STATE OF ARKANSAS

Revisions to the Arkansas State Implementation Plan

National Ambient Air Quality Standards Infrastructure SIPs And NAAQS SIP per Ark. Code Ann. § 8-4-318

Prepared by the
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Infrastructure State Implementation Plans and NAAQS State Implementation Plan

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1 Introduction

1.1 Arkansas State Implementation Plan Revision

Arkansas has included revisions to adopt National Ambient Air Quality Standards (NAAQS) finalized by the Environmental Protection Agency (EPA) and listed below into Arkansas Pollution Control & Ecology Commission's ("Commission" or APC&EC) Regulation No. 19, Regulations of the Arkansas Plan of Implementation for Air Pollution Control, allowing the Arkansas Department of Environmental Quality (ADEQ or the "Department") to retain permitting authority for each of the NAAQS, including the Prevention of Significant Deterioration (PSD) program. The revised standards adopted into APC&EC Regulation No. 19 are as follows:

- October 17, 2006: EPA revised the 24-hour primary and secondary standards for particulate matter less than 2.5 micrometers in diameter ($PM_{2.5}$ NAAQS) from 65 micrograms per cubic meter ($\mu g/m^3$) to 35 $\mu g/m^3$ (71 FR 61144).
- March 27, 2008: EPA revised the 8-hour ozone NAAQS from 0.08 parts per million (ppm) to 0.075 ppm (73 FR 16436).
- November 12, 2008: EPA revised the lead NAAQS from a calendar quarter average of 1.5 $\mu g/m^3$ to a rolling three-month average of 0.15$\mu g/m^3$ (73 FR 66964).
- June 22, 2010: EPA retained the secondary 3-hour NAAQS of 0.5 ppm for sulfur dioxide (SO_2), and added a 1-hour standard of 75 parts per billion (ppb) (75 FR 35520).
- February 9, 2010: EPA added for nitrogen dioxide (NO_2) a primary 1-hour NAAQS of 100 ppb and retained the primary and secondary annual standards of 53 ppb (75 FR 6474).
- January 15, 2013: EPA revised primary standards for annual $PM_{2.5}$ NAAQS from 15$\mu g/m^3$ to 12 $\mu g/m^3$. In the same rule, EPA retained the 24-hour primary and secondary $PM_{2.5}$ standard at a level of 35 $\mu g/m^3$ and the secondary $PM_{2.5}$ standard at a level of 15 $\mu g/m^3$ (78 FR 3086).

The enclosed proposed State Implementation Plan (SIP) revision satisfies requirements for these criteria pollutants revised by EPA.

In order to implement the stationary source permitting program, including minor source and PSD permitting in Arkansas and to allow ADEQ to retain permitting authority for each of the NAAQS, revisions to APC&EC Regulation No. 19 were required. APC&EC Regulation No. 19 is applicable to any stationary source with the potential to emit any federally regulated air pollutant equal to or in excess of the threshold for both major and minor sources, and is federally enforceable.

This submission also includes revisions to update the incorporation by reference date for the Code of Federal Regulations Title 40 Part 70 (40 C.F.R. Part 70) in SIP-related parts of APC&EC Regulation No. 26 to reflect current federal law (75 FR 31607, June 3, 2010).

1.2 Approved Arkansas SIP components included in this Revision

APC&EC Regulation No. 19, Regulations of the Arkansas Plan of Implementation for Air Pollution Control

- Chapter 2 – *Definitions*
- Chapter 4 – *Minor Source Review*
  - Reg. 19.401, "General Applicability"
  - Reg. 19.407, "Permit Amendments"
  - Reg. 19.412, "Dispersion Modeling"
- Chapter 7 – *Sampling, Monitoring, And Reporting Requirements*
  - Reg. 19.702, "Air Emissions Sampling"
  - Reg. 19.703, "Continuous Emissions Monitoring"
- Chapter 9 – *Prevention of Significant Deterioration*
  - Reg. 19.903, "Definitions"
  - Reg. 19.904, "Adoption of Regulations"
- Appendix A – Insignificant Activities List
- Appendix B – *National Ambient Air Quality Standards List*

Substantive changes to APC&EC Regulation No. 19 were made in response to EPA's revised annual primary standard for $PM_{2.5}$, which lowered the level to 12.0 $\mu g/m^3$ from 15 $\mu g/m^3$. (78 FR. 3086, January 15, 2013.)

The regulatory amendments related to the Arkansas SIP involve the following:

- Revisions to include the federal revised 2012 $PM_{2.5}$NAAQS.
- Revision to update the definition of "Volatile Organic Compounds" to match the federal definition. (77 FR 37610, June 22, 2012; 78 FR 9823, February 12, 2013; 78 FR 53029, August 28, 2013; 78 FR 62451, October 22, 2013; and 79 FR 17037, March 27, 2014.)

Additional non-substantive changes were made to APC&EC Regulation No. 19 chapters 1, 3, 5, 11, 13, 14 and 15 for clarification, consistency and correction.

APC&EC Regulation No. 26: Regulations of the Arkansas Operating Air Permit Program

- Chapter 4 – *Applications for Permits*
    - Reg. 26.401, "Duty to apply"
- Chapter 6 – Permit Review by The Public, Affected States, and EPA
    - Reg. 26.603, "Transmission of permit information to the Administrator"
    - Reg. 26.604, "Review of draft permit by affected States"

The regulatory amendments related to the SIP involve the following:

- Revisions to update the incorporation by reference date for 40 C.F.R. Part 70 throughout APC&EC Regulation No. 26 to reflect current federal law (75 FR 31607, June 3, 2010).

Additional non-substantive changes were made to APC&EC Regulation No. 26 chapters 3 and 5 for clarification, correction and consistency.

The Department filed APC&EC Regulations No. 19 and 26 with the Commission to initiate rulemaking on November 21, 2014. The Commission initiated the rulemaking on December 5, 2014. Stakeholder meetings occurred on January 13, 2015, January 28, 2015, February 10, 2015, February 24, 2015 and March 19, 2015. The public hearing for APC&EC Regulations No. 19 and 26 was held on January 12, 2015, and the 30-day public comment period ended February 17, 2015. ADEQ worked closely with EPA and stakeholders to produce the most equitable solutions to public concerns after consideration of public comments. ADEQ then finalized a responsive summary addressing all comments received, and prepared final revisions to APC&EC Regulations No. 19 and 26. ADEQ presented the regulatory packets to the Arkansas Legislative Joint Public Health, Welfare and Labor Committee on January 11, 2016 and the Arkansas Legislative Council Administrative Rules and Regulations Subcommittee Council on January 12, 2016. After these committees reviewed and approved the proposed revisions to the regulations, the Department submitted and filed the revised and final regulations with the Commission on February 12, 2016, for final adoption. The Commission adopted revisions to APC&EC Regulations No. 19 and 26 on February 26, 2016. Following the Commission's approval, the regulations were filed with the Arkansas Secretary of State, and revisions outlined herein are fully effective as of March 14, 2016.

Making these changes will maintain consistency between federal air pollution control programs and the Commission's regulations governing air pollution in Arkansas.

The changes to APC&EC Regulations No. 19 and 26 are consistent with and allowable under federal programs. The changes are protective of air quality in the State and will not negatively affect attainment goals.

Sources affected by these program revisions are found throughout the State.

These revisions ensure ADEQ’s ability to protect the NAAQS, PSD increments, reasonable further progress demonstrations, and visibility goals.

No substantive revisions have been made to the emission limitations, work practice standards or recordkeeping/reporting requirements portions of this program at this time. A permit threshold and De Minimis levels for $PM_{2.5}$ have been adopted and NAAQS evaluation requirements for non-PSD permit applications have been elaborated in the NAAQS SIP included as chapter 4 of this package.

Furthermore, ADEQ’s existing compliance and enforcement strategies will remain in place.

2 National Ambient Air Quality Standards – Levels, Health Impacts, and Sources

2.1 Background

Arkansas State Implementation Plan Development

On August 22, 2014, the Commission adopted revisions pertaining to the Prevention of Significant Deterioration (PSD) permitting proposed by ADEQ to APC&EC Regulation No. 19, Regulations of the Arkansas Plan of Implementation for Air Pollution Control (APC&EC Regulation No. 19). The revisions to APC&EC Regulation No. 19 were necessary to implement the revised NAAQS under the PSD and Major Source Air program. EPA published several final rules in the Federal Register (FR) promulgating the following requirements:

- October 17, 2006: EPA revised the 24-hour $PM_{2.5}$ primary and secondary NAAQS from 65 $\mu g/m^3$ to 35$\mu g/m^3$, revoked the annual standard for particulate matter with an aerodynamic diameter less than 10 micrometers (PM_{10}), and retained the 24-hour primary and secondary NAAQS standards of 150 $\mu g/m^3$ for PM_{10} (71 FR 61144, Oct. 17, 2006).

- March 27, 2008: EPA revised the 8-hour ozone NAAQS standard from 0.08 ppm to 0.075 ppm (73 FR 16436, Mar. 27, 2008).

- November 12, 2008: EPA revised the lead NAAQS standard from a calendar quarter average of 1.5$\mu g/m^3$ to a rolling three-month average of 0.15$\mu g/m^3$ (73 FR 66964, Nov. 12, 2008).

- June 22, 2010: EPA retained the secondary 3-hour NAAQS standard of 0.5 ppm for SO_2, and added a 1-hour standard of 75 ppb (75 FR 35520, Jun. 22, 2010).

- February 9, 2010: EPA added a primary 1-hour NAAQS standard of 100 ppb for NO_2 and retained the primary and secondary annual NO_2 standard of 53 ppb (75 FR 6474, Feb. 9, 2010).

- January 15, 2013: EPA published a final rule in the Federal Register that promulgated the revised primary standard for the annual $PM_{2.5}$ NAAQS by lowering the level from 15 $\mu g/m^3$ to 12.0 $\mu g/m^3$. EPA's revised primary standard provides increased protection against health effects associated with long- and short-term exposures. In the same rule, EPA retained the 24-hour $PM_{2.5}$ standard at a level of 35 $\mu g/m^3$ and the secondary annual $PM_{2.5}$ standard at the level of 15 $\mu g/m^3$ (78 FR 3086).

On February 26, 2016, the Commission adopted revisions proposed by ADEQ to APC&EC Regulation No. 19 to implement the revised NAAQS for all purposes of the Arkansas air program and to implement the revised NAAQS for $PM_{2.5}$ published subsequent to the initiation of the previous rulemaking. Arkansas's current revisions to the State's infrastructure State Implementation Plan (SIP) to maintain, enforce, and implement the NAAQS are for the following criteria pollutant standards: 2006 and 2012 $PM_{2.5}$ NAAQS, 2008 ozone NAAQS, 2008 lead NAAQS, 2010 NO_2 NAAQS, and 2010 SO_2 NAAQS.

In this SIP submission, ADEQ also addresses certain state requirements for a NAAQS SIP required by Ark. Code Ann. § 8-4-317 in which ADEQ shall consider and take into account the factors specified in the Ark. Code Ann. § 8-4-312 in the case of any emission limit, work practice or operation standard, environmental standard, analytical method, dispersion air modeling requirement, or monitoring requirement which is not identical to standards or requirements in the federal regulations. Thus, this SIP includes a reasoned consideration of the relevant factors pertaining to the permit threshold and De Minimis levels established for $PM_{2.5}$ and additional modeling requirements for PM_{10}, NO_2, and SO_2.

2.2 Protection of the National Ambient Air Quality Standards

The Clean Air Act (CAA) section 109 requires EPA to set NAAQS for pollutants considered harmful to public health and the environment. EPA has set NAAQS for six principal pollutants, which are called "criteria" pollutants, listed in Table 1. Units of measure for the standards are ppm by volume, ppb by volume, and $\mu g/m^3$. Regulatory information about NAAQS is found in the Code of Federal Regulations, Title 40, Part 50 (40 C.F.R. Part 50). EPA sets two types of NAAQS:

1. Primary NAAQS are limits set to protect public health, including the health of sensitive populations such as asthmatics, children, and the elderly.

2. Secondary NAAQS are limits set to protect public welfare, including protection against decreased visibility, damage to animals, crops, vegetation, and buildings.

Table 1. National Ambient Air Quality Standards

Pollutant [final rule citation]	Primary/ Secondary	Averaging Time	Level	Form
Carbon Monoxide [76 FR 54294, Aug 31, 2011]	primary	8-hour	9 ppm	Not to be exceeded more than once per year
		1-hour	35 ppm	
Lead [73 FR 66964, Nov 12, 2008]	primary and secondary	Rolling 3 month average	0.15 $\mu g/m^3$	Not to be exceeded

Pollutant [final rule citation]		Primary/ Secondary	Averaging Time	Level	Form
Nitrogen Dioxide [75 FR 6474, Feb 9, 2010] [61 FR 52852, Oct 8, 1996]		primary	1-hour	100 ppb	98th percentile of 1-hour daily maximum concentrations, averaged over 3 years
		primary and secondary	Annual	53 ppb	Annual Mean
Ozone [73 FR 16436, Mar 27, 2008]		primary and secondary	8-hour	0.075 ppm	Annual fourth-highest daily maximum 8-hr concentration, averaged over 3 years
Particle Pollution Dec 14, 2012 [18 FR 3086, Jan 15, 2013]	$PM_{2.5}$	primary	Annual	12 μg/m^3	Annual mean, averaged over 3 years
		secondary	Annual	15 μg/m^3	Annual mean, averaged over 3 years
		primary and secondary	24-hour	35 μg/m^3	98th percentile, averaged over 3 years
	PM_{10}	primary and secondary	24-hour	150 μg/m^3	Not to be exceeded more than once per year on average over 3 years
Sulfur Dioxide [75 FR 35520, Jun 22, 2010] [38 FR 25678, Sept 14, 1973]		primary	1-hour	75 ppb	99th percentile of 1-hour daily maximum concentrations, averaged over 3 years
		secondary	3-hour	0.5 ppm	Not to be exceeded more than once per year

3 Infrastructure State Implementation Plan

Under CAA sections 110(a)(1) and 110(a)(2), each state is required to submit a SIP that provides for the implementation, maintenance, and enforcement of a revised primary or secondary NAAQS. CAA section 110(a)(1) and section 110(a)(2) require each state to make this new SIP submission within three years after EPA promulgates a new or revised NAAQS for approval into the existing SIP to assure that the SIP meets the applicable requirements for such new and revised NAAQS. This type of SIP submission is commonly referred to as an “infrastructure SIP.”

The national and state infrastructure reports contain the status of the state submissions to meet the requirements and EPA's actions on the submissions. The required infrastructure elements tracked for each state are labeled in the report as:

- Section 110(a)(2)(A) Emission limits and other control measures
- Section 110(a)(2)(B) Ambient air quality monitoring/data system
- Section 110(a)(2)(C) Program for enforcement of control measures
- Section 110(a)(2)(D)(i)(I) Prong 1: Interstate transport – significant contribution
- Section 110(a)(2)(D)(i)(I) Prong 2: Interstate transport – interfere with maintenance
- Section 110(a)(2)(D)(i)(II) Prong 3: Interstate transport – prevention of significant deterioration
- Section 110(a)(2)(D)(i)(II) Prong 4: Interstate transport – protect visibility
- Section 110(a)(2)(D)(ii) - Interstate and international pollution abatement
- Section 110(a)(2)(E) Adequate authority and resources
- Section 110(a)(2)(F) Stationary source monitoring system
- Section 110(a)(2)(G) Emergency power
- Section 110(a)(2)(H) Future SIP revisions
- Section 110(a)(2)(J) Consultation with government officials; Public notification; PSD and visibility protection
- Section 110(a)(2)(K) Air quality modeling/data
- Section 110(a)(2)(L) Permitting fees
- Section 110(a)(2)(M) Consultation/participation by affected local entities

3.1 2006 Particulate Matter less than 2.5 Micrometers in Diameter ($PM_{2.5}$) NAAQS

The federally enforceable SIP for Arkansas is compiled in 40 C.F.R. Part 52 Subpart E § 52.170. The requirements of sections 110(a)(2)(A) – (M) of the CAA relevant to the 2006 $PM_{2.5}$ NAAQS are contained in the current SIP or SIP revisions which have been submitted, but not yet approved by EPA, and the attachments included in this SIP submittal, which are hereby incorporated by reference. The following table summarizes where and how the requirements of sections 110(a)(2)(A) – (M) are addressed.

On September 16, 2009, the State of Arkansas submitted a SIP that addressed the infrastructure elements specified in the CAA section 110(a)(2) for the 2006 $PM_{2.5}$ NAAQS. On August 20, 2012 (77 FR 50033), EPA partially approved and partially disapproved the submittal provided by the State of Arkansas to demonstrate that Arkansas meets the requirements for the 2006 $PM_{2.5}$ NAAQS.

In this revision to the SIP, Arkansas demonstrates that it has adequate resources and authority to implement, maintain, and enforce the 2006 24-hour $PM_{2.5}$ NAAQS and addresses the deficiencies from the August 20, 2012 partial disapproval. The elements that have been approved by the EPA on August 20, 2012 are listed in the column "Approved by EPA" and have not been revised in this submission.

For consistency in formatting throughout all the 110 NAAQS SIPs included in this submission, some abbreviations were included or changed, such as "A.C.A." for "Ark. Code Ann." and "APC&EC" was added for "Arkansas Pollution Control and Ecology Commission" or "Commission."

Section 110(a)(2) Element	**Summary of Element (Statutory Language)**	**Provisions in the Current SIP or Recent SIP Revision Submittals**	**Approved by EPA**
110(a)(2)(A) Emission limits and other control measures	*include enforceable emission limitations and other control measures, means, or techniques (including economic incentives such as fees, marketable permits, and auctions of emissions rights), as well as schedules and timetables for compliance, as may be necessary or appropriate to*	•Arkansas's enforceable emission limitations and other control measures are covered in Arkansas Water and Air Pollution Control Act, Arkansas Code Annotated ("Ark. Code Ann.") § 8-4-101 *et. seq*, and those provisions of the Arkansas Pollution Control & Ecology Commission (APC&EC) Regulation 19, listed in 40 C.F.R. §	77 FR 50033

	meet the applicable requirements of this Act;	52.170. •The regulations in APC&EC Regulation 19 have been duly adopted by APC&EC. Where these provisions relate to Section 110 requirements, SIP revisions have been submitted to and approved by EPA. EPA-approved SIP revisions are codified at 40 C.F.R. Part 52, Subpart E. Arkansas has an EPA-approved air permitting program for both major and minor facilities, which ensures that all applicable requirements are included in the facility permit.	
110(a)(2)(B) Ambient air quality monitoring and data analysis system	*provide for establishment and operation of appropriate devices, methods, systems, and procedures necessary to- (i) monitor, compile, and analyze data on ambient air quality, and (ii) upon request, make such data available to the Administrator;*	•APC&EC Regulation Number 19, Regulations of the Arkansas Plan of Implementation for Air Pollution Control, Reg. 19.302 grants the Arkansas Department of Environmental Quality (ADEQ) responsibility for ambient air monitoring as a precaution to prevent the NAAQS from being exceeded. •Ark. Code Ann. § 8-1-202 grants the ADEQ Director authority to provide technical and legal expertise and assistance in the field of environmental protection. Ark. Code Ann. § 8-4-311 (a)(3) empowers ADEQ to encourage and conduct studies, investigations, and research relating to air pollution and its causes, prevention, control, and abatement.	77 FR 50033

110(a)(2)(C) Program to enforce control measures, regulate modification and construction of stationary sources and a permit program	*include a program to provide for the enforcement of the measures described in subparagraph (A), and regulation of the modification and construction of any stationary source within the areas covered by the plan as necessary to assure that national ambient air quality standards are achieved, including a permit program as required in parts C and D;*	Ark. Code Ann. § 8-4-203(a)(1) authorizes ADEQ to issue, continue in effect, revoke, modify, or deny permits to prevent, control, or abate pollution. Ark. Code Ann. § 8-4-311 (a)(1) empowers ADEQ to develop and effectuate a comprehensive program for the prevention and control of all sources of air pollution in the State of Arkansas. •Chapter 4 of APC&EC Regulation 19 describes the regulation and permitting of the operation, modification and construction of minor stationary sources. •Chapter 9 of APC&EC Regulation 19 authorizes enforcement of regulations governing the prevention of significant deterioration (PSD) of air quality and regulations governing the protection of visibility in mandatory Federal Class I areas. •Ark. Code Ann. § 8-4-311(a)(10) empowers ADEQ to make, issue, modify, revoke, and enforce orders prohibiting, controlling or abating air pollution and requiring the adoption of remedial measures to prevent, control, or abate air pollution. •Ark Code Ann. § 8-4-311(a)(7) empowers	

		ADEQ to administer and enforce all laws and regulations relating to pollution of the air. **This SIP Revision:** Arkansas perceives there to be no changes necessary to the PSD program to implement the 2006 $PM_{2.5}$ NAAQS. On May 22, 2014, EPA published "Finding of Failure To Submit a Prevention of Significant Deterioration State Implementation Plan Revision for Particulate Matter Less Than 2.5 Micrometers ($PM_{2.5}$)." On September 10, 2014, Arkansas submitted to EPA a request for parallel processing of proposed revisions to the SIP which would fully comply with the federal $PM_{2.5}$ PSD regulations and with required elements involving $PM_{2.5}$ increments for the 2006 $PM_{2.5}$ NAAQS. On November 10, 2014, EPA proposed to approve three revisions submitted by ADEQ on July 26, 2010, November 6, 2012, and September 10, 2014 and proposed to approve a portion of the December 17, 2007 SIP submittal for the $PM_{2.5}$ NAAQS pertaining to interstate transport of air pollution and PSD (79 FR 66663). On December 4, 2014, Arkansas submitted the final SIP revisions to address the 2006 $PM_{2.5}$ PSD elements. EPA's final approval was published on March 4, 2015 (80 FR 11573). ADEQ has the authority to implement the 2006 $PM_{2.5}$ NAAQS and regulate	

		and permit $PM_{2.5}$ emissions, and its precursors, through the Arkansas PSD program. •Arkansas submitted the Greenhouse Gases (GHG) SIP on July 17, 2010 and a revision on November 6, 2010 addressing the PSD program for EPA approval. EPA-approved Arkansas's SIP revisions on April 2, 2013 (78 FR 19596), and rescinded the FIP that was in place which addressed permitting for GHG PSD purposes in Arkansas. With the approval of the SIP revisions to address GHG PSD permitting and 2006 $PM_{2.5}$ PSD elements, ADEQ has a complete EPA-approved PSD permitting program in place covering the required elements for all regulated New Source Review (NSR) pollutants.	
110(a)(2)(D)(i) Interstate transport provisions	*contain adequate provisions- (i) prohibiting, consistent with the provisions of this title, any source or other type of emissions activity within the State from emitting any air pollutant in amounts which will- (I) contribute significantly to nonattainment in, or interfere with maintenance by, any other State with respect to any such national primary or secondary ambient air quality standard, or (II) interfere with measures required*	**This SIP Revision:** •APC&EC Reg. 19.402 states: "No permit shall be granted or modified under this chapter unless the owner/operator demonstrates to the reasonable satisfaction of ADEQ that the stationary source will be constructed or modified to operate without resulting in a violation of applicable portions of this regulation or without interfering with the attainment or maintenance of a national ambient air quality standard."	

	to be included in the applicable implementation plan for any other State under part C to prevent significant deterioration of air quality or to protect visibility,	APC&EC Reg. 19.402 is consistent with these requirements as it is an Arkansas promulgated regulation that applies to all stationary sources in Arkansas. •According to EPA's modeling in "Air Quality Modeling Final Rule Technical Support Document"[1] published in June 2011 to support the Final Cross-State Air Pollution Rule (76 FR 48208), Arkansas's largest downwind contribution to nonattainment for the 2006 $PM_{2.5}$ annual standard was 0.1 $\mu g/m^3$ and Arkansas's largest downwind contribution to maintenance of the 2006 $PM_{2.5}$ annual standard was 0.04 $\mu g/m^3$. Arkansas's largest downwind contribution to nonattainment for the 2006 24-hour $PM_{2.5}$ NAAQS was 0.24 $\mu g/m^3$ and Arkansas's largest downwind contribution to maintenance of the 2006 24-hour $PM_{2.5}$ NAAQS was 0.23 $\mu g/m^3$. Because Arkansas's largest downwind contributions to nonattainment and largest downwind contributions to maintenance were below 1 %, EPA found that Arkansas did not significantly contribute to nonattainment or maintenance of the 2006 $PM_{2.5}$ annual and 24-hour NAAQS in another state. Additionally, on August 29, 2013, EPA finalized a rule (78 FR 53269) in which they determined that the	

[1] Air Quality Modeling Final Rule Technical Support Document, June 2011 http://www.epa.gov/airtransport/CSAPR/pdfs/AQModeling.pdf

		existing SIP for Arkansas contains adequate provisions to prohibit air emissions from significantly contributing to nonattainment or interfering with maintenance of the 1997 annual and 24-hour $PM_{2.5}$ NAAQS and the revised 2006 24-hour $PM_{2.5}$ NAAQS in any other state as required by section 110(a)(2)(D)(i)(l) of the Act. •All new major sources and major modifications are subject to a comprehensive EPA-approved PSD permitting program, including GHG PSD permitting approved on April 2, 2013 (78 FR 19596) and $PM_{2.5}$ PSD permitting approved on March 4, 2015 (80 FR 11573). Chapter 9 of APC&EC Regulation 19 authorizes enforcement of regulations governing the prevention of significant deterioration of air quality and regulations governing the protection of visibility in mandatory Federal Class I areas. •Arkansas is currently subject to the Regional Haze Rule which addresses visibility-impairing pollutants. Arkansas's PSD program is used to further protect visibility. In 2008, Arkansas submitted a Regional Haze SIP, but EPA partially approved and partially disapproved it. Arkansas has experienced considerable improvement in regional haze in relation to the reasonable progress goals and uniform rate of progress established in the Regional Haze SIP.	

		The most recent data from 2015 and current five-year rolling averages show that visibility impairment in Arkansas's Class I areas is decreasing more rapidly than the uniform rate of progress and 2018 reasonable progress goals submitted in the 2008 Regional Haze SIP.[2] •Additionally, visibility at Federal Class I areas in other states affected by Arkansas sources has improved for the least and most impaired days between 2000 and 2015. On the most impaired days, Hercules Glade, MO and Mingo, MO achieved a 2.92 deciview (dv) and 5.24 dv reduction in haziness, respectively, between the 2000 – 2004 baseline period and 2011 – 2015 analysis period. On the least impaired days, Hercules Glade, MO and Mingo, MO achieved a 2.54dv and 2.42 dv reduction in haziness, respectively, between the 2000 – 2004 baseline period and the 2011 – 2015 analysis period. Based on the visibility improvement in Class I areas in nearby states, ADEQ concludes that stationary sources in Arkansas do not significantly interfere with other states' plans to protect visibility.[3]	
110(a)(2)(D)(ii) Interstate	*contain adequate provisions- (ii) insuring*	•Ark. Code Ann. § 8-4-311(a)(8) authorizes	

[2]Arkansas Regional Haze Five Year Progress Report, May 2015: https://www.adeq.state.ar.us/air/planning/pdfs/ar_5yr_prog_rep_review-final-6-2-2015.pdf; Federal Land Manager Environmental Database < http://views.cira.colostate.edu/fed/ToolsMenu.aspx>
[3]Id.

and International pollution abatement	*compliance with the applicable requirements of sections 126 and 115 (relating to interstate and international pollution abatement)*	ADEQ to represent the State in all matters pertaining to the plans, procedures, or negotiations for interstate compacts in relation to air pollution control. **This SIP Revision:** •Based on information gathered from ADEQ's permit database, ADEQ concludes that the limited amount of point and area source $PM_{2.5}$ emissions do not preclude the State from ensuring compliance with CAA § 126 and § 115. There are no final findings under § 115 of the CAA against Arkansas with respect to the 2006 $PM_{2.5}$ NAAQS. •All new major sources and major modifications are subject to a comprehensive EPA-approved PSD permitting program, including GHG PSD permitting approved on April 2, 2013 (78 FR 19596) and $PM_{2.5}$ PSD permitting approved on March 4, 2015 (80 FR 11573). Chapter 9 of APC&EC Regulation 19 authorizes enforcement of regulations governing the prevention of significant deterioration of air quality and regulations governing the protection of visibility in mandatory Federal Class I areas. •APC&EC Reg. 19.903 describes the notification required when dealing with a major	

		new source or major modification.	
110(a)(2)(E)(i) Adequate personnel, funding and authority to carry out plan,	*provide (i) necessary assurances that the State (or, except were the Administrator deems inappropriate, the general purpose local government or governments, or a regional agency designated by the State or general purpose local government for such purpose) will have adequate personnel, funding, and authority under State (and, as appropriate, local) law to carry out such implementation plan (and is not prohibited by any provision of Federal or State law from carrying out such implementation plan or portion thereof),*	•Ark. Code Ann. § 8-1-103(1)(A) grants APC&EC the authority to establish, by regulation, reasonable fees for initial issuance, annual review, and modification of permits. ADEQ is authorized to collect the fees established by APC&EC and shall deny the issuance of an initial permit, a renewal permit, or a modification permit if and when a facility fails or refuses to pay the fees after reasonable notice. •Ark. Code Ann. § 8-1-202 states that the Director of ADEQ's duties include the day-to-day administration of all activities that the Department is empowered by law to perform, including, but not limited to, the employment and supervision of such technical, legal, and administrative staff, within approved appropriations, as is necessary to carry out the responsibilities vested with the Department. •APC&EC Regulation 9, Fee Regulation, Chapter 5, Air Permit Fees, contains the air permit fees applicable to non-part 70 permits, part 70 permits and general permits.	77 FR 50033
110(a)(2)(E)(ii) Comply with state boards,	*(ii)requirements that the State comply with the requirements respecting State boards under section 128,*	•The requirements of §110(a)(2)(E)(ii) are not applicable because permit and enforcement orders are issued directly by ADEQ, not state	77 FR 50033

		boards or commissions.	
110(a)(2)(E)(iii) Oversee local and regional governments/ agencies	*(iii) necessary assurances that where the State has relied on a local or regional government, agency, or instrumentality for the implementation of any plan provision, the State has responsibility for ensuring adequate implementation of such plan provision;*	The requirements of §110(a)(2)(E)(iii) are not applicable to Arkansas because it does not rely on localities for specific SIP implementation.	77 FR 50033
110(a)(2)(F) Stationary source emissions monitoring and reporting system	*require, as may be prescribed by the Administrator-- (i) the installation, maintenance, and replacement of equipment, and the implementation of other necessary steps, by owners or operators of stationary sources to monitor emissions from such sources, (ii) periodic reports on the nature and amounts of emissions and emissions-related data from such sources, and (iii) correlation of such reports by the State agency with any emission limitations or standards established pursuant to this Act, which reports shall be available at reasonable times for public inspection;*	•Regulatory requirements have been codified in APC&EC Regulation 19, Regulations of the Arkansas Plan of Implementation for Air Pollution Control, Chapter 7 (pertaining to sampling and testing). •Requirements in Chapter 7, Reg.19.705 provide for the reporting of emissions inventories in a format established by the ADEQ on a schedule set forth in the section. In addition, Reg.19.705 requires the submission of emission statements as required by the CAA. •Area, mobile, and nonroad data are reported on a three-year cycle. •Enforceable emission limitations and other control measures are covered in the Arkansas Water and Air Pollution Control Act and those provisions of Ark. Code Ann. §§ 8-4-310 and 8-4-311. Elements of the program for enforcement	77 FR 50033

		are found in the monitoring, recordkeeping and reporting requirements for sources in these control measures as well as individual SIP permits.	
110(a)(2)(G) Authority to declare air pollution emergency and notify public	*provide for authority comparable to that in section 303 and adequate contingency plans to implement such authority;*	•Ark. Code Ann. § 8-1-202(b)(2)(C) empowers the ADEQ to issue orders under circumstances that reasonably require emergency measures to be taken to protect the environment or the public health and safety. APC&EC Reg. 8.502 requires ADEQ to publish a Notice of Emergency Order in a newspaper covering the affected area, or in a newspaper of statewide circulation. The notice must contain a description of the action, ADEQ's authority for taking the action and other information appropriate to ensure the public is informed about the action. •Ark. Code Ann. § 8-4-202(e)(1) empowers APC&EC to declare an emergency and implement emergency rules, regulations, suspensions, or moratoria on categories or types of permits if APC&EC determines that imminent peril to the public health, safety, or welfare requires immediate change in the rules or immediate suspension or moratorium on categories or types of permits. •APC&EC Regulation 8, Administrative	77 FR 50033

		procedures, Reg. 8.807 authorizes APC&EC to waive or reduce the notice requirements in cases involving emergency rulemaking. No emergency rule shall be effective for more than one hundred eighty (180) days.	
110(a)(2)(H) Future SIP revisions	*provide for revision of such plan- (i) from time to time as may be necessary to take account of revisions of such national primary or secondary ambient air quality standard or the availability of improved or more expeditious methods of attaining such standard, and (ii) except as provided in paragraph (3)(C), whenever the Administrator finds on the basis of information available to the Administrator that the plan is substantially inadequate to attain the national ambient air quality standard which it implements or to otherwise comply with any additional requirements established under this Act;*	•APC&EC Regulation 19, Regulations of the Arkansas Plan of Implementation for Air Pollution Control, Chapter 1, provides a clear delineation of those regulations that are promulgated by APC&EC in satisfaction of certain requirements of the CAA. •Ark. Code Ann. § 8-4-311(a)(7) empowers ADEQ to administer and enforce all laws and regulations relating to pollution of the air. •Ark. Code Ann. § 8-4-202(d)(4)(A) authorizes APC&EC to refer to the Code of Federal Regulations for any APC&EC standard or regulation that is identical to a regulation promulgated by the EPA.	77 FR 50033
110(a)(2)(I) Nonattainment areas (interstate transport)	*in the case of a plan or plan revision for an area designated as a nonattainment area, meet the applicable requirements of part D (relating to nonattainment areas);*	•Arkansas's nonattainment area plans required under part D are on a different schedule from the section 110 infrastructure elements. Currently, Arkansas does not have any areas designated nonattainment for $PM_{2.5}$.	
110(a)(2)(J) (§ 121	*meet the applicable requirements of section 121 (relating to consultation),*	•Arkansas has incorporated by reference into the APC&EC Regulation 19, Regulations of the	77 FR 50033

consultation),		Arkansas Plan of Implementation for Air Pollution Control, Chapter 9, the requirements in 40 C.F.R. Part 52 under § 161 of the CAA (42 U.S.C.A. § 7471) for PSD in their entirety, with the exception of 40 C.F.R. §§ 52.21(b)(2)(iii)(a), 40 C.F.R. 52.21(b)(55-58), 40 C.F.R. 52.21(i) and 40 C.F.R. 52.21(cc). These provisions were approved by EPA as part of the SIP.	
110(a)(2)(J) (Section 127 public notification)	*meet the applicable requirements of section 127 (relating to public notification),*	•The public is notified of concentrations that exceed the NAAQS from the ADEQ website (www.adeq.state.ar.us) that contains hourly concentrations of $PM_{2.5}$ taken from monitoring sites throughout the state. These monitoring sites also upload data to EPA's AirNow website, which provides data to the public.	77 FR 50033
110(a)(2)(J) PSD & visibility protection	*meet the applicable requirements of part C (relating to prevention of significant deterioration of air quality and visibility protection);*	**This SIP Revision:** •Under APC&EC Regulation 19, Chapter 9, Arkansas has incorporated by reference the requirements in 40 C.F.R. Part 52 for PSD in their entirety, with the exception of 40 C.F.R. §§ 52.21(b)(2)(iii)(a), 52.21(b)(49), 52.21(b)(50), 52.21(b)(55-58), 52.21(i) and 52.21(cc). These provisions were approved by EPA as part of the SIP. These incorporated provisions also provide for protection of visibility in Federal Class I areas.	

		•All new major sources and major modifications are subject to a comprehensive EPA-approved PSD permitting program, including GHG PSD permitting approved on April 2, 2013 (78 FR 19596) and $PM_{2.5}$ PSD permitting approved on March 4, 2015 (80 FR 11573). Chapter 9 of APC&EC Regulation 19 authorizes enforcement of regulations governing the prevention of significant deterioration of air quality and regulations governing the protection of visibility in mandatory Federal Class I areas. •The visibility subelement of Element J is not being addressed because EPA stated in their September 13, 2013 "Guidance on Infrastructure State Implementation Plan (SIP Elements under Clean Air Act Sections 110(a)(1) and 110(a)(2)"[4] that they believe that there are no newly applicable visibility protection obligations pursuant to Element J after the promulgation of a new or revised NAAQS.	
110(a)(2)(K) Air quality modeling/data	*provide for- (i) the performance of such air quality modeling as the Administrator may prescribe for the purpose of predicting the effect on ambient air quality of any emissions of any air pollutant for which the Administrator has established a*	•Arkansas has submitted the Emissions Inventory SIP revision pertaining to Crittenden County during calendar years 2006 and 2007. These plans submitted the necessary modeling where required. The status of this SIP revision is below:	77 FR 50033

[4] EPA Guidance on Infrastructure State Implementation Plan (SIP) Elements under Clean Air Act Sections 110(a)(1) and 11(a)(2), September 13, 2013.

	national ambient air quality standard, and (ii) the submission, upon request, of data related to such air quality modeling to the Administrator;	•The Emissions Inventory SIP for Crittenden County was submitted to EPA and approved on January 15, 2009.	
110(a)(2)(L) Major Stationary source permitting fees	*require the owner or operator of each major stationary source to pay to the permitting authority, as a condition of any permit required under this Act, a fee sufficient to cover- (i) the reasonable costs of reviewing and acting upon any application for such a permit, and (ii) if the owner or operator receives a permit for such source, the reasonable costs of implementing and enforcing the terms and conditions of any such permit (not including any court costs or other costs associated with any enforcement action), until such fee requirement is superseded with respect to such sources by the Administrator's approval of a fee program under title V; and*	•The fee requirements of APC&EC Regulation 26, Regulations of the Arkansas Operating Air Permit Program, Chapter 11, were approved by EPA as meeting the CAA requirements and were incorporated in Arkansas's SIP. Arkansas's Title V operating permit program in Chapter 11 was approved October 9, 2001. •APC&EC Regulation 9, Fee Regulation, Chapter 5, Air Permit Fees, contains the air permit fees applicable to non-part 70 permits, part 70 permits and general permits.	77 FR 50033
110(a)(2)(M) Consultation/ Participation by affected local entities	*provide for consultation and participation by local political subdivisions affected by the plan.*	•Pursuant to APC&EC Regulation 8, Administrative Procedures, Arkansas will continue to provide for consultation and participation from those affected by the SIP. (Reg. 8.205 Public Notice of Permit Application; Reg. 8.207 Public Notice of Draft Permitting Decision; Reg. 8.405 Public Notice of Notices of	77 FR 50033

		Violation and Consent Administrative Orders; and Reg. 8.801 Public Notice of Rulemaking.) •In addition, ADEQ participates in the Central Regional Air Planning Association, which is an organization of states, tribes, federal agencies, and other interested parties concerned with air quality. Through these interactions and public participation on rule and plan development, the requirements of 100(a)(2)(M) are fulfilled. We believe the public notice and hearing processes fulfill the requirements for consultation with local political subdivisions affected by the SIP.	

3.2 2008 Ozone NAAQS

The federally enforceable SIP for Arkansas is compiled in 40 C.F.R. Part 52 Subpart E § 52.170. The requirements of sections 110(a)(2)(A) – (M) of the CAA relevant to the 2008 ozone NAAQS are included in this SIP submittal. The following table summarizes where and how the requirements of sections 110(a)(2)(A) – (M) are addressed.

In this revision to the SIP, Arkansas demonstrates that it has adequate resources and authority to implement, maintain, and enforce the 2008 8-hour ozone NAAQS.

Section 110(a)(2) Element	*Summary of Element (Statutory Language)*	Provisions in the Current SIP or Recent SIP Revision Submittals
110(a)(2)(A) Emission limits and other control measures	*include enforceable emission limitations and other control measures, means, or techniques (including economic incentives such as fees, marketable permits, and auctions of emissions rights), as well as schedules and timetables for compliance, as may be necessary or appropriate to meet the applicable requirements of this Act;*	•Arkansas's enforceable emission limitations and other control measures are covered in Arkansas Water and Air Pollution Control Act, Arkansas Code Annotated (Ark. Code Ann.) § 8-4-101 *et. seq*, and those provisions of the Arkansas Pollution Control & Ecology Commission (APC&EC) Regulation 19, listed in 40 C.F.R. § 52.170. •The regulations in APC&EC Regulation 19 have been duly adopted by APC&EC. Where these provisions relate to section 110 requirements, SIP revisions have been submitted to and approved by EPA. EPA-approved SIP revisions are codified at 40 C.F.R. Part 52, Subpart E. Arkansas has an EPA-approved air permitting program for both major and minor facilities, which ensures that all applicable requirements are included in the facility permit.
110(a)(2)(B) Ambient air quality	*provide for establishment and operation of appropriate*	•APC&EC Reg. 19.302 grants ADEQ responsibility for ambient air monitoring and computer modeling of regulated air pollutant emissions. •Ark. Code Ann. § 8-4-311(a)(3) empowers ADEQ to encourage and conduct

monitoring and data analysis system	*devices, methods, systems, and procedures necessary to- (i) monitor, compile, and analyze data on ambient air quality, and (ii) upon request, make such data available to the Administrator;*	studies, investigations, and research relating to air pollution and its causes, prevention, control, and abatement. •Ark. Code Ann. § 8-4-311(a)(4) grants ADEQ the ability to collect and disseminate information relative to air pollution and its prevention and control. •In conjunction with the references above, Arkansas monitors air quality for ozone at appropriate locations throughout the state using EPA-approved methods and submits ozone data to the EPA's Air Quality System (AQS) consistent with EPA regulations under 40 C.F.R. Part 58. •Ark. Code Ann. § 8-4-311(a)(2) gives ADEQ the ability to advise, consult, and cooperate with the federal government in furtherance of safeguarding the air resources of the state by controlling or abating air pollution and preventing new air pollution if it is in the interest of the public health and welfare of the people. See also Ark. Code Ann. § 8-4-301 and § 8-4-302. Under this authority, ADEQ submits annual monitoring network plans, consistent with EPA's ambient air monitoring regulations, which describe how ADEQ has complied with monitoring requirements and explains proposed changes to the network, if any. •Ark. Code Ann. § 8-1-202 grants the ADEQ Director authority to retain the technical and legal expertise and assistance in the field of environmental protection.
110(a)(2)(C) Program to enforce control measures, regulate modification and construction of stationary sources and a permit	*include a program to provide for the enforcement of the measures described in subparagraph (A), and regulation of the modification and construction of any*	•Ark. Code Ann. § 8-4-203(a)(1) authorizes ADEQ to issue, continue in effect, revoke, modify, or deny permits to prevent, control, or abate pollution. Ark. Code Ann. § 8-4-311 (a)(1) empowers ADEQ to develop and effectuate a comprehensive program for the prevention and control of all sources of air pollution in the State of Arkansas. •Chapter 4 of APC&EC Regulation 19 describes the regulation and permitting of the

program	*stationary source within the areas covered by the plan as necessary to assure that national ambient air quality standards are achieved, including a permit program as required in parts C and D;*	operation, modification, and construction of minor stationary sources. •Chapter 9 of APC&EC Regulation 19 authorizes enforcement of regulations governing the prevention of significant deterioration (PSD) of air quality and regulations governing the protection of visibility in mandatory Federal Class I areas. •Ark. Code Ann. § 8-4-311(a)(10) empowers ADEQ to make, issue, modify, revoke, and enforce orders prohibiting, controlling, or abating air pollution and requiring the adoption of remedial measures to prevent, control, or abate air pollution. •Ark .Code Ann. § 8-4-311(a)(7) empowers ADEQ to administer and enforce all laws and regulations relating to pollution of the air. •ADEQ has a complete EPA-approved PSD permitting program in place covering the required elements for all regulated New Source Review (NSR) pollutants, including greenhouse gases (GHG). EPA had previously published a finding of failure to submit a PSD SIP for $PM_{2.5}$ (79 FR 29354) and imposed a Federal Implementation Plan for PSD permitting of GHGs (75 FR 82246); however, ADEQ submitted SIP revisions addressing 2006 $PM_{2.5}$ PSD elements, which was approved on March 4, 2015 (80 FR 11573), and GHG PSD permitting, which was approved on April 2, 2013 (78 FR 19596). No changes to the PSD program are necessary to implement the 2008 ozone NAAQS.
110(a)(2)(D)(i) Interstate transport provisions	*contain adequate provisions- (i) prohibiting, consistent with the provisions of this title, any source or other type of emissions activity within the State from emitting any air*	•APC&EC Reg. 19.402 states the following: "No permit shall be granted or modified under this chapter unless the owner/operator demonstrates to the reasonable satisfaction of ADEQ that the stationary source will be constructed or modified to operate without resulting in a violation of applicable portions of this regulation or without interfering with the attainment or maintenance of a national ambient air quality standard." APC&EC Reg. 19.402 is consistent with these requirements as it is an Arkansas promulgated regulation that applies to all stationary sources in

	pollutant in amounts which will- (I) contribute significantly to nonattainment in, or interfere with maintenance by, any other State with respect to any such national primary or secondary ambient air quality standard, or (II) interfere with measures required to be included in the applicable implementation plan for any other State under part C to prevent significant deterioration of air quality or to protect visibility,	Arkansas. •All new major sources and major modifications are subject to a comprehensive EPA-approved PSD permitting program, including GHG PSD permitting approved on April 2, 2013 (78 FR 19596) and $PM_{2.5}$ PSD permitting approved on March 4, 2015 (80 FR 11573). Chapter 9 of APC&EC Regulation 19 authorizes enforcement of regulations governing the prevention of significant deterioration of air quality and regulations governing the protection of visibility in mandatory Federal Class I areas. •Arkansas is currently subject to the Regional Haze Rule, which addresses visibility-impairing pollutants. Arkansas's PSD program is used to further protect visibility. In 2008, Arkansas submitted a Regional Haze SIP and EPA partially approved and partially disapproved it on March 12, 2012. Arkansas has experienced considerable improvement in regional haze in relation to the reasonable progress goals and uniform rate of progress established in the Regional Haze SIP. The most recent data from 2015 and current five-year rolling averages show that visibility impairment in Arkansas's Federal Class I areas is decreasing more rapidly than the uniform rate of progress and 2018 reasonable progress goals submitted in the 2008 Regional Haze SIP.[5] •Additionally, visibility at Federal Class I areas in other states affected by Arkansas sources has improved for the least and most impaired days between 2000 and 2015. On the most impaired days, Hercules Glade, MO and Mingo, MO achieved a 2.92 deciview (dv) and 5.24 dv reduction in haziness, respectively, between the 2000 – 2004 baseline period and 2011 – 2015 analysis period. On the least impaired days, Hercules Glade, MO and Mingo, MO achieved a 2.54dv and 2.42 dv reduction in haziness, respectively, between the 2000 – 2004 baseline period and the 2011 – 2015 analysis period. Based on the visibility improvement in Class I areas in nearby states,

[5] Arkansas Regional Haze Five Year Progress Report, May 2015: https://www.adeq.state.ar.us/air/planning/pdfs/ar_5yr_prog_rep_review-final-6-2-2015.pdf; Federal Land Manager Environmental Database < http://views.cira.colostate.edu/fed/ToolsMenu.aspx>

		ADEQ concludes that stationary sources in Arkansas do not significantly interfere with other states' plans to protect visibility.[6]
110(a)(2)(D)(ii) Interstate and International pollution abatement	*contain adequate provisions- (ii) insuring compliance with the applicable requirements of sections 126 and 115 (relating to interstate and international pollution abatement)*	•Ark. Code Ann. § 8-4-311(a)(8) authorizes ADEQ to represent the State in all matters pertaining to the plans, procedures, or negotiations for interstate compacts in relation to air pollution control. •Based on information gathered from ADEQ's permit database, ADEQ concludes that the limited amount of point and area source ozone emissions do not preclude the State from ensuring compliance with CAA § 126 and § 115. There are no final findings under § 115 of the CAA against Arkansas with respect to the 2008 ozone NAAQS. •All new major sources and major modifications are subject to a comprehensive EPA-approved PSD permitting program, including GHG PSD permitting approved on April 2, 2013 (78 FR 19596) and $PM_{2.5}$ PSD permitting approved on March 4, 2015 (80 FR 11573). Chapter 9 of APC&EC Regulation 19 authorizes enforcement of regulations governing the prevention of significant deterioration (PSD) of air quality and regulations governing the protection of visibility in mandatory Federal Class I areas. •APC&EC Reg. 19.903 describes the notification required when dealing with a major new source or major modification.
110(a)(2)(E)(i) Adequate personnel, funding and	*provide (i) necessary assurances that the State (or, except were the Administrator deems*	•Ark. Code Ann. § 8-1-103(1)(A) grants ADEQ and APC&EC the authority to establish by regulation, reasonable fees for initial issuance, annual review, and modification of permits. •Under Ark. Code Ann. § 8-1-103(3) and § 8-1-103(5), ADEQ is authorized to

[6] Arkansas Regional Haze Five Year Progress Report, May 2015: https://www.adeq.state.ar.us/air/planning/pdfs/ar_5yr_prog_rep_review-final-6-2-2015.pdf; Federal Land Manager Environmental Database < http://views.cira.colostate.edu/fed/ToolsMenu.aspx>

authority to carry out plan, (ii) Comply with state boards, (iii) Oversee local and regional governments/ agencies	*inappropriate, the general purpose local government or governments, or a regional agency designated by the State or general purpose local government for such purpose) will have adequate personnel, funding, and authority under State (and, as appropriate, local) law to carry out such implementation plan (and is not prohibited by any provision of Federal or State law from carrying out such implementation plan or portion thereof), (ii)requirements that the State comply with the requirements respecting State boards under section 128, (iii) necessary assurances that where the State has relied on a local or*	collect the fees established by APC&EC and shall deny the issuance of an initial permit, a renewal permit, or a modification permit if and when a facility fails or refuses to pay the fees after reasonable notice. •Ark. Code Ann. § 8-1-202(b)(2)(D) states that duties of the Director of ADEQ include the day-to-day administration of all activities that ADEQ is empowered by law to perform, including, but not limited to, the employment and supervision of such technical, legal, and administrative staff, within approved appropriations, as is necessary to carry out the responsibilities vested with ADEQ. •APC&EC Regulation 9, Fee Regulation, Chapter 5, contains the air permit fees applicable to non-part 70 permits, part 70 permits, and general permits. •APC&EC Reg. 19.301 gives ADEQ the responsibility of meeting all applicable regulations and requirements contained in the CAA, as amended, if any area of the State is determined to be in violation of the NAAQS. •APC&EC Reg. 19.410 gives ADEQ the authority to revoke, suspend, or modify any permit for cause. •The requirements of §110(a)(2)(E)(ii) are not entirely applicable because permit and enforcement orders are issued directly by ADEQ, not approved by state boards or commissioners. •Under APC&EC Reg. 8.202, the Director or the Director's delegate shall issue all permits with nothing in APC&EC Regulation 8 being construed to authorize APC&EC to issue a permit, including the power to reverse or affirm a permitting decision by the Director. •APC&EC Regulation 8, Chapter 4, highlights that APC&EC does not play a leading role in approving enforcement actions.

	regional government, agency, or instrumentality for the implementation of any plan provision, the State has responsibility for ensuring adequate implementation of such plan provision;	•Under Ark. Code Ann. § 21-8-1001, no member of a state board or commission or board member of an entity receiving state funds shall participate in, vote on, influence or attempt to influence an official decision if the member has a pecuniary interest in the matter under consideration by the board, commission, or entity. In addition, no member of a state board or commission or board member of an entity receiving state funds shall participate in any discussion or vote on a rule or regulation that exclusively benefits the member. •Arkansas does not rely on local agencies for specific SIP implementation. The requirements of §110(a)(2)(E)(iii) are not applicable.
110(a)(2)(F) Stationary source emissions monitoring and reporting system	*require, as may be prescribed by the Administrator-- (i) the installation, maintenance, and replacement of equipment, and the implementation of other necessary steps, by owners or operators of stationary sources to monitor emissions from such sources, (ii) periodic reports on the nature and amounts of emissions and emissions-related data from such sources, and (iii)*	•Regulatory requirements pertaining to sampling, monitoring, and reporting are codified in APC&EC Regulation 19, Chapter 7. •APC&EC Reg. 19.705 provides the record keeping and reporting requirements for stationary sources subject to APC&EC Regulation 19. APC&EC Reg. 19.705 outlines how records of air emissions are to be maintained and how information and data should be submitted to ADEQ. •APC&EC Reg. 19.702 provides guidelines and timelines for air emissions sampling necessary to enable Arkansas to determine whether the sources are in compliance. •Enforceable emission limitations and other control measures are covered in the Arkansas Water and Air Pollution Control Act and those provisions of Ark. Code Ann. §§ 8-4-310 and 8-4-311. Elements of the program for enforcement are found in the monitoring, recordkeeping, and reporting requirements for sources in these control measures as well as individual SIP permits. •APC&EC Reg. 19.703 requires any stationary source subject to this regulation to install, calibrate, operate, and maintain equipment to continuously monitor or

	correlation of such reports by the State agency with any emission limitations or standards established pursuant to this Act, which reports shall be available at reasonable times for public inspection;	determine federally regulated air pollutant emissions in accordance with Federal specification and in accordance with any joint specifications outlined by ADEQ, with the concurrence of EPA. •APC&EC Reg. 19.701 states that ADEQ will use any credible evidence based on sampling, monitoring, and reporting, to determine violations of applicable emissions limitations. •Under Ark. Code Ann. § 8-4-311(a)(2), ADEQ has the power to advise, consult, and cooperate with the federal government, including EPA Region 6 administrator. Arkansas submits emission inventory data annually to EPA for inclusion in the National Emissions Inventory. •APC&EC Reg. 19.706 requires public availability of emissions data.
110(a)(2)(G) Authority to declare air pollution emergency and notify public	*provide for authority comparable to that in section 303 and adequate contingency plans to implement such authority;*	•Ark. Code Ann. § 8-1-202(b)(2)(C) empowers the Director of ADEQ to issue orders under circumstances that reasonably require emergency measures to be taken to protect the environment or the public health and safety. APC&EC Reg. 8.502 gives the Director the ability to issue an Emergency Order when necessary to meet an emergency or situation of imminent hazard. APC&EC Reg. 8.502 requires the Director to publish a Notice of Emergency Order in a newspaper covering the affected area, or in a newspaper of statewide circulation. The notice must contain a description of the action, ADEQ's authority for taking the action, and other information appropriate to ensure the public is informed about the action. •Ark. Code Ann. § 8-4-202(e)(1) empowers APC&EC to declare an emergency and implement emergency rules, regulations, suspensions, or moratoria on categories or types of permits if APC&EC determines that imminent peril to the public health, safety, or welfare requires immediate change in the rules or immediate suspension or moratorium on categories or types of permits.

		•APC&EC Reg. 8.807 authorizes APC&EC to waive or reduce the notice requirements in cases involving emergency rulemaking. No emergency rule shall be effective for more than one hundred eighty (180) days unless allowed by law.
110(a)(2)(H) Future SIP revisions	*provide for revision of such plan- (i) from time to time as may be necessary to take account of revisions of such national primary or secondary ambient air quality standard or the availability of improved or more expeditious methods of attaining such standard, and (ii) except as provided in paragraph (3)(C), whenever the Administrator finds on the basis of information available to the Administrator that the plan is substantially inadequate to attain the national ambient air quality standard which it implements or to otherwise comply with*	•APC&EC Regulation 19, Chapter 1, provides a clear delineation of those regulations that are promulgated by APC&EC in satisfaction of certain requirements of the CAA, including making ADEQ responsible for administering the attainment and maintenance of the NAAQS. •Ark. Code Ann. § 8-4-311(a)(7) empowers ADEQ to administer and enforce all laws and regulations relating to pollution of the air. •Ark. Code Ann. § 8-4-202(d)(4)(A)(ii) authorizes APC&EC to refer to the Code of Federal Regulations for any APC&EC standard or regulation that is identical to a regulation promulgated by EPA. •Under APC&EC Regulation 19, Chapter 3, ADEQ is charged with the protection of the NAAQS. According to APC&EC Reg. 19.301, if any area of the State is determined to be in violation of the NAAQS, all applicable requirements contained in the CAA, as amended, and all regulations promulgated thereto shall be met by ADEQ.

	any additional requirements established under this Act;	
110(a)(2)(I) Nonattainment areas (interstate transport)	*in the case of a plan or plan revision for an area designated as a nonattainment area, meet the applicable requirements of part D (relating to nonattainment areas);*	•Arkansas's nonattainment area plans required under part D are on a different schedule from the section 110 infrastructure elements. Arkansas has one area that was designated nonattainment as nonattainment for the 2008 Ozone NAAQS, Crittenden County, which was classified as Marginal. As such, a nonattainment SIP submittal is not required. An emission inventory SIP for Crittenden County has been submitted to the EPA on August 28, 2015 and EPA published the final rule on January 14, 2016 approving this SIP revision (81 FR 1884). On December 10, 2015, Arkansas submitted to EPA the 2008 8-hour ozone NAAQS redesignation to attainment request and a maintenance plan for Crittenden County. On February 10, 2016, EPA published a proposal to redesignate Crittenden County as attainment for the 2008 8-hour ozone NAAQS and to approve the maintenance plan (81 FR 7046) and on April 25, 2016, EPA finalized the redesignation of Crittenden County to attainment for the 2008 8-hour ozone NAAQS and its approval of the maintenance plan (81 FR 24030). Crittenden County is presently designated attainment for the 2008 8-hour ozone NAAQS.
110(a)(2)(J) (§ 121 consultation), (§127 public notification), PSD and visibility protection	*meet the applicable requirements of section 121 (relating to consultation), meet the applicable requirements of section 127 (relating to public notification), meet the applicable requirements of part C (relating to prevention of*	•Ark. Code Ann. § 8-4-301(b) prescribes a method of utilizing the program for the control of air pollution. Under Ark. Code Ann. § 8-4-301(b), the program shall be undertaken in a progressive manner, and each of its successive objectives shall be sought to be accomplished by a maximum of cooperation and conciliation among all the parties concerned. In addition, Ark. Code Ann. § 8-4-302 reiterates Ark. Code Ann. § 8-4-301(b) by affirming that the purpose is to safeguard the air resources of the State by controlling or abating air pollution that exists and preventing new air pollution under a program which shall be consistent with the declaration of policy stated in Ark. Code Ann. § 8-4-301 and with Ark. Code Ann. Title 8, Chapter, 4,

	significant deterioration of air quality and visibility protection);	Subchapter 3. •All SIP revisions in Arkansas undergo public notice and hearing, which provides for comment by the public. •Air quality data from Arkansas's monitoring network is published on ADEQ's website. Additionally, Arkansas is required to submit monitoring data to the Air Quality System in a timely manner. •Ark. Code Ann. § 8-4-311(a)(6) encourages voluntary cooperation by the people, municipalities, counties, industries, and others in preserving and restoring the purity of the air within the State. •The public is notified of concentrations that exceed the NAAQS from the ADEQ website (https://www.adeq.state.ar.us/techsvs/air_chem_lab/) that contains hourly concentrations taken from monitoring sites throughout the State and the Air Quality Index for the Little Rock and Springdale metropolitan areas. This index displays which sensitive groups are at greater risk from each pollutant. •These monitoring sites also upload data to EPA's AirNow website, which provides data to a broader section of the public and includes links to help the public understand what they can do to keep their air clean. •Under APC&EC Regulation 19, Chapter 9, Arkansas has incorporated by reference the requirements in 40 C.F.R. Part 52 for PSD in their entirety, with the exception of 40 C.F.R. §§ 52.21(b)(2)(iii)(a), 52.21(b)(49), 52.21(b)(50), 52.21(b)(55-58), 52.21(i) and 52.21(cc). These provisions were approved by EPA as part of the SIP. These incorporated provisions also provide for protection of visibility in Federal Class I areas. •All new major sources and major modifications are subject to a comprehensive EPA-approved PSD permitting program, including GHG PSD permitting approved

		on April 2, 2013 (78 FR 19596) and $PM_{2.5}$ PSD permitting approved on March 4, 2015 (80 FR 11573). Chapter 9 of APC&EC Regulation 19 authorizes enforcement of regulations governing the prevention of significant deterioration of air quality and regulations governing the protection of visibility in mandatory Federal Class I areas. •The visibility subelement of Element J is not being addressed because EPA stated in their September 13, 2013 "Guidance on Infrastructure State Implementation Plan (SIP Elements under Clean Air Act Sections 110(a)(1) and 110(a)(2)"[7] that they believe that there are no newly applicable visibility protection obligations pursuant to Element J after the promulgation of a new or revised NAAQS.
110(a)(2)(K) Air quality modeling/data	*provide for- (i) the performance of such air quality modeling as the Administrator may prescribe for the purpose of predicting the effect on ambient air quality of any emissions of any air pollutant for which the Administrator has established a national ambient air quality standard, and (ii) the submission, upon request, of data related to such air quality modeling to the*	•APC&EC Regulation 19, Chapter 3, outlines that ADEQ is responsible for ambient air monitoring and computer modeling of regulated air pollutant emissions in any area that can reasonably be expected to be in excess of the NAAQS and review of the ambient air impacts of any new or modified source of federally regulated air emission that is the subject of the requirements of this Plan. See APC&EC Reg. 19.302(A) and (B). Under APC&EC Reg. 19.302 (B), all computer modeling shall be performed using EPA-approved models, and using averaging times commensurate with averaging times stated in the NAAQS. •ADEQ has the ability to submit data related to air quality modeling to the Administrator under Ark. Code Ann. § 8-4-311 (a)(2) which gives ADEQ the power to advise, consult, and cooperate with the federal government.

[7] EPA Guidance on Infrastructure State Implementation Plan (SIP) Elements under Clean Air Act Sections 110(a)(1) and 11(a)(2), September 13, 2013.

	Administrator;	
110(a)(2)(L) Major Stationary source permitting fees	*require the owner or operator of each major stationary source to pay to the permitting authority, as a condition of any permit required under this Act, a fee sufficient to cover- (i) the reasonable costs of reviewing and acting upon any application for such a permit, and (ii) if the owner or operator receives a permit for such source, the reasonable costs of implementing and enforcing the terms and conditions of any such permit (not including any court costs or other costs associated with any enforcement action), until such fee requirement is superseded with respect to such sources by the*	•The fee requirements of APC&EC Regulation 26, Chapter 11, were approved by EPA as meeting the CAA requirements and were incorporated in Arkansas's SIP. Arkansas's Title V operating permit program was approved by EPA October 9, 2001 (66 FR 51313). •ADEQ has the authority to adjust the fee as necessary using its rulemaking authority. APC&EC Regulation 9, Chapter 5, contains the air permit fees applicable to non-part 70 permits, part 70 permits, and general permits. Revisions to air permitting fee in Chapter 5 were approved by EPA on April 30, 2015 (80 FR 24216).

	Administrator's approval of a fee program under title V; and	
110(a)(2)(M) Consultation/ Participation by affected local entities	*provide for consultation and participation by local political subdivisions affected by the plan.*	•Pursuant to APC&EC Regulation 8, Arkansas will continue to provide for consultation and participation from those affected by the SIP. Under APC&EC Reg. 8, those organizations affected by the SIP will be able to participate in developing the SIP via comments and potential public hearings. ADEQ is the sole state-level enforcer and implementer of the SIP. See APC&EC Reg. 8.205 *Public Notice of Permit Application*; APC&EC Reg. 8.206 *Request for Public Hearing on Application for Permit*; APC&EC Reg. 8.207 *Public Notice of Draft Permitting Decision*; APC&EC Reg. 8.208 *Public Comment on Draft Permitting Decision*; APC&EC Reg. 8.209 *Public Hearings*; APC&EC Reg. 8.405 *Public Notice of Notices of Violations and Consent Administrative Orders*; APC&EC Reg. 8.801 *Public Notice of Rulemaking.* •ADEQ participates in the Central States Air Resources Agencies, which is an organization of states, tribes, federal agencies, and other interested parties concerned with air quality. The interactions and public participation on rule and plan development play a role in satisfying the requirements of § 110(a)(2)(M).

3.3 2008 Lead NAAQS

The federally enforceable SIP for Arkansas is compiled in 40 C.F.R. Part 52 Subpart E § 52.170. The requirements of sections 110(a)(2)(A) – (M) of CAA relevant to the 2008 lead NAAQS are contained in the current SIP or SIP revisions which have been submitted, but not yet approved by EPA and the attachments included in this SIP submittal, which are hereby incorporated by reference. The following table summarizes where and how the requirements of sections 110(a)(2)(A) – (M) are addressed.

In this revision to the SIP, Arkansas demonstrates that it has adequate resources and authority to implement, maintain, and enforce the 2008 lead NAAQS.

110(a)(2)(A) Emission limits and other control measures	*include enforceable emission limitations and other control measures, means, or techniques (including economic incentives such as fees, marketable permits, and auctions of emissions rights), as well as schedules and timetables for compliance, as may be necessary or appropriate to meet the applicable requirements of this Act;*	•Arkansas's enforceable emission limitations and other control measures are covered in Arkansas Water and Air Pollution Control Act, Arkansas Code Annotated (Ark.Code.Ann.) § 8-4-101 *et. seq*, and those provisions of the Arkansas Pollution Control & Ecology Commission (APC&EC) Regulation 19, listed in 40 C.F.R. § 52.170. •The regulations in APC&EC Regulation 19 have been duly adopted by APC&EC. Where these provisions relate to section 110 requirements, SIP revisions have been submitted to and approved by EPA. EPA-approved SIP revisions are codified at 40 C.F.R. Part 52, Subpart E. Arkansas has an EPA-approved air permitting program for both major and minor facilities, which ensures that all applicable requirements are included in the facility permit.
110(a)(2)(B) Ambient air quality	*provide for establishment and operation of appropriate*	•APC&EC Reg. 19.302, grants ADEQ responsibility for ambient air monitoring and computer modeling of regulated air pollutant emissions.

monitoring and data analysis system	*devices, methods, systems, and procedures necessary to- (i) monitor, compile, and analyze data on ambient air quality, and (ii) upon request, make such data available to the Administrator;*	•Ark. Code. Ann. § 8-4-311(a)(3) empowers ADEQ to encourage and conduct studies, investigations, and research relating to air pollution and its causes, prevention, control, and abatement. •Ark. Code. Ann. § 8-4-311(a)(4) grants ADEQ the ability to collect and disseminate information relative to air pollution and its prevention and control. •In conjunction with the references above, Arkansas monitors air quality for lead at appropriate locations throughout the state using EPA-approved methods and submits lead data to the EPA's Air Quality System (AQS) consistent with EPA regulations under 40 C.F.R. Part 58. •Ark. Code. Ann. § 8-4-311(a)(2) gives ADEQ the ability to advise, consult, and cooperate with the federal government in furtherance of safeguarding the air resources of the State by controlling or abating air pollution and preventing new air pollution if it is in the interest of the public health and welfare of the people. See Ark. Code. Ann. § 8-4-302 and § 8-4-301.
110(a)(2)(C) Program to enforce control measures, regulate modification and construction of stationary sources and a permit program	*include a program to provide for the enforcement of the measures described in subparagraph (A), and regulation of the modification and construction of any stationary source within the areas covered by the plan as necessary to assure that national*	•Ark. Code. Ann. § 8-4-203(a)(1) authorizes ADEQ to issue, continue in effect, revoke, modify, or deny permits to prevent, control, or abate pollution. •Ark. Code. Ann. § 8-4-311 (a)(1) empowers ADEQ to develop and effectuate a comprehensive program for the prevention and control of all sources of pollution of the air of the State of Arkansas. •Chapter 4 of APC&EC Regulation 19, describes the regulation and permitting of the operation, modification, and construction of minor stationary source. •Chapter 9 of APC&EC Regulation 19, authorizes enforcement of regulations governing the prevention of significant deterioration of air quality and regulations governing the protection of visibility in mandatory Federal Class I areas.

	ambient air quality standards are achieved, including a permit program as required in parts C and D;	•Ark. Code. Ann. § 8-4-311(a)(10) empowers ADEQ to make, issue, modify, revoke, and enforce orders prohibiting, controlling or abating air pollution and requiring the adoption of remedial measures to prevent, control, or abate air pollution. •Ark. Code. Ann. § 8-4-311(a)(7) empowers ADEQ to administer and enforce all laws and regulations relating to pollution of the air. No changes to the PSD program are necessary to implement the 2008 lead NAAQS.
110(a)(2)(D)(i) Interstate transport provisions	*contain adequate provisions- (i) prohibiting, consistent with the provisions of this title, any source or other type of emissions activity within the State from emitting any air pollutant in amounts which will- (I) contribute significantly to nonattainment in, or interfere with maintenance by, any other State with respect to any such national primary or secondary ambient air quality standard, or (II) interfere with measures*	•ADEQ has determined that there are few sources of lead emissions located in close proximity to Arkansas's borders (e.g., within 2 miles). The physical properties of lead prevent lead emissions from experiencing the same travel or formation phenomena as $PM_{2.5}$ or ozone and there is a sharp decrease in lead concentrations as the distance from a lead source increases. •There are four nonattainment areas for the 2008 lead NAAQS in states neighboring Arkansas: Bristol in Sullivan County, Tennessee; Frisco in Collin County, Texas; Iron, Dent, and Reynolds Counties in Missouri; and Jefferson County, Missouri. None of these nonattainment areas are within 50 miles of the Arkansas border. Because the physical properties of lead prevent long distance transport of lead emissions, the Department concludes that Arkansas does not significantly contribute to nonattainment or maintenance in other states. •All new major sources and major modifications are subject to a comprehensive EPA-approved PSD permitting program, including Greenhouse Gas (GHG) PSD permitting approved on April 2, 2013 (78 FR 19596) and $PM_{2.5}$ PSD permitting approved on March 4, 2015 (80 FR 11573). Chapter 9 of APC&EC Regulation 19 authorizes enforcement of regulations governing the prevention of significant deterioration of air quality and regulations governing the protection of visibility in

	required to be included in the applicable implementation plan for any other State under part C to prevent significant deterioration of air quality or to protect visibility,	mandatory Federal Class I areas. •Arkansas has two Federal Class I areas within its borders and determined in its 2008 Regional Haze SIP that sources located in Arkansas also contribute to regional haze in two additional Federal Class I areas: Hercules Glade Wilderness and Mingo National Wildlife Refuge in Missouri; however, the contribution to visibility impairment from lead emitted by sources in Arkansas on Hercules Glade and Mingo is negligible. According to the 2011 National Emissions Inventory (NEI), only two sources emitted greater than 0.5 tons of lead in 2011, the most recent year for which data is available. These sources were Trefilarbed Arkansas Inc. in Jefferson County and Remington Arms Co Inc. in Lonoke County which emitted 0.813 and 0.753 tons of lead, respectively, in 2011. Neither of these facilities is located near a Federal Class I area. Trefilarbed Arkansas Inc. and Remington Arms Co Inc. are both located more than a 150 miles from the nearest Federal Class I area in another state.[8] •The Totty Field airport is the closest lead source in Arkansas to the Hercules Glade Wilderness area in Missouri. This facility is approximately 18.4 miles from the boundary of the Hercules Glade to the source and emitted 7.69 x 10^{-6} tons of lead in 2011 according to the 2011 NEIv2.[9] The Ark-Mo airport is the closest lead source in Arkansas to the Mingo Wilderness National Wildlife Refuge in Missouri. This facility is approximately 31.3 miles from the boundary of the Mingo National Wildlife Refuge and emitted 8.6 x 10^{-4} tons of lead in 2011 according to the 2011 NEIv2.[10] Based on the small amounts of lead emitted and the distance of lead stationary sources from Federal Class I areas, the Department has determined that lead stationary sources have a negligible impact on visibility.

[8] Proximity of Arkansas Lead Sources to Class I Wilderness Areas Map (attached after the 2008 Lead NAAQS Infrastructure State Implementation Plan table)
[9] Id. and EPA 2011 National Emissions Inventory version 2.
[10] Id.

110(a)(2)(D)(ii) Interstate and International pollution abatement	*contain adequate provisions- (ii) insuring compliance with the applicable requirements of sections 126 and 115 (relating to interstate and international pollution abatement)*	•Ark. Code. Ann. § 8-4-311(a)(8) authorizes ADEQ to represent the State in all matters pertaining to the plans, procedures, or negotiations for interstate compacts in relation to air pollution control. •Based on information gathered from ADEQ's permit database, ADEQ concludes that the limited amount of point and area source lead emissions do not preclude the State from ensuring compliance with CAA § 126 and § 115. There are no final findings under § 115 of the CAA against Arkansas with respect to the 2008 lead NAAQS. •All new major sources and major modifications are subject to a comprehensive EPA-approved PSD permitting program, including GHG PSD permitting approved on April 2, 2013 (78 FR 19596) and $PM_{2.5}$ PSD permitting approved on March 4, 2015 (80 FR 11573). Chapter 9 of APC&EC Regulation 19 authorizes enforcement of regulations governing the prevention of significant deterioration of air quality and regulations governing the protection of visibility in mandatory Federal Class I areas. • APC&EC Reg. 19.903 describes the notification required when dealing with a major new source or major modification.
110(a)(2)(E)(i) Adequate personnel, funding and authority to carry out plan, (ii) Comply with state boards, (iii) Oversee local and	*provide (i) necessary assurances that the State (or, except were the Administrator deems inappropriate, the general purpose local government or governments, or a regional agency*	•Ark. Code. Ann. § 8-1-103(1)(A) grants ADEQ and APC&EC the authority to establish by regulation, reasonable fees for initial issuance, annual review, and modification of permits. •Under Ark. Code. Ann. § 8-1-303(3), ADEQ is authorized to collect the fees established by the Commission and shall deny the issuance of an initial permit, a renewal permit, or a modification permit if and when a facility fails or refuses to pay the fees after reasonable notice. •Ark. Code. Ann. § 8-1-202(b)(2)(D) states that the ADEQ Director's duties include

regional governments/ agencies	*designated by the State or general purpose local government for such purpose) will have adequate personnel, funding, and authority under State (and, as appropriate, local) law to carry out such implementation plan (and is not prohibited by any provision of Federal or State law from carrying out such implementation plan or portion thereof), (ii)requirements that the State comply with the requirements respecting State boards under section 128, (iii) necessary assurances that where the State has relied on a local or regional government, agency, or instrumentality for the implementation of any plan provision, the State*	the day-to-day administration of all activities that ADEQ is empowered by law to perform, including, but not limited to, the employment and supervision of such technical, legal, and administrative staff, within approved appropriations, as is necessary to carry out the responsibilities vested with the department. •APC&EC Regulation 9, Fee Regulation, Chapter 5, contains the air permit fees applicable to non-part 70 permits, part 70 permits, and general permits. •APC&EC Reg. 19.301, gives ADEQ the responsibility of meeting all applicable regulations and requirements contained in the CAA, as amended, if any area of the state is determined to be in violation of the NAAQS. •APC&EC Reg. 19.410, gives ADEQ the authority to revoke, suspend, or modify any permit for cause. •The requirements of §110(a)(2)(E)(ii) are not entirely applicable because permit and enforcement orders are issued directly by ADEQ, not approved by state boards or commissioners. •Under the APC&EC Reg. 8.202, the Director or the Director's delegate shall issue all permits with nothing in APC&EC Regulation 8 being construed to authorize the Commission to issue a permit, including the power to reverse or affirm a permitting decision by the Director. APC&EC Regulation 8, Chapter 4, highlights that the Commission does not play a leading role in approving enforcement actions. •Under Ark. Code. Ann. § 21-8-1001, no member of a state board or commission or board member of an entity receiving state funds shall participate in, vote on, influence or attempt to influence an official decision if the member has a pecuniary interest in the matter under consideration by the board, commission, or entity. In addition, no member of a state board or commission or board member of an entity receiving state funds shall participate in any discussion or vote on a rule or

	has responsibility for ensuring adequate implementation of such plan provision;	regulation that exclusively benefits the member. •Arkansas does not rely on local agencies for specific SIP implementation. The requirements of §110(a)(2)(E)(iii) are not applicable.
110(a)(2)(F) Stationary source emissions monitoring and reporting system	*require, as may be prescribed by the Administrator-- (i) the installation, maintenance, and replacement of equipment, and the implementation of other necessary steps, by owners or operators of stationary sources to monitor emissions from such sources, (ii) periodic reports on the nature and amounts of emissions and emissions-related data from such sources, and (iii) correlation of such reports by the State agency with any emission limitations or standards established*	•Regulatory requirements pertaining to sampling, monitoring and reporting have been codified in APC&EC Regulation 19, Chapter 7. Requirements in Chapter 7, APC&EC Reg. 19.705 provide the record keeping and reporting requirements for stationary sources subject to APC&EC Regulation 19. APC&EC Reg. 19.705 outlines how records of emissions are to be maintained and how information and data should be submitted to ADEQ. •APC&EC Reg. 19.702 provides guidelines and timelines for air emissions sampling necessary to enable Arkansas to determine whether the sources are in compliance. •Enforceable emission limitations and other control measures are covered in the Arkansas Water and Air Pollution Control Act and those provisions of Ark. Code. Ann. §§ 8-4-310 and 8-4-311. Elements of the program for enforcement are found in the monitoring, recordkeeping, and reporting requirements for sources in these control measures as well as individual SIP permits. •APC&EC Reg. 19.703 requires any stationary source subject to this regulation to install, calibrate, operate, and maintain equipment to continuously monitor or determine federally regulated air pollutant emissions in accordance with Federal specification and in accordance with any joint specifications outlined by ADEQ, with the concurrence of EPA. •APC&EC Reg. 19.701 states that ADEQ will use any credible evidence based on

	pursuant to this Act, which reports shall be available at reasonable times for public inspection;	sampling, monitoring, and reporting, to determine violations of applicable emissions limitations. •Under Ark. Code. Ann. § 8-4-311(a)(2), ADEQ has the power to advise, consult, and cooperate with the federal government, including EPA Region 6 administrator. Arkansas submits emission inventory data annually to EPA for inclusion in the NEI. •Reg. 19.706 requires public availability of emissions data.
110(a)(2)(G) Authority to declare air pollution emergency and notify public	*provide for authority comparable to that in section 303 and adequate contingency plans to implement such authority;*	•Ark. Code. Ann. § 8-1-202(b)(2)(C) empowers the Director of ADEQ to issue orders under circumstances that reasonably require emergency measures to be taken to protect the environment or the public health and safety. •APC&EC Reg. 8.502 gives the Director the ability to issue an Emergency Order when necessary to meet an emergency or situation of imminent hazard. Reg. 8.502 requires the Director to publish a Notice of Emergency Order in a newspaper covering the affected area, or in a newspaper of statewide circulation. The notice must contain a description of the action, ADEQ's authority for taking the action and other information appropriate to ensure the public is informed about the action. •Ark. Code. Ann. § 8-4-202(e)(1) empowers APC&EC to declare an emergency and implement emergency rules, regulations, suspensions, or moratoria on categories or types of permits if the Commission determines that imminent peril to the public health, safety, or welfare requires immediate change in the rules or immediate suspension or moratorium on categories or types of permits. •APC&EC Reg. 8.807 authorizes the Commission to waive or reduce the notice requirements in cases involving emergency rulemaking. No emergency rule shall be effective for more than one hundred eighty (180) days unless allowed by law.
110(a)(2)(H)	*provide for revision of*	•APC&EC Regulation 19, Chapter 1, provides a clear delineation of those

Future SIP revisions	*such plan- (i) from time to time as may be necessary to take account of revisions of such national primary or secondary ambient air quality standard or the availability of improved or more expeditious methods of attaining such standard, and (ii) except as provided in paragraph (3)(C), whenever the Administrator finds on the basis of information available to the Administrator that the plan is substantially inadequate to attain the national ambient air quality standard which it implements or to otherwise comply with any additional requirements established under this Act;*	regulations that are promulgated by the Commission in satisfaction of certain requirements of the CAA, including making ADEQ responsible for administering the attainment and maintenance of the NAAQS. •Ark.Code.Ann. § 8-4-311(a)(7) empowers ADEQ to administer and enforce all laws and regulations relating to pollution of the air. •Ark.Code.Ann. § 8-4-202(d)(4)(A)(ii) authorizes APC&EC to refer to the Code of Federal Regulations for any Commission standard or regulation that is identical to a regulation promulgated by the EPA. •Under APC&EC Regulation 19, Chapter 3, ADEQ is charged with the protection of the NAAQS. According to APC&EC Reg. 19.301, if any area of the State is determined to be in violation of the NAAQS, all applicable requirements contained in the CAA, as amended, and all regulations promulgated thereto shall be met by ADEQ.

110(a)(2)(I) Nonattainment areas (interstate transport)	*in the case of a plan or plan revision for an area designated as a nonattainment area, meet the applicable requirements of part D (relating to nonattainment areas);*	•Arkansas's nonattainment area plans required under part D are on a different schedule from the section 110 infrastructure elements. Currently, Arkansas does not have any area designated nonattainment for lead.
110(a)(2)(J) (§ 121 consultation), (§127 public notification), PSD and visibility protection	*meet the applicable requirements of section 121 (relating to consultation), meet the applicable requirements of section 127 (relating to public notification), meet the applicable requirements of part C (relating to prevention of significant deterioration of air quality and visibility protection);*	•Ark. Code. Ann. § 8-4-301(b), prescribes a method of utilizing the program for the control of air pollution. Under Ark. Code. Ann. § 8-4-301(b), the program shall be undertaken in a progressive manner, and each of its successive objectives shall be sought to be accomplished by a maximum of cooperation and conciliation among all the parties concerned. In addition, Ark. Code. Ann. § 8-4-302 reiterates Ark. Code. Ann. § 8-4-301(b) by affirming that the purpose is to safeguard the air resources of the State by controlling or abating air pollution that exists and preventing new air pollution under a program which shall be consistent with the declaration of policy stated in Ark. Code Ann. § 8-4-301 and with Ark. Code Ann, Title 8, Chapter 4, Subchapter 3. •All SIP revisions undergo public notice and hearing, which provides for comment by the public. •Air quality data from Arkansas's monitoring network is published on ADEQ's website. Additionally, Arkansas is required to submit monitoring data to the Air Quality System (AQS) in a timely manner. •Ark. Code. Ann. § 8-4-311(a)(6) encourages voluntary cooperation by the people, municipalities, counties, industries, and others in preserving and restoring the purity of the air within the State.

		•Under APC&EC Regulation 19, Chapter 9, Arkansas has incorporated by reference the requirements in 40 C.F.R. Part 52 for PSD in their entirety, with the exception of 40 C.F.R. §§ 52.21(b)(2)(iii)(a), 52.21(b)(49), 52.21(b)(50), 52.21(b)(55-58), 52.21(i) and 52.21(cc). These incorporated provisions also provide for protection of visibility in Federal Class I areas. •All new major sources and major modifications are subject to a comprehensive EPA-approved PSD permitting program, including GHG PSD permitting approved on April 2, 2013 (78 FR 19596) and $PM_{2.5}$ PSD permitting approved on March 4, 2015 (80 FR 11573). Chapter 9 of APC&EC Regulation 19 authorizes enforcement of regulations governing the prevention of significant deterioration of air quality and regulations governing the protection of visibility in mandatory Federal Class I areas. •The visibility subelement of Element J is not being addressed because EPA stated in their September 13, 2013 "Guidance on Infrastructure State Implementation Plan (SIP) Elements under Clean Air Act Sections 110(a)(1) and 110(a)(2)"[11] that they believe that there are no newly applicable visibility protection obligations pursuant to Element J after the promulgation of a new or revised NAAQS.
110(a)(2)(K) Air quality modeling/data	*provide for- (i) the performance of such air quality modeling as the Administrator may prescribe for the purpose of predicting the effect on ambient air quality of any emissions*	•APC&EC Regulation 19, Chapter 3, outlines that ADEQ is responsible for ambient air monitoring and computer modeling of regulated air pollutant emissions in any area that can reasonably be expected to be in excess of the NAAQS and review of the ambient air impacts of any new or modified source of federally regulated air emission that is the subject of the requirements of this Plan. See APC&EC Reg. 19.302(A) and (B). Under APC&EC Reg. 19.302 (B), all computer modeling shall be performed using EPA-approved models, and using averaging times commensurate with averaging times stated in the NAAQS.

