facilities, average speeds, annual VMT, etc. Considering the high-speeds—up to 80 mph and 100 mph—at the facilities and daily usage of these tracks, a dust emission rate was determined based on the silt loading factor from freeways along with reduced vehicle weights matching a light-duty vehicle fleet. This revised emission rate was then used to calculate emissions from the paved roads located within these facilities.¹³

¹² Based on precipitation data for Pinal County at the Maricopa monitor from the AZMET network, <http://ag.arizona.edu/azmet/az-data.htm>.

¹³ Since the manufacturers do not produce or test heavy-duty trucks, the average weight of vehicles operated at the tracks is lower than those operated on the highways. Based on the test track activity, the silt loading of the paved test tracks was assumed to match the value determined for freeways. Calculations showed that the reduced weight of the vehicles on the test track led to a slightly lower emission rate on the test tracks than that cited in Table 2-4 for freeways.

Road Types	VMT (Daily)	PM _{2.5} Emission Factor (g/mi)	PM _{2.5} Emissions (tons/year)
Freeways	62,950	0.03	0.76
Low Traffic Arterials	427,685	0.17	29.33
High Traffic Arterials	136,428	0.06	3.30
Test Tracks	8,917	0.02	0.07
Total	635,980	N/A	33.47

Road Types	VMT (Daily)	PM _{2.5} Emission Factor (g/mi)	PM _{2.5} Emissions (tons/year)
Freeways	66,857	0.03	0.81
Low Traffic Arterials	454,232	0.17	31.15
High Traffic Arterials	144,897	0.06	3.51
Test Tracks	8,941 ¹⁴	0.02	0.07
Total	674,927	N/A	35.54

Unpaved Road Fugitive Dust Emissions – Fugitive PM_{2.5} emissions from unpaved roads were calculated using the guidance in Section 13.2.2 of AP-42. AP-42 emission factors were applied to unpaved road VMT values to estimate fugitive PM_{2.5} emissions. The unpaved road particulate emission factors were derived from the following AP-42 equation for publicly accessible unpaved roads:

$$E = \left[\frac{k \left(\frac{S}{12}\right)^1 \left(\frac{S}{30}\right)^{0.5}}{\left(\frac{M}{0.5}\right)^{0.2}} - C \right] \left(1 - \frac{P}{N}\right)$$

where:

E = annual average particulate emission factor adjusted for natural mitigation (lb/mile);

k = particle size multiplier for particle size range (1.8 lb/mile for PM₁₀ and 0.18 lb/mile for PM_{2.5});

¹⁴ The 2011 and 2008 annual VMT values were held constant, however, 2008 is a leap year with 366 days making the calculated average daily VMT slightly lower than the 2011 average daily VMT which is based on a year with 365 days.

s = surface material silt content;

S = mean vehicle speed;

M = surface material moisture content;

C = emission factor for 1980s vehicle fleet exhaust, brake wear, and tire wear (0.00047 lb/mile for PM_{10});

P = annual number of “wet” days with at least 0.254 mm (0.01 in) of precipitation (31 days in 2008 and 2011); and

N = annual number of days (366 days in 2008 and 365 in 2011).

The particle size multiplier used in this instance is 0.18 lb/mile in order to calculate the $PM_{2.5}$ emissions due to unpaved road activity. Four categories of unpaved roads have been identified in Pinal County: agricultural, public, private, and trails. The surface material silt and moisture contents for each category are summarized in the previously referenced PM_{10} emission inventory document. Subcategories were developed for agricultural, public, private unpaved roads, and trails to account for variations in average vehicle speeds and annual average daily traffic (ADT). The total mileage for each subcategory is based on information presented in the previously referenced PM_{10} emission inventory document. ADT and speed estimates for public unpaved roads are based on measurements obtained in 2013 and 2014.¹⁵ ADT is multiplied by total mileage to calculate daily VMT.

As noted previously, both Nissan and Volkswagen operate test tracks within the $PM_{2.5}$ nonattainment area and operate vehicles on unpaved roads. Permits for these facilities indicate that emissions controls are applied to the unpaved roads at both facilities. For this reason, the silt and moisture contents for these roads are assumed to be the same as the public unpaved roads. ADEQ obtained information on travel activity and average speeds for vehicles operating on unpaved roads at these facilities.¹⁶

The $PM_{2.5}$ emission factors were multiplied by the daily VMT estimates to produce unpaved road emissions for the $PM_{2.5}$ nonattainment area (NAA), which are summarized by category in Table 2-7 for year 2008.

¹⁵ Email from Margaret Ittelson, Traffic Research and Analysis, to Bob Dulla, Sierra Research, January 22, 2014, providing measurements of hourly ADT and speed collected at 20 separate categories of public unpaved roads. The ADT values were averaged with data collected on the same public unpaved road segments in 2013.

¹⁶ VMT for the two facilities totaled 721,804, with an average vehicle speed of 45 mph.