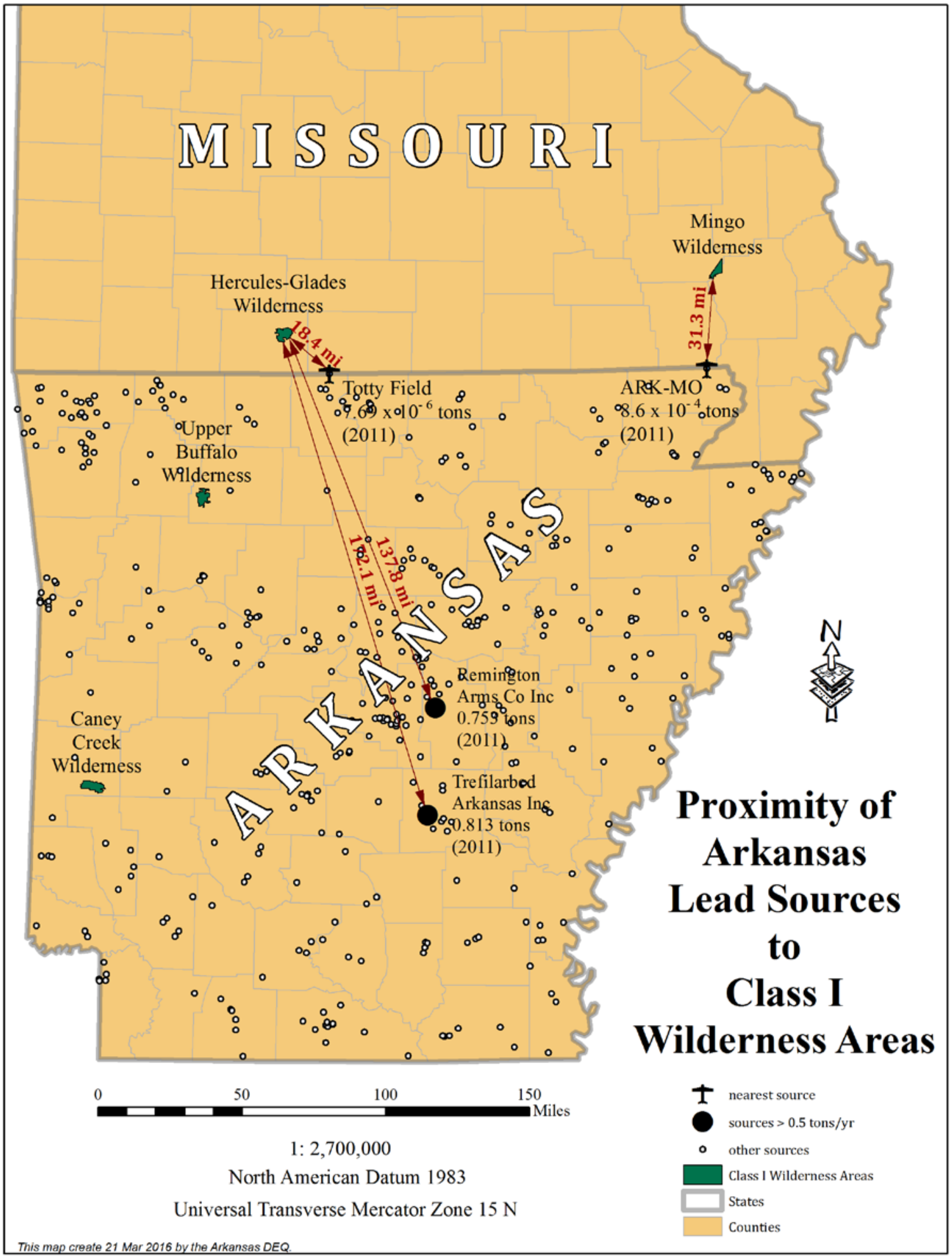
[11] EPA Guidance on Infrastructure State Implementation Plan (SIP) Elements under Clean Air Act Sections 110(a)(1) and 110(a)(2). September 13, 2013.

	of any air pollutant for which the Administrator has established a national ambient air quality standard, and (ii) the submission, upon request, of data related to such air quality modeling to the Administrator;	•ADEQ has the ability to submit data related to air quality modeling to the Administrator under Ark. Code. Ann. § 8-4-311 (a)(2) which gives ADEQ the power to advise, consult, and cooperate with the federal government.
110(a)(2)(L) Major Stationary source permitting fees	*require the owner or operator of each major stationary source to pay to the permitting authority, as a condition of any permit required under this Act, a fee sufficient to cover- (i) the reasonable costs of reviewing and acting upon any application for such a permit, and (ii) if the owner or operator receives a permit for such source, the reasonable costs of implementing and enforcing the terms and*	•The fee requirements of APC&EC Regulation 26, Chapter 11, were approved by EPA as meeting the CAA requirements and were incorporated in Arkansas's SIP. Arkansas's Title V operating permit program was approved by EPA October 9, 2001 (66 FR 51313). •ADEQ has the authority to adjust the fee as necessary using its rulemaking authority. APC&EC Regulation 9, Chapter 5, contains the air permit fees applicable to non-part 70 permits, part 70 permits, and general permits. Revisions to the air permitting fees in Chapter 5 were approved by EPA on April 30, 2015 (80 FR 24216).

	conditions of any such permit (not including any court costs or other costs associated with any enforcement action), until such fee requirement is superseded with respect to such sources by the Administrator's approval of a fee program under title V; and	
110(a)(2)(M) Consultation/ Participation by affected local entities	*provide for consultation and participation by local political subdivisions affected by the plan.*	•Pursuant to the APC&EC Regulation 8, Arkansas will continue to provide for consultation and participation from those affected by the SIP. Under Regulation 8, those organizations affected by the SIP will be able to participate in developing the SIP via comments and potential public hearings. ADEQ is the sole state-level enforcer and implementer of the SIP. See APC&EC Reg. 8.205 *Public Notice of Permit Application*; APC&EC Reg. 8.206 *Request for Public Hearing on Application for Permit*; APC&EC Reg. 8.207 *Public Notice of Draft Permitting Decision*; APC&EC Reg. 8.208 *Public Comment on Draft Permitting Decision*; APC&EC Reg. 8.209 *Public Hearings*; APC&EC Reg. 8.405 *Public Notice of Notices of Violations and Consent Administrative Orders*; APC&EC Reg. 8.801 *Public Notice of Rulemaking.* •ADEQ participates in the Central State Air ResourcesAgencies, which is an organization of states, tribes, federal agencies and other interested parties concerned with air quality. The interactions and public participation on rule and plan

		development play a role in satisfying the requirements of § 110(a)(2)(M).

Figure 1. Proximity of Arkansas Lead Sources to Federal Class I Wilderness Areas



3.4 2010 Nitrogen Dioxide (NO_2) NAAQS

The federally enforceable SIP for Arkansas is compiled in 40 C.F.R. Part 52 Subpart E § 52.170. The requirements of sections 110(a)(2)(A) – (M) of the CAA relevant to the 2010 NO_2 NAAQS are contained in this SIP. The following table summarizes where and how the requirements of sections 110(a)(2)(A) – (M) are addressed.

In this revision to the SIP, Arkansas is demonstrating that it has adequate resources and authority to implement, maintain, and enforce the 2010 NO_2 NAAQS.

110(a)(2)(A) Emission limits and other control measures	*include enforceable emission limitations and other control measures, means, or techniques (including economic incentives such as fees, marketable permits, and auctions of emissions rights), as well as schedules and timetables for compliance, as may be necessary or appropriate to meet the applicable requirements of this Act;*	•Arkansas's enforceable emission limitations and other control measures are covered in Arkansas Water and Air Pollution Control Act, Arkansas Code Annotated (Ark. Code Ann.) § 8-4-101 *et. seq*, and those provisions of the Arkansas Pollution Control and Ecology Commission (APC&EC) Regulation 19, listed in 40 C.F.R. § 52.170. •The regulations in APC&EC Regulation 19 have been duly adopted by APC&EC. Where these provisions relate to section 110 requirements, SIP revisions have been submitted to and approved by EPA. EPA-approved SIP revisions are codified at 40 C.F.R. Part 52, Subpart E. Arkansas has an EPA-approved air permitting program for both major and minor facilities, which ensures that all applicable requirements are included in the facility permit.

110(a)(2)(B) Ambient air quality monitoring and data analysis system	*provide for establishment and operation of appropriate devices, methods, systems, and procedures necessary to- (i) monitor, compile, and analyze data on ambient air quality, and (ii) upon request, make such data available to the Administrator;*	•APC&EC Reg. 19.302 grants ADEQ responsibility for ambient air monitoring and computer modeling of regulated air pollutant emissions. •Ark. Code Ann. § 8-4-311(a)(3) empowers ADEQ to encourage and conduct studies, investigations, and research relating to air pollution and its causes, prevention, control, and abatement. •Ark. Code Ann. § 8-4-311(a)(4) grants ADEQ the ability to collect and disseminate information relative to air pollution and its prevention and control. •In conjunction with the references above, Arkansas monitors air quality for NO_2 at appropriate locations throughout the state using EPA-approved methods and submits NO_2 data to the EPA's Air Quality System (AQS) consistent with EPA regulations under 40 C.F.R. Part 58. EPA has approved ADEQ's placement of NO_2 core samplers at the NCore site for ambient monitoring. •Ark. Code Ann. § 8-4-311(a)(2) gives ADEQ the ability to advise, consult, and cooperate with the federal government in furtherance of safeguarding the air resources of the state by controlling or abating air pollution and preventing new air pollution if it is in the interest of the public health and welfare of the people. See also Ark. Code Ann. § 8-4-301 and § 8-4-302. Under this authority, ADEQ submits annual monitoring network plans, consistent with EPA's ambient air monitoring regulations, which describe how ADEQ has complied with monitoring requirements and explains proposed changes to the network, if any. •Ark. Code Ann. § 8-1-202 grants the ADEQ Director authority to retain the technical and legal expertise and assistance in the field of environmental protection.
110(a)(2)(C) Program to enforce control	*include a program to provide for the enforcement of the*	•Ark. Code Ann. § 8-4-203(a)(1) authorizes ADEQ to issue, continue in effect, revoke, modify, or deny permits to prevent, control, or abate pollution. Ark. Code Ann. § 8-4-311 (a)(1) empowers ADEQ to develop and effectuate a comprehensive

measures, regulate modification and construction of stationary sources and a permit program	*measures described in subparagraph (A), and regulation of the modification and construction of any stationary source within the areas covered by the plan as necessary to assure that national ambient air quality standards are achieved, including a permit program as required in parts C and D;*	program for the prevention and control of all sources of air pollution in the State of Arkansas. •Chapter 4 of APC&EC Regulation 19 describes the regulation and permitting of the operation, modification and construction of minor stationary sources. •Chapter 9 of APC&EC Regulation 19 authorizes enforcement of regulations governing the prevention of significant deterioration (PSD) of air quality and regulations governing the protection of visibility in mandatory Federal Class I areas. •Ark. Code Ann. § 8-4-311(a)(10) empowers ADEQ to make, issue, modify, revoke, and enforce orders prohibiting, controlling or abating air pollution and requiring the adoption of remedial measures to prevent, control, or abate air pollution. •Ark. Code Ann. § 8-4-311(a)(7) empowers ADEQ to administer and enforce all laws and regulations relating to pollution of the air. •ADEQ has a complete EPA-approved PSD permitting program in place covering the required elements for all regulated New Source Review (NSR) pollutants, including greenhouse gases (GHG). EPA had previously published findings of failure to submit a PSD SIP for $PM_{2.5}$ (79 FR 29354) and imposed a Federal Implementation Plan for PSD permitting of GHG (75 FR 82246); however, ADEQ submitted SIP revisions addressing 2006 $PM_{2.5}$ PSD elements, which was approved on March 4, 2015 (80 FR 11573), and GHG PSD permitting, which was approved on April 2, 2013 (78 FR 19596). Arkansas perceives there to be no changes necessary to the PSD program to implement the 2010 NO_2 NAAQS.
110(a)(2)(D)(i) Interstate transport	*contain adequate provisions- (i) prohibiting, consistent with the provisions of*	•APC&EC Reg. 19.402 states: "No permit shall be granted or modified under this chapter unless the owner/operator demonstrates to the reasonable satisfaction of ADEQ that the stationary source will be constructed or modified to operate without resulting in a violation of applicable portions of this regulation or without interfering

provisions	*this title, any source or other type of emissions activity within the State from emitting any air pollutant in amounts which will- (I) contribute significantly to nonattainment in, or interfere with maintenance by, any other State with respect to any such national primary or secondary ambient air quality standard, or (II) interfere with measures required to be included in the applicable implementation plan for any other State under part C to prevent significant deterioration of air quality or to protect visibility,*	with the attainment or maintenance of a national ambient air quality standard." APC&EC Reg. 19.402 is consistent with these requirements as it is an Arkansas promulgated regulation that applies to all stationary sources in Arkansas. •On January 20, 2012, the EPA determined that no area in the country is in violation of the 2010 NO_2 NAAQS. Since there are no nonattainment areas in the country for this pollutant, Arkansas's NO_2 emissions cannot be significantly contributing to nonattainment in any other state. Arkansas also does not have any nonattainment areas for NO_2. Further evidence to support the Department's determination that Arkansas does not significantly contribute to nonattainment or interfere with maintenance of the 2010 NO_2 NAAQS is provided in Appendix H. •All new major sources and major modifications are subject to a comprehensive EPA-approved PSD permitting program, including Greenhouse Gas (GHG) PSD permitting approved on April 2, 2013 (78 FR 19596) and $PM_{2.5}$ PSD permitting approved on March 4, 2015 (80 FR 11573). Chapter 9 of APC&EC Regulation 19 authorizes enforcement of regulations governing the prevention of significant deterioration of air quality and regulations governing the protection of visibility in mandatory Federal Class I areas. •Arkansas is currently subject to the Regional Haze Rule, which addresses visibility-impairing pollutants. Arkansas's PSD program is used to further protect visibility. In 2008, Arkansas submitted a Regional Haze SIP and EPA partially approved and partially disapproved it on March 12, 2012. Arkansas has experienced considerable improvement in regional haze in relation to the reasonable progress goals and uniform rate of progress established in the Regional Haze SIP. The most recent data from 2015 and current five-year rolling averages show that visibility impairment in Arkansas's Federal Class I areas is decreasing more rapidly than the uniform rate of progress and 2018 reasonable progress goals submitted in the 2008 Regional Haze

		SIP.[12] •Additionally, visibility at Federal Class I areas in other states affected by Arkansas sources has improved for the least and most impaired days between 2000 and 2015. On the most impaired days, Hercules Glade, MO and Mingo, MO achieved a 2.92 deciview (dv) and 5.24 dv reduction in haziness, respectively, between the 2000 – 2004 baseline period and 2011 – 2015 analysis period. On the least impaired days, Hercules Glade, MO and Mingo, MO achieved a 2.54dv and 2.42 dv reduction in haziness, respectively, between the 2000 – 2004 baseline period and the 2011 – 2015 analysis period. Based on the visibility improvement in Class I areas in nearby states, ADEQ concludes that stationary sources in Arkansas do not significantly interfere with other states' plans to protect visibility.[13]
110(a)(2)(D)(ii) Interstate and International pollution abatement	*contain adequate provisions- (ii) insuring compliance with the applicable requirements of sections 126 and 115 (relating to interstate and international pollution abatement)*	•Ark. Code Ann. § 8-4-311(a)(8) authorizes ADEQ to represent the State in all matters pertaining to the plans, procedures, or negotiations for interstate compacts in relation to air pollution control. •Based on information gathered from ADEQ's permit database, ADEQ concludes that the limited amount of point and area source NO_2 emissions do not preclude the State from ensuring compliance with CAA § 126 and § 115. There are no final findings under § 115 of the CAA against Arkansas with respect to the 2010 NO_2 NAAQS. •All new major sources and major modifications are subject to a comprehensive EPA-approved PSD permitting program, including GHG PSD permitting approved on April 2, 2013 (78 FR 19596) and $PM_{2.5}$ PSD permitting approved on March 4, 2015 (80 FR 11573). Chapter 9 of APC&EC Regulation 19 authorizes enforcement

[12]Arkansas Regional Haze Five Year Progress Report, May 2015: https://www.adeq.state.ar.us/air/planning/pdfs/ar_5yr_prog_rep_review-final-6-2-2015.pdf; Federal Land Manager Environmental Database < http://views.cira.colostate.edu/fed/ToolsMenu.aspx>
[13]Id.

		of regulations governing the prevention of significant deterioration of air quality and regulations governing the protection of visibility in mandatory Federal Class I areas. •APC&EC Reg. 19.903 describes the notification required when dealing with a major new source or major modification.
110(a)(2)(E)(i) Adequate personnel, funding and authority to carry out plan, (ii) Comply with state boards, (iii) Oversee local and regional governments/ agencies	*provide (i) necessary assurances that the State (or, except were the Administrator deems inappropriate, the general purpose local government or governments, or a regional agency designated by the State or general purpose local government for such purpose) will have adequate personnel, funding, and authority under State (and, as appropriate, local) law to carry out such implementation plan (and is not prohibited by any provision of Federal or State law from carrying out such implementation plan or*	•Ark. Code Ann. § 8-1-103(1)(A) grants the ADEQ and the APC&EC the authority to establish by regulation, reasonable fees for initial issuance, annual review, and modification of permits. •Under Ark. Code Ann. § 8-1-103(3) and § 8-1-103(5), ADEQ is authorized to collect the fees established by APC&EC and shall deny the issuance of an initial permit, a renewal permit, or a modification permit if and when a facility fails or refuses to pay the fees after reasonable notice. •Ark. Code Ann. § 8-1-202(b)(2)(D) states that duties of the Director of ADEQ include the day-to-day administration of all activities that ADEQ is empowered by law to perform, including, but not limited to, the employment and supervision of such technical, legal, and administrative staff, within approved appropriations, as is necessary to carry out the responsibilities vested with ADEQ. •APC&EC Regulation 9, Fee Regulation, Chapter 5, contains the air permit fees applicable to non-part 70 permits, part 70 permits, and general permits. •APC&EC Reg. 19.301 gives ADEQ the responsibility of meeting all applicable regulations and requirements contained in the CAA, as amended, if any area of the State is determined to be in violation of the NAAQS. •APC&EC Reg. 19.410 gives ADEQ the authority to revoke, suspend, or modify any permit for cause. •The requirements of §110(a)(2)(E)(ii) are not entirely applicable because permit and

	portion thereof), (ii)requirements that the State comply with the requirements respecting State boards under section 128, (iii) necessary assurances that where the State has relied on a local or regional government, agency, or instrumentality for the implementation of any plan provision, the State has responsibility for ensuring adequate implementation of such plan provision;	enforcement orders are issued directly by ADEQ, not approved by state boards or commissioners. •Under APC&EC Reg. 8.202, the Director or the Director's delegate shall issue all permits with nothing in APC&EC Regulation 8 being construed to authorize APC&EC to issue a permit, including the power to reverse or affirm a permitting decision by the Director. •APC&EC Regulation 8, Chapter 4, highlights that APC&EC does not play a leading role in approving enforcement actions. •Under Ark. Code Ann. § 21-8-1001, no member of a state board or commission or board member of an entity receiving state funds shall participate in, vote on, influence or attempt to influence an official decision if the member has a pecuniary interest in the matter under consideration by the board, commission, or entity. In addition, no member of a state board or commission or board member of an entity receiving state funds shall participate in any discussion or vote on a rule or regulation that exclusively benefits the member. •Arkansas does not rely on local agencies for specific SIP implementation. The requirements of §110(a)(2)(E)(iii) are not applicable.
110(a)(2)(F) Stationary source emissions monitoring and reporting system	*require, as may be prescribed by the Administrator-- (i) the installation, maintenance, and replacement of equipment, and the implementation of other necessary steps, by*	•Regulatory requirements pertaining to sampling, monitoring, and reporting are codified in APC&EC Regulation 19, Chapter 7. •APC&EC Reg. 19.705 provides the record keeping and reporting requirements for stationary sources subject to APC&EC Regulation 19. APC&EC Reg. 19.705 outlines how records of air emissions are to be maintained and how information and data should be submitted to ADEQ. •APC&EC Reg. 19.702 provides guidelines and timelines for air emissions sampling

	owners or operators of stationary sources to monitor emissions from such sources, (ii) periodic reports on the nature and amounts of emissions and emissions-related data from such sources, and (iii) correlation of such reports by the State agency with any emission limitations or standards established pursuant to this Act, which reports shall be available at reasonable times for public inspection;	necessary to enable Arkansas to determine whether the sources are in compliance. •Enforceable emission limitations and other control measures are covered in the Arkansas Water and Air Pollution Control Act and those provisions of Ark. Code Ann. §§ 8-4-310 and 8-4-311. Elements of the program for enforcement are found in the monitoring, recordkeeping, and reporting requirements for sources in these control measures as well as individual SIP permits. •APC&EC Reg. 19.703 requires any stationary source subject to this regulation to install, calibrate, operate, and maintain equipment to continuously monitor or determine federally regulated air pollutant emissions in accordance with federal specification and in accordance with any joint specifications outlined by ADEQ, with the concurrence of EPA. •APC&EC Reg. 19.701 states that ADEQ will use any credible evidence based on sampling, monitoring, and reporting, to determine violations of applicable emissions limitations. •Under Ark. Code Ann. § 8-4-311(a)(2), ADEQ has the power to advise, consult, and cooperate with the federal government, including EPA Region 6 administrator. Arkansas submits emission inventory data annually to EPA for inclusion in the National Emissions Inventory. •APC&EC Reg. 19.706 requires public availability of emissions data.
110(a)(2)(G) Authority to declare air pollution emergency and	*provide for authority comparable to that in section 303 and adequate contingency plans to implement such*	•Ark. Code Ann. § 8-1-202(b)(2)(C) empowers the Director of ADEQ to issue orders under circumstances that reasonably require emergency measures to be taken to protect the environment or the public health and safety. APC&EC Reg. 8.502 gives the Director the ability to issue an Emergency Order when necessary to meet an emergency or situation of imminent hazard. APC&EC Reg. 8.502 requires the Director to publish a Notice of Emergency Order in a newspaper covering the

notify public	*authority;*	affected area, or in a newspaper of statewide circulation. The notice must contain a description of the action, ADEQ's authority for taking the action and other information appropriate to ensure the public is informed about the action. •Ark. Code Ann. § 8-4-202(e)(1) empowers APC&EC to declare an emergency and implement emergency rules, regulations, suspensions, or moratoria on categories or types of permits if APC&EC determines that imminent peril to the public health, safety, or welfare requires immediate change in the rules or immediate suspension or moratorium on categories or types of permits. •APC&EC Reg. 8.807 authorizes APC&EC to waive or reduce the notice requirements in cases involving emergency rulemaking. No emergency rule shall be effective for more than one hundred eighty (180) days unless allowed by law.
110(a)(2)(H) Future SIP revisions	*provide for revision of such plan- (i) from time to time as may be necessary to take account of revisions of such national primary or secondary ambient air quality standard or the availability of improved or more expeditious methods of attaining such standard, and (ii) except as provided in paragraph (3)(C), whenever the Administrator finds on*	•APC&EC Regulation 19, Chapter 1, provides a clear delineation of those regulations that are promulgated by APC&EC in satisfaction of certain requirements of the CAA, including making ADEQ responsible for administering the attainment and maintenance of the NAAQS. •Ark. Code Ann. § 8-4-311(a)(7) empowers ADEQ to administer and enforce all laws and regulations relating to pollution of the air. •Ark. Code Ann. § 8-4-202(d)(4)(A)(ii) authorizes APC&EC to refer to the Code of Federal Regulations for any APC&EC standard or regulation that is identical to a regulation promulgated by EPA. •Under APC&EC Regulation 19, Chapter 3, ADEQ is charged with the protection of the NAAQS. According to APC&EC Reg. 19.301 , if any area of the State is determined to be in violation of the NAAQS, all applicable requirements contained in the CAA, as amended, and all regulations promulgated thereto shall be met by

	the basis of information available to the Administrator that the plan is substantially inadequate to attain the national ambient air quality standard which it implements or to otherwise comply with any additional requirements established under this Act;	ADEQ.
110(a)(2)(I) Nonattainment areas (interstate transport)	*in the case of a plan or plan revision for an area designated as a nonattainment area, meet the applicable requirements of part D (relating to nonattainment areas);*	•Arkansas's nonattainment area plans required under part D are on a different schedule from the section 110 infrastructure elements. Currently, Arkansas does not have any area designated nonattainment for NO_2.
110(a)(2)(J) (§ 121 consultation), (§127 public notification), PSD and visibility protection	*meet the applicable requirements of section 121 (relating to consultation), meet the applicable requirements of section 127 (relating to public notification), meet the applicable*	•Ark. Code Ann. § 8-4-301(b) prescribes a method of utilizing the program for the control of air pollution. Under Ark. Code Ann. § 8-4-301(b), the program shall be undertaken in a progressive manner, and each of its successive objectives shall be sought to be accomplished by a maximum of cooperation and conciliation among all the parties concerned. In addition, Ark. Code Ann. § 8-4-302 reiterates Ark. Code Ann. § 8-4-301(b) by affirming that the purpose is to safeguard the air resources of the State by controlling or abating air pollution that exists and preventing new air pollution under a program which shall be consistent with the declaration of policy

	requirements of part C (relating to prevention of significant deterioration of air quality and visibility protection);	stated in Ark. Code Ann. § 8-4-301 and with Ark. Code Ann. Title 8, Chapter 4, Subchapter 3. •All SIP revisions in Arkansas undergo public notice and hearing, which provides for comment by the public. •Air quality data from Arkansas's monitoring network is published on ADEQ's website. Additionally, Arkansas is required to submit monitoring data to the Air Quality System in a timely manner. •Ark. Code Ann. § 8-4-311(a)(6) encourages voluntary cooperation by the people, municipalities, counties, industries, and others in preserving and restoring the purity of the air within the State. •Under APC&EC Regulation 19, Chapter 9, Arkansas has incorporated by reference the requirements in 40 C.F.R. Part 52 for PSD in their entirety, with the exception of 40 C.F.R. §§ 52.21(b)(2)(iii)(a), 52.21(b)(49), 52.21(b)(50), 40 C.F.R. § 52.21(b)(55-58), 40 C.F.R. § 52.21(i) and 40 C.F.R. § 52.21(cc). These provisions were approved by EPA as part of the SIP. These incorporated provisions also provide for protection of visibility in Federal Class I areas. •All new major sources and major modifications are subject to a comprehensive EPA-approved PSD permitting program, including GHG PSD permitting approved on April 2, 2013 (78 FR 19596) and $PM_{2.5}$ PSD permitting approved on March 4, 2015 (80 FR 11573). Chapter 9 of APC&EC Regulation 19 authorizes enforcement of regulations governing the prevention of significant deterioration of air quality and regulations governing the protection of visibility in mandatory Federal Class I areas. •The visibility subelement of Element J is not being addressed because EPA stated in

		their September 13, 2013 "Guidance on Infrastructure State Implementation Plan (SIP) Elements under Clean Air Act Sections 110(a)(1) and 110(a)(2)"[14] that they believe that there are no newly applicable visibility protection obligations pursuant to Element J after the promulgation of a new or revised NAAQS.
110(a)(2)(K) Air quality modeling/data	*provide for- (i) the performance of such air quality modeling as the Administrator may prescribe for the purpose of predicting the effect on ambient air quality of any emissions of any air pollutant for which the Administrator has established a national ambient air quality standard, and (ii) the submission, upon request, of data related to such air quality modeling to the Administrator;*	•APC&EC Regulation 19, Chapter 3, outlines that ADEQ is responsible for ambient air monitoring and computer modeling of regulated air pollutant emissions in any area that can reasonably be expected to be in excess of the NAAQS and review of the ambient air impacts of any new or modified source of federally regulated air emission that is the subject of the requirements of this Plan. See APC&EC Reg. 19.302(A) and (B). Under APC&EC Reg. 19.302 (B), all computer modeling shall be performed using EPA-approved models, and using averaging times commensurate with averaging times stated in the NAAQS. •ADEQ has the ability to submit data related to air quality modeling to the Administrator under Ark. Code Ann. § 8-4-311 (a)(2) which gives ADEQ the power to advise, consult, and cooperate with the federal government.
110(a)(2)(L) Major Stationary	*require the owner or operator of each major*	•The fee requirements of APC&EC Regulation 26, Chapter 11, were approved by EPA as meeting the CAA requirements and were incorporated in Arkansas's SIP.

[14] EPA Guidance on Infrastructure State Implementation Plan (SIP) Elements under Clean Air Act Sections 110(a)(1) and 110(a)(2). September 13, 2013.

source permitting fees	*stationary source to pay to the permitting authority, as a condition of any permit required under this Act, a fee sufficient to cover- (i) the reasonable costs of reviewing and acting upon any application for such a permit, and (ii) if the owner or operator receives a permit for such source, the reasonable costs of implementing and enforcing the terms and conditions of any such permit (not including any court costs or other costs associated with any enforcement action), until such fee requirement is superseded with respect to such sources by the Administrator's approval of a fee program under title V; and*	Arkansas's Title V operating permit program was approved by EPA October 9, 2001 (66 FR 51313). •ADEQ has the authority to adjust the fee as necessary using its rulemaking authority. APC&EC Regulation 9, Chapter 5, contains the air permit fees applicable to non-part 70 permits, part 70 permits, and general permits. Revisions to air permitting fee in Chapter 5 were approved by EPA on April 30, 2015 (80 FR 24216).

110(a)(2)(M) Consultation/ Participation by affected local entities	*provide for consultation and participation by local political subdivisions affected by the plan.*	•Pursuant to APC&EC Regulation 8, Arkansas will continue to provide for consultation and participation from those affected by the SIP. Under APC&EC Regulation 8, those organizations affected by the SIP will be able to participate in developing the SIP via comments and potential public hearings. ADEQ is the sole state-level enforcer and implementer of the SIP. See APC&EC Reg. 8.205 *Public Notice of Permit Application*; APC&EC Reg. 8.206 *Request for Public Hearing on Application for Permit*; APC&EC Reg. 8.207 *Public Notice of Draft Permitting Decision*; APC&EC Reg. 8.208 *Public Comment on Draft Permitting Decision*; APC&EC Reg. 8.209 *Public Hearings*; APC&EC Reg. 8.405 *Public Notice of Notices of Violations and Consent Administrative Orders*; APC&EC Reg. 8.801 *Public Notice of Rulemaking.* •ADEQ participates in the Central States Air Resources Agencies, which is an organization of states, tribes, federal agencies and other interested parties concerned with air quality. The interactions and public participation on rule and plan development play a role in satisfying the requirements of § 110(a)(2)(M).

3.5 2010 Sulfur Dioxide (SO_2) NAAQS

The federally enforceable SIP for Arkansas is compiled in 40 C.F.R. Part 52 Subpart E § 52.170. The requirements of sections 110(a)(2)(A) – (M) of the CAA relevant to the SO_2 NAAQS are included in this SIP submittal. The following table summarizes where and how the requirements of sections 110(a)(2)(A) – (M) are addressed.

In this revision to the SIP, Arkansas is demonstrating that it has adequate resources and authority to implement, maintain, and enforce the 2010 SO_2 NAAQS.

110(a)(2)(A) Emission limits and other control measures	*include enforceable emission limitations and other control measures, means, or techniques (including economic incentives such as fees, marketable permits, and auctions of emissions rights), as well as schedules and timetables for compliance, as may be necessary or appropriate to meet the applicable requirements of this Act;*	•Arkansas's enforceable emission limitations and other control measures are covered in Arkansas Water and Air Pollution Control Act, Arkansas Code Annotated (Ark. Code Ann.) § 8-4-101 *et. seq*, and those provisions of Arkansas Pollution Control & Ecology Commission (APC&EC) Regulation 19, listed in 40 C.F.R. § 52.170. • The regulations in APC&EC Regulation 19 have been duly adopted by APC&EC. Where these provisions relate to section 110 requirements, SIP revisions have been submitted to and approved by EPA. EPA-approved SIP revisions are codified at 40 C.F.R. Part 52, Subpart E. Arkansas has an EPA-approved air permitting program for both major and minor facilities, which ensures that all applicable requirements are included in the facility permit.
110(a)(2)(B) Ambient air quality monitoring and	*provide for establishment and operation of appropriate devices, methods,*	•APC&EC Reg. 19.302 grants ADEQ responsibility for ambient air monitoring and computer modeling of regulated air pollutant emissions. •Ark. Code Ann. § 8-4-311(a)(3) empowers ADEQ to encourage and conduct studies, investigations, and research relating to air pollution and its causes,

data analysis system	*systems, and procedures necessary to- (i) monitor, compile, and analyze data on ambient air quality, and (ii) upon request, make such data available to the Administrator;*	prevention, control, and abatement. •Ark. Code Ann. § 8-4-311(a)(4) grants ADEQ the ability to collect and disseminate information relative to air pollution and its prevention and control. •In conjunction with the references above, Arkansas monitors air quality for SO_2 at appropriate locations throughout the state using EPA-approved methods and submits SO_2 data to the EPA's Air Quality System (AQS) consistent with EPA regulations under 40 C.F.R. Part 58. •Ark. Code Ann. § 8-4-311(a)(2) gives ADEQ the ability to advise, consult, and cooperate with the federal government in furtherance of safeguarding the air resources of the State by controlling or abating air pollution and preventing new air pollution if it is in the interest of the public health and welfare of the people. See also Ark. Code Ann. § 8-4-301 and § 8-4-302. Under this authority, ADEQ submits annual monitoring network plans, consistent with EPA's ambient air monitoring regulations, which describe how ADEQ has complied with monitoring requirements and explains proposed changes to the network, if any. •Ark. Code Ann. § 8-1-202 grants the ADEQ Director authority to retain the technical and legal expertise and assistance in the field of environmental protection.
110(a)(2)(C) Program to enforce control measures, regulate modification and construction of stationary sources and a permit	*include a program to provide for the enforcement of the measures described in subparagraph (A), and regulation of the modification and construction of any stationary source within*	•Ark. Code Ann. § 8-4-203(a)(1) authorizes ADEQ to issue, continue in effect, revoke, modify, or deny permits to prevent, control, or abate pollution. Ark. Code Ann. § 8-4-311 (a)(1) empowers ADEQ to develop and effectuate a comprehensive program for the prevention and control of all sources of air pollution in the State of Arkansas. •Chapter 4 of APC&EC Regulation 19 describes the regulation and permitting of the operation, modification, and construction of minor stationary sources.

program	*the areas covered by the plan as necessary to assure that national ambient air quality standards are achieved, including a permit program as required in parts C and D;*	•Chapter 9 of APC&EC Regulation 19 authorizes enforcement of regulations governing the prevention of significant deterioration (PSD) of air quality and regulations governing the protection of visibility in mandatory Federal Class I areas. •Ark. Code Ann. § 8-4-311(a)(10) empowers ADEQ to make, issue, modify, revoke, and enforce orders prohibiting, controlling or abating air pollution and requiring the adoption of remedial measures to prevent, control, or abate air pollution. •Ark. Code Ann. § 8-4-311(a)(7) empowers ADEQ to administer and enforce all laws and regulations relating to pollution of the air. •ADEQ has a complete EPA-approved PSD permitting program in place covering the required elements for all regulated New Source Review (NSR) pollutants, including greenhouse gases (GHG). EPA had previously published findings of failure to submit a PSD SIP for $PM_{2.5}$ (79 FR 29354) and imposed a Federal Implementation Plan for PSD permitting of GHG (75 FR 82246); however, ADEQ submitted SIP revisions addressing 2006 $PM_{2.5}$ PSD elements, which was approved on March 4, 2015 (80 FR 11573), and GHG PSD permitting, which was approved on April 2, 2013 (78 FR 19596). Arkansas perceives there to be no changes necessary to the PSD program to implement the SO_2 NAAQS.
110(a)(2)(D)(i) Interstate transport provisions	*contain adequate provisions- (i) prohibiting, consistent with the provisions of this title, any source or other type of emissions activity within the State from emitting any air pollutant in amounts*	•APC&EC Reg. 19.402 states: "No permit shall be granted or modified under this chapter unless the owner/operator demonstrates to the reasonable satisfaction of ADEQ that the stationary source will be constructed or modified to operate without resulting in a violation of applicable portions of this regulation or without interfering with the attainment or maintenance of a national ambient air quality standard." APC&EC Reg. 19.402 is consistent with these requirements as it is an Arkansas promulgated regulation that applies to all stationary sources in Arkansas. •In EPA's initial round of SO_2 nonattainment designations (78 FR 47191), counties in three neighboring states—Jackson County, MO (partial); Jefferson County MO

	which will- (I) contribute significantly to nonattainment in, or interfere with maintenance by, any other State with respect to any such national primary or secondary ambient air quality standard, or (II) interfere with measures required to be included in the applicable implementation plan for any other State under part C to prevent significant deterioration of air quality or to protect visibility,	(partial); Sullivan County, TN (partial); and St. Bernard Parish, LA (whole county)—were designated as nonattainment for the 2010 SO_2 NAAQS. The nearest nonattainment area for the 2010 SO_2 NAAQS is approximately 104 miles from the Arkansas border and over 150 miles from any major SO_2 source in Arkansas.[15] In EPA's memorandum "Additional Clarification Regarding Application of Appendix W Modeling Guidance for the 1-hour NO_2 National Ambient Air Quality Standard" issued on March 1, 2011, EPA indicates that SO_2 as a directly emitted unreacted pollutant causes relatively localized health impacts and that the maximum concentrations can be expected to be observed within 1 – 2 miles of some large power plants and other facilities. Given that the nearest nonattainment area for the 2010 SO_2 NAAQS is over 150 miles away from any major SO_2 source in Arkansas, ADEQ concludes that sources in Arkansas do not contribute to nonattainment or interfere with maintenance of the 2010 SO_2 NAAQS in other states. Further evidence to support the Department's determination that Arkansas does not significantly contribute to nonattainment or interfere with maintenance of the 2010 SO_2 NAAQS in other states is provided in Appendix H. •All new major sources and major modifications are subject to a comprehensive EPA-approved PSD permitting program, including GHG PSD permitting approved on April 2, 2013 (78 FR 19596) and $PM_{2.5}$ PSD permitting approved on March 4, 2015 (80 FR 11573). Chapter 9 of APC&EC Regulation 19 authorizes enforcement of regulations governing the prevention of significant deterioration of air quality and regulations governing the protection of visibility in mandatory Federal Class I areas. ••Arkansas is currently subject to the Regional Haze Rule, which addresses visibility-impairing pollutants. Arkansas's PSD program is used to further protect visibility. In 2008, Arkansas submitted a Regional Haze SIP and EPA partially approved and

[15] Proximity of Arkansas SO_2 Sources to Nonattainment Areas Map (attached after the 2010 SO_2 NAAQS Infrastructure State Implementation Plan table)
EPA 2011 National Emission Inventory version 2

		partially disapproved it on March 12, 2012. Arkansas has experienced considerable improvement in regional haze in relation to the reasonable progress goals and uniform rate of progress established in the Regional Haze SIP. The most recent data from 2015 and current five-year rolling averages show that visibility impairment in Arkansas's Federal Class I areas is decreasing more rapidly than the uniform rate of progress and 2018 reasonable progress goals submitted in the 2008 Regional Haze SIP.[16] •Additionally, visibility at Federal Class I areas in other states affected by Arkansas sources has improved for the least and most impaired days between 2000 and 2015. On the most impaired days, Hercules Glade, MO and Mingo, MO achieved a 2.92 deciview (dv) and 5.24 dv reduction in haziness, respectively, between the 2000 – 2004 baseline period and 2011 – 2015 analysis period. On the least impaired days, Hercules Glade, MO and Mingo, MO achieved a 2.54dv and 2.42 dv reduction in haziness, respectively, between the 2000 – 2004 baseline period and the 2011 – 2015 analysis period. Based on the visibility improvement in Class I areas in nearby states, ADEQ concludes that stationary sources in Arkansas do not significantly interfere with other states' plans to protect visibility.[17]
110(a)(2)(D)(ii) Interstate and International pollution abatement	*contain adequate provisions- (ii) insuring compliance with the applicable requirements of sections 126 and 115 (relating to interstate and international*	•Ark. Code Ann. § 8-4-311(a)(8) authorizes ADEQ to represent the State in all matters pertaining to the plans, procedures, or negotiations for interstate compacts in relation to air pollution control. •Based on information gathered from ADEQ's permit database, ADEQ concludes that the limited amount of point and area source SO_2 emissions do not preclude the State from ensuring compliance with CAA § 126 and § 115. There are no final findings under § 115 of the CAA against Arkansas with respect to the 2010 SO_2

[16]Arkansas Regional Haze Five Year Progress Report, May 2015: https://www.adeq.state.ar.us/air/planning/pdfs/ar_5yr_prog_rep_review-final-6-2-2015.pdf; Federal Land Manager Environmental Database < http://views.cira.colostate.edu/fed/ToolsMenu.aspx>
[17]Id.

	pollution abatement)	NAAQS. •All new major sources and major modifications are subject to a comprehensive EPA-approved PSD permitting program, including GHG PSD permitting approved on April 2, 2013 (78 FR 19596) and $PM_{2.5}$ PSD permitting approved on March 4, 2015 (80 FR 11573). Chapter 9 of APC&EC Regulation 19 authorizes enforcement of regulations governing the prevention of significant deterioration of air quality and regulations governing the protection of visibility in mandatory Federal Class I areas. •APC&EC Reg. 19.903 describes the notification required when dealing with a major new source or major modification.
110(a)(2)(E)(i) Adequate personnel, funding and authority to carry out plan, (ii) Comply with state boards, (iii) Oversee local and regional governments/ agencies	*provide (i) necessary assurances that the State (or, except were the Administrator deems inappropriate, the general purpose local government or governments, or a regional agency designated by the State or general purpose local government for such purpose) will have adequate personnel, funding, and authority under State (and, as appropriate, local) law to carry out such*	•Ark. Code Ann. § 8-1-103(1)(A) grants ADEQ and APC&EC the authority to establish by regulation, reasonable fees for initial issuance, annual review, and modification of permits. •Under Ark. Code Ann. § 8-1-103(3) and § 8-1-103(5), ADEQ is authorized to collect the fees established by APC&EC and shall deny the issuance of an initial permit, a renewal permit, or a modification permit if and when a facility fails or refuses to pay the fees after reasonable notice. •Ark. Code Ann. § 8-1-202(b)(2)(D) states that duties of the Director of ADEQ include the day-to-day administration of all activities that ADEQ is empowered by law to perform, including, but not limited to, the employment and supervision of such technical, legal, and administrative staff, within approved appropriations, as is necessary to carry out the responsibilities vested with ADEQ. •APC&EC Regulation 9, Fee Regulation, Chapter 5, contains the air permit fees applicable to non-part 70 permits, part 70 permits, and general permits. •APC&EC Reg. 19.301 gives ADEQ the responsibility of meeting all applicable

	implementation plan (and is not prohibited by any provision of Federal or State law from carrying out such implementation plan or portion thereof), (ii)requirements that the State comply with the requirements respecting State boards under section 128, (iii) necessary assurances that where the State has relied on a local or regional government, agency, or instrumentality for the implementation of any plan provision, the State has responsibility for ensuring adequate implementation of such plan provision;	regulations and requirements contained in the CAA, as amended, if any area of the State is determined to be in violation of the NAAQS. •APC&EC Reg. 19.410 gives ADEQ the authority to revoke, suspend, or modify any permit for cause. •The requirements of §110(a)(2)(E)(ii) are not entirely applicable because permit and enforcement orders are issued directly by ADEQ, not approved by state boards or commissioners. •Under APC&EC Reg. 8.202, the Director or the Director's delegate shall issue all permits with nothing in APC&EC Regulation 8 being construed to authorize APC&EC to issue a permit, including the power to reverse or affirm a permitting decision by the Director. •APC&EC Regulation 8, Chapter 4, highlights that APC&EC does not play a leading role in approving enforcement actions. •Under Ark. Code Ann. § 21-8-1001, no member of a state board or commission or board member of an entity receiving state funds shall participate in, vote on, influence or attempt to influence an official decision if the member has a pecuniary interest in the matter under consideration by the board, commission, or entity. In addition, no member of a state board or commission or board member of an entity receiving state funds shall participate in any discussion or vote on a rule or regulation that exclusively benefits the member. •Arkansas does not rely on local agencies for specific SIP implementation. The requirements of § 110(a)(2)(E)(iii) are not applicable.
110(a)(2)(F) Stationary source	*require, as may be prescribed by the*	•Regulatory requirements pertaining to sampling, monitoring, and reporting are codified in APC&EC Regulation 19, Chapter 7.

emissions monitoring and reporting system	*Administrator-- (i) the installation, maintenance, and replacement of equipment, and the implementation of other necessary steps, by owners or operators of stationary sources to monitor emissions from such sources, (ii) periodic reports on the nature and amounts of emissions and emissions-related data from such sources, and (iii) correlation of such reports by the State agency with any emission limitations or standards established pursuant to this Act, which reports shall be available at reasonable times for public inspection;*	•APC&EC Reg. 19.705 provides the record keeping and reporting requirements for stationary sources subject to APC&EC Regulation 19. APC&EC Reg. 19.705 outlines how records of air emissions are to be maintained and how information and data should be submitted to ADEQ. •APC&EC Reg. 19.702 provides guidelines and timelines for air emissions sampling necessary to enable Arkansas to determine whether the sources are in compliance. •Enforceable emission limitations and other control measures are covered in the Arkansas Water and Air Pollution Control Act and those provisions of Ark. Code Ann. §§ 8-4-310 and 8-4-311. Elements of the program for enforcement are found in the monitoring, recordkeeping and reporting requirements for sources in these control measures as well as individual SIP permits. •APC&EC Reg. 19.703 requires any stationary source subject to this regulation to install, calibrate, operate, and maintain equipment to continuously monitor or determine federally regulated air pollutant emissions in accordance with federal specification and in accordance with any joint specifications outlined by ADEQ, with the concurrence of EPA. •APC&EC Reg. 19.701 states that ADEQ will use any credible evidence based on sampling, monitoring, and reporting to determine violations of applicable emissions limitations. •Under Ark. Code Ann. § 8-4-311(a)(2), ADEQ has the power to advise, consult, and cooperate with the federal government, including the EPA Region 6 administrator. Arkansas submits emission inventory data annually to EPA for inclusion in the National Emissions Inventory. •APC&EC Reg. 19.706 requires public availability of emissions data.

110(a)(2)(G) Authority to declare air pollution emergency and notify public	*provide for authority comparable to that in section 303 and adequate contingency plans to implement such authority;*	•Ark. Code Ann. § 8-1-202(b)(2)(C) empowers the Director of ADEQ to issue orders under circumstances that reasonably require emergency measures to be taken to protect the environment or the public health and safety. APC&EC Reg. 8.502 gives the Director the ability to issue an Emergency Order when necessary to meet an emergency or situation of imminent hazard. APC&EC Reg. 8.502 requires the Director to publish a Notice of Emergency Order in a newspaper covering the affected area, or in a newspaper of statewide circulation. The notice must contain a description of the action, ADEQ's authority for taking the action and other information appropriate to ensure the public is informed about the action. •Ark. Code Ann. § 8-4-202(e)(1) empowers APC&EC to declare an emergency and implement emergency rules, regulations, suspensions, or moratoria on categories or types of permits if APC&EC determines that imminent peril to the public health, safety, or welfare requires immediate change in the rules or immediate suspension or moratorium on categories or types of permits. •APC&EC Reg. 8.807 authorizes APC&EC to waive or reduce the notice requirements in cases involving emergency rulemaking. No emergency rule shall be effective for more than one hundred eighty (180) days unless allowed by law.
110(a)(2)(H) Future SIP revisions	*provide for revision of such plan- (i) from time to time as may be necessary to take account of revisions of such national primary or secondary ambient air quality standard or the availability of improved or more expeditious*	•APC&EC Regulation 19, Chapter 1, provides a clear delineation of those regulations that are promulgated by APC&EC in satisfaction of certain requirements of the CAA, including making ADEQ responsible for administering the attainment and maintenance of the NAAQS. •Ark. Code Ann. § 8-4-311(a)(7) empowers ADEQ to administer and enforce all laws and regulations relating to pollution of the air. •Ark. Code Ann. § 8-4-202(d)(4)(A)(ii) authorizes APC&EC to refer to the Code of Federal Regulations for any APC&EC standard or regulation that is identical to a

	methods of attaining such standard, and (ii) except as provided in paragraph (3)(C), whenever the Administrator finds on the basis of information available to the Administrator that the plan is substantially inadequate to attain the national ambient air quality standard which it implements or to otherwise comply with any additional requirements established under this Act;	regulation promulgated by EPA. •Under APC&EC Regulation 19, Chapter 3, ADEQ is charged with the protection of the NAAQS. According to APC&EC Reg. 19.301, if any area of the State is determined to be in violation of the NAAQS, all applicable requirements contained in the CAA, as amended, and all regulations promulgated thereto shall be met by ADEQ.
110(a)(2)(I) Nonattainment areas (interstate transport)	*in the case of a plan or plan revision for an area designated as a nonattainment area, meet the applicable requirements of part D (relating to nonattainment areas);*	•Arkansas's nonattainment area plans required under part D are on a different schedule from the section 110 infrastructure elements. Currently, Arkansas does not have any area designated nonattainment for SO_2.
110(a)(2)(J) (§ 121 consultation),	*meet the applicable requirements of section*	•Ark. Code Ann. § 8-4-301(b) prescribes a method of utilizing the program for the control of air pollution. Under Ark. Code Ann. § 8-4-301(b), the program shall be

(§127 public notification), PSD and visibility protection	*121 (relating to consultation), meet the applicable requirements of section 127 (relating to public notification), meet the applicable requirements of part C (relating to prevention of significant deterioration of air quality and visibility protection);*	undertaken in a progressive manner, and each of its successive objectives shall be sought to be accomplished by a maximum of cooperation and conciliation among all the parties concerned. In addition, Ark. Code Ann. § 8-4-302 reiterates Ark. Code Ann. § 8-4-301(b) by affirming that the purpose is to safeguard the air resources of the State by controlling or abating air pollution that exists and preventing new air pollution under a program which shall be consistent with the declaration of policy stated in Ark. Code Ann. § 8-4-301 and with Ark. Code Ann. Title 8, Chapter 4, Subchapter 3. •All SIP revisions in Arkansas undergo public notice and hearing, which provides for comment by the public. •Air quality data from Arkansas's monitoring network is published on ADEQ's website. Additionally, Arkansas is required to submit monitoring data to the Air Quality System in a timely manner. •Ark. Code Ann. § 8-4-311(a)(6) encourages voluntary cooperation by the people, municipalities, counties, industries, and others in preserving and restoring the purity of the air within the State. •Under APC&EC Regulation 19, Chapter 9, Arkansas has incorporated by reference the requirements in 40 C.F.R. §§ 52.21(b)(2)(iii)(a), 52.21(b)(49), 52.21(b)(50), 52.21(b)(55-58), 52.21(i) and 52.21(cc). These provisions were approved by EPA as part of the SIP. These incorporated provisions also provide for protection of visibility in Federal Class I areas. •All new major sources and major modifications are subject to a comprehensive EPA-approved PSD permitting program, including GHG PSD permitting approved on April 2, 2013 (78 FR 19596) and $PM_{2.5}$ PSD permitting approved on March 4, 2015 (80 FR 11573). Chapter 9 of APC&EC Regulation 19 authorizes enforcement of regulations governing the prevention of significant deterioration of air quality and

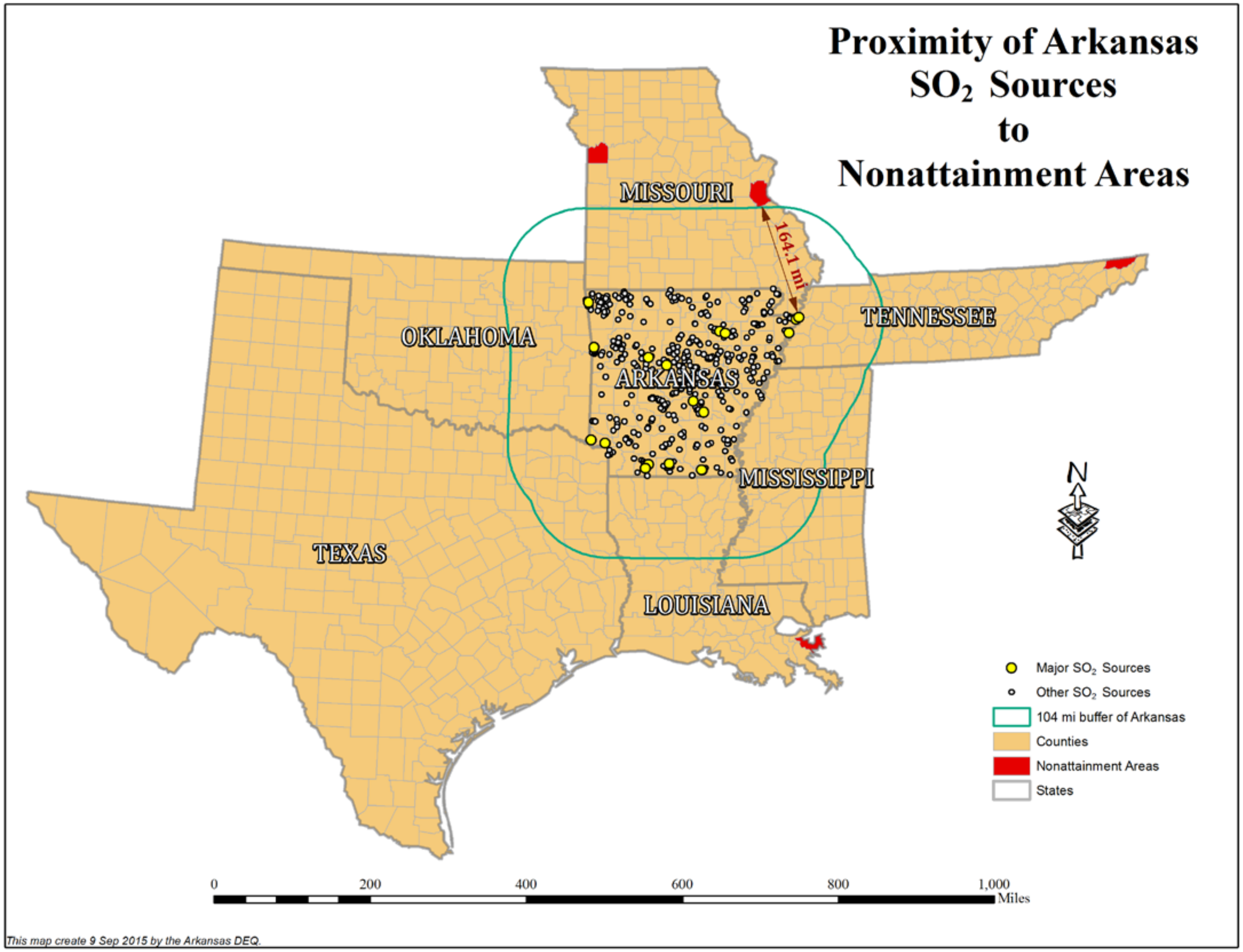
		regulations governing the protection of visibility in mandatory Federal Class I areas. •The visibility subelement of Element J is not being addressed because EPA stated in their September 13, 2013 "Guidance on Infrastructure State Implementation Plan (SIP) Elements under Clean Air Act Sections 110(a)(1) and 110(a)(2)"[18] that they believe that there are no newly applicable visibility protection obligations pursuant to Element J after the promulgation of a new or revised NAAQS.
110(a)(2)(K) Air quality modeling/data	*provide for- (i) the performance of such air quality modeling as the Administrator may prescribe for the purpose of predicting the effect on ambient air quality of any emissions of any air pollutant for which the Administrator has established a national ambient air quality standard, and (ii) the submission, upon request, of data related to such air quality modeling to the Administrator;*	•APC&EC Regulation 19, Chapter 3, outlines that ADEQ is responsible for ambient air monitoring and computer modeling of regulated air pollutant emissions in any area that can reasonably be expected to be in excess of the NAAQS and review of the ambient air impacts of any new or modified source of federally regulated air emission that is the subject of the requirements of this Plan. See APC&EC Reg. 19.302(A) and (B). Under APC&EC Reg. 19.302 (B), all computer modeling shall be performed using EPA-approved models, and using averaging times commensurate with averaging times stated in the NAAQS. •ADEQ has the ability to submit data related to air quality modeling to the Administrator under Ark. Code Ann. § 8-4-311 (a)(2) which gives ADEQ the power to advise, consult, and cooperate with the federal government.
110(a)(2)(L)	*require the owner or*	•The fee requirements of APC&EC Regulation 26, Chapter 11, were approved by

[18] EPA Guidance on Infrastructure State Implementation Plan (SIP) Elements under Clean Air Act Sections 110(a)(1) and 110(2). September 13, 2013.

Major Stationary source permitting fees	*operator of each major stationary source to pay to the permitting authority, as a condition of any permit required under this Act, a fee sufficient to cover- (i) the reasonable costs of reviewing and acting upon any application for such a permit, and (ii) if the owner or operator receives a permit for such source, the reasonable costs of implementing and enforcing the terms and conditions of any such permit (not including any court costs or other costs associated with any enforcement action), until such fee requirement is superseded with respect to such sources by the Administrator's approval of a fee program under*	EPA as meeting the CAA requirements and were incorporated in Arkansas's SIP. Arkansas's Title V operating permit program was approved by EPA October 9, 2001 (66 FR 51313). •ADEQ has the authority to adjust the fee as necessary using its rulemaking authority. APC&EC Regulation 9, Chapter 5, contains the air permit fees applicable to non-part 70 permits, part 70 permits, and general permits. Revisions to air permitting fee in Chapter 5 were approved by EPA on April 30, 2015 (80 FR 24216).

	title V; and	
110(a)(2)(M) Consultation/ Participation by affected local entities	*provide for consultation and participation by local political subdivisions affected by the plan.*	•Pursuant to APC&EC Regulation 8, Arkansas will continue to provide for consultation and participation from those affected by the SIP. Under APC&EC Regulation 8, those organizations affected by the SIP will be able to participate in developing the SIP via comments and potential public hearings. ADEQ is the sole state-level enforcer and implementer of the SIP. See APC&EC Reg. 8.205 *Public Notice of Permit Application*; APC&EC Reg. 8.206 *Request for Public Hearing on Application for Permit*; APC&EC Reg. 8.207 *Public Notice of Draft Permitting Decision*; APC&EC Reg. 8.208 *Public Comment on Draft Permitting Decision*; APC&EC Reg. 8.209 *Public Hearings*; APC&EC Reg. 8.405 *Public Notice of Notices of Violations and Consent Administrative Orders*; APC&EC Reg. 8.801 *Public Notice of Rulemaking.* •ADEQ participates in the Central State Air Resources Agencies, which is an organization of states, tribes, federal agencies and other interested parties concerned with air quality. The interactions and public participation on rule and plan development play a role in satisfying the requirements of § 110(a)(2)(M).

Figure 2. Proximity of Arkansas SO_2 Sources to Nonattainment Areas



3.6 2012 Particulate Matter less than 2.5 Micrometers in Diameter ($PM_{2.5}$) NAAQS

The federally enforceable SIP for Arkansas is compiled in 40 C.F.R. Part 52 Subpart E § 52.170. The requirements of sections 110(a)(2)(A) – (M) of the CAA relevant to the 2012 $PM_{2.5}$ NAAQS are included in this SIP submittal. The following table summarizes where and how the requirements of sections 110(a)(2)(A) – (M) are addressed.

In this revision to the SIP, Arkansas is demonstrating that it has adequate resources and authority to implement, maintain, and enforce the 2012 $PM_{2.5}$ NAAQS.

110(a)(2)(A) Emission limits and other control measures	*include enforceable emission limitations and other control measures, means, or techniques (including economic incentives such as fees, marketable permits, and auctions of emissions rights), as well as schedules and timetables for compliance, as may be necessary or appropriate to meet the applicable requirements of this Act;*	•Arkansas's enforceable emission limitations and other control measures are covered in Arkansas Water and Air Pollution Control Act, Arkansas Code Annotated (Ark. Code Ann.) § 8-4-101 *et. seq*, and those provisions of Arkansas Pollution Control & Ecology Commission (APC&EC) Regulation 19, listed in 40 C.F.R. § 52.170. •The regulations in APC&EC Regulation 19 have been duly adopted by APC&EC. Where these provisions relate to section 110 requirements, SIP revisions have been submitted to and approved by EPA. EPA-approved SIP revisions are codified at 40 C.F.R. Part 52, Subpart E. Arkansas has an EPA-approved air permitting program for both major and minor facilities, which ensures that all applicable requirements are included in the facility permit.
110(a)(2)(B) Ambient air quality monitoring and data analysis	*provide for establishment and operation of appropriate devices, methods, systems, and procedures necessary to- (i)*	•APC&EC Reg. 19.302 grants ADEQ responsibility for ambient air monitoring and computer modeling of regulated air pollutant emissions. •Ark. Code Ann. § 8-4-311(a)(3) empowers ADEQ to encourage and conduct studies, investigations, and research relating to air pollution and its causes, prevention, control, and abatement.

system	*monitor, compile, and analyze data on ambient air quality, and (ii) upon request, make such data available to the Administrator;*	•Ark. Code Ann. § 8-4-311(a)(4) grants ADEQ the ability to collect and disseminate information relative to air pollution and its prevention and control. •In conjunction with the references above, Arkansas monitors air quality for $PM_{2.5}$ at appropriate locations throughout the State using EPA-approved methods and submits $PM_{2.5}$ data to the EPA's Air Quality System (AQS) consistent with EPA regulations under 40 C.F.R. Part 58. •Ark. Code Ann. § 8-4-311(a)(2) gives ADEQ the ability to advise, consult, and cooperate with the federal government in furtherance of safeguarding the air resources of the State by controlling or abating air pollution and preventing new air pollution if it is in the interest of the public health and welfare of the people. See also Ark. Code Ann. § 8-4-301 and § 8-4-302. Under this authority, ADEQ submits annual monitoring network plans, consistent with EPA's ambient air monitoring regulations, which describe how ADEQ has complied with monitoring requirements and explains proposed changes to the network, if any. •Ark. Code Ann. § 8-1-202 grants the ADEQ Director authority to retain the technical and legal expertise and assistance in the field of environmental protection.
110(a)(2)(C) Program to enforce control measures, regulate modification and construction of stationary sources and a permit program	*include a program to provide for the enforcement of the measures described in subparagraph (A), and regulation of the modification and construction of any stationary source within the areas covered by the*	•Ark. Code Ann. § 8-4-203(a)(1) authorizes ADEQ to issue, continue in effect, revoke, modify, or deny permits to prevent, control, or abate pollution. Ark. Code Ann. § 8-4-311 (a)(1) empowers ADEQ to develop and effectuate a comprehensive program for the prevention and control of all sources of air pollution in the State of Arkansas. •Chapter 4 of APC&EC Regulation 19 describes the regulation and permitting of the operation, modification and construction of minor stationary sources. •Chapter 9 of APC&EC Regulation 19 authorizes enforcement of regulations governing the prevention of significant deterioration (PSD) of air quality and

	plan as necessary to assure that national ambient air quality standards are achieved, including a permit program as required in parts C and D;	regulations governing the protection of visibility in mandatory Federal Class I areas. •Ark. Code Ann. § 8-4-311(a)(10) empowers ADEQ to make, issue, modify, revoke, and enforce orders prohibiting, controlling or abating air pollution and requiring the adoption of remedial measures to prevent, control, or abate air pollution. •Ark .Code Ann. § 8-4-311(a)(7) empowers ADEQ to administer and enforce all laws and regulations relating to pollution of the air. •All new major sources and major modifications are subject to a comprehensive EPA-approved PSD permitting program, including GHG PSD permitting approved on April 2, 2013 (78 FR 19596) and $PM_{2.5}$ PSD permitting approved on March 4, 2015 (80 FR 11573). Chapter 9 of APC&EC Regulation 19 authorizes enforcement of regulations governing the prevention of significant deterioration of air quality and regulations governing the protection of visibility in mandatory Federal Class I areas. Arkansas perceives there to be no changes necessary to the PSD program to implement the 2012 $PM_{2.5}$ NAAQS.
110(a)(2)(D)(i) Interstate transport provisions	*contain adequate provisions- (i) prohibiting, consistent with the provisions of this title, any source or other type of emissions activity within the State from emitting any air pollutant in amounts which will- (I) contribute significantly*	•APC&EC Reg. 19.402 states: "No permit shall be granted or modified under this chapter unless the owner/operator demonstrates to the reasonable satisfaction of ADEQ that the stationary source will be constructed or modified to operate without resulting in a violation of applicable portions of this regulation or without interfering with the attainment or maintenance of a national ambient air quality standard." APC&EC Reg. 19.402 is consistent with these requirements as it is an Arkansas promulgated regulation that applies to all stationary sources in Arkansas. •According to EPA modeling, 19 monitoring sites in the United States are projected to be in nonattainment or maintenance of the 2012 $PM_{2.5}$ annual NAAQS in 2017.[19] Of those sites projected to be nonattainment or maintenance areas for the 2012 $PM_{2.5}$

[19] CSAPR Update, Proposed Rule, 80 FR 75705, October 26, 2015

	to nonattainment in, or interfere with maintenance by, any other State with respect to any such national primary or secondary ambient air quality standard, or (II) interfere with measures required to be included in the applicable implementation plan for any other State under part C to prevent significant deterioration of air quality or to protect visibility,	annual NAAQS in 2017, 17 are in California, two are in Shoshone County Idaho, and one is located in Allegheny County, Pennsylvania. EPA modeling further indicates that "All of the receptors, except for the Allegheny County receptor, are projected to remain problem receptors in 2025."[20] In the past, EPA provided source apportionment modeling to identify upwind states contributing to nonattainment and maintenance areas in downwind states; however, EPA stated in a March 17, 2016 memorandum that such contribution modeling for the purposes of the 2012 $PM_{2.5}$ NAAQS was unnecessary given the limited number of receptors and their locations.[21] Therefore, the Department has reviewed other evidence in makings its determination as to what is necessary to address prongs 1 and 2. Past contribution modeling by EPA for the 2006 $PM_{2.5}$ NAAQS, included in "Air Quality Modeling Final Rule Technical Support Document" published in June 2011 to support the Final Cross-State Air Pollution Rule (76 FR 48208), demonstrated that Arkansas's did not significantly contribute to nonattainment or interfere with maintenance of the annual $PM_{2.5}$ NAAQS that was set in 1997 and retained in 2006.[22] Arkansas's largest contribution to nonattainment for the 2006 annual PM2.5 NAAQS was 0.1 $\mu g/m^3$and Arkansas's largest downwind contribution to maintenance of the 2006 $PM_{2.5}$ annual standard was 0.04 $\mu g/m^3$. Not only are both of these values below the 1 % significance threshold for the annual $PM_{2.5}$ NAAQS retained in 2006 (15 $\mu g/m^3$), they are also below 1 % of the 2012 $PM_{2.5}$ NAAQS value of 12 $\mu g/m^3$. For Arkansas, the projected Allegheny County, PA nonattainment area is the closest

[20] Information on Interstate Transport "Good Neighbor" Provision for the 2012 Fine Particulate Matter National Ambient Air Quality Standards under Clean Air Act Section 110(a)(2)(D)(i)(I), March 17 2016 Memorandum

[21] Id.

[22] Air Quality Modeling Final Rule Technical Support Document, June 2011 http://www.epa.gov/airtransport/CSAPR/pdfs/AQModeling.pdf

		projected $PM_{2.5}$ nonattainment area to Arkansas with the straight-line distance of approximately 620 miles. Although EPA and ADEQ have not conducted contribution modeling for the 2012 $PM_{2.5}$ NAAQS, EPA has performed contribution modeling showing that Arkansas does not significantly contribute to Allegheny County, PA for the 2008 ozone NAAQS.[23] This modeling showed that Arkansas's projected contribution to ozone design value for Allegheny County, PA would be 0.22 ppb, well below the significant contribution level of one percent (0.75 ppb) of the 2008 ozone NAAQS (75 ppb). Further evidence to support the Department's determination that Arkansas does not significantly contribute to nonattainment or interfere with maintenance of the 2012 $PM_{2.5}$ NAAQS is provided in Appendix H. •All new major sources and major modifications are subject to a comprehensive EPA-approved PSD permitting program, including GHG PSD permitting which was approved on April 2, 2013 (78 FR 19596) and $PM_{2.5}$ PSD permitting which was approved on March 4, 2015 (80 FR 11573). Chapter 9 of APC&EC Regulation 19 authorizes enforcement of regulations governing the prevention of significant deterioration of air quality and regulations governing the protection of visibility in mandatory Federal Class I areas. •Arkansas is currently subject to the Regional Haze Rule, which addresses visibility-impairing pollutants. Arkansas's PSD program is used to further protect visibility. In 2008, Arkansas submitted a Regional Haze SIP and EPA partially approved and partially disapproved it on March 12, 2012. Arkansas has experienced considerable improvement in regional haze in relation to the reasonable progress goals and uniform rate of progress established in the Regional Haze SIP. The most recent data from 2015 and current five-year rolling averages show that visibility impairment in Arkansas's Federal Class I areas is decreasing more rapidly than the uniform rate of

[23] Air Quality Modeling TSD for the 2008 Ozone NAAQS Cross-State Air Pollution Rule Proposal, November 2015:https://www.epa.gov/airmarkets/air-quality-modeling-technical-support-document-2008-ozone-naaqs-cross-state-air

		progress and 2018 reasonable progress goals submitted in the 2008 Regional Haze SIP.[24] •Additionally, visibility at Federal Class I areas in other states affected by Arkansas sources has improved for the least and most impaired days between 2000 and 2015. On the most impaired days, Hercules Glade, MO and Mingo, MO achieved a 2.92 deciview (dv) and 5.24 dv reduction in haziness, respectively, between the 2000 – 2004 baseline period and 2011 – 2015 analysis period. On the least impaired days, Hercules Glade, MO and Mingo, MO achieved a 2.54dv and 2.42 dv reduction in haziness, respectively, between the 2000 – 2004 baseline period and the 2011 – 2015 analysis period. Based on the visibility improvement in Class I areas in nearby states, ADEQ concludes that stationary sources in Arkansas do not significantly interfere with other states' plans to protect visibility.[25]
110(a)(2)(D)(ii) Interstate and International pollution abatement	*contain adequate provisions- (ii) insuring compliance with the applicable requirements of sections 126 and 115 (relating to interstate and international pollution abatement)*	•Ark. Code Ann. § 8-4-311(a)(8) authorizes ADEQ to represent the State in all matters pertaining to the plans, procedures, or negotiations for interstate compacts in relation to air pollution control. •Based on information gathered from ADEQ's permit database, ADEQ concludes that the limited amount of point and area source $PM_{2.5}$ emissions do not preclude the State from ensuring compliance with CAA § 126 and § 115. There are no final findings under § 115 of the CAA against Arkansas with respect to the 2012 $PM_{2.5}$ NAAQS. •All new major sources and major modifications are subject to a comprehensive EPA-approved PSD permitting program, including GHG PSD permitting approved on April 2, 2013 (78 FR 19596) and $PM_{2.5}$ PSD permitting approved on March 4,

[24]Arkansas Regional Haze Five Year Progress Report, May 2015: https://www.adeq.state.ar.us/air/planning/pdfs/ar_5yr_prog_rep_review-final-6-2-2015.pdf; Federal Land Manager Environmental Database < http://views.cira.colostate.edu/fed/ToolsMenu.aspx>
[25]Id.

		2015 (80 FR 11573). Chapter 9 of APC&EC Regulation 19 authorizes enforcement of regulations governing the prevention of significant deterioration of air quality and regulations governing the protection of visibility in mandatory Federal Class I areas. •APC&EC Reg. 19.903 describes the notification required when dealing with a major new source or major modification.
110(a)(2)(E)(i) Adequate personnel, funding and authority to carry out plan, (ii) Comply with state boards, (iii) Oversee local and regional governments/ agencies	*provide (i) necessary assurances that the State (or, except were the Administrator deems inappropriate, the general purpose local government or governments, or a regional agency designated by the State or general purpose local government for such purpose) will have adequate personnel, funding, and authority under State (and, as appropriate, local) law to carry out such implementation plan (and is not prohibited by any provision of Federal*	•Ark. Code Ann. § 8-1-103(1)(A) grants the ADEQ and APC&EC the authority to establish by regulation, reasonable fees for initial issuance, annual review, and modification of permits. •Under Ark. Code Ann. § 8-1-103(3) and § 8-1-103(5), ADEQ is authorized to collect the fees established by APC&EC and shall deny the issuance of an initial permit, a renewal permit, or a modification permit if and when a facility fails or refuses to pay the fees after reasonable notice. •Ark. Code Ann. § 8-1-202(b)(2)(D) states that duties of the Director of ADEQ include the day-to-day administration of all activities that ADEQ is empowered by law to perform, including, but not limited to, the employment and supervision of such technical, legal, and administrative staff, within approved appropriations, as is necessary to carry out the responsibilities vested with ADEQ. •APC&EC Regulation 9, Fee Regulation, Chapter 5, contains the air permit fees applicable to non-part 70 permits, part 70 permits, and general permits. •APC&EC Reg. 19.301 gives ADEQ the responsibility of meeting all applicable regulations and requirements contained in the CAA, as amended, if any area of the State is determined to be in violation of the NAAQS. •APC&EC Reg. 19.410 gives ADEQ the authority to revoke, suspend, or modify any

	or State law from carrying out such implementation plan or portion thereof), (ii)requirements that the State comply with the requirements respecting State boards under section 128, (iii) necessary assurances that where the State has relied on a local or regional government, agency, or instrumentality for the implementation of any plan provision, the State has responsibility for ensuring adequate implementation of such plan provision;	permit for cause. •The requirements of §110(a)(2)(E)(ii) are not entirely applicable because permit and enforcement orders are issued directly by ADEQ, not approved by state boards or commissioners. •Under APC&EC Reg. 8.202, the Director or the Director's delegate shall issue all permits with nothing in APC&EC Regulation 8 being construed to authorize APC&EC to issue a permit, including the power to reverse or affirm a permitting decision by the Director. •APC&EC Regulation 8, Chapter 4, highlights that APC&EC does not play a leading role in approving enforcement actions. •Under Ark. Code Ann. § 21-8-1001, no member of a state board or commission or board member of an entity receiving state funds shall participate in, vote on, influence or attempt to influence an official decision if the member has a pecuniary interest in the matter under consideration by the board, commission, or entity. In addition, no member of a state board or commission or board member of an entity receiving state funds shall participate in any discussion or vote on a rule or regulation that exclusively benefits the member. •Arkansas does not rely on local agencies for specific SIP implementation. The requirements of §110(a)(2)(E)(iii) are not applicable.
110(a)(2)(F) Stationary source emissions monitoring and reporting system	*require, as may be prescribed by the Administrator-- (i) the installation, maintenance, and replacement of*	•Regulatory requirements pertaining to sampling, monitoring and reporting are codified in APC&EC Regulation 19, Chapter 7. •APC&EC Reg. 19.705 provides the record keeping and reporting requirements for stationary sources subject to APC&EC Regulation 19. APC&EC Reg. 19.705 outlines how records of air emissions are to be maintained and how information and

	equipment, and the implementation of other necessary steps, by owners or operators of stationary sources to monitor emissions from such sources, (ii) periodic reports on the nature and amounts of emissions and emissions-related data from such sources, and (iii) correlation of such reports by the State agency with any emission limitations or standards established pursuant to this Act, which reports shall be available at reasonable times for public inspection;	data should be submitted to ADEQ. •APC&EC Reg. 19.702 provides guidelines and timelines for air emissions sampling necessary to enable Arkansas to determine whether the sources are in compliance. •Enforceable emission limitations and other control measures are covered in the Arkansas Water and Air Pollution Control Act and those provisions of Ark. Code Ann. §§ 8-4-310 and 8-4-311. Elements of the program for enforcement are found in the monitoring, recordkeeping and reporting requirements for sources in these control measures as well as individual SIP permits. •APC&EC Reg. 19.703 requires any stationary source subject to this regulation to install, calibrate, operate, and maintain equipment to continuously monitor or determine federally regulated air pollutant emissions in accordance with federal specification and in accordance with any joint specifications outlined by ADEQ, with the concurrence of EPA. •APC&EC Reg. 19.701 states that ADEQ will use any credible evidence based on sampling, monitoring, and reporting, to determine violations of applicable emissions limitations. •Under Ark. Code Ann. § 8-4-311(a)(2), ADEQ has the power to advise, consult, and cooperate with the federal government, including EPA Region 6 administrator. Arkansas submits emission inventory data annually to EPA for inclusion in the National Emissions Inventory. •APC&EC Reg. 19.706 requires public availability of emissions data.
110(a)(2)(G) Authority to declare air	*provide for authority comparable to that in section 303 and*	•Ark. Code Ann. § 8-1-202(b)(2)(C) empowers the Director of ADEQ to issue orders under circumstances that reasonably require emergency measures to be taken to protect the environment or the public health and safety. APC&EC Reg. 8.502 gives

pollution emergency and notify public	*adequate contingency plans to implement such authority;*	the Director the ability to issue an Emergency Order when necessary to meet an emergency or situation of imminent hazard. APC&EC Reg. 8.502 requires the Director to publish a Notice of Emergency Order in a newspaper covering the affected area, or in a newspaper of statewide circulation. The notice must contain a description of the action, ADEQ's authority for taking the action and other information appropriate to ensure the public is informed about the action. •Ark. Code Ann. § 8-4-202(e)(1) empowers APC&EC to declare an emergency and implement emergency rules, regulations, suspensions, or moratoria on categories or types of permits if APC&EC determines that imminent peril to the public health, safety, or welfare requires immediate change in the rules or immediate suspension or moratorium on categories or types of permits. •APC&EC Reg. 8.807 authorizes APC&EC to waive or reduce the notice requirements in cases involving emergency rulemaking. No emergency rule shall be effective for more than one hundred eighty (180) days unless allowed by law.
110(a)(2)(H) Future SIP revisions	*provide for revision of such plan- (i) from time to time as may be necessary to take account of revisions of such national primary or secondary ambient air quality standard or the availability of improved or more expeditious methods of attaining such standard, and (ii) except as provided in*	•APC&EC Regulation 19, Chapter 1, provides a clear delineation of those regulations that are promulgated by APC&EC in satisfaction of certain requirements of the CAA, including making ADEQ responsible for administering the attainment and maintenance of the NAAQS. •Ark. Code Ann. § 8-4-311(a)(7) empowers ADEQ to administer and enforce all laws and regulations relating to pollution of the air. •Ark. Code Ann. § 8-4-202(d)(4)(A)(ii) authorizes APC&EC to refer to the Code of Federal Regulations for any APC&EC standard or regulation that is identical to a regulation promulgated by EPA. •Under APC&EC Regulation 19, Chapter 3, ADEQ is charged with the protection of the NAAQS. According to APC&EC Reg. 19.301, if any area of the State is

	paragraph (3)(C), whenever the Administrator finds on the basis of information available to the Administrator that the plan is substantially inadequate to attain the national ambient air quality standard which it implements or to otherwise comply with any additional requirements established under this Act;	determined to be in violation of the NAAQS, all applicable requirements contained in the CAA, as amended, and all regulations promulgated thereto shall be met by ADEQ.
110(a)(2)(I) Nonattainment areas (interstate transport)	*in the case of a plan or plan revision for an area designated as a nonattainment area, meet the applicable requirements of part D (relating to nonattainment areas);*	•Arkansas's nonattainment area plans required under part D are on a different schedule from the section 110 infrastructure elements. Currently, Arkansas does not have any area designated nonattainment for $PM_{2.5}$.
110(a)(2)(J) (§ 121 consultation), (§127 public notification),	*meet the applicable requirements of section 121 (relating to consultation), meet the applicable requirements*	•Ark. Code Ann. § 8-4-301(b) prescribes a method of utilizing the program for the control of air pollution. Under Ark. Code Ann. § 8-4-301(b), the program shall be undertaken in a progressive manner, and each of its successive objectives shall be sought to be accomplished by a maximum of cooperation and conciliation among all the parties concerned. In addition, Ark. Code Ann. § 8-4-302 reiterates Ark. Code

PSD and visibility protection	*of section 127 (relating to public notification), meet the applicable requirements of part C (relating to prevention of significant deterioration of air quality and visibility protection);*	Ann. § 8-4-301(b) by affirming that the purpose is to safeguard the air resources of the State by controlling or abating air pollution that exists and preventing new air pollution under a program which shall be consistent with the declaration of policy stated in Ark. Code Ann. § 8-4-301 and with Ark. Code Ann. Title 8, Chapter 4, Subchapter 3.•All SIP revisions in Arkansas undergo public notice and hearing, which provides for comment by the public. •Air quality data from Arkansas's monitoring network is published on ADEQ's website. Additionally, Arkansas is required to submit monitoring data to the Air Quality System in a timely manner. •Ark. Code Ann. § 8-4-311(a)(6) encourages voluntary cooperation by the people, municipalities, counties, industries, and others in preserving and restoring the purity of the air within the State. •The public is notified of concentrations that exceed the NAAQS from the ADEQ website ((https://www.adeq.state.ar.us/techsvs/air_chem_lab) that contains hourly concentrations taken from monitoring sites throughout the State and the Air Quality Index for the Little Rock and Springdale metropolitan areas. This Index displays which sensitive groups are at greater risk from each pollutant. •These monitoring sites also upload data to EPA's AirNow website, which provides data to a broader section of the public and includes links to help the public understand what they can do to keep their air clean. •Under APC&EC Regulation 19, Chapter 9, Arkansas has incorporated by reference the requirements in 40 C.F.R. §§ 52.21(b)(2)(iii)(a), 52.21(b)(49), 52.21(b)(50), 52.21(b)(55-58), § 52.21(i) and 52.21(cc). These provisions were approved by EPA as part of the SIP. These incorporated provisions also provide for protection of visibility in Federal Class I areas.

		•All new major sources and major modifications are subject to a comprehensive EPA-approved PSD permitting program, including GHG PSD permitting which was approved on April 2, 2013 (78 FR 19596) and $PM_{2.5}$ PSD permitting which was approved on March 4, 2015 (80 FR 11573). Chapter 9 of APC&EC Regulation 19 authorizes enforcement of regulations governing the prevention of significant deterioration of air quality and regulations governing the protection of visibility in mandatory Federal Class I areas. •The visibility subelement of Element J is not being addressed because EPA stated in their September 13, 2013 "Guidance on Infrastructure State Implementation Plan (SIP) Elements under Clean Air Act Sections 110(a)(1) and 110(a)(2)"[26] that they believe that there are no newly applicable visibility protection obligations pursuant to Element J after the promulgation of a new or revised NAAQS.
110(a)(2)(K) Air quality modeling/data	*provide for- (i) the performance of such air quality modeling as the Administrator may prescribe for the purpose of predicting the effect on ambient air quality of any emissions of any air pollutant for which the Administrator has established a national ambient air quality standard, and (ii) the submission, upon*	•APC&EC Regulation 19, Chapter 3, outlines that ADEQ is responsible for ambient air monitoring and computer modeling of regulated air pollutant emissions in any area that can reasonably be expected to be in excess of the NAAQS and review of the ambient air impacts of any new or modified source of federally regulated air emission that is the subject of the requirements of this Plan. See APC&EC Reg. 19.302(A) and (B). Under APC&EC Reg. 19.302 (B), all computer modeling shall be performed using EPA-approved models, and using averaging times commensurate with averaging times stated in the NAAQS. •ADEQ has the ability to submit data related to air quality modeling to the Administrator under Ark. Code Ann. § 8-4-311 (a)(2) which gives ADEQ the power to advise, consult, and cooperate with the federal government.