Unpaved Road Category	Typical Daily PM _{2.5} Emissions (lbs/day)	Annual PM _{2.5} Emissions (tons/yr)
Agricultural	2,543	465
Public	4,180	765
Private	1,346	246
Trails	60	11
Test Tracks	260	48
Total	8,388	1,535

No forecasts of travel activity are available for any category of unpaved roads within either the PM_{2.5} or PM₁₀ nonattainment areas for the year 2011; therefore, the 2008 VMT estimates for unpaved roads were held constant through 2011. Discussions with Pinal County’s public works department and local municipalities, however, determined that controls were applied to selected unpaved roads in both 2010 and 2011. Based on this information, the unpaved road dust control projects that were implemented in these years that affect roads located within the PM_{2.5} nonattainment area were identified. Table 2-8 lists the road types, the length, the control measures, and control efficiency for these unpaved road dust control projects. The effects of these controls were incorporated into the estimates of unpaved road fugitive dust emissions presented in Table 2-9.

Control Measures	Control Efficiency ^a	Road Length (Mile) for Each Road Type ^b				
		A	B	C	D	E
Graded and watered once per month	0.03	1.0	0.0	2.5	4.5	0.0
Graded and watered twice per month	0.05	0.0	0.0	2.4	0.0	0.0
Chip Seal	0.9	0.0	0.0	4.7	0.0	0.0

a. Based on “Control of Open Fugitive Dust Sources,” EPA-450/3-88-008, U.S. EPA, September 1988.

b. Road types are defined to represent different ADT levels.

Unpaved Road Category	Typical Daily PM _{2.5} Emissions (lbs/day)	Annual PM _{2.5} Emissions (tons/yr)
Agricultural	2,536	465
Public	4,126	755
Private	1,342	246
Trails	60	11
Test Tracks	259	48
Total	8,323	1,525

A summary of the PM_{2.5} emissions from fugitive dust for non-windblown and windblown source activity is presented in Tables 2-10 and 2-11.

Source Category	2008 Emissions, tons/year			2011 Emissions, tons/year	
	PM ₁₀		Emission Conversion Factor	PM _{2.5}	
	In PM ₁₀ NAA	In PM _{2.5} NAA		In PM _{2.5} NAA	In PM _{2.5} NAA
Agricultural Operations	2,754	790	0.20	158	158
CAFOs	2,176	2,176	0.18	387	231
Dairies	190	79	0.18	14	14
Construction	5,559	1,050	0.10	105	48
Paved Road	1,136	N/A	N/A	42	43
Unpaved Roads	46,456	14,903	N/A	1,535	1,525
Non-Windblown Dust Subtotal	58,271	18,998		2,241	2,019

**Table 2-11
Annual PM_{2.5} Emission Inventory Calculation Values (Windblown Dust Sources)**

Source Category	2008 Emissions, tons/year			2011 Emissions, tons/year	
	PM ₁₀		Emission Conversion Factor	PM _{2.5}	PM _{2.5}
	In PM ₁₀ NAA	In PM _{2.5} NAA		In PM _{2.5} NAA	In PM _{2.5} NAA
Developed Urban Lands	253	44	0.15	7	8
Developed Rural Lands	2,482	870	0.15	131	157
Unpaved Roads	5,855	1,322	0.15	198	239
Cleared Areas	475	245	0.15	37	44
Residential Construction	1,162	511	0.15	77	42
CAFOs and Dairies	1,009	756	0.15	113	137
Desert Shrubland	52,531	8,141	0.15	1,221	1,471
Agricultural Croplands	32,357	9,328	0.15	1,399	1,685
Commercial Construction	585	111	0.15	17	9
Other	5,826	222	0.15	33	40
Site Development	789	135	0.15	20	11
Windblown Dust Subtotal	103,324	21,685		3,253	3,842

###

3. MOBILE SOURCE GASEOUS POLLUTANTS

3.1 On-Road Emissions

MOVES 2010b Configuration – Mobile source exhaust emissions for travel on both paved and unpaved roads were modeled using MOVES 2010b simulations along with link outputs from the Arizona Travel Demand Model (AZTDM). MOVES runs were performed as described in the “On-Road Mobile Source Emissions Modeling for Paved Roads” section of the documentation (see Pinal County PM₁₀ Nonattainment Area 2008 Base Year Emissions report referenced above) for both the 2008 and 2011 model years. The model was modified to account for changes between the annual and episodic runs for the 2008 baseline runs. MOVES was configured in the emission rates mode with additional outputs for a wider range of pollutants and additional inputs created to cover the average monthly meteorology for the entire year.

The additional meteorological data for 2008 were converted from hourly temperature and relative humidity data from Casa Grande for each month of the year.¹⁷ Missing hourly data were flagged and ignored during the creation of the average monthly temperature and relative humidity profiles.