[26] EPA Guidance on Infrastructure State Implementation Plan (SIP) Elements under Clean Air Act Sections 110(a)(1) and 110(A)(2). September 13, 2013.

	request, of data related to such air quality modeling to the Administrator;	
110(a)(2)(L) Major Stationary source permitting fees	*require the owner or operator of each major stationary source to pay to the permitting authority, as a condition of any permit required under this Act, a fee sufficient to cover- (i) the reasonable costs of reviewing and acting upon any application for such a permit, and (ii) if the owner or operator receives a permit for such source, the reasonable costs of implementing and enforcing the terms and conditions of any such permit (not including any court costs or other costs associated with any enforcement action), until such fee*	•The fee requirements of APC&EC Regulation 26, Chapter 11, were approved by EPA as meeting the CAA requirements and were incorporated in Arkansas's SIP. Arkansas's Title V operating permit program was approved by EPA on October 9, 2001 (66 FR 51313). •ADEQ has the authority to adjust the fee as necessary using its rulemaking authority. APC&EC Regulation 9, Chapter 5, contains the air permit fees applicable to non-part 70 permits, part 70 permits, and general permits. Revisions to air permitting fee in Chapter 5 were approved by EPA on April 30, 2015 (80 FR 24216).

	requirement is superseded with respect to such sources by the Administrator's approval of a fee program under title V; and	
110(a)(2)(M) Consultation/ Participation by affected local entities	*provide for consultation and participation by local political subdivisions affected by the plan.*	•Pursuant to APC&EC Regulation 8, Arkansas will continue to provide for consultation and participation from those affected by the SIP. Under APC&EC Regulation 8, those organizations affected by the SIP will be able to participate in developing the SIP via comments and potential public hearings. ADEQ is the sole state-level enforcer and implementer of the SIP. See APC&EC Reg. 8.205 *Public Notice of Permit Application*; APC&EC Reg. 8.206 *Request for Public Hearing on Application for Permit*; APC&EC Reg. 8.207 *Public Notice of Draft Permitting Decision*; APC&EC Reg. 8.208 *Public Comment on Draft Permitting Decision*; APC&EC Reg. 8.209 *Public Hearings*; APC&EC Reg. 8.405 *Public Notice of Notices of Violations and Consent Administrative Orders*; APC&EC Reg. 8.801 *Public Notice of Rulemaking.* •ADEQ participates in the Central State Air Resources Agencies, which is an organization of states, tribes, federal agencies and other interested parties concerned with air quality. The interactions and public participation on rule and plan development play a role in satisfying the requirements of § 110(a)(2)(M).

4 NAAQS State Implementation Plan pursuant to Arkansas Code Annotated. § 8-4-318

4.1 Background

Under Ark. Code Ann. § 8-4-318, ADEQ must develop a NAAQS state implementation plan (NAAQS SIP), which includes measures necessary for the attainment and maintenance of the NAAQS in each air quality control region (AQCR) or portion of an AQCR within the State. The Department is including this NAAQS SIP in addition to the required federal submissions.

Ark. Code Ann. § 8-4-317(C)(i) requires a written explanation of (1) the rational for the proposal demonstrating a reasoned consideration of factors set forth in Ark. Code Ann. § 8-4-312; (2) the need for each measure in attaining or maintaining the NAAQS; and (3) that any requirements or standards are based upon generally accepted scientific knowledge and engineering practices. For standards or requirements identical to an applicable federal regulation, Ark. Code Ann. § 8-4-317(b)(1)(C)(ii) states that the demonstration required under Ark. Code Ann. § 8-4-317(b)(1)(C)(i) may be satisfied by reference to the federal regulation.

ADEQ is proposing a new minor new source review (NSR) permitting strategy. The permit thresholds and NAAQS evaluation requirements included in the minor NSR permitting strategy were developed after reasoned consideration of the factors in exercising ADEQ's powers and responsibilities codified in Ark. Code. Ann. § 8-4-312 and with significant input from stakeholders. The Department is confident that implementation of the minor NSR permitting strategy included in this SIP is adequate to ensure that minor source construction or modification activities do not interfere with attainment or maintenance of the NAAQS.

ADEQ is including $PM_{2.5}$ thresholds and De Minimis levels in this strategy. A written explanation of both the rational for $PM_{2.5}$ thresholds and De Minimis levels in maintaining the NAAQS and an explanation of the basis upon generally accepted scientific knowledge and engineering practices is set forth in section 1.4.2.1.1. Additional supporting documentation is attached in Appendix C. A written consideration of the factors set forth in Ark. Code Ann. § 8-4-312 for $PM_{2.5}$ thresholds and De Minimis levels is located in section 1.4.2.1.2.

In addition, ADEQ is proposing pollutant-specific minor NSR NAAQS evaluation requirements. A written explanation of the rational for these requirements, an explanation of their basis in generally accepted scientific knowledge and engineering practices, and a consideration of the factors in Ark. Code Ann. § 8-4-312 are set forth in the following sections and additional supporting documentation is contained in Appendix I and Appendix G: section 1.4.2.2.1 for the PM_{10} NAAQS evaluation requirements, section 1.4.2.2.2 for the SO_2 NAAQS evaluation requirements, and 1.4.2.2.3 for the NO_2 NAAQS evaluation requirements.

On February 26, 2016, the Commission adopted revisions to APC&EC Regulation No. 19 to include the 2006 $PM_{2.5}$ NAAQS, the 2008 ozone NAAQS, the 2008 lead NAAQS, the 2010 SO_2 NAAQS, the 2010 NO_2 NAAQS, and the 2012 $PM_{2.5}$ NAAQS. ADEQ now has the authority to implement, maintain, and enforce these standards. Because these standards adopted into APC&EC Regulation No. 19 and included in this SIP submission are identical to federal standards, the demonstration required under Ark. Code Ann. § 8-4-317(b)(1)(C)(i) is satisfied by reference to the applicable federal regulation. Table 2 lists the standards adopted in APC&EC Regulation No. 19 on February 26, 2016 and the applicable federal regulation.

Table 2. Federal Standards Incorporated into the NAAQS SIP

Standard	Promulgation of Federal Final Rule
2006 $PM_{2.5}$ NAAQS	71 FR 61144
2008 ozone NAAQS	73 FR 16483
2008 lead NAAQS	73 FR 66964
2010 SO_2 NAAQS	75 FR 35520
2010 NO_2 NAAQS	75 FR 6474
2012 $PM_{2.5}$ NAAQS	78 FR 3086

4.2 Minor New Source Review Permitting Strategy

Revisions to the minor NSR permitting strategy included in this NAAQS SIP are the establishment of permitting and De Minimis thresholds for $PM_{2.5}$ adopted in Reg. 19.401 and Reg. 19.407(c) and NAAQS evaluation requirements for non-PSD permitting actions under the authority in SIP-approved Reg. 19.402 and Reg. 19.405.

4.2.1 Adoption of $PM_{2.5}$ Thresholds and De Minimis Levels

4.2.1.1 Determination of $PM_{2.5}$ Thresholds and De Minimis Levels

On February 26, 2016, in an amendment to the APC&EC Regulation No. 19, Regulations of the Arkansas Plan of Implementation for Air Pollution Control (APC&EC Regulation No. 19), the Commission adopted a $PM_{2.5}$ permit threshold of 10 tons per year (tpy) in Reg. 19.401 and a $PM_{2.5}$ De Minimis level of 10 tpy in Reg. 19.407(c). The level at which the $PM_{2.5}$ thresholds were set was based on the Significant Emissions Rate (SER) for $PM_{2.5}$ promulgated by EPA under 40 C.F.R. § 51.166(b)(23)(i). In EPA's "Implementation of the New Source Review (NSR) Program for Particulate Matter Less than 2.5 Micrometers ($PM_{2.5}$)" rule finalized on May 16, 2008, EPA stated that the agency considers "emissions increases [lower than the SERs] to be De Minimis."[27] According to EPA's analysis of modeling using the ISC3 model described in 70 FR 66038, increases in direct $PM_{2.5}$ emissions less than 10 tpy would be unlikely to increase annual average ambient $PM_{2.5}$ concentrations by more than four percent of the annual $PM_{2.5}$ standard. Based on EPA's assertion that increases in $PM_{2.5}$ below the SER promulgated under 40

[27] 73 FR 28332

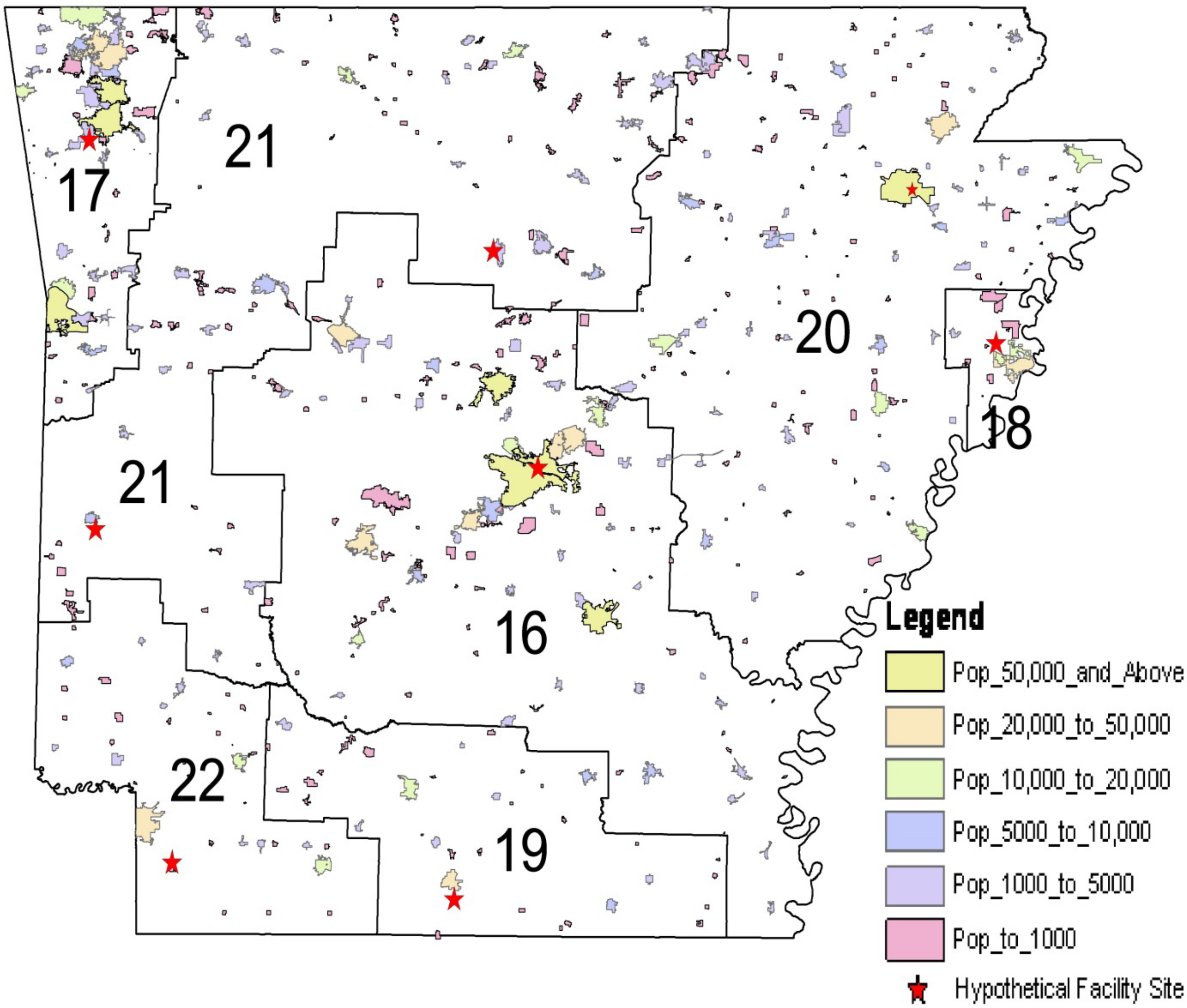
C.F.R. § 51.166(b)(23)(i) can be considered De Minimis, the Department set the permitting thresholds at 10 tpy.

The Department also contracted with ICF to produce a modeling-based analysis which demonstrated that emission increases less than the proposed thresholds will not cause or contribute to a violation of the NAAQS or interfere with NAAQS attainment or maintenance. ICF modeled the potential impacts of emissions increases equal to the $PM_{2.5}$ permit threshold and De Minimis level of 10 tpy. ICF's full report, which includes modeling for the other criteria pollutant permit thresholds, can be found in Appendix C.[28] As a part of this modeling exercise, ICF conducted Community Multiscale Air Quality (CMAQ) analysis using CMAQ results from a previous modeling exercise[29] for the 2008 base year and the 2008/2015 future year from the Arkansas statewide modeling effort. Based on this modeling demonstration, the Department has determined that sources which emit less than $PM_{2.5}$ threshold/De Minimis level will not cause or contribute to a violation of the NAAQS or interfere with attainment or maintenance of the NAAQS.

In this modeling analysis, a CMAQ simulation using the 2015 future year from the previous statewide modeling effort was rerun with the addition of eight new theoretical sources with emissions set equal to the $PM_{2.5}$ permit threshold/De Minimis level in APC&EC Regulation No. 19. These eight hypothetical sources were distributed such that each AQCR identified in Figure 3 contained at least one approximately centrally located hypothetical source (two hypothetical sources were sited in AQCR 21 due to its geographic scope). Most of these hypothetical facility locations also tended to be located in or near urban areas. Stack parameters for these hypothetical sources were set at the median values for stack height, stack diameter, exit temperature, and exit velocity of all minor point sources in Arkansas, based on the 2011 National Emissions Inventory. CMAQ was used to evaluate the potential impact of hypothetical emission increases equal to the permitting thresholds for $PM_{2.5}$ using future year 2015 as background. The maximum CMAQ-derived impact was calculated for the 24-hour average $PM_{2.5}$ NAAQS and annual average $PM_{2.5}$ NAAQS. This maximum impact was then applied statewide to determine the worst-case impacts from emission increases equal to the permit thresholds anywhere in the State. Relative response factors (RRF), the ratio of future-year to base-year simulated concentrations, were derived based on the modeling results and were used to calculate future year design values (FDV). The results of this modeling effort are described below.

[28] ICF (2015). "Air Quality Modeling Analysis of Minor Source Permit Thresholds." Prepared for the Arkansas Department of Environmental Quality, North Little Rock, Arkansas (15-003).
[29] ICF (2014). "Criteria Pollutant Modeling Analysis for Arkansas." Prepared for the Arkansas Department of Environmental Quality, North Little Rock, Arkansas (14-003).

Figure 3. Arkansas AQCRs and hypothetical minor point source facility locations in relation to human population density



AQCR 16, Pulaski County; AQCR 17, Washington County; AQCR 18, Crittenden County; AQCR 19, Union County; AQCR 20, Craighead County; AQCR 21, Van Buren and Polk Counties; AQCR 22, Miller County

Annual average $PM_{2.5}$ NAAQS and 24-hour $PM_{2.5}$ NAAQS maximum simulated impacts occur at or near the hypothetical sources with the maximum difference varying by location and ranging from approximately 0.2 to 0.3 $\mu g/m^3$ on a monthly average basis. The maximum differences in 24-hour average $PM_{2.5}$ NAAQS concentration for each day considering all grid cells in the 4-km grid were compiled and added to the 2015 baseline 24-hour $PM_{2.5}$ NAAQS concentration for each day and each grid cell to create the 2015 plus maximum impact (PMI) dataset for $PM_{2.5}$ NAAQS. The 2015 PMI resultant values are intended to represent the future-year concentrations assuming worst-case impacts from threshold emission increases at any location within the modeling grid. EPA's Model Attainment Test Software (MATS) was applied for monitoring sites (for both 24-hour and annual average $PM_{2.5}$) and for unmonitored areas (for annual average $PM_{2.5}$ NAAQS only). MATS does not support spatial-field analysis for 24-hour $PM_{2.5}$ NAAQS.

Regarding site-specific modeling results for 24-hour $PM_{2.5}$, NAAQS the results for each monitoring site assume that a hypothetical source identical to those modeled is located such that the worst-case impact occurs at the monitoring site. Current-year design values used for this summary were calculated as the average of the design values for the three overlapping three-year periods that include the modeled year (2006 – 2008, 2007 – 2009, and 2008 – 2010) and all sites with data during the 2006 to 2010 period are included. The current-year design values are based on the data contained within the MATS database and are calculated within MATS. MATS input parameters were set to the EPA-recommended default values and, per EPA guidance, the ten percent highest concentrations based on the baseline simulation results were used in the calculation of the RRFs for each site. Daily $PM_{2.5}$ design values for 2015 PMI are estimated to be 0.2 to 0.6 $\mu g/m^3$ higher than the 2015 baseline values and the estimated future-year design values for all sites are well below the NAAQS. Annual $PM_{2.5}$ design values for 2015 PMI are estimated to be 0.2 to 0.4 $\mu g/m^3$ higher than the 2015 baseline values and also do not affect attainment or maintenance of the annual $PM_{2.5}$ NAAQS for any monitoring site.

MATS was also used to conduct a spatial-fields analysis for $PM_{2.5}$ consisting of: 1) modeled concentrations being used to calculate RRFs for every grid cell, 2) the model-derived gradients were used in conjunction with observed data to estimate current-year design values for every grid cell, and 3) results of steps 1 and 2 were used to estimate FDVs for every grid cell. The objective was to determine whether there are unmonitored areas more sensitive to the addition of emissions corresponding to amount and type modeled than other areas. The average $PM_{2.5}$ RRF is 0.8619 for the 2015 baseline and 0.9045 for the 2015 PMI scenario with the increase of 0.0425 representing a 0.4 $\mu g/m^3$ increase relative to a base concentration of 10 $\mu g/m^3$. For the AQCRs, worst-case impacts are expected to increase the average RRFs by 0.0284 to 0.0501 and in no case is the average RRF expected to increase to a value greater than one.

In both the 2015 baseline and 2015 PMI plots, MATS projected FDVs show several isolated unmonitored areas with annual average $PM_{2.5}$ concentrations greater than 12 $\mu g/m^3$, which are greater than those projected for the monitoring sites. This result is due to the fact that the modeled concentration gradients are used in MATS to estimate current and future design values for unmonitored areas and this can result in estimated current-year design values for unmonitored areas that are greater than at any monitoring site. Without use of the modeled concentration gradients, the monitored data are simply interpolated to each grid cell, which results in more uniform FDVs and lower peak values, by up to 5 $\mu g/m^3$. The spatial-fields analysis is not intended to examine if there are unmonitored areas for which the minor source impacts would potentially result in nonattainment issues. Since the result depends on the assumed current-year design value at each unmonitored location, which is unknown, this analysis is most useful at identifying areas where the impacts are likely to have a greater effect on the design values. Nevertheless, the FDVs indicate a few isolated areas/grid cells within Arkansas greater than 12 μg/m^3 for the gradient-adjusted case and no grid cells greater than 12 μg/m^3 for the straight interpolation case for both the 2015 baseline and 2015 PMI scenarios. The maximum impact at any grid cell is 0.41 μg/m^3.

The regional-scale modeling and impact assessment methodology were designed to examine worst-case impacts from threshold emission increases at each location within the modeling grid. The addition of the modeled worst-case impacts to the 2015 baseline does not affect attainment or maintenance of the 24-hour or annual $PM_{2.5}$ NAAQS for any monitoring site. The results estimated the 2015 FDVs for 24-hour $PM_{2.5}$ NAAQS to be 0.2 to 0.6 μg/m^3 higher than the 2015 baseline values and that the FDVs for annual average $PM_{2.5}$ will be 0.2 to 0.4 μg/m^3 higher than the 2015 baseline values. The data indicate that central and southwestern Arkansas may be more sensitive to the addition of PM-related (VOC, NOx, SO_2, and primary $PM_{2.5}$) emissions, relative to the calculation of $PM_{2.5}$ NAAQS-relevant metrics; however, all worst-case impacts were below the NAAQS.

4.2.1.2 Consideration of the factors in Ark. Code Ann. § 8-4-312

Pursuant to Ark. Code Ann. § 8-4-317, the Department must demonstrate a reasoned consideration of the factors set forth in in Ark. Code Ann. § 8-4-312 "[i]n the case of any emission limit, work practice or operational standard, environmental standard, analytical method, air dispersion modeling requirement, or monitoring requirement that is incorporated as an element of the proposed state implementation plan submittal." Table 3 provides a written explanation of the Department's consideration of the factors in Ark. Code Ann. § 8-4-312 in setting the $PM_{2.5}$ NAAQS minor source permit and De Minimis levels, as applicable.

Table 3. Consideration of the Ark. Code. Ann. § 8-4-312 in Setting $PM_{2.5}$ Permitting and De Minimis Thresholds

Ark. Code Ann. § 8-4-312 Factors	Consideration of the Factors
(1) The quantity and characteristics of air contaminants and the duration of their presence in the atmosphere that may cause air pollution in a particular area of the state;	$PM_{2.5}$ is emitted directly from sources such as diesel engines, other combustion sources, and smelters. This is considered primary $PM_{2.5}$. Secondary $PM_{2.5}$ can also form in the atmosphere due to complex reactions of precursor compounds such as oxides of sulfur (SOx) and oxides of nitrogen (NOx). $PM_{2.5}$ may be composed of sulfate, nitrate, ammonium and /or hydrogen ions. It may also contain elemental carbon, metal compounds, organic compounds, and particle-bound water. It is very difficult to tie secondary $PM_{2.5}$ in the atmosphere to specific sources. The nature of $PM_{2.5}$ is such that it may stay suspended in the

	atmosphere for long periods of time and may be transported hundreds of miles. Monitored concentrations of $PM_{2.5}$ have decreased steadily across Arkansas since 2005. Annual $PM_{2.5}$ design values decreased significantly between 2005 and 2014 and all monitoring locations now exhibit design values below the NAAQS. The permit and De Minimis levels adopted into APC&EC Regulation No. 19 and included in this SIP will be applicable statewide, and are expected be protective of the NAAQS.
(2) Existing physical conditions and topography;	This factor is not applicable to setting a statewide minor source permit and De Minimis level thresholds.
(3) Prevailing wind directions and velocities;	This factor is not applicable to setting a statewide minor source permit and De Minimis level thresholds.
(4) Temperatures and temperature-inversion periods, humidity, and other atmospheric conditions;	This factor is not applicable to setting a statewide minor source permit and De Minimis level thresholds.
(5) Possible chemical reactions between air contaminants or between such air contaminants and air gases, moisture, or sunlight;	NOx, SOx, and VOCs, and soot emitted from a variety of sources, along with water vapor may react in the atmosphere to form sulfates, nitrates, and other types of fine particles.
(6) The predominant character of development of the area of the state such as residential, highly developed industrial, commercial, or other characteristics	This factor is not applicable to setting minor source permit and De Minimis level thresholds since these thresholds will be applicable statewide.
(7) Availability of air-cleaning devices;	This factor is not applicable to setting minor source permit and De Minimis level thresholds.
(8) Economic feasibility of air-cleaning devices	This factor is not applicable to setting minor source permit and De Minimis level thresholds.
(9) Effect on normal human health of particular	$PM_{2.5}$ contains microscopic solids and liquid

air contaminants	droplets that are small enough to get deep into the lungs when inhaled. Numerous scientific studies have linked particle pollution to a number of adverse health effects. These effects include: premature death in people with heart or lung disease, nonfatal heart attacks, irregular heartbeat, aggravated asthma, decreased lung function, and increased respiratory symptoms such as irritation of airways, coughing, and difficulty breathing. The Commission adopted $PM_{2.5}$ permit thresholds and De Minimis levels of 10 tpy which were set at the SER for $PM_{2.5}$ NAAQS promulgated by EPA under 40 C.F.R. § 51.166(b)(23)(i). In EPA's "Implementation of the New Source Review (NSR) Program for Particulate Matter Less than 2.5 Micrometers ($PM_{2.5}$)" rule finalized on May 16, 2008, EPA states that the agency considers "emissions increases [lower than the SERs] to be De Minimis."[30] According to EPA's analysis of modeling using the ISC3 model described in 70 FR 66038, increases in direct $PM_{2.5}$ emissions less than 10 tons per year would be unlikely to increase annual average ambient $PM_{2.5}$ concentrations by more than four percent of the annual $PM_{2.5}$ standard. Setting the permit and De Minimis levels at 10 tpy is unlikely to endanger the public health because emissions increases below this level are unlikely to interfere with attainment or maintenance of the annual or 24-hour $PM_{2.5}$ NAAQS. Permitting of sources with emission increases greater than this level allows the Department to ensure that construction and operation of those sources will not interfere with attainment or maintenance of the $PM_{2.5}$

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(10) Effect on efficiency of industrial operation resulting from use of air-cleaning devices;	This factor is not applicable to setting minor source permit and De Minimis level thresholds.
(11) The extent of danger to property in the area reasonably to be expected from any particular air contaminant;	Damage from particulate matter can include staining and damage of stone and other material, including culturally important buildings, statues, and monuments. Particles can also damage sensitive farm crops and forest plants. The permit and De Minimis levels adopted into APC&EC Regulation No. 19 and included in this SIP allow the Department to regulate sources with emissions above those levels. In doing so, the Department can ensure that construction and operation of those sources will not interfere with attainment or maintenance of the NAAQS. No specific danger to property is anticipated as a result of the proposed permit and De Minimis levels.
(12) Interference with reasonable enjoyment of life by persons in the area and conduct of established enterprises that can reasonably be expected from air contaminants;	NAAQS developed for various pollutants by EPA are designed to be protective of human health and the environment. Pollutant levels at or below these levels would not be expected to interfere with reasonable enjoyment of life by persons in the area. Since the proposed permit and De Minimis levels of 10 tpy of $PM_{2.5}$ are expected to be protective of the NAAQS, these limits should not interfere with reasonable enjoyment of life by persons in the State.
(13) The volume of air contaminants emitted from a particular class of air contamination sources;	According to national emissions inventory (NEI) data, emissions of primary $PM_{2.5}$ increased in Arkansas between 2002 and 2011. The increase is largely due to increased estimations of prescribed and wild fires. The contribution of industrial processes, fuel combustion, solvent, and miscellaneous sources have decreased over time. According

	to 2011 NEI data, fires contributed 51 % of the direct $PM_{2.5}$ emissions in Arkansas. Agriculture contributed 19 %. Dust accounted for 17 %. Mobile sources contributed 4 %. Industrial processes, miscellaneous sources, fuel combustion, and solvent sources contributed less than 9 % combined, indicating that stationary sources are not the driver for increases in primary $PM_{2.5}$ emissions in the State.
(14) The economic and industrial development of the state and the social and economic value of the air contamination sources;	The economic and industrial development of the state is a priority for Arkansas and air contamination sources that will be subject to permitting yield economic benefits to the state and provide Arkansans with jobs. By setting the minor NSR permitting and De Minimis levels at the SER for $PM_{2.5}$, the state appropriately balances development with environmental protection. Establishing the minor source applicability thresholds for $PM_{2.5}$ at the level of the SER for $PM_{2.5}$ under 40 C.F.R. 51.166(b)(23)(i) ensures that sources which emit trivial amounts of $PM_{2.5}$ will not be required to obtain a permit based on their $PM_{2.5}$ emissions. Establishing the De Minimis level at the same level ensures that emission increases of $PM_{2.5}$ less than the SER can be processed as De Minimis. Those sources that will be permitted for $PM_{2.5}$ will be subject to air permit fees pursuant to APC&EC Regulation No. 9, Chapter 5. Currently, permit fees in Arkansas are $23.93 per ton per pollutant, up to a cap of 4,000 tons per pollutant. It is unlikely that permit fees will increase due to a fee being imposed for $PM_{2.5}$. In most cases, the $PM_{2.5}$ emissions from sources will already be included in emissions of other pollutants. By not requiring a permit

	for sources with emissions below the threshold and by processing permitting actions for emission increases below De Minimis levels as De Minimis, unnecessary financial burdens to sources can be avoided.
(15) The maintenance of public enjoyment of the state's natural resources; and	$PM_{2.5}$ can have many undesirable effects in the environment. Fine particles are the main cause of reduced visibility (haze) in parts of the United States, including many national parks and wilderness areas. Particles, which eventually settle out of the atmosphere onto land or water, can have a number of detrimental effects. These include acidification of lakes and streams, changing the nutrient balance in coastal waters and large river basins, depleting nutrients in soil, and damaging sensitive forests and farm crops. Since the thresholds adopted into APC&EC Regulation No. 19 and included in this SIP are expected to be protective of the $PM_{2.5}$ NAAQS, no adverse effects to public enjoyment of the State's natural resources are expected.
(16) Other factors that the department or the commission may find applicable.	This factor is not applicable to setting a statewide minor source permit and De Minimis level thresholds.

4.2.2 Pollutant-Specific Minor NSR NAAQS Evaluation Requirements

Pursuant to Ark. Code Ann. § 8-4-318(a)(2), the Department determined that pollutant-specific NAAQS evaluation requirements for non-PSD (minor NSR) permitting actions under the authority in SIP-approved Reg. 19.402 and Reg. 19.405 are necessary for the attainment and maintenance of the NAAQS.

In reviewing the relevant requirements and selecting for which sources to require modeling, ADEQ adhered to EPA's rationale when it promulgated the only existing federal requirements to model specific sources, which is under the PSD program. In maintaining the NAAQS, "[i]t is the State's responsibility to decide what limits the SIP should impose upon the various sources." (Operating Permit Program, 56 FR 21712-01) Section 110(a)(2)(C) requires that each SIP "include a program to provide for the [...] regulation of the modification and construction of any stationary source within the areas covered by the plan as necessary to assure that the [NAAQS] are achieved."

ADEQ acknowledges, just as EPA did when it promulgated the PSD permitting requirements, that it is "not possible" to conduct preconstruction review for every source. (Approval and Promulgation of Implementation Plans, 39 FR 31000). Just as EPA chose to "concentrate the effort on important large sources," ADEQ is also focusing minor NSR permitting requirements for modeling on those sources with large net emissions increases.

This is consistent with the framework that EPA envisioned when it promulgated the PSD permitting regulations, the preamble of which stated that "[t]he rulemaking allows States generally to exempt from air quality reviews those sources with minimal emissions." (43 FR 26380) The preamble goes on to explain that "only those sources which would have allowable emissions equal to or greater than [PSD emission thresholds], or would impact a class I area or an area where the increment is known to be violated must receive ambient review (*Id.*). EPA referred to the idea that modeling demonstrations for every permitted source as "unduly burdensome," and ADEQ agrees in the case of the minor NSR permitting as well. (57 FR 32276)

The presumption that modeling is not required for every source continues to the present day. EPA's "Model Rule for Minor NSR Program," which was released in 2012 as part of its "Tribal NSR Implementation Manual," does not require routine modeling. Instead, the manual explains that the permitting authority will require an air quality impacts analysis from a minor source or modification only if it is concerned that construction of the minor source or modification would cause or contribute to a NAAQS or PSD increment violation. (EPA, Model Rule for Minor New Source Review Program)

In order to avoid the "unduly burdensome" requirement of routine modeling for all minor NSR sources, ADEQ determined that it is appropriate to only require modeling when there is sufficient cause for "concern" that construction or modification will impede the state's ability to maintain the NAAQS. ADEQ is proposing modeling thresholds that reflect an appropriate level of stringency based on extensive modeling performed by ICF.

Specifically, the Department determined that it is necessary to require NAAQS evaluations for minor NSR permitting involving construction of stationary sources with relatively large proposed emissions of PM_{10}, SO_2, and NOx and minor NSR permitting involving modification of stationary sources with relatively large proposed net emission increases of PM_{10}, SO_2, and NOx. For the purposes of determining whether modeling is necessary for a minor NSR modification, the net emission increase will be determined based on the difference between the sum of proposed permitted emission rates and the sum of previously permitted emission rates for all units.

No new NAAQS evaluation requirements are included as part of this SIP for lead. Pursuant to monitoring requirements for lead under 40 C.F.R. 58 Appendix D § 4.5, the Department is required to conduct ambient air lead monitoring near non-airport lead sources which emit 0.5 or more tons per year of lead and from each airport which emits one or more tons per year unless a waiver is obtained for the lead source. The Department has also determined that NAAQS evaluations will not be required for minor NSR permitting of ozone, $PM_{2.5}$, or CO. Support for the Department's NAAQS evaluation requirements determination can be found in Appendix G and Appendix I.

The Department will continue to evaluate ambient concentrations of NAAQS in the State, permit data, and modeling updates based upon updated emission inventories, and modeling for new or revised NAAQS to determine whether revisions to the NAAQS evaluation requirements detailed below are necessary. If the Department determines that it is necessary and appropriate to revise or create new modeling requirements for minor NSR permitting, the Department shall do so through a NAAQS SIP revision.

4.2.2.1 PM_{10} NAAQS Evaluation Requirements

For minor NSR permitting actions on proposed construction of new stationary sources with PM_{10} emissions of 100 tpy or greater, the owner/operator shall demonstrate that the construction will not interfere with maintenance or attainment of the 24-hour PM_{10} NAAQS using air dispersion modeling, unless an alternative demonstration method is approved by the Department. For minor NSR permitting actions, existing stationary sources proposing a modification that will result in a net PM_{10} emissions increase of 100 tpy or greater shall demonstrate that the modification will not interfere with maintenance or attainment of the 24-hour PM_{10} NAAQS using air dispersion modeling, unless an alternative demonstration method is approved by the Department.

4.2.2.1.1 Consideration of the factors in Ark. Code Ann. § 8-4-312

Per Ark. Code Ann. § 8-4-317, the Department must demonstrate reasoned consideration of the factors in exercising the ADEQ's powers and responsibilities codified in Ark. Code Ann. § 8-4-312 for any new emission limit, work practice or operational standard, environmental standard, analytical method, air dispersion modeling requirement, or monitoring requirement that is incorporated as an element of a proposed SIP submittal. Table 4 provides a written explanation of the Department's rationale for the modeling requirements for PM_{10} NAAQS and the Department's consideration of the factors in Ark. Code Ann. § 8-4-312, as applicable.

Table 4. Consideration of the Factors in Ark. Code. Ann. § 8-4-312 in Setting NAAQS Evaluation Requirements for PM_{10}

Ark. Code Ann. § 8-4-312 Factors	Consideration of the Factors
(1) The quantity and characteristics of air contaminants and the duration of their presence in the atmosphere that may cause air pollution	PM_{10} consists of particles, between 2.5 and 10 micrometers (μm) in diameter. These particles may be generated by grinding or crushing operations, mineral processing, agricultural

in a particular area of the state;	operations, fuel combustion, and fires, among others. These particles originate from a variety of mobile and stationary sources and their chemical composition varies widely. PM_{10} particles generally do not stay suspended in the atmosphere or travel long distances, as finer particles do, and often settle out in areas relatively near their sources.
(2) Existing physical conditions and topography;	Physical conditions and topography may affect the fate and transport of PM_{10} in the atmosphere. Since PM_{10} is emitted from many sources, both mobile and stationary throughout the State, the effects of physical conditions and topography are highly variable from one area of the state to another.
(3) Prevailing wind directions and velocities;	Prevailing wind directions and velocities may affect fate and transport of PM_{10}. Since PM_{10} is emitted from many sources, both mobile and stationary throughout the State, the effects of wind directions and velocities are highly variable from one area of the state to another.
(4) Temperatures and temperature-inversion periods, humidity, and other atmospheric conditions;	Temperature and temperature-inversion periods, humidity, and other atmospheric conditions may affect fate and transport of PM_{10}. Since PM_{10} is emitted from many sources, both mobile and stationary throughout the State, temperatures and temperature-inversion periods, humidity, and other atmospheric conditions are highly variable from one area of the state to another.
(5) Possible chemical reactions between air contaminants or between such air contaminants and air gases, moisture, or sunlight;	PM_{10} is a mixture of materials that can include smoke, soot, dust, salt, acids, and metals and may also contain particles resulting from reactions of gases emitted from vehicles and industrial processes.
(6) The predominant character of development of the area of the state such as residential,	This factor is not applicable to setting a statewide threshold at which the Department

highly developed industrial, commercial, or other characteristics	deems it necessary to evaluate the ambient air quality impact for PM_{10} sources for minor NSR permitting actions.
(7) Availability of air-cleaning devices;	This factor is not applicable to setting a statewide threshold at which the Department deems it necessary to evaluate the ambient air quality impact for PM_{10} sources for minor NSR permitting actions.
(8) Economic feasibility of air-cleaning devices	This factor is not applicable to setting a statewide threshold at which the Department deems it necessary to evaluate the ambient air quality impact for PM_{10} sources for minor NSR permitting actions.
(9) Effect on normal human health of particular air contaminants	PM_{10} is small enough to enter the respiratory tract as inhaled particles. Inhalation of PM_{10} can increase the frequency and severity of asthma attacks, cause or aggravate bronchitis and other lung diseases, and reduce the body's ability to fight infections. Certain populations may be more sensitive to the effects of particulate pollution than others. These include children, the elderly, exercising adults, and those with pre-existing lung disease. Ambient air quality modeling analysis is a tool used by ADEQ to assess the likely air quality impacts of a stationary source under proposed permit conditions. This tool assists ADEQ in ensuring that permitted stationary sources will be constructed or modified to operate without interfering with attainment or maintenance of the NAAQS. Performing modeling for the PM_{10} NAAQS for emission increases of 100 tpy or more will enable ADEQ to ensure that permitting of relatively large emission increases will not interfere with attainment or maintenance of the NAAQS and prevent exposures to concentrations of PM_{10} that may have a deleterious effect on human health. The

	Department may allow an alternative demonstration submitted by the permittee in lieu of modeling if the Department deems that such a method is sufficiently robust as to ensure that the proposed emission increase will not interfere with attainment or maintenance of the NAAQS.
(10) Effect on efficiency of industrial operation resulting from use of air-cleaning devices;	This factor is not applicable to setting a statewide threshold at which the Department deems it necessary to evaluate the ambient air quality impact for PM_{10} sources for minor NSR permitting actions.
(11) The extent of danger to property in the area reasonably to be expected from any particular air contaminant;	Acidic PM_{10} particles may damage certain man-made materials. Additionally, PM_{10} contributes to reduced visibility in many parts of the United States. NAAQS developed for various pollutants by EPA are designed to be protective of human health and the environment. PM_{10} levels below the NAAQS should not reasonably be expected to endanger property within Arkansas. Performing modeling for PM_{10} for proposed emission increases of 100 tpy or greater will assist ADEQ in ensuring that permitted stationary sources will be constructed or modified to operate without interfering with attainment or maintenance of the NAAQS. The Department may allow an alternative demonstration submitted by the permittee in lieu of modeling if the Department deems that such a method is sufficiently robust as to ensure that the proposed emission increase will not interfere with attainment or maintenance of the NAAQS.
(12) Interference with reasonable enjoyment of life by persons in the area and conduct of established enterprises that can reasonably be	NAAQS developed for various pollutants by EPA are designed to be protective of human health and the environment. Pollutant levels at or below these levels would not be expected to

expected from air contaminants;	interfere with reasonable enjoyment of life by persons in the area. Modeling ambient air quality analysis is a tool used by ADEQ to assess the likely air quality impacts of a stationary source under proposed permit conditions. This tool assists ADEQ in ensuring that permitted stationary sources will be constructed or modified to operate without interfering with attainment or maintenance of the NAAQS. Performing modeling for the PM_{10} NAAQS for emission increases of 100 tpy or more will enable ADEQ to ensure that permitting of relatively large emission increases will not interfere with attainment or maintenance of the NAAQS or interfere with enjoyment of life and conduct of established enterprises within the State. The Department may allow an alternative demonstration submitted by the permittee in lieu of modeling if the Department deems that such a method is sufficiently robust as to ensure that the proposed emission increase will not interfere with attainment or maintenance of the NAAQS.
(13) The volume of air contaminants emitted from a particular class of air contamination sources;	According to national emissions inventory (NEI) data, 2011emissions of PM_{10} in Arkansas totaled 469,045 tons. Percentages from various sources are as follows: Dust – 46.3 %; Agriculture (28.9 %); Fires (18.4 %); Industrial (2.1 %); Mobile (1.7 %); Fuel Combustion (1.3 %); Miscellaneous (1.1 %); Solvent (0.00002 %).
(14) The economic and industrial development of the state and the social and economic value of the air contamination sources;	Minor source construction or modification activities that will cause an increase in PM_{10} emissions greater than 100 tpy will be required to demonstrate compliance with the 24-hour PM_{10} NAAQS by means of air dispersion modeling, unless the Department approves an

	alternative demonstration method. Air dispersion modeling costs may range from \$2,000 to \$10,000 per pollutant. Air contamination sources that will be subject to NAAQS compliance demonstrations yield significant economic benefits to the state and provide Arkansans with jobs. Setting the threshold for modeling at 100 tpy allows ADEQ to assess whether a proposed emission increase above the EPA-defined major source threshold would be likely to interfere with attainment or maintenance of the NAAQS while not requiring modeling for emission increases that are unlikely to adversely impact attainment and maintenance of the NAAQS. Thus establishing a 100 tpy threshold for NAAQS evaluation requirements for non-PSD sources provides a balanced approach to both economic development and environmental protection.
(15) The maintenance of public enjoyment of the state's natural resources; and	PM_{10} is associated with respiratory health issues, visibility impairment, and damage to certain man-made materials under certain circumstances. NAAQS developed for various pollutants by EPA are designed to be protective of human health and the environment. Pollutant levels at or below these levels would not be expected to interfere with public enjoyment of the State's natural resources. Modeling ambient air quality analysis is a tool used by ADEQ to assess the likely air quality impacts of a stationary source under proposed permit conditions. This tool assists ADEQ in ensuring that permitted stationary sources will be constructed or modified to operate without interfering with attainment or maintenance of the NAAQS. Performing modeling for the

	PM_{10} NAAQS for proposed emission increases of 100 tpy or greater will enable ADEQ to ensure that permitting of relatively large emission increases will not interfere with attainment or maintenance of the NAAQS or interfere with public enjoyment of the State's natural resources. The Department may allow an alternative demonstration submitted by the permittee in lieu of modeling if the Department deems that such a method is sufficiently robust as to ensure that the proposed emission increase will not interfere with attainment or maintenance of the NAAQS.
(16) Historical Modeling for Minor NSR Permitting	Beginning in the mid-1990s, the Air Permits Branch of ADEQ conducted dispersion modeling for all Title V permits in accordance with an established protocol. This protocol, among other things, required modeling for criteria pollutants permitted for 100 tpy emissions or greater. Because of the nature of PM_{10} emission sources and background levels, PM_{10} was modeled regardless of permitted emission rates. This protocol is no longer in effect. The typical scenario was for ADEQ to conduct an initial screening model. If results were less than 50 % of NAAQS, no further evaluation was done. If the results were greater than 50 %, background was added and the result compared to the NAAQS. If total concentrations, predicted values plus background, were over the NAAQS, the facility was contacted for refined modeling analysis. The results of this modeling were summarized in the Statement of Basis for each permit issued. As part of NAAQS SIP development, the Air Permit Branch compiled a list of every Title V issued in Arkansas; this consisted of 365

	facilities (2039 permit versions issued). This list is included in the "Historical Title V Modeling Results Technical Support Document" in Appendix G. Approximately 240 of the facilities had modeling results, the remainder did not, mainly because they fell below the then applicable modeling thresholds. Single or multiple pollutants may have been included in any specific facility modeling. Any ADEQ modeling result over 50 % of the NAAQS was then identified for further investigation, including the addition of background values. Historical modeling by the Department has shown no correlation between PM_{10} emission rates and predicted impacts to attainment and maintenance of the 24-hour PM_{10} NAAQS. This is probably due to the wide variation in PM emission sources and the tendency of these sources to be fugitive or otherwise with minimal dispersion. These types of sources are also the most difficult to model; emission rates are questionable and the performance of the actual model is questionable in predicting these impacts. Past permit review has resulted in some control requirements. The most common has been controlling fugitive dust from roads, but there have been other controls (Dust control nozzles, baghouses on PM sources, etc.). The 100 tpy threshold for modeling of the 24-hour PM_{10} NAAQS for minor NSR construction or modification permitting was selected based on the EPA-defined major source emission rate.

4.2.2.2 SO_2 NAAQS Evaluation Requirements

For minor NSR permitting actions on proposed construction of new stationary sources with SO_2 emissions of 100 tpy or greater, the owner/operator shall demonstrate that the construction will not interfere with maintenance or attainment of the 1-hour SO_2 NAAQS using air dispersion modeling, unless an alternative demonstration method is approved by the Department. For minor NSR permitting actions, existing stationary sources proposing a modification that will result in a net SO_2 emissions increase of 100 tpy or greater shall demonstrate that the modification will not interfere with maintenance or attainment of the 1-hour SO_2 NAAQS using air dispersion modeling, unless an alternative demonstration method is approved by the Department. Demonstrating that a proposed construction or modification would not interfere with maintenance or attainment of the 1-hour SO_2 NAAQS is sufficient to demonstrate that the construction or modification would not interfere with the less stringent 3-hour SO_2 NAAQS.

4.2.2.2.1 Consideration of the factors in Ark. Code Ann. § 8-4-312

Per Ark. Code Ann. § 8-4-317, the Department must demonstrate reasoned consideration of the factors in exercising the ADEQ's powers and responsibilities codified in Ark. Code Ann. § 8-4-312 for any new emission limit, work practice or operational standard, environmental standard, analytical method, air dispersion modeling requirement, or monitoring requirement that is incorporated as an element of a proposed SIP submittal. Table 5 provides a written explanation of the Department's rationale for the modeling requirements for SO_2 and the Department's consideration of the factors in Ark. Code Ann. § 8-4-312, as applicable.

Table 5. Consideration of the Factors in Ark. Code. Ann. § 8-4-312 in Setting NAAQS Evaluation Requirements for SO_2

Ark. Code Ann. § 8-4-312 Factors	Consideration of the Factors
(1) The quantity and characteristics of air contaminants and the duration of their presence in the atmosphere that may cause air pollution in a particular area of the state;	SO_2 is one of a group of highly reactive gasses known as "oxides of sulfur." The largest sources of SO_2 emissions are from fossil fuel combustion at power plants (73 %) and other industrial facilities (20 %). Smaller sources of SO_2 emissions include industrial processes such as extracting metal from ore, and the burning of high sulfur containing fuels by locomotives, large ships, and nonroad equipment. While SO_2 tends not to be transported long distances in its original form, it does react with other pollutants and water vapor to form fine particulates and acidic aerosols that may be transported long

	distances. It also contributes to acid rain.
(2) Existing physical conditions and topography;	Physical conditions and topography may affect the fate and transport of SO_2 in the atmosphere. Since SO_2 is emitted from many sources, both mobile and stationary throughout the State, the effects of physical conditions and topography are highly variable from one area of the State to another.
(3) Prevailing wind directions and velocities;	Prevailing wind directions and velocities may affect the fate and transport of SO_2. Since SO_2 is emitted from many sources, both mobile and stationary throughout the State, the effects of wind directions and velocities are highly variable from one area of the State to another.
(4) Temperatures and temperature-inversion periods, humidity, and other atmospheric conditions;	Temperature and temperature-inversion periods, humidity, and other atmospheric conditions may affect the fate and transport of SO_2. Since SO_2 is emitted from many sources, both mobile and stationary throughout the State, temperatures and temperature-inversion periods, humidity, and other atmospheric conditions are highly variable from one area of the State to another.
(5) Possible chemical reactions between air contaminants or between such air contaminants and air gases, moisture, or sunlight;	SO_2 is highly reactive and does not tend to travel great distances in its original form. It can, however, react with other pollutants and/or water vapor to form fine particulates and acidic aerosols. Once formed, these particles/aerosols may remain in the atmosphere for long periods and travel hundreds of miles.
(6) The predominant character of development of the area of the state such as residential, highly developed industrial, commercial, or other characteristics	This factor is not applicable to setting a statewide threshold at which the Department deems it necessary to evaluate the ambient air quality impact for SO_2 sources for minor NSR permitting actions.

(7) Availability of air-cleaning devices;	This factor is not applicable to setting a statewide threshold at which the Department deems it necessary to evaluate the ambient air quality impact for SO_2 sources for minor NSR permitting actions.
(8) Economic feasibility of air-cleaning devices	This factor is not applicable to setting a statewide threshold at which the Department deems it necessary to evaluate the ambient air quality impact for SO_2 sources for minor NSR permitting actions.
(9) Effect on normal human health of particular air contaminants	Current scientific evidence links short-term exposures to SO_2, ranging from five minutes to 24 hours, with an array of adverse respiratory effects, including bronchoconstriction and increased asthma symptoms. These effects are particularly important for asthmatics at elevated ventilation rates (e.g., while exercising or playing). Modeling ambient air quality analysis is a tool used by ADEQ to assess the likely air quality impacts of a stationary source under proposed permit conditions. This tool assists ADEQ in ensuring that permitted stationary sources will be constructed or modified to operate without interfering with attainment or maintenance of the NAAQS. Performing modeling for the 1-hour SO_2 NAAQS for emission increases of 100 tpy or more will enable ADEQ to ensure that permitting of relatively large emission increases will not interfere with attainment or maintenance of the NAAQS and will prevent exposures to concentrations of SO_2 that may have a deleterious effect on human health. The Department may allow an alternative demonstration submitted by the permittee in lieu of modeling if the Department deems that such a method is sufficiently robust as to ensure that the proposed emission increase will

	not interfere with attainment or maintenance of the NAAQS.
(10) Effect on efficiency of industrial operation resulting from use of air-cleaning devices;	This factor is not applicable to setting a statewide threshold at which the Department deems it necessary to evaluate the ambient air quality impact for SO_2 sources for minor NSR permitting actions.
(11) The extent of danger to property in the area reasonably to be expected from any particular air contaminant;	SO_2 is a precursor to sulfates, which are associated with acidification of lakes and streams, and accelerated corrosion of buildings and monuments. SO_2 also contributes to formation of fine particulate matter. Modeling ambient air quality analysis is a tool used by ADEQ to assess the likely air quality impacts of a stationary source under proposed permit conditions. This tool assists ADEQ in ensuring that permitted stationary sources will be constructed or modified to operate without interfering with attainment or maintenance of the NAAQS. The secondary 3-hour NAAQS for SO_2 is set to protect against damage to animals, crops, vegetation; therefore, performing modeling for the 1-hour SO_2 NAAQS, which is more stringent than the 3-hour NAAQS, for proposed emission increases of 100 tpy or greater will assist ADEQ in ensuring that permitted stationary sources will be constructed or modified to operate without interfering with attainment or maintenance of the secondary NAAQS. The Department may allow an alternative demonstration submitted by the permittee in lieu of modeling if the Department deems that such a method is sufficiently robust as to ensure that the proposed emission increase will not interfere with attainment or maintenance of the

	NAAQS.
(12) Interference with reasonable enjoyment of life by persons in the area and conduct of established enterprises that can reasonably be expected from air contaminants;	NAAQS developed for various pollutants by EPA are designed to be protective of human health and the environment. Pollutant levels at or below these levels would not be expected to interfere with reasonable enjoyment of life by persons in the area. Modeling ambient air quality analysis is a tool used by ADEQ to assess the likely air quality impacts of a stationary source under proposed permit conditions. This tool assists ADEQ in ensuring that permitted stationary sources will be constructed or modified to operate without interfering with attainment or maintenance of the NAAQS. The primary 1-hour NAAQS for SO_2 is set to protect public health; therefore, performing modeling for proposed emission increases of 100 tpy or greater will enable ADEQ to ensure that minor NSR permitting of relatively large emission increases will not interfere with attainment or maintenance of the NAAQS or interfere with reasonable enjoyment of life and conduct of established enterprises from this pollutant. The Department may allow an alternative demonstration submitted by the permittee in lieu of modeling if the Department deems that such a method is sufficiently robust as to ensure that the proposed emission increase will not interfere with attainment or maintenance of the NAAQS.
(13) The volume of air contaminants emitted from a particular class of air contamination sources;	According to National Emission Inventory (NEI) data, 93,200 tpy of SO_2 were emitted from sources in Arkansas in 2011. Percentages from various sources are as follows: fuel combustion (85 %); fires (8 %); industrial processes (6 %); mobile (0.7 %); solvents

	(0.00001%); and miscellaneous (0.09 %).
(14) The economic and industrial development of the state and the social and economic value of the air contamination sources;	Minor source construction or modification activities that will cause an increase in SO_2 emissions greater than 100 tpy will be required to demonstrate compliance with the 1-hour SO_2 NAAQS by means of air dispersion modeling, unless the Department approves an alternative demonstration method. Air dispersion modeling costs may range from \$2,000 to \$10,000 per pollutant. Air contamination sources that will be subject to NAAQS compliance demonstrations yield significant economic benefits to the state and provide Arkansans with jobs. Setting the threshold for modeling at 100 tpy allows ADEQ to assess whether a proposed emission increase above the EPA-defined major source threshold would be likely to interfere with attainment or maintenance of the NAAQS while not requiring modeling for emission increases that are unlikely to adversely impact attainment and maintenance of the NAAQS. Thus establishing a 100 tpy threshold for NAAQS evaluation requirements for non-PSD sources provides a balanced approach to both economic development and environmental protection.
(15) The maintenance of public enjoyment of the state's natural resources; and	SO_2 can have many undesirable effects in the environment. Fine particles, of which sulfates derived from SO_2 are a constituent, are the main cause of reduced visibility (haze) in parts of the United States, including many national parks and wilderness areas. SO_2 contributes to acidification of lakes and streams and to acid rain, which may encourage corrosion and damage buildings and monuments made from stone and some other materials. Ambient air quality modeling analysis is a tool

	used by ADEQ to assess the likely air quality impacts of a stationary source under proposed permit conditions. This tool assists ADEQ in ensuring that permitted stationary sources will be constructed or modified to operate without interfering with attainment or maintenance of the NAAQS. Performing modeling for the 1-hour SO_2 NAAQS for proposed emission increases of 100 tpy or greater will enable ADEQ to ensure that minor NSR permitting of relatively large emission increases will not interfere with attainment or maintenance of the NAAQS or interfere with public enjoyment of the State's natural resources. The Department may allow an alternative demonstration submitted by the permittee in lieu of modeling if the Department deems that such a method is sufficiently robust as to ensure that the proposed emission increase will not interfere with attainment or maintenance of the NAAQS.
(16) Historical Modeling for Minor NSR Permitting	Beginning in the mid-1990s, the Air Permits Branch of ADEQ conducted dispersion modeling for all Title V permits in accordance with an established protocol. This protocol, among other things, required modeling for criteria pollutants permitted for 100 tpy emissions or greater. Because of the nature of PM_{10} emission sources and background levels, PM_{10} was modeled regardless of permitted emission rates. This protocol is no longer in effect. The typical scenario was for ADEQ to conduct an initial screening model. If results were less than 50 % of NAAQS, no further evaluation was done. If results were greater than 50 %, background was added and the result compared to the NAAQS. If total concentrations,

	predicted values plus background, were over the NAAQS, the facility was contacted for refined modeling analysis. The results of this modeling were summarized in the Statement of Basis for each permit issued. As part of NAAQS SIP development, the Air Permit Branch compiled a list of every Title V issued in Arkansas; this consisted of 365 facilities (2039 permit versions issued). This list is included in the "Historical Title V Modeling Results Technical Support Document" in Appendix G. Approximately 240 of the facilities had modeling results, the remainder did not, mainly because they fell below the then applicable modeling thresholds. Single or multiple pollutants may have been included in any specific facility modeling. Any ADEQ modeling result over 50 % of the NAAQS was then identified for further investigation, including the addition of background values. There were eight instances of the 3-hour SO_2 impacts predicted at 50 % of the 3-hour SO_2 NAAQS. Except for the case of some emergency diesel generators (LM Windpower) and the TEC unit at Riceland, emission rates modeled were in excess of 600 lb/hr. The LM scenario is an unrealistic event and the Riceland results were less than 52 % of the NAAQS. It does not appear that emission rates below major NSR levels would ever indicate a 3-hour SO_2 NAAQS compliance issue. The primary 1-hour SO_2 NAAQS is a relatively new standard (2010) and the ADEQ does not have experience modeling for this standard for minor NSR permitting actions. Because of the much stricter 1-hour values and the shorter averaging times, any comparison to

	past modeling would not suffice to assure compliance with these NAAQS. The 100 tpy threshold for modeling of the primary 1-hour SO_2 NAAQS for minor NSR construction or modification permitting was selected based on the EPA-defined major source emission rate.

4.2.2.3 NO_2 NAAQS Evaluation Requirements

For minor NSR permitting actions on proposed construction of new stationary sources with NOx emissions of 100 tpy or greater, the owner/operator shall demonstrate that the construction will not interfere with maintenance or attainment of with the 1-hour NO_2 NAAQS using air dispersion modeling, unless an alternative demonstration method is approved by the Department. For minor NSR permitting actions, existing stationary sources proposing a modification that will result in a net NOx emissions increase of 100 tpy or greater shall demonstrate that the modification will not interfere with maintenance or attainment of the 1-hour NO_2 NAAQS using air dispersion modeling, unless an alternative demonstration method is approved by the Department. Modeling for the annual NO_2 NAAQS is not required for minor NSR construction or modification activities.

4.2.2.3.1 Consideration of the factors in Ark. Code Ann. § 8-4-312

Per Ark. Code Ann. § 8-4-317, the Department must demonstrate reasoned consideration of the factors in exercising the ADEQ's powers and responsibilities codified in Ark. Code Ann. § 8-4-312 for any new emission limit, work practice or operational standard, environmental standard, analytical method, air dispersion modeling requirement, or monitoring requirement that is incorporated as an element of a proposed SIP submittal. Table 6 provides a written explanation of the Department's rationale for the modeling requirements for NO_2 NAAQS and the Department's consideration of the factors in Ark. Code Ann. § 8-4-312, as applicable.

Table 6. Consideration of the Factors in Ark. Code. Ann. § 8-4-312 in Setting NAAQS Evaluation Requirements for NO_2

Ark. Code Ann. § 8-4-312 Factors	Consideration of the Factors
(1) The quantity and characteristics of air contaminants and the duration of their presence in the atmosphere that may cause air pollution in a particular area of the state;	NO_2 is one of a group of highly reactive gases known as "oxides of nitrogen," or "nitrogen oxides" (NOx). Other nitrogen oxides include nitrous acid and nitric acid. EPA's NAAQS uses NO_2 as the indicator for the larger group of nitrogen oxides. NO_2 forms quickly from emissions from cars, trucks and buses, power

	plants, and off-road equipment.[31] NOx may be transported for long distances and may react with other pollutants or water vapor to form secondary pollutants.
(2) Existing physical conditions and topography;	Physical conditions and topography may affect fate and transport of NO_2 in the atmosphere. Since NO_2 is emitted from many sources, both mobile and stationary throughout the State, the effects of physical conditions and topography are highly variable from one area of the State to another.
(3) Prevailing wind directions and velocities;	Prevailing wind directions and velocities may affect the fate and transport of NO_2. Since NO_2 is emitted from many sources, both mobile and stationary throughout the State, the effects of wind directions and velocities are highly variable from one area of the state to another.
(4) Temperatures and temperature-inversion periods, humidity, and other atmospheric conditions;	Temperature and temperature-inversion periods, humidity, and other atmospheric conditions may affect the fate and transport of NO_2. Since NO_2 is emitted from many sources, both mobile and stationary throughout the State, temperatures and temperature-inversion periods, humidity, and other atmospheric conditions are highly variable from one area of the State to another.
(5) Possible chemical reactions between air contaminants or between such air contaminants and air gases, moisture, or sunlight;	NO_2 and other NOx, SO_2, and VOCs, emitted from a variety sources, along with water vapor may react in the atmosphere to form sulfates, nitrates, and other types of fine particles. NO_2 and other NOx also contribute to ozone formation.
(6) The predominant character of development of the area of the state such as residential, highly developed industrial, commercial, or	This factor is not applicable to setting a statewide threshold at which the Department deems it necessary to evaluate the ambient air

[31] EPA Nitrogen Dioxide – Retrieved frm http://www3.epa.gov/airquality/nitrogenoxides/index.html

other characteristics	quality impact for NO_2 sources for minor NSR permitting actions.
(7) Availability of air-cleaning devices;	This factor is not applicable to setting a statewide threshold at which the Department deems it necessary to evaluate the ambient air quality impact for NO_2 sources for minor NSR permitting actions.
(8) Economic feasibility of air-cleaning devices	This factor is not applicable to setting a statewide threshold at which the Department deems it necessary to evaluate the ambient air quality impact for NO_2 sources for minor NSR permitting actions.
(9) Effect on normal human health of particular air contaminants	Exposure to NO_2 occurs through inhalation. Scientific studies link short-term NO_2 exposures, ranging from 30 minutes to 24 hours, with adverse respiratory effects including airway inflammation in healthy people and increased respiratory symptoms in people with asthma. Also, studies show a connection between breathing elevated short-term NO_2 concentrations, and increased visits to emergency departments and hospital admissions for respiratory issues, especially asthma. NO_2 exposure concentrations near roadways are of particular concern for susceptible individuals, including people with asthma and other respiratory conditions, children, and the elderly. NO_2 and other NOx react with ammonia, moisture, and other compounds to form small particles. These small particles can penetrate deeply into sensitive parts of the lungs and can cause or worsen respiratory disease, such as emphysema and bronchitis, and can aggravate existing heart disease,

	leading to increased hospital admissions and premature death.[32] Ambient air quality modeling analysis is a tool used by ADEQ to assess the likely air quality impacts of a stationary source under proposed permit conditions. This tool assists ADEQ in ensuring that permitted stationary sources will be constructed or modified without interfering with attainment of maintenance of the NAAQS. Performing modeling for the 1-hour NO_2 NAAQS for emission increases of 100 tpy or more will enable ADEQ to ensure that minor NSR permitting of relatively large emission increases will not interfere with attainment or maintenance of the NAAQS and will prevent acute exposures to concentrations of NO_2 that may have a deleterious effect on human health. The Department may allow an alternative demonstration submitted by the permittee in lieu of modeling if the Department deems that such a method is sufficiently robust as to ensure that the proposed emission increase will not interfere with attainment or maintenance of the NAAQS. Based on historical modeling of Title V sources by the air permit branch of ADEQ, it does not appear likely that emission rates below major NSR levels would ever indicate an primary and secondary annual NO_2 NAAQS compliance issue set to protect human health and the environment; therefore, minor source construction or modification activities in the State are not expected to cause long-term exposures to concentrations of NO_2 that may have a deleterious effect on human health.
(10) Effect on efficiency of industrial operation	This factor is not applicable to setting a statewide threshold at which the Department

[32] EPA Nitrogen Dioxide - Health – Retrieved from http://www3.epa.gov/airquality/nitrogenoxides/health.html

resulting from use of air-cleaning devices;	deems it necessary to evaluate the ambient air quality impact for NO_2 sources for minor NSR permitting actions.
(11) The extent of danger to property in the area reasonably to be expected from any particular air contaminant;	NO_2 is an ingredient of acid rain (acid aerosols), which can damage stone used on buildings, statues, monuments, as well as vegetation and waterways. Acid aerosols can also reduce visibility.[33] NAAQS developed for various pollutants by EPA are designed to be protective of human health and the environment. Based on historical modeling of Title V sources by the air permit branch of ADEQ, it does not appear likely that emission rates below major NSR levels would ever indicate an primary and secondary annual NO_2 NAAQS compliance issue set to protect human health and the environment; therefore, minor source construction or modification activities in the State are not expected to endanger property within Arkansas.
(12) Interference with reasonable enjoyment of life by persons in the area and conduct of established enterprises that can reasonably be expected from air contaminants;	NAAQS developed for various pollutants by EPA are designed to be protective of human health and the environment. Pollutant levels at or below these levels would not be expected to interfere with reasonable enjoyment of life by persons in the area. Ambient air quality modeling analysis is a tool used by ADEQ to assess the likely air quality impacts of a stationary source under proposed permit conditions. This tool assists ADEQ in ensuring that permitted stationary sources will be constructed or modified to operate without interfering with attainment or maintenance of the NAAQS.

[33] Source: http://www.fairfaxcounty.gov/hd/air/airpollutants.htm

	The primary standards for NO_2 were developed to protect human health, and the secondary standard to protect public welfare; therefore, performing modeling for the 1-hour NO_2 NAAQS for proposed emission increases of 100 tpy or greater will enable ADEQ to ensure that minor NSR permitting of relatively large emission increases will not interfere with attainment or maintenance of the NAAQS or interfere with enjoyment of life and conduct of established enterprises within the State. The Department may allow an alternative demonstration submitted by the permittee in lieu of modeling if the Department deems that such a method is sufficiently robust as to ensure that the proposed emission increase will not interfere with attainment or maintenance of the NAAQS.
(13) The volume of air contaminants emitted from a particular class of air contamination sources;	According to EPA National Emissions Inventory (NEI) data, 257,601 tpy of NO_2 were emitted from sources in Arkansas in 2011. Percentages from various sources were as follows: mobile sources (52.22 %); fuel combustion (23.59 %); biogenics (9.83 %); industrial processes (8.18 %); Fires (5.68 %); miscellaneous (0.48 %); solvents (0.02 %).
(14) The economic and industrial development of the state and the social and economic value of the air contamination sources;	Minor source construction or modification activities that will cause an increase in NO_2 emissions greater than 100 tpy will be required to demonstrate compliance with the annual NO_2 NAAQS by means of air dispersion modeling, unless the Department approves an alternative demonstration method. Air dispersion modeling costs may range from \$2,000 to \$10,000 per pollutant. Air contamination sources that will be subject to NAAQS compliance demonstrations yield significant economic benefits to the state and

	provide Arkansans with jobs. Setting the threshold for modeling at 100 tpy allows ADEQ to assess whether a proposed emission increase above the EPA-defined major source threshold would be likely to interfere with attainment or maintenance of the NAAQS while not requiring modeling for emission increases that are unlikely to adversely impact attainment and maintenance of the NAAQS provides a balanced approach to both economic development and environmental protection
(15) The maintenance of public enjoyment of the state's natural resources; and	NO_2 contributes to the formation of ground-level ozone and fine particulate matter. In addition, it is associated with a number of adverse effects on the respiratory system. The primary NAAQS for NO_2, set by EPA at 53 ppb (annual) and 100 ppb (hourly) are designed to be protective of human health. The secondary standard of 53 ppb (annual) is designed to protect the public welfare. Ambient air quality modeling analysis is a tool used by ADEQ to assess the likely air quality impacts of a stationary source under proposed permit conditions. This tool assists ADEQ in ensuring that permitted stationary sources will be constructed or modified to operate without interfering with attainment or maintenance of the NAAQS. Performing modeling for the NO_2 NAAQS for proposed emission increases of 100 tpy or greater will enable ADEQ to ensure that minor NSR permitting of relatively large emission increases will not interfere with attainment or maintenance of the NAAQS or interfere with the enjoyment of the State's natural resources. The Department may allow an alternative demonstration submitted by the permittee in lieu of modeling if the Department deems that such a method is sufficiently robust as to ensure that the proposed emission

	increase will not interfere with attainment or maintenance of the NAAQS.
(16) Other factors that the department or the commission may find applicable.	Beginning in the mid-1990s, the air permits branch of ADEQ conducted dispersion modeling for all Title V permits in accordance with an established protocol. This protocol, among other things, required modeling for criteria pollutants permitted for 100 tpy emissions or greater. Because of the nature of PM_{10} emission sources and background levels, PM_{10} was modeled regardless of permitted emission rates. This protocol is no longer in effect. The typical scenario was for ADEQ to conduct an initial screening model. If results were less than 50 % of NAAQS, no further evaluation was done. If results were greater than 50 %, background was added and the result compared to the NAAQS. If total concentrations, predicted values plus background were over the NAAQS, the facility was contacted for refined modeling analysis. The results of this modeling were summarized in the Statement of Basis for each permit issued. As part of NAAQS SIP development, the Air Permit Branch compiled a list of every Title V permit issued in Arkansas; this consisted of 365 facilities (2039 permit versions issued). This list is included in the "Historical Title V Modeling Results Technical Support Document" in Appendix G. Approximately 240 of the facilities had modeling results, the remainder did not, mainly because they fell below the then applicable modeling thresholds. Single or multiple pollutants may have been included in any specific facility modeling. Any ADEQ modeling result over 50 % of the NAAQS was then identified for further

	investigation, including the addition of background values. Annual NOx impacts approached the NAAQS on multiple occasions. There is no consistency or pattern of emission rates versus impact; however, the impacts did not approach 90 % of the NAAQS until around an equivalent emission rate of 250 tpy. It does not appear that emission rates below major NSR levels would ever indicate an annual NO_2 NAAQS compliance issue. The primary 1-hour NO_2 NAAQS is a relatively new standard (2010) and the ADEQ does not experience modeling for this standard for minor NSR permitting actions. The 100 tpy threshold for modeling of the primary 1-hour NO_2 NAAQS for minor NSR construction or modification permitting was selected based on the EPA-defined major source emission rate.

Appendix A

Current Voluntary Control Measures for Protection of the National Ambient Air Quality Standards in Arkansas

Current Voluntary Control Measures for Protection of the National Ambient Air Quality Standards in Arkansas

1. Forestry Smoke Management

40 C.F.R. § 51.308 (d)(3)(v)(E) requires Arkansas to consider smoke management techniques for the purposes of agricultural and forestry management. In 2007, the Arkansas Forestry Commission (AFC), approved revisions to the Arkansas Smoke Management Plan (SMP). The Arkansas SMP is designed to assure that prescribed fires are planned and executed in a manner designed to minimize impacts associated with the smoke produced by prescribed fires. A copy of the SMP may be found at:

http://forestry.arkansas.gov/Services/KidsTeachersEveryone/Documents/ArkansasVSMG.pdf

Arkansas has adopted a basic SMP, in which owners/managers voluntarily notify state officials of fire plans. Arkansas's SMP recommends a written fire plan that includes measures that can be taken to reduce residual smoke from burning activities. Arkansas's SMP recommends these actions to reduce smoke impacts where applicable:

- Reduce the fuel loading in the area to be burned by mechanical means or by using frequent, low-intensity burns to gradually reduce fuels
- Reduce the amount of fuel consumed by the fire by burning when fuel moistures for larger fuels and duff moistures are high
- Rapid and complete mop-up after the burn or mop-up of certain fuel
- Reference "Smoke Management Guide for Prescribed Fire and Wildland Fire" by National Wildfire Coordinating Group Fire Use Working Team, publication NFES 1279

In addition, the Arkansas SMP has a process to evaluate potential smoke impacts at sensitive receptors and schedule fires to minimize exposure of sensitive populations and avoid visibility impacts in Federal Class I areas. Arkansas's SMP details procedures for the identification of smoke sensitive targets and minimization of their exposure to smoke. Methodologies to reduce smoke exposure include smoke emissions estimates using determination of available fuels and identification of the category day based on local weather conditions forecast.

Arkansas's SMP details the AFC Dispatch Center's role in locating each prescribed fire in the center of an airshed. This system estimates the range, in tons of fuel, that can be allocated to an airshed based upon downwind distance to the nearest smoke sensitive target and monitors the total fuel loading tonnage burned within each air shed, each day, in order to ensure compliance with permissible limits. If the AFC Dispatch center determines that the fuel tonnage for a single prescribed fire causes the air pollution tonnage for a given airshed to exceed these limits, the AFC Dispatch Center will recommend to the prescribed fire manager that the plan should be altered by measures such as delaying the burn and reducing the acreage to be burned.

Arkansas has a public notification process and exposure reduction process in place to reduce the impacts of burning. The AFC, in cooperation with the Arkansas Prescribed Fire Committee, explains the use and importance of fire for ecosystem management, the implications of smoke to public health and safety, and the goals of the SMP. This public awareness effort uses posters, pamphlets, news releases, and public presentations. Prescribed fire managers are encouraged to train on-the-ground personnel to understand the SMP. AFC cooperates with organizations and government agencies such as Arkansas Lung Association or the Arkansas Department of Environmental Quality to make the public aware of planned prescribed fires.

Arkansas's SMP states that monitoring of the smoke from the prescribed fire should match the size of the fire. For small or short duration fires (such as those in grass or leaf litter), visual monitoring of the directions of the smoke plume and monitoring nuisance complaints by the public may be sufficient. Other monitoring techniques include posting personnel on vulnerable roadways to look for visibility impairment and to initiate safety measures for motorists; posting personnel at other smoke sensitive areas to look for smoke intrusions; using aircraft to track the progress of smoke plumes; and continued tracking of meteorological conditions during the fire. For prescribed fires in fuels with longer duration burning (such as timber litter or slash), and which are expected to last more than one day, locating real-time particulate matter (PM) monitors at smoke- sensitive areas may be warranted to facilitate timely response to smoke problems.

The AFC has established a policy to issue health advisories when necessary. State and federal prescribed fire managers routinely notify landowners adjacent to prescribed burns of the potential for exposure to smoke. AFC Dispatch is currently developing a daily listing of planned prescribed fires on the AFC website (www.forestry.state.ar.us). The planned prescribed burn listing will have the county, nearest community, legal description, planned ignition time, and acres of the prescribed burn.

Arkansas's SMP has provisions for an annual review by the Arkansas Forestry Commission that will include the following activities:

- Collect and review information on acres burned by prescribed fire and wildfire
- Review the reference, continuous, and IMPROVE monitoring station data maintained by ADEQ
- Use information from reports of nuisance complaints or significant smoke intrusions to measure the effectiveness of the SMP

- Provide recommendations to ADEQ and Arkansas Prescribed Fire Committee concerning the SMP

Pursuant to the EPA's Interim guidance cited above, Arkansas has adopted a program that should help prevent National Ambient Air Quality Standard (NAAQS) violations and addresses visibility impairment due to fires. This program established the documentation of basic parameters such as: contact information of person in charge, purpose of prescribed bum, fuel type and tonnage, ignition time and duration of fire, wind speed, direction, location, and distance to sensitive receptors. Prescribed fire managers are required under Arkansas law to notify the AFC Dispatch Center on the morning of the prescribed fire by calling 1-800-830-8015. See Ark. Code Ann. § 20-22-302.

2. Ozone Action Days

During May through September, "Ozone Season," ozone forecasts for the Little Rock/North Little Rock Metropolitan Statistical Area (MSA) are conducted on a daily basis. This MSA includes Pulaski, Saline, Faulkner, and Lonoke Counties.

For air quality information throughout the entire year, the ADEQ Air Quality Index (AQI), a measure of overall air quality that identifies the most significant air pollutant for the day, is reported by ADEQ's Technical Services Division on weekdays.

There are now two basic types of Ozone Action Days:

1. An Ozone Action Advisory will be declared when the AQI forecast is code orange, indicating that prolonged outdoor exertion is unhealthy for sensitive groups (i.e., children and persons with asthma or other breathing problems).

2. An Ozone Action Alert will be declared when the AQI forecast is code red, indicating that prolonged outdoor exertion is unhealthy for everyone.

In addition, unusually sensitive people should routinely check the AQI as reported in newspapers and on the radio, television, and the Internet and consider limiting prolonged outdoor exertion when the AQI is code yellow.

A website dedicated to Ozone Action Days information has been set up by Metroplan. ADEQ advises Metroplan on ozone-related issues and provides support.

The Technical Services Division of ADEQ calculates the local Air Quality Index (AQI), not to be confused with the Ozone Forecast. It is a scale used to report risk based on actual levels of ozone and fine particulates. The higher the AQI value the greater the health concern.

3. Diesel Emissions Reduction Act (DERA) Go Red! Program

Through DERA and EPA, funding to reduce diesel emissions is allocated to states. States then have the option to award DERA funds to governmental, non-profit, and private entities on a competitive or first-come, first-served basis. Funding must be used to reduce diesel emissions utilizing exhaust controls, engine upgrades, idling reduction technology, engine replacements or vehicle/equipment replacements. The vehicles/equipment must be medium or heavy-duty diesels to be eligible for funding. ADEQ administers the Go Red! Program and receives applications for projects to reduce diesel emissions in Arkansas. This program has awarded funding assistance to more than 30 entities between 2008 and 2015 to reduce diesel emissions in Arkansas.

Appendix B

Future Consideration for Protection of the National Ambient Air Quality Standards in Arkansas

Future Consideration for Protection of the National Ambient Air Quality Standards in Arkansas

Background

The Department engaged in a series of robust meetings with stakeholders to suggest approaches to protect Arkansas from exceedances of the National Ambient Air Quality Standards (NAAQS). The provisions included in the infrastructure SIP and NAAQS SIP are sufficient to ensure attainment and maintenance of the NAAQS in the State. However, should areas of the State be at risk of nonattainment, the Department would like to present stakeholders' ideas to be used as possible approaches for Arkansas to consider in future revisions of the NAAQS.

Potential Control Strategies and Control Measures for Reducing Particulate Matter

1. Measures to Reduce Road Dust
   - Incentivize paving county roads
   - Use GIS and $PM_{2.5}$ data to identify areas of concern with heavy use including traffic counts and weight impacts
   - Incentivize control measures for unpaved roads such as dust suppression from water trucks, especially during seasonal or short-term periods of heavy traffic
   - Incorporate $PM_{2.5}$ reduction objectives into the Arkansas Unpaved Roads Program

2. Measures to Reduce Particulate Pollution from Wood Debris/Open Burning
   - Develop a wood waste chipping program for mulch
   - Encourage use of wood waste as fuel in wood-fired boilers

3. Measures to Reduce Particulate Pollution from Prescribed Burning
   - Encourage voluntary participation in the Arkansas Forestry Commission's Arkansas Smoke Management Program
   - Involve ADEQ in assisting the Arkansas Forestry Commission with implementation of the Arkansas Smoke Management Program by hiring a meteorologist

4. Measures to Reduce Particulate Pollution from Diesel Vehicles
   - Expand programs such as Go Red! (DERA)
   - Pursue additional money through grants or local venue funding from local sources

Potential Control Strategies and Control Measures for Reducing Ozone

1. Measures to Reduce On-Road Emissions of Ozone Precursors
   - Expansion of Clean Cities Program beyond Central Arkansas
   - Encourage reducing petroleum use in favor of alternative and renewable fuels
   - Encourage smarter driving practices and fuel economy improvements
   - Emphasize ozone issues during the transportation planning process

     a. Improving vehicle movement efficiency
     b. Raise the fuel tax to decrease the number of vehicles on the road and roll back the proceeds of this tax into transportation planning

2. Enact a program similar to the Texas Emission Reduction Program
   - Further information can be found at: https://www.tceq.texas.gov/publications/pd/020/2014/texas-emissions-reduction-plan-(terp)-the-success-continues

3. Encourage Employer-Based Measures to Reduce the Single Occupancy Vehicle Trips
   - Crowdsourcing
   - Natural Gas Van Pooling
   - Rideshare
   - State Government commuting policies, e.g. flex schedules
   - Telecommuting
   - Anti-idling

Conclusion

Although the Department believes that current measures included in the SIP are sufficient to ensure attainment with the NAAQS adopted in this SIP, these measures identified by the stakeholders could be implemented to further reduce emissions of criteria pollutants should the state identify potential areas of Arkansas to be at risk of non-compliance with the NAAQS. In addition to the potential control strategies and measures listed above, stakeholders suggested that the state should use its enforcement authority to ensure that current state and federal regulations achieve intended emissions reductions.

Appendix C

2010 Minor NSR Permitting Thresholds and De Minimis Levels SIP Technical Support Document

ADEQ
A R K A N S A S
Department of Environmental Quality

November 30, 2015

Ms. Ashley Mohr
Environmental Scientist, Air Permits Section
U.S. EPA Region 6
1445 Ross Avenue, Suite 1200, Mail Code: 6PD
Dallas, Texas 75202-2733

Dear Ms. Mohr,

On July 11, 2014, EPA R6 contacted ADEQ regarding the need for additional information on the Arkansas Minor NSR Threshold State Implementation Plan (SIP) revision submitted on July 26, 2010 for EPA's review and approval. In reviewing Arkansas SIP submission, EPA identified two items as significant issues requiring resolution:

1. National Ambient Air Quality Standards Compliance Demonstration for Increased Minor NSR Permitting Thresholds
2. Minor New Source Review Program's Applicability for $PM_{2.5}$

Pursuant to the request for more information regarding the first item, the Arkansas Department of Environmental Quality (ADEQ) has performed technical analyses in support of the current State-effective permit thresholds and De Minimis levels for carbon monoxide (CO), nitrogen oxides (NOx), sulfur dioxide (SO_2), volatile organic compounds (VOC), and particulate matter with an aerodynamic diameter less than or equal to 10 micrometers (PM_{10}), which were revised in 2008 and were submitted to EPA as part of the 2010 Arkansas Minor NSR Threshold State Implementation Plan (SIP) revision. On July 10, 2015, the Arkansas Department of Environmental Quality (ADEQ) submitted a draft technical support document that provided a monitoring based analysis which demonstrated that exempting sources which emit less than the current State-effective permit thresholds and De Minimis levels for CO, NOx, SO_2, VOC, and PM_{10} has not interfered with attainment or maintenance of the NAAQS for CO, NOx, SO_2, ozone, or PM_{10} in the years since these thresholds were revised. Subsequent to this submission, ADEQ has also contracted with ICF International to model the potential impacts of emission increases equal to the revised permit thresholds and De Minimis levels using a combined AERMOD/Community Multiscale Air Quality (CMAQ) analysis. The results of this modeling analysis demonstrate that source which emit less than the revised permit thresholds and De Minimis levels will not cause or contribute to a violation of the NAAQS or interfere with attainment of the NAAQS.

At this time, ADEQ would like to submit the enclosed final technical support document for the 2010 Arkansas Minor NSR Threshold SIP Revision which details the rationale behind the levels at which the permit thresholds and De Minimis levels were set and provides monitoring and modeling demonstrations which show that these thresholds are appropriate and do not interfere with attainment or maintenance of the National Ambient Air Quality Standards (NAAQS).

Regarding the second item, Minor NSR Program's Applicability for $PM_{2.5}$, ADEQ anticipates submitting a technical demonstration in support of the $PM_{2.5}$ permit threshold and De Minimis level proposed in the current rulemaking for APC&EC Regulation No. 19 at a later date.

This demonstration should assist EPA in their review and approval of the 2010 Arkansas Minor NSR Threshold State Implementation Plan (SIP) revision. We would appreciate your feedback on the enclosed demonstration.

Sincerely,

Tony Davis, Planning Branch Manager
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Arkansas Department of Environmental Quality

2010 Minor NSR Permitting Thresholds and De Minimis Levels SIP Revision

Technical Support Document

November 2015

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Executive Summary

On December 5, 2008, the Arkansas Pollution Control and Ecology Commission (APC&EC) adopted revisions to the minor new source review (Minor NSR) permit thresholds for carbon monoxide (CO), nitrogen oxides (NO_x), sulfur dioxide (SO_2), volatile organic compounds (VOC), and particulate matter with an aerodynamic diameter less than or equal to 10 micrometers (PM_{10}). The Arkansas Department of Environmental Quality (the Department) submitted a SIP revision to the United States Environmental Protection Agency (EPA) which included these threshold revisions. This technical support document details the rationale behind the levels at which the permit thresholds and De Minimis levels were set and provides monitoring and modeling demonstrations which show that these thresholds are appropriate and do not interfere with attainment or maintenance of the National Ambient Air Quality Standards in Arkansas.

Background

On December 5, 2008, in an amendment to the Arkansas Pollution Control and Ecology Commission (APC&EC) Regulation Number 19 - Regulations of the Arkansas Plan of Implementation for Air Pollution Control (Regulation No. 19), minor new source review (Minor NSR) permit thresholds for carbon monoxide (CO), nitrogen oxides (NO_x), sulfur dioxide (SO_2), volatile organic compounds (VOC), particulate matter with an aerodynamic diameter less than or equal to 10 micrometers (PM_{10}), single hazardous air pollutant (HAP), and multiple HAPs were revised. Table 1 contains a comparison of the old (previous to the Minor NSR permit threshold revision) and the revised Minor NSR permit thresholds. De Minimis levels were also revised for CO, NO_x, SO_2, VOC, PM, and PM_{10}. The De Minimis levels for these pollutants were set equal to the permit thresholds. Table 2 contains a comparison of the old (previous to the De Minimis levels revision) and the revised De Minimis levels. The revised Minor NSR permit thresholds and De Minimis levels became effective in the State on January 25, 2009 and on July 26, 2010, the Arkansas Department of Environmental Quality (the Department) submitted to EPA a SIP revision (2010 Threshold SIP) containing the regulatory amendments reflecting the revised thresholds and De Minimis levels for certain pollutants.