The list of pollutants modeled for the annual inventory included carbon monoxide (CO), nitrogen oxide (NO), nitrogen dioxide (NO₂), sulfur dioxide (SO₂), ammonia (NH₃), volatile organic compounds (VOC), and primary PM_{2.5}. Emission rates for running exhaust, starting, idling, and evaporative processes were extracted from the MYSQL output database for each of the pollutants over all of the months.

For the 2011 year MOVES runs, the YearID variable was changed to 2011 in the inputs for source type age distribution, fuel supply, source type population, and annual vehicle type VMT. Since MOVES is being operated in the rates mode, the VMT and vehicle population levels were held at the 2008 levels for the MOVES runs. All other MOVES inputs remained unchanged between the two model years. The vehicle VMT and population values were updated in the final emissions rates calculation formulas.

Exhaust Emissions Calculations for Paved and Unpaved Roads – Rate-per-distance hourly emission factors were extracted to a lookup table that allowed for emissions to be calculated based on the source types, speed, and hour for each of the above-listed pollutants. This is the same methodology as used in the PM₁₀ episodic modeling only the list of pollutants has been expanded. Emissions were calculated over those links in the

¹⁷ These data were downloaded from <ftp://ftp.ncdc.noaa.gov/pub/data/noaa/2008/> on July 3, 2013.

PM_{2.5} nonattainment area using the TDM outputs for speed, time, and VMT by source type. The average hourly emissions for a single day were summed for each pollutant to calculate the average daily emissions. The VMT activity was scaled to the 2011 levels based on the scaling of the population in the PM_{2.5} nonattainment area. The 2011 VMT levels were then multiplied by emission factors unique to pollutant, vehicle type, hour, speed, and road type to calculate the projected exhaust emissions. A summary of the VMT and vehicle population changes for the nonattainment area is presented in Table 3-1.

Table 3-1 PM_{2.5} Nonattainment Area Vehicle Activity and Population		
Year	VMT (daily)	Vehicle Population
2008	635,980	37,950
2011	674,927	40,305

Emissions due to evaporative losses and starting and idling activities were calculated based on the emission factors extracted from MOVES multiplied by the vehicle population in the PM_{2.5} nonattainment area. In 2008, the vehicle population was scaled down from the county to the PM_{2.5} nonattainment area based on the ratio of human population between the two areas. For the 2011 emissions, the vehicle population was scaled to 2011 from the 2008 levels based on human population growth in the PM_{2.5} nonattainment area.

The test track emissions were calculated using the same lookup table procedure. VMT on the track was assumed to come only from light-duty passenger vehicles, as indicated by staff at the facilities. Test speeds were provided from both facilities. Vehicle weights and fuels were assumed to represent the on-road mix of light duty vehicles. One difference between the test facility fleet and the lookup table fleet is in the age distribution of vehicles. The test track vehicle age distribution reflects late model year passenger vehicles, whereas the lookup table assumes an older fleet on average. This age assumption produces a higher, conservative estimate of test track exhaust emissions. Additional MOVES runs to update the existing lookup table with a younger vehicle fleet were not recommended due to the negligible overall impact on the exhaust emissions inventory. Based on information provided by the test track operators, travel activity on paved roads was held constant from 2008 to 2011.

Tables 3-2 and 3-3 show the 2008 and 2011 annual emissions in the PM_{2.5} nonattainment area.

Table 3-2					
2008 PM_{2.5} Nonattainment Area Paved Road Exhaust Emissions					
Activity	NOx (tons/year)	SO ₂ (tons/year)	NH ₃ (tons/year)	VOC (tons/year)	PM _{2.5} (tons/year)
Running Exhaust	283.71	9.08	1.70	92.84	7.25
Start & Idle Exhaust	135.49	0.10	0.00	226.85	1.45
Evaporative	0.00	0.00	0.00	80.20	0.00
Test Track	4.09	0.16	0.02	1.66	0.07
Total	423.30	9.35	1.72	401.55	8.77

Table 3-3					
2011 PM_{2.5} Nonattainment Area Paved Road Exhaust Emissions					
Activity	NOx (tons/year)	SO ₂ (tons/year)	NH ₃ (tons/year)	VOC (tons/year)	PM _{2.5} (tons/year)
Running Exhaust	213.50	8.15	1.76	70.41	5.84
Start & Idle Exhaust	134.72	0.10	0.00	194.52	1.28
Evaporative	0.00	0.00	0.00	71.86	0.00
Test Track	2.99	0.13	0.02	1.11	0.07
Total	351.21	8.39	1.78	337.89	7.18

Unpaved exhaust emissions were calculated for the 2008 and 2011 annual inventories using the same methods applied in the PM₁₀ 2008 modeling episodes inventories. Hourly average emission rates were extracted from MOVES by pollutant and speed bin. Rates were determined based on the average speed of a given unpaved road type. These speed-specific rates were then multiplied by the daily VMT for that unpaved road type. Test track emissions for unpaved roads similarly are based on daily estimates of VMT and speed, and vehicle characteristics provided by the operators of the test facilities. As noted for the paved emissions for the test tracks, the vehicle age distribution on the test tracks is skewed towards newer vehicles; thus, the estimates provided here are more conservative. A summary of the 2008 emissions is provided in Table 3-4 by road type and pollutant.

Table 3-4					
2008 PM_{2.5} Nonattainment Area Unpaved Road Exhaust Emissions					
Activity	NO _x (tons/year)	SO ₂ (tons/year)	NH ₃ (tons/year)	VOC (tons/year)	PM _{2.5} (tons/year)
Agricultural	8.06	0.26	0.05	4.64	0.22
Public	14.89	0.48	0.09	6.75	0.35
Private	3.53	0.11	0.02	1.84	0.09
Trails	0.16	0.00	0.00	0.00	0.00
Test Tracks	0.78	0.03	0.00	0.27	0.01
Total	27.41	0.88	0.16	13.49	0.68

The 2011 control inventory for unpaved exhaust is shown in Table 3-5. VMT has been projected to change on the public unpaved roads and remains static on the other unpaved roads.

Table 3-5					
2011 PM_{2.5} Nonattainment Area Unpaved Road Exhaust Emissions					
Activity	NO _x (tons/year)	SO ₂ (tons/year)	NH ₃ (tons/year)	VOC (tons/year)	PM _{2.5} (tons/year)
Agricultural	6.51	0.23	0.05	3.66	0.20
Public	10.63	0.39	0.08	4.53	0.28
Private	2.59	0.09	0.02	1.27	0.08
Trails	0.01	0.00	0.00	0.00	0.00
Test Tracks	0.56	0.02	0.00	0.18	0.01
Total	20.31	0.74	0.16	9.64	0.56

3.2 Nonroad Emissions

Pinal County specific emissions¹⁸ were determined using EPA's NONROAD model,¹⁹ which included Pinal County specific input values where available. The NONROAD emissions were calculated for the PM₁₀ nonattainment area (see Pinal County PM₁₀ Nonattainment Area 2008 Base Year Emissions report referenced above). As described

¹⁸ Input files are included in Appendix 8 of the previously referenced PM₁₀ emission inventory document.

¹⁹ U.S. EPA NONROAD Model, Version 2008a, released July 2009.

below, in the absence of sector-specific information for the entire nonattainment area, PM₁₀ nonattainment area nonroad emissions were allocated to the PM_{2.5} nonattainment area using human population ratios.²⁰

EPA’s NONROAD emissions model calculates emissions from each source according to the methodology described below. Note that this calculation yields emission results in grams per year, which the model then converts to tons/year.

$$Emissions = EF \times DF \times P \times LF \times Hours \times Units$$

where:

EF = emission factor in g/hp-hr

DF = deterioration factor (dimensionless)

P = power in horsepower

LF = load factor (dimensionless)

Hours = annual operating hours for each unit

Units = total population of engines operating in a given year

The inputs used to configure the NONROAD model to represent Pinal County are documented in the previously cited PM₁₀ emission inventory report.

It should be noted that the “Pleasure Craft” and “Railway Maintenance” equipment categories were excluded due to the absence of recreational areas and rail yards in the nonattainment area that would accommodate their use. Table 3-6 summarizes the 2008 and 2011 nonroad emissions for the PM_{2.5} nonattainment area

Table 3-6					
2008 and 2011 NONROAD Emissions Pinal County PM_{2.5} Nonattainment Area					
Year	Population in the PM _{2.5} Nonattainment Area	PM _{2.5}	NOx	SO ₂	VOC
		(tons/year)	(tons/year)	(tons/year)	(tons/year)
2008	49,878	20.6	249.6	0.14	161.0
2011	52,974	21.9	265.1	0.15	171.0

²⁰ The population ratio (i.e., 49,878 / 259,141 = 19.2%) was determined using 2010 PM_{2.5} and PM₁₀ nonattainment area census block data provided by ADEQ.

3.3 Railroad Emissions

The PM₁₀ daily emission factors for estimating 2008 railroad operations are described in the previously referenced PM₁₀ emission inventory document. Emission factors^{21,22,23,24} for all the other pollutants were used to calculate the annual railroad emissions by assuming two trains travelling through the nonattainment area each hour, 366 days per year for 2008 and 365 days per year for 2011. The reduction in emission factors from 2008 to 2011 is due mainly to improved locomotive engine technology, the penetration of newer (i.e., cleaner) locomotives into the national fleet, more stringent locomotive emission standards, and reductions in fuel sulfur content. Table 3-7 and Table 3-8 summarize the length of track and the annual and typical daily emissions in the nonattainment area for 2008 and 2011, respectively.