Table 1 Comparison of Minor NSR Permit Thresholds in Tons per Year (tpy)

Pollutant	Previous Permit Threshold	Revised Permit Threshold adopted in 2008
CO	40	75
NO_x	25	40
SO_2	25	40
VOC	25	40
PM_{10}	10	15
Lead	0.5	0.5
Single Hazardous Air Pollutant (HAP)	1.0	2.0
Multiple HAPs	3.0	5.0

Table 2 Comparison of De Minimis Levels in Tons per Year (tpy)

Pollutant	Previous De Minimis Levels	Revised De Minimis Levels adopted in 2008
CO	5	75
NO_x	5	40
SO_2	5	40
VOC	20	40
PM	NA	25
PM_{10}	5	15
Lead	0.5	0.5

As part of the 2010 Threshold SIP revision submittal, the Department submitted emissions data for 20 facilities with emissions between the old and new proposed permit thresholds which opted to no longer operate under a permit. This data indicated that these 20 sources made up 0.125 % or less of total permitted emissions for each criteria pollutant.

The percentages of emissions from these sources for each criteria pollutant in Arkansas were compared to those percentages included in the EPA's "Review of New Sources and Modifications in Indian Country" proposed rule (71 FR 48696). In the "Review of New Sources and Modifications in Indian Country," EPA included a table, which listed the percentage of total emissions from unregulated sources for each criteria pollutant, and stated that the EPA "believes that [the table] provides excellent evidence that sources below the proposed minor NSR thresholds will be inconsequential to attainment and maintenance of the NAAQS." The EPA did not include modeling to demonstrate that unregulated sources below EPA's minor NSR permitting thresholds in Indian Country would not cause a violation or interfere with the maintenance of the NAAQS. In Arkansas's 2010 Threshold SIP Revision submittal, the Department submitted data mirroring the table which EPA stated provided "excellent evidence" that proposed minor NSR thresholds will be inconsequential to attainment and maintenance of the NAAQS and the data provided by Arkansas showed that the percent of total emissions from the formerly permitted 20 sources would be lower than what EPA found to be negligible for tribal minor NSR.

Although, the Department mirrored its analysis of the change in Minor NSR permitting thresholds after the methodology that EPA considered reasonable in its “Review of New Sources and Modifications in Indian Country” rule, the EPA has requested additional documentation to support the revised Minor NSR permitting thresholds.

In response to EPA’s request, the Department submits the following additional information to support the revised Minor NSR permit thresholds and De Minimis levels contained in the 2010 Threshold SIP.

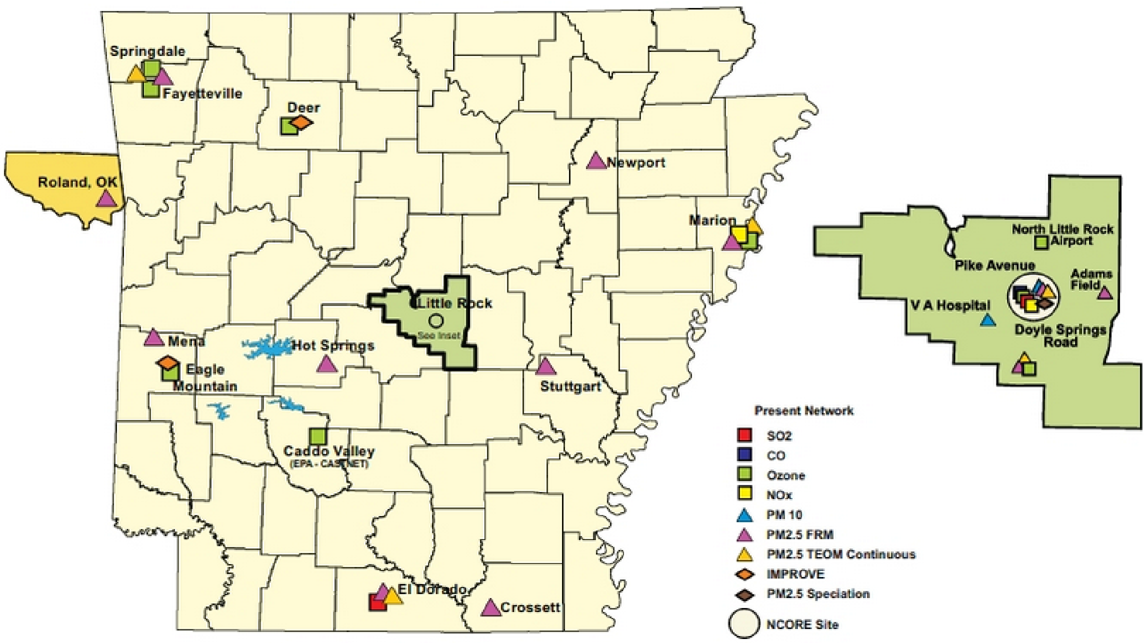
Determination of Permitting Thresholds and De Minimis Levels

The values of the current permit thresholds and De Minimis levels (permitting thresholds), with the exception of CO, were set at the significant emission rates (SER) promulgated under 40 C.F.R. 51.166(b)(23)(i) because EPA analysis has demonstrated that emission increases lower than these rates can be considered De Minimis. Because EPA’s analysis demonstrated that these levels can be considered De Minimis, the Department revised its thresholds to match these EPA-approved values. The permitting thresholds for CO were set below the SER. Although sources which emit less than the current permit thresholds are not required to obtain a permit, the Department still requires sources which emit greater than the previous permit thresholds to register with the Department.

Monitoring Trends Analysis

Although minor NSR permitting thresholds for CO, NO_x, SO_2, VOC, and PM_{10} were increased in the December 2008 Regulation No. 19 rulemaking, these changes have not interfered with the ability of the Department to protect the National Ambient Air Quality Standards (NAAQS) in the State. Analysis of monitoring data demonstrates that, despite the change in the permitting thresholds for minor sources, air quality in Arkansas has improved since the adoption of these revised thresholds. This demonstration describes the trends in monitor design values for CO, ozone, NO_2, PM_{10}, and SO_2 prior to and following the revision of the minor NSR permitting thresholds for these pollutants and their precursors. Because permitting thresholds had not been established for $PM_{2.5}$ and remained unchanged for lead in the 2008 amendment to APC&EC Regulation No. 19, trends in $PM_{2.5}$ and lead design values are not discussed. Revisions to permitting thresholds for single HAP and multiple HAPs are not discussed because these pollutants fall under Clean Air Act (CAA) §112 and do not have NAAQS. Locations of monitors in the Arkansas Ambient Air Monitoring Network are depicted in Figure 1.

Figure 1. Arkansas Ambient Air Monitoring Network



Carbon Monoxide

Arkansas has one CO monitor located at the Pike Avenue at River Road (PARR, AQS ID 05-119-0007) NCORE site in Pulaski County. Despite the CO minor NSR permitting threshold increase from 40 to 75 tpy and the De Minimis level increase from 5 to 75 tpy, ambient CO concentrations at PARR have decreased since the adoption of the permitting threshold revisions in 2008. Figure 2 demonstrates the downward trend in design values at PARR for the 2011 1-hour CO NAAQS. Figure 3 demonstrates the downward trend in design values at PARR for the 2011 8-hour CO NAAQS.

Figure 2. Carbon Monoxide 1-Hour NAAQS Design Values at PARR

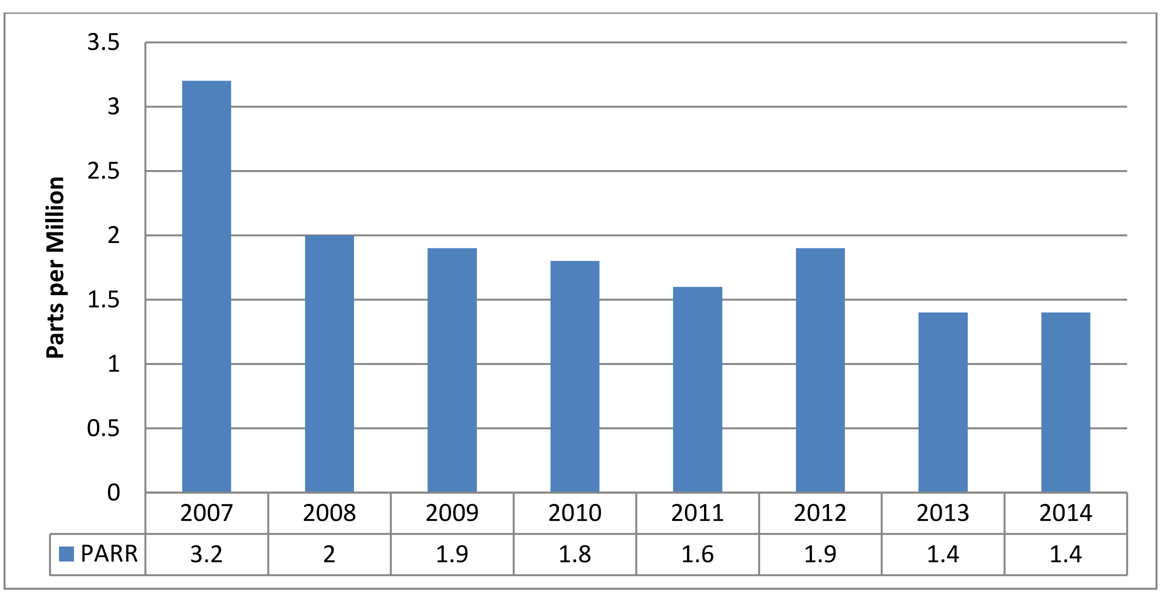
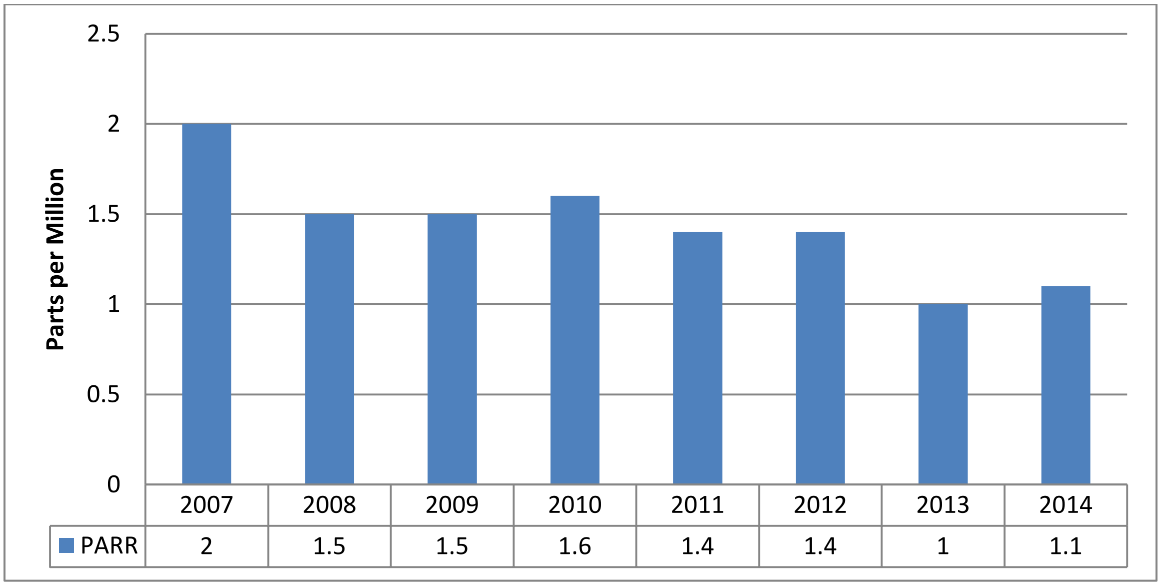


Figure 3. Carbon Monoxide 8-Hour NAAQS Design Value at PARR



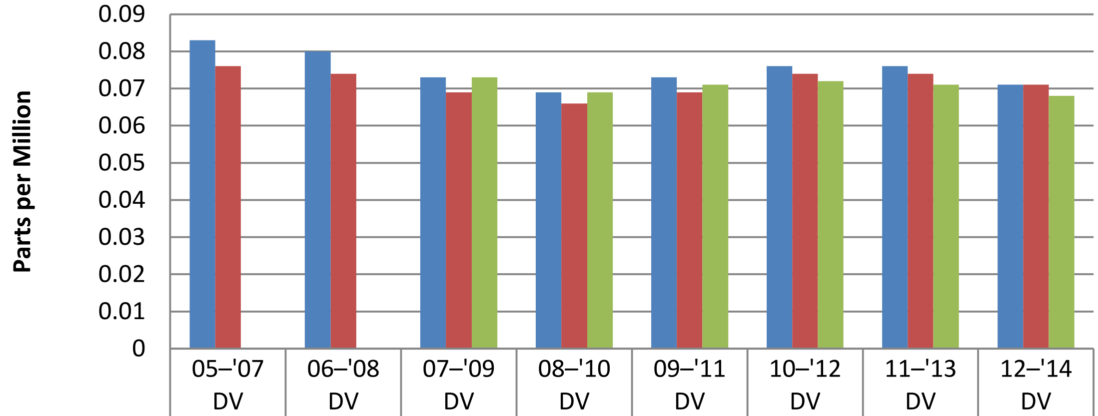
The 1-hour CO design value at PARR decreased from 3.2 parts per million (ppm) in 2007 (prior to adoption of the revised CO minor NSR permitting thresholds) to 1.4 ppm in 2014. The 1-hour CO design values at PARR for the years 2007–2014 were significantly lower than the current 1-hour CO NAAQS level of 35 ppm. The 8-hour CO design values have also decreased at PARR since the revision of the CO permitting thresholds. The 8-hour CO design value at PARR in 2014 (1.1 ppm) was 45% lower than the design value at PARR in 2007 (2 ppm). The PARR monitor data following the 2008 revision of the CO permitting thresholds indicate that exempting sources which emit less than the revised threshold from permitting and exempting emission increases less than the revised De Minimis level from review have not caused or contributed to a violation of the current 1-hour and 8-hour CO NAAQS.

Ozone

Arkansas currently has nine ozone monitors, seven of which were active prior to the revision of minor NSR permitting thresholds for ozone precursor pollutants—NO_x, VOC, and CO—in 2008. The permit thresholds for NO_x and VOC were revised from 25 tpy to 40 tpy and the De Minimis levels for both pollutants were revised from 5 to 40 tpy. The permit threshold for CO was revised from 40 tpy to 75 tpy and the De Minimis level was revised from 5 to 75 tpy. Despite the upward revision in minor source permitting thresholds for ozone precursors, the 2007–2014 ozone monitoring data demonstrates that air quality in Arkansas has continued to improve with respect to ozone pollution.

In Pulaski County, ozone monitors are located at the PARR NCORE site (AQS ID 015-119-007), the North Little Rock Airport (NLR Airport, AQS ID 05-119-1002), and Doyle Springs Road (AQS ID 05-119-1008). Although the Doyle Springs Road monitor was active during 2007 and 2008, a three-year design value for this monitor was not available until 2009. Figure 4 demonstrates the trend in design value for the 8-hour ozone NAAQS at the monitors in Pulaski County.

Figure 4. Ozone 8-Hour NAAQS Design Value Pulaski County

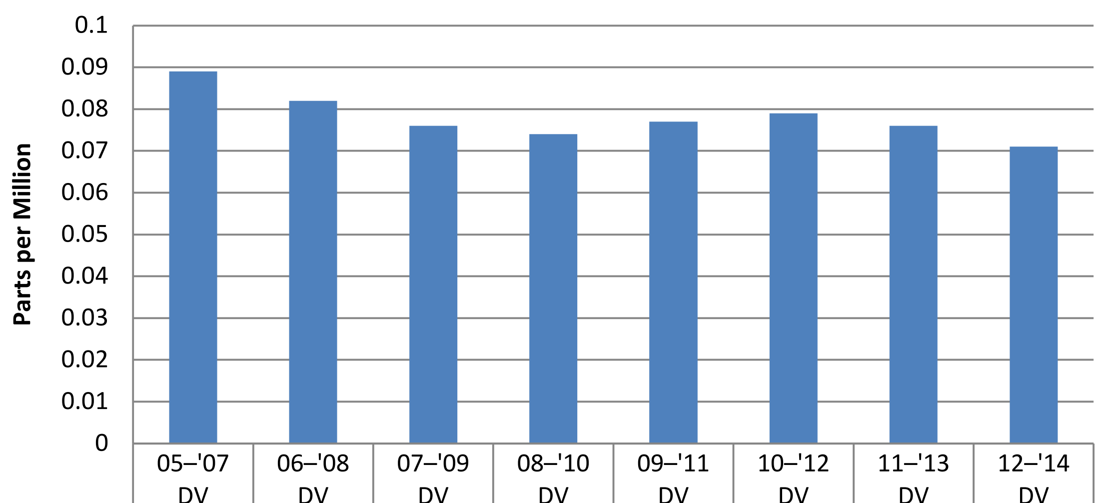


	05–'07 DV	06–'08 DV	07–'09 DV	08–'10 DV	09–'11 DV	10–'12 DV	11–'13 DV	12–'14 DV
NLRAP	0.083	0.08	0.073	0.069	0.073	0.076	0.076	0.071
ADEQ/DSR	0.076	0.074	0.069	0.066	0.069	0.074	0.074	0.071
PARR			0.073	0.069	0.071	0.072	0.071	0.068

Although ozone 8-hour design values at PARR, NLR Airport, and Doyle Springs Road have fluctuated from year-to-year, the overall trend has been downward following the revision of the minor NSR permitting threshold values in 2008. As of 2014, the design values at all three monitoring locations were below the 2008 ozone NAAQS.

There is one ozone monitor located in the city of Marion at LH Polk and Colonial Drive in Crittenden County (Marion, AQS ID 05-035-0005). Crittenden County, part of the Memphis Metropolitan Statistical Area (MSA), is currently the only county in Arkansas that has been designated nonattainment for ozone. Figure 5 demonstrates the downward trend in design value at the Marion monitor.

Figure 5. Ozone 8-Hour NAAQS Design Value Crittenden County

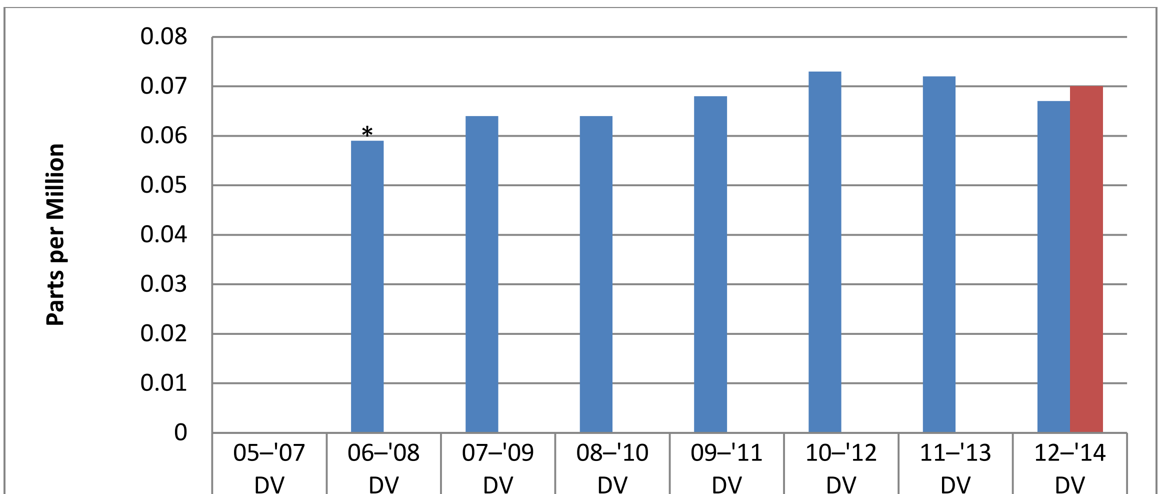


	05–'07 DV	06–'08 DV	07–'09 DV	08–'10 DV	09–'11 DV	10–'12 DV	11–'13 DV	12–'14 DV
Marion	0.089	0.082	0.076	0.074	0.077	0.079	0.076	0.071

The design value for the Marion monitor decreased from 0.089 ppm in 2007—prior to the minor NSR permit threshold revision for VOC, NO_x, and CO—to 0.071 ppm in 2014, a 20 % reduction. Based on data for 2014, Crittenden County is now meeting the 2008 8-hour Ozone NAAQS. Arkansas plans to submit a redesignation request for Crittenden County based on the 0.071 ppm design value for 2012–2014 at the Marion monitor. Despite the revision in the minor NSR permitting thresholds for VOC, NO_x, and CO, air quality in Crittenden County improved in the years following the revision.

In Washington County, ozone monitors are located in Springdale at 600 Old South Missouri Road (Springdale, AQS ID 05-143-0005) and in Fayetteville at 429 Ernest Lancaster Drive (Fayetteville Airport, AQS ID 05-143-0006). Figure 6 below demonstrates the trend in the 8-hour ozone design value for the Springdale and Fayetteville monitors. Because the Fayetteville Airport monitor came online in 2012, a design value could only be calculated for 2014.

Figure 6. Ozone 8-Hour NAAQS Design Value Washington County



	05–'07 DV	06–'08 DV	07–'09 DV	08–'10 DV	09–'11 DV	10–'12 DV	11–'13 DV	12–'14 DV
Springdale		0.059	0.064	0.064	0.068	0.073	0.072	0.067
Fayetteville								0.07

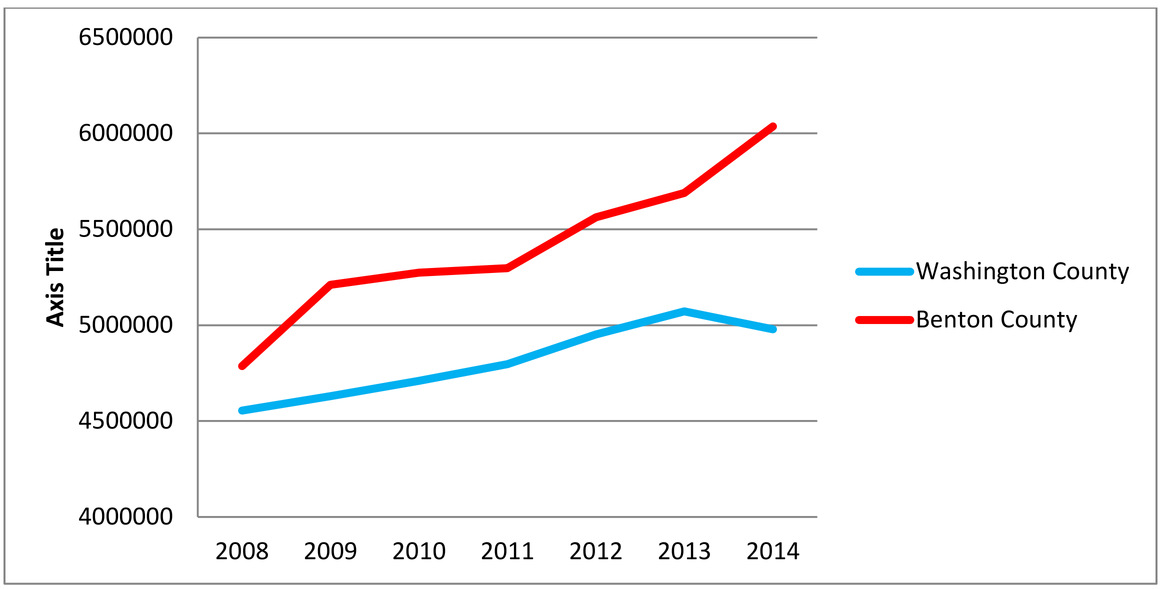
**The 2006 – 2008 design value at the Springdale monitor did not meet completeness criteria.*

The 8-hour ozone design value at the Springdale monitor, located in the Fayetteville-Springdale-Rogers MSA, has generally increased since the revision of the minor NSR permitting thresholds for NO_x, VOC, and CO. The Fayetteville-Springdale-Rogers MSA has undergone rapid population growth over the past twenty years. The U.S. Census Bureau estimates that the population of the Fayetteville-Springdale-Rogers MSA has grown by 65,528 people over the 2007 – 2014 timeframe for which ozone design values at the Springdale monitor were assessed.[1] According to the 2011 NEI v2, on-road mobile sources contributed 44 % percent of total NO_x emissions in Benton and Washington Counties—the two counties

[1] U.S. Census Bureau Annual Estimates of the Population of Metropolitan and Micropolitan Statistical Areas: April 1, 2000 to July 1, 2007 (CBSA-EST2007-01) XLS
And Metropolitan and Micropolitan Statistical Area; and for Puerto Rico

covered by the Fayetteville-Springdale-Rogers MSA. Stationary sources which emit less than the current State-effective and the former permit thresholds for CO , NOx, and VOC would typically be classified as nonpoint sources because these sources, unless required based on emissions other pollutants exceeding thresholds established in the EPA Air Emissions Reporting Requirements, would not be required to submit Emission Inventory reports. Nonpoint sources (excluding biogenics) made up only 6 % of total NO_x emissions. Nonpoint sources (excluding biogenics) only contributed 10 % to total VOC emissions in Benton and Washington counties in 2011; whereas biogenics, the largest contributor to VOC emissions in these counties, made up 72 % of VOC emissions. Because nonpoint sources (excluding biogenics) were not a major contributor to VOC and NO_x emissions in Benton and Washington Counties, it is likely that the increase in ozone concentration between 2008 and 2013 was due to other sources, such as increased mobile emissions in the Fayetteville-Springdale-Rogers MSA as a result of the rapid population growth in that area. Figure 7 demonstrates the increase in Daily Vehicle Miles Traveled (DVMT) between 2008 and 2014 for Benton and Washington Counties.[2] Despite the increase in ozone concentration between 2008 and 2014, the design value at the Springdale monitor did not exceed the 2008 8-hour ozone NAAQS. The 2014 design value at the Fayetteville Airport monitor was also below the 2008 8-hour ozone NAAQS.

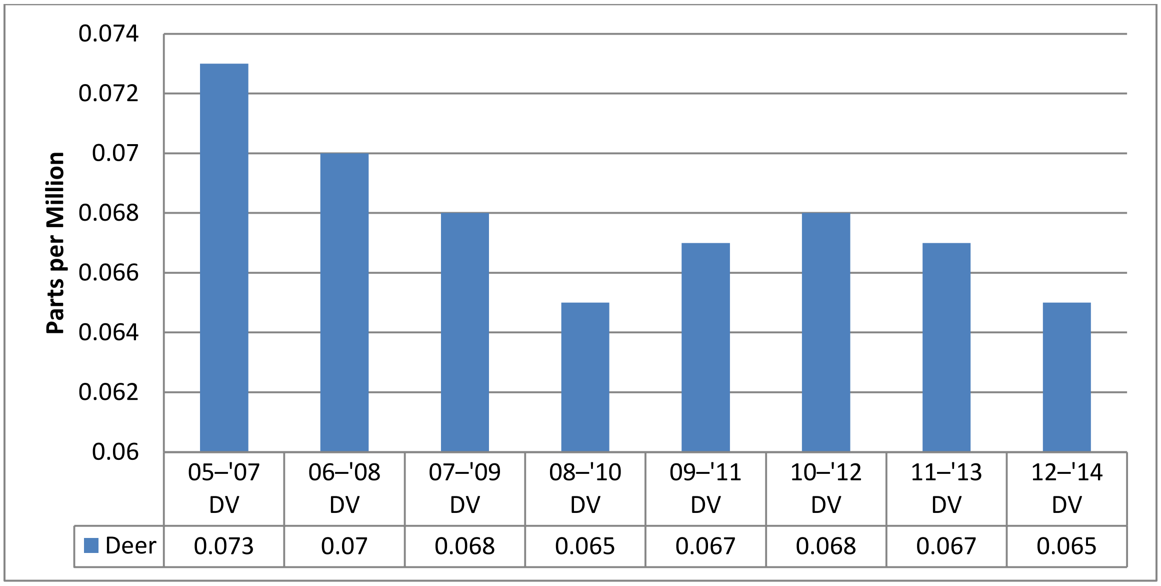
Figure 7. DVMT for Benton and Washington Counties 2008 – 2014



Newton County has one ozone monitor located on Highway 16 (Deer, AQS ID 05-113-0002). Figure 8 demonstrates the downward trend in 8-hour design values following the revision of the permitting thresholds for NO_x, VOC, and CO.

[2] Arkansas State Highway and Transportation Department
http://www.arkansashighways.com/System_Info_and_Research/traffic_information.aspx

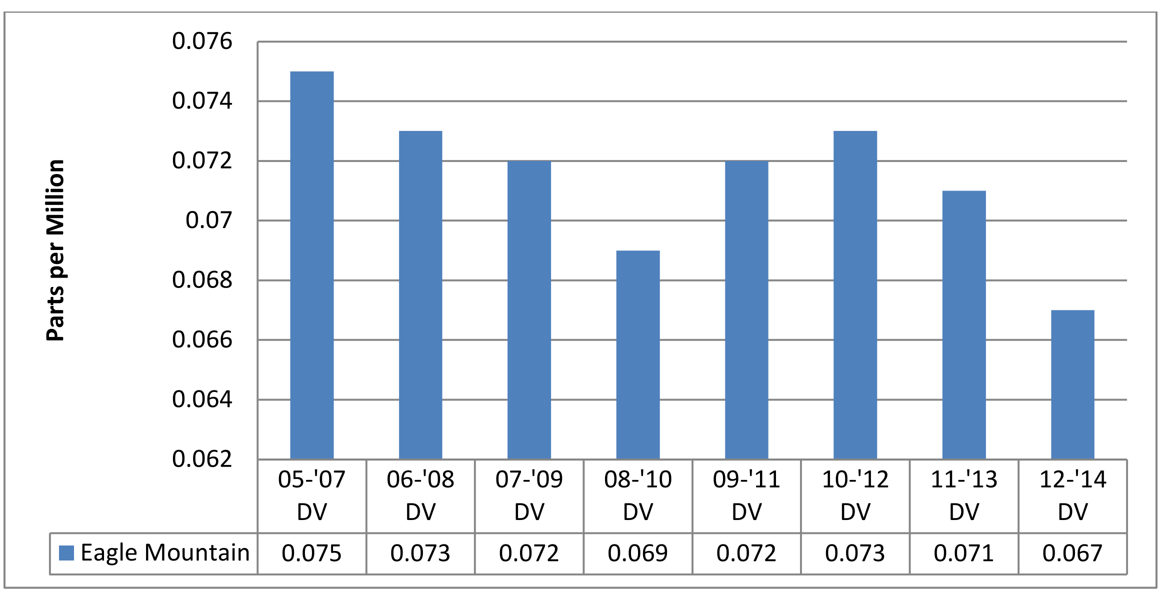
Figure 8. Ozone 8-Hour NAAQS Design Value Newton County



The 8-hour ozone design values at the Deer monitor have decreased from 0.073 ppm in 2007—prior to the revision of the minor NSR permit thresholds for NO_x, VOC, and CO—to 0.065 ppm in 2014, an 11 % decrease in ozone concentration. Despite the upward revision in NO_x, VOC, and CO permitting thresholds, air quality in Newton County continues to improve with respect to ozone and has remained below the level of the 2008 8-hour ozone NAAQS.

Polk County has one ozone monitor located in Mena at 463 Polk 631 (Eagle Mountain, AQS ID 05-113-0003). Figure 9 demonstrates the downward trend in 8-hour ozone design value at Eagle Mountain following the revision of the minor NSR permitting thresholds for CO, NO_x, and VOC.

Figure 9. Ozone 8-Hour NAAQS Design Value Polk County



The 8-hour ozone design values at the Eagle Mountain monitor have decreased from 0.075 ppm in 2007—prior to the revision of the minor NSR permitting thresholds for NO_x, VOC, and CO—to 0.067 ppm in 2014, an 11 % decrease in ozone concentration. Despite the upward revision in NO_x, VOC, and CO permit thresholds, air quality in Polk County continues to improve with respect to ozone and has remained below the level of the 2008 8-hour ozone NAAQS.

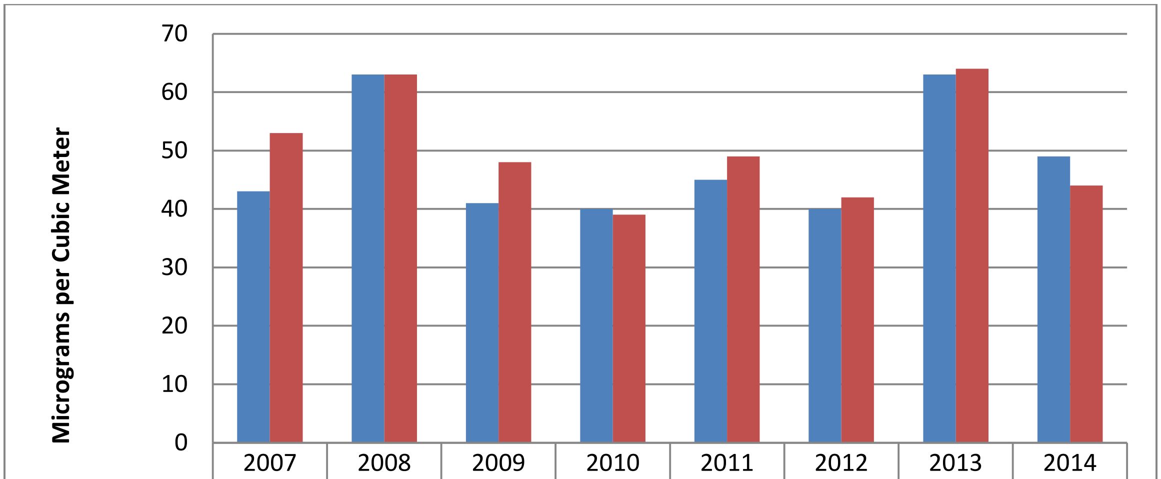
The ozone monitor located at Lower Lake Recreation Area in Clark County (Caddo Valley, AQS ID 05-019-9991) began operation in 2011. Because this monitor was not in operation prior to the revision of the minor NSR permitting thresholds for ozone precursors—CO, NO_x, and VOC, it is not possible to do a comparison of design values at this site prior to and following the permit threshold revisions in 2008. The design values for Caddo value in 2012 and 2013 did not meet completeness criteria; however, the design value based on data from 2012–2014 was 0.066 ppm which is well below the level of the 2008 8-hour ozone NAAQS.

With the exception of the Springdale monitor in Washington County, all monitored sites have experienced a decrease in the level of ambient ozone concentrations despite the 2008 revision to the minor NSR permitting thresholds for ozone precursors–NO_x, VOC, and CO. At the Springdale location, the design values have increased since 2007; however, these values remained below the level of the 2008 8-hour ozone NAAQS. The monitoring data for ozone following the 2008 revision of the NO_x, VOC, and CO permitting thresholds indicate that exempting source which emit less than the revised thresholds from permitting and less than the revised De Minimis levels from review have not caused or contributed to a violation of the current ozone NAAQS.

PM_{10}

There are two PM_{10} monitors in Arkansas, both located in Pulaski County. One monitor is located at the PARR NCORE site (AQS 05-119-0007) and the other is located at the Veterans Affairs Hospital on the 4300 Block of West 7th Street (VA Hospital, AQS 04-119-1007). Figure 10 demonstrates the trends in PM_{10} emissions both prior to and following the revision of the minor NSR permitting threshold values for PM_{10}.

Figure 10. PM_{10} 24-Hour Maximum Pulaski County



	2007	2008	2009	2010	2011	2012	2013	2014
PARR	43	63	41	40	45	40	63	49
VA Hospital	53	63	48	39	49	42	64	44

PM_{10} concentrations at the PARR monitor and the VA Hospital monitor fluctuated from year-to-year between 2007 and 2014. The maximum 24-hour average concentration has not exceeded the 24-hour PM_{10} NAAQS at either monitor since the revision of the PM_{10} minor NSR permitting thresholds. The highest maximum 24-hour average concentration (64 $\mu g/m^3$) during the analysis years, which occurred in 2013, was less than half of the current 24-hour PM_{10} NAAQS of 150 $\mu g/m^3$. The monitor data following the 2008 revision of the PM_{10} permit threshold indicate that exempting sources which emit less than the revised threshold from permitting and exempting emission increases less than the revised De Minimis levels from review have not caused or contributed to a violation of the 24-hour PM_{10} NAAQS in Pulaski County.

NO_2

Arkansas has two NO_2 monitors in the state: one in Pulaski County and the other in Crittenden County. Data from these monitors indicate that the upward revision of the NO_x permit threshold from 25 tpy to 40 tpy and the revision of the NO_x De Minimis level from 5 to 40 tpy have not put Arkansas in danger of violating the NO_2 annual NAAQS or the NO_2 1-hour NAAQS.

The NO_2 monitor in Pulaski County is located at the PARR NCORE site (AQS ID 05-119-0007). Figure 11 demonstrates the trend in the annual NO_2 design value at the PARR monitor. Figure 12 demonstrates the trend in 1-hour NO_2 design values at the PARR monitor following the revision in the Minor NSR NO_x permitting threshold values.

Figure 11. NO_2 Annual NAAQS Design Values Pulaski County

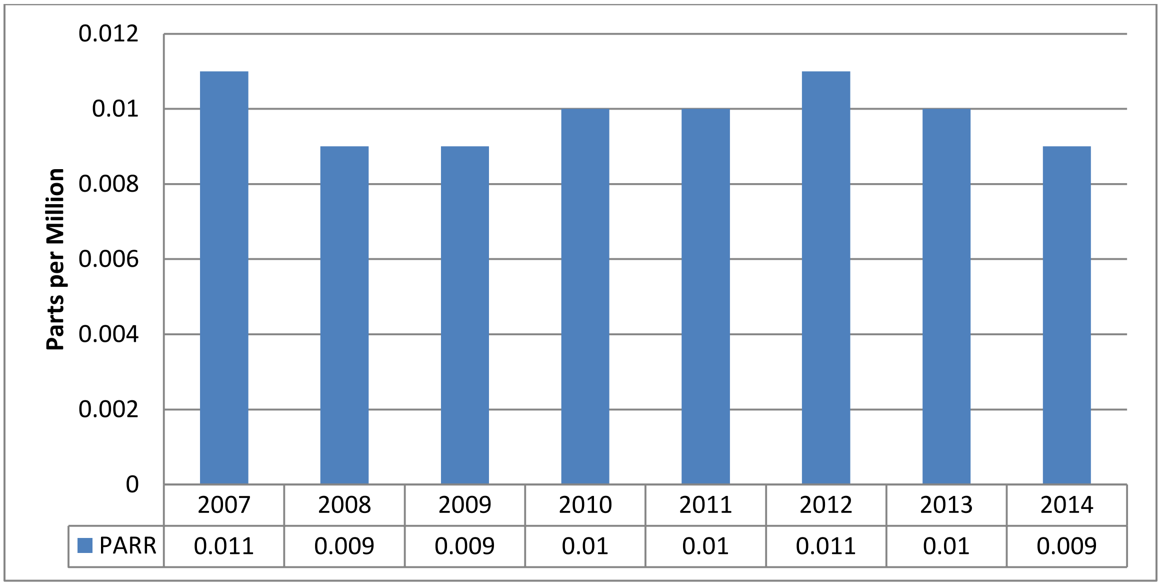
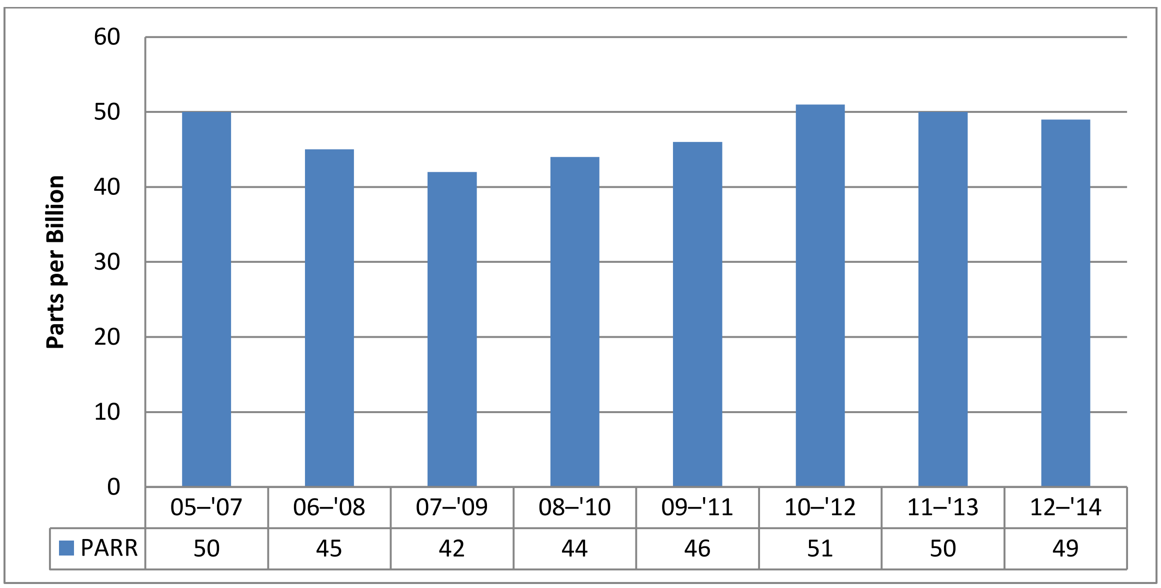


Figure 12. NO_2 1-Hour NAAQS Design Values Pulaski County



The design values for the 1-hour and annual NO_2 NAAQS at PARR have fluctuated from year-to-year between 2007 and 2014; but, the overall trend indicates that NO_2 concentrations did not significantly change during this time period. The NO_2 annual design values at PARR, which ranged from 9 to 11 ppb did not approach the NO_2 Annual NAAQS of 53 ppb. The NO_2 1-hour design values at PARR, which ranged from 42 to 51 ppb did not approach the NO_2 1-hour NAAQS of 100 ppb. The monitoring data at PARR following the 2008 revision to the NO_x permitting thresholds indicate that exempting sources which emit less than the revised threshold from permitting and exempting emission increases less than the revised De Minimis levels from review has not caused or contributed to a violation of the annual or 1-hour NAAQS for NO_2.

The NO_2 monitor in Crittenden County is located at LH Polk and Colonial Drive (Marion, 05-035-0005). Figure 13 demonstrates the trend in the annual NO_2 design value at the Marion monitor. Figure 14 demonstrates the trend in 1-hour NO_2 design values at the Marion monitor following the revision in the NO_x minor NSR permitting threshold values.

Figure 13. Annual NO_2 NAAQS Design Values Crittenden County

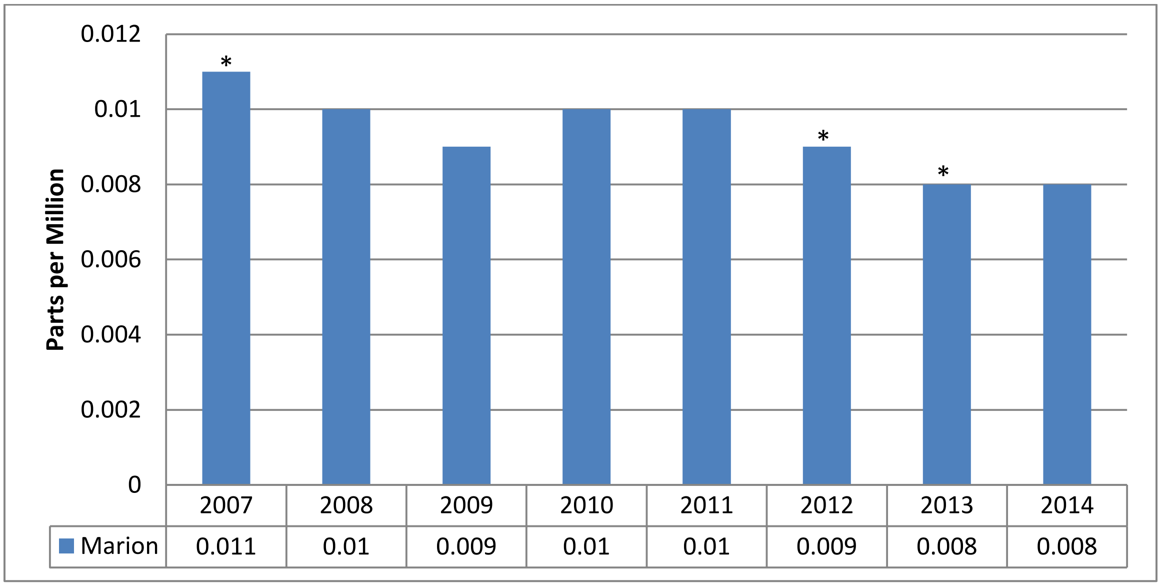
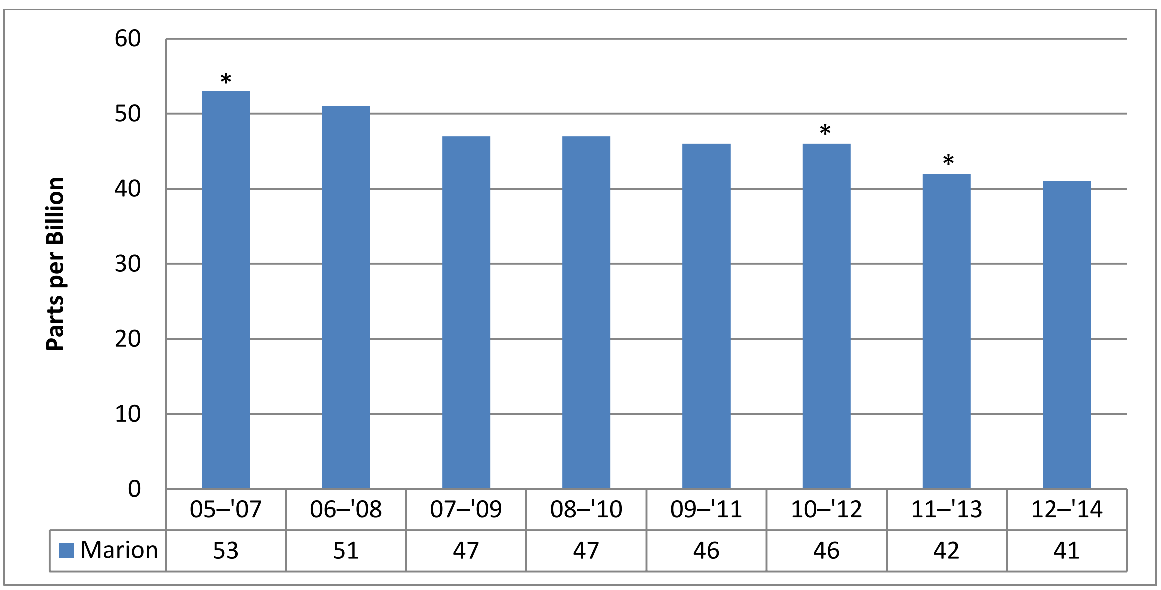


Figure 14. NO_2 1-Hour NAAQS Design Values Crittenden County



**The 2007, 2012, and 2013 design values at the Marion monitor did not meet completeness criteria.*

The design values for the 1-hour and annual NO_2 NAAQS at Marion have fluctuated from year-to-year between 2007 and 2014, but the overall trend indicates that NO_2 concentrations have decreased since the revision of the NO_x minor NSR permitting thresholds. The NO_2 annual design values at the Marion monitor, which ranged from 8 to 11 ppb, did not approach the NO_2 Annual NAAQS of 53 ppb. The NO_2 1-hour design values at the Marion monitor, which ranged from 41 to 53 ppb, did not approach the NO_2 1-hour NAAQS of 100 ppb. The monitoring data at the Marion monitor following the 2008 revision to the NO_x permitting thresholds indicate that exempting sources which emit less than the revised threshold from permitting and exempting emission increases less than the revised De Minimis levels from review has not caused or contributed to a violation of the annual or 1-hour NAAQS for NO_2.

SO_2

There are two SO_2 monitors in Arkansas: one in Pulaski County and one in Union County. Data from these monitors indicate that the upward revision of the SO_2 permit threshold from 25 tpy to 40 tpy and the revision of the SO_2 De Minimis level from 5 to 40 tpy have not put Arkansas in danger of violating the current 1-hour or 3-hour SO_2 NAAQS.

The monitor in Pulaski County is located at the PARR NCORE site (AQS ID 05-119-0007). Figure 15 demonstrates the trend in 1-hour SO_2 design values at PARR prior to and following the revision of the SO_2 permitting thresholds. Figure 16 demonstrates the trend in 3-hour SO_2 design values at PARR prior to and following the revision of the SO2 permitting thresholds. When rounded to the first decimal place, as prescribed in 40 CFR §50.5(a), the 3-hour SO_2 design values for all years between 2007 and 2014 were 0.

Figure 15. SO_2 1-Hour NAAQS Design Values Pulaski County

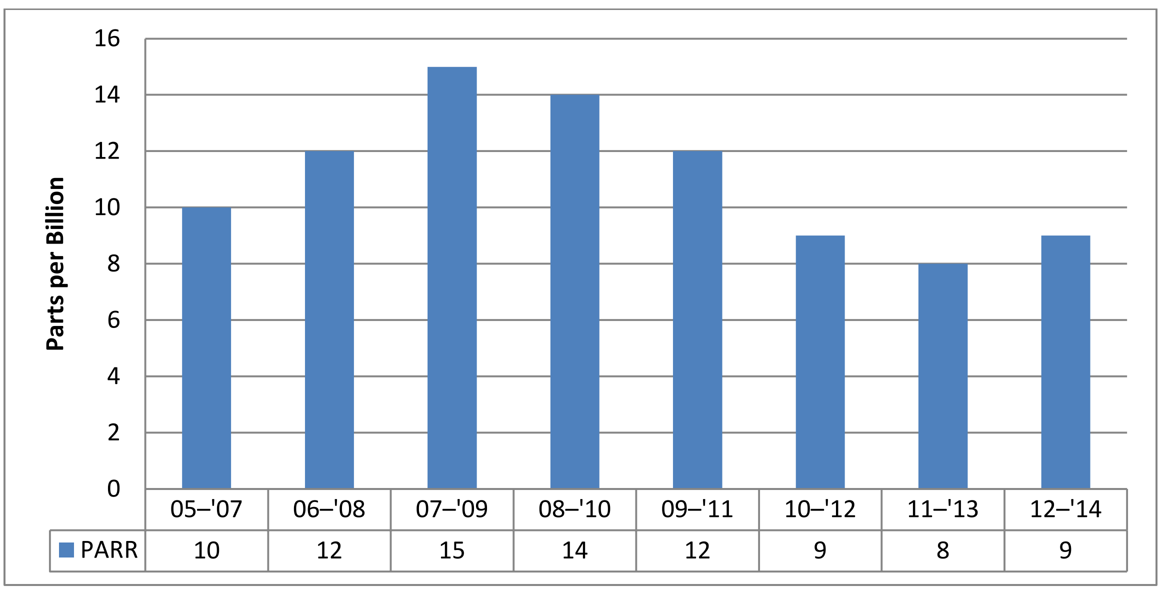
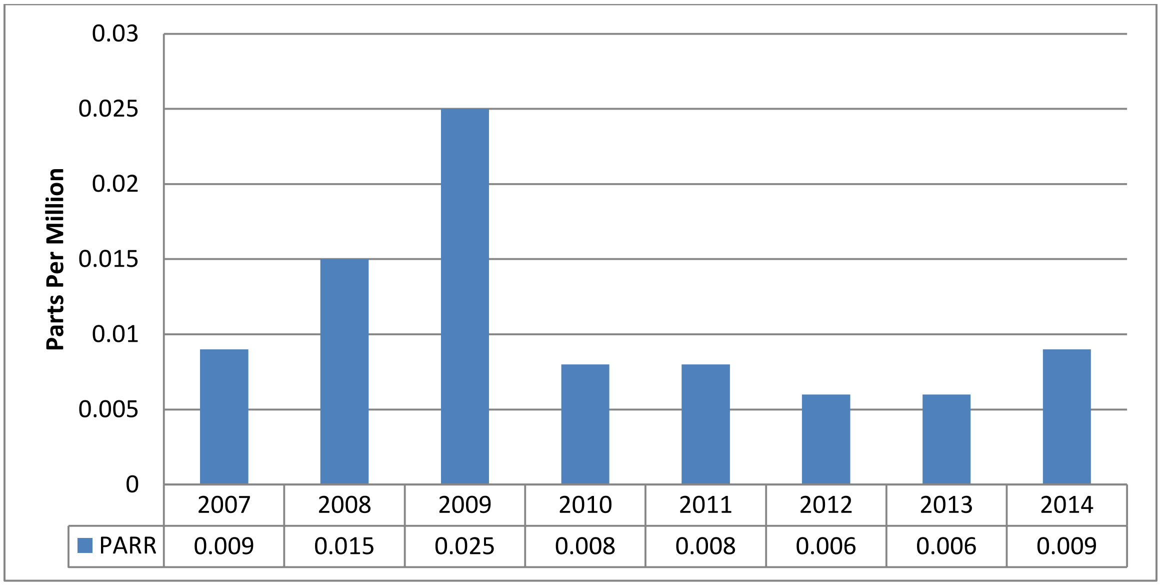


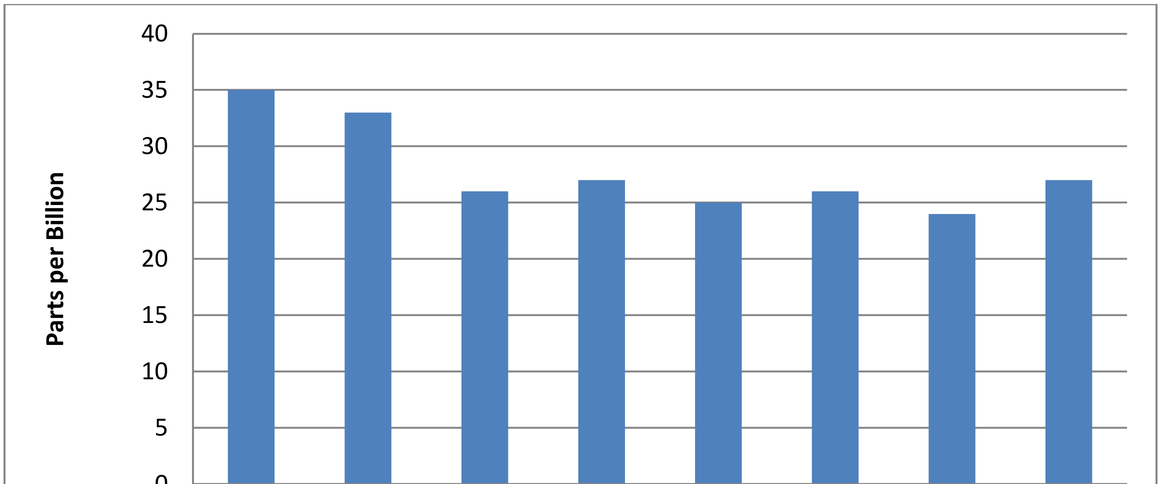
Figure 16. SO2 3-Hour NAAQS Design Values Pulaski County



The design value for 1-hour SO_2 NAAQS at PARR increased from 12 to 15 ppb between 2008 and 2009 following the revision of the SO_2 minor NSR permit threshold then began to decrease, reaching a low of 8 ppb in 2013. All 1-hour design values at the PARR monitor following the revision of the SO_2 permitting thresholds were well below the 2010 SO_2 1-hour NAAQS of 75 ppb. All design values for the 3-hour SO_2 NAAQS at PARR were well below the standard of 0.5 ppm, and, when rounded to one decimal place as prescribed by 40 CFR §50.5(a), rounded to 0.0 ppm. The PARR monitor data following the revision of the SO_2 permitting thresholds indicate that exempting sources which emit less than the revised thresholds from permitting and exempting emission increases less than the revised De Minimis levels from review have not caused or contributed to a violation of the 1-hour or 3-hour NAAQS for SO_2 in Pulaski County.

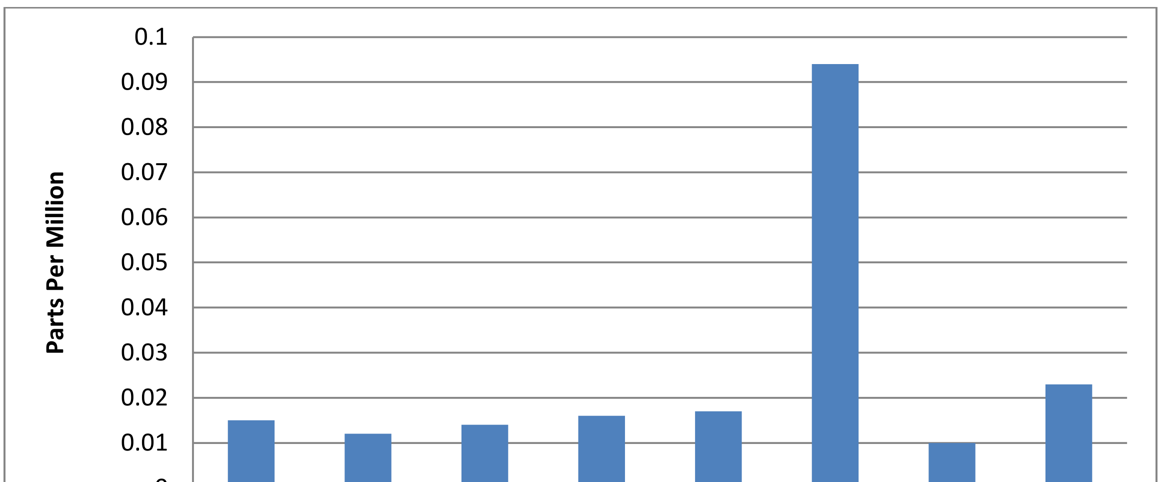
The monitor in Union County is located in Union Memorial Hospital (El Dorado, AQS 05-139-0006). Figure 17 demonstrates the downward trend in 1-hour SO_2 design values at the El Dorado monitor following the revision of the SO_2 permitting thresholds. Figure 18 demonstrates the trend in 3-hour SO_2 design values at El Dorado following the revision of the SO_2 permitting thresholds. When rounded to the first decimal place, as prescribed in 40 CFR 50.5, only the 3-hour design value for 2012 was above 0.0 during the 2007 – 2014 timeframe.

Figure 17. SO_2 1-Hour NAAQS Design Values Union County



	05–'07	06–'08	07–'09	08–'10	09–'11	10–'12	11–'13	12–'14
El Dorado	35	33	26	27	25	26	24	27

Figure 18. SO_2 3-Hour NAAQS Design Values Union County



	2007	2008	2009	2010	2011	2012	2013	2014
El Dorado	0.015	0.012	0.014	0.016	0.017	0.094	0.01	0.023

The design values for the 1-hour SO_2 standard at the El Dorado Monitor have declined following the revision of the SO_2 minor NSR permitting thresholds revision in 2008. All 1-hour design values at the El Dorado monitor following the revision of the SO_2 permitting thresholds were well below the 2010 SO_2 1-hour NAAQS of 75 ppb. All design values for the 3-hour SO_2 NAAQS at PARR were well below the standard 0.5 ppm, and, when rounded to one decimal place as prescribed by 40 CFR §50.5(a), the 3-hour design values for all years except 2012 rounded to 0.0 ppm. The 3-hour SO_2 design value in 2012 was higher than in any of the other years in the 2007 – 2014 period; however, the 2012 3-hour design value was far below the 3-hour NAAQS of 0.5 ppm. The El Dorado monitor data following the revision of the SO_2 permitting thresholds indicate that exempting sources which emit less than the revised thresholds from permitting and exempting emission increases less than the revised De Minimis levels from review have not caused or contributed to a violation of the 1-hour or 3-hour NAAQS for SO_2 Union County.

Summary of Monitoring Trends Analysis

The monitoring data indicate that the upward revision of the minor NSR permitting thresholds for CO, NO_x, VOC, PM_{10}, and SO_2 has not interfered with the ability of Arkansas to attain and maintain the current NAAQS for CO, ozone, PM_{10}, NO_2, and SO_2.

Arkansas has one nonattainment area, Crittenden County, which was designated marginal nonattainment for the 2008 Ozone NAAQS on March 24, 2010. Air quality has continued to improve in Crittenden County, despite the minor NSR permit threshold revision for ozone precursors, to the extent that the most recent data indicates that ozone concentrations in Crittenden County have fallen below the level of the 2008 8-hour ozone NAAQS. Arkansas anticipates submitting a redesignation request for Crittenden County in 2015. The rest of the State has been classified attainment/unclassifiable for all pollutants.

For the most part, design values at monitors for PM_{10}, CO, ozone, NO_2, and SO_2 have either decreased or remained largely unchanged over the 2007 – 2014 timeframe. The exception to this downward trend in design values at monitoring stations is the increase in ozone design values at the Springdale monitor in Washington County between 2008 and 2012. Ozone design values at the Springdale monitor decreased from the 2012 peak design value in 2013 and 2014. The increase in ozone concentrations in the Washington County area between 2008 and 2012 is likely due to the rapid population growth in that region rather than the exemption of small minor sources which emit below the revised thresholds from permitting and the exemption of emission increases below the revised De Minims levels from review. Although ozone design values at the Springdale monitors have increased following the revision of the permitting thresholds for ozone precursors (NO_x, CO, and VOC), the design values at that monitor have remained below the level of the 2008 8-hour ozone NAAQS.

The monitoring data indicate that air quality in Arkansas has continued to improve following the SIP revision which increased the Minor NSR permitting thresholds for CO, NO_x, VOC, PM_{10}, and SO_2. Based on the trends in design values at monitored locations, it is unlikely exempting sources which emit less than the revised permitting thresholds from permitting and exempting emission increases less than the revised De Minimis levels will cause or contribute to a violation of the current NAAQS for CO, ozone, PM_{10}, $NO_{2,}$ or SO_2.

Modeling Analysis

To examine the impact of emissions increases at the level of the revised permit thresholds and De Minimis levels submitted in the 2010 Threshold SIP revision, the Department contracted with ICF International to model the potential impacts of emissions increases equal to the revised permit thresholds and De Minimis levels for CO, NOx, SO_2, VOC, and PM_{10}.[3] ICF's full report, which also includes a modeling demonstration in support of the currently proposed $PM_{2.5}$ permit threshold and De Minimis level, can be found in Appendix A. As a part of this modeling exercise, ICF conducted a combined AERMOD/Community Multiscale Air Quality (CMAQ) analysis using CMAQ modeling for the 2008 base year and the 2008/2015 future year from the Arkansas statewide modeling effort.[4] Based on this modeling demonstration, the Department has determined that sources which emit less than the revised permit thresholds/De Minimis levels will not cause or contribute to a violation of the NAAQS or interfere with attainment or maintenance of the NAAQS.

In this modeling analysis, a CMAQ simulation using the 2015 future year from the previous statewide modeling effort was rerun with the addition of eight new theoretical sources with emissions set equal to the revised permit thresholds: 75 tons per year (tpy) CO, 40 tpy NOx, 40 tpy SO_2, 40 tpy VOC, and 15 tpy PM_{10}. These eight hypothetical sources were distributed such that each Air Quality Control Region (AQCR) identified in Figure 19 contained at least one approximately centrally located hypothetical source (two hypothetical sources were sited in AQCR 21 due to its geographic scope). Most of these hypothetical facility locations also tend to be located in or near urban areas. Stack parameters for these hypothetical sources were set at the median values for stack height, stack diameter, exit temperature, and exit velocity of all minor point sources in Arkansas, based on the 2011 National Emissions Inventory. AERMOD was used to evaluate the potential impact of hypothetical emission increases equal to the revised thresholds on CO, PM_{10}, NO_2, and SO_2 with the 2015 CMAQ future year concentrations as the background. CMAQ was used to evaluate the potential impact of hypothetical emission increases equal to the revised thresholds for Ozone, PM_{10}, NO_2, and SO_2 using future year 2015 as background. The maximum CMAQ-derived impact was calculated for the 8-hour ozone NAAQS, the 1-hour NO_2 NAAQS, the 1-hour SO_2 NAAQS, and the 24-hour PM_{10} NAAQS. This maximum impact was then applied statewide to determine the worst case impacts from emission increases equal to the revised permit thresholds anywhere in the State. Relative response factors (RRF), the ratio of future-year to base-year simulated concentrations, were derived based on the modeling results and were used to calculate future year design values (FDV). The results of this modeling effort are described below.

[3] ICF (2015). "Air Quality Modeling Analysis of Minor Source Permit Thresholds." Prepared for the Arkansas Department of Environmental Quality, North Little Rock, Arkansas (15-003).

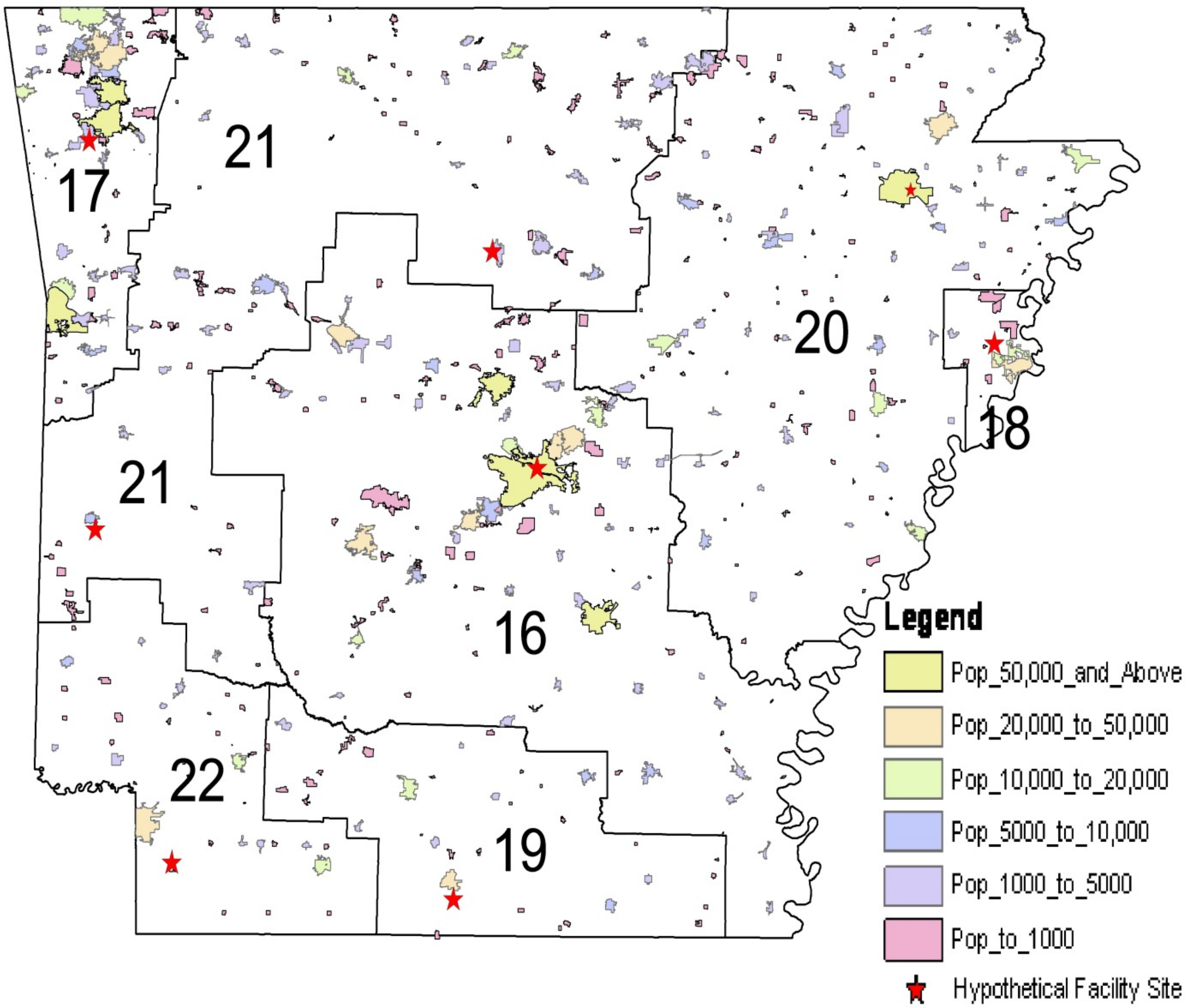
This modeling report has been included as Appendix A.

[4] ICF (2014). "Criteria Pollutant Modeling Analysis for Arkansas." Prepared for the Arkansas Department of Environmental Quality, North Little Rock, Arkansas (14-003).

This modeling report has been included as Appendix B.

Figure 19. Hypothetical Minor Point Source Facility Locations

Arkansas' Air Quality Control Regions (AQCR) and hypothetical minor point source facility locations (AQCR 16, Pulaski County; AQCR 17, Washington County; AQCR 18, Crittenden County; AQCR 19, Union County; AQCR 20, Craighead County; AQCR 21, Van Buren and Polk Counties; AQCR 22, Miller County) in relation to human population density.



Carbon Monoxide

For CO, the resultant AERMOD + Background maximum concentration of 0.972 ppm is much less than the 1-hour CO NAAQS of 35 ppm which indicates that worst-case near-field impacts would not result in an exceedance of the NAAQS for CO. When the daily maximum AEERMOD-derived impacts were added to the simulated CMAQ-derived concentrations for each day and used in conjunction with the 2008 current-year modeling results to calculate RRF and FDV, for 2015, the 1-hour CO RRF of 0.6022 indicates that the future year value is less than the base year value and that the FDV of 1.927 ppm is less than the 35 ppm 1-hour NAAQS. The 8-hour CO NAAQS was not included in this analysis as the results for the 1-hour CO NAAQS are expected to be larger than for other averaging periods.

Ozone

EPA's Model Attainment Test Software (MATS) was used to calculate RRFs and FDVs for ozone following the recommendations outlined in the updated draft guidance issued by EPA in December 2014.[5] MATS input parameters were set to the EPA-recommended default values and per EPA guidance, the ten highest concentrations, based on the baseline simulation results, were used in the calculation of the RRFs for each site. The simulated maximum impacts on 8-hour ozone concentration varied by location and by day, ranging from approximately zero to 1.1 ppb. The maximum differences for each day considering all grid cells in the 4-km grid were compiled and added to the 2015 baseline daily maximum 8-hour ozone concentration for each day and each grid cell to create the 2015 PMI dataset for ozone.

Monitoring site specific results assume that a hypothetical source is located such that the worst-case impact occurs at the monitoring site. Current-year design values were calculated as the average of the design values for the three overlapping three-year periods that include the modeled year (2006-2008, 2007-2009, and 2008-2010) and all sites with data during the 2006 to 2010 period are included. Ozone design values for 2015 plus maximum impact data set (PMI), the adjusted 2015 modeling results assuming worst-case impacts from threshold emission increases, are estimated to be 0.2 to 0.4 ppb higher than the 2015 baseline values. All RRF values are less than 1, indicating future year values are predicted to be less than the base year. Also, the highest FDV value is 70.2 ppb and all FDV values are less than the 75 ppb NAAQS threshold.

MATS was also used to conduct a spatial-fields analysis consisting of 1) modeled concentrations being used to calculate RRFs for every grid cell, 2) model-derived gradients being used in conjunction with observed data to estimate current-year design values for every grid cell, and 3) the results of 1 and 2 being used to estimate future-year design values for every grid cell. The objective was to determine whether there are unmonitored areas within the domain that are more sensitive to the addition of emissions corresponding to the amount and type modeled than other areas. The average RRF for 8-hour ozone is 0.8910 for the 2015 baseline and 0.8942 for the 2015 PMI scenario; therefore, an average RRF increase of 0.0032 represents a 0.2 ppb increase relative to a base concentration of 70 ppb. There is little variation among the AQCRs with the worst-case impacts are expected to increase the average

[5] US EPA (2014)"Modeling Guidance for Demonstrating Attainment of Air Quality Goals for Ozone, PM2.5, and Regional Haze"

RRFs by 0.0027 to 0.0039 and all RRFs were less than 1, indicating that the future year values are less than the base year value.

PM_{10}

The simulated maximum impacts on 24-hour PM_{10} concentration occur at or near the hypothetical sources with the maximum difference varying by location and by day, ranging from approximately 0.1 to 2.7 µg/m^3. The maximum differences for each day considering all grid cells in the 4-km grid were compiled and added to the 2015 baseline daily maximum 24-hour PM_{10} concentration for each day and each grid cell to create the 2015 PMI dataset for PM_{10}. MATS was also applied to calculate RRF values only for both monitoring sites and unmonitored areas and although MATS does not accommodate PM_{10}, it can be used to calculate RRFs for any two datasets. The MATS input parameters were set to the EPA-recommended default values with only the RRFs being calculated using MATS and the FDVs being calculated by hand.

Arkansas has one PM_{10} monitoring site and the site-specific modeling results assume that a hypothetical source is located such that the worst-case impact occurs at the monitoring site. The current-year design value used for this summary was calculated as the maximum 2nd highest PM_{10} concentration for the three years ending with the modeled year 2006-2008. The MATS input parameters were set to the EPA-recommended default values for ozone and only RRFs were calculated using MATS; FDVs were then calculated by hand. Estimated future-year design values are well below the NAAQS with the PM_{10} design value for 2015 PMI is estimated to be 0.8 µg/m^3 higher than the 2015 baseline values. Likewise, the RRFs were less than 1, indicating that the future year values are less than the base year value.

A simple spatial-fields analysis was also conducted for PM_{10} with 1) the modeled concentrations being used to calculate RRFs for every grid cell, 2) the design value being set equal to the value for the only monitoring site, and 3) the results of step 1 and 2 being used to estimate FDVs for every grid cell with the objective being to determine whether there are unmonitored areas that are more sensitive to the addition of emissions corresponding to amount and type modeled than other areas. The average RRF for 24-hour PM_{10} is 0.8829 for the 2015 baseline and 0.9067 for the 2015 PMI scenario. The increase of 0.0238 represents 0.95 µg/m^3 increase relative to a base concentration of 40 µg/m^3. On average for the AQCRs, the worst-case impacts are expected to increase the RRFs by 0.0170 to 0.0280. In no case is the average RRF increased to a value greater than one (which would indicate an increase rather than a decrease in PM_{10} over time). Overall, RRFs are increased the most for AQCRs 21 and 22, which represent the western and southwestern portions of the state. FDVs were calculated using a current year value of 40 µg/m^3 for every grid cell based on the current-year value for the Little Rock monitoring site. FDVs are all well below 150 µg/m^3 for all grid cells for both the 2015 baseline and the 2015 PMI scenarios with the maximum impact for any grid cell being 1.48 µg/m^3. Difference plots for both RRFs and FDVs show that the worst-case impacts tend to increase RRFs and FDVs by a greater amount for western and northwestern Arkansas compared to the rest of the state. See ICF (2015) for RRFs by county, as well as both calculated RRF values and estimated FDVs for the 4-km grid (2015 baseline and 2015 PMI scenarios along with the differences between the two).

To further examine the potential near-field impacts from new or existing sources with emissions increases less than the proposed permit thresholds, a combined AERMOD/CMAQ analysis was also conducted. For each location, daily AERMOD-derived concentrations (for the receptor with the maximum annual average value) were added to the CMAQ-derived concentrations for the same location such that CMAQ values were used as "background". All metrics were calculated in accordance with the form of the standard for each species. For 24-hour PM_{10}, the maximum AERMOD-derived concentration with a CMAQ-derived background was 47.6 $\mu g/m^3$, less than the NAAQS of 150 $\mu g/m^3$. For the North Little Rock monitoring site in Pulaski County, the AERMOD + Background RRF was 0.8992 and the FDV was 36.9 $\mu g/m^3$. Therefore, the FDVs are less than the NAAQS and worst-case impacts would not result in an exceedance of the NAAQS.

NO_2

Simulated maximum impacts on 1-hr NO_2 concentration occur near and downwind of the hypothetical sources. Maximum differences vary by location and by day, ranging from approximately zero to 6 ppb. Considering all grid cells in the 4-km grid were compiled and added to the 2015 baseline daily maximum 1-hour NO_2 concentration for each day and each grid cell to create the 2015 PMI dataset for NO_2. Adjusted 2015 modeling results (2015 PMI) were calculated based on the worst-case impacts from threshold emission increases at any location within the modeling grid. The annual NO_2 NAAQS was not included in this analysis as the results for the 1-hour NO_2 NAAQS are expected to be larger than for other averaging periods.

Regarding site-specific modeling results for NO_2, Arkansas has two NO_2 monitoring sites and the results for each monitoring site assume that a hypothetical source identical to those modeled is located such that the worst-case impact occurs at the monitoring site. Current-year design values used for this summary were calculated as the average of the design values for the three overlapping three-year periods that include the modeled year (2006-2008, 2007-2009, and 2008-2010). NO_2 design values for 2015 PMI are estimated to be 1.3 to 1.5 ppb higher than the 2015 baseline values and the estimated FDVs are well below the NAAQS such that addition of the modeled worst-case impacts to the 2015 baseline does not affect attainment or maintenance of the NAAQS.

A simple spatial-fields analysis was also conducted for NO_2 consisting of: 1) modeled concentrations being used to calculate RFFs for every grid cell, 2) an average design value for the Arkansas was calculated based on data for the two monitoring sites, and 3) results of steps 1 and 2 being used to estimate FDVs for every grid cell. The objective was to determine whether there are unmonitored areas within the domain that are more sensitive to the addition of emissions corresponding to amount and type modeled than other areas. The average RRF for 1-hour NO_2 is 0.6617 for the 2015 baseline and 0.7630 for the 2015 PMI scenario with the increase of 0.0743 representing a 3.3 ppb increase relative to a base concentration of 45 ppb. For the AQCRs, the worst-case impacts are expected to increase the RFFs by 0.0314 to 0.1519 and in no case is the average RRF increased to a value greater than one, indicating that the future year values are less than the base year value. RRFs increased the most for AQCRs 19 and 21 in south-central and southwestern Arkansas; see ICF 2015 for RRFs by county. FDVs were calculated using a current-year value of 45 ppb for every grid cell, which was based on an average (approximately) of the current-year design values for the Little Rock and Marion monitoring sites.

Estimated FDVs and the differences were calculated for the 2015 baseline and the 2015 PMI scenarios. Although the addition of the worst-case impacts tends to increase RRFs and FDVs more in northwestern, western, and southwestern Arkansas compare to the rest of the state, all of the FDVs are well below 100 ppb for both the 2015 baseline and 2015 PMI scenarios.

To further examine the potential near-field impacts from new or existing sources with emissions increases less than the proposed permit thresholds, a combined AERMOD/CMAQ analysis was also conducted. For each location, daily AERMOD-derived concentrations (for the receptor with the maximum annual average value) were added to the CMAQ-derived concentrations for the same location such that CMAQ values were used as "Background". All metrics were calculated in accordance with the form of the standard for each species. For 1-hour NO_2, the maximum AERMOD-derived concentration with a CMAQ-derived background was 47.7 ppb, less than the NAAQS of 100 ppb. For Annual NO_2, the maximum AERMOD-derived concentration with a CMAQ-derived background was 6.7 ppb, less than the NAAQS of 53 ppb. For the North Little Rock monitoring site in Pulaski County, the AERMOD + Background RRF was 0.8281 and the FDV was 36.2 ppb. For the Marion monitoring site in Crittenden County, the AERMOD + Background RRF was 0.9764 and the FDV was 47.2 ppb; therefore, the FDVs are less than the NAAQS and worst-case impacts would not result in an exceedance of the NAAQS.

SO_2

Simulated maximum impacts on 1-hour SO_2 concentration occur near and downwind of the hypothetical sources and vary by location and by day, ranging from approximately zero to 4 ppb. Maximum differences for each day for all grid cells in the 4-km grid were compiled and added to the 2015 baseline daily maximum 1-hour SO_2 concentration for each day and each grid cell to create the 2015 PMI dataset for SO_2. The 2015 PMI resultant values are intended to represent the future-year concentrations assuming worst-case impacts from threshold emission increases at any location. Then, MATS was applied to calculate RRF values only for both monitoring sites and unmonitored areas; MATS does not accommodate SO_2 but can be used to calculate RRFs for any two datasets. The 3-hour SO_2 NAAQS was not included in this analysis as the results for the 1-hour SO_2 NAAQS are expected to be larger than for other averaging periods.

Arkansas has two SO_2 monitoring sites and the modeling results for each monitoring site assume that a hypothetical source identical to those modeled is located such that the worst-case impact occurs at the monitoring site. Current-year design values were calculated as the average of the design values for the three overlapping three-year periods that include the modeled year (2006-2008, 2007-2009, and 2008-2010) and all sites with data during the 2006 to 2010 period are included. MATS input parameters were set to the EPA-recommended default values and only the RRFs were calculated using MATS. FDVs were then calculated by hand. SO_2 design values for 2015 PMI are estimated to be 0.90 to 3.9 ppb higher than the 2015 baseline values and the estimated FDVs are well below the NAAQS, not affecting attainment or maintenance of the NAAQS for either monitoring site.

A simple spatial-fields analysis was also conducted for SO_2: 1) modeled concentrations being used to calculate RRFs for every grid cell, 2) an average design value was calculated based on data for the two monitoring sites, and 3) results of steps 1 and 2 being used to estimate FDVs for every grid cell. The objective was to determine whether there are unmonitored areas that are more sensitive to the addition of emissions corresponding to amount and type modeled than other areas. The average RRF for 1-hour SO_2 is 0.9943 for the 2015 baseline and 1.1809 for the 2015 PMI scenario for an increase of 0.1866 representing a 3.7 ppb increase relative to a base concentration of 20 ppb. On average for the AQCRs, worst-case impacts are expected to increase RRFs by 0.1089 to 0.2249 but in no case is the average RRF increased from a value less than one to a value greater than one, as several of the AQCR's baseline values are already greater than one. RRFs are increased the most for AQCR 21 which represents the western to northwestern portion of the state; see ICF 2015 for RRFs by county. FDVs were calculated to be 20 ppb using an average (approximately) current-year design values for the Little Rock and El Dorado monitoring sites and estimated FDVs and the differences were calculated for the 2015 baseline and the 2015 PMI scenarios. Difference plots show that the addition of the worst-case impacts tend to increase the RRFs and FDVs by a greater amount for northwestern Arkansas compared to the rest of the State but despite increased RRFs, the FDVs are all below 1-hour SO_2 NAAQS (75 ppb) for both the 2015 baseline and the 2015 PMI scenarios.

To further examine the potential near-field impacts from new or existing sources with emissions increases less than the proposed permit thresholds, a combined AERMOD/CMAQ analysis was also conducted. For each location, daily AERMOD-derived concentrations (for the receptor with the maximum annual average value) were added to the CMAQ-derived concentrations for the same location such that CMAQ values were used as "background". All metrics were calculated in accordance with the form of the standard for each species. For 1-hour SO_2, the maximum AERMOD-derived concentration with a CMAQ-derived background was 45.1 ppb, less than the NAAQS of 75 ppb. For the North Little Rock monitoring site in Pulaski County, the AERMOD + Background RRF was 1.6986 and the FDV was 20.0 ppb. For the El Dorado monitoring site in Union County, the AERMOD + Background RRF was 1.5221 and the FDV was 39.6 ppb. Even with the higher RRFs, the FDVs are less than the NAAQS and worst-case impacts would not result in an exceedance of the NAAQS.

Summary of Modeling Analysis

The modeling analysis utilized two, separately and in combination, air quality modeling systems (AERMOD and CMAQ) along with a variety of post-processing and analysis techniques to examine the potential impacts on the NAAQS from new minor point sources with emissions equal to the revised permit thresholds. These techniques were applied appropriately to examine impacts at both the regional and near-field resolutions.

Regional Scale Results

The regional-scale modeling and impact assessment methodology was designed to examine worst-case impacts from threshold emission increases at each location within the modeling grid.

Modeled worst-case impacts of 40 tpy of both VOC and NO_X to the 2015 baseline increases the FDVs by 0.2 to 0.4 ppb where they remain below the NAAQS and therefore not affecting attainment or maintenance of the ozone NAAQS for any monitoring site. While remaining below the NAAQS, the VOC and NO_X analyses did indicate that central and southwestern Arkansas may be more sensitive to the addition of ozone-related emissions and could be areas for greater vigilance of these pollutants.