Pollutants	Emission Factors (g/mile/hour/train)	Track Length in PM _{2.5} Nonattainment Area (miles)	# of Trains (per hour)	Annual Emissions (tons/yr)	Typical Daily Emissions (lbs/day)
NO _x	1229	18	2	428	2341
PM _{2.5}	36	18	2	13	69
SO ₂	120	18	2	42	229
NH ₃	1	18	2	0.2	1
VOC	65	18	2	23	125

²¹ NO_x, PM₁₀, and VOC emission factors were obtained from Emission Factors for Locomotives, EPA-420-F-09-025, April 2009, Tables 5-7.

²² PM_{2.5} emission factor based on PM₁₀ emission factor and emission estimates from Regulatory Impact Analysis: Control of Emissions of Air Pollution from Locomotive Engines and Marine Compression Ignition Engines Less than 30 Liters Per Cylinder, EPA-420-R-08-001, March 2008, Table 3-71 and 3-72.

²³ SO₂ emission factor calculated based on method shown in Emission Factors for Locomotives, EPA-420-F-09-025, April 2009, and assumes a diesel fuel density of 3200 g/gal and a fuel sulfur content of 2640 ppm and 235 ppm for 2008 and 2011, respectively (engineering estimate).

²⁴ NH₃ emission factor from Bergin, Harrell, Janssen, Locomotive Emission Inventories for the United States from ERTAC Rail, undated, page 6.

**Table 3-8
Summary of the 2011 Annual Emissions and Typical Daily Emissions for Railroads in
Pinal County PM_{2.5} Nonattainment Area**

Pollutants	Emission Factors (g/mile/hour/train)	Track Length in PM _{2.5} Nonattainment Area (miles)	# of Trains (per hour)	Annual Emissions (tons/yr)	Typical Daily Emissions (lbs/day)
NO _x	1000	18	2	349	1913
PM _{2.5}	29	18	2	10	55
SO ₂	10	18	2	3	19
NH ₃	1	18	2	0.2	1
VOC	52	18	2	18	99

###

4. OTHER SOURCE EMISSIONS

The other source categories, listed in Table 4-1, are estimated based on the NEI.²⁵ The 2008 NEI for Pinal County was used as the starting point for calculating both PM_{2.5} emissions and PM_{2.5} precursor emissions for the Pinal PM_{2.5} nonattainment area. The emissions within the nonattainment area were estimated by applying appropriate emission allocation factors (e.g., relative population, employment, area of agriculture land area, etc.) to the Pinal County PM_{2.5} and precursor emission inventories. The same projection factors (e.g., relative population, employment, agriculture land area, etc.) were also used to project the 2008 emissions to 2011 emissions. Projection of 2008 emissions to 2011 emissions, in place of utilizing the 2011 NEI data, was decided to be preferential in order to maintain methodological consistency between the 2008 and 2011 emission inventories presented in this document.

Tables 4-2 and 4-3 list the other source categories included in the domain and the corresponding emission allocation factors and projection factors used in the calculation.

²⁵ <http://www.epa.gov/ttn/chief/eiinformation.html>.

Table 4-1					
Summary of the Population, Employment, and Other Emission Allocation Factors Used in PM_{2.5} Inventory Calculations					
Year	Domain	Population ^a (#)	Employment ^b (#)	Pesticide ^c (Acre)	Mining Operations ^d (#)
2008	County Level	358,190	42,273	386,184	724
2008	PM _{2.5} NAA	49,878	5,769	77,739	18
PM _{2.5} Allocation Factor		0.14	0.14	0.20	0.02
2011	PM _{2.5} NAA	52,974	3,829	77,739	18
2011 Projection Factor		1.06	0.66	1.00	1.00

- a. Population data for the county and PM_{2.5} nonattainment area for 2008 and 2011 were acquired from the Arizona Department of Administration.
- b. Employment data for the county and PM_{2.5} NAA for 2008 and 2011 were acquired from U.S. Census data (<http://censtats.census.gov/cgi-bin/zbpnaic/zbpsect.pl>). The county-wide employee numbers for years 2008 and 2011 are available directly from the website. The Census data show that the number of paid employees at the county level increased slightly between 2008 and 2011, from 42,273 to 44,197. The employee numbers for the PM_{2.5} NAA are not directly available from the Census data. The Census data report the employee numbers for each zip code within the county, so the sum of the employee numbers for each zip code within the PM_{2.5} NAA (85238, 85239, 85247, 85272, and 85293) was used to represent the employee numbers in the PM_{2.5} NAA. Based on that calculation, the Census data show that the number of paid employees in the PM_{2.5} NAA decreased from 5,769 in 2008 to 3,829 in 2011. Other publicly available data, such as Arizona Department of Administration (ADOA) and Central Arizona Association of Governments (CAAG) data, were explored but did not have the resolution of the U.S. Census data, so the Census data were used.
- c. Pesticide acreage was used to allocate County-level biogenic emissions from the 2008 NEI to the PM_{2.5} nonattainment area.
- d. The Point locations of Arizona mines for the county and PM_{2.5} nonattainment area were acquired from AZGEO Clearinghouse (<https://azgeo.az.gov/azgeo/>); underground mines were excluded.