Although difference plots show that the addition of the worse-case impacts tend to preferentially increase calculated RRFs and FDVs in northwestern, western, and southwestern Arkansas for NO_2, in northwestern Arkansas for SO_2, and in western and northwestern Arkansas for PM_{10}, worse-case impacts of these pollutants to the 2015 baseline also does not affect attainment or maintenance of the NAAQS.

Combined Near-field/Regional Scale Results

The combined near-field/regional-scale modeling and impact assessment was designed to examine worst-case impacts from threshold emission increases for each AQCR and the maximum impacts were applied for each selected source and each monitoring site location.

For all species and metrics, the results for the AERMOD + Background concentrations are much less than the NAAQS. When applied to monitoring sites, the worse-case local impacts increase the FDVs but the resultant values are less than the NAAQS values and do not result in any NAAQS exceedances. For all species, with the exception of SO_2, the FDVs are lower than current year values for both the baseline and local impact scenarios. For SO_2, even though the FDVs are higher than the current year values, the FDVs are still only 53% of the NAAQS and worst-case impacts would not result in a NAAQS exceedance.

Conclusion

This technical support document has described the derivation of the revised permit thresholds and De Minimis levels for CO, NO_x, SO_2, VOC, PM, and PM_{10} that were submitted in the 2010 Threshold SIP as well as a monitoring based analysis and modeling based analysis which support the levels at which these thresholds were set. The monitoring based analysis demonstrates that these revisions have not resulted in deterioration of air quality with respect to the CO, NO_2, SO_2, ozone, or PM_{10} NAAQS, and a modeling based analysis. On the contrary, air quality with respect to these pollutants has improved in the years following the revision of the minor NSR permit thresholds and De Minimis levels. Furthermore, modeling conducted by ICF on behalf of the Department has shown that worst-case impacts from emission increases equal to the revised permit thresholds and De Minimis levels will not interfere with attainment or maintenance of the NAAQS. The Department has determined that the revised permit thresholds and De Minimis levels for CO, NO_x, SO_2, VOC, PM, and PM_{10}, which have been effective in the State since 2009, are sufficiently protective of the NAAQS and the monitoring trends and modeling analyses further support this determination.

Appendix A

ICF International

Air Quality Modeling Analysis of Minor Source Permit Thresholds

September 30, 2015

MEMORANDUM

To: Mark McCorkle and David Clark, Arkansas Department of Environmental Quality (ADEQ)

From: Sharon Douglas, Jay Haney, Belle Hudischewskyj, Yihua Wei and Tom Myers, ICF

Date: September 30, 2015

Re: Air Quality Modeling Analysis of Minor Source Permit Thresholds

Introduction

This memorandum summarizes the methods and results of an air quality modeling exercise designed to inform minor source permit applications and future-year attainment of the National Ambient Air Quality Standards (NAAQS) for the State of Arkansas. Air quality modeling was used to demonstrate that sources permitted under the Minor New Source Review (NSR) program with emissions increases less than proposed permit thresholds will not cause or contribute to a violation of the NAAQS or interfere with the maintenance of the NAAQS.

In a February 17, 2015 letter "EPA Comments on Proposed Revisions to the Arkansas Plan of Implementation for Air Pollution Control - Regulation No. 19 (Docket No. 14-010-R)," EPA states that one of the requirements for approval of Reg. 19.305 is for ADEQ to demonstrate how all sources permitted under the Minor NSR Program will not cause or contribute to a NAAQS violation or interfere with the maintenance of the NAAQS. EPA further states "the ADEQ may achieve this by providing a detailed analysis and supporting documentation, such as generic air quality modeling, to demonstrate that all sources permitted under the Minor NSR program will not interfere with NAAQS attainment or maintenance for all NAAQS." As part of this demonstration "the ADEQ needs to provide additional technical information to demonstrate that proposed changes with emissions increases less than the referenced thresholds will not cause or contribute to a violation of the NAAQS or interfere with the maintenance of the NAAQS. The referenced thresholds are the proposed permit threshold/de minimus levels listed in the 2010 Arkansas State Implementation Plan Revision. For criteria pollutants, these are as follows: carbon monoxide (CO) 75 tons per year (tpy), oxides of nitrogen (NO_x) 40 tpy, sulfur dioxide (SO_2) 40 tpy, volatile organic compounds (VOC) 40 tpy, particulate matter (PM) 25 tpy, PM_{10} 15 tpy, and $PM_{2.5}$ 10 tpy.

To examine the potential impacts on these pollutants from new sources or existing sources with emissions increases less than the proposed permit thresholds, ICF conducted a combined AERMOD/CMAQ analysis. The CMAQ modeling for the 2008 base year and the 2008/2015 future year from the Arkansas DEQ statewide modeling effort (ICF, 2014) was used for the regional-scale component of the modeling analysis.

Description of Minor Point Sources

As part of this study, hypothetical minor point sources were modeled using both regional-scale and source-specific modeling methods.

The sources were assumed to emit VOC, NO_x, SO_2, CO, $PM_{2.5}$, and PM_{10}. The emissions for each species were set equal to the permit threshold values, as follows:

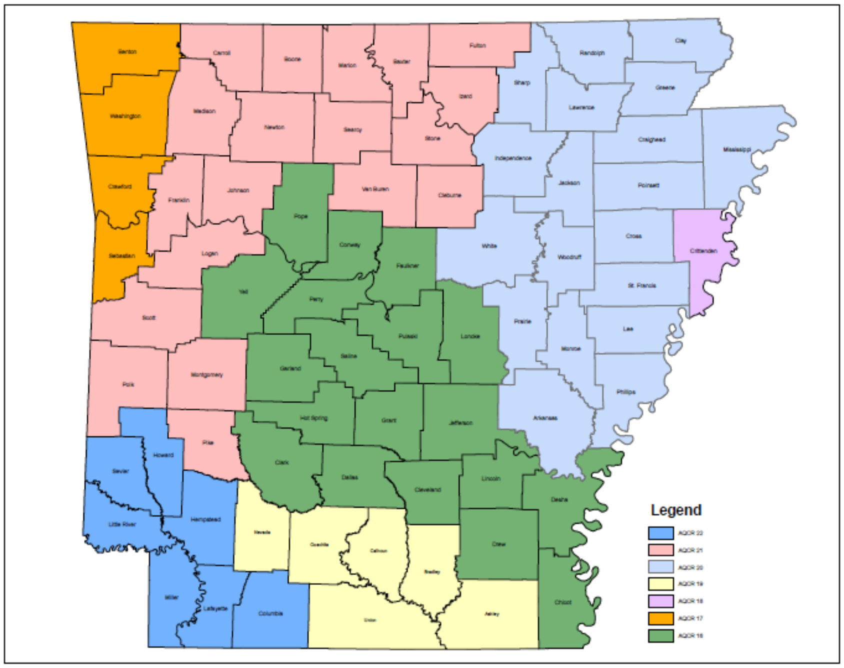
- VOC: 40 tpy
- NO_x: 40 tpy
- SO_2: 40 tpy
- CO: 75 tpy
- $PM_{2.5}$: 10 tpy
- PM_{10}: 15 tpy

The stack parameters were set equal to the median values of stack height, stack diameter, exit temperature, and exit velocity of all minor point sources in Arkansas, based on the 2011 National Emission Inventory (NEI). These values are as follows:

- Stack height: 12.7 meters (m)
- Stack diameter: 0.67 m
- Temperature: 337.8 degrees Kelvin
- Exit velocity: 9.2 meters per second (m/s)

Eight hypothetical sources were approximately centrally located within each State of Arkansas air quality control region (AQCR) identified in Figure 1. AQCR 21 (pink) includes two locations, since it covers two distinct geographical areas. Specifically, the sites were placed in the approximate centers of the following counties: Pulaski, Washington, Crittenden, Union, Craighead, Van Buren, Polk and Miller. The locations were shifted slightly from the center of the county for Polk, Van Buren, and Washington Counties to ensure that the source locations would be accessible (and near a populated or urban area).

Figure 1. Arkansas DEQ Air Quality Control Regions.



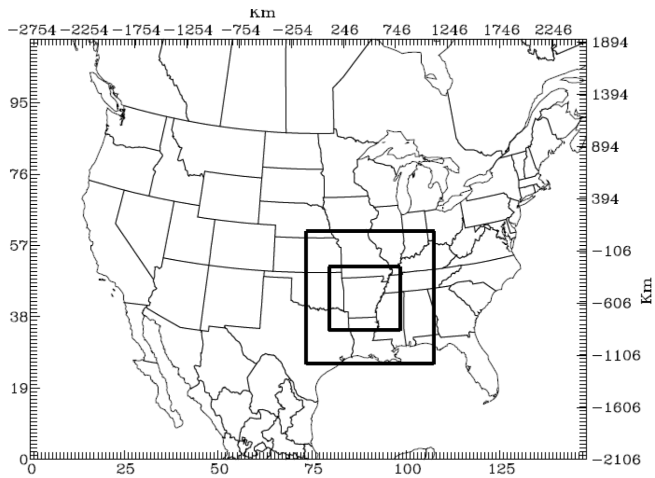
Regional-Scale Modeling

Methodology

Photochemical modeling was used to examine the potential impacts of emission increases from new sources on ozone and $PM_{2.5}$ concentrations. Specifically, the Community Multiscale Air Quality (CMAQ) model was used to simulate the potential impacts from the hypothetical sources described in the previous section. While the photochemical modeling exercise was specifically designed to examine ozone and $PM_{2.5}$, CMAQ also simulates NO_2, SO_2, and PM_{10} so the results for those pollutants were also examined. The CMAQ modeling for the 2008 base year (2008 current year scenario) and the 2008/2015 future year (2015 baseline scenario) from the Arkansas DEQ statewide modeling effort (ICF, 2014) was used as the basis for the regional-scale component of the modeling analysis.

The CMAQ future-year (2015) emission inventory was modified to include the eight hypothetical new point sources, distributed throughout the AQCRs. The emission sources were characterized as single low-level point sources with emission rates set to the threshold values. CMAQ was run (for the 4-km grid only) for the annual simulation period. The full CMAQ modeling domain is presented in Figure 2 and includes a 36-km resolution outer grid encompassing the continental U.S.; a 12-km resolution intermediate grid; and a 4-km resolution inner grid encompassing Arkansas. Only the 4-km grid was used for this application; the boundary conditions were obtained from the 12-km modeling results for the statewide modeling effort (ICF, 2014).

Figure 2. CMAQ Modeling Domain for the Arkansas Statewide Criteria Pollutant Air Quality Modeling Analysis.



The maximum CMAQ-derived impact on daily maximum 8-hour ozone, 24-hour average $PM_{2.5}$, and annual average $PM_{2.5}$ for any location in Arkansas was calculated. In addition, the maximum CMAQ-derived impact on daily maximum 1-hour NO_2, daily maximum 1-hour SO_2, and 24-hour average PM_{10} was also calculated. The statewide maximum impact for each simulation day (maximum over all AQCRs and grid cells in Arkansas) was used for the remaining steps of this analysis.

The daily maximum CMAQ-derived impact was then added to the simulated CMAQ-derived concentrations for each day and grid cell for the future-year (2015) simulation. The resultant values are intended to represent the future-year concentrations assuming worst-case impacts from threshold emission increases at any location within the modeling grid. The adjusted 2015 modeling results will be referred to as the 2015 plus maximum impact dataset or 2015 PMI throughout the remainder of this memorandum.

The 2015 PMI values were used in conjunction with the 2008 current-year modeling results (again from the statewide modeling analysis) to calculate relative reduction factors (RRFs) and estimated future-year design values (FDVs) (for 2015) for both monitored and unmonitored locations. These results were compared with the prior 2015 results (from the original statewide modeling analysis) as well as with the NAAQS to examine whether emission increases less than the referenced thresholds will cause or contribute to a violation of the NAAQS or potentially interfere with the maintenance of the NAAQS.

EPA's MATS software was used to calculate RRFs and future-year design values for ozone and $PM_{2.5}$, following the recommendations outlined in the updated draft guidance issued by EPA in December 2014 (Modeling Guidance for Demonstrating Attainment of Air Quality Goals for Ozone, PM2.5, and Regional Haze [EPA, 2014]). MATS was also used to calculate RRFs for NO_2, SO_2 and PM_{10} using the same methodology as used for ozone.

This methodology is based on relative (rather than absolute) use of the modeling results, and relies on the ability of the air quality modeling system to simulate the change in concentration due to changes in emissions, but not necessarily its ability to simulate exact values for future-year concentrations. For each air quality metric, a future-year estimated design value (FDV) is calculated using the "current-year" design value and the future-year and base-year modeling results.

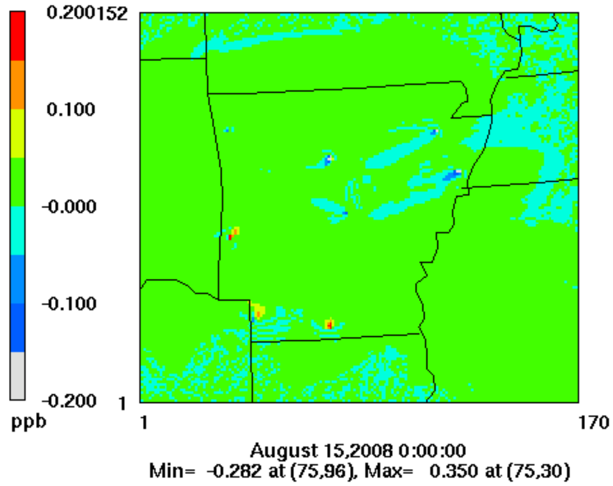
The current-year design value for each pollutant and monitoring site within Arkansas was calculated in accordance with the form of the standard for that pollutant. For this analysis (which is not an attainment demonstration) the current-year design values were based on data for 2006 through 2010. Calculation of the current year design values differs among the pollutants and the procedures outlined in the guidance document were followed. Additional detail for each pollutant is provided in the results sections.

The current-year design value for each site was then multiplied by a relative response factor (RRF), which is defined as ratio of the future-year to base-year simulated concentration in the vicinity of the monitoring site. The resulting value is referred to as the future-year design value or FDV. The methodology has additional layers of complexity for multi-species pollutants such as $PM_{2.5}$; these are outlined in the guidance document and were accounted for in this analysis. The resulting values were compared with the NAAQS. The analysis was conducted for both the 2008 current-year/2015 baseline and 2008 current year/2015 PMI simulation pairs. Tabular and graphical summaries of the RRFs and EDVs were prepared and average values of the RRFs for each county and AQCR were calculated.

Results for Ozone

The simulated maximum impacts on 8-hour ozone concentration occur near and downwind of the hypothetical sources. The maximum difference varies by location and by day and ranges from approximately zero to 1.1 parts per billion (ppb). An example difference plot illustrating the impacts for 15 August is provided in Figure 3.

Figure 3. Example Difference in CMAQ-Derived Daily Maximum 8-Hour Average Ozone Concentration with the Addition of Emissions from the Eight Hypothetical Minor Point Sources (August 15).



The plot shows a mix of small increases and decreases in simulated daily maximum 8-hour ozone concentrations for the selected day, near and downwind of the source locations. The largest increase is 0.35 ppb. The largest decrease is -0.28. Decreases in ozone are likely due to the added NO_x emissions from the hypothetical sources. The response of the CMAQ model to the changes in emissions is influenced by the complex photochemistry represented by the model. Under certain conditions increases in NO_x emissions can lead to decreases in ozone. This occurs when the conversion of NO to NO_2 is inhibited (due to either relatively low VOC concentrations or limited photolysis conditions – as might be expected to occur during the nighttime hours or on cloudy days).

The maximum differences for each day considering all grid cells in the 4-km grid were compiled and added to the 2015 baseline daily maximum 8-hour ozone concentration for each day and each grid cell to create the 2015 PMI dataset for ozone. The 2015 PMI resultant values are intended to represent the future-year concentrations assuming worst-case impacts from threshold emission increases at any location within the modeling grid.

Next, MATS was applied for both monitoring sites and unmonitored areas.

Site-specific Modeling Results for Ozone

Table 1 summarizes the site-specific MATS results for 8-hour ozone. In this case, the results for each monitoring site assume that a hypothetical source identical to those modeled is located such that the worst-case impact occurs at the monitoring site. The current-year design values used for this summary were calculated as the average of the design values for the three overlapping three-year periods that include the modeled year (2006-2008, 2007-2009, and 2008-2010). All sites with data during the 2006 to 2010 period are included in the table. The current-year design values are based on the data contained within the MATS database and are calculated within MATS. The MATS input parameters were set to the EPA-recommended default values. Per current EPA guidance, the ten highest concentrations, based on the baseline simulation results, were used in the calculation of the RRFs for each site. Units for the FDVs are ppb. The RRF values are unitless.

Table 1. RRFs and Estimated Future-Year 8-Hour Ozone Design Values (ppb) for Monitoring Sites within Arkansas.

Site/Location	County	Current-Year 8-Hr Ozone Design Values (ppb)	2015 Baseline		2015 PMI		Difference in FDV (ppb)
			RRF	FDV (ppb)	RRF	FDV (ppb)	
North Little Rock (Pike Ave)	Pulaski	72.3	0.8837	63.8	0.8881	64.2	0.4
North Little Rock Airport	Pulaski	74.3	0.8773	65.1	0.8813	65.4	0.3
Little Rock (Doyle Springs Rd)	Pulaski	68.0	0.8762	59.5	0.8806	59.8	0.3
Marion	Crittenden	77.3	0.9059	70.0	0.9094	70.2	0.2
Deer	Newton	68.0	0.8966	60.9	0.8988	61.1	0.3
Springdale	Washington	64.0	0.8787	56.2	0.8823	56.4	0.2
Mena	Polk	71.7	0.8932	64.0	0.8966	64.2	0.2

Note: The NAAQS for 8-hour average ozone concentration is 75 ppb.

Ozone design values for 2015 PMI are estimated to be 0.2 to 0.4 ppb higher than the 2015 baseline values. The estimated future-year design values for all sites are below the NAAQS. Addition of the modeled worst-case impacts to the 2015 baseline does not affect attainment or maintenance of the NAAQS for any monitoring site.

Statewide Modeling Results for Ozone

MATS was also used to conduct a spatial-fields analysis. This analysis consisted of several steps: 1) the modeled concentrations were used to calculate RRFs for every grid cell, 2) the model-derived gradients were used in conjunction with observed data to estimate current-year design values for every grid cell, and 3) the results of steps 1 and 2 were used to estimate future-year design values for every grid cell. The objective was to determine whether there are unmonitored areas within the domain that are more sensitive to the addition of emissions corresponding to amount and type modeled than other areas.

The average RRF for 8-hour ozone for Arkansas (based on all grid cells that comprise the state) is 0.8910 for the 2015 baseline and 0.8942 for the 2015 PMI scenario. This increase in average RRF (0.0032) represents a 0.2 ppb increase relative to a base concentration of 70 ppb. Table 2 summarizes the RRFs by AQCR.

Table 2. RRFs for Each AQCR for the 2015 Baseline and 2015 PMI Scenarios: 8-Hour Ozone.

AQCR	2015 Baseline	2015 PMI	Difference (PMI – Baseline)
AQCR 16	0.8842	0.8876	0.0034
AQCR 17	0.8974	0.9012	0.0038
AQCR 18	0.8880	0.8912	0.0032
AQCR 19	0.8959	0.8990	0.0031
AQCR 20	0.8878	0.8906	0.0027
AQCR 21	0.8987	0.9018	0.0031
AQCR 22	0.8896	0.8935	0.0039

For the AQCRs, the worst-case impacts are expected to increase the average RRFs by 0.0027 to 0.0039. In no case is the average RRF increased to a value greater than one (which would indicate an increase rather than a decrease in ozone over time). Overall, there is little variation among the AQCRs. RRFs by county are provided in Attachment A.

Figure 4 displays the calculated RRF values for the 4-km grid for the 2015 baseline and 2015 PMI scenarios and the difference between the two, calculated as PMI minus baseline. The difference plot is intended to examine whether there are areas within the state where the estimated worst-case impacts would have a greater effect on the RRFs compared to other areas.

Figure 4. RRFs and Differences Based on MATS Spatial-Fields Analysis for the 2015 Baseline and 2015 PMI Scenarios: 8-Hour Ozone.

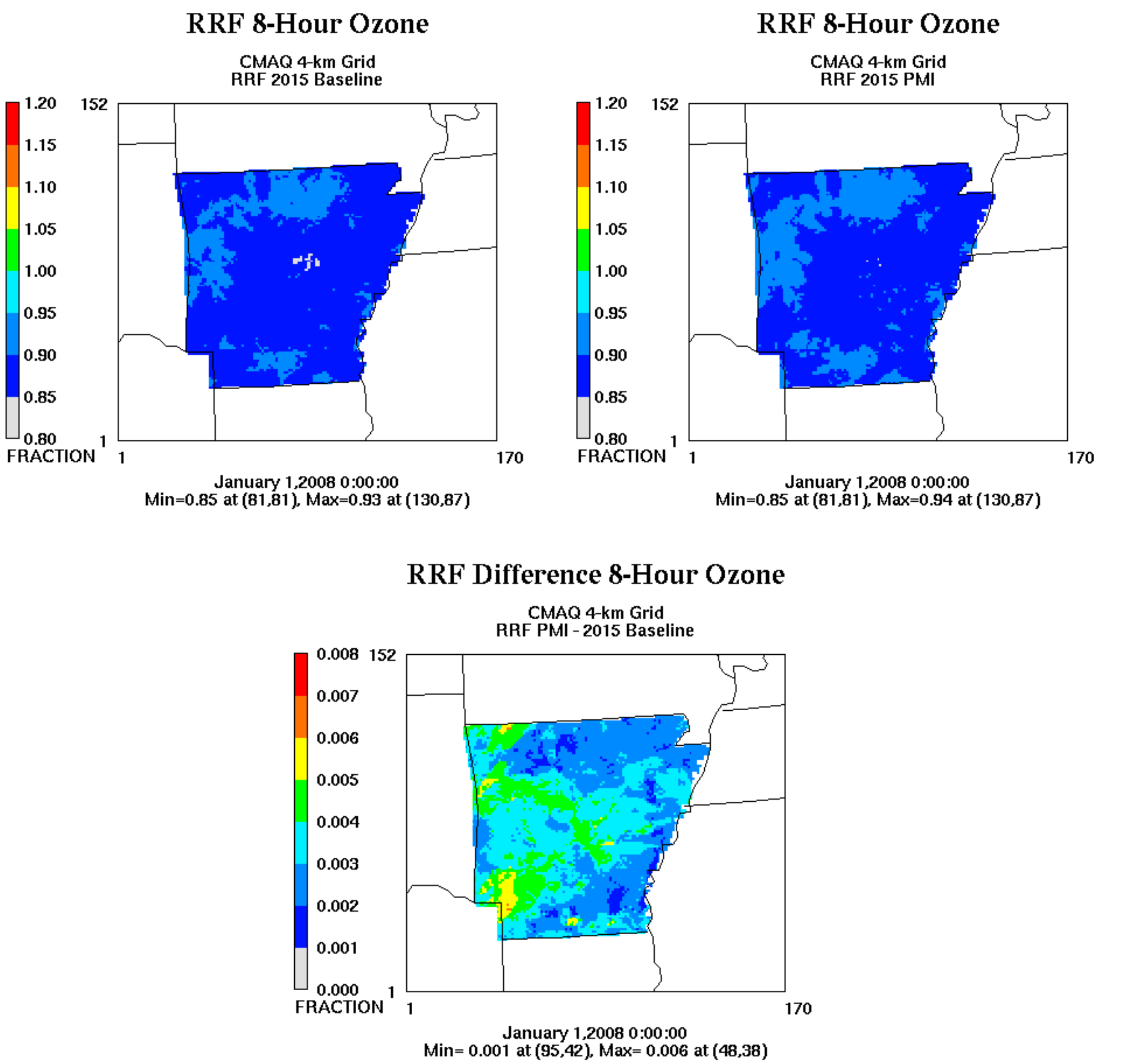
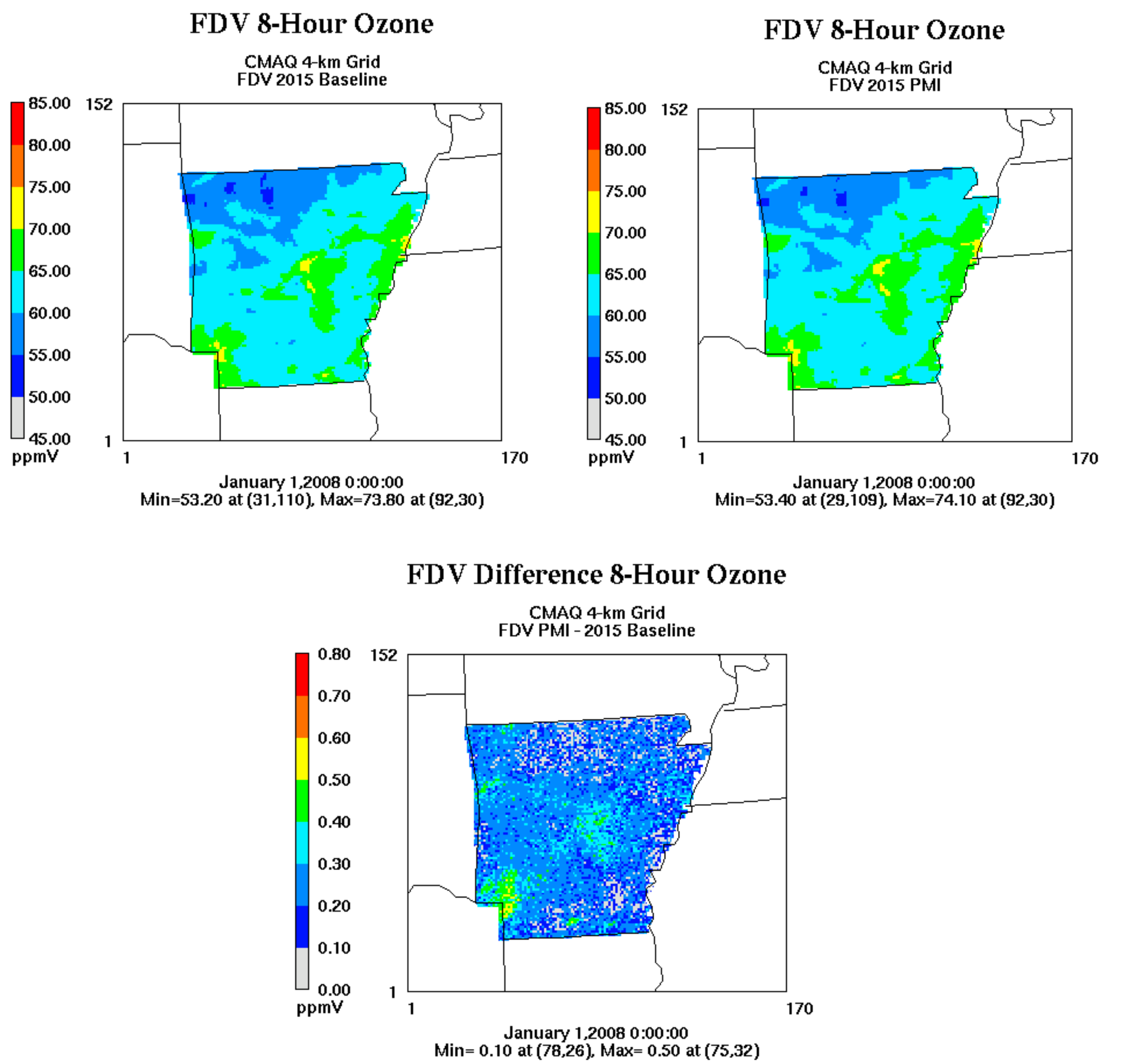


Figure 5 displays the estimated FDVs for the 4-km grid for the 2015 baseline and 2015 PMI scenarios and the difference between the two, calculated as PMI minus baseline.

Figure 5. FDVs and Differences Based on MATS Spatial-Fields Analysis for the 2015 Baseline and 2015 PMI Scenarios: 8-Hour Ozone.



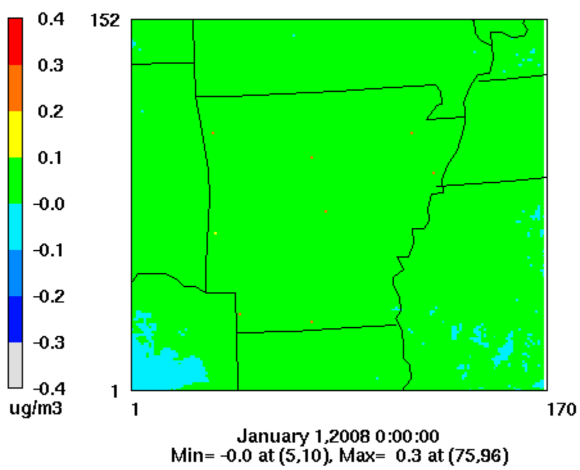
The difference plots show that that the addition of the worst-case impacts tends to increase the RRFs and FDVs by a greater amount for some areas in central and southwestern Arkansas compared to the rest of the State. This is likely because the impacts represent a greater percentage of the simulated concentrations on the days with the highest concentrations (those included in the calculation of the RRF) for these areas than for other areas. One possible conclusion is that worst-case impacts are more likely to affect the design values in these areas. Nevertheless, the impacts are small relative to the base concentrations.

Note that the FDVs for some unmonitored locations are greater than those projected for the monitoring sites (as presented in Table 1), for both the 2015 baseline and the 2015 PMI scenarios. This is due to the fact that the modeled concentration gradients are used in MATS to estimate current and future design values for unmonitored areas and this can result in estimated current-year design values for unmonitored areas that are greater than at any monitoring site. Without use of the modeled concentration gradients, the monitored data are simply interpolated to each grid cell. This results in more uniform FDVs and slightly lower peak values (by about 2 ppb). The spatial-fields analysis of the FDVs is not intended to examine if there are unmonitored areas for which the minor source impacts could potentially result in nonattainment issues. Since the result depends on the current-year design value at each unmonitored grid cell, which is unknown, this analysis is most useful at identifying those areas where the impacts are likely to have a greater effect on the design values. Nevertheless, the FDVs are less than 75 ppb (the current or 2015 NAAQS) for all grid cells within Arkansas for both the 2015 baseline and 2015 PMI scenarios, and the maximum impact at any grid cell is 0.5 ppb.

Results for $PM_{2.5}$

The simulated maximum impacts on 24-hour and annual average $PM_{2.5}$ concentration occur at or near the hypothetical sources. The maximum difference varies by location and ranges from approximately 0.2 to 0.3 micrograms per cubic meter (µg/m^3) on a monthly average basis. An example difference plot illustrating the impacts for annual average $PM_{2.5}$ is provided in Figure 6.

Figure 6. Example Difference in CMAQ-Derived Annual Average $PM_{2.5}$ Concentration with the Addition of Emissions from the Eight Hypothetical Minor Point Sources.



The plot shows small increases in simulated annual average $PM_{2.5}$ concentration at or near the source locations. The largest increase is 0.3 µg/m^3.

The maximum differences in 24-hour average $PM_{2.5}$ concentration for each day considering all grid cells in the 4-km grid were compiled and added to the 2015 baseline 24-hour $PM_{2.5}$ concentration for each day and each grid cell to create the 2015 PMI dataset for $PM_{2.5}$. The 2015 PMI resultant values are intended to represent the future-year concentrations assuming worst-case impacts from threshold emission increases at any location within the modeling grid.

Next, MATS was applied for monitoring sites (for both 24-hour and annual average $PM_{2.5}$) and for unmonitored areas (for annual average $PM_{2.5}$ only). MATS does not support spatial-fields analysis for 24-hour $PM_{2.5}$.

Site-specific Modeling Results for $PM_{2.5}$

Table 3 summarizes the site-specific MATS results for 24-hour $PM_{2.5}$ and Table 4 summarizes the results for annual average $PM_{2.5}$. The results for each monitoring site assume that a hypothetical source identical to those modeled is located such that the worst-case impact occurs at the monitoring site. The current-year design values used for this summary were calculated as the average of the design values for the three overlapping three-year periods that include the modeled year (2006-2008, 2007-2009, and 2008-2010). All currently operating sites with data during the 2006 to 2010 period are included in the table. The current-year design values are based on the data contained within the MATS database and are calculated within MATS. The MATS input parameters were set to the EPA-recommended default values. Per current EPA guidance, the ten percent highest concentrations, based on the baseline simulation results, were used in the calculation of the RRFs for each site. Units for the FDVs are $\mu g/m^3$. For $PM_{2.5}$, the RRF values are calculated for each component species and are therefore not included in the table.

Table 3. RRFs and Estimated Future-Year 24-Hour $PM_{2.5}$ Design Values ($\mu g/m^3$) for Monitoring Sites within Arkansas.

Site/Location	County	Current-Year 24-Hr $PM_{2.5}$ Design Values ($\mu g/m^3$)	2015 Baseline FDV ($\mu g/m^3$)	2015 PMI FDV ($\mu g/m^3$)	Difference in FDV ($\mu g/m^3$)
North Little Rock (Pike Ave)	Pulaski	25.4	21.6	22.0	0.4
Little Rock (Adams Field)	Pulaski	28.1	23.7	23.9	0.2
Little Rock (Doyle Springs Rd)	Pulaski	25.9	21.8	22.1	0.3
Marion	Crittenden	27.2	22.1	22.4	0.3
Stuttgart	Arkansas	25.4	21.2	21.5	0.3
Mena	Polk	23.3	20.6	22.2	0.6
Hot Springs	Garland	23.4	19.9	20.3	0.4
El Dorado	Union	23.0	19.7	19.9	0.2
Crossett	Ashley	22.9	19.3	19.5	0.2

Note: The NAAQS for 24-hour average $PM_{2.5}$ concentration is 35 $\mu g/m^3$.

Daily $PM_{2.5}$ design values for 2015 PMI are estimated to be 0.2 to 0.6 µg/m^3 higher than the 2015 baseline values. The estimated future-year design values for all sites are well below the NAAQS. Addition of the modeled worst-case impacts to the 2015 baseline does not affect attainment or maintenance of the 24-hour $PM_{2.5}$ NAAQS for any monitoring site.

Table 4. RRFs and Estimated Future-Year Annual Average $PM_{2.5}$ Design Values (µg/m^3) for Monitoring Sites within Arkansas.

Site/Location	County	Current-Year Annual $PM_{2.5}$ Design Values (µg/m^3)	2015 Baseline FDV (µg/m^3)	2015 PMI FDV (µg/m^3)	Difference in FDV (µg/m^3)
North Little Rock (Pike Ave)	Pulaski	11.8	10.4	10.6	0.2
Little Rock (Adams Field)	Pulaski	12.2	10.8	11.0	0.2
Little Rock (Doyle Springs Rd)	Pulaski	12.0	10.7	11.0	0.3
Marion	Crittenden	11.8	10.4	10.6	0.2
Stuttgart	Arkansas	11.3	10.2	10.4	0.2
Mena	Polk	10.9	9.8	10.2	0.4
Hot Springs	Garland	11.1	10.1	10.4	0.3
El Dorado	Union	11.3	10.1	10.4	0.3
Crossett	Ashley	11.1	10.0	10.2	0.2

Note: The NAAQS for annual average $PM_{2.5}$ concentration is 12 µg/m^3.

Annual $PM_{2.5}$ design values for 2015 PMI are estimated to be 0.2 to 0.4 µg/m^3 higher than the 2015 baseline values. The estimated future-year design values for all sites are all below the NAAQS. Addition of the modeled worst-case impacts to the 2015 baseline does not affect attainment or maintenance of the annual $PM_{2.5}$ NAAQS for any monitoring site.

Statewide Modeling Results for $PM_{2.5}$

MATS was also used to conduct a spatial-fields analysis for annual $PM_{2.5}$. This analysis consisted of several steps: 1) the modeled concentrations were used to calculate RRFs for every grid cell, 2) the model-derived gradients were used in conjunction with observed data to estimate current-year design values for every grid cell, and 3) the results of steps 1 and 2 were used to estimate future-year design values for every grid cell. The objective was to determine whether there are unmonitored areas within the domain that are more sensitive to the addition of emissions corresponding to amount and type modeled than other areas.

The average RRF for Arkansas (based on all grid cells that comprise the state) is 0.8619 for the 2015 baseline and 0.9045 for the 2015 PMI scenario. This increase (0.0425) represents a 0.4 $\mu g/m^3$ increase relative to a base concentration of 10 $\mu g/m^3$. Table 5 summarizes the RRFs by AQCR.

Table 5. RRFs for Each AQCR for the 2015 Baseline and 2015 PMI Scenarios: Annual Average $PM_{2.5}$.

AQCR	2015 Baseline	2015 PMI	Difference (PMI – Baseline)
AQCR 16	0.8619	0.9040	0.0421
AQCR 17	0.8633	0.9056	0.0424
AQCR 18	0.8530	0.8814	0.0284
AQCR 19	0.8629	0.9098	0.0469
AQCR 20	0.8587	0.8918	0.0330
AQCR 21	0.8661	0.9162	0.0501
AQCR 22	0.8588	0.9062	0.0474

For the AQCRs, the worst-case impacts are expected to increase the average RRFs by 0.0284 to 0.0501. In no case is the average RRF increased to a value greater than one (which would indicate an increase rather than a decrease in $PM_{2.5}$ over time). Overall, RRFs are increased the most for AQCRs 19, 21 and 22, which encompass most of the southwestern part of the State. RRFs by county are provided in Attachment B.

Figure 7 displays the calculated RRF values for the 4-km grid for the 2015 baseline and 2015 PMI scenarios and the difference between the two, calculated as PMI minus baseline.

Figure 7. RRFs and Differences Based on MATS Spatial-Fields Analysis for the 2015 Baseline and 2015 PMI Scenarios: Annual Average $PM_{2.5}$.

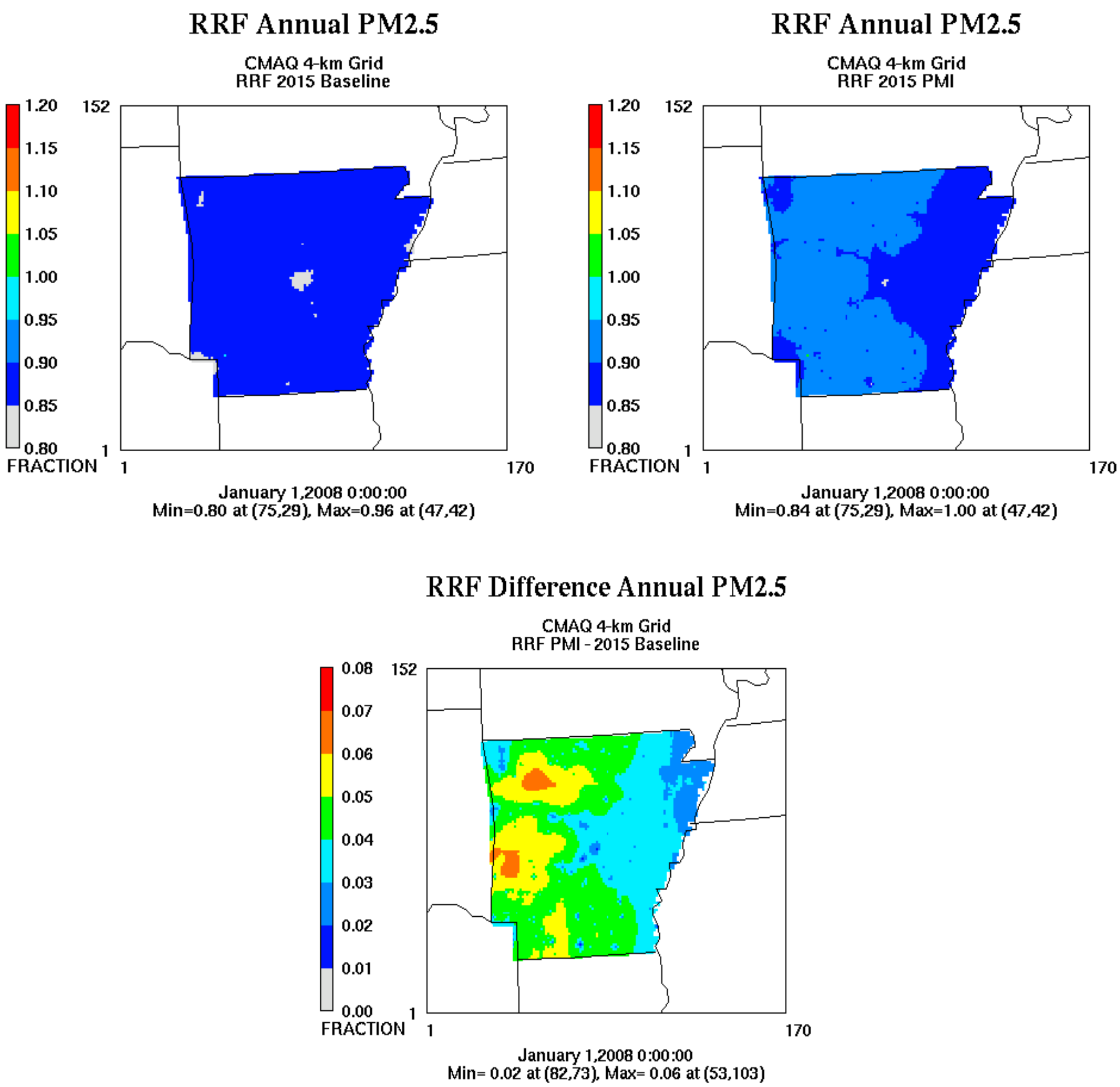
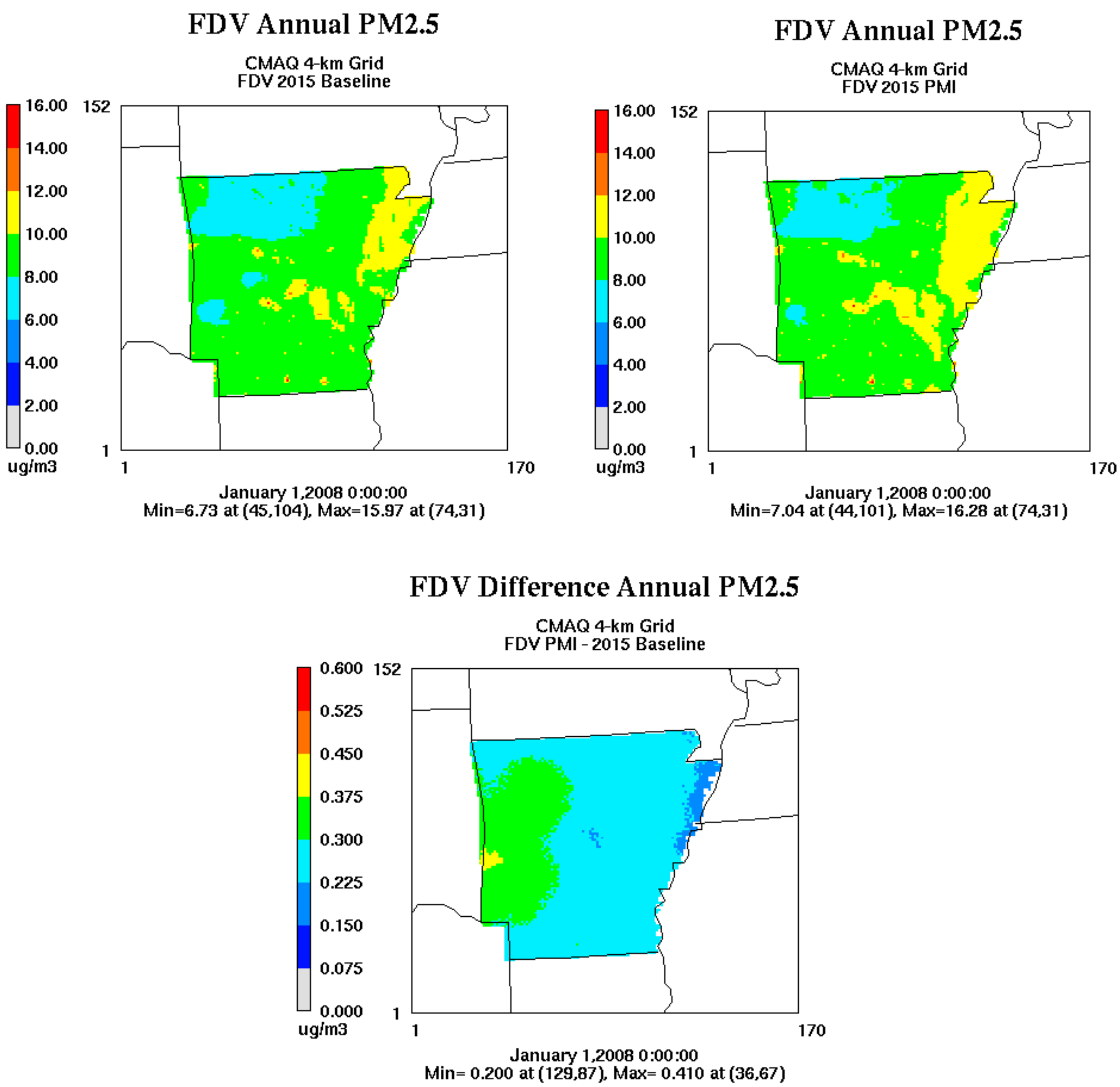


Figure 8 displays the estimated FDVs for the 4-km grid for the 2015 baseline and 2015 PMI scenarios and the difference between the two, calculated as PMI minus baseline.

Figure 8. FDVs and Differences Based on MATS Spatial-Fields Analysis for the 2015 Baseline and 2015 PMI Scenarios: Annual Average $PM_{2.5}$.



The difference plots show that the addition of the worst-case impacts tends to increase the RRFs and FDVs by a greater amount for some areas in western Arkansas compared to the rest of the state. Worst-case impacts in these areas are more likely to affect the RRF and FDV values. Nevertheless, the impacts are small relative to the base concentrations.

The MATS projected FDVs show several isolated unmonitored areas throughout the state with annual average $PM_{2.5}$ concentrations greater than 12 $\mu g/m^3$. These appear in both the 2015 baseline and 2015 PMI plots. The values are greater than those projected for the monitoring sites (as presented in Table 4). This is due to the fact that the modeled concentration gradients are used in MATS to estimate current and future design values for unmonitored areas and this can result in estimated current-year design values for unmonitored areas that are greater than at any monitoring site. Without use of the modeled concentration gradients, the monitored data are simply interpolated to each grid cell. This results in more uniform FDVs and lower peak values (by up to 5 $\mu g/m^3$). The spatial-fields analysis is not intended to examine if there are unmonitored areas for which the minor source impacts would potentially result in nonattainment issues. Since the result depends on the assumed current-year design value at each unmonitored location, which is unknown, this analysis is most useful at identifying those areas where the impacts are likely to have a greater effect on the design values. Nevertheless, the FDVs indicate a few isolated areas/grid cells within Arkansas greater than 12 $\mu g/m^3$ for the gradient-adjusted case and no grid cells greater than 12 $\mu g/m^3$ for the straight interpolation case for both the 2015 baseline and 2015 PMI scenarios. The maximum impact at any grid cell is 0.41 $\mu g/m^3$.

Results for NO_2

The simulated maximum impacts on 1-hour NO_2 concentration occur near and downwind of the hypothetical sources. The maximum difference varies by location and by day and ranges from approximately zero to 6 parts per billion (ppb). The maximum differences for each day considering all grid cells in the 4-km grid were compiled and added to the 2015 baseline daily maximum 1-hour NO_2 concentration for each day and each grid cell to create the 2015 PMI dataset for ozone. The 2015 PMI resultant values are intended to represent the future-year concentrations assuming worst-case impacts from threshold emission increases at any location within the modeling grid.

Next, MATS was applied to calculate RRF values only for both monitoring sites and unmonitored areas. MATS does not accommodate NO_2 but can be used to calculate RRFs for any two datasets.

Site-specific Modeling Results for NO_2

Table 6 summarizes the site-specific RRFs and FDVs for 1-hour NO_2. There are two NO_2 monitoring sites in Arkansas, and the results for each monitoring site assume that a hypothetical source identical to those modeled is located such that the worst-case impact occurs at the monitoring site. The current-year design values used for this summary were calculated as the average of the design values for the three overlapping three-year periods that include the modeled year (2006-2008, 2007-2009, and 2008-2010). All sites with data during the 2006 to 2010 period are included in the table. The MATS input parameters were set to the EPA-recommended default values for ozone and only the RRFs were calculated using MATS. The FDVs were then calculated by hand. Units for the FDVs are ppb. The RRF values are unitless.

Table 6. RRFs and Estimated Future-Year 1-Hour NO_2 Design Values (ppb) for Monitoring Sites within Arkansas.

Site/Location	County	Current-Year 1-Hr NO_2 Design Values (ppb)	2015 Baseline		2015 PMI		Difference in FDV (ppb)
			RRF	FDV (ppb)	RRF	FDV (ppb)	
North Little Rock (Pike Ave)	Pulaski	43.7	0.6846	29.9	0.7150	31.2	1.3
Marion	Crittenden	48.3	0.7986	38.6	0.8308	40.1	1.5

Note: The NAAQS for 1-hour average NO_2 concentration is 100 ppb.

NO_2 design values for 2015 PMI are estimated to be 1.3 to 1.5 ppb higher than the 2015 baseline values. The estimated future-year design values for both sites are well below the NAAQS. Addition of the modeled worst-case impacts to the 2015 baseline does not affect attainment or maintenance of the NAAQS for either monitoring site.

Statewide Modeling Results for NO_2

A simple spatial-fields analysis was also conducted for NO_2. This analysis consisted of several steps: 1) the modeled concentrations were used to calculate RRFs for every grid cell, 2) an average design value for Arkansas (based on data for the two sites) was calculated, and 3) the results of steps 1 and 2 were used to estimate future-year design values for every grid cell. The objective was to determine whether there are unmonitored areas within the domain that are more sensitive to the addition of emissions corresponding to amount and type modeled than other areas.

The average RRF for 1-hour NO_2 for Arkansas (based on all grid cells that comprise the state) is 0.6617 for the 2015 baseline and 0.7630 for the 2015 PMI scenario. This increase (0.0743) represents a 3.3 ppb increase relative to a base concentration of 45 ppb. Table 7 summarizes the RRFs by AQCR.

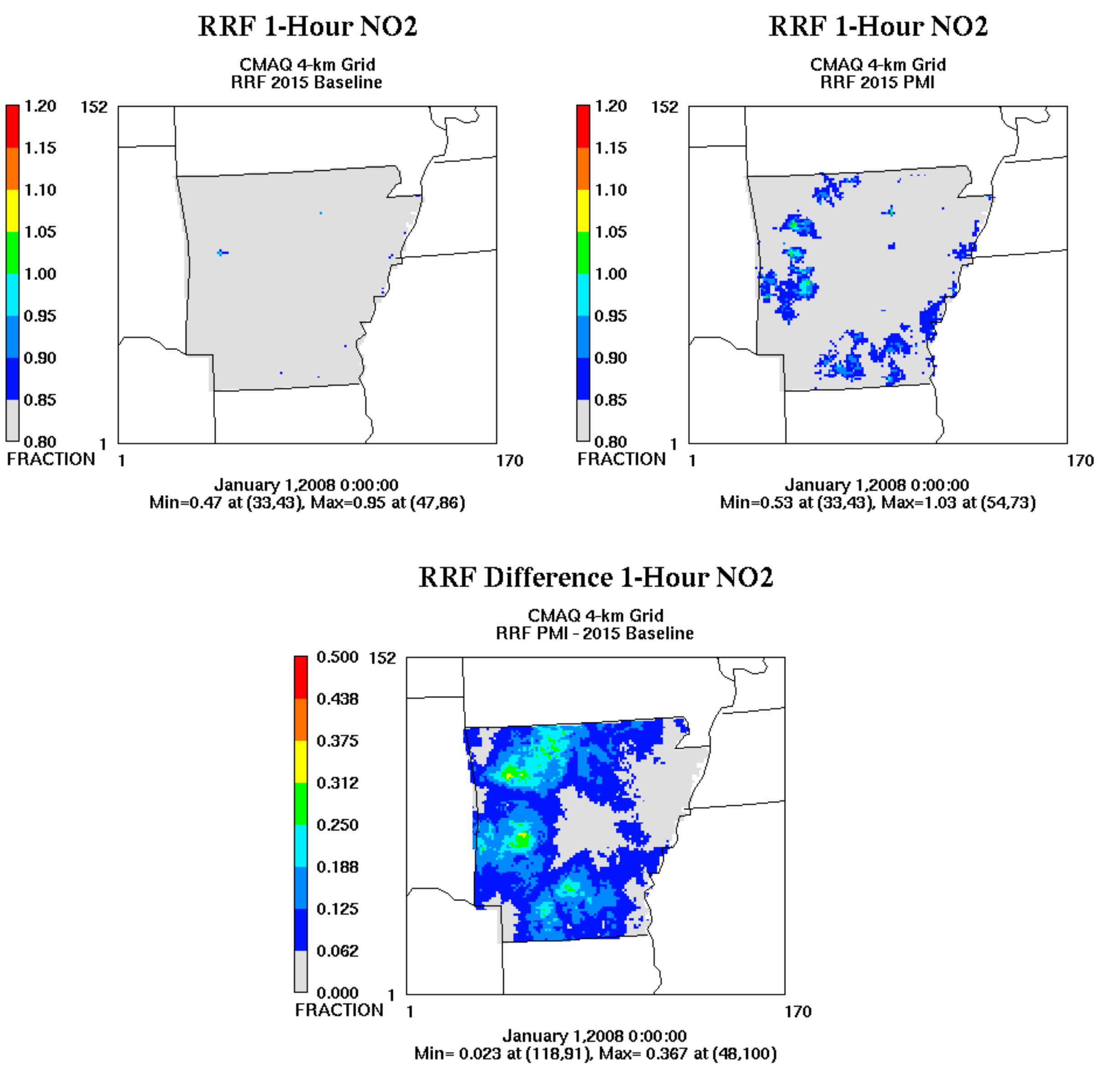
Table 7. RRFs for Each AQCR for the 2015 Baseline and 2015 PMI Scenarios: 1-Hour NO_2.

AQCR	2015 Baseline	2015 PMI	Difference (PMI – Baseline)
AQCR 16	0.6464	0.7401	0.0937
AQCR 17	0.6462	0.7277	0.0816
AQCR 18	0.7997	0.8311	0.0314
AQCR 19	0.7049	0.8335	0.1286
AQCR 20	0.6861	0.7472	0.0611
AQCR 21	0.6307	0.7826	0.1519
AQCR 22	0.6735	0.7648	0.0912

On average for the AQCRs, the worst-case impacts are expected to increase the RRFs by 0.0314 to 0.1519. In no case is the average RRF increased to a value greater than one (which would indicate an increase rather than a decrease in $PM_{2.5}$ over time). Overall, RRFs are increased the most for AQCRs 19 and 21, which represent the south-central and southwestern portions of the State. RRFs by county are provided in Attachment C.

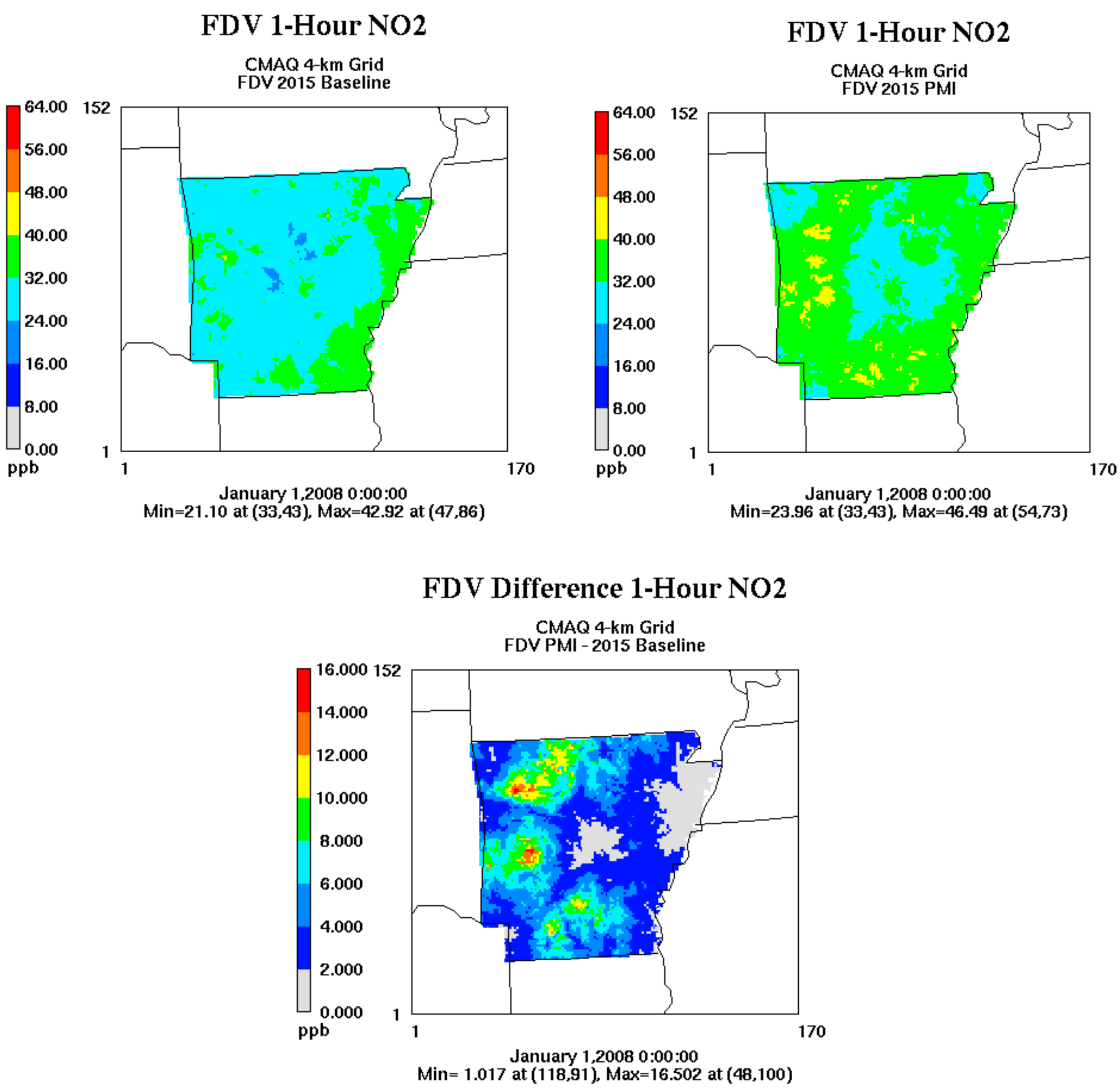
Figure 9 displays the calculated RRF values for the 4-km grid for the 2015 baseline and 2015 PMI scenarios and the difference between the two, calculated as PMI minus baseline.

Figure 9. RRFs and Differences Based on MATS Spatial-Fields Analysis for the 2015 Baseline and 2015 PMI Scenarios: 1-Hour NO_2.



FDVs were calculated using a current-year value of 45 ppb for every grid cell. This was based on an average (approximately) of the current-year design values for the Little Rock and Marion monitoring sites. Figure 20 displays the estimated FDVs for the 4-km grid for the 2015 baseline and 2015 PMI scenarios and the difference between the two, calculated as PMI minus baseline.

Figure 10. FDVs and Differences Based on MATS Spatial-Fields Analysis for the 2015 Baseline and 2015 PMI Scenarios: 1-Hour NO_2.



The difference plots show that that the addition of the worst-case impacts tends to increase the RRFs and FDVs by a greater amount for some areas in northwestern, western, and southwestern Arkansas compared to the rest of the State. Thus these areas may be more sensitive to the addition of NO_2 emissions, relative to the calculation of 1-hour NO_2 NAAQS-relevant metrics. Despite the increased

RRFs, the FDVs are all well below 100 ppb for all grid cells within Arkansas for both the 2015 baseline and 2015 PMI scenarios.

Regional-scale modeling may not be the best tool for the analysis of NO_2 impacts. NO_2 is directly emitted into the atmosphere and a grid-based model like CMAQ is not likely to capture the sub grid-scale impacts due to individual emissions sources. Additional analysis of NO_2 (both 1-hour and annual average concentrations) was performed using the AERMOD model and is presented later in the memorandum.

Results for SO_2

The simulated maximum impacts on 1-hour SO_2 concentration occur near and downwind of the hypothetical sources. The maximum difference varies by location and by day and ranges from approximately zero to 4 parts per billion (ppb). The maximum differences for each day considering all grid cells in the 4-km grid were compiled and added to the 2015 baseline daily maximum 1-hour SO_2 concentration for each day and each grid cell to create the 2015 PMI dataset for ozone. The 2015 PMI resultant values are intended to represent the future-year concentrations assuming worst-case impacts from threshold emission increases at any location within the modeling grid.

Next, MATS was applied to calculate RRF values only for both monitoring sites and unmonitored areas. MATS does not accommodate SO_2 but can be used to calculate RRFs for any two datasets.

SITE-SPECIFIC MODELING RESULTS FOR SO_2

Table 8 summarizes the site-specific RRFs and FDVs for 1-hour SO_2. There are two SO_2 monitoring sites in Arkansas, and the results for each monitoring site assume that a hypothetical source identical to those modeled is located such that the worst-case impact occurs at the monitoring site. The current-year design values used for this summary were calculated as the average of the design values for the three overlapping three-year periods that include the modeled year (2006-2008, 2007-2009, and 2008-2010). All sites with data during the 2006 to 2010 period are included in the table. The MATS input parameters were set to the EPA-recommended default values for ozone and only the RRFs were calculated using MATS. The FDVs were then calculated by hand. Units for the FDVs are ppb. The RRF values are unitless.

Table 8. RRFs and Estimated Future-Year 1-Hour SO_2 Design Values (ppb) for Monitoring Sites within Arkansas.

Site/Location	County	Current-Year 1-Hr SO_2 Design Values (ppb)	2015 Baseline		2015 PMI		Difference in FDV (ppb)
			RRF	FDV (ppb)	RRF	FDV (ppb)	
North Little Rock (Pike Ave)	Pulaski	12.3	0.7560	9.4	0.8412	10.3	0.9
El Dorado	Union	26.0	0.8914	23.2	1.0421	27.1	3.9

Note: The NAAQS for 1-hour average SO_2 concentration is 75 ppb.

SO_2 design values for 2015 PMI are estimated to be 0.9 to 3.9 ppb higher than the 2015 baseline values. The estimated future-year design values for both sites are well below the NAAQS. Addition of the modeled worst-case impacts to the 2015 baseline does not affect attainment or maintenance of the NAAQS for either monitoring site.

Statewide Modeling Results for SO_2

A simple spatial-fields analysis was also conducted for SO_2. This analysis followed the same steps as that for NO_2: 1) the modeled concentrations were used to calculate RRFs for every grid cell, 2) an average design value for Arkansas (based on data for the two sites) was calculated, and 3) the results of steps 1 and 2 were used to estimate future-year design values for every grid cell. The objective was to determine whether there are unmonitored areas within the domain that are more sensitive to the addition of emissions corresponding to amount and type modeled than other areas.

The average RRF for 1-hour SO_2 for Arkansas (based on all grid cells that comprise the state) is 0.9943 for the 2015 baseline and 1.1809 for the 2015 PMI scenario. This increase (0.1866) represents a 3.7 ppb increase relative to a base concentration of 20 ppb. Table 9 summarizes the RRFs by AQCR.

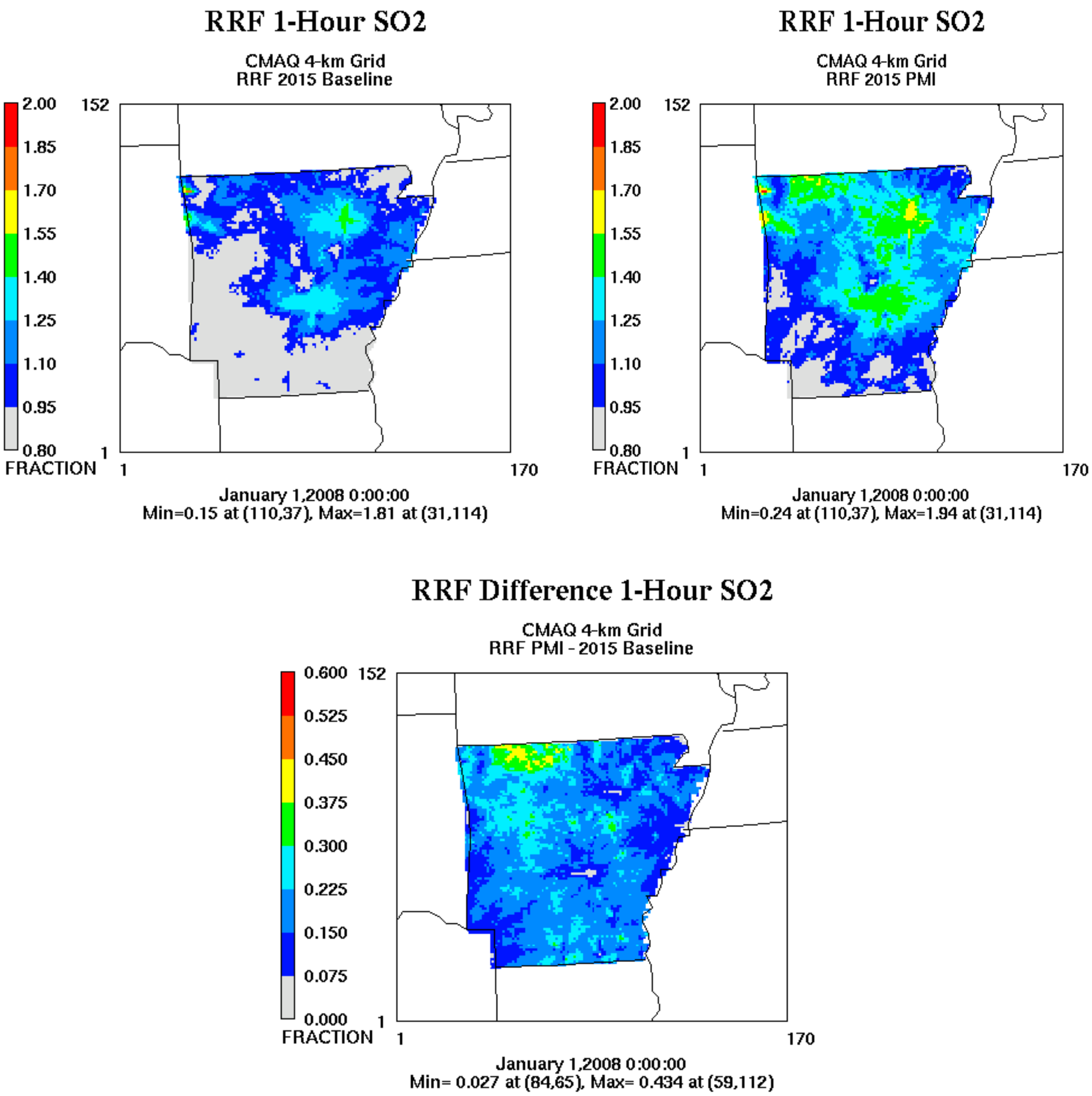
Table 9. RRFs for Each AQCR for the 2015 Baseline and 2015 PMI Scenarios: 1-Hour SO_2.

AQCR	2015 Baseline	2015 PMI	Difference (PMI – Baseline)
AQCR 16	1.0081	1.1978	0.1897
AQCR 17	1.0302	1.2201	0.1899
AQCR 18	1.1552	1.2641	0.1089
AQCR 19	0.7994	0.9999	0.2005
AQCR 20	1.0926	1.2510	0.1584
AQCR 21	1.0092	1.2341	0.2249
AQCR 22	0.7734	0.9217	0.1483

On average for the AQCRs, the worst-case impacts are expected to increase the RRFs by 0.1089 to 0.2249. In no case is the average RRF increased from a value less than one to a value greater than one. However, for several of the AQCRs the baseline values are already greater than one and are increased further. This finding is consistent with that statewide modeling effort (ICF, 2014), which found that SO_2 concentrations in several areas were projected to increase between the base year and 2015. Overall, RRFs are increased the most for AQCR 21 which represents the western to northwestern portion of the State. RRFs by county are provided in Attachment D.

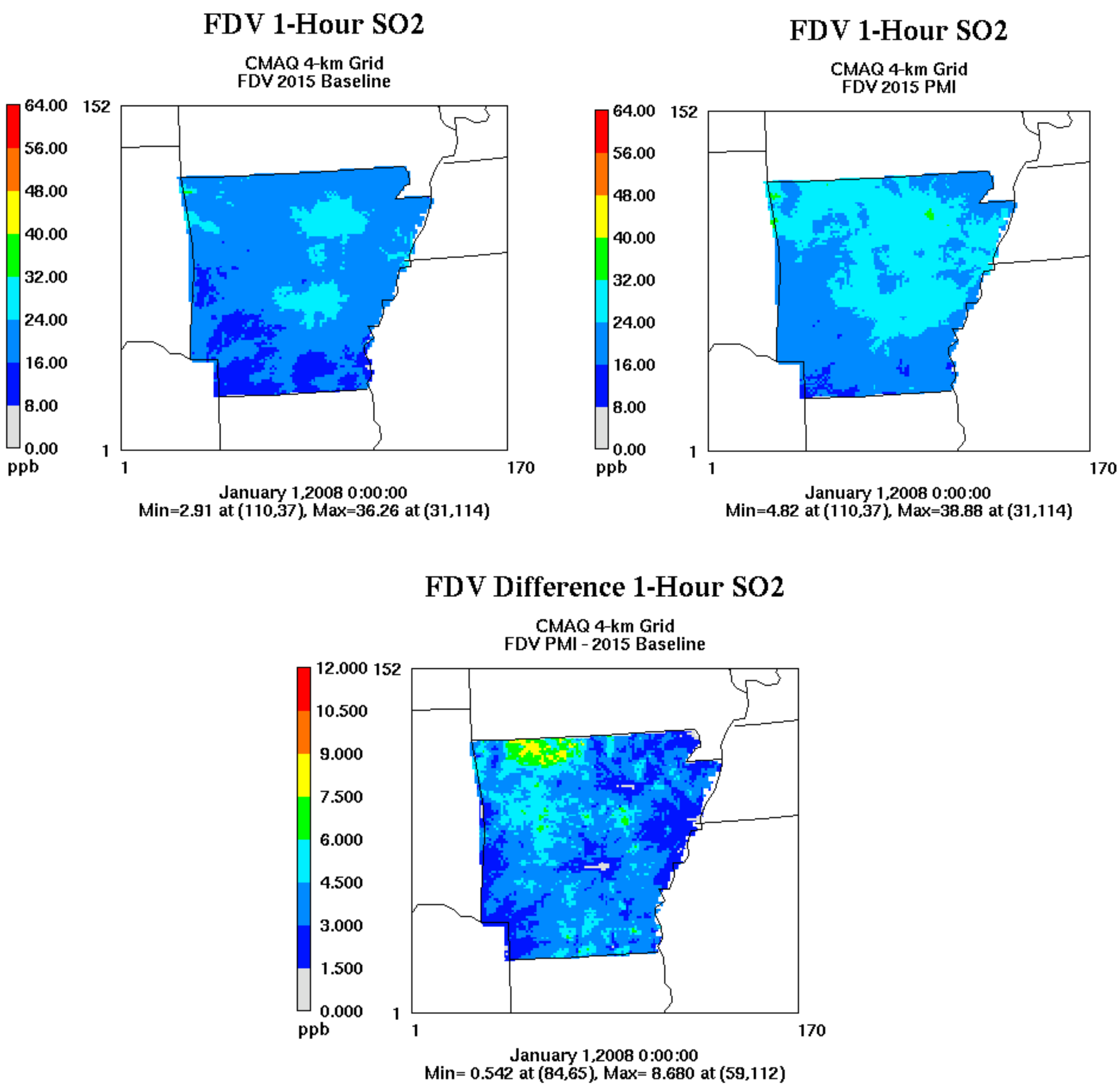
Figure 11 displays the calculated RRF values for the 4-km grid for the 2015 baseline and 2015 PMI scenarios and the difference between the two, calculated as PMI minus baseline.

Figure 11. RRFs and Differences Based on MATS Spatial-Fields Analysis for the 2015 Baseline and 2015 PMI Scenarios: 1-Hour SO_2.



FDVs were calculated using a current-year value of 20 ppb for every grid cell. This was based on an average (approximately) of the current-year design values for the Little Rock and El Dorado monitoring sites. Figure 12 displays the estimated FDVs for the 4-km grid for the 2015 baseline and 2015 PMI scenarios and the difference between the two, calculated as PMI minus baseline.

Figure 12. FDVs and Differences Based on MATS Spatial-Fields Analysis for the 2015 Baseline and 2015 PMI Scenarios: 1-Hour SO_2.



The difference plots show that that the addition of the worst-case impacts tends to increase the RRFs and FDVs by a greater amount for northwestern Arkansas compared to the rest of the State. This area may be more sensitive to the addition of SO_2 emissions, relative to the calculation of 1-hour SO_2 NAAQS-relevant metrics. Despite the increased RRFs, the FDVs are all well below 75 ppb for all grid cells within Arkansas for both the 2015 baseline and 2015 PMI scenarios. Note that the statewide criteria pollutant modeling analysis (ICF, 2014) also showed increases in SO_2 concentrations between the base year and 2015. This is attributable to a projected increase in SO_2 emissions for electric generating units (EGUs) throughout the state. The 2015 emissions used for this analysis reflect Clean Air Interstate Rule

(CAIR) controls. However, Arkansas was identified as one of the states for which CAIR calls for NO_x controls only; no controls are imposed on SO_2 emissions and the emission inventory for 2015 reflects a significant increase in SO_2 emissions for the larger EGU's compared to the base year.

Similar to NO_2, regional-scale modeling may not be the best tool for the analysis of SO_2 impacts. SO_2 is directly emitted into the atmosphere and a grid-based model like CMAQ is not likely to capture the sub grid-scale impacts due to individual emissions sources. Additional analysis of SO_2 was performed using the AERMOD model and is presented later in the memorandum.

Results for PM_{10}

The simulated maximum impacts on 24-hour PM_{10} concentration occur at or near the hypothetical sources. The maximum difference varies by location and by day and ranges from approximately 0.1 to 2.7 µg/m^3. The maximum differences for each day considering all grid cells in the 4-km grid were compiled and added to the 2015 baseline daily maximum 24-hour PM_{10} concentration for each day and each grid cell to create the 2015 PMI dataset for ozone. The 2015 PMI resultant values are intended to represent the future-year concentrations assuming worst-case impacts from threshold emission increases at any location within the modeling grid.

Next, MATS was applied to calculate RRF values only for both monitoring sites and unmonitored areas. MATS does not accommodate PM_{10} but can be used to calculate RRFs for any two datasets.

Site-specific Modeling Results for PM_{10}

Table 10 summarizes the site-specific RRFs and FDVs for 24-hour PM_{10}. There is only one PM_{10} monitoring sites in Arkansas, and the results assume that a hypothetical source identical to those modeled is located such that the worst-case impact occurs at the monitoring site. The current-year design values used for this summary were calculated as the maximum 2nd highest PM_{10} concentration for the three years ending with the modeled year 2006-2008. For PM_{10}, the MATS input parameters were set to the EPA-recommended default values for ozone and only the RRFs were calculated using MATS. The FDVs were then calculated by hand. Units for the FDVs are µg/m^3. The RRF values are unitless.

Table 10. RRFs and Estimated Future-Year 24-Hour PM_{10} Design Values (µg/m^3) for Monitoring Sites within Arkansas.

Site/Location	County	Current-Year 24-Hr PM_{10} Design Values (µg/m^3)	2015 Baseline		2015 PMI		Difference in FDV (µg/m^3)
			RRF	FDV (µg/m^3)	RRF	FDV (µg/m^3)	
North Little Rock (Pike Ave)	Pulaski	41.0	0.8434	34.6	0.8621	35.3	0.8

Note: The NAAQS for 24-hour PM_{10} concentration is 150 µg/m3.

The PM_{10} design value for 2015 PMI is estimated to be 0.8 µg/m^3 higher than the 2015 baseline values. The estimated future-year design values for both sites are well below the NAAQS. Addition of the modeled worst-case impacts to the 2015 baseline does not affect attainment or maintenance of the NAAQS for the monitoring site.

STATEWIDE MODELING RESULTS FOR PM_{10}

A simple spatial-fields analysis was also conducted for PM_{10}. This analysis followed the same steps as that for NO_2: 1) the modeled concentrations were used to calculate RRFs for every grid cell, 2) the design value for Arkansas was set equal to the value for the only monitoring site, and 3) the results of steps 1 and 2 were used to estimate future-year design values for every grid cell. The objective was to determine whether there are unmonitored areas within the domain that are more sensitive to the addition of emissions corresponding to amount and type modeled than other areas.

The average RRF for 24-hour PM_{10} for Arkansas (based on all grid cells that comprise the state) is 0.8829 for the 2015 baseline and 0.9067 for the 2015 PMI scenario. This increase (0.0238) represents a 0.95 µg/m^3 increase relative to a base concentration of 40 µg/m^3. Table 11 summarizes the RRFs by AQCR.

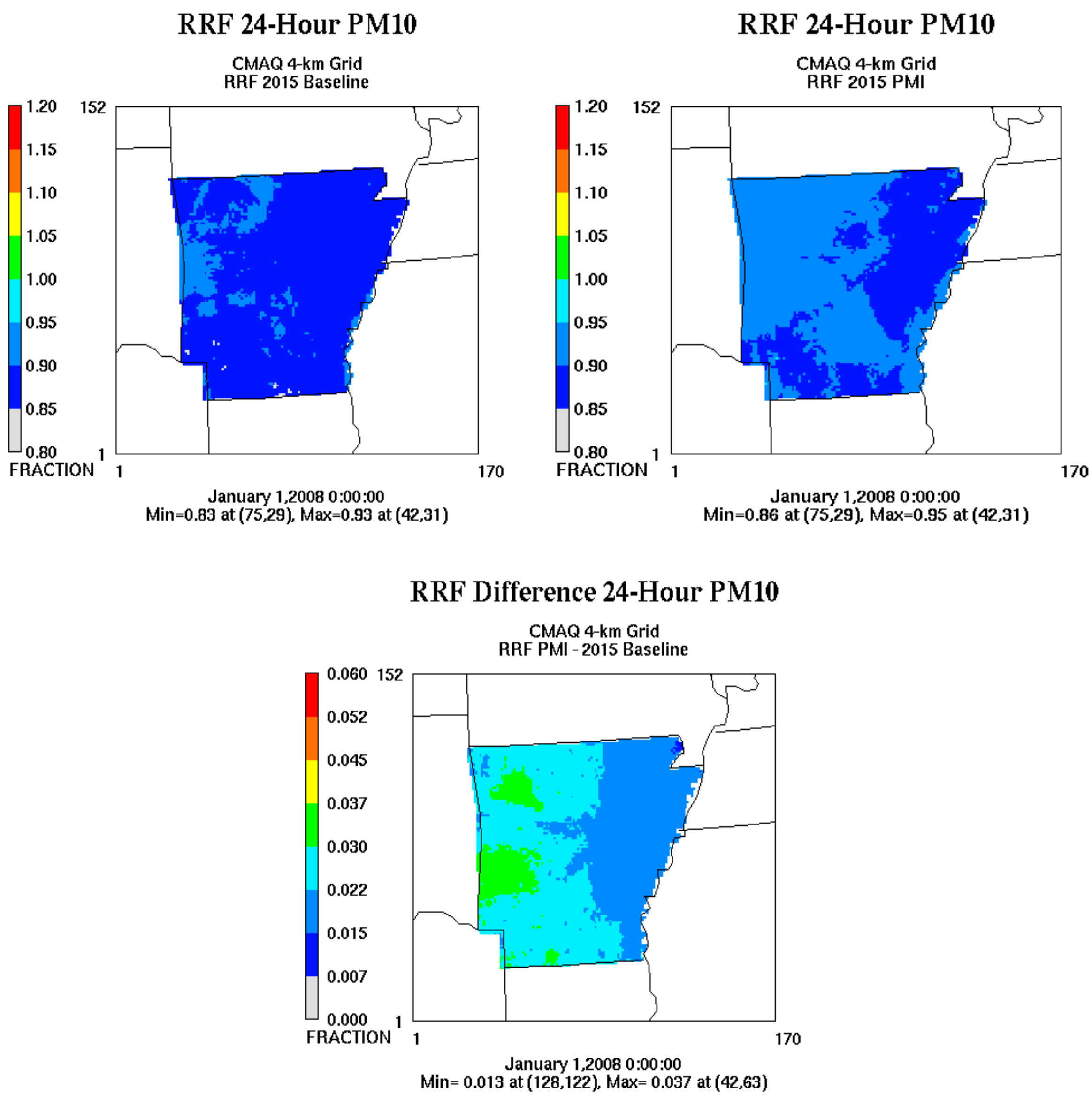
Table 11. RRFs for Each AQCR for the 2015 Baseline and 2015 PMI Scenarios: 24-Hour PM_{10}.

AQCR	2015 Baseline	2015 PMI	Difference (PMI – Baseline)
AQCR 16	0.8876	0.9112	0.0236
AQCR 17	0.9017	0.9275	0.0258
AQCR 18	0.8793	0.8963	0.0170
AQCR 19	0.8726	0.8985	0.0259
AQCR 20	0.8727	0.8908	0.0181
AQCR 21	0.8917	0.9192	0.0275
AQCR 22	0.8725	0.9005	0.0280

On average for the AQCRs, the worst-case impacts are expected to increase the RRFs by 0.0170 to 0.0280. In no case is the average RRF increased to a value greater than one (which would indicate an increase rather than a decrease in PM_{10} over time). Overall, RRFs are increased the most for AQCRs 21 and 22, which represent the western and southwestern portions of the State. RRFs by county are provided in Attachment E.

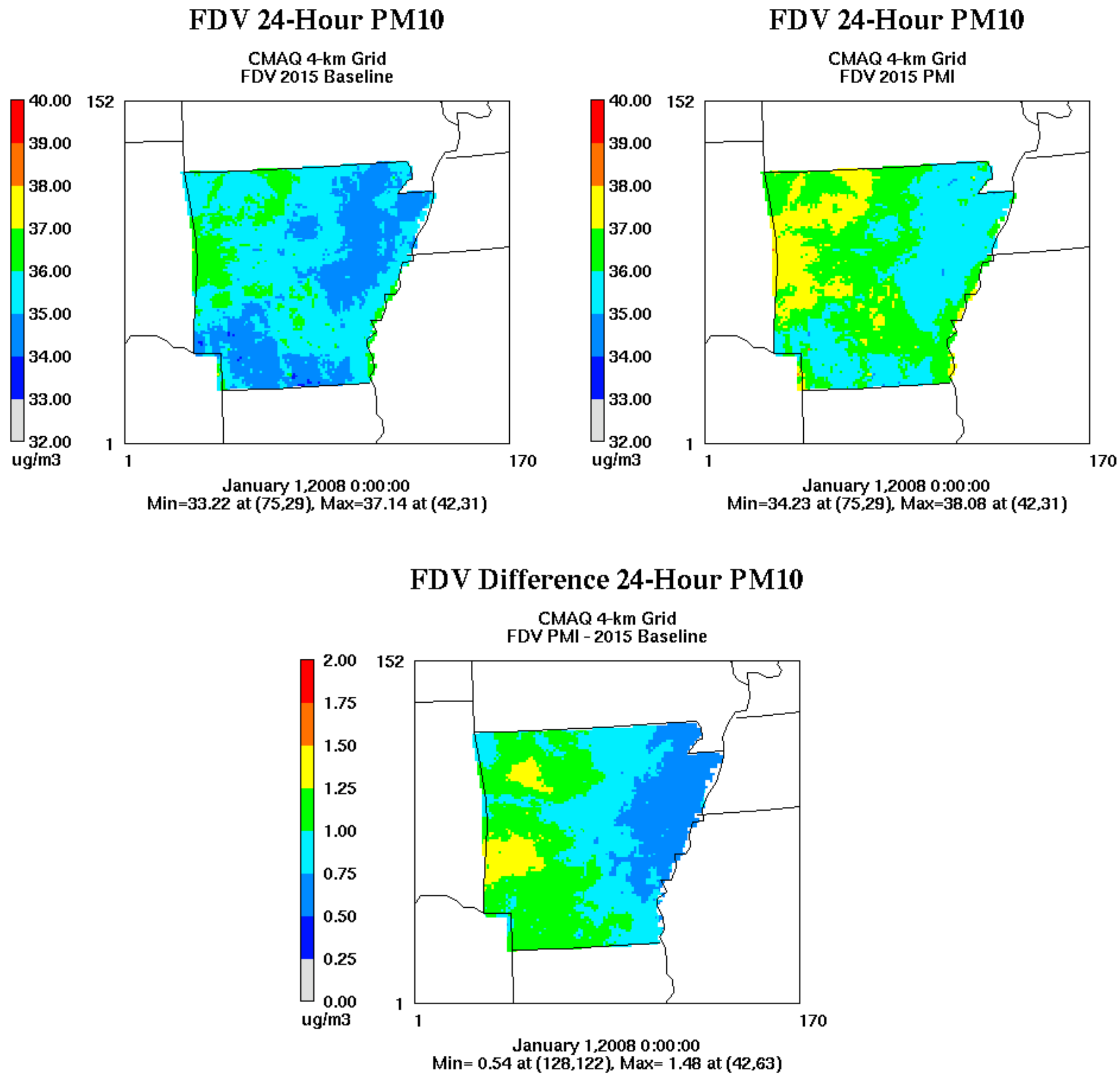
Figure 13 displays the calculated RRF values for the 4-km grid for the 2015 baseline and 2015 PMI scenarios and the difference between the two, calculated as PMI minus baseline.