Table 4-2						
Summary of the 2008 Annual Emissions for Other Sources in the Pinal County PM_{2.5} Nonattainment Area (tons/year)						
Source Categories	Allocation Factor	PM _{2.5}	NH ₃	NO _x	SO ₂	VOC
Chemical & Allied Product Mfg	Employment	0.5	0.0	0.0	0.0	5.8
Fuel Comb. Residential	Population	5.9	1.9	9.6	0.2	6.6
Metals Processing	Employment	1.5	0.0	0.0	0.0	0.0
Biogenic	Agriculture Lands	0.0	0.0	289.1	0.0	25,349.2
Other Industrial Processes	Employment + # of Mine Operations	36.6	0.9	6.8	0.6	73.9
Petroleum & Related Industries	Employment	1.0	0.0	0.9	0.5	0.7
Solvent Utilization	Employment	0.0	0.0	0.3	0.0	348.5
Storage & Transport	Employment	6.2	0.1	0.0	0.0	262.0
Waste Disposal & Recycling	Employment	132.8	11.5	35.7	1.0	108.0

Table 4-3						
Summary of the 2011 Annual Emissions for Other Sources in the Pinal County PM_{2.5} Nonattainment Area (tons/year)						
Source Categories	Allocation Factor	PM _{2.5}	NH ₃	NO _x	SO ₂	VOC
Chemical & Allied Product Mfg	Employment	0.3	0.0	0.0	0.0	3.8
Fuel Comb. Residential	Population	6.2	2.1	10.2	0.2	7.0
Metals Processing	Employment	1.0	0.0	0.0	0.0	0.0
Biogenic	Agriculture Lands	0.0	0.0	289.1	0.0	25,349.2
Other Industrial Processes	Employment + # of Mine Operations	28.4	0.9	5.9	0.6	49.3
Petroleum & Related Industries	Employment	0.6	0.0	0.6	0.4	0.5
Solvent Utilization	Employment	0.0	0.0	0.2	0.0	231.3
Storage & Transport	Employment	4.1	0.1	0.0	0.0	173.9
Waste Disposal & Recycling	Employment	88.2	7.6	23.7	0.7	71.7

###

5. SUMMARY

Comparison of the 2008 to the 2011 annual PM_{2.5} and precursor emission tables (Table 5-1 provides totals, Table 5-2 and Table 5-3 provide source-specific estimates) reveals that, with the exception of directly emitted PM_{2.5}, emissions are declining. This downward trend confirms the clean data finding in the downward PM_{2.5} concentrations recorded at the Cowtown monitoring site. Examination of directly emitted PM_{2.5} emissions in these tables shows that the 5.3% increase in total emissions between 2008 and 2011 is due entirely to the increase in windblown emissions caused by the higher number of high wind hours in 2011. Despite the increase in high wind hours and estimated windblown emissions, no exceedances of the 24-hour PM_{2.5} standard were recorded at the Cowtown monitoring site in 2011. This finding supports ADEQ's determination that PM_{2.5} exceedances at the Cowtown monitor were primarily the result of local activity-related dust entrainment, as noted in the Inventory Preparation Plan referenced above. As such, while primary PM_{2.5} windblown emissions in the PM_{2.5} Nonattainment Area increased 589 tons between 2008 and 2011, non-windblown emissions decreased 286 tons between 2008 and 2011 (primarily from CAFOs located in close proximity to the Cowtown monitor), contributing to the Cowtown monitor ultimately complying with the 24-hr PM_{2.5} standard. Additionally, implementation of PM₁₀ control strategies under an approved West Pinal County SIP will reduce windblown PM_{2.5} emissions in future years. Annual average daily PM_{2.5} emission estimates are presented in Tables 5-4 and 5-5 for 2008 and 2011, respectively.

Table 5-1					
Comparison of the 2008 & 2011 Annual PM_{2.5} Emissions in the Pinal County PM_{2.5} Nonattainment Area					
Years	PM_{2.5} Primary Emissions (tons/year)	NH₃ Emissions (tons/year)	NO_x Emissions (tons/year)	SO₂ Emissions (tons/year)	VOC Emissions (tons/year)
2008	5,741	1,060	1,580	55.7	26,873
2011	6,044	703	1,369	14.7	26,507

**Table 5-2
Summary of the 2008 Annual PM_{2.5} Emissions in the Pinal County PM_{2.5} Nonattainment Area**

Source Category	PM _{2.5} Primary Emissions		NH ₃ Emissions		NO _x Emissions		SO ₂ Emissions		VOC Emissions	
	(tons/year)	% of Total	(tons/year)	% of Total	(tons/year)	% of Total	(tons/year)	% of Total	(tons/year)	% of Total
Agriculture Harvesting	17	0.30%	170	16.03%	0	0.00%	0	0.00%	0	0.00%
Agriculture Tilling	141	2.46%			0	0.00%	0	0.00%	0	0.00%
CAFOs	387	6.74%	873	82.34%	0	0.00%	0	0.00%	0	0.00%
Paved Road	42	0.73%	2	0.19%	423	26.77%	9	16.16%	402	1.50%
Unpaved Road	1,536	26.75%	0.2	0.02%	27	1.71%	0.9	1.62%	13	0.05%
Nonroad	26	0.45%	0	0.00%	250	15.82%	0.1	0.18%	161	0.60%
Railroad	13	0.23%	0	0.00%	428	27.09%	42	75.40%	23	0.09%
Construction	105	1.83%	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Dairy	14	0.24%	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Permitted Sources	21	0.37%	1	0.09%	109	6.90%	1.4	2.51%	119	0.44%
Windblown Emissions	3,253	56.66%	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Chemical & Allied Product Mfg	1	0.02%	0	0.00%	0	0.00%	0	0.00%	6	0.02%
Fuel Comb. Other	6	0.10%	2	0.19%	10	0.63%	0.2	0.36%	7	0.03%
Metals Processing	2	0.03%	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Biogenic	0	0.00%	0	0.00%	289	18.29%	0	0.00%	25,349	94.33%
Other Industrial Processes	37	0.64%	1	0.09%	7	0.44%	0.6	1.08%	74	0.28%
Petroleum & Related Industries	1	0.02%	0	0.00%	1	0.06%	0.5	0.90%	1	0.00%
Solvent Utilization	0	0.00%	0	0.00%	0	0.00%	0	0.00%	348	1.29%
Storage & Transport	6	0.10%	0	0.00%	0	0.00%	0	0.00%	262	0.97%
Waste Disposal & Recycling	133	2.32%	11	1.04%	36	2.28%	1	1.80%	108	0.40%
Total Emissions	5,741	100%	1,060	100%	1,580	100%	55.7	100%	26,873	100%

**Table 5-3
Summary of the 2011 Annual PM_{2.5} Emissions in the Pinal County PM_{2.5} Nonattainment Area**

Source Category	PM _{2.5} Emissions		NH ₃ Emissions		NOx Emissions		SO ₂ Emissions		VOC Emissions	
	(tons/year)	% of Total	(tons/year)	% of Total	(tons/year)	% of Total	(tons/year)	% of Total	(tons/year)	% of Total
Agriculture Harvesting	17	0.28%	170	24.18%	0	0.00%	0	0.00%	0	0.00%
Agriculture Tilling	141	2.33%			0	0.00%	0	0.00%	0	0.00%
CAFOs	231	3.82%	520	73.95%	0	0.00%	0	0.00%	0	0.00%
Paved Road	43	0.71%	2	0.28%	351	25.64%	8	54.42%	338	1.28%
Unpaved Road	1,526	25.25%	0.2	0.03%	20	1.46%	0.7	4.76%	10	0.04%
Nonroad	27	0.45%	0	0.00%	265	19.36%	0.1	0.68%	171	0.65%
Railroad	10	0.17%	0	0.00%	349	25.49%	3	20.41%	18	0.07%
Construction	48	0.79%	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Dairy	14	0.23%	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Permitted Sources	17	0.28%	0	0.00%	54	3.94%	1	6.80%	84	0.32%
Windblown Emissions	3,842	63.57%	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Chemical & Allied Product Mfg	0	0.00%	0	0.00%	0	0.00%	0	0.00%	4	0.02%
Fuel Comb. Residential	6	0.10%	2	0.28%	10	0.73%	0.2	1.36%	7	0.03%
Metals Processing	1	0.02%	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Biogenic	0	0.00%	0	0.00%	289	21.11%	0	0.00%	25,349	95.63%
Other Industrial Processes	28	0.46%	1	0.14%	6	0.44%	0.6	4.08%	49	0.18%
Petroleum & Related Industries	1	0.02%	0	0.00%	1	0.07%	0.4	2.72%	0	0.00%
Solvent Utilization	0	0.00%	0	0.00%	0	0.00%	0	0.00%	231	0.87%
Storage & Transport	4	0.07%	0	0.00%	0	0.00%	0	0.00%	174	0.66%
Waste Disposal & Recycling	88	1.46%	8	1.14%	24	1.75%	0.7	4.76%	72	0.27%
Total Emissions	6,044	100%	703	100.00%	1,369	100%	14.7	100%	26,507	100%