Figure 11. RRFs and Differences Based on MATS Spatial-Fields Analysis for the 2015 Baseline and 2015 PMI Scenarios: 24-Hour PM_{10}.



FDVs were calculated using a current-year value of 40 µg/m^3 for every grid cell. This was based the current-year design value for the Little Rock monitoring site. Figure 12 displays the estimated FDVs for the 4-km grid for the 2015 baseline and 2015 PMI scenarios and the difference between the two, calculated as PMI minus baseline.

Figure 12. FDVs and Differences Based on MATS Spatial-Fields Analysis for the 2015 Baseline and 2015 PMI Scenarios: 24-Hour PM_{10}.



The difference plots show that that the addition of the worst-case impacts tends to increase the RRFs and FDVs by a greater amount for western and northwestern Arkansas compared to the rest of the State. This area may be more sensitive to the addition of PM_{10} emissions, relative to the calculation of 24-hour PM_{10} NAAQS-relevant metrics. Despite the increased RRFs, the FDVs are all well below 150 $\mu g/m^3$ for all grid cells within Arkansas for both the 2015 baseline and 2015 PMI scenarios, and the maximum impact for any grid cell is 1.48 $\mu g/m^3$.

Additional analysis of PM_{10} was performed using the AERMOD model and is presented later in the memorandum.

Combined Near-Field/Regional Modeling

Methodology

To further examine the potential near-field impacts from new or existing sources with emissions increases less than the proposed permit thresholds, a combined AERMOD/CMAQ analysis was also conducted. The CMAQ modeling for the 2008 base year and the 2015 future year from the statewide modeling effort (ICF, 2014) was also used for this analysis.

AERMOD (version 15181) was applied for the same eight hypothetical sources used for the regional analysis, distributed throughout the AQCRs. Emissions for all species were set equal to permit thresholds (converted to emission rates in grams per second) and stack parameters were set to a median value for minor point sources in Arkansas.

Meteorological inputs for AERMOD were derived from the same gridded meteorological fields used for the CMAQ inputs. Specifically, the meteorological inputs were prepared based on Weather Research and Forecasting (WRF) meteorological inputs for the 2008 base year, using the Meteorological Model Interface (MMIF) program.

The receptor grid for each source consists of receptor cells spaced at 100 m intervals beginning 100 m from the source. This spacing continues out to 1000 m. The spacing then increases to 200 m and continues out to 2000 m from the source. The overall area covered by the receptor grid is 4000 x 4000 m (4 x 4 km), which is the size of one CMAQ grid cell.

For each source location, digital topographical data (in the form of 7.5 minute Digital Elevation Model (DEM) files) for the analysis region were obtained from the U.S. Geological Survey (USGS) and processed for use in AERMOD using the AERMAP preprocessor program.

AERMOD was applied for one year for each of NO_x, SO_2 CO and PM_{10}. For NO_2, the Ozone Limiting Method (OLM) module was used. Hourly ozone values were extracted from the CMAQ regional-scale modeling results and were used by AERMOD to approximate the rate of conversion of nitrogen oxide (NO) to NO_2. In addition, an ambient NO_2/NO_x ratio of 90 percent and an in-stack NO_2/NO_x ratio of 50 percent by mass was used. These values are consistent with EPA guidance. The maximum AERMOD-derived impacts on daily maximum 1-hour NO_2, annual average NO_2, daily maximum 1-hour SO_2, daily maximum 1-hour CO, daily maximum 8-hour average CO, and 24-hour average PM_{10} were calculated for each AQCR.

For each source location, daily AERMOD-derived concentrations (for the receptor with the maximum annual average value) were added to the CMAQ-derived concentrations for that same location. In this manner, the CMAQ values were used as “background”. The statewide daily maximum impact (maximum over all locations/AQCRs) and statewide average impacts (average over all locations/AQCRs) were obtained and used for the remaining steps of this analysis. The resultant values are expected to represent the near-field future-year concentrations assuming worst-case impacts from threshold emission increases at a range of locations throughout the State.

The daily maximum AERMOD-derived impacts were added to the simulated CMAQ-derived concentrations for each day and grid cell for the “future-year” (2015) simulation. The resultant values are expected to represent the future-year concentrations assuming worst-case impacts from threshold emission increases at any location within the modeling grid.

The adjusted (CMAQ + AERMOD) modeling results were used in conjunction with the 2008 current-year modeling results (again from the statewide modeling analysis) to calculate relative reduction factors (RRFs) and estimated future-year design values (FDVs) (for 2015) for monitored locations. These results were compared with the prior 2015 results (from the original statewide modeling analysis), the regional-scale (PMI) modeling results, and the NAAQS to examine whether emission increases less than the referenced thresholds could cause or contribute to a violation of the NAAQS or potentially interfere with the maintenance of the NAAQS. For this analysis the RRFs were calculated by hand, using the MATS methodology.

As for the regional-scale analysis, the current-year design value for each pollutant and monitoring site within Arkansas was calculated based on data for 2006 through 2010, in accordance with the form of the standard for that pollutant. Tabular summaries of the RRFs and FDVs were prepared and are presented in the results section.

Results

Maximum AERMOD-Derived Impacts

Tables 12 and 13 provide the AERMOD-derived impacts for each species and relevant NAAQS metric. Table 12 lists the AERMOD-derived impact without background and Table 13 includes the estimated (CMAQ-derived) background concentration. All metrics were calculated in accordance with the form of the standard for each species. For example the 1-hour NO_2 concentration is based on the 98th percentile (or eight highest) value for each modeled location. The maximum and average of these over all locations is presented in the table. Day-specific background values were obtained from the CMAQ results and paired in space and time with the AERMOD concentrations.

Table 12. Maximum and Average AERMOD-Derived Concentrations: No Background.

Species/ Metric	AERMOD (Max Over All Locations)	AERMOD (Average Over All Locations)	NAAQS
1-Hour NO_2 (ppb)	47.7	37.3	100
Annual NO_2 (ppb)	6.7	3.6	53
1-Hour SO_2 (ppb)	42.5	34.7	75
1-Hour CO (ppb)	241	202	35,000
24-Hour PM_{10} ($\mu g/m^3$)	31.1	22.3	150

Table 13. Maximum and Average AERMOD-Derived Concentrations: With CMAQ-Derived Background.

Species/ Metric	AERMOD + Background (Max Over All Locations)	AERMOD + Background (Average Over All Locations)	NAAQS
1-Hour NO2 (ppb)	67.8	53.6	100
Annual NO_2 (ppb)	12.8	8.4	53
1-Hour SO_2 (ppb)	45.1	37.8	75
1-Hour CO (ppb)	972	562	35,000
24-Hour PM_{10} ($\mu g/m^3$)	47.6	39.0	150

For all species and metrics the resultant AERMOD plus background concentrations are much less than the NAAQS. This indicates that for the range of locations modeled, worst-case near-field (or local) impacts would not result in an exceedance of the NAAQS for any species.

Site-Specific RRFs and FDVs with AERMOD-Derived Impacts

The daily maximum AERMOD-derived impacts were then added to the simulated CMAQ-derived concentrations for each day and used in conjunction with the 2008 current-year modeling results to calculate RRFs and FDVs (for 2015) for monitored locations. The results are presented in Tables 14 through 17 for 1-hour NO_2, 1-hour SO_2, 1-hour CO, and 24-hour PM_{10}. Annual NO_2 and 8-hour CO were not included since the results for 1-hour are expected to be larger than for other averaging periods. Note that the RRFs calculated to reflect the AERMOD-derived impacts (AERMOD plus background) are larger (in some cases much larger) than those calculated using the CMAQ-derived impacts (2015 PMI scenarios, as presented earlier in this memorandum). This is consistent with the interpretation that AERMOD is able to represent the local impacts that may not be captured by CMAQ, especially for primary pollutants.

Table 14. RRFs and Estimated Future-Year 1-Hour NO_2 Design Values (ppb) for Monitoring Sites within Arkansas Considering Worst-Case Near-Field Impacts.

Site/Location	County	Current-Year 1-Hr NO_2 Design Values (ppb)	2015 Baseline		AERMOD + Background		Difference in FDV (ppb)
			RRF	FDV (ppb)	RRF	FDV (ppb)	
North Little Rock (Pike Ave)	Pulaski	43.7	0.6846	29.9	0.8281	36.2	6.3
Marion	Crittenden	48.3	0.7986	38.6	0.9764	47.2	8.6

Note: The NAAQS for 1-hour average NO_2 concentration is 100 ppb.

Table 15. RRFs and Estimated Future-Year 1-Hour SO_2 Design Values (ppb) for Monitoring Sites within Arkansas Considering Worst-Case Near-Field Impacts.

Site/Location	County	Current-Year 1-Hr SO_2 Design Values (ppb)	2015 Baseline		AERMOD + Background		Difference in FDV (ppb)
			RRF	FDV (ppb)	RRF	FDV (ppb)	
North Little Rock (Pike Ave)	Pulaski	12.3	0.7560	9.4	1.6986	20.0	11.6
El Dorado	Union	26.0	0.8918	23.2	1.5221	39.6	16.4

Note: The NAAQS for 1-hour average SO_2 concentration is 75 ppb.

Table 16. RRFs and Estimated Future-Year 1-Hour CO Design Values (ppb) for Monitoring Sites within Arkansas Considering Worst-Case Near-Field Impacts.

Site/Location	County	Current-Year 1-Hr CO Design Values (ppb)	2015 Baseline		AERMOD + Background		Difference in FDV (ppb)
			RRF	FDV (ppb)	RRF	FDV (ppb)	
North Little Rock (Pike Ave)	Pulaski	3200	0.5781	1850	0.6022	1927	77

Note: The NAAQS for 1-hour CO concentration is 35,000 ppb.

Table 17. RRFs and Estimated Future-Year 24-Hour PM_{10} Design Values (μg/m^3) for Monitoring Sites within Arkansas Considering Worst-Case Near-Field Impacts.

Site/Location	County	Current-Year 24-Hr PM_{10} Design Values (μg/m^3)	2015 Baseline		AERMOD + Background		Difference in FDV (μg/m^3)
			RRF	FDV (μg/m^3)	RRF	FDV (μg/m^3)	
North Little Rock (Pike Ave)	Pulaski	41.0	0.8434	34.6	0.8992	36.9	2.3

Note: The NAAQS for 24-hour PM_{10} concentration is 150 μg/m3.

Even with the higher RRFs, the FDVs for all species are less than the NAAQS values. This indicates that for the range of locations modeled, worst-case local impacts would not result in an exceedance of the NAAQS for any species at the monitoring sites. For all species, with the exception of SO_2 the FDVs are lower than the current year values for both the baseline and local impact scenarios.

Key Findings/Conclusions

This analysis utilized two air quality modeling systems (both separately and in combination) as well as a variety of postprocessing and analysis techniques to examine the potential impacts from new minor point sources with emissions increases less than proposed permit thresholds for Arkansas. The emissions were set to the threshold level for all pollutants and the maximum impacts were used in the analysis results and for comparison with the NAAQS for each pollutant. The potential worst-case impacts were applied to every part of the state – including every grid cell based on the 4-km resolution CMAQ modeling domain, all air quality monitoring sites, and specific near-source locations. A variety of modeling and postprocessing techniques was applied in order to ensure the appropriate treatment of primary and secondary pollutants and the resolution of both regional and near-field (or local) impacts. The effects of topography and meteorology on air quality were accounted for in determining the maximum or worst-case impacts.

The regional-scale modeling and impact assessment methodology was designed to examine worst-case impacts from threshold emission increases at each location within the modeling grid. The results indicate:

- Addition of the modeled worst-case impacts (based on 40 tpy of both VOC and NO_x emissions) to the 2015 baseline does not affect attainment or maintenance of the ozone NAAQS for any monitoring site. The worst-case impacts result in estimated 2015 FDVs that are 0.2 to 0.4 ppb higher than the 2015 baseline values. The estimated future-year design values for all sites are below the NAAQS.

- Difference plots show that the addition of the worst-case impacts tends to increase the calculated RRFs and FDVs for ozone by a greater amount for some areas in central and southwestern Arkansas compared to the rest of the State. Thus these areas may be more sensitive to the addition of ozone-related (VOC or NO_x) emissions, relative to the calculation of 8-hour ozone NAAQS-relevant metrics.

- Addition of the modeled worst-case impacts to the 2015 baseline does not affect attainment or maintenance of the 24-hour or annual $PM_{2.5}$ NAAQS for any monitoring site. The worst-case impacts result in estimated 2015 FDVs for 24-hour $PM_{2.5}$ that are 0.2 to 0.6 $\mu g/m^3$ higher than the 2015 baseline values and estimated 2015 FDVs for annual average $PM_{2.5}$ that are 0.2 to 0.4 $\mu g/m^3$ higher than the 2015 baseline values. The estimated future-year design values for all sites and both metrics are below the NAAQS.

- Difference plots show that the addition of the worst-case impacts tends to increase the calculated RRFs and FDVs for $PM_{2.5}$ by a greater amount for some areas in central and southwestern Arkansas compared to the rest of the State. Thus these areas may be more sensitive to the addition of PM-related (VOC, NO_x, SO_2, and primary $PM_{2.5}$) emissions, relative to the calculation of $PM_{2.5}$ NAAQS-relevant metrics.

- Addition of the modeled worst-case impacts to the 2015 baseline does not affect attainment or maintenance of the 1-hour NO_2, 1-hour SO_2 or 24-hour PM_{10} NAAQS for any monitoring site (although the number of monitors for these pollutants is very limited).

- Difference plots show that that the addition of the worst-case impacts tends to preferentially increase the calculated RRFs and FDVs in northwestern, western and southwestern Arkansas for NO_2, in northwestern Arkansas for SO_2, and in western and northwestern Arkansas for PM_{10}.

The combined near-field/regional-scale modeling and impact assessment was designed to examine worst-case impacts from threshold emission increases for each AQCR and the maximum impacts were applied for each selected source and each monitoring site location. The results indicate:

- For all species and metrics the resultant AERMOD plus background concentrations are much less than the NAAQS. This indicates that for the range of locations modeled, worst-case near-field (or local) impacts would not result in an exceedance of the NAAQS for any species.

- When applied to the monitoring sites, the modeled, worst-case local impacts increase the FDVs but the resultant values for all species are all less than the NAAQS values.

- For all species, with the exception of $SO_{2,}$ the FDVs are lower than the current year values for both the baseline and local impact scenarios.

The analysis is based on one source per location (for modeling purposes this was assumed to be one grid cell). Since the modeled impacts occur within or nearby to the source location, cumulative effects from sources in multiple grid cells are expected to be small. Cumulative effects from multiple sources at any given location (or within approximately one grid cell) with emissions totals that sum to greater than the threshold levels should be examined on a case-by-case basis.

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EPA. 2014. “Modeling Guidance for Demonstrating Attainment of Air Quality Goals for Ozone, $PM_{2.5}$, and Regional Haze.” U.S. EPA Office of Air Quality Planning and Standards, Research Triangle Park, North Carolina (December 2014, Draft).

ICF. 2014. “Criteria Pollutant Modeling Analysis for Arkansas.” Prepared for the Arkansas Department of Environmental Quality, North Little Rock, Arkansas (14-003).

Appendix B

ICF International

Criteria Pollutant Modeling Analysis for Arkansas

2014

Criteria Pollutant Modeling Analysis for Arkansas

Final Report

July 28, 2014

Submitted to:

Arkansas Department of Environmental Quality
Air Division – Planning and Air Quality Analysis
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San Rafael, CA 94903

14-003

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1 Introduction

This document describes an air quality modeling study of future-year air pollutant concentrations for the State of Arkansas. The pollutants of interest are ozone, fine particulate matter ($PM_{2.5}$), nitrogen dioxide (NO_2) and sulfur dioxide (SO_2). The modeling analysis includes two base years (2005 and 2008) and a future year (2015).

1.1 Objectives

The objectives of the modeling study are to identify areas within potential ozone, $PM_{2.5}$, SO_2, and NO_2 issues throughout the state, examine the expected changes in these pollutants between the base and future years, and identify areas within the state where additional air quality monitoring may be used to ensure compliance with existing National Ambient Air Quality Standards (NAAQS).

1.2 Overview of the Modeling Study

The air quality modeling was conducted using version 5.0 of the Community Multiscale Air Quality (CMAQ) model. The meteorological and emissions inputs to the model were based on modeling databases available from EPA (adapted for the area of interest).

The modeling focused on two base years, 2005 and 2008, and a future year of 2015. The modeling domain consists of a 36-km resolution outer grid encompassing the U.S. (the CONUS grid), a 12-km resolution grid over the central states, and a high-resolution 4-km grid over the entire state of Arkansas. Two annual simulation periods were simulated.

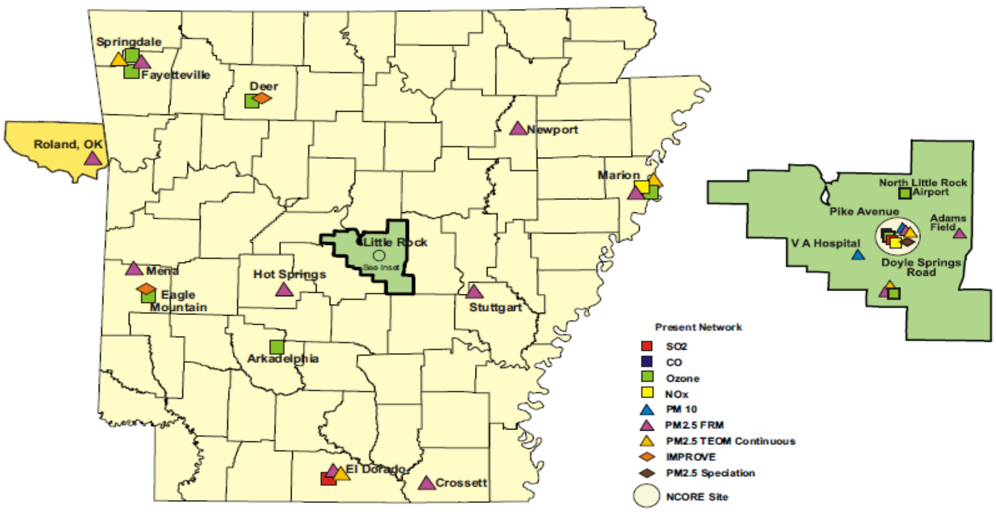
The modeling inventories were processed and prepared for CMAQ using EPA's Sparse-Matrix Operator Kernel Emissions (SMOKE) software (version 3.1).

The modeling analysis included the evaluation of model performance for the two base years. EPA's Modeled Attainment Test Software (MATS) was used in the analysis of the future-year modeling results for monitored and unmonitored areas.

2 Overview of Air Quality in Arkansas

Figure 2-1 depicts the locations of currently operating air quality monitoring sites within Arkansas.

Figure 2-1. Air Quality Monitoring Network for Arkansas



Source: ADEQ (2014)

Current air quality and air quality trends for ozone, $PM_{2.5}$, NO_2, and SO_2 based on data from the ADEQ monitoring network are summarized in the remainder of this section. Since, all of these pollutants can contribute to visibility impairment, visibility within the two Class I[1] areas in Arkansas is also summarized, based on data from Interagency Monitoring of Protected Visual Environments (IMPROVE) network.

2.1 Air Quality Conditions and Trends

2.1.1 Ozone

Ozone is a secondary pollutant that is not directly emitted into the atmosphere but instead is formed in the lower atmosphere by a series of reactions involving ultra violet (UV) radiation and precursor emissions of oxides of nitrogen (NO_x) and volatile organic compounds (VOCs). NO_x consists of nitric oxide (NO) and nitrogen dioxide (NO_2), which are primarily emitted from anthropogenic sources. VOCs consist of thousands of individual hydrocarbon and oxygenated hydrocarbon species emitted from anthropogenic, biogenic, and geogenic sources. Ozone formation in the troposphere is affected by local weather conditions: winds, temperature, solar radiation, and horizontal and vertical dispersion characteristics, which influence precursor concentrations, reaction rates, formation, transport, and

[1] Class I air quality areas include national parks larger than 6,000 acres and wilderness areas larger than 5,000 acres that existed or were authorized as of August 7, 1977. The two Class I areas in Arkansas are Caney Creek Wilderness and Upper Buffalo Wilderness.

deposition. Because the primary ozone-forming reaction is photochemically driven (i.e., by the sun), ozone concentrations typically peak during the daylight hours and decrease after sunset.

Health effects studies have determined that exposure to ozone can reduce lung function and increase the incidence and severity of respiratory illnesses such as asthma. Repeated exposure to ozone may also damage vegetation and trees. To protect public health, the U.S. EPA established the first NAAQS for ozone in 1971 and has since revised the level and form of the standard several times. The most recent revision occurred in March 2008 and set the 8-hour ozone standard to 75 parts per billion (ppb). Note that the official level of the 8-hour ozone standard is 0.075 parts per million (ppm), equivalent to 75 ppb. To attain this standard, the three-year average of the annual fourth highest daily maximum 8-hour ozone concentration at all sites within a designated area must be less than or equal to 75 ppb. The three-year average, or "design value", is calculated for each site, and the maximum value over all sites within an area determines the design value for the area. EPA issued attainment/non-attainment designations in April 2012. For most areas, compliance with the new standard was determined using data collected during the period 2008–2010.

Table 2-1 lists the currently operating ozone monitoring sites located within Arkansas and the 8-hour ozone design values for each site for the three three-year periods ending in 2010, 2011, and 2012.

Table 2-1. Ozone Monitoring Sites and 8-Hour Ozone Design Values for the Three-Year Periods Ending in 2010, 2011, and 2012

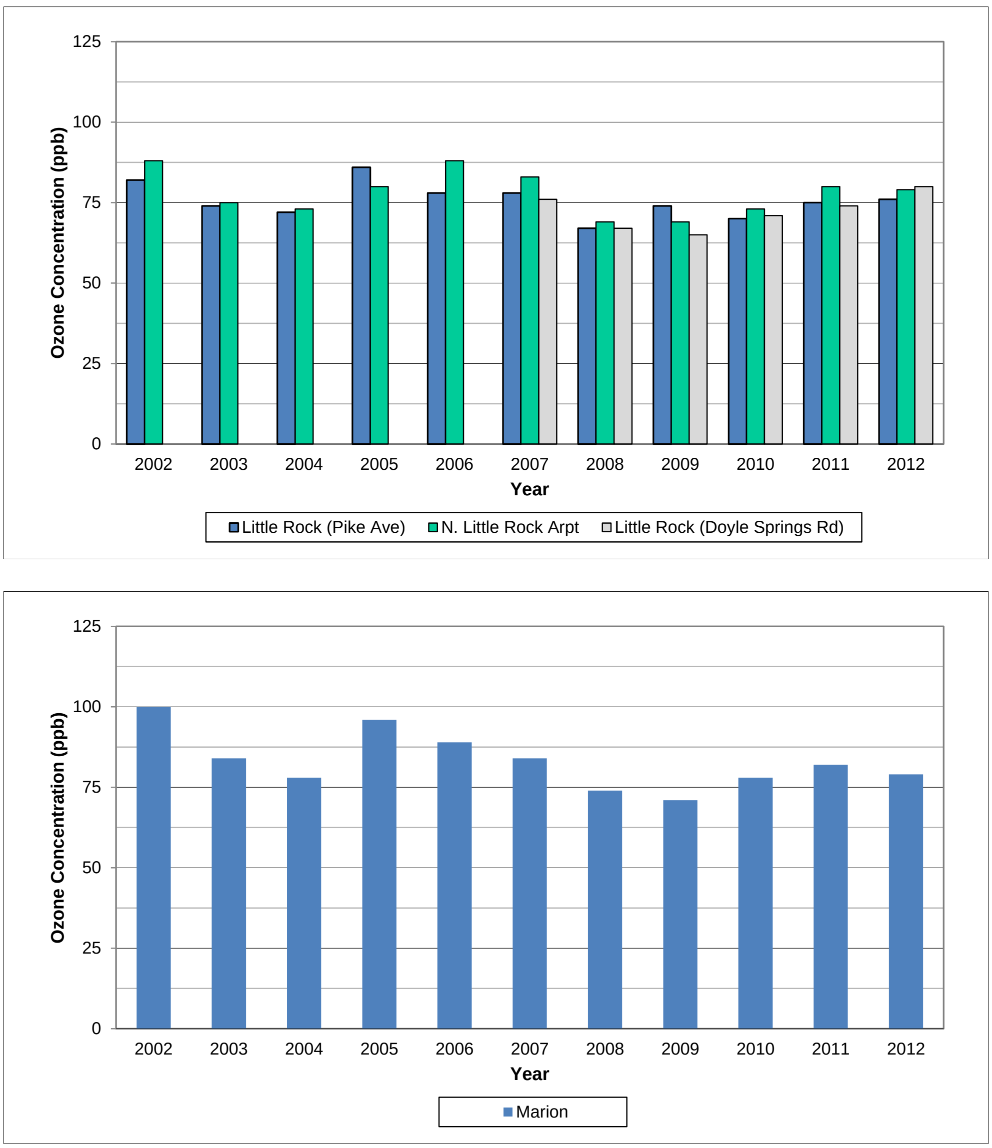
Site Name	ID	County	2008–2010 8-Hour Ozone Design Value (ppb)	2009–2011 8-Hour Ozone Design Value (ppb)	2010–2012 8-Hour Ozone Design Value (ppb)
North Little Rock (Pike Ave)	051190007	Pulaski	70	73	73
North Little Rock Airport	051191002	Pulaski	70	74	77
Little Rock (Doyle Springs Rd)	051191008	Pulaski	67	70	75
Marion	050350005	Crittenden	74	77	79
Deer	051010002	Newton	66	68	69
Springdale	051430005	Washington	64	68	73
Fayetteville	051430006	Washington	—	—	79[1]
Mena	051130003	Polk	70	73	73
Arkadelphia (CASTNet)[3]	050199991	Clark	—	64[1]	64[2]

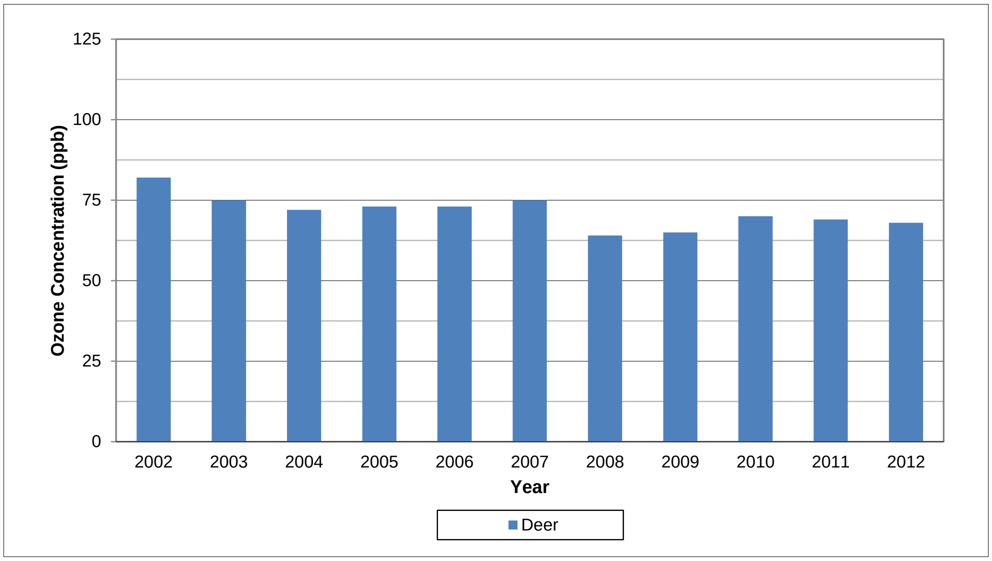
[1] Based on one year of monitoring data.
[2] Based on two years of monitoring data.
[3] Clean Air Status and Trends Network.

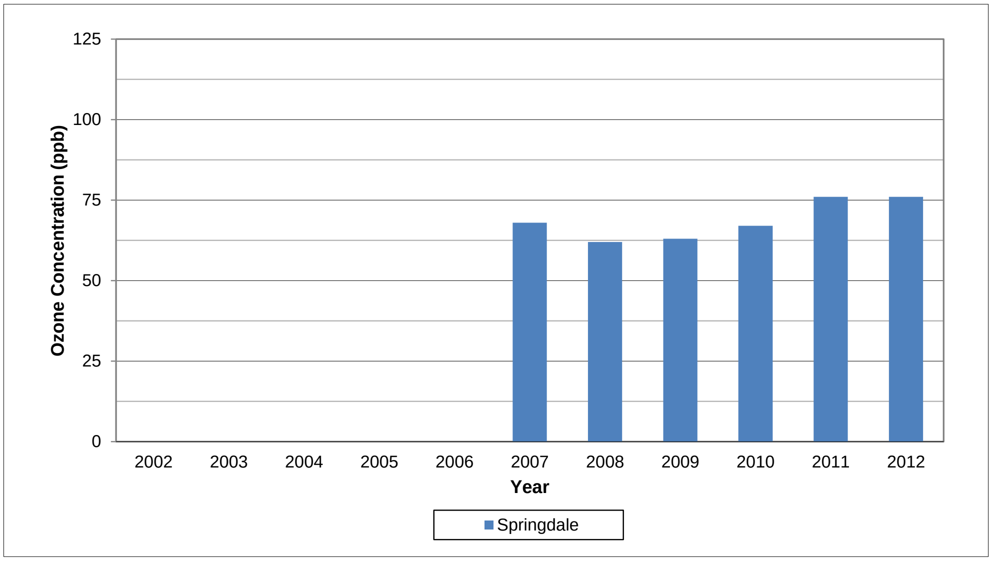
For the three year period ending in 2012, the 8-hour ozone design values are greater than 75 ppb for the North Little Rock Airport and Marion sites (and thus for the Little Rock and Memphis areas). The estimated design values for the newly established Fayetteville site is also greater than 75 ppb, but the estimate is based on only one year of monitoring data.

Figure 2-2 displays the fourth highest 8-hour average ozone concentrations and Figure 2-3 displays the 8-hour ozone design values for all currently operating monitoring sites with five or more years of data. Data for years with incomplete data and design values based on fewer than three years of data are not included in the displays. As noted earlier, the fourth highest 8-hour average ozone concentration for each year is used to calculate the design value and assess compliance with the ozone NAAQS. Note that the Little Rock sites are grouped together and that the maximum value for any site in the Little Rock area represents the design value for the area.

Figure 2-2. Fourth Highest 8-Hour Average Ozone Concentration (ppb) for Monitoring Sites within Arkansas




125
100
75
50
25
0
Ozone Concentration (ppb)
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
Year
Deer


125
100
75
50
25
0
Ozone Concentration (ppb)
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
Year
Springdale

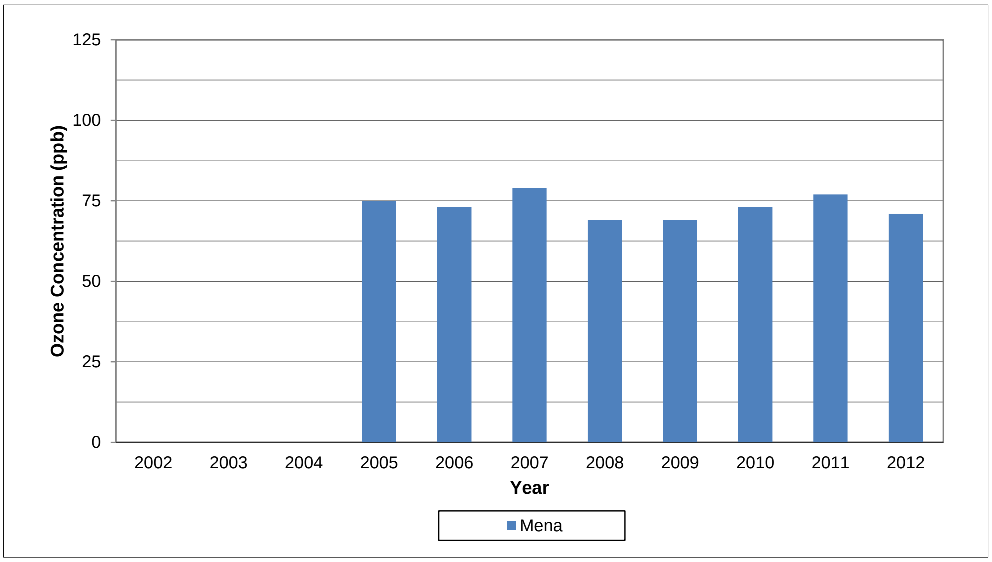
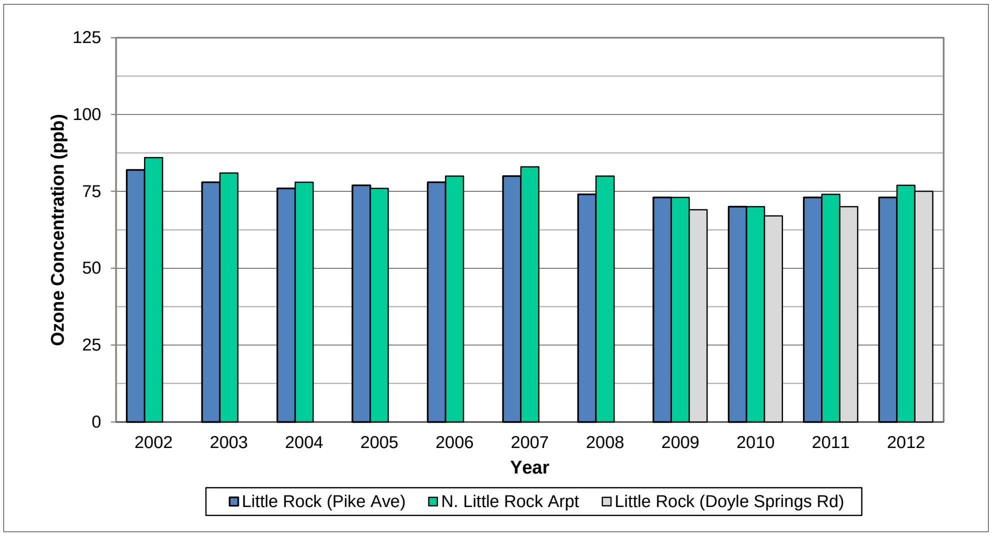
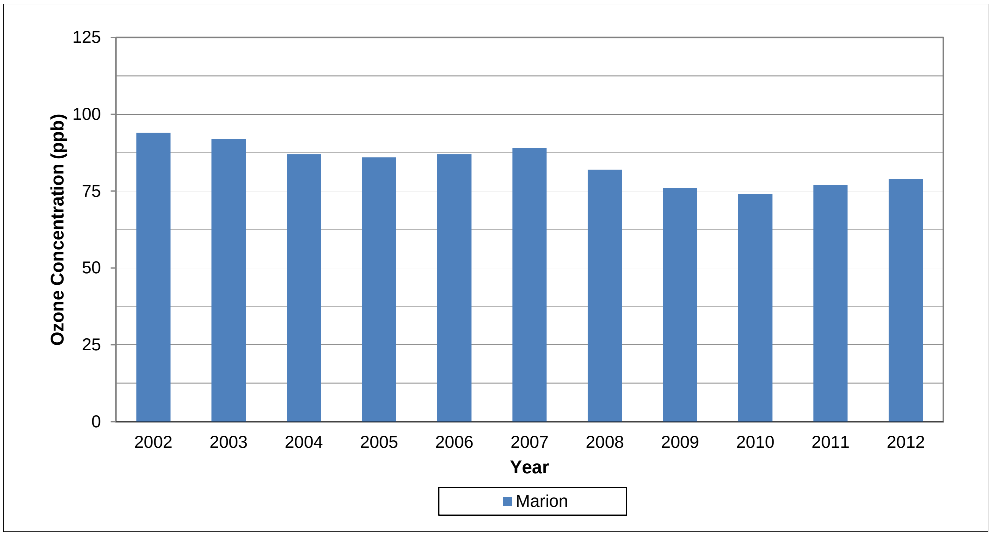
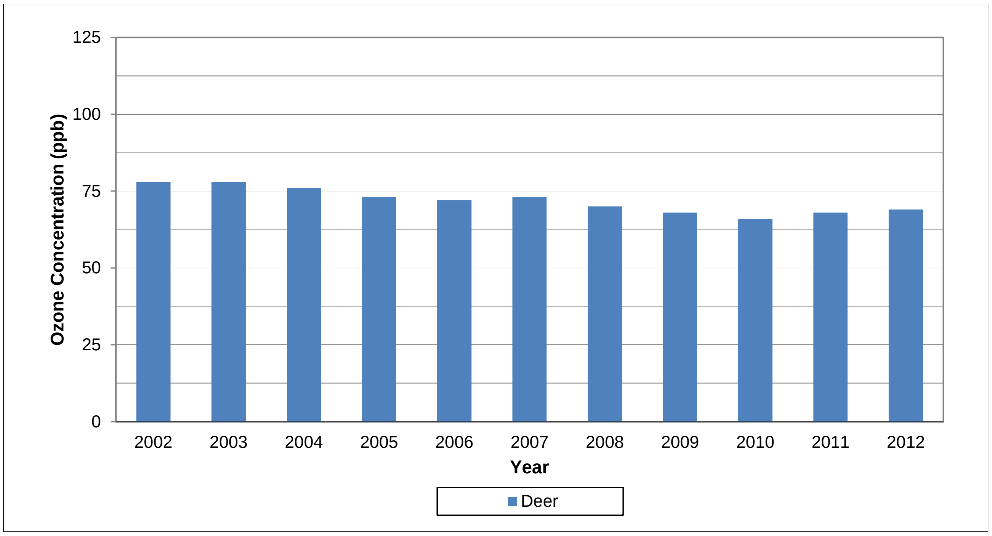
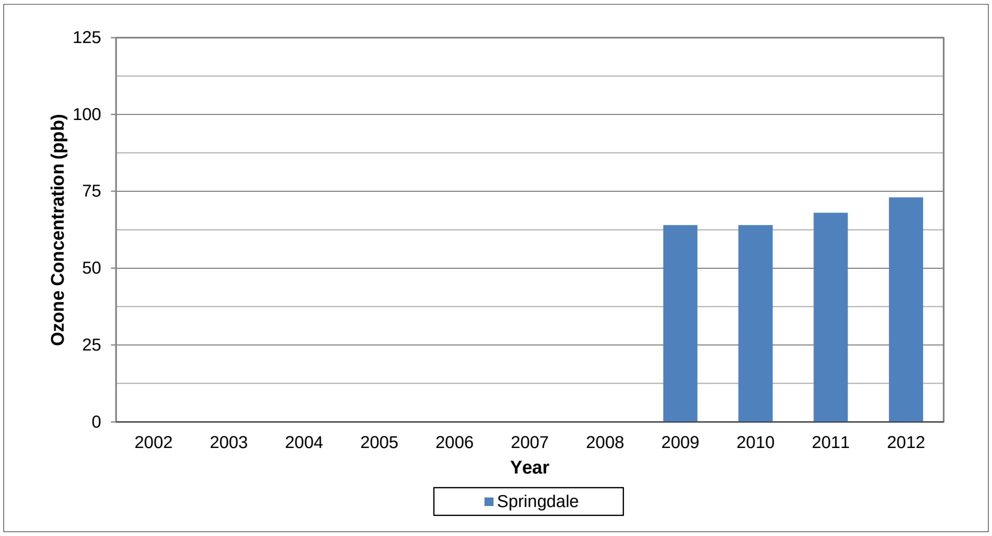

125
100
75
50
25
0
Ozone Concentration (ppb)
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
Year
Mena

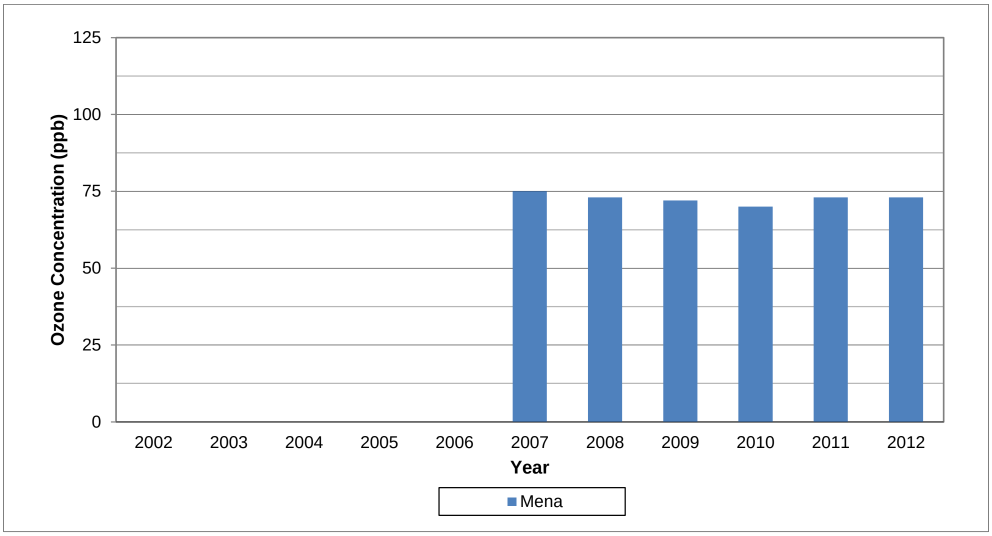
Figure 2-3. 8-Hour Ozone Design Values (ppb) for Monitoring Sites within Arkansas











Note: The NAAQS for 8-hour average ozone concentration is 75 ppb.

The design values displayed in Figure 2-3 are based on three years of data. Overall, the data indicate a downward trend in design value for Marion and Deer, a slight downward trend for Little Rock and Mena, and an upward trend for Springdale.

2.1.2 $PM_{2.5}$

The recent emphasis on $PM_{2.5}$ as an air pollutant of concern is based primarily on epidemiological studies that have indicated a cause and effect relationship between exposure to fine particles and health effects, including respiratory and cardiovascular disease and premature mortality. Particulates are also a primary constituent of regional haze, which limits visibility and the attainment of visibility goals, and ultimately diminishes the natural beauty of the environment.

Fine particulates in the atmosphere consist of primary particles that are emitted directly from sources and secondary particles that form in the atmosphere through chemical and physical processes.

Pollutants that contribute to the formation of secondary aerosols include SO_2, NO_x, and ammonia (NH_3). Natural sources of fine particulates and precursor pollutants include organic aerosols from vegetation, wind-blown dust, sea salt, and forest fires. Anthropogenic contributors include numerous agricultural, mobile, and industrial sources. Meteorology plays an important role in particulate formation and transport and in determination of the ambient particulate concentration levels.

The U.S. EPA established new standards for fine particulate matter in 1997, and subsequently revised the 24-hour standard in 2006 and the annual standard in 2012. Under these standards, fine particles are defined as those with a diameter of less than 2.5 microns; particles of this size are also referred to as $PM_{2.5}$. The annual $PM_{2.5}$ NAAQS requires the three-year average annual mean concentration to be less than or equal to 12 micrograms per cubic meter (µg/m^3). The daily $PM_{2.5}$ standard requires the three-year average of the 98th percentile daily average concentration to be less than or equal to 35 µg/m^3. The averages or "design values" are calculated for each site and then the maximum value over all sites within an area is the design value for the area.

Table 2-2 lists the currently operating $PM_{2.5}$ monitoring sites located within Arkansas and the annual design values for each site for the three three-year periods ending in 2010, 2011, and 2012. Designations for the annual $PM_{2.5}$ standard are expected to be issued in 2014.

Table 2-2. $PM_{2.5}$ Monitoring Sites and Annual $PM_{2.5}$ Design Values for the Three-Year Periods Ending in 2010, 2011, and 2012

Site Name	ID	County	2008–2010 Annual $PM_{2.5}$ Design Value (µg/m^3)	2009–2011 Annual $PM_{2.5}$ Design Value (µg/m^3)	2010–2012 Annual $PM_{2.5}$ Design Value (µg/m^3)
North Little Rock (Pike Ave)	051190007	Pulaski	11.6	11.7	11.9
Little Rock (Adams Field)	051191004	Pulaski	12.0	11.8	11.7
Little Rock (Doyle Springs Rd)	051191008	Pulaski	12.0	12.1	12.2
Marion	050350005	Crittenden	11.1	11.1	11.2
Stuttgart	050010011	Arkansas	10.9	10.7	10.8
Newport	050670001	Jackson	10.4	10.2	10.3
Springdale	051430005	Washington	10.7	11.0	10.8
Mena	051130002	Polk	10.4	10.8	10.8
Hot Springs	050510003	Garland	10.7	10.8	11.0
El Dorado	051390006	Union	10.9	11.1	11.4
Crossett	050030005	Ashley	10.4	10.6	10.8
Roland	401359021	Sequoyah (OK)	--	11.6[1]	10.9[2]

[1] Based on one year of monitoring data.

[2] Based on two years of monitoring data.

The annual $PM_{2.5}$ design values are greater than 12 µg/m^3 for Little Rock (Doyle Springs Road) for the periods ending in 2011 and 2012.

Table 2-3 lists 24-hour design values for each site for the three three-year periods ending in 2010, 2011, and 2012.

Table 2-3. $PM_{2.5}$ Monitoring Sites and 24-Hour $PM_{2.5}$ Design Values for the Three-Year Periods Ending in 2010, 2011, and 2012

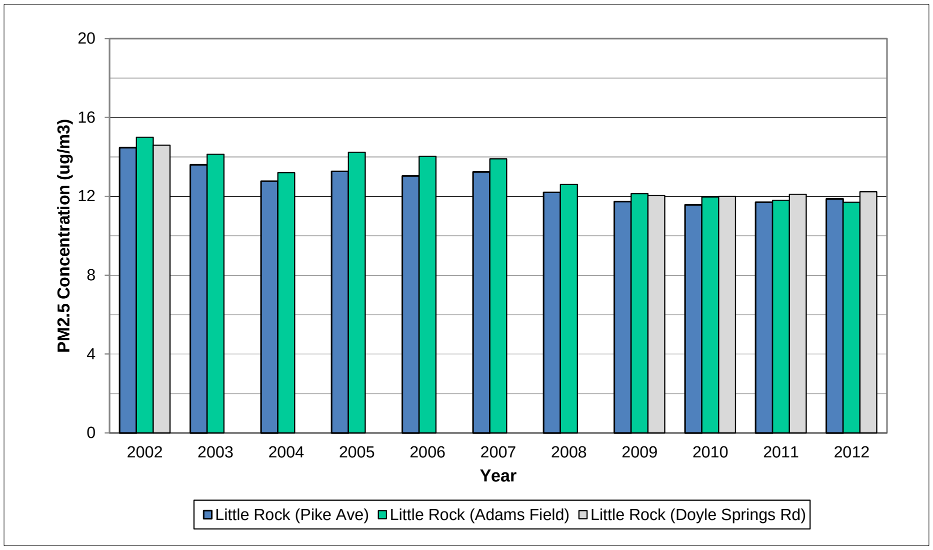
Site Name	ID	County	2008–2010 24-Hr $PM_{2.5}$ Design Value (µg/m^3)	2009–2011 24-Hr $PM_{2.5}$ Design Value (µg/m^3)	2010–2012 24-Hr $PM_{2.5}$ Design Value (µg/m^3)
North Little Rock (Pike Ave)	051190007	Pulaski	24	23	23
Little Rock (Adams Field)	051191004	Pulaski	25	24	25
Little Rock (Doyle Springs Rd)	051191008	Pulaski	25	25	26
Marion	050350005	Crittenden	24	22	23
Stuttgart	050010011	Arkansas	24	22	21
Newport	050670001	Jackson	23	22	22
Springdale	051430005	Washington	22	23	22
Mena	051130002	Polk	21	22	22
Hot Springs	050510003	Garland	21	21	22
El Dorado	051390006	Union	21	22	23
Crossett	050030005	Ashley	21	22	23
Roland	401359021	Sequoyah (OK)	--	23[1]	22[2]

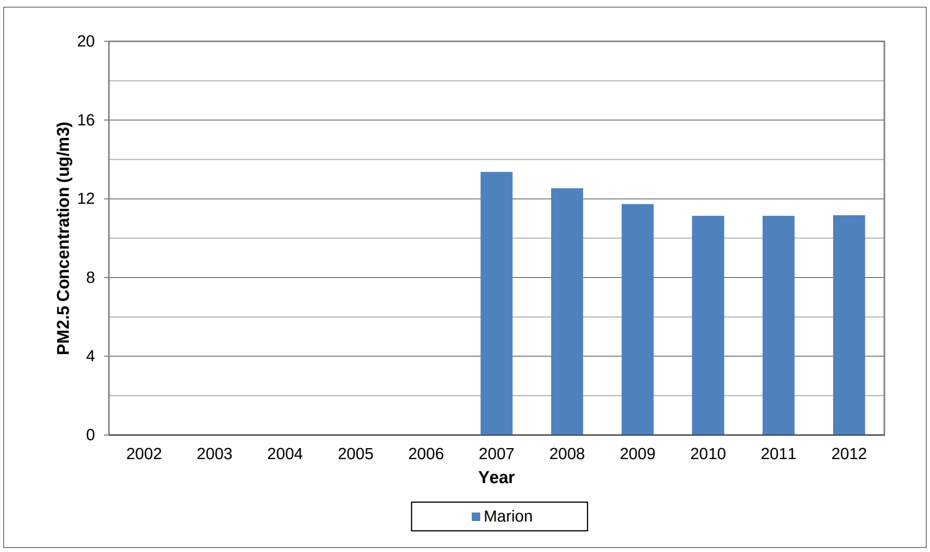
[1] Based on one year of monitoring data.
[2] Based on two years of monitoring data.

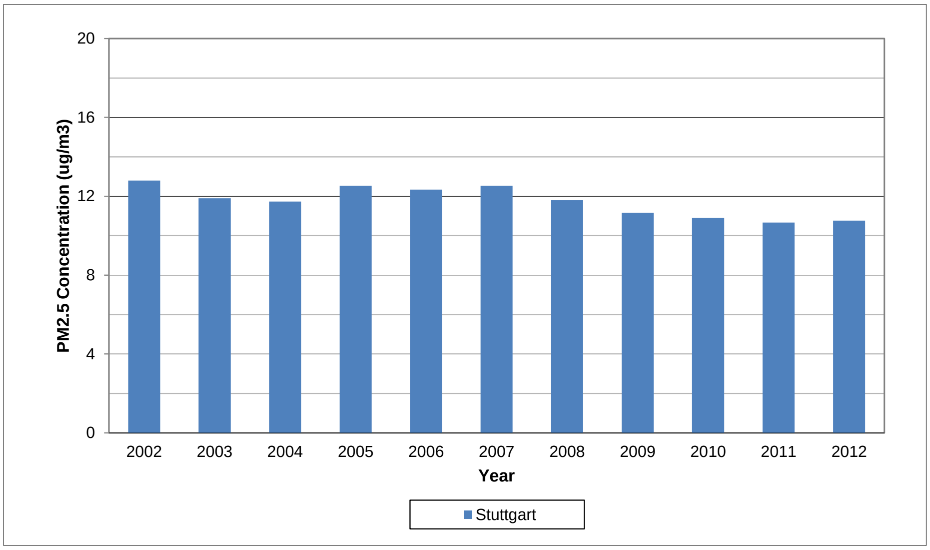
For the three-year period ending in 2012, the annual $PM_{2.5}$ design values are much less than 35 µg/m^3 for all sites and all three periods.

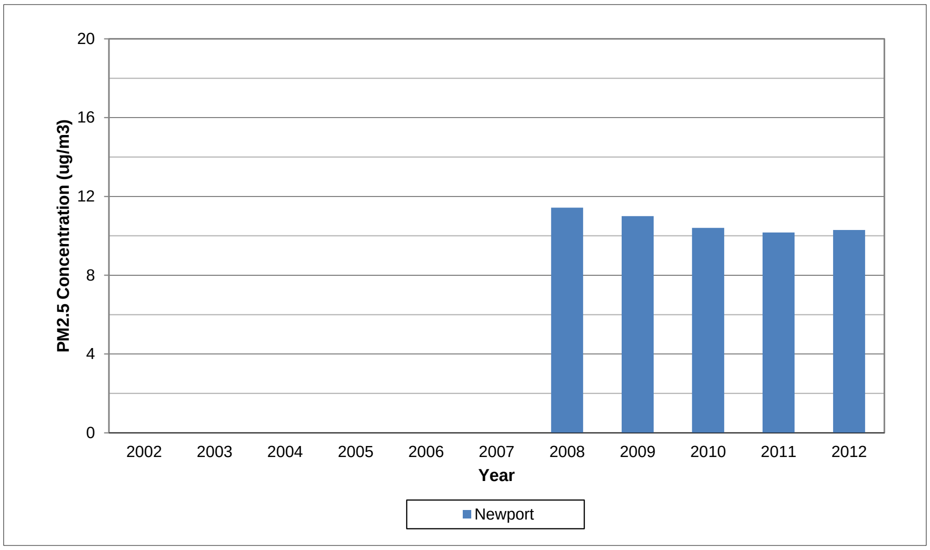
Figure 2-4 displays the annual $PM_{2.5}$ design values and Figure 2-5 displays the 24-hr $PM_{2.5}$ design values for all currently operating monitoring sites with five or more years of data. Data for years with incomplete data and design values based on fewer than three years of data are not included in the displays. Note that the Little Rock sites are grouped together and that the maximum value for any site in the Little Rock area represents the design value for the area.

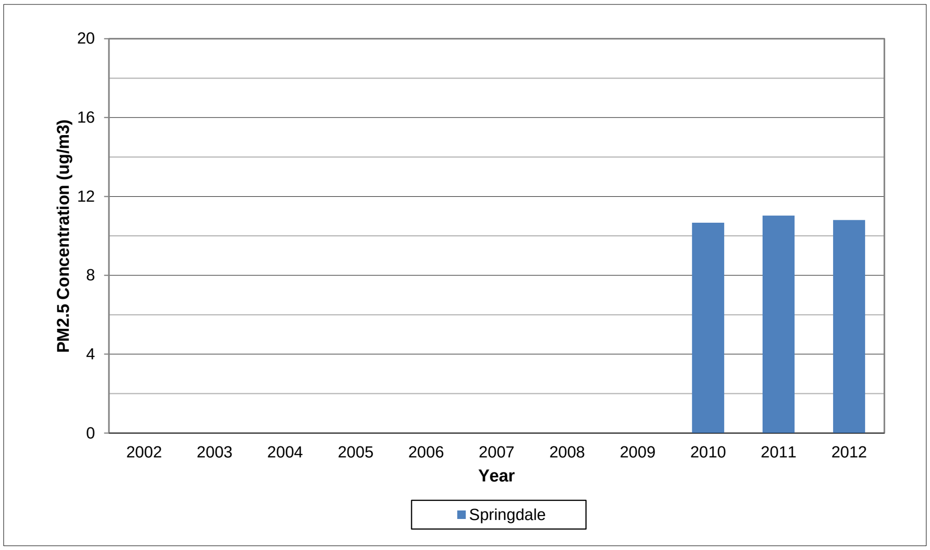
Figure 2-4. Annual $PM_{2.5}$ Design Values ($\mu g/m^3$) for Monitoring Sites within Arkansas

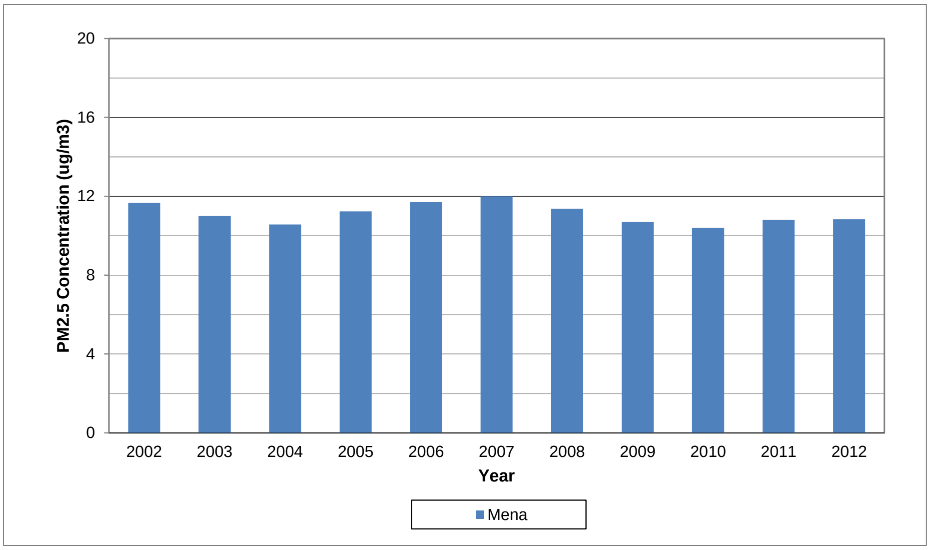


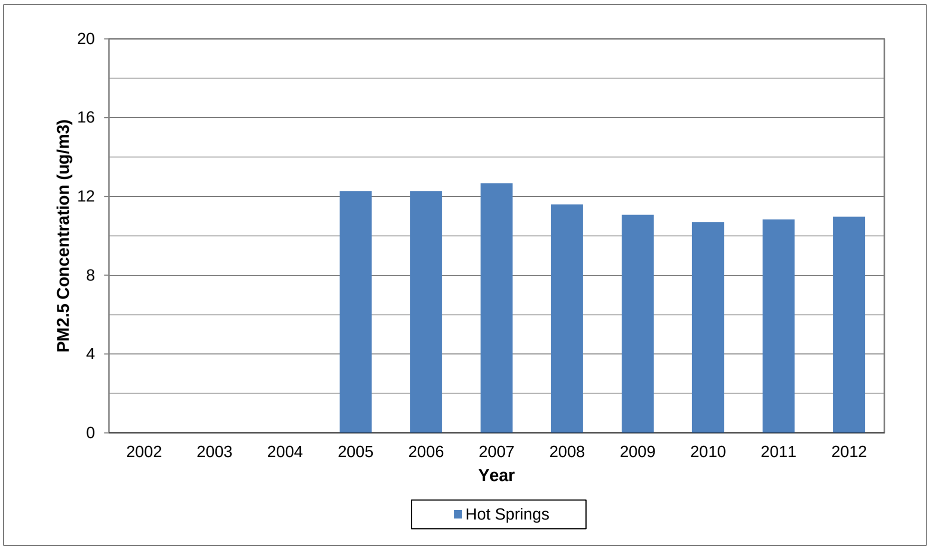


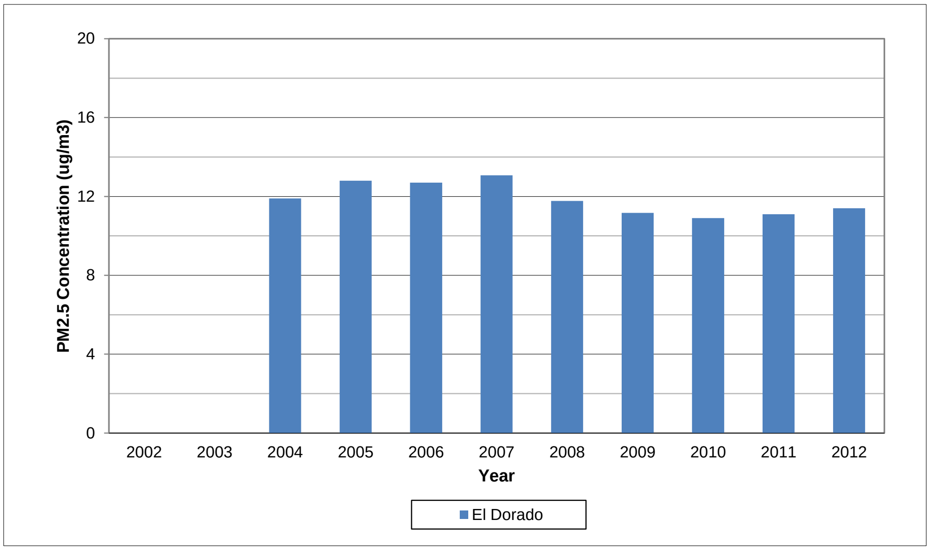

PM2.5 Concentration (ug/m3)
0
4
8
12
16
20
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
Year
Stuttgart

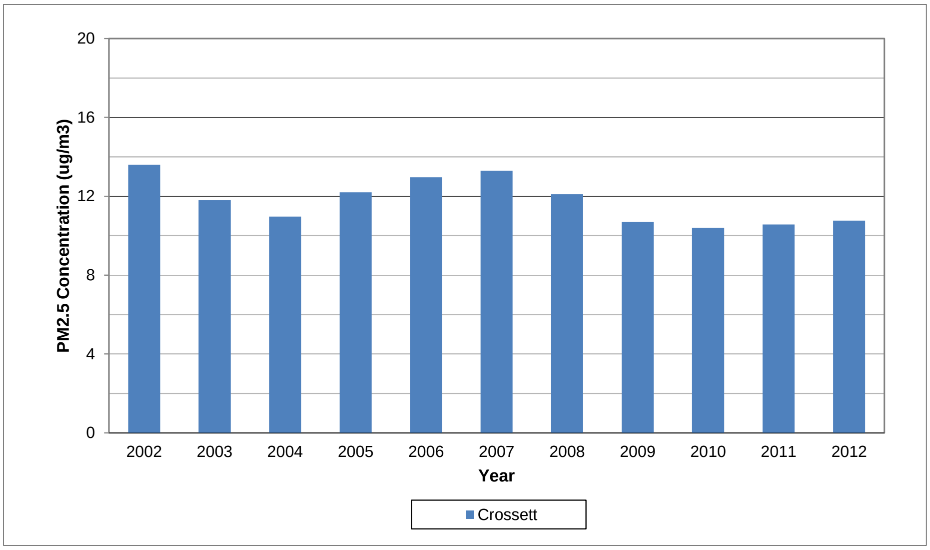

PM2.5 Concentration (ug/m3)
0
4
8
12
16
20
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
Year
Newport


PM2.5 Concentration (ug/m3)
0
4
8
12
16
20
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
Year
Springdale


20
16
12
8
4
0
PM2.5 Concentration (ug/m3)
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
Year
Mena

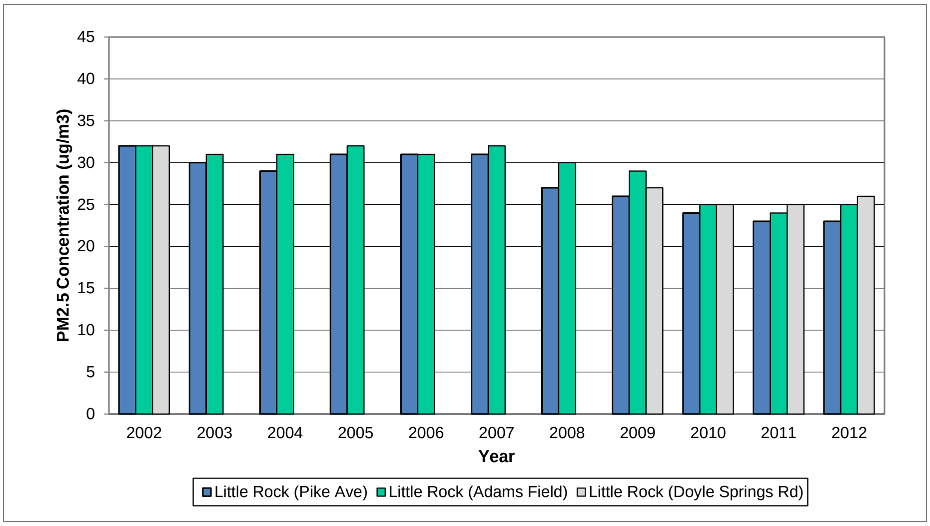

20
16
12
8
4
0
PM2.5 Concentration (ug/m3)
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
Year
Hot Springs

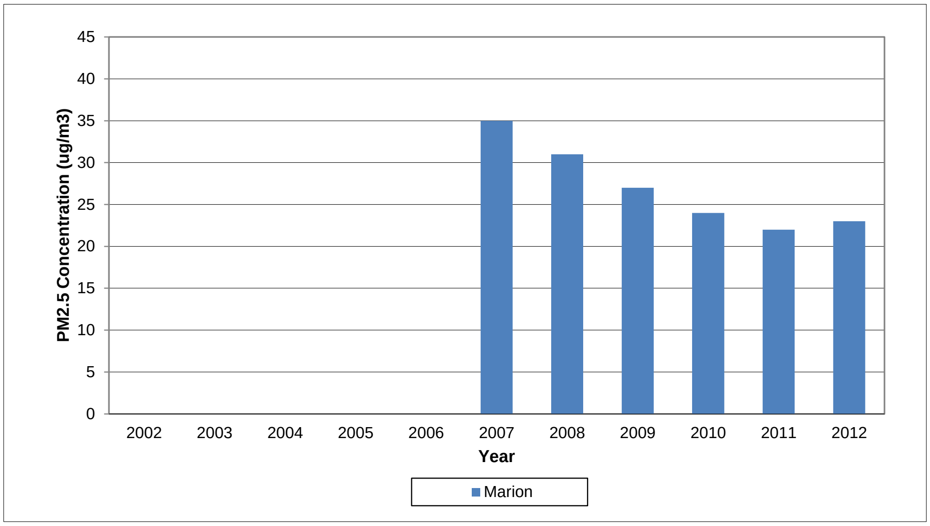

20
16
12
8
4
0
PM2.5 Concentration (ug/m3)
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
Year
El Dorado

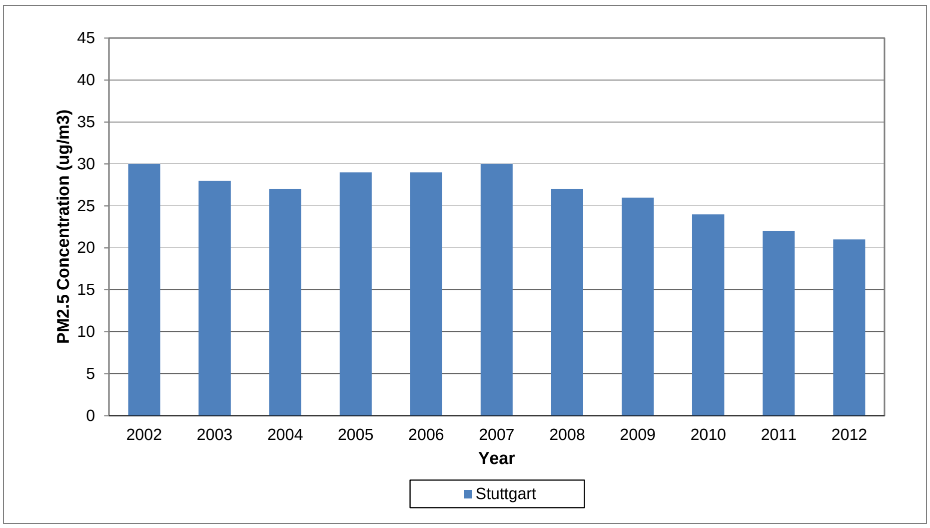


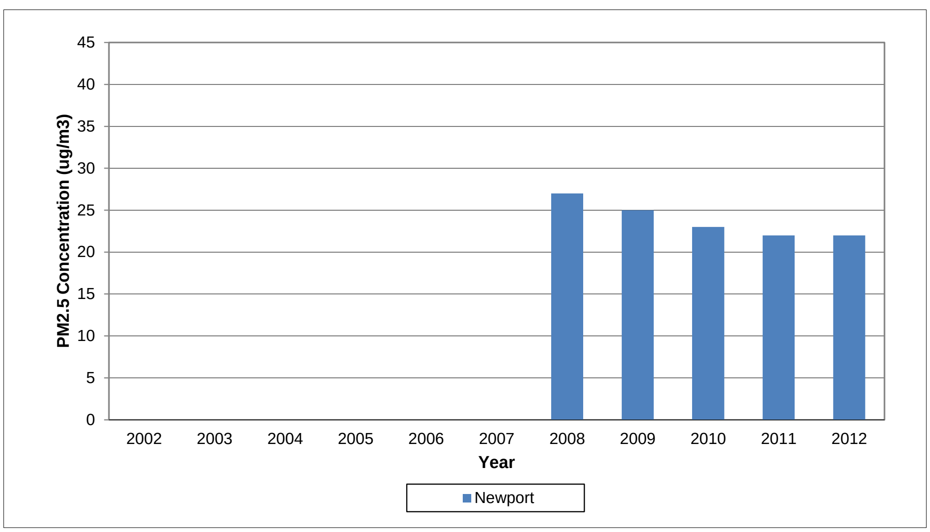
Note: The NAAQS for annual average $PM_{2.5}$ concentration is 12 µg/m^3.

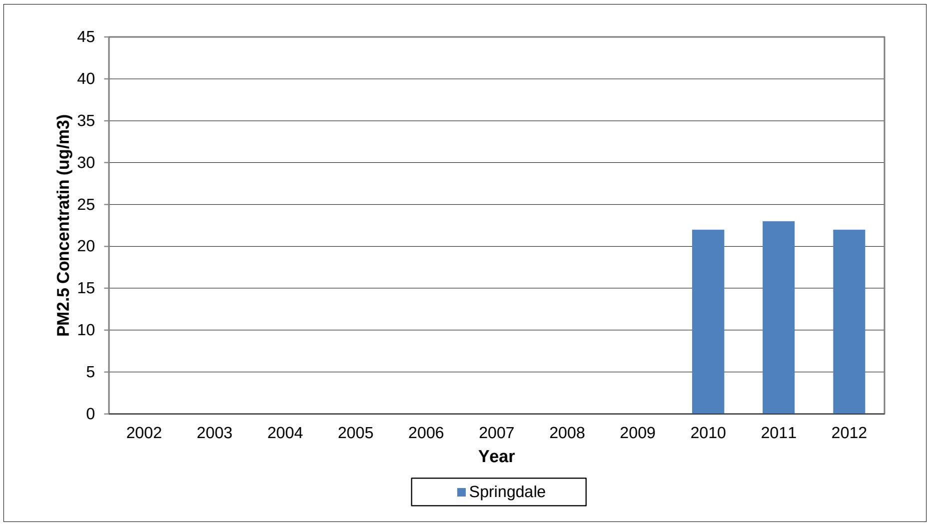
Figure 2-5. 24-Hour $PM_{2.5}$ Design Values (µg/m^3) for Monitoring Sites within Arkansas

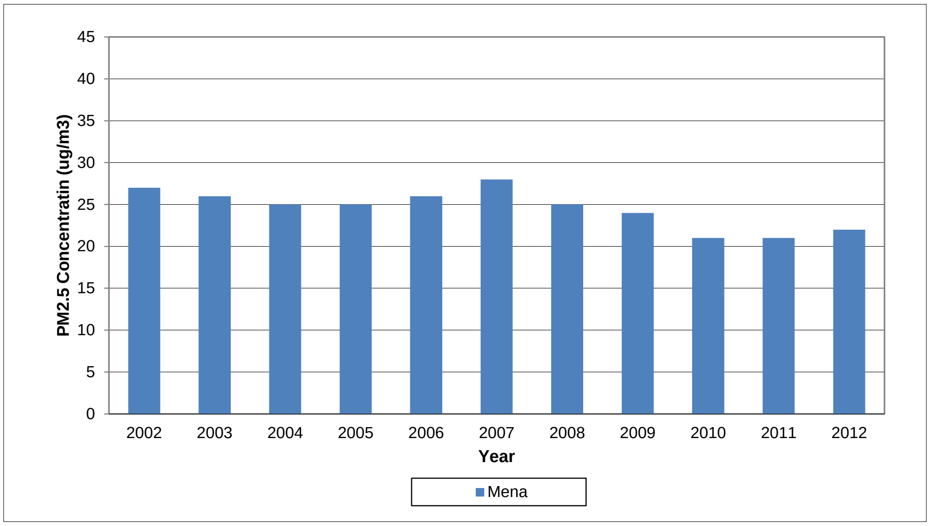


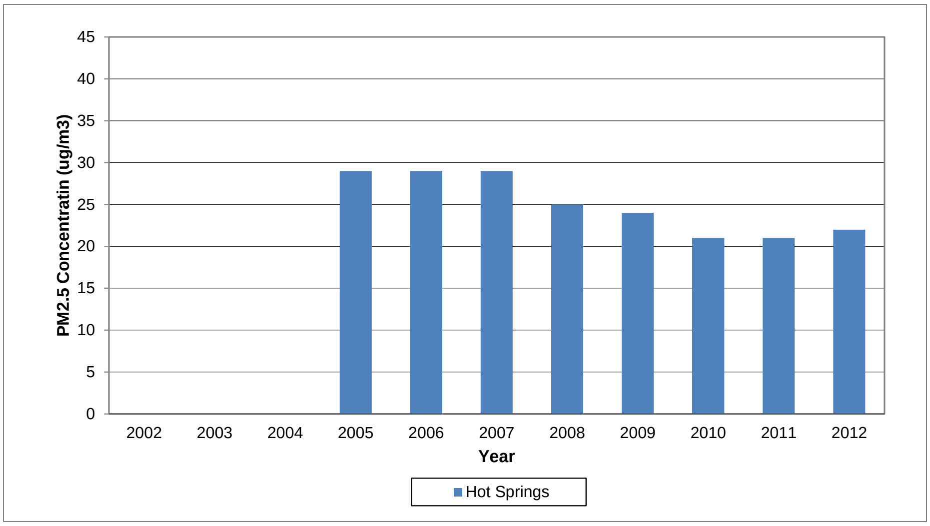

PM2.5 Concentration (ug/m3)
0
5
10
15
20
25
30
35
40
45
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
Year
Marion

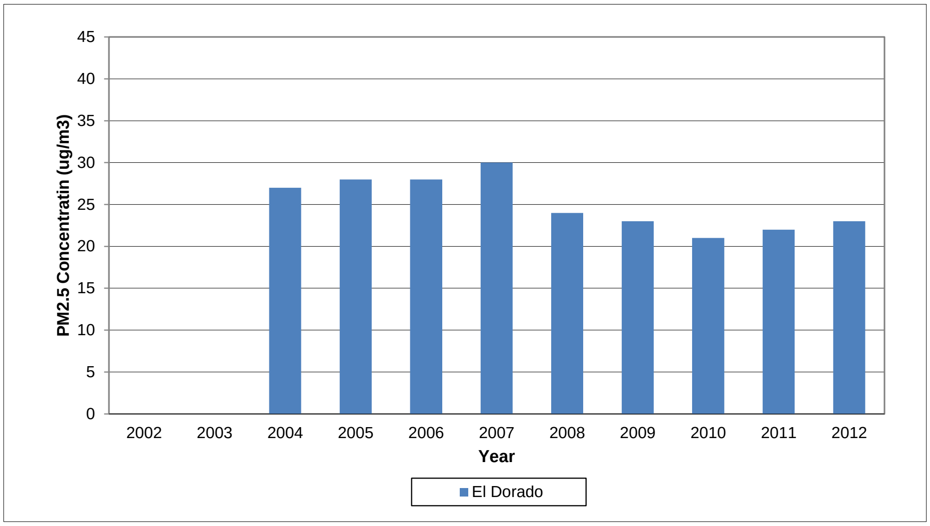

PM2.5 Concentration (ug/m3)
0
5
10
15
20
25
30
35
40
45
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
Year
Stuttgart

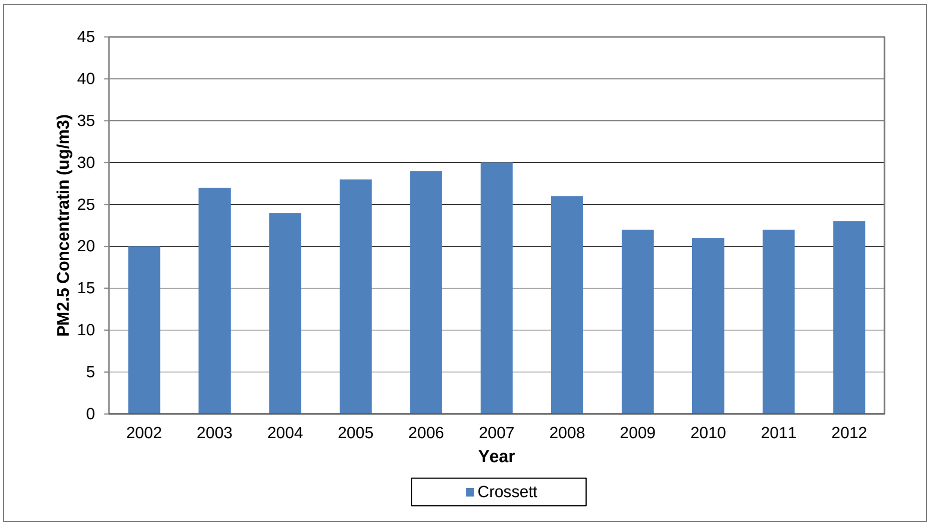

PM2.5 Concentration (ug/m3)
0
5
10
15
20
25
30
35
40
45
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
Year
Newport


PM2.5 Concentratin (ug/m3)
0
5
10
15
20
25
30
35
40
45
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
Year
Springdale


PM2.5 Concentratin (ug/m3)
0
5
10
15
20
25
30
35
40
45
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
Year
Mena


PM2.5 Concentratin (ug/m3)
0
5
10
15
20
25
30
35
40
45
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
Year
Hot Springs





Note: The NAAQS for 24-hour average $PM_{2.5}$ concentration is 35 µg/m^3.

The design values displayed in Figures 2-4 and 2-5 are based on three years of data. Overall, the data indicate a downward trend in $PM_{2.5}$ concentrations for all sites. However, design values go up and down throughout the eleven-year period. For several of the sites with a full data record, the data indicate a downward trend in design value between 2002 and 2004, an upward trend between 2004 and 2007, and a downward trend between 2007 and 2012. These findings are possibly (even likely) influenced by differences in meteorological and wildfire conditions among the years/periods.

2.1.3 NO_2

NO_2 is a precursor to both ozone and $PM_{2.5}$. In addition, it reacts with water in the respiratory tract to form nitric acid, which is a corrosive irritant. It impairs lung function and can cause respiratory problems including airway inflammation in healthy people, and increased symptoms in people with asthma. Effective April 2010, the 1-hour NO_2 NAAQS requires the three-year average of the 98th-percentile of the annual distribution of daily maximum NO_2 concentration to be less than or equal to 100 ppb (188 µg/m^3). The annual NO_2 NAAQS requires the annual average concentration to be less than or equal to 53 ppb (100 µg/m^3).

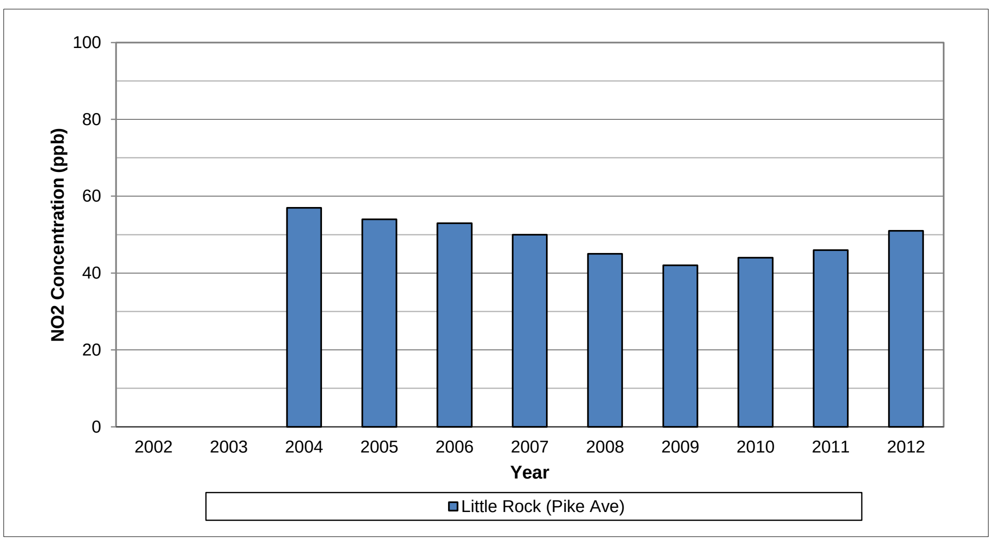
Table 2-4 lists the currently operating NO_2 monitoring sites located within Arkansas and the 1-hour NO_2 design values for each site for the three three-year periods ending in 2010, 2011, and 2012.

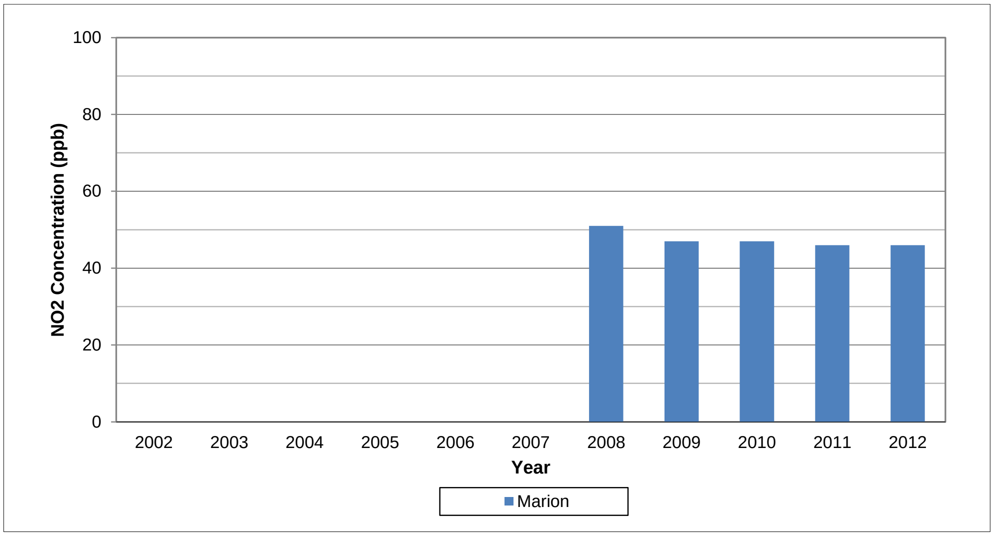
Table 2-4. NO_2 Monitoring Sites and 1-Hour NO_2 Design Values for the Three-Year Periods Ending in 2010, 2011, and 2012

Site Name	ID	County	2008–2010 1-Hour NO_2 Design Value (ppb)	2009–2011 1-Hour NO_2 Design Value (ppb)	2010–2012 1-Hour NO_2 Design Value (ppb)
North Little Rock (Pike Ave)	051190007	Pulaski	44	46	51
Marion	050350005	Crittenden	47	46	46

For all three three-year periods, the 1-hour NO_2 design values are less than 100 ppb for both the North Little Rock (Pike Ave) and Marion sites. The corresponding 98th percentile values for each component year are also less than 100 ppb. Figure 2-6 displays the 1-hour NO_2 design values for these two sites for all years with data beginning with 2002.