**Table 5-4
Summary of the 2008 Typical Daily PM_{2.5} Emissions in the Pinal County PM_{2.5} Nonattainment Area**

Source Category	PM _{2.5} Primary Emissions		NH ₃ Emissions		NOx Emissions		SO ₂ Emissions		VOC Emissions	
	(lbs/day)	% of Total	(lbs/day)	% of Total	(lbs/day)	% of Total	(lbs/day)	% of Total	(lbs/day)	% of Total
Agriculture Harvesting	93	0.30%	929	16.03%	0	0.00%	0	0.00%	0	0.00%
Agriculture Tilling	770	2.46%			0	0.00%	0	0.00%	0	0.00%
CAFOs	2,115	6.74%	4,770	82.34%	0	0.00%	0	0.00%	0	0.00%
Paved Road	230	0.73%	11	0.19%	2,311	26.77%	49	16.16%	2,197	1.50%
Unpaved Road	8,392	26.75%	1	0.02%	148	1.71%	5	1.62%	71	0.05%
Nonroad	142	0.45%	0	0.00%	1,366	15.82%	1	0.18%	880	0.60%
Railroad	71	0.23%	0	0.00%	2,339	27.09%	230	75.40%	126	0.09%
Construction	574	1.83%	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Dairy	77	0.24%	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Permitted Sources	115	0.37%	5	0.09%	596	6.90%	8	2.51%	650	0.44%
Windblown Emissions	17,776	56.66%	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Chemical & Allied Product Mfg	5	0.02%	0	0.00%	0	0.00%	0	0.00%	33	0.02%
Fuel Comb. Other	33	0.10%	11	0.19%	55	0.63%	1	0.36%	38	0.03%
Metals Processing	11	0.03%	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Biogenic	0	0.00%	0	0.00%	1,579	18.29%	0	0.00%	138,519	94.33%
Other Industrial Processes	202	0.64%	5	0.09%	38	0.44%	3	1.08%	404	0.28%
Petroleum & Related Industries	5	0.02%	0	0.00%	5	0.06%	3	0.90%	5	0.00%
Solvent Utilization	0	0.00%	0	0.00%	0	0.00%	0	0.00%	1,902	1.29%
Storage & Transport	33	0.10%	0	0.00%	0	0.00%	0	0.00%	1,432	0.97%
Waste Disposal & Recycling	727	2.32%	60	1.04%	197	2.28%	5	1.80%	590	0.40%
Total Emissions	31,372	100%	5,793	100%	8,634	100%	304	100%	146,847	100%

**Table 5-5
Summary of the 2011 Typical Daily PM_{2.5} Emissions in the Pinal County PM_{2.5} Nonattainment Area**

Source Category	PM _{2.5} Emissions		NH ₃ Emissions		NO _x Emissions		SO ₂ Emissions		VOC Emissions	
	(lbs/day)	% of Total	(lbs/day)	% of Total	(lbs/day)	% of Total	(lbs/day)	% of Total	(lbs/day)	% of Total
Agriculture Harvesting	93	0.28%	932	24.23%	0	0.00%	0	0.00%	0	0.00%
Agriculture Tilling	773	2.33%			0	0.00%	0	0.00%	0	0.00%
CAFOs	1,266	3.82%	2,842	73.90%	0	0.00%	0	0.00%	0	0.00%
Paved Road	236	0.71%	11	0.28%	1,923	25.64%	44	54.42%	1,852	1.28%
Unpaved Road	8,362	25.25%	1	0.03%	110	1.46%	4	4.76%	55	0.04%
Nonroad	148	0.45%	0	0.00%	1,452	19.36%	1	0.68%	937	0.65%
Railroad	55	0.17%	0	0.00%	1,912	25.49%	16	20.41%	99	0.07%
Construction	263	0.79%	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Dairy	77	0.23%	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Permitted Sources	93	0.28%	0	0.00%	296	3.94%	5	6.80%	460	0.32%
Windblown Emissions	21,052	63.57%	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Chemical & Allied Product Mfg	0	0.00%	0	0.00%	0	0.00%	0	0.00%	22	0.02%
Fuel Comb. Residential	33	0.10%	11	0.28%	55	0.73%	1	1.36%	38	0.03%
Metals Processing	5	0.02%	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Biogenic	0	0.00%	0	0.00%	1,584	21.11%	0	0.00%	138,899	95.63%
Other Industrial Processes	153	0.46%	5	0.14%	33	0.44%	3	4.08%	268	0.18%
Petroleum & Related Industries	5	0.02%	0	0.00%	5	0.07%	2	2.72%	0	0.00%
Solvent Utilization	0	0.00%	0	0.00%	0	0.00%	0	0.00%	1,266	0.87%
Storage & Transport	22	0.07%	0	0.00%	0	0.00%	0	0.00%	953	0.66%
Waste Disposal & Recycling	482	1.46%	44	1.14%	132	1.75%	4	4.76%	395	0.27%
Total Emissions	33,118	100%	3,845	100%	7,501	100%	81	100%	145,244	100%

###