Figure 2-6. 1-Hour NO_2 Design Values (ppb) for Monitoring Sites within Arkansas





Note: The NAAQS for 1-hour NO_2 concentration is 100 ppb.

The design values displayed in Figure 2-6 are based on three years of data. For Little Rock, the data indicate a decrease in design value between 2004 and 2009, followed by an increase between 2009 and 2012. The data for Marion show an overall decrease from 2008 to 2009, but a flat trend for the past four design-value periods.

For both sites, the annual average NO_2 values are well below the standard.

2.1.4 SO_2

SO_2 is also a precursor of $PM_{2.5}$ and can contribute to both acid rain and visibility impairment. The primary standard for SO_2 is the 1-hour SO_2 NAAQS which requires the three-year average of the 99th-percentile of the annual distribution of daily maximum SO_2 concentration to be less than or equal to 75 ppb (196 μg/m^3).

Table 2-5 lists the currently operating SO_2 monitoring sites located within Arkansas and the 1-hour SO_2 design values for each site for the three three-year periods ending in 2010, 2011, and 2012.

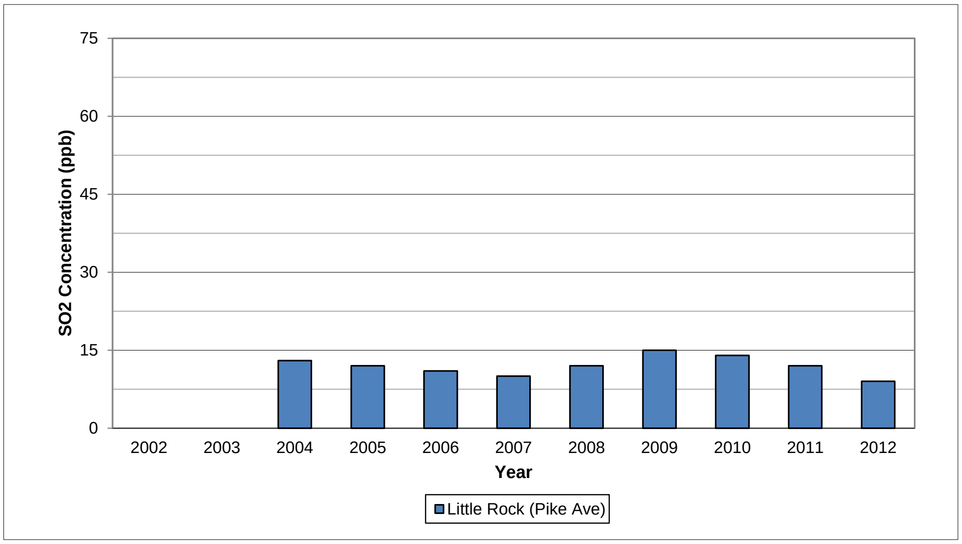
Table 2-5. SO_2 Monitoring Sites and 1-Hour SO_2 Design Values for the Three-Year Periods Ending in 2010, 2011, and 2012

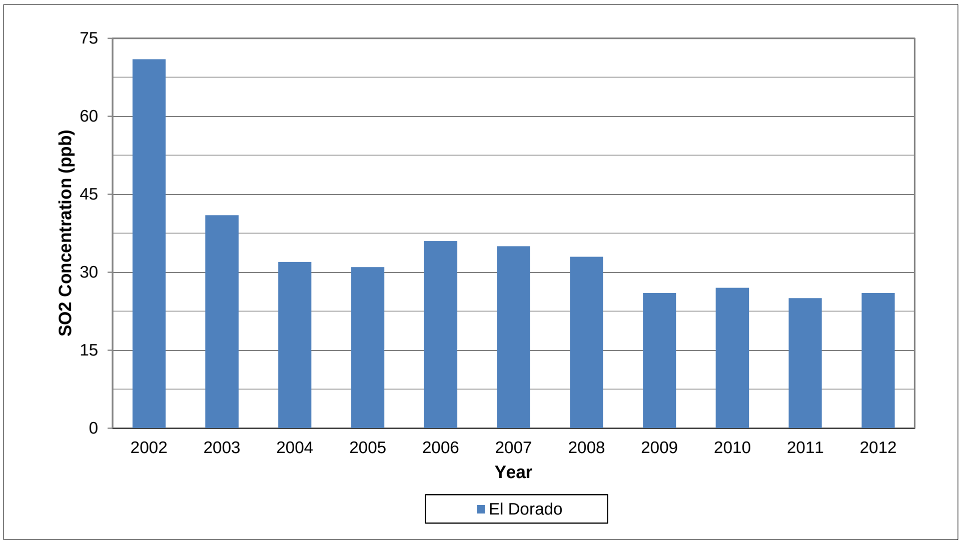
Site Name	ID	County	2008–2010 1-Hour SO_2 Design Value (ppb)	2009–2011 1-Hour SO_2 Design Value (ppb)	2010–2012 1-Hour SO_2 Design Value (ppb)
North Little Rock (Pike Ave)	051190007	Pulaski	14	12	9
El Dorado	051390006	Union	27	25	26

The SO_2 design values are higher for the El Dorado site, compared to the Little Rock site, but much less than 75 ppb for both sites and all three periods. The corresponding 99th percentile values for each component year are also less than 75 ppb.

Figure 2-7 displays the 1-hour SO_2 design values.

Figure 2-7. 1-Hour SO_2 Design Values (ppb) for Monitoring Sites within Arkansas





Note: The NAAQS for 1-hour SO_2 concentration is 75 ppb.

The design values displayed in Figure 2-7 are based on three years of data. For Little Rock, the data indicate a relatively flat tendency between 2004 and 2012. The data for El Dorado show a large drop between 2002 and 2003, followed by a more gradual (and uneven) decrease from 2003 to 2012.

2.1.5 Visibility

Visibility impairment or light extinction can result from the scattering and/or absorption of light by particles in the atmosphere. Coarse and fine particles from both natural and anthropogenic sources can contribute to light extinction. High humidity conditions can also contribute to light extinction and reduced visibility. Visibility is sometimes expressed in terms of deciview units, which vary approximately in proportion to the human response to visibility change. Higher deciview (dv) values correspond to poorer visibility (and a lower visual range).

In 1999, the U.S. EPA promulgated regional haze regulations to prevent "any future, and remedy any existing, impairment of visibility" at 156 designated Class I areas (national parks greater than 6000 acres and wilderness areas greater than 5000 acres). The regional haze rule calls for states to establish "reasonable progress goals" for each Class I area to improve visibility on the 20 percent haziest days and to prevent visibility degradation on the 20 percent clearest days. The national goal is to return visibility to natural background levels by 2064. Using the period 2000 to 2004 as the baseline period, states are to evaluate progress in improving visibility by 2018 and every ten years thereafter. State Implementation Plans (SIPs) for the first phase of the regional haze regulation were due in December 2007. Several Regional Planning Organizations (RPOs) have been developing control strategies to guide states in meeting the regional haze goals.

There are two Class I areas in Arkansas. These are Caney Creek Wilderness and Upper Buffalo Wilderness. Visibility is monitored at these sites as part of the IMPROVE monitoring network. Table 2-6 lists the average visibility (deciviews) for the 20 percent worst visibility days for the periods 2002–2006, 2005–2009, and 2008–2012 for both areas. Deciviews (DV) corresponding to the 2018 goal and estimated natural conditions (EPA, 2003) are also provided.

Table 2-6. Average Visibility for the 20 Percent Worst Days for Class I Areas in Arkansas Based on Data for 2002 through 2012

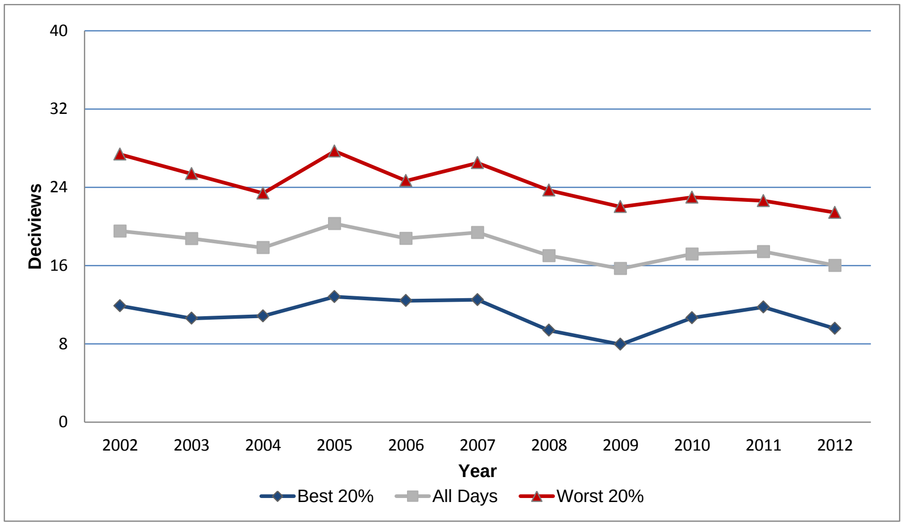
Site Name	ID	County	2002–2006 Average Visibility for 20% Worst Days (dv)	2005–2009 Average Visibility for 20% Worst Days (dv)	2008–2012 Average Visibility for 20% Worst Days (dv)	2018 Glidepath Goal (dv)	Estimated Natural Conditions (dv)
Caney Creek Wilderness	CACR1	Newton	25.7	24.9	22.5	22.9	11.3
Upper Buffalo Wilderness	UPBU1	Union	25.4	24.5	22.9	22.8	11.3

The IMPROVE data indicate that the 2018 goals have been met or nearly met in 2012 and that continued improvement in visibility is needed to achieve the natural condition goals for both areas. As noted above, some measures to reduce regional haze and improve visibility at these and other Class I areas may be under consideration (or being implemented), based on the work conducted by the RPOs.

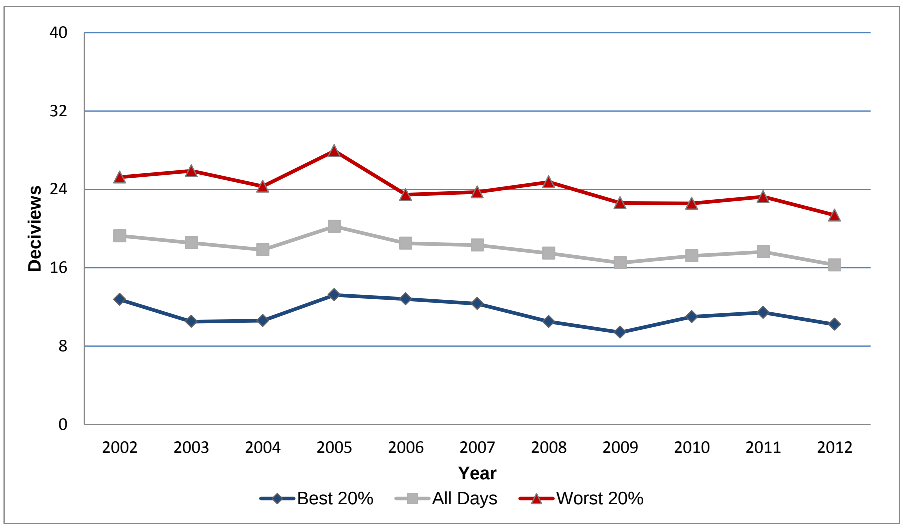
Figure 2-8 displays annual average visibility in deciviews for the 20 percent best days, 20 percent worst days, and all days for each year during the period 2002-2012 for the two IMPROVE sites.

Figure 2-8. Annual Average Visibility (Deciviews) for IMPROVE Monitoring Sites within Arkansas

Caney Creek Wilderness



Upper Buffalo Wilderness



The data for both sites show a slight downward trend (toward improved visibility) for all three categories of days.

2.2 Representativeness of the Simulation Periods

The modeling analysis includes two base years, 2005 and 2008. The meteorological conditions that characterize these two years are representative of the eleven year period from 2002 through 2012. Table 2-7 summarizes the meteorological conditions including temperature, precipitation, and wind information that characterize the Little Rock area, based on meteorological data from the local National Weather Service (NWS) monitoring site for the two years and the multi-year period.

Table 2-7. Summary Meteorological Data for Little Rock for 2005, 2008 and 2002-2012

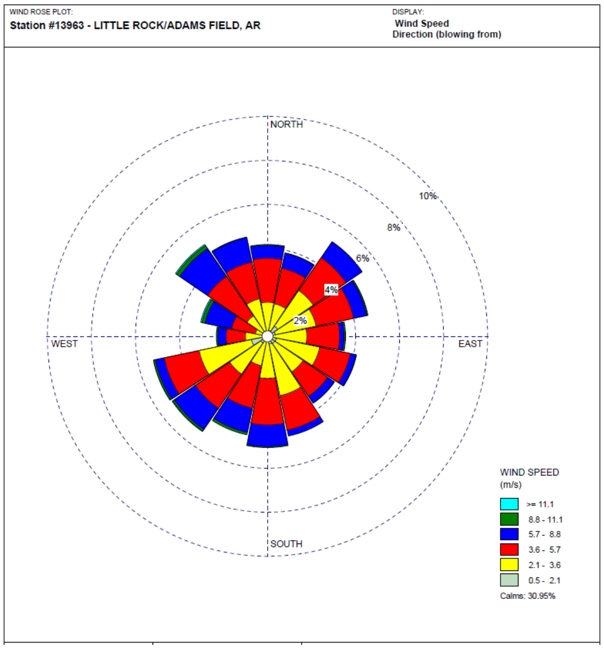
Metric	2005	2008	2002–2012
Mean annual temperature (degrees Fahrenheit)	64.2	62.1	63.4
Mean annual precipitation (inches)	34.6	58.2	49.8
Mean annual wind speed (meters per second)	2.7	3.4	3.1
Prevailing surface wind direction (indicates direction from which the winds are blowing from)	SW	SSW	S

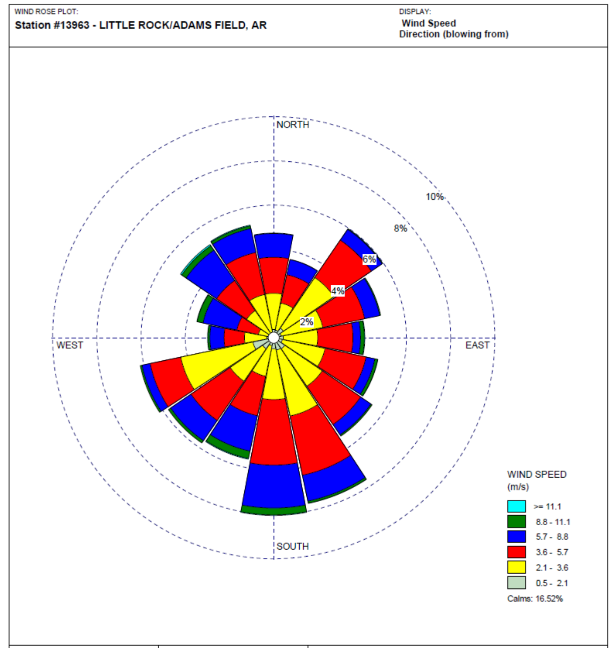
Temperatures were slightly higher than average for 2005 and slightly lower than average for 2008. The total amount of precipitation was lower than average for 2005 and higher than average for 2008. Overall, 2005 was a warmer, dryer year and 2008 was a cooler, wetter year compared to the 2002-2012 multi-year period. Average surface wind speeds were lower than average for 2005 and higher than average for 2008. Predominant wind directions for both 2005 and 2008 include a westerly component and differ slightly from the predominant southerly wind direction that characterizes the multi-year period.

Figure 2-9 illustrates the frequency of observed surface wind speed and wind direction for the Little Rock NWS site for the two years and the multi-year period. In the wind rose diagrams, wind direction is defined as the direction from which the wind is blowing. The length of the bar within that wind-direction sector indicates the frequency of occurrence of a particular wind direction. The shading indicates the distribution of wind speeds.

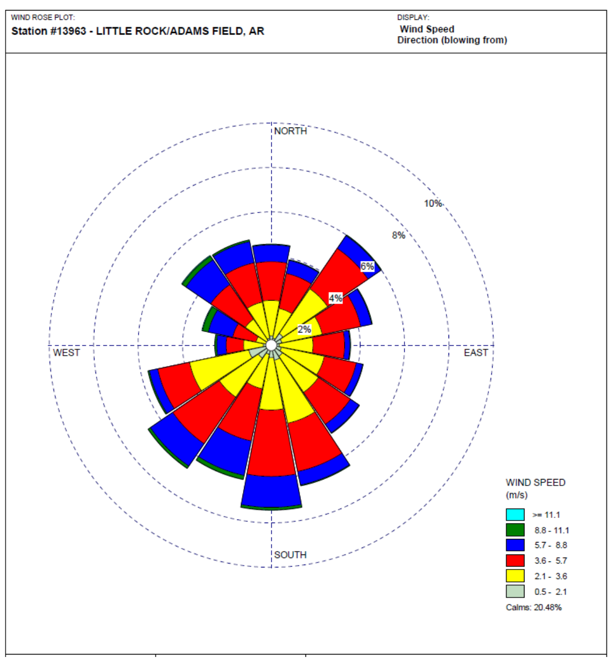
Figure 2-9. Frequency of Surface Wind Speed and Wind Direction for Little Rock, Arkansas

2005/2008





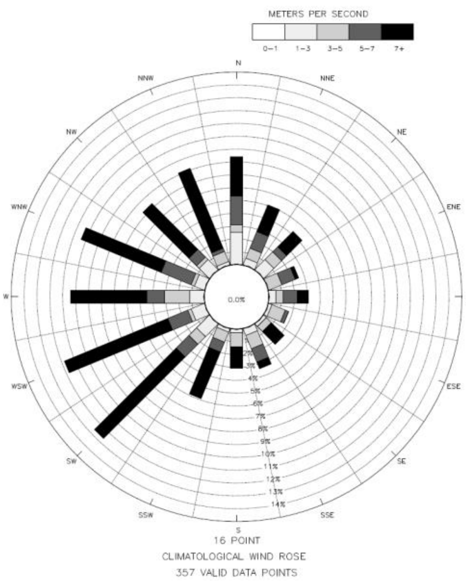
2002-2012

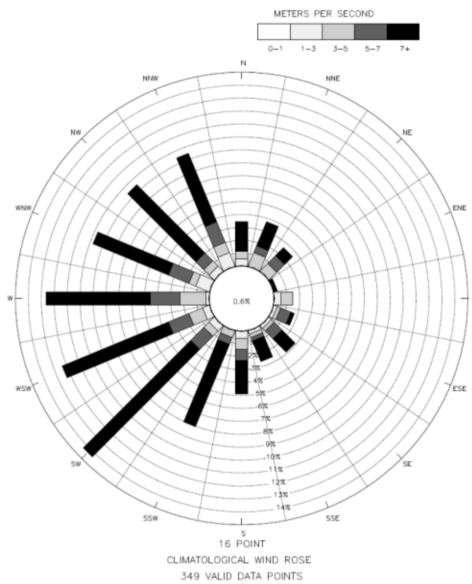


Surface wind directions for both years capture the range of wind directions observed during the full 2002-2012 period. Surface winds for 2005 are characterized by lower wind speeds, a greater incidence of calm winds, and less frequent southerly winds than the full 2002-2012 period. Surface winds for 2008 are characterized by higher wind speeds (and fewer calm periods) than the full period.

Figure 2-10 compares the frequency of observed upper-air wind directions and speeds for the two years and the multi-year period. The upper-air data are for the Little Rock upper-air monitoring site, and are available twice per day, at approximately 0600 and 1800 LST. The plots show data for 850 mb, which is approximately 1500 m above ground level (agl). The upper-air wind data are used here to obtain information about the regional-scale wind directions.

Figure 2-10a. Frequency of 850 mb Wind Speed and Wind Direction for Little Rock, Arkansas: 0600 CST 2005/2008





2002–2012

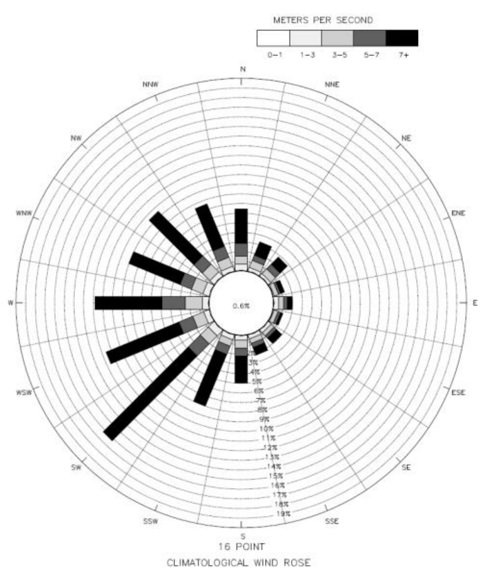
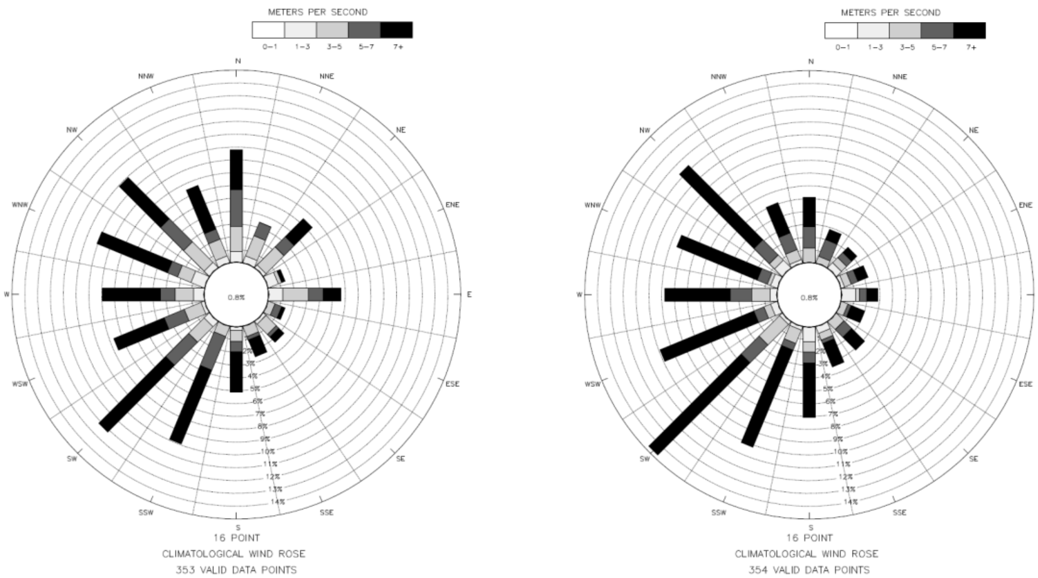
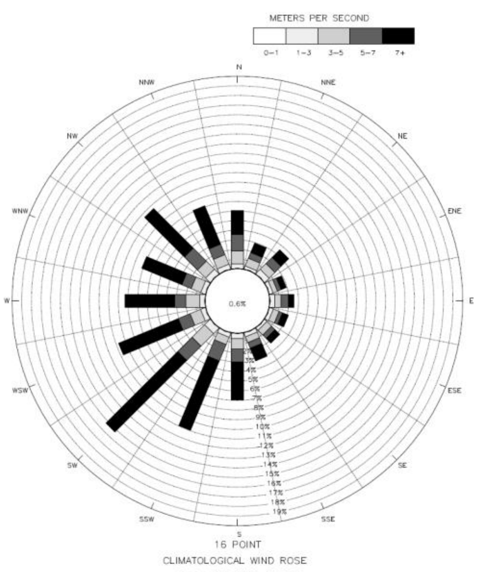


Figure 2-10b. Frequency of 850 mb Wind Speed and Wind Direction for Little Rock, Arkansas: 1800 CST 2005/2008



2002-2012



The upper-air wind directions for both 2005 and 2008 are characterized by a greater frequency of winds from the north and the east, compared to the multi-year period. However, the predominant wind directions (southwesterly to northwesterly) are well represented.

The air quality concentrations that characterize the two modeled years appear to span the range of concentrations measured during the eleven year period from 2002 through 2012. Key air quality metrics for ozone, $PM_{2.5}$, NO_2, and SO_2 for 2005, 2008 and the multi-year period are summarized and compared in Table 2-8. The summary focuses on Little Rock, using data from the Pike Avenue site. The reader is referred to Section 2.2 for information on other monitoring sites.

Table 2-8. Key Air Quality Metrics for the North Little Rock (Pike Ave) Monitoring Site for 2005, 2008 and 2002-2012

Metric	2005	2008	2002–2012 Min/Max/Average		
Ozone					
4th Highest 8-Hour Ozone Concentration (ppb)	86	67	67	86	76
Number of Days with Daily Maximum 8-Hour Ozone Concentrations > 75 ppb	16	0	0	16	4
$PM_{2.5}$					
Annual Average $PM_{2.5}$ Concentration ($\mu g/m^3$)	14.7	11.6	10.8	14.7	12.4
98th Percentile 24-Hour $PM_{2.5}$ Concentration ($\mu g/m^3$)	39.3	25.6	22.2	39.3	27.1
NO_2					
Annual Average NO_2 Concentration ($\mu g/m^3$)	22.6	16.9	16.9	28.2	21.7
98th Percentile 1-Hour NO_2 Concentration ($\mu g/m^3$)	101.5	75.2	75.2	116.6	94.6
SO_2					
99th Percentile 1-Hour SO_2 Concentration ($\mu g/m^3$)	21.0	36.0	21.0	52.4	31.4

The year 2005 includes the highest overall concentrations for ozone and $PM_{2.5}$, above average concentrations for NO_2, and the lowest overall concentrations for SO_2. The year 2008 includes the lowest overall concentrations for ozone and NO_2, below average (close to median value) concentrations for $PM_{2.5}$, and above average concentrations for SO_2. Together 2005 and 2008 appear to capture both best and worst case air quality conditions for Little Rock, especially for ozone and $PM_{2.5}$.

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3 Air Quality Modeling Methodology

Air quality modeling was used to identify areas with potential ozone, $PM_{2.5}$, SO_2, and NO_2 issues throughout the state, examine the expected changes in these pollutants between the base and future years, and identify areas within the state where additional air quality monitoring may be used to ensure NAAQS compliance. Key components of this modeling analysis included:

- Emission inventory preparation,
- Base-year air quality model application and evaluation (2005 and 2008)
- Future-year air quality model application and assessment (2015).

The primary tools that were used for this assessment include:

- Sparse-Matrix Operator Kernel Emissions (SMOKE) processing tool (version 3.1) for the preparation of model-ready emissions;
- Community Multiscale Air Quality (CMAQ) model (version 5.0) for quantifying the air quality changes for the different scenarios;
- Atmospheric Model Evaluation Tool (AMET) to evaluate the CMAQ modeling results; and
- Modeled Attainment Test Software (MATS) to assess future-year air quality.

These tools are widely used by EPA and others for conducting air quality analysis.

The air quality modeling included an assessment of "current" conditions for two recent historical periods (2005 and 2008). Air quality was then evaluated for the selected future year (2015) by applying the modeling systems using the historical meteorological inputs and estimated emissions for 2015.

The air quality modeling methodology is presented in the remainder of this section. The current- and future-year regional modeling analyses were conducted using emissions data available from EPA and the Arkansas DEQ. Detailed information on the emissions is provided in Section 4 of this document.

3.1 Overview of the CMAQ Modeling System

Version 5.0 of the CMAQ model was used for the statewide modeling analysis. The CMAQ model is a state-of-the-science, regional air quality modeling system that can be used to simulate the physical and chemical processes that govern the formation, transport, and deposition of gaseous and particulate species in the atmosphere (Byun and Ching 1999). The CMAQ tool was designed to improve the understanding of air quality issues (including the physical and chemical processes that influence air quality) and to support the development of effective emission control strategies on both the regional and local scales. The CMAQ model was designed as a "one-atmosphere" model. This concept refers to the ability of the model to dynamically simulate ozone, particulate matter, and other species (such as mercury) in a single simulation. In addition to addressing a variety of pollutants, CMAQ can be applied to a variety of regions (with varying geographical, land-use, and emissions characteristics) and for a range of space and time scales. The latest version of CMAQ includes state-of-the-science advection, dispersion and deposition algorithms, the latest version of the Carbon Bond (CB) chemical mechanism (CB05), and diagnostic tools for assessing source apportionment.

Numerous recent applications of the model, for both research and regulatory air quality planning purposes, have focused on the simulation of ozone and fine particulate matter ($PM_{2.5}$). The CMAQ model was used by EPA to support the development of the Clean Air Interstate Rule (CAIR) (EPA, 2005). It was also used by EPA to support the second prospective analysis of the costs and benefits of the Clean Air Act (CAA) (Douglas et al., 2008) and by ADEQ to support the re-establishment of an Economic Development Zone (EDZ) for Crittenden County (ICF, 2013).

The CMAQ model numerically simulates the physical processes that determine the magnitude, temporal variation, and spatial distribution of the concentrations of ozone and particulate species in the atmosphere and the amount, timing, and distribution of their deposition to the earth's surface. The simulation processes include advection, dispersion (or turbulent mixing), chemical transformation, cloud processes, and wet and dry deposition. The CMAQ science algorithms are described in detail by Byun and Ching (1999).

The CMAQ model requires several different types of input files. Gridded, hourly emission inventories characterize the release of anthropogenic, biogenic, and, in some cases, geogenic emissions from sources within the modeling domain. The emissions represent both low-level and elevated sources and a variety of source categories (including, for example, point, on-road mobile, non-road mobile, area, and biogenic). The amount and spatial and temporal distribution of each emitted pollutant or precursor species are key determinants to the resultant simulated air quality values.

The CMAQ model also requires hourly, gridded input fields of several meteorological parameters including wind, temperature, mixing ratio, pressure, solar radiation, fractional cloud cover, cloud depth, and precipitation. A full list of the meteorological input parameters is provided in Byun and Ching (1999). The meteorological input fields are typically prepared using a data-assimilating prognostic meteorological model, the output of which is processed for input to the CMAQ model using the Meteorology-Chemistry Interface Processor (MCIP). The prescribed meteorological conditions influence the transport, vertical mixing, and resulting distribution of the simulated pollutant concentrations. Certain of the meteorological parameters, such as mixing ratio, can also influence the simulated chemical reaction rates. Rainfall and near-surface meteorological characteristics govern the wet and dry deposition, respectively, of the simulated atmospheric constituents.

Initial and boundary condition (IC/BC) files provide information on pollutant concentrations throughout the domain for the first hour of the first day of the 10-day spin-up period for the simulation, and along the lateral boundaries of the domain for each hour of the simulation. Photolysis rates and other chemistry-related input files supply information needed by the gas-phase and particulate chemistry algorithms.

3.2 CMAQ Application Procedures for the Statewide Modeling Analysis

The CMAQ model was used in this study to examine future-year air quality throughout the State of Arkansas. The air quality modeling methodology is presented in this section.

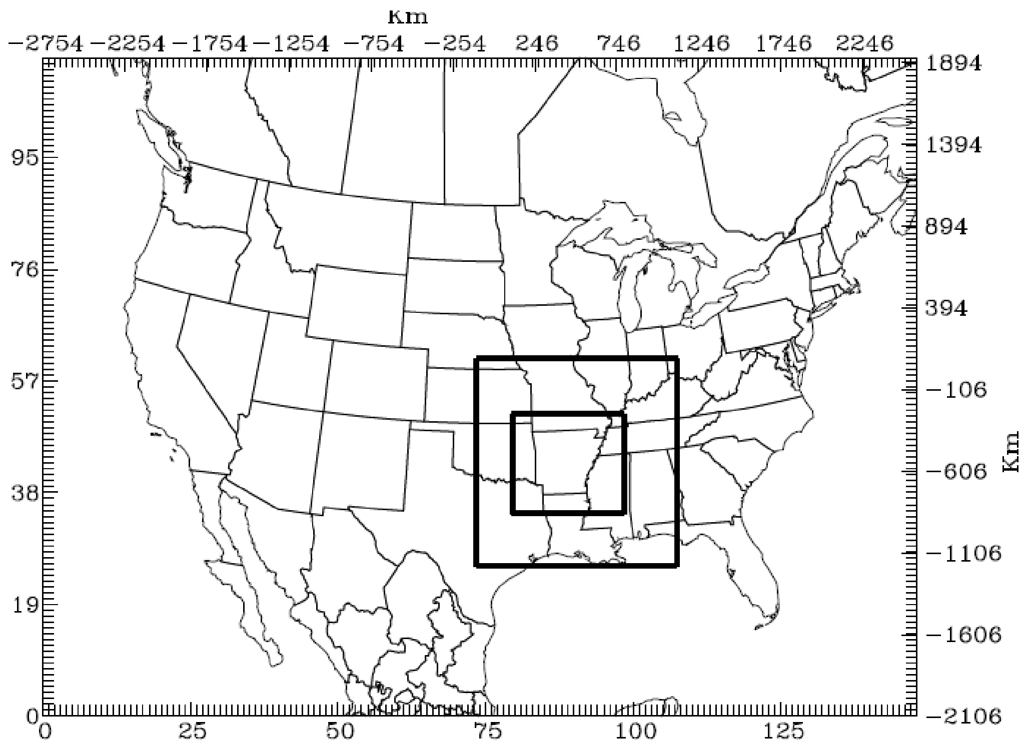
3.3 Modeling Domain

The modeling domain for application of the CMAQ model is presented in Figure 3-1and includes a 36-km resolution outer grid encompassing the continental U.S.; a 12-km resolution intermediate grid; and a 4-km resolution inner grid encompassing Arkansas.

The regional extent of the modeling domain is intended to provide realistic boundary conditions for the area of interest and thus avoid some of the uncertainty introduced in the modeling results through the incomplete and sometimes arbitrary specification of boundary conditions. The use of 4-km grid resolution is consistent with an urban-scale analysis.

The CMAQ domain is further defined by fourteen vertical layers.

Figure 3-1. CMAQ Modeling Domain for the Arkansas Statewide Criteria Pollutant Air Quality Modeling Analysis



3.4 Simulation Period

The two annual simulation periods are 2005 and 2008. These periods were selected due to the availability of emission data and gridded meteorological inputs from EPA.

In running the model, the simulation periods were divided into two parts covering January through June and July through December, respectively. Each part of each simulation also included an additional five start-up simulation days, which were intended to reduce the influence of uncertainties in the initial conditions on the simulation results.

3.5 Modeling Databases

As discussed in the following section, the input files for the application of the CMAQ model were prepared using data and modeling databases obtained from EPA.

3.6 Input Preparation

3.6.1 Emission Inputs

This section summarizes the data, methods, and procedures followed in preparing modeling emission inventories for use in the air quality modeling analysis. Five core regional-scale emission inventories were prepared as part of this study, including a 2005 base-year emission inventory, a 2008 base-year emission inventory, a 2008 current-year inventory, a 2015 future-year baseline emission inventory using 2005 meteorological conditions, and a 2015 future-year baseline inventory using 2008 meteorological conditions. The resulting emissions are presented and summarized in Section 4.

Emissions Data

The CMAQ model requires as input, hourly, gridded criteria pollutant emissions of both anthropogenic and biogenic sources that have been spatially allocated to the appropriate grid cells and chemically speciated for the applicable chemical mechanism used in the model. The modeling inventories were processed and prepared for CMAQ using EPA's Sparse-Matrix Operator Kernel Emissions (SMOKE) software (Version 3.1), with the inline emissions feature.

The 2005 and 2008 base-year emission inventories were prepared based on EPA's National Emission Inventory (NEI), specifically Version 4.2 of the 2005-based modeling platform (EPA, 2005) and EPA's 2008-based platform (2007v5) (EPA, 2012). The NEI includes emission data for the following sectors:

- Electric Generating Unit (EGU) point sources
- Other point sources (non-EGU point)
- Non-point (area) sources
- On-road motor vehicles
- Non-road motor vehicles
- Average-year wildfires and prescribed fires
- Fugitive dust
- Agriculture
- Locomotives and commercial marine except for Category 3 commercial marine vessels
- Category 3 commercial marine vessels
- Canadian, Mexican and offshore emissions for point, non-point and on-road sectors
- Biogenic sources

- Oceanic gaseous chlorine emissions

The SMOKE input files for 2005 and 2008 were obtained from the EPA ftp site.

The gridded surrogates used for spatially allocating anthropogenic emissions and land-use data for preparation of the biogenic emissions for the 12-km grid were extracted from the EPA platform database and the corresponding 12-km grid covering the eastern U.S. The gridded surrogates for the 4-km grid were prepared using the EPA SRGTOOLS and associated database. Land-use data for preparation of the biogenic emissions for the 4-km grid were prepared based on the BELD3 database.

The modeling inventories include the following pollutants: volatile organic compounds (VOC), oxides of nitrogen (NO_x), carbon monoxide (CO), sulfur dioxide (SO_2), fine particulates ($PM_{2.5}$), coarse particulates (PM_{10}), and ammonia (NH_3).

The future-year baseline emission inventories were prepared based on Version 4.2 of the 2005 modeling platform, projected to 2014 (EPA, 2005). The 2014 emissions were used to represent 2015 and no further projection of the emissions was done. The projected EGU emissions were not adjusted for the Cross-State Air Pollution Rule (CSAPR), as this rule was "vacated" in August 2012. Instead, the EGU emissions are consistent with the original Clean Air Interstate Rule (CAIR). In addition, emissions for a new EGU facility (American Electric Power (AEP) Service Corporation's John W. Turk, Jr. facility) located in southwestern Arkansas were added to the future-year baseline inventory. These data were provided by ADEQ (2012).

Emissions Inventory Preparation Methodology

As noted above, SMOKE version 3.1 was utilized to process the emissions and prepare CMAQ-ready inputs for the base-year (2005 and 2008) and 2015 future-year baseline using source sector files obtained from EPA and updated EGU emissions provided by ADEQ. Emission files were prepared for the 36-, 12- and 4-km resolution grids used in the modeling analysis, and included processing of all source sectors using various SMOKE programs and inputs, and review and quality assurance checks.

The general procedures followed in preparing the modeling inventories, using various programs included with SMOKE, were the following:

- Perform chemical speciation to transform input criteria pollutants into the CB-05 chemical mechanism species, as required by CMAQ.
- Perform temporal distribution to distribute the input annual/monthly emissions into hourly emissions.
- Perform spatial distribution of input emissions to the 36-, 12- and 4-km resolution modeling grids.
- Merge emissions from all source categories into the CMAQ model-ready files.

Quality Assurance Procedures

The emissions inventory processing quality assurance (QA) procedures included the preparation and examination of tabular emissions summaries and graphical display products.

Tabular summaries were used to examine emissions totals for various steps of the emissions processing. Summaries for input emissions are based on the input inventory data: monthly emissions for the on-road and non-road sectors, and annual emissions for other sectors for criteria pollutants. Summaries for the emissions are based on the SMOKE output reports which include daily emissions for each CB-05 species for each sector. The output daily emissions are summed over all days in the year and the CB-05 species are summed for the criteria pollutants. The emissions summaries were made for each scenario by state and sector, and comparisons were made between the input emissions and output emissions for each sector to assure consistency.

In addition to the tabular summaries, various graphical displays were prepared for one day of each month to examine the spatial distribution and temporal variation for each sector and the final merged emissions using a graphical plotting package.

3.6.2 Meteorological Inputs

The 36- and 12-km resolution meteorological input files for the 2005 and 2008 annual simulation periods were originally prepared by EPA using the Pennsylvania State University/National Center for Atmospheric Research (PSU/NCAR) Fifth Generation Mesoscale Model (MM5, version 3.7.4) (EPA, 2009). The model was applied for a 36-km resolution grid covering all of the lower 48 states and major portions of Canada and Mexico and for two 12-km resolution grids covering the eastern and western U.S. (EPA 2009). For the performance evaluation, temperature, wind speed, wind direction, and moisture data were obtained from NOAA's Meteorological Assimilation Data Ingest System (MADIS) and rainfall data were obtained from the National Weather Service's Climate Prediction Center.

The MM5 outputs were postprocessed by EPA for input to CMAQ using the MCIP program. The meteorological fields for the 12-km study domain were extracted from the larger 12-km domain for the eastern U.S. used by EPA. The 12-km meteorological inputs were also used as the basis for the 4-km meteorological fields. Interpolation and reanalysis methods were used to adapt the input files to the 4-km grid. The 12-km fields were interpolated to the 4-km grid. For most parameters, objective analysis (based on bi-linear interpolation) was used to combine the interpolated fields with available observations and thus adjust the 12-km fields to the 4-km grid. Certain parameters such as radiation, rainfall, and land-use-based quantities, which are not expected to exhibit smooth variations in space, were not interpolated and the values used for the 4-km sub-cells were the same as for the encompassing 12-km grid cell.

3.6.3 Other Inputs

All other input files for the application of the CMAQ model were obtained from EPA.

3.7 Model Performance Evaluation

An integral component of all modeling studies is the evaluation of model performance for the base-year (or base-case) simulation. For this study, the CMAQ modeling results were compared with observed data, using a variety of graphical and statistical analysis products.

3.7.1 Air Quality Data

Air quality data for the evaluation of model performance were obtained from EPA's Air Quality System (AQS) database. Ozone, PM_{10}, $PM_{2.5}$, NO_2, SO_2 and CO data for all monitoring sites within the 12- and 4-km grids were obtained and processed for use by AMET. The model performance statistics were calculated using a variety of hourly concentrations, daily maximum 1-hour concentrations, daily maximum 8-hour average concentrations, and 24-hour average concentrations. For consistency with the NAAQS, the evaluation focuses on daily maximum 1-hour concentration for NO_2 and SO_2, daily maximum 8-hour average concentration for ozone, and 24-hour average concentration for $PM_{2.5}$.

3.7.2 Model Performance Evaluation Methodology

The overall objective of a model performance evaluation is to establish that the modeling system can be used reliably to predict the effects of changes in emissions on future-year air quality. This was primarily accomplished by comparing the modeling results with observed data, using a variety of graphical and statistical analysis products. EPA guidance (EPA, 2007) stresses the need to evaluate the model relative to how it will be used in the air quality assessment; that is in simulating the response to changes in emissions. To examine the response of the model to differences in the inputs, the ability of the model to simulate month-to-month differences in concentration levels and patterns, the ability of the model to simulate the concentrations (or at least the frequency distribution of concentrations) associated with different types of meteorological conditions; and the ability of the model to perform consistently and reasonably across a range of concentrations were also examined.

The evaluation focused on the 12- and 4-km resolution grids. Analysis of results for the 12-km resolution grid emphasized representation of the regional-scale concentration levels and patterns, as well as month-to-month variations in regional-scale ozone air quality. A more detailed analysis of the results was performed for the innermost, high-resolution (4-km) grid. This included the analysis of the magnitude and timing of site-specific concentrations and a statistical evaluation. Statistical model performance evaluation focused on ozone, $PM_{2.5}$, NO_2 and SO_2 and statistics were calculated using hourly concentrations, daily maximum 1-hour concentrations, daily maximum 8-hour average concentrations, and 24-hour average concentrations, as appropriate. For extraction of the model output and matching with the station values, concentration information was taken from the grid cell in which the monitoring site is located.

Graphical Analysis to Support Model Performance Evaluation

AMET generates a wide variety of graphical analysis products to facilitate the evaluation of CMAQ model performance. Plots and graphics were used to assess the reasonableness of the results. The graphical analysis included the following:

- Spatial plots of the simulated values were used to qualitatively assess the ability of the model to provide reasonable concentration patterns, consistent with the emissions and seasonal and day-to-day variations in meteorology.
- Bias and error plots were used to graphically display statistical measures of model performance and to identify any spatial patterns or trends in the model performance statistics.

- Concentration time-series plots comparing simulated and observed values at selected monitoring sites were used to determine whether the timing and magnitude of the simulated values match the observations.
- Scatter plots were used to graphically compare the simulated and observed concentrations.

Statistical Analysis to Support Model Performance Evaluation

AMET also calculates a variety of statistical measures to facilitate the evaluation of CMAQ model performance. Table 3-1 summarizes key statistical measures that were used to provide insight into model performance.

Table 3-1. Statistical Measures Used for the CMAQ Model Performance Evaluation for the Statewide Modeling Analysis

Metric	Definition
# of data pairs	The number of observation/simulation data pairs
Mean observation value	The average observed concentration
Mean simulation value	The average simulated concentration
Mean bias	$\left(\frac{1}{N}\right)\sum_{l=1}^{N}(S_l - O_l)$ where N is the number of data pairs, and S_l and O_l are the simulated and observed values at site l, respectively, over a given time interval.
Normalized bias	$\left(\frac{1}{N}\right)\sum_{l=1}^{N}(S_l - O_l)/O_l \cdot 100\%$
Normalized mean bias	$\sum_{l=1}^{N}(S_l - O_l)/\sum_{l=1}^{N}O_l \cdot 100\%$
Fractional bias	$\left(\frac{1}{N}\right)\sum_{l=1}^{N}(S_l - O_l)/0.5(S_l + O_l) \cdot 100\%$
Mean error	$\left(\frac{1}{N}\right)\sum_{l=1}^{N}\lvert S_l - O_l\rvert$
Normalized error	$\left(\frac{1}{N}\right)\sum_{l=1}^{N}\lvert S_l - O_l\rvert/O_l \cdot 100\%$
Normalized mean error	$\sum_{l=1}^{N}\lvert S_l - O_l\rvert \Big/ \sum_{l=1}^{N}O_l \cdot 100\%$
Fractional error	$\left(\frac{1}{N}\right)\sum_{l=1}^{N}\lvert S_l - O_l\rvert/0.5(S_l + O_l) \cdot 100\%$
Correlation	$\left(N\left(\sum SO\right)-\left(\sum S\right)\left(\sum O\right)\right)\Big/\sqrt{\left(N\sum S^2-\left(\sum S\right)^2\right)\left(N\sum O^2-\left(\sum O\right)^2\right)}$
Index of agreement	A measure of how well the model represents the pattern of perturbation about the mean value; ranges from 0 to 1.

In calculating the statistical measures, AMET pairs the CMAQ model output with the observed data for the appropriate locations and time intervals.

Model Performance Criteria

In keeping with current EPA guidance on model performance evaluation for ozone, a "weight-of-evidence" approach was employed to determine whether model performance is good enough for use in future-year modeling and air quality assessment. In other words, an integrated assessment of the above information was used to document and qualitatively and quantitatively assess whether an acceptable base-case simulation has been achieved.

To the extent practicable, the statistical measures for certain of the pollutants were compared with model performance goals and criteria used for prior studies, as suggested in EPA guidance (EPA, 2007). For ozone, these include recommended ranges for the normalized bias and normalized error from prior (ca. 1990) EPA guidance (these are still widely used for urban- and regional-scale model performance evaluation).

3.7.3 Criteria Pollutant Assessment

The key objectives of this modeling study were to identify potential ozone, $PM_{2.5}$, SO_2, and NO_2 issues throughout the State of Arkansas, examine the expected changes in these pollutants between the base and future years, and identify areas within the state where additional air quality monitoring may be used to ensure compliance with existing NAAQS.

This was accomplished by first examining the changes in simulated concentration between the future year and base or current year in order to examine the magnitude and extent of the simulated decreases in concentration and to identify any areas with increases in concentration. The difference plots reference the form of the standard and averaging period(s) (e.g., 1-hour NO_2 and SO_2, 8-hour average ozone, and 24-hour and annual average $PM_{2.5}$) appropriate for each pollutant. Tabular summaries of the concentrations and differences for monitoring sites and any grid locations with an increase in concentration of any of the pollutants between the base and future years were also prepared.

Note that, for consistency with the 2015 emissions, the 2008 simulation was first rerun with "current-year" emissions, in which the anthropogenic emissions were consistent with 2005 and 2015 in terms of methodology, but the biogenic emissions were consistent with the 2008 meteorological conditions. The "current year" modeling results were used as the basis for the criteria pollutant assessment for 2008.

Next, the procedures outlined in EPA guidance on the use of models for attainment demonstration purposes (EPA, 2007) were applied. The guidance specifically addresses ozone and $PM_{2.5}$, but the same procedures were applied for all of the criteria pollutants considered in the analysis. This methodology is based on relative (rather than absolute) use of the modeling results, and relies on the ability of the air quality modeling system to simulate the change in concentration due to changes in emissions, but not necessarily its ability to simulate exact values for future-year concentrations. For each air quality metric, a future-year estimated design value (FDV) is calculated using the "current-year" design value and the future-year and base-year modeling results.

The current-year design value for each pollutant and monitoring site within Arkansas was calculated in accordance with the form of the standard for that pollutant. For this analysis (which is not an attainment demonstration) the current-year design values were based on data for 2005 through 2008. This was done to represent the emissions base year (2005), the meteorological base years (2005 and 2008), and to allow a direct comparison of the projected future-year design values for the two simulation pairs. Calculation of the current year design values differs among the pollutants and the procedures outlined in the guidance document were followed. Additional detail for each pollutant is provided in Section 6.

The current-year design value for each site was then multiplied by a relative response factor (RRF), which is defined as ratio of the future-year to base-year simulated concentration in the vicinity of the monitoring site. The resulting value is referred to as the future-year design value or FDV. The methodology has additional layers of complexity for multi-species pollutants such as $PM_{2.5}$; these are carefully outlined in the guidance document and were accounted for this in this analysis. The resulting values were compared with the NAAQS. The analysis was conducted for both base-year/future-year simulation pairs. For ozone and $PM_{2.5}$, the MATS software was used to estimate the FDVs for 2015. For NO_2 and SO_2, which are not accommodated in MATS, the same procedures were applied using custom software. Tabular summaries comparing the DVs and FDVs and assessing compliance relative to the NAAQS were prepared.

This analysis also examined future-year attainment for locations without monitoring sites. The current-year design value for the unmonitored area was set equal to the value for the nearest monitoring site or to an interpolated value based on several neighboring sites. Additional detail for each site and pollutant is provided in Section 6.

4 Emission Inventories

The modeling emission inventories for the base-year (2005 and 2008) and future-year baseline (2015) are summarized in this section.

Tables 4-1 through 4-4 summarize the base-year (2005 and 2008) and future-year (2015) emissions used for the CMAQ modeling. These tables summarize anthropogenic emissions by source sector and pollutant for the 36-km grid, the 12-km grid, the 4-km grid, and the State of Arkansas. Emissions totals are provided for the following species: VOC, NO_x, SO_2, CO, and $PM_{2.5}$. The units are thousand tons per year (thousand tpy).

Table 4-1. Base-Year (2005 and 2008) and Future-Year Baseline (2015) Emissions for the Arkansas Statewide Criteria Pollutant Modeling Analysis: 36-km Grid

Source Sector	2005 Base Year				
	VOC (thousand tpy)	NO_x (thousand tpy)	SO_2 (thousand tpy)	CO (thousand tpy)	$PM_{2.5}$ (thousand tpy)
EGU Point	45	3,726	10,372	603	496
Non-EGU Point	1,292	2,218	2,077	3,209	431
Non-Point (Area)	8,959	1,885	1,248	16,054	2,793
Non-Road	3,497	3,881	420	19,979	253
On-Road Mobile	6,144	8,841	172	43,350	297
Total	19,938	20,552	14,289	83,195	4,270

Source Sector	2008 Base Year				
	VOC (thousand tpy)	NO_x (thousand tpy)	SO_2 (thousand tpy)	CO (thousand tpy)	$PM_{2.5}$ (thousand tpy)
EGU Point	42	3,363	9,152	705	330
Non-EGU Point	1,048	2,078	1,589	2,940	410
Non-Point (Area)	8,638	1,453	524	20,310	2,659
Non-Road	2,494	3,349	256	18,046	232
On-Road Mobile	3,202	7,430	39	37,278	283
Total	15,424	17,672	11,559	79,279	3,915

Source Sector	2015 Future-Year Baseline				
	VOC (thousand tpy)	NO_x (thousand tpy)	SO_2 (thousand tpy)	CO (thousand tpy)	$PM_{2.5}$ (thousand tpy)
EGU Point	45	2,089	7,155	717	423
Non-EGU Point	1,152	2,014	1,639	3,025	409
Non-Point (Area)	8,506	1,818	1,157	15,637	2,745
Non-Road	2,325	2,896	74	14,340	175
On-Road Mobile	2,283	4,808	26	28,133	166
Total	14,311	13,625	10,051	61,852	3,917

Table 4-2. Base-Year (2005 and 2008) and Future-Year Baseline (2015) Emissions for the Arkansas Statewide Criteria Pollutant Modeling Analysis: 12-km Grid

Source Sector	2005 Base Year				
	VOC (thousand tpy)	NO_x (thousand tpy)	SO_2 (thousand tpy)	CO (thousand tpy)	$PM_{2.5}$ (thousand tpy)
EGU Point	18	1,254	3,809	327	158
Non-EGU Point	506	736	717	926	162
Non-Point (Area)	1,919	435	355	3,465	729
Non-Road	694	1,149	107	4,245	65
On-Road Mobile	1,364	2,214	47	9,881	73
Total	4,500	5,788	5,035	18,844	1,186

Source Sector	2008 Base Year				
	VOC (thousand tpy)	NO_x (thousand tpy)	SO_2 (thousand tpy)	CO (thousand tpy)	$PM_{2.5}$ (thousand tpy)
EGU Point	18	1,185	3,422	374	89
Non-EGU Point	390	658	544	781	151
Non-Point (Area)	2,336	408	111	5,171	736
Non-Road	665	867	61	3,917	54
On-Road Mobile	770	1,901	11	8,895	68
Total	4,179	5,019	4,149	19,137	1,098

Source Sector	2015 Future-Year Baseline				
	VOC (thousand tpy)	NO_x (thousand tpy)	SO_2 (thousand tpy)	CO (thousand tpy)	$PM_{2.5}$ (thousand tpy)
EGU Point	17	711	3,387	225	171
Non-EGU Point	458	673	563	885	145
Non-Point (Area)	1,567	367	273	3,009	672
Non-Road	451	863	16	2,881	44
On-Road Mobile	504	1,150	6	6,037	36
Total	2,997	3,764	4,245	13,036	1,078

Table 4-3. Base-Year (2005 and 2008) and Future-Year Baseline (2015) Emissions for the Arkansas Statewide Criteria Pollutant Modeling Analysis: 4-km Grid

Source Sector	2005 Base Year				
	VOC (thousand tpy)	NO_x (thousand tpy)	SO_2 (thousand tpy)	CO (thousand tpy)	$PM_{2.5}$ (thousand tpy)
EGU Point	3	241	499	185	15
Non-EGU Point	116	137	73	196	33
Non-Point (Area)	402	94	61	818	169
Non-Road	156	212	17	792	12
On-Road Mobile	247	403	8	1,845	13
Total	924	1,087	658	3,837	242

Source Sector	2008 Base Year				
	VOC (thousand tpy)	NO_x (thousand tpy)	SO_2 (thousand tpy)	CO (thousand tpy)	$PM_{2.5}$ (thousand tpy)
EGU Point	4	220	471	172	11
Non-EGU Point	80	133	52	146	21
Non-Point (Area)	482	81	25	1,530	197
Non-Road	152	154	7	733	10
On-Road Mobile	148	361	2	1,742	12
Total	866	949	557	4,323	252

Source Sector	2015 Future-Year Baseline				
	VOC (thousand tpy)	NO_x (thousand tpy)	SO_2 (thousand tpy)	CO (thousand tpy)	$PM_{2.5}$ (thousand tpy)
EGU Point	4	169	482	56	17
Non-EGU Point	100	122	67	188	32
Non-Point (Area)	379	90	60	793	166
Non-Road	103	158	1	555	8
On-Road Mobile	92	217	1	1,110	6
Total	679	756	610	2,703	230

Table 4-4. Base-Year (2005 and 2008) and Future-Year Baseline (2015) Emissions for the Arkansas Statewide Criteria Pollutant Modeling Analysis: State of Arkansas

Source Sector	2005 Base Year				
	VOC (thousand tpy)	NO_x (thousand tpy)	SO_2 (thousand tpy)	CO (thousand tpy)	$PM_{2.5}$ (thousand tpy)
EGU Point	0	35	66	4	2
Non-EGU Point	35	36	13	65	11
Non-Point (Area)	125	24	28	298	45
Non-Road	37	63	6	227	4
On-Road Mobile	44	106	2	510	3
Total	242	265	115	1,105	65

Source Sector	2008 Base Year				
	VOC (thousand tpy)	NO_x (thousand tpy)	SO_2 (thousand tpy)	CO (thousand tpy)	$PM_{2.5}$ (thousand tpy)
EGU Point	1	38	72	4	1
Non-EGU Point	27	37	14	40	6
Non-Point (Area)	153	21	5	619	75
Non-Road	35	49	2	208	3
On-Road Mobile	47	94	1	521	3
Total	264	240	95	1,392	89

Source Sector	2015 Future-Year Baseline				
	VOC (thousand tpy)	NO_x (thousand tpy)	SO_2 (thousand tpy)	CO (thousand tpy)	$PM_{2.5}$ (thousand tpy)
EGU Point	1	38	102	13	4
Non-EGU Point	32	32	12	63	11
Non-Point (Area)	120	23	27	296	45
Non-Road	26	45	0	179	3
On-Road Mobile	24	57	0	331	2
Total	202	195	142	882	63

Total base-year (2005 and 2008) and future-year baseline anthropogenic emissions for the 4-km grid and State of Arkansas, excluding CO, are graphically displayed and compared in Figure 4-1 and Figure 4-2, respectively.

Figure 4-1. Base-Year (2005 and 2008) and Future-Year Baseline (2015) Emissions Totals for the Arkansas Statewide Criteria Pollutant Modeling Analysis: 4-km Grid

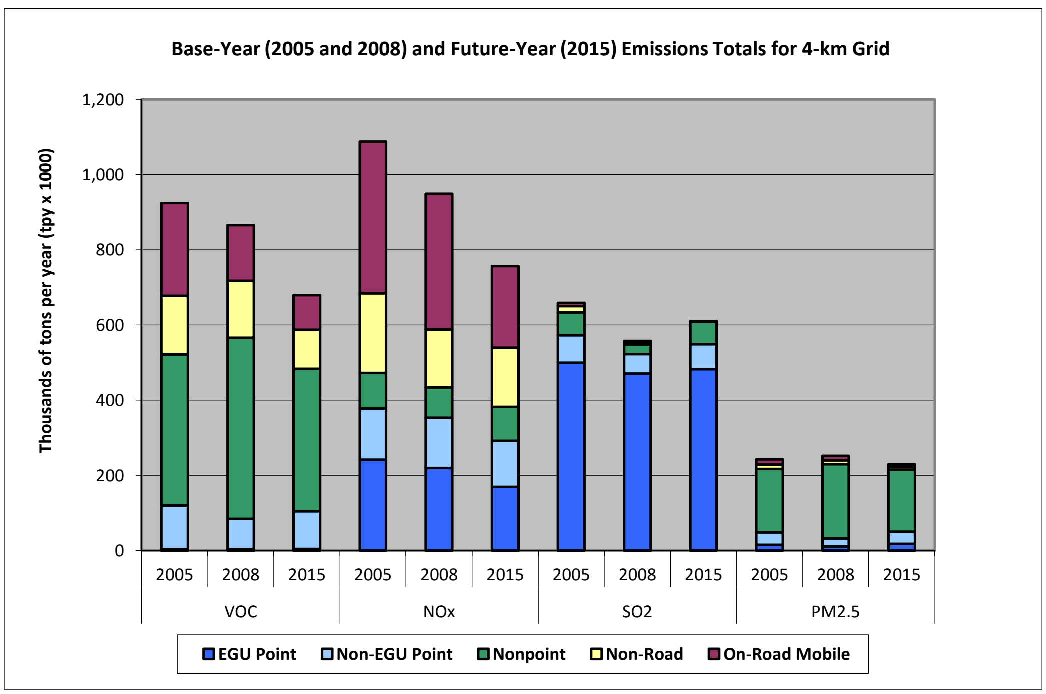
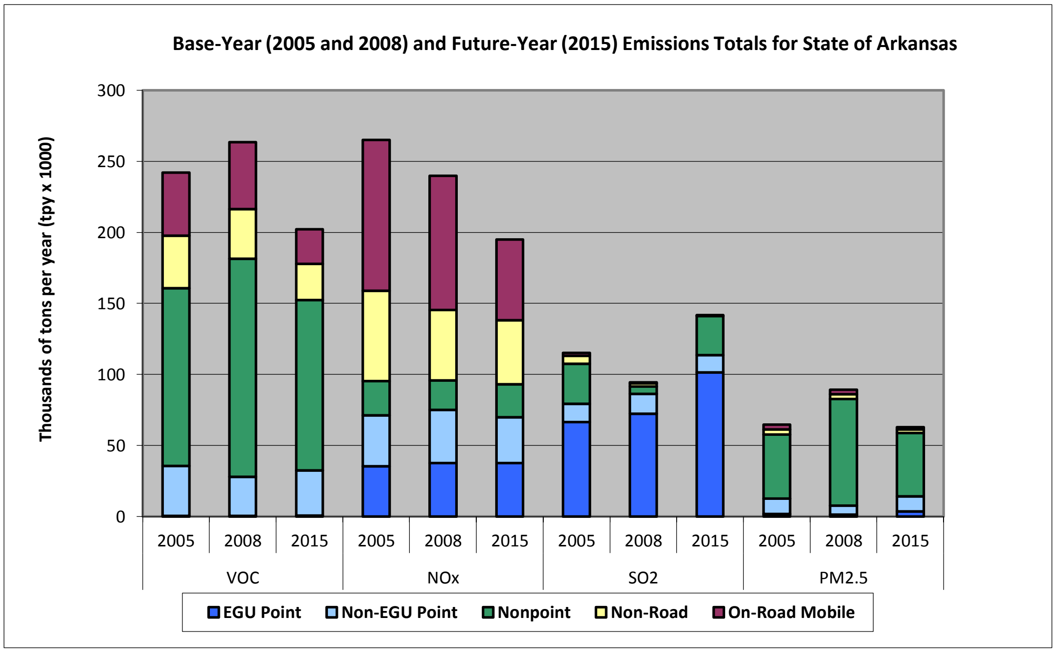


Figure 4-2. Base-Year (2005 and 2008) and Future-Year Baseline (2015) Emissions Totals for the Arkansas Statewide Criteria Pollutant Modeling Analysis: State of Arkansas



For the 4-km grid, overall anthropogenic VOC emissions are 27 percent lower, and both NO_x and CO emissions are 30 percent lower for 2015 compared to 2005. These changes reflect expected future emission reductions due to on-road mobile fleet turnover and the use of cleaner fuels; the introduction and use of cleaner non-road engines, fuel, and other equipment; and the mandated reductions in EGU emissions. For SO_2 in the 4-km grid, the emissions 2015 emissions are slightly lower than the 2005 emissions, but for the State of Arkansas, SO_2 emissions are higher in 2015 compared to 2005, mainly due to large increases in emissions from EGU's. The 2008 reflect some decreases compared to 2005, but also some increases. Note that these are not directly comparable, due to differences in fire emissions (this mostly affects primary $PM_{2.5}$) and other emissions that are affected by meteorology. There are also some methodological changes in the way EPA estimated the emissions between 2005 and 2008. As discussed in Section 6, the 2008 emissions were used for the base-year model performance for that period, but "current-year" emissions, consistent with 2005, were used for the future-year projections.

Table 4-5 presents a summary of EGU emissions for 2005 and 2015 for State of Arkansas sources. The emissions for the large power plants reflect expected growth in electricity demand as well as controls imposed by the CAIR legislation. For example, there are a few new sources that have come on line since 2005 and there are a number of small "generic units" in 2015 that have been added to the Arkansas inventory, reflecting expected future demands in electricity throughout the state. The NO_x emissions for most of the existing sources increase slightly, but there is a decrease in emissions at the Entergy White Bluff plant, likely reflecting CAIR controls. Because Arkansas is identified as one of the states that CAIR imposes NO_x controls only on, to reduce ozone concentrations, no controls are imposed on SO_2 emissions, and there is a significant increase in SO_2 emissions estimated for 2015 for the larger EGU's.

Table 4-5. Base-Year (2005) and Future-Year Baseline (2015) EGU Emissions for the Arkansas Statewide Criteria Pollutant Modeling Analysis: State of Arkansas

County	Facility Name	2005 Base Case				
		VOC (tpy)	NO_x (tpy)	SO_2 (tpy)	CO (tpy)	$PM_{2.5}$ (tpy)
Benton	SWEPCO-Flint Creek Power Plant	63	4,628	8,228	529	253
Craighead	City Water Light Plant City of Jonesboro	7	27	21	11	5
Franklin	Thomas B Fitzhugh Generating Station	8	147	185	48	3
Hempstead	CTI-Arkansas Electric Cooperative	1	5	0	0	0
Hot Spring	KGen-Hot Spring LLC	1	34	1	47	0
Hot Spring	Lake Catherine	8	204	1	29	0
Independence	Entergy Ark-Independence	179	13,174	22,367	1,487	695
Jefferson	Entergy Ark-White Bluff	178	16,263	34,890	1,481	682
Jefferson	Pine Bluff Entergy Center	3	250	4	21	30
Lafayette	Entergy Ark-Couch	3	112	0	40	0
Ouachita	John L McClellan Generating Station	3	212	461	12	1
Phillips	Entergy Ark-Ritchie	0	1	0	1	0
Pulaski	Entergy Ark-Lynch	0	0	0	0	0
Pulaski	Entergy Ark-Mabelvale	0	0	0	0	0
Union	Union Power Station-El Dorado	21	211	6	427	1
Woodruff	Carl Bailey	5	138	220	40	18
Total		**480**	**35,408**	**66,385**	**4,173**	**1,688**

County	Facility Name	2015 Future-Year Baseline				
		VOC (tpy)	NO_x (tpy)	SO_2 (tpy)	CO (tpy)	$PM_{2.5}$ (tpy)
Arkansas	STEC-S LLC	3	96	28	119	4
Benton	Generic Unit	0	1	0	4	0
Benton	SWEPCO-Flint Creek Power Plant	72	5,446	16,287	599	422
Bradley	Potlatch Southern Wood Products	5	138	40	171	6
Clay	Generic Unit	0	1	0	5	0
Clay	Municipal Light	0	5	0	0	0
Craighead	City Water Light Plant City of Jonesboro	2	92	0	70	0
Franklin	Thomas B Fitzhugh Generating Station	2	138	0	99	0
Greene	Paragould Reciprocating	0	37	0	1	0
Greene	Paragould Turbine	0	0	0	0	0
Hempstead	CTI-Arkansas Electric Cooperative	0	9	0	15	0
Hempstead	John W. Turk Jr.	23	1,334	2,103	3,950	615
Hot Spring	Hot Spring Power Project	1	6	0	42	0
Hot Spring	KGen-Hot Spring LLC	4	19	0	144	0
Independence	Entergy Ark-Independence	222	14,189	32,958	2,609	1,163
Jefferson	Entergy Ark-White Bluff	206	14,090	48,351	2,420	1,067
Jefferson	Pine Bluff Entergy Center	8	172	0	303	1
Mississippi	Dell Power Station	3	56	0	128	0
Mississippi	Plum Point Energy	76	1,091	1,746	636	256
Phillips	Entergy Ark-Ritchie	0	2	0	0	0
Pulaski	Wrightsville Power Facility	9	306	0	349	1
Union	Union Power Station-El Dorado	26	450	0	1,026	2
Washington	Harry D Mattison Power Plant	0	3	0	6	0
Total		**662**	**37,681**	**101,513**	**12,695**	**3,537**

As noted earlier, a key component of the emission processing is the spatial allocation of the emissions to each grid cell or point-source location in the modeling domain. To illustrate the spatial distribution of emissions throughout the modeling domain, spatial plots of low-level anthropogenic VOC and NO_x emissions and biogenic VOC emissions for the 4-km grid for 15 July (representing a typical summer day) are displayed in Figure 4-3 through Figure 4-5. The anthropogenic emissions are for the 2015 future-year baseline. The spatial distribution of emissions for the base years (not shown) is similar to that for the future-year baseline.

The anthropogenic VOC emissions are associated mainly with population centers scattered throughout the domain, with the highest emissions occurring in the Memphis, Little Rock and Jackson areas. The

NO_x emissions are similarly associated with population centers, but reflect emissions associated with the various transportation modes and corridors that are running through the area including the Interstate highways, state highways, railways, and waterways. The biogenic VOC emissions are associated with the various types of vegetation growing in the region including hardwood and softwood forests and agricultural crops located in eastern Arkansas and along the Mississippi River delta.

Figure 4-3. Spatial Distribution of Future-Year Baseline (2015) Low-Level Anthropogenic Emissions for the 4-km Modeling Grid for the Arkansas Statewide Criteria Pollutant Modeling Analysis: VOC

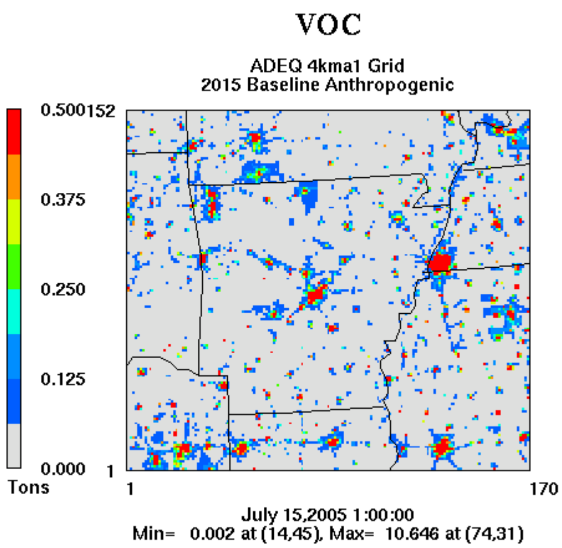


Figure 4-4. Spatial Distribution of Future-Year Baseline (2015) Low-Level Anthropogenic Emissions for the 4-km Modeling Grid for the Arkansas Statewide Criteria Pollutant Modeling Analysis: NO_x

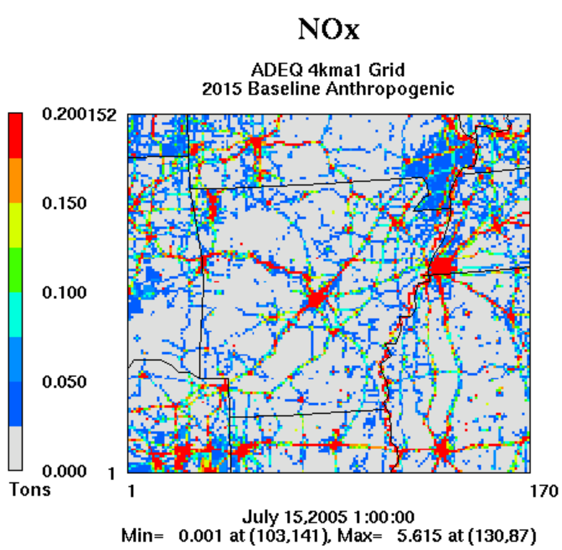
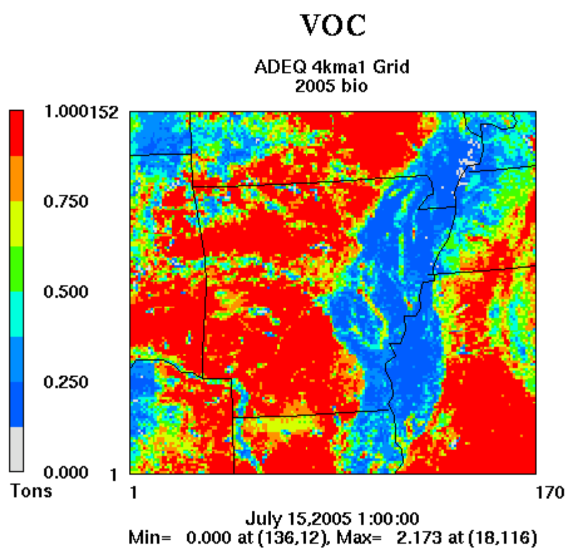


Figure 4-5. Spatial Distribution of Biogenic Emissions for the 4-km Modeling Grid for the Arkansas Statewide Criteria Pollutant Modeling Analysis: VOC



5 Base-Year Modeling Results

The base-year modeling effort included the application of CMAQ for the 2005 and 2008 annual simulation periods and the evaluation of model performance.

5.1 2005 Simulation Period

CMAQ model performance for the base-year simulation for 2005 is summarized in the remainder of this section.

5.1.1 Summary of Model Performance for Ozone

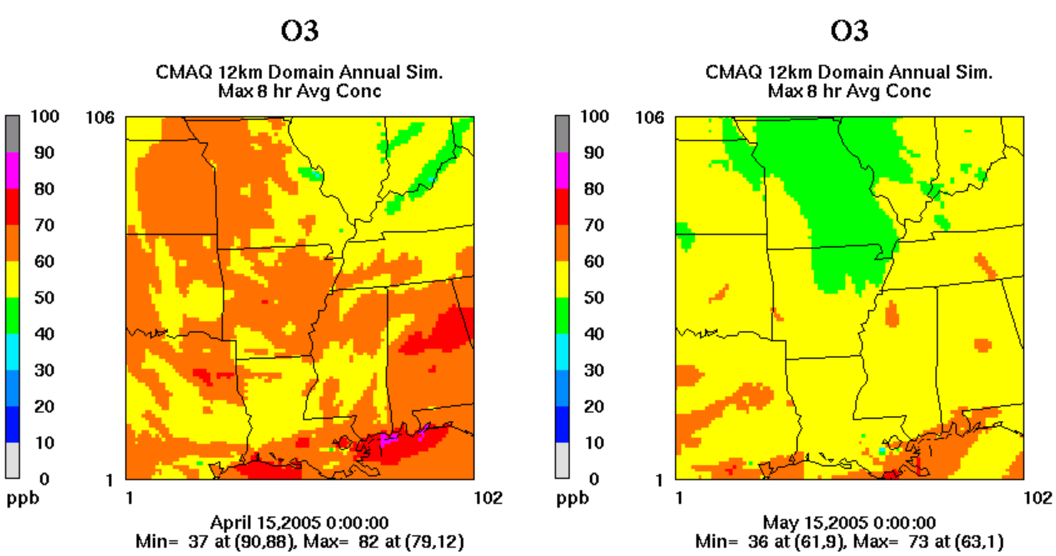
CMAQ model performance for ozone focused on the typical ozone season months of April through October and is summarized in the remainder of this section.

12-km Grid

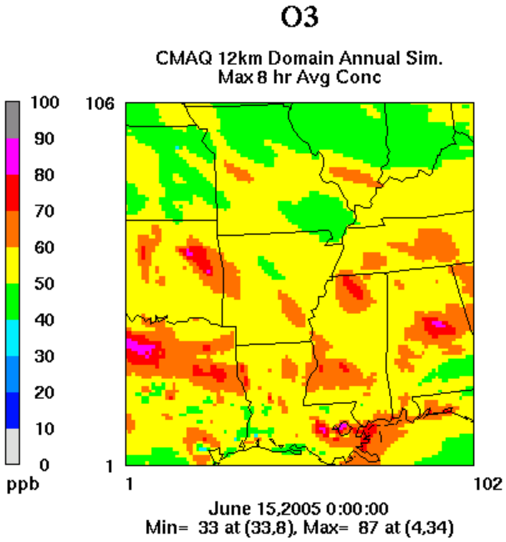
Spatial Concentration Patterns

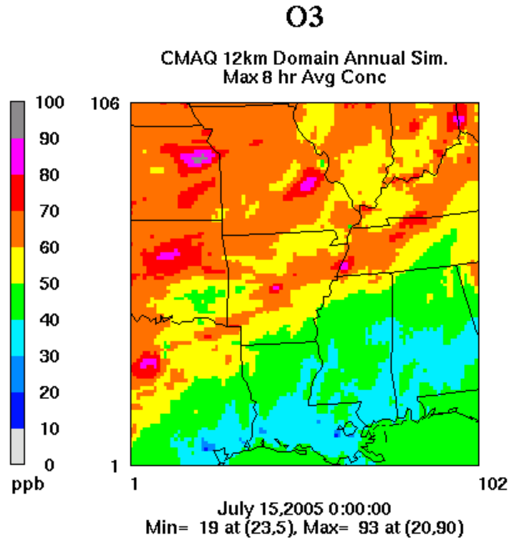
Spatial plots of the simulated ozone concentration patterns for the 12-km grid for selected days throughout the simulation period were plotted and examined. Figure 5-1 illustrates the simulated ozone concentration patterns for the 15th of each month (April – October). Consistent with the NAAQS for ozone, daily maximum 8-hour average ozone concentration is displayed. The units are parts per billion (ppb).

Figure 5-1. Simulated Daily Maximum 8-Hour Ozone Concentration (ppb) for Selected Days for the CMAQ 12-km Grid
April 15/May 15

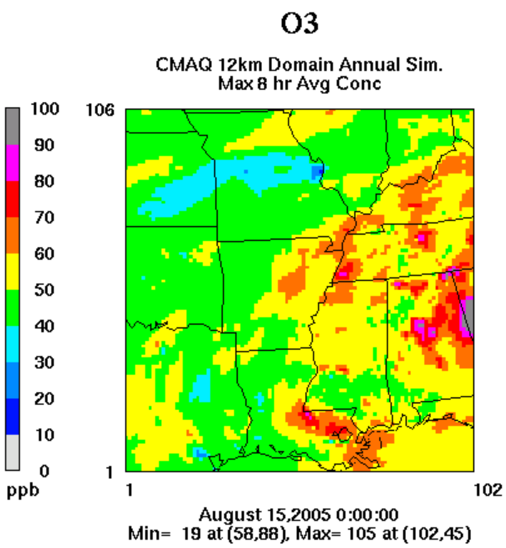


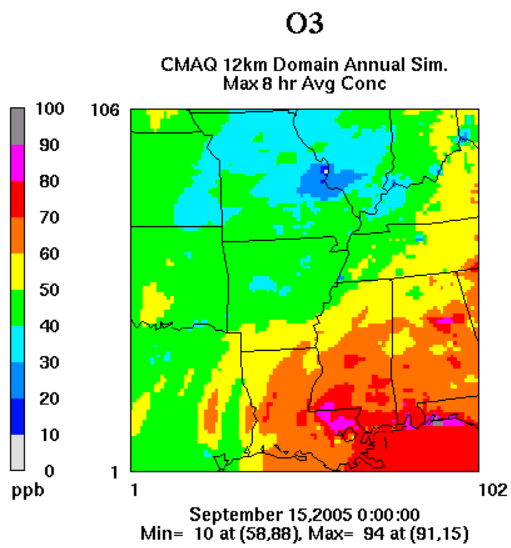
June 15/July 15



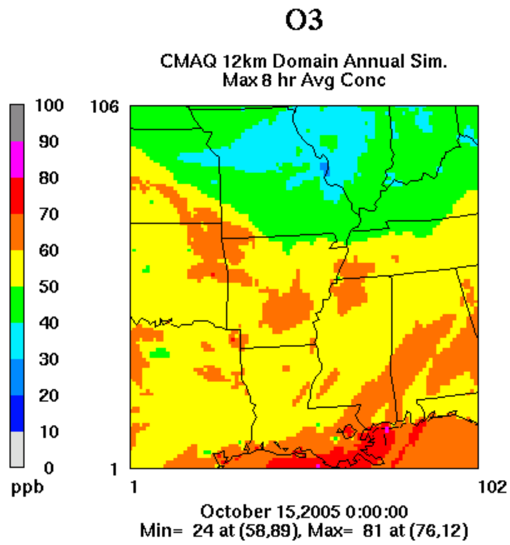


August 15/September 15





October 15

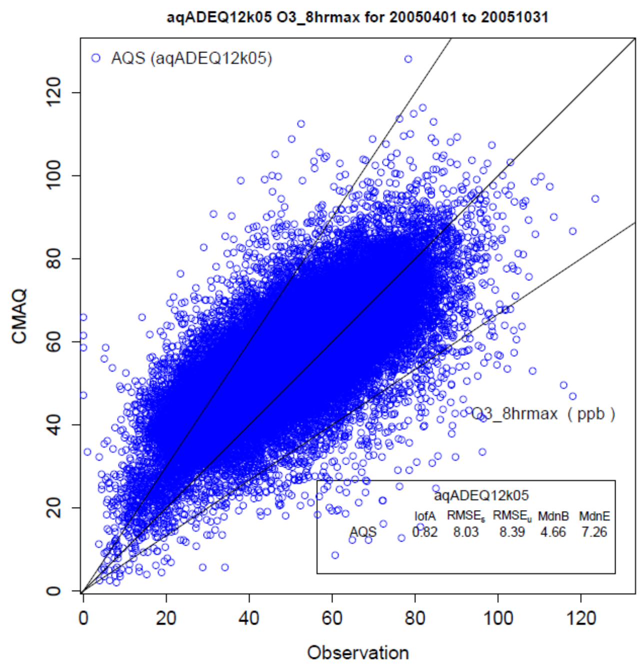


The plots depict a wide range of ozone concentration patterns for the selected days and illustrate the regional nature of ozone. Among the selected days, the simulated 8-hour average ozone concentrations are highest over Arkansas for the middle days of April, July, and October, exceeding 80 ppb on July 15. Maximum 8-hour average concentrations for the 12-km grid range from 73 to 105 ppb for the selected days.

Comparison of Simulated and Observed Concentrations

A scatter plot comparing simulated and observed daily maximum 8-hour ozone concentrations for the 12-km grid for April through October is presented in Figure 5-2. The scatter plot provides a visual representation of how well the simulated values match the observations, and can reveal biases toward over- or underestimation of the observed values. Also included on the scatter plot is some statistical information further summarizing model performance. Note that these statistical measures are calculated using the 8-hour average ozone concentrations. The solid lines on the plot are for visual reference and are drawn with slopes of 1:1 (center), 1.5:1 (upper), and 1:1.5 (lower).

Figure 5-2. Comparison of Simulated and Observed Daily Maximum 8-Hour Average Ozone Concentration (ppb) for the 12-km Grid (April through October)



There is a general tendency for CMAQ to overestimate the 8-hour average ozone concentrations, especially for observed values within the range of 20 to 60 ppb. However, the higher concentrations are well simulated and there is good correlation overall as indicated by an index of agreement of 0.82.

Statistical Measures of Model Performance

Summary metrics and statistical measures calculated using hourly ozone concentrations for the 12-km grid are presented in Table 5-1. The recommended ranges for the normalized bias and normalized error shown in this table are no longer a part of current EPA guidance but are still widely used for urban- and regional-scale model performance evaluations (EPA, 2007). A lower bound of 40 ppb was used in calculating the normalized bias and error statistics.

Table 5-1. Summary Model Performance Statistics for Ozone for the 12-km Modeling Grid

Metric	Apr	May	Jun	Jul	Aug	Sep	Oct	Apr–Oct	Goal
Number of Data Pairs	85,545	91,156	80,095	68,630	66,587	61,934	38,690	492,931	
Mean Observed (ppb)	51.9	54.1	57.1	55.2	55.3	56.9	52.1	54.7	
Mean Simulated (ppb)	48	50.2	53.9	54.9	56.1	56.0	49.3	52.5	
Mean Bias (ppb)	-3.9	-3.8	-3.2	-0.3	0.9	-1.0	-2.7	-2.2	
Normalized Bias (%)	-7.0	-6.4	-4.9	0.7	3.1	-1.0	-4.6	-3.2	**± 15**
Normalized Mean Bias (%)	-7.5	-7.1	-5.6	-0.5	1.5	-1.7	-5.3	-4.0	
Fractional Bias (%)	-11.2	-10.8	-9.5	-3.4	-2.1	-5.7	-9.4	-7.7	
Mean Error (ppb)	8.7	9.4	10.4	10.4	11.8	10.9	10.1	10.2	

Normalized Error (%)	17.1	18.0	19.1	19.8	22.4	20.1	20.0	19.3	**≤ 35**
Normalized Mean Error (%)	16.7	17.4	18.3	18.9	21.4	19.1	19.5	18.6	
Fractional Error (%)	20.5	21.3	22.0	21.0	23.8	22.3	23.0	21.8	
Correlation (unitless)	0.51	0.52	0.59	0.51	0.46	0.57	0.49	0.54	
Index of Agreement (unitless)	0.66	0.68	0.74	0.70	0.66	0.73	0.66	0.70	

The statistical measures indicate very good agreement, on average, between the simulated and observed concentrations for all months. The normalized bias is within ±15 percent and the normalized error is well within 35 percent for all months. Using a lower bound value of 60 ppb for the calculation of the statistics, the normalized mean bias for the multi-month period (April- October) is -7.6 percent and the normalized mean error is 14.6 percent, indicating some underestimation of the higher ozone values but also very good model performance.

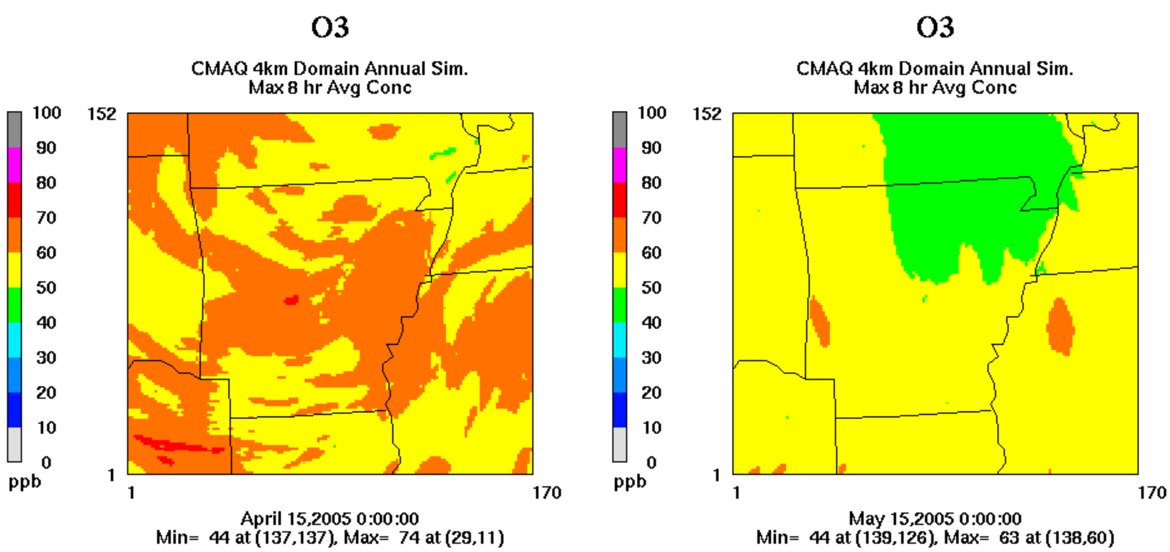
Ozone Model Performance for the 4-km Grid

Spatial Concentration Patterns

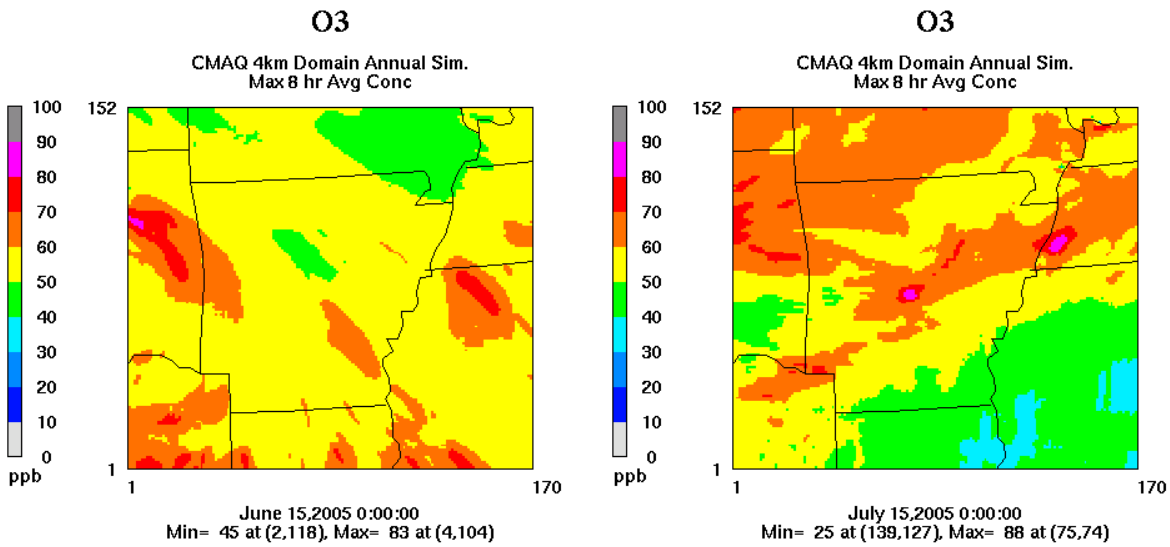
Spatial plots of the simulated ozone concentration patterns for the 4-km grid for selected days throughout the simulation period were plotted and examined. Figure 5-3 illustrates the daily maximum 8-hour average ozone concentration patterns for the 15th of each month (April – October). Units are parts per billion (ppb).

Figure 5-3. Simulated Daily Maximum 8-Hour Ozone Concentration (ppb) for Selected Days for the CMAQ 4-km Grid

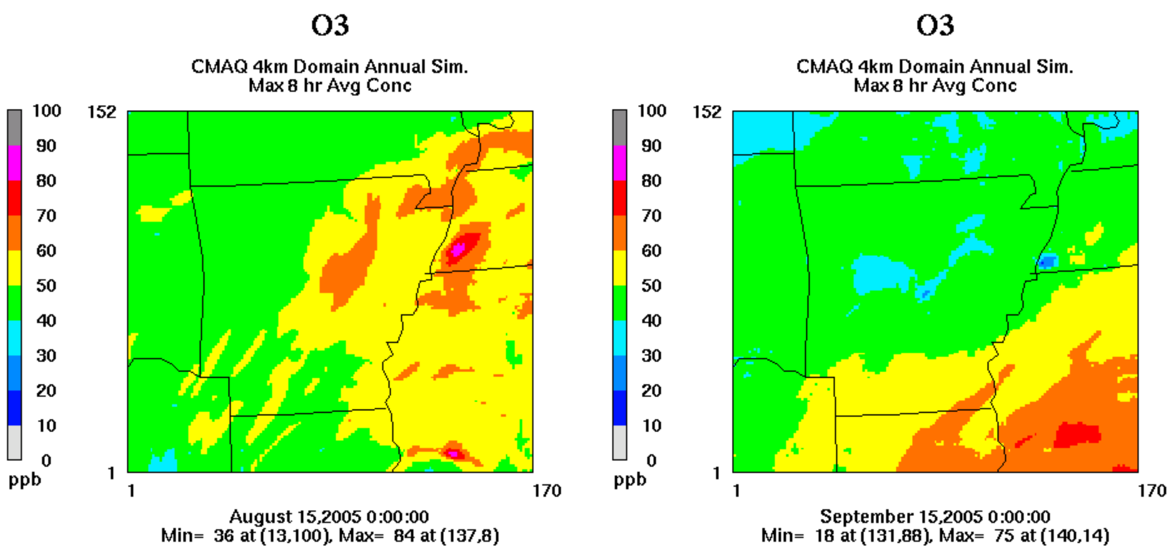
April 15/May 15



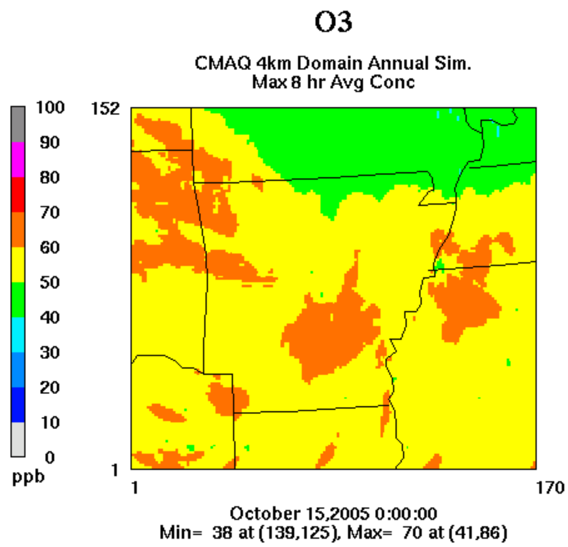
June 15/July 15



August 15/September 15



October 15

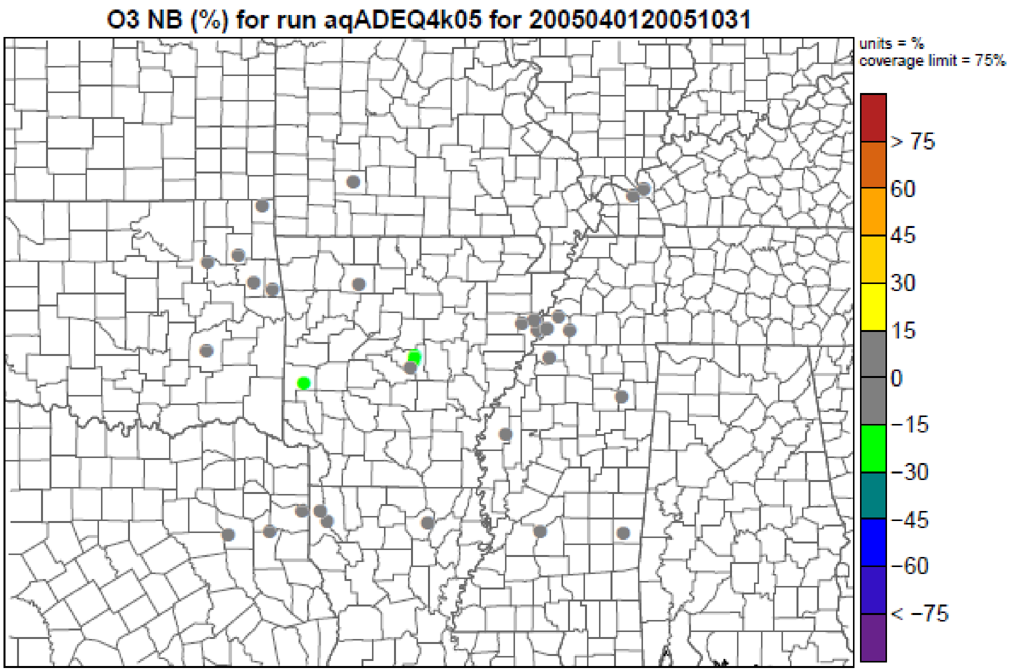


For many of the selected days, the simulated ozone concentration patterns indicate moderate to high ozone concentrations over at least a portion of Arkansas. Higher concentrations are more widespread across the state on April 15 and July 15. Among the selected days, the highest simulated concentration occurs near Little Rock on July 15. On this day the simulated daily maximum 8-hour ozone concentration is 88 ppb.

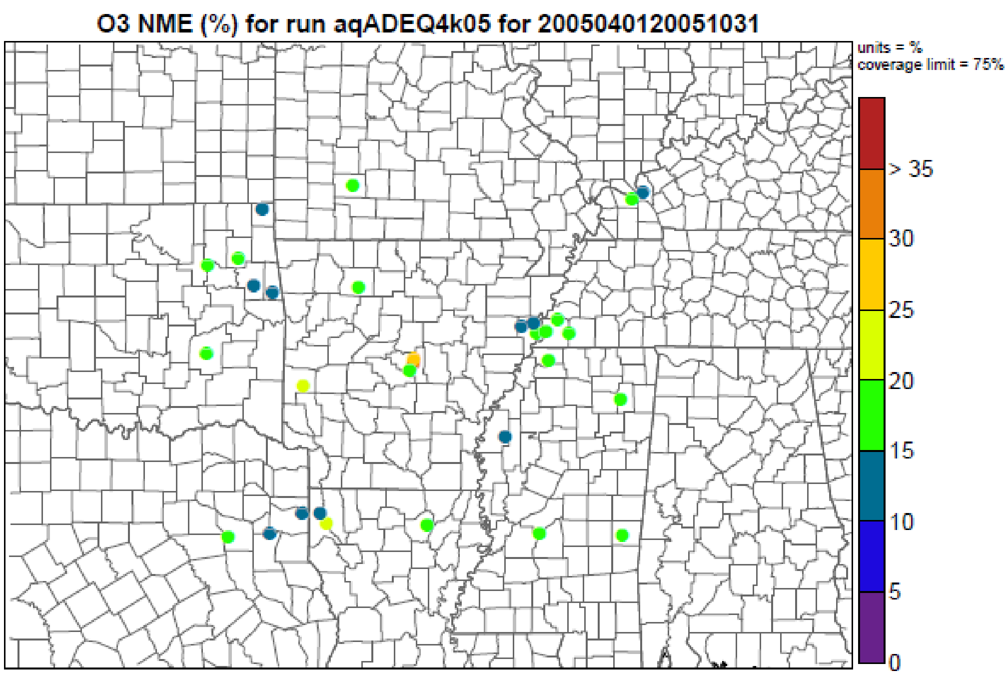
Figure 5-4 depicts the average bias and error for all sites in the 4-km modeling grid, based on daily maximum 8-hour ozone concentrations for the ozone season months (April through October). For the normalized bias, gray shaded circles indicate that the bias is within ± 15 percent; blue and green shading indicates underestimation of the observed concentrations and yellow, orange, and red shading indicates overestimation. For the normalized mean error, blue and green shading represent the smaller errors, while red indicates an error greater than 35 percent. A lower bound of 40 ppb was used in calculating the normalized bias and error statistics. Note that the plotted area is slightly larger than the 4-km grid, but that information is presented only for sites within the 4-km grid.

Figure 5-4. Normalized Bias (%) and Normalized Mean Error (%) Based on Daily Maximum 8-Hour Average Simulated and Observed Ozone Concentrations for April through October for the CMAQ 4-km Grid

Normalized Bias



Normalized Mean Error

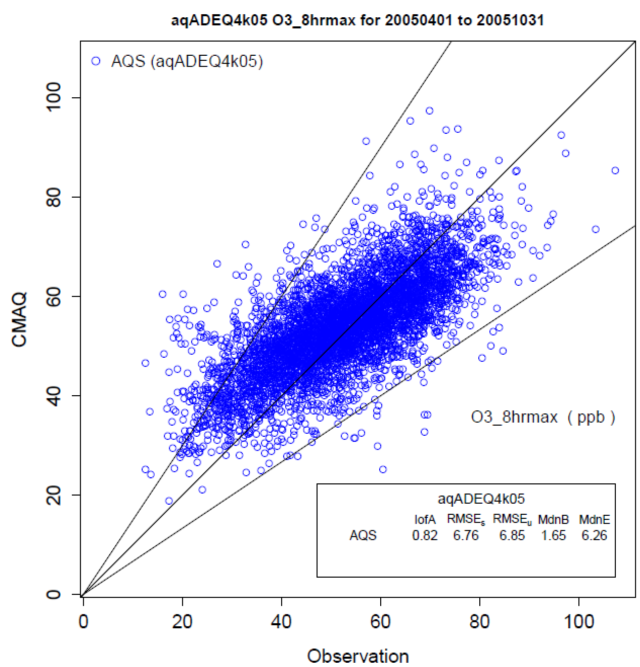


Model performance is consistent throughout the 4-km grid (i.e., there do not appear to be any distinct differences in model performance within the region covered by the grid). For most monitoring sites, the normalized bias is within ± 15 percent (as indicated by the gray shading). The normalized mean error is less than 35 percent for all sites and months.

Comparison of Simulated and Observed Concentrations

A scatter plot comparing simulated and observed daily maximum 8-hour ozone concentrations for the 4-km grid for April through October is presented in Figure 5-5. Again, note that the statistical measures given on the plot are calculated using the 8-hour average ozone concentrations.

Figure 5-5. Comparison of Simulated and Observed Daily Maximum 8-Hour Average Ozone Concentration (ppb) for the 4-km Grid (April through October)



There is a slight tendency for CMAQ to overestimate the lower concentrations and underestimate the higher concentrations, but there is good correlation overall as indicated by an index of agreement of 0.82.

Statistical Measures of Model Performance

Summary metrics and statistical measures calculated using hourly ozone concentrations for the 4-km grid are presented in Table 5-2. A lower bound of 40 ppb was used in calculating the normalized bias and error statistics.

Table 5-2. Summary Model Performance Statistics for Ozone for the 4-km Modeling Grid

Metric	Apr	May	Jun	Jul	Aug	Sep	Oct	Apr-Oct	Goal
Number of Data Pairs	9,580	10,931	10,031	8,982	8,994	8,580	5,937	63,035	
Mean Observed (ppb)	51.5	54.0	57.6	54.0	54.4	57.2	52.4	54.5	
Mean Simulated (ppb)	47.3	49.2	52.0	52.0	53.6	52.8	47.5	50.7	
Mean Bias (ppb)	-4.1	-4.8	-5.6	-2.0	-0.7	-4.4	-4.9	-3.8	
Normalized Bias (%)	-7.2	-8.3	-8.9	-2.7	0.0	-7.2	-8.7	-6.1	**± 15**
Normalized Mean Bias (%)	-8.0	-8.9	-9.7	-3.7	-1.3	-7.7	-9.3	-7.0	
Fractional Bias (%)	-10.6	-11.6	-12.8	-6.6	-3.9	-10.8	-12.4	-9.8	
Mean Error (ppb)	8.1	8.9	9.7	9.9	10.3	9.6	9.3	9.4	
Normalized Error (%)	15.9	16.5	17.2	18.9	19.6	17.4	17.9	17.6	**≤ 35**
Normalized Mean Error (%)	15.7	16.1	16.9	18.4	18.9	16.9	17.7	17.2	
Fractional Error (%)	18.6	19.2	20.4	20.7	21.0	20.0	20.7	20.0	
Correlation (unitless)	0.49	0.56	0.63	0.47	0.45	0.61	0.54	0.55	
Index of Agreement (unitless)	0.65	0.70	0.75	0.65	0.65	0.74	0.68	0.70	

The statistical measures for the 4-km grid also show underestimation of ozone for most months. The normalized bias is within ±15 percent and the normalized error is well within 35 percent for all months and for the ozone season. Using a lower-bound value of 60 ppb, the normalized mean bias for the multi-month period (April- October) is –11.1 percent and the normalized mean error is 15.4 percent, also within the model performance goals.

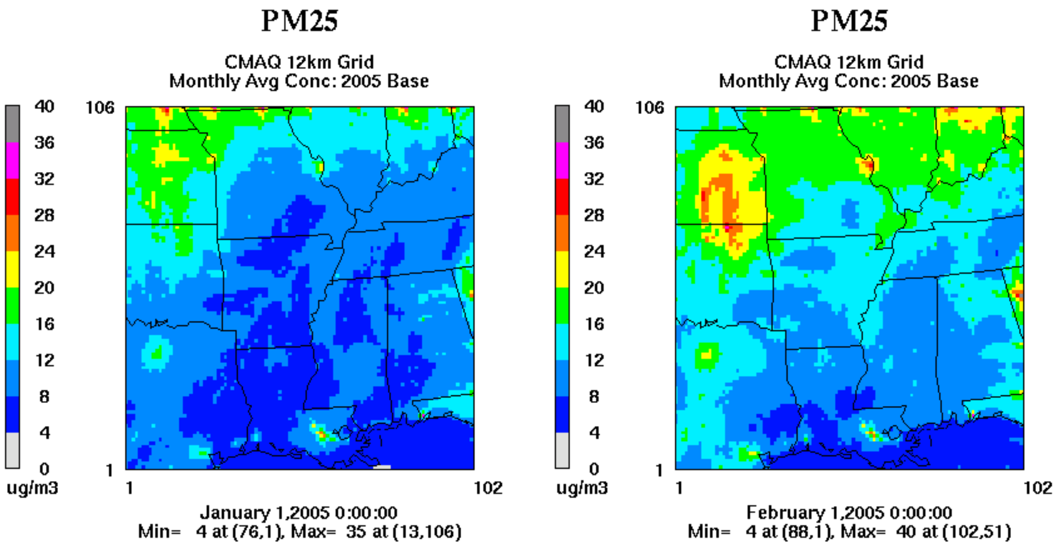
5.1.2 Summary of Model Performance for $PM_{2.5}$

12-km Grid

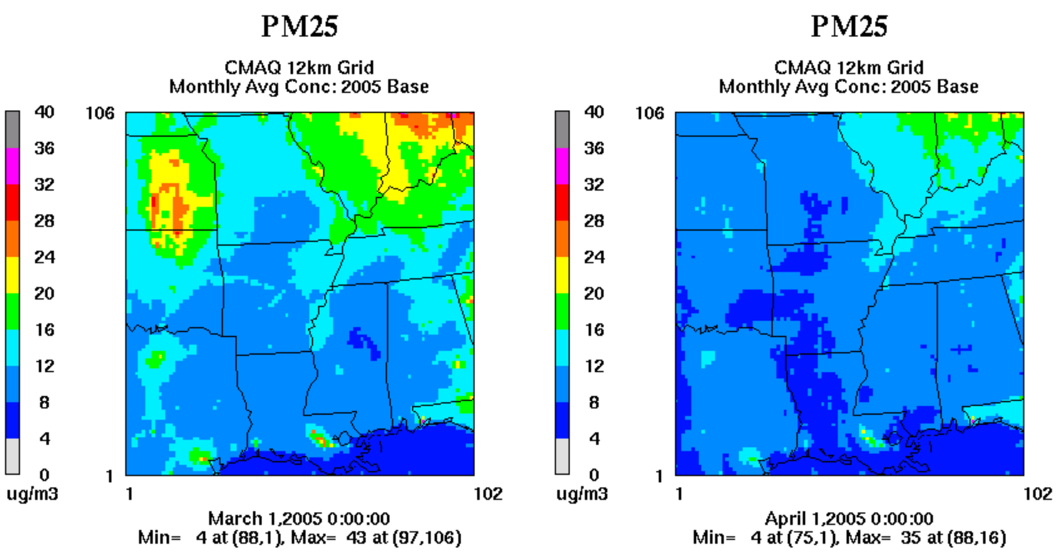
Spatial Concentration Patterns

Spatial plots of the monthly average simulated $PM_{2.5}$ concentration patterns for the 12-km grid are illustrated in Figure 5-6. The units are micrograms per cubic meter ($\mu g/m^3$).

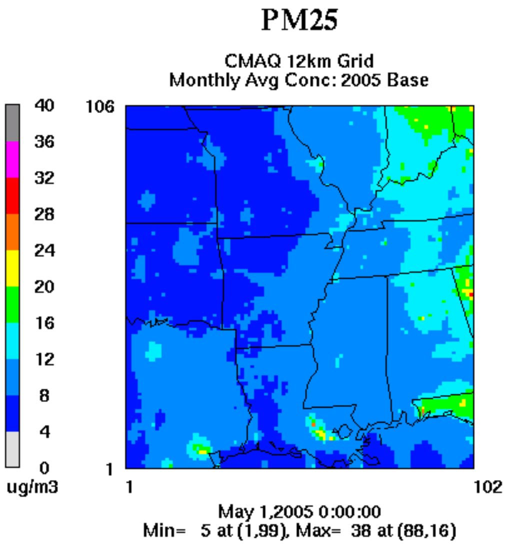
Figure 5-6. Simulated Monthly Average $PM_{2.5}$ Concentration (μg/m^3) for the CMAQ 12-km Grid
January/February

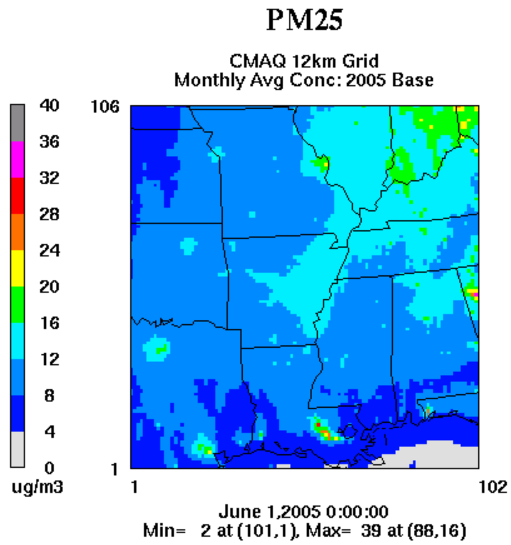


March/April

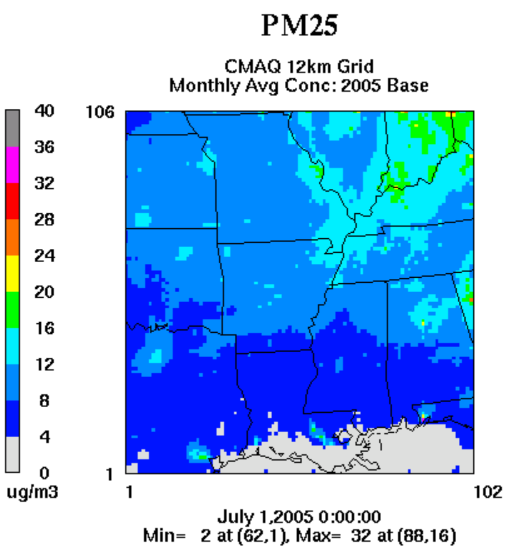


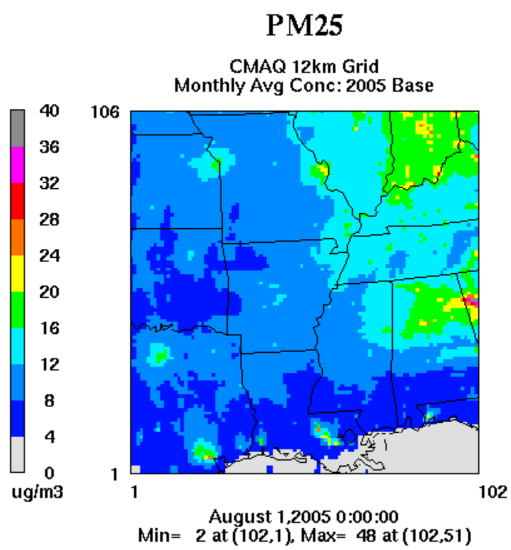
May/June



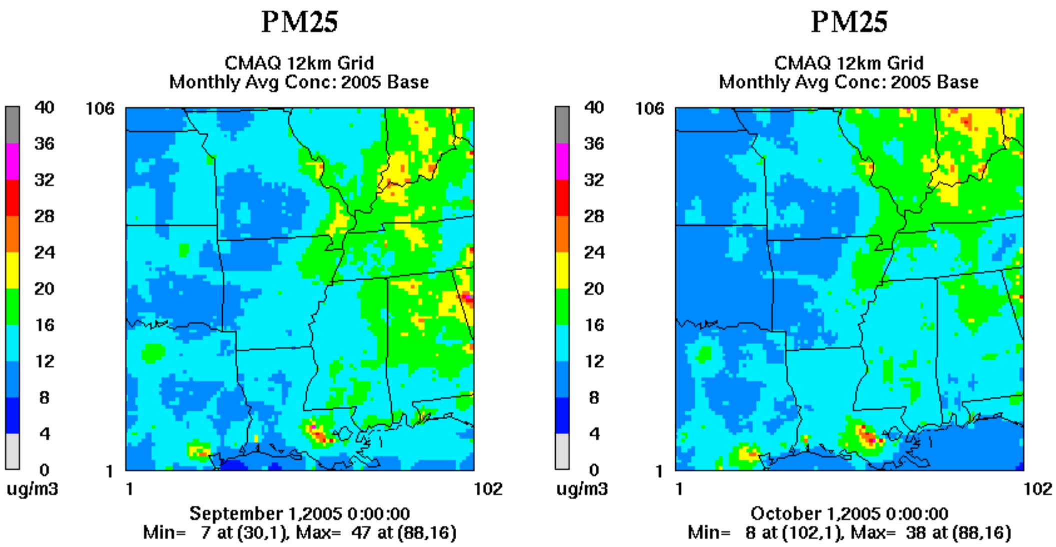


July/August

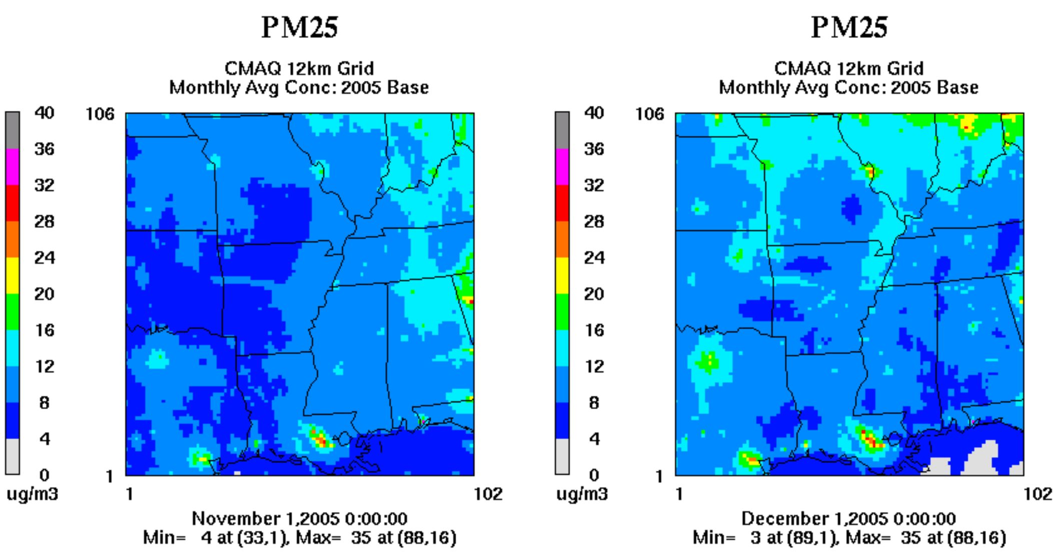




September/October



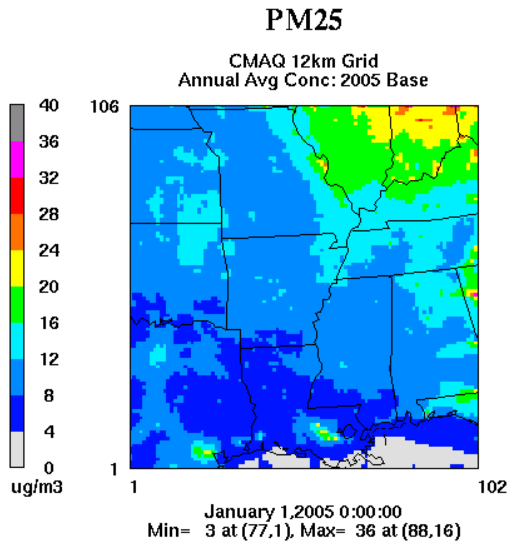
November/December



For most months, the simulated monthly average $PM_{2.5}$ concentrations over Arkansas are within the range of 4 to 16 µg/m^3. For September and October, the model results indicate localized areas of higher $PM_{2.5}$ (in the 16 to 20 µg/m^3 range) over the northwest portion of the state.

Figure 5-7 displays the annual average simulated $PM_{2.5}$ concentration pattern for the 12-km grid.

Figure 5-7. Simulated Annual Average $PM_{2.5}$ Concentration (µg/m^3) for the CMAQ 12-km Grid

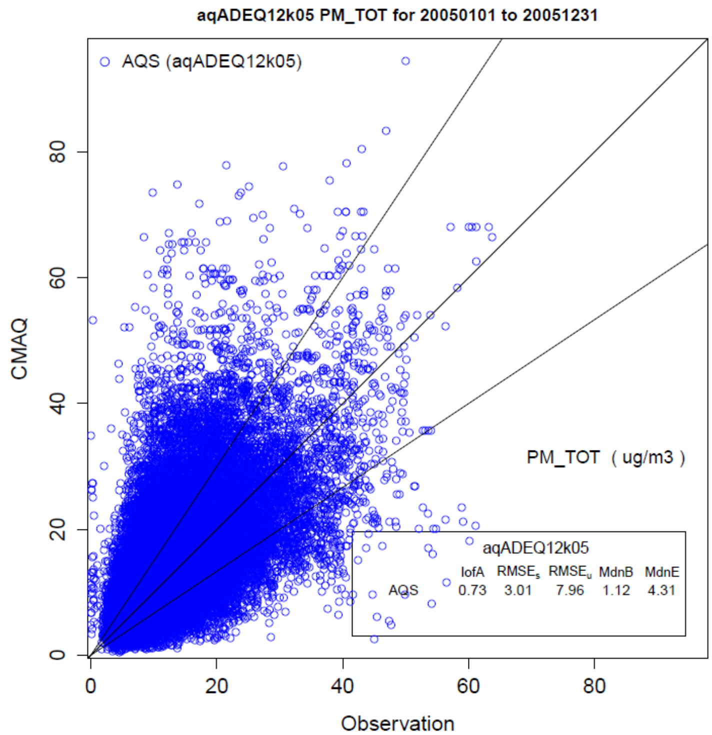


The simulated annual average concentrations range from about 4 to 16 ppb over Arkansas and across most of the 12-km grid, with higher $PM_{2.5}$ concentrations (greater than 16 µg/m^3) over Kentucky, Illinois, Indiana, Ohio, and several other isolated areas. The maximum simulated annual average $PM_{2.5}$ concentration is 36 µg/m^3 and is located along the Gulf Coast (near Pensacola).

Comparison of Simulated and Observed Concentrations

Scatter plots comparing simulated and observed 24-hour $PM_{2.5}$ concentrations for AQS sites within the 12-km grid for the annual simulation period are presented in Figure 5-8.

Figure 5-8. Comparison of Simulated and Observed 24-Hour Average $PM_{2.5}$ Concentration ($\mu g/m^3$) for the 12-km Grid (All Months)



The scatter plot indicates an overall tendency for the model to overestimate observed annual average $PM_{2.5}$ concentrations within the 12-km grid.

Statistical Measures of Model Performance

Summary metrics and statistical measures calculated using 24-hr $PM_{2.5}$ concentrations for the 12-km grid are presented in Table 5-3. The recommended ranges for the fractional bias and fractional error are based on Boylan (2005) and are widely used for regional-scale model performance evaluation for $PM_{2.5}$. No lower bound was applied in calculating the statistics.

Table 5-3. Summary Model Performance Statistics for $PM_{2.5}$ for the 12-km Modeling Grid

Metric	Jan–Mar	Apr–Jun	Jul–Sep	Oct–Dec	Annual	Goal
Number of Data Pairs	7,685	7,867	7,202	6,964	29,718	
Mean Observed (ppb)	12.3	14.1	17.6	12.5	14.1	
Mean Simulated (ppb)	17.1	14.3	16.2	16.7	16.0	
Mean Bias (ppb)	4.8	0.1	1.4	4.1	1.9	
Fractional Bias (%)	25.8	-0.4	-13.9	24.8	9.0	**± 60**
Mean Error (ppb)	7.0	5.2	5.9	6.0	6.0	
Fractional Error (%)	45.9	36.1	38.7	40.7	40.3	**≤ 75**
Correlation (unitless)	0.60	0.57	0.65	0.61	0.57	
Index of Agreement (unitless)	0.67	0.75	0.80	0.69	0.73	

On average, $PM_{2.5}$ concentrations are overestimated for the first and fourth quarters (the cooler months of the year), slightly overestimated for the second quarter, and underestimated for third quarter. On an annual basis, this results in a slight to moderate overestimation and overall better model performance for the warmer months when observed $PM_{2.5}$ concentrations are relatively high. The statistical measures for fractional bias and fractional error are well within the model performance goals for all periods.

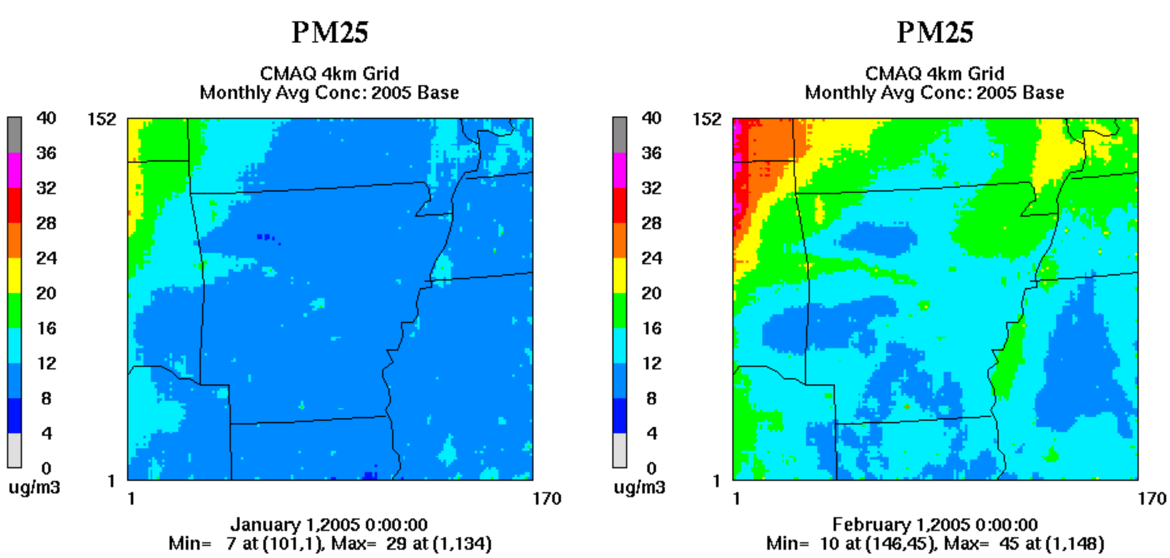
4-km Grid

Spatial Concentration Patterns

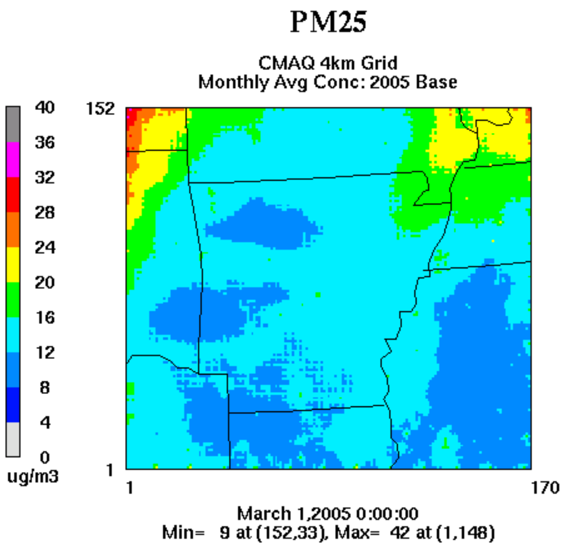
Spatial plots of the monthly average simulated $PM_{2.5}$ concentration patterns for the 4-km grid are illustrated in Figure 5-9. The units are micrograms per cubic meter ($\mu g/m^3$).

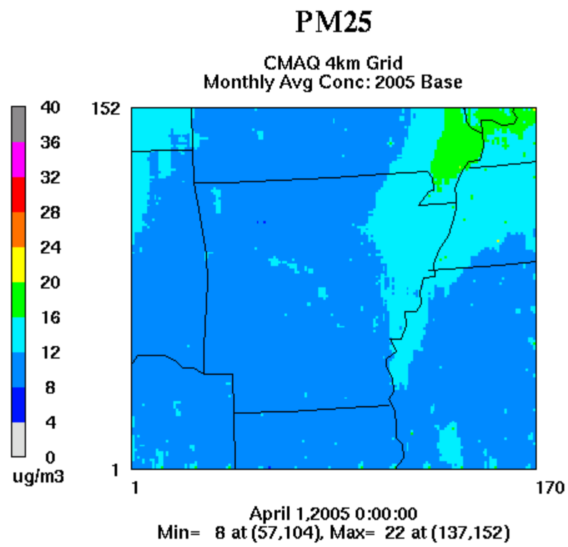
Figure 5-9. Simulated Monthly Average $PM_{2.5}$ Concentration ($\mu g/m^3$) for the CMAQ 4-km Grid

January/February

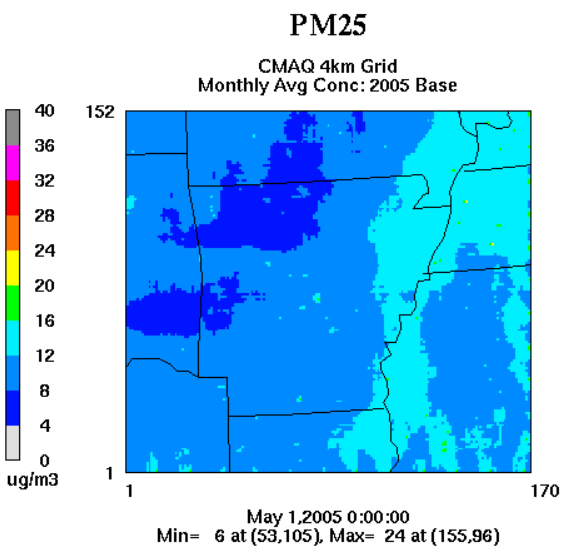


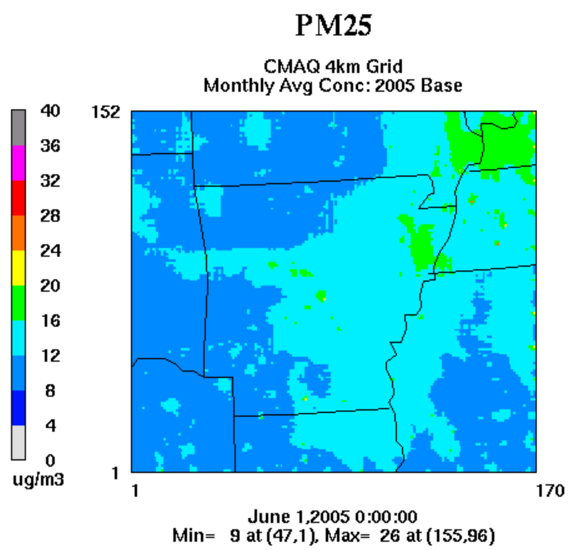
March/April



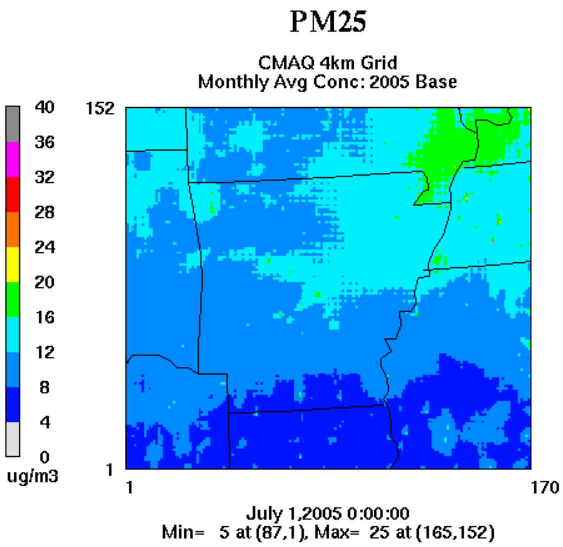


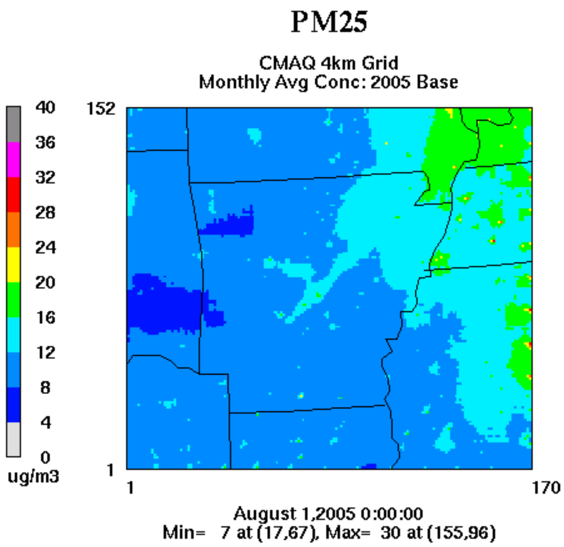
May/June



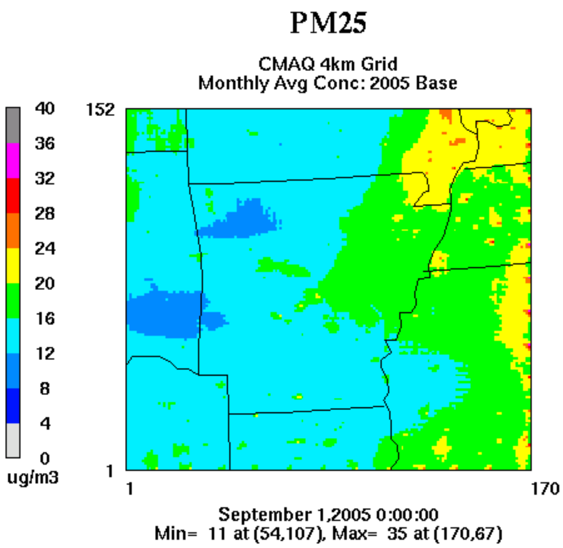


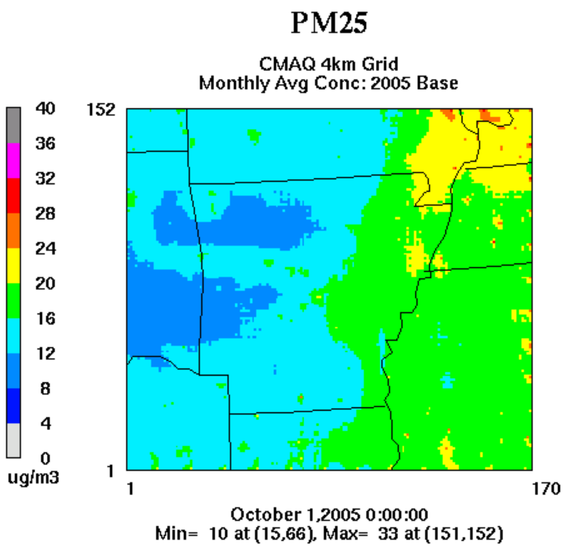
July/August



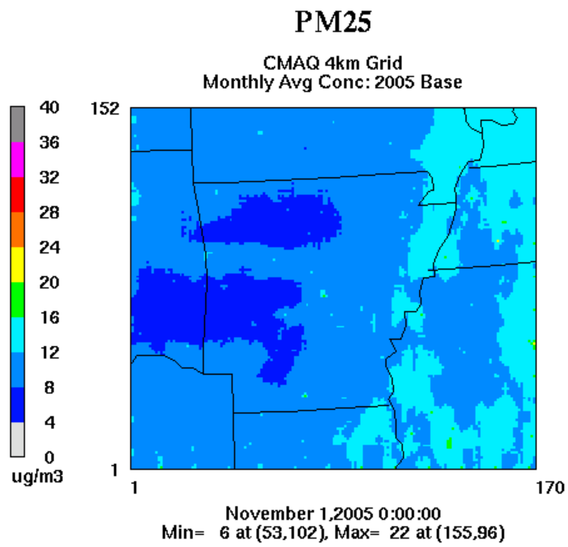


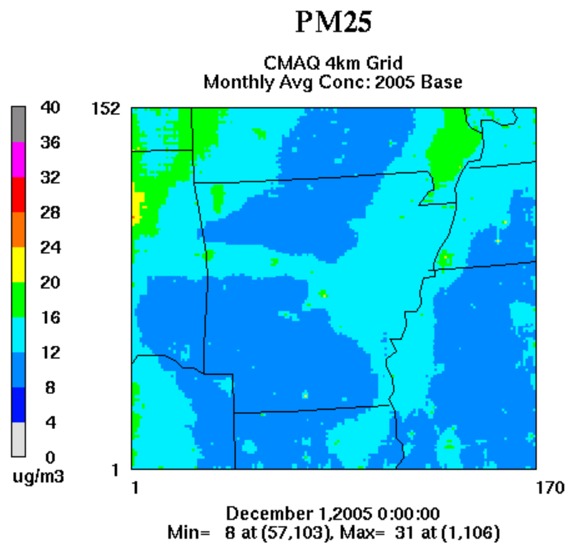
September/October





November/December

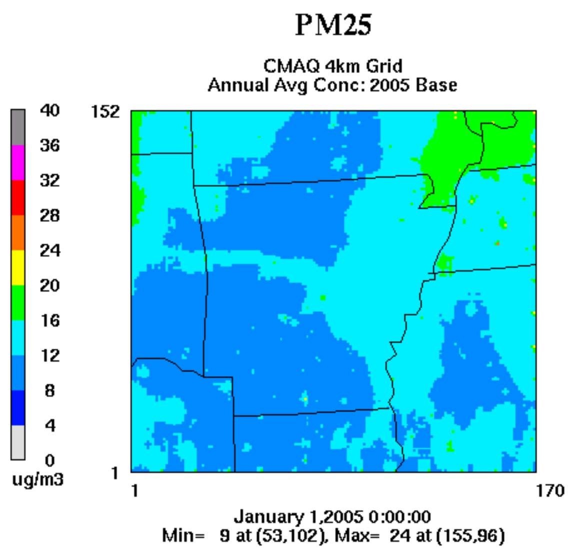




For most months, the simulated monthly average $PM_{2.5}$ concentrations over Arkansas are generally within the range of 4 to 16 µg/m^3. Somewhat higher concentrations (in the 16 to 24 µg/m^3 range) are simulated in the northern part of the state for February, in the northeastern part of the state for September, in the eastern part of the state for October.

Figure 5-10 displays the annual average simulated $PM_{2.5}$ concentration pattern for the 4-km grid.

Figure 5-10. Simulated Annual Average $PM_{2.5}$ Concentration (µg/m^3) for the CMAQ 4-km Grid

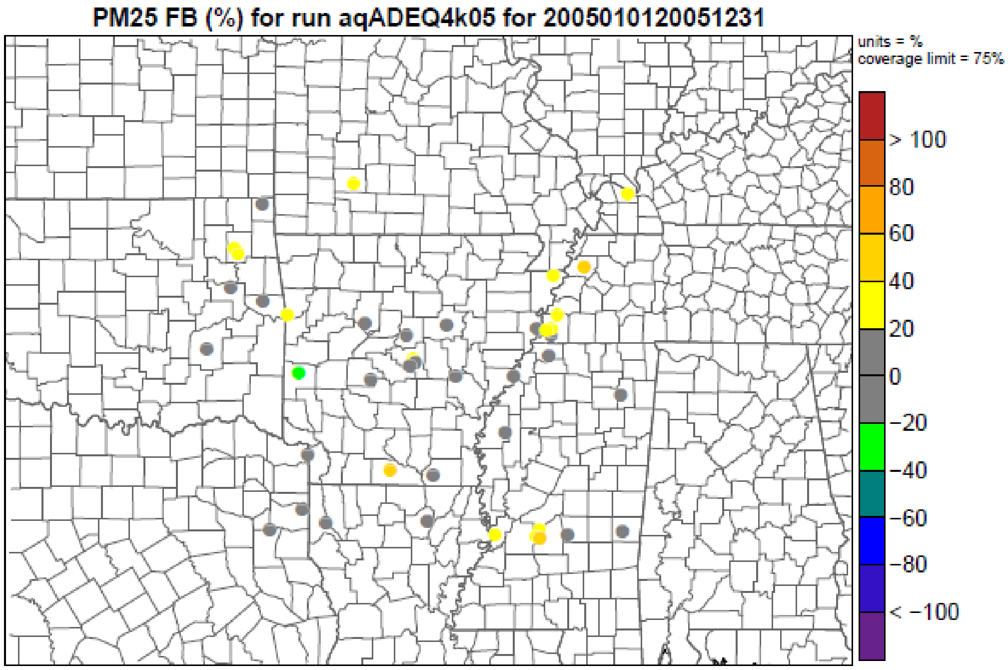


The simulated annual average $PM_{2.5}$ concentrations are less than 16 µg/m^3 throughout the state, with the exception of a few localized areas, including Little Rock.

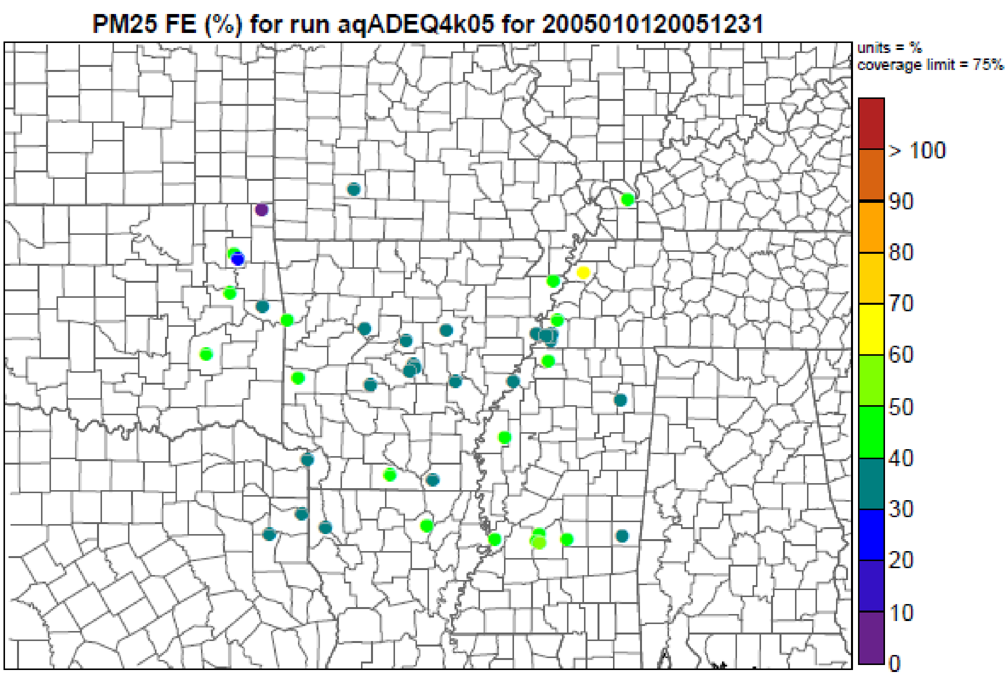
Because the observed $PM_{2.5}$ concentrations can be quite small and there is no accepted minimum threshold, fractional bias and error are better suited to characterizing model performance. To illustrate the agreement between the simulated and observed values, Figure 5-11 depicts the fractional bias and fractional error statistics for the 4-km modeling domain. The statistics are calculated using 24-hour average $PM_{2.5}$ concentrations and are calculated using data for the annual simulation period. Again, each monitoring site is represented by a circle and the shading of the circle provides information about how well the 24-hour observed $PM_{2.5}$ concentrations are represented by the simulation results, on average. For the fractional bias, gray shaded circles indicate that the fraction bias is within ± 20 percent and, in general, values within ±60 percent (lighter colors) correspond to acceptable model performance. Blue and green shading indicates underestimation of the observed concentrations and yellow, orange, and red shading indicates overestimation. For the fractional error, blue and green shading represent the smaller errors, while red indicates an error greater than 100 percent. Values less than 75 percent are considered to represent reasonable model performance for $PM_{2.5}$.

Figure 5-11. Fractional Bias (%) and Fractional Error (%) Based on 24-Hour Average Simulated and Observed $PM_{2.5}$ Concentrations for CMAQ 4-km Grid (All Months)

Fractional Bias



Fractional Error

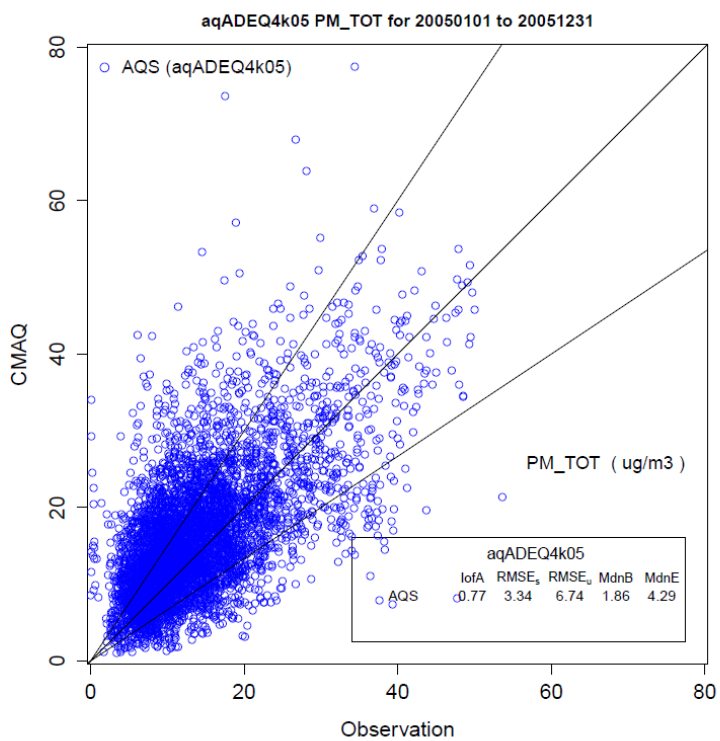


The fractional bias is within the range of -40 to 60 percent for all sites located within the 4-km grid (as indicated by the green, gray, and yellow, and orange shading) and within the range of -40 to 40 percent for all but three sites (in orange). The three sites with a greater amount of overestimation are located in northwestern Tennessee, southern Arkansas, and central Mississippi; thus no regional overestimation patterns are evident. The fractional error is less than 70 percent for all sites. Some of the best performance (teal shading) is over Arkansas.

Comparison of Simulated and Observed Concentrations

Scatter plots comparing simulated and observed 24-hour $PM_{2.5}$ concentrations for AQS sites within the 4-km grid for the annual simulation period are presented in Figure 5-12.

Figure 5-12. Comparison of Simulated and Observed 24-Hour Average $PM_{2.5}$ Concentration ($\mu g/m^3$) for the 4-km Grid (All Months)



The scatter plot shows fairly good agreement between the simulated and observed $PM_{2.5}$ concentrations and a slight tendency for overestimation.

Statistical Measures of Model Performance

Summary metrics and statistical measures calculated using 24-hr $PM_{2.5}$ concentrations for the 4-km grid are presented in Table 5-4. The recommended ranges for the fractional bias and fractional error are based on Boylan (2005) and are widely used for regional-scale model performance evaluation for $PM_{2.5}$. No lower bound was applied in calculating the statistics.

Table 5-4. Summary Model Performance Statistics for $PM_{2.5}$ for the 4-km Modeling Grid

Metric	Jan-Mar	Apr-Jun	Jul-Sep	Oct-Dec	Annual	Goal
Number of Data Pairs	1,307	1,341	1,282	1,312	5,242	
Mean Observed (ppb)	10.6	14.5	18.1	12.5	13.9	
Mean Simulated (ppb)	16.6	14.9	16.5	16.7	16.2	
Mean Bias (ppb)	6.0	0.5	-1.6	4.2	2.3	
Fractional Bias (%)	40.0	4.1	-13.9	28.1	14.7	**± 60**
Mean Error (ppb)	7.3	4.4	4.9	5.7	5.6	
Fractional Error (%)	52.5	30.3	32.3	40.4	38.8	**≤ 75**
Correlation (unitless)	0.51	0.74	0.76	0.64	0.62	
Index of Agreement (unitless)	0.56	0.86	0.86	0.72	0.77	

Performance is similar to that for the 12-km grid. On average, $PM_{2.5}$ concentrations are overestimated for the first and fourth quarters, slightly overestimated for the second quarter, and underestimated for third quarter. On an annual basis, this results in a slight to moderate overestimation. Model performance is best for the warmer months when observed $PM_{2.5}$ concentrations are relatively high. The statistical measures for fractional bias and fractional error are well within the model performance goals for all periods.

5.1.3 Summary of Model Performance for PM_{10}, NO_x, SO_2 and CO

Model performance for PM_{10}, NO_x, SO_2 and CO was examined with emphasis on quarterly and annual average concentrations. Observed concentrations of these criteria pollutants are generally expected to represent local rather than regional scale concentrations. This is due to the fact that these pollutants are directly emitted into the atmosphere and also because the monitoring sites are typically located in urban areas and near roadways. A grid-based model like CMAQ may not be able to capture the sub grid-scale variations in concentration reflected in the data that are due to local emissions sources and thus may not agree with the observed data unless the data are representative of the area encompassed by a grid cell. Thus, model performance for these species was examined only for the 4-km grid.

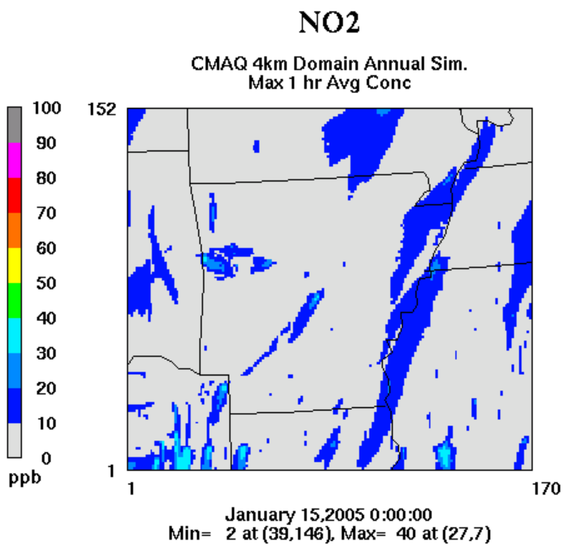
4-km Grid

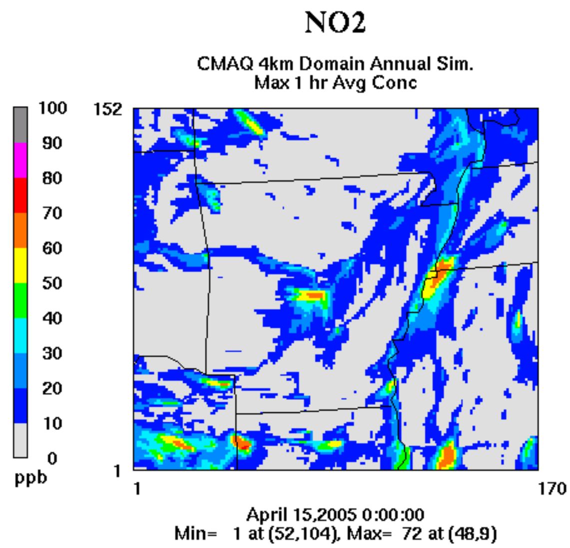
Spatial Concentration Patterns for NO_2 and SO_2

Spatial plots of the simulated NO_2 and SO_2 concentration patterns for the 4-km grid for selected days throughout the simulation period were plotted and examined. Figures 5-13 and 5-14 illustrate the daily maximum 1-hour average NO_2 concentration patterns and daily maximum 1-hour average SO_2 concentration patterns, respectively, for the 15th of January, April, July, and October (one day per quarter). These are provided primarily as a point of reference for the difference plots presented in Section 6. Units are parts per billion (ppb).

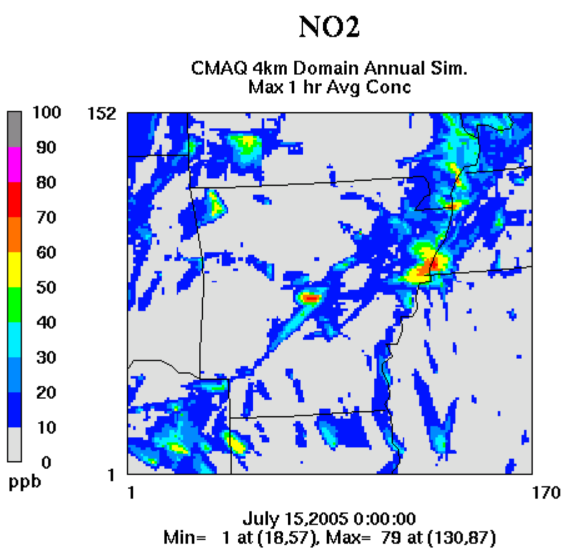
Figure 5-13. Simulated Daily Maximum 1-NO_2 Concentration (ppb) for Selected Days for the CMAQ 4-km Grid

January 15/April 15





July 15/October 15



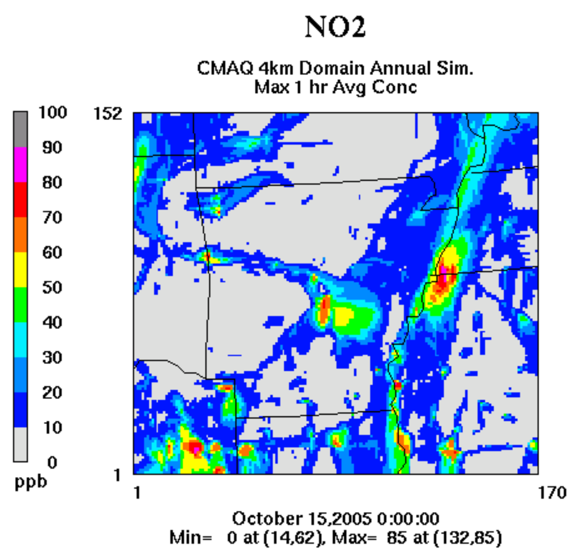
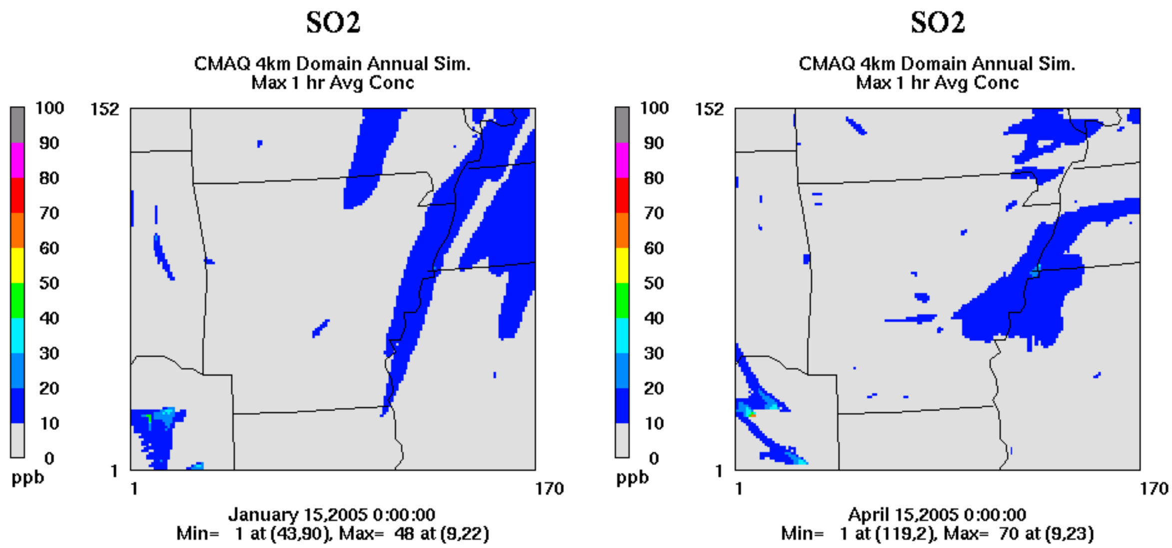
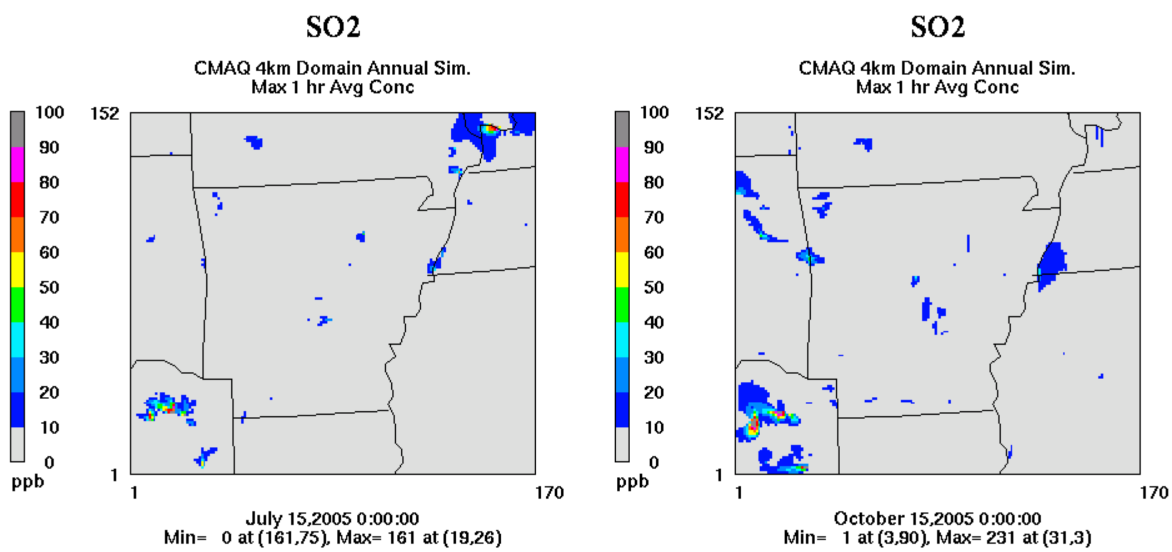


Figure 5-14. Simulated Daily Maximum 1-SO_2 Concentration (ppb) for Selected Days for the CMAQ 4-km Grid

January 15/April 15



July 15/October 15

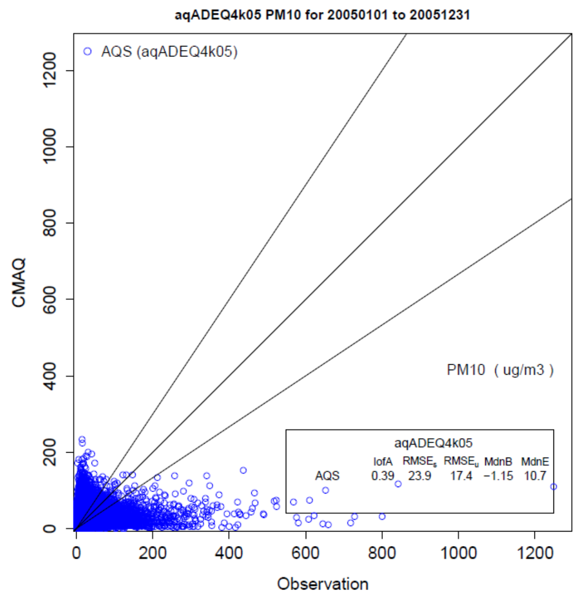


Simulated NO_2 concentrations are highest over and downwind of Memphis, Little Rock, and other urban areas. SO_2 concentrations are low throughout Arkansas, with some areas of high SO_2 in southern Illinois and northeastern Texas.

Comparison of Simulated and Observed Concentrations

Scatter plots comparing simulated and observed 24-hour PM_{10} concentrations for AQS sites within the 4-km grid for the annual simulation period are presented in Figure 5-15. Units for PM_{10} are µg/m^3.

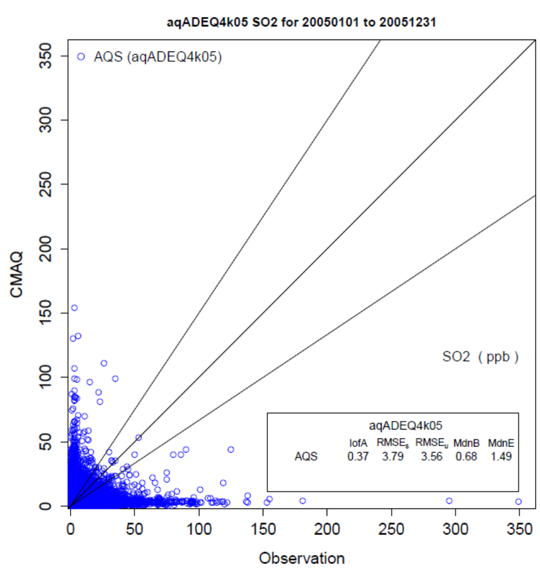
Figure 5-15. Comparison of Simulated and Observed 24-Hour Average PM_{10} Concentration (µg/m^3) for the 4-km Grid (All Months)



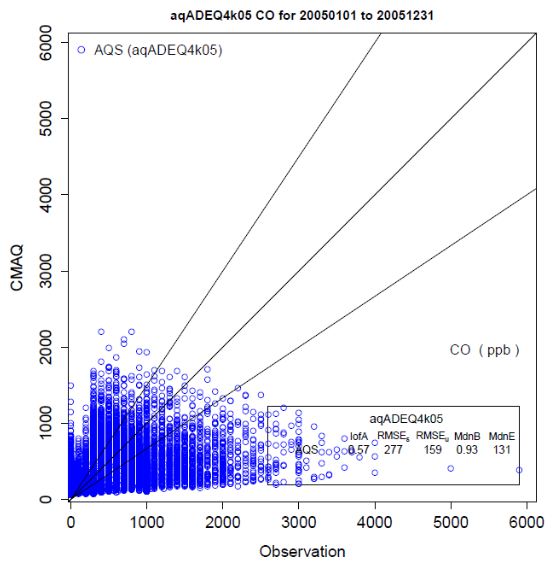
Scatter plots comparing simulated and observed hourly NO_x, SO_2, and CO concentrations for AQS sites within the 4-km grid for the annual simulation period are presented in Figure 5-16. Units for the gaseous species are ppb.

Figure 5-16. Comparison of Simulated and Observed Hourly Average NO_2, SO_2, and CO Concentrations (ppb) for the 4-km Grid (All Months)

NO_2/SO_2



CO



As expected, agreement between the simulated and observed values is not very good. PM_{10} concentrations are mostly underestimated, but there is a lot of scatter about the 1:1 line. High observed values tend to be underestimated while the low observed values are both under- and overestimated. Model performance for 1-hour NO_2, SO_2, and CO concentrations is characterized by a good deal of scatter about the 1:1 line and a tendency for overestimation of NO_2, and underestimation of CO.

Statistical Measures of Model Performance

Summary metrics and statistical measures for all months for PM_{10}, NO_x, and SO_2 for the 4-km grid are presented in Table 5-5. No lower bound was applied in calculating the statistics; fractional bias and error are emphasized.

Table 5-5. Summary Model Performance Statistics for PM_{10}, NO_2, SO_2 and CO for the 4-km Modeling Grid

Metric	PM_{10} (µg/m^{3})	NO_2 (ppb)	SO_2 (ppb)	CO (ppb)
Number of Data Pairs	3,758	82,062	180,525	55,333
Mean Observed (ppb)	23	8.0	2.4	308
Mean Simulated (ppb)	24.7	10.0	3.2	254
Mean Bias (ppb)	1.7	2.0	0.8	-53.5
Fractional Bias (%)	9.3	-4.4	4.8	-8.8
Mean Error (ppb)	14.3	5.7	2.6	205
Fractional Error (%)	55.8	63.8	75.2	65.6

The statistics suggest better model performance than the scatter plots. A fractional bias within ±67 percent indicates that the simulated values are, on average, within a factor of two of the observed values. This is achieved for all four pollutants. However, as indicated by the scatter plots and confirmed by the larger errors, the relatively low bias values for PM_{10}, NO_2, SO_2, and CO are due to a mix of under and overestimation and not necessarily to good model performance. The fractional error values are nonetheless within the goals established for $PM_{2.5}$.

5.2 2008 Simulation Period

CMAQ model performance for the base-year simulation for 2008 is summarized in the remainder of this section.

5.2.1 Summary of Model Performance for Ozone

CMAQ model performance for ozone focused on the typical ozone season months of April through October and is summarized in the remainder of this section.

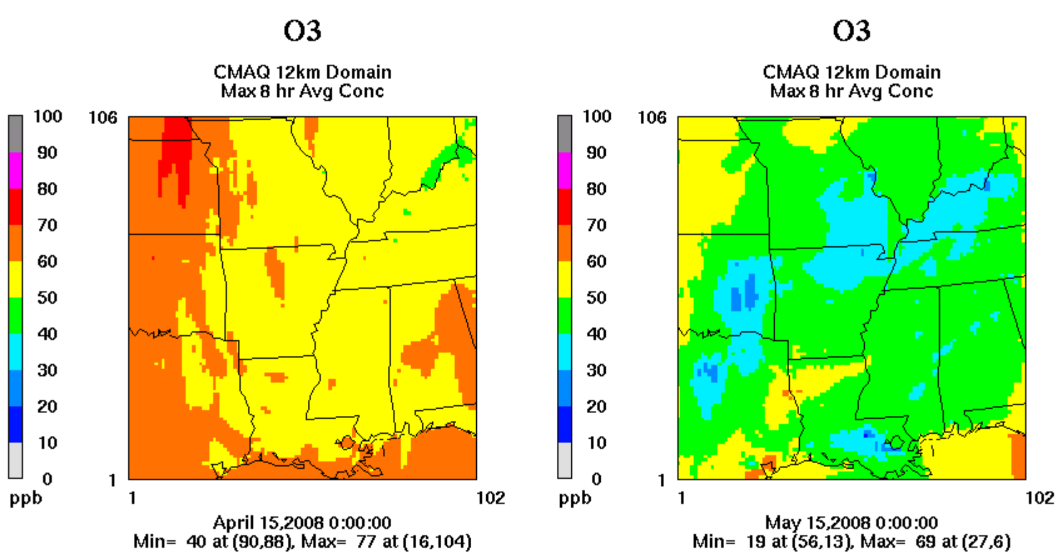
12-km Grid

Spatial Concentration Patterns

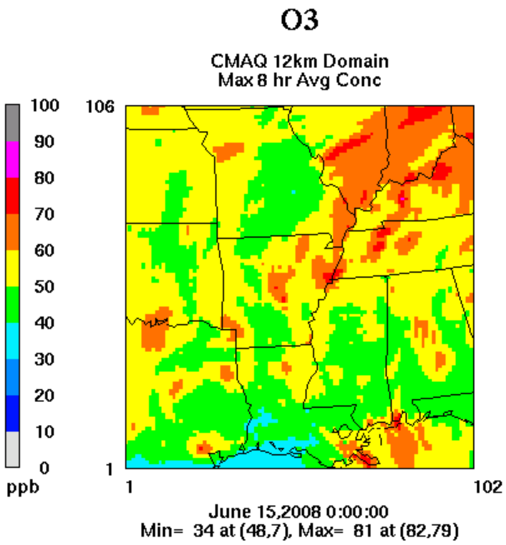
Spatial plots of the simulated ozone concentration patterns for the 12-km grid for selected days throughout the simulation period were plotted and examined. Figure 5-17 illustrates the simulated ozone concentration patterns for the 15th of each month (April – October). Consistent with the NAAQS for ozone, daily maximum 8-hour average ozone concentration is displayed. The units are parts per billion (ppb).

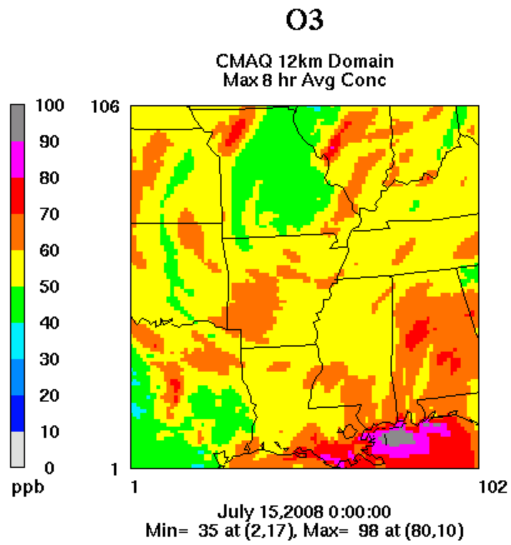
Figure 5-17. Simulated Daily Maximum 8-Hour Ozone Concentration (ppb) for Selected Days for the CMAQ 12-km Grid

April 15/May 15

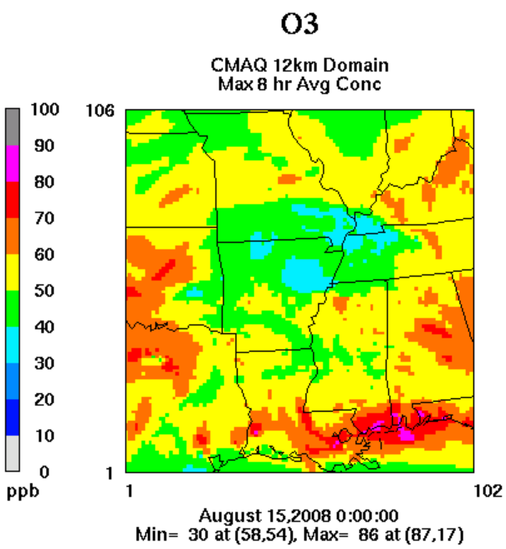


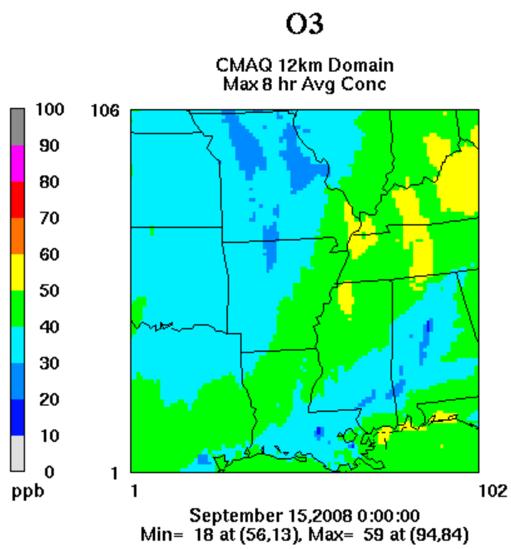
June 15/July 15



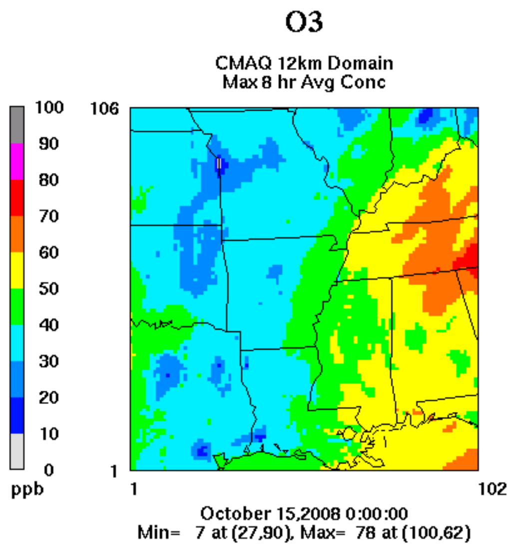


August 15/September 15





October 15

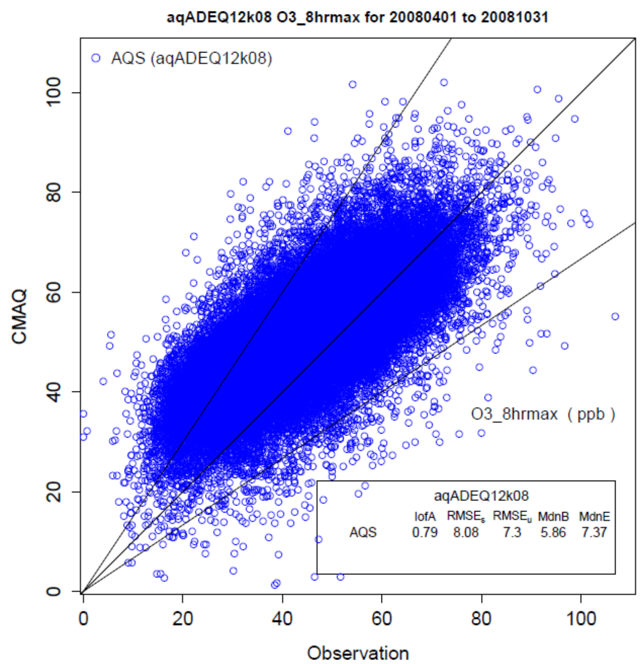


The plots depict a wide range of ozone concentration patterns for the selected days and illustrate the regional nature of ozone and potential transport patterns. Among the selected days, the simulated 8-hour average ozone concentrations are highest over Arkansas for the middle days of April, June, and July. Maximum 8-hour average concentrations for the 12-km grid range from 59 to 98 ppb for the selected days, overall slightly lower than for the 2005 annual simulation period.

Comparison of Simulated and Observed Concentrations

A scatter plot comparing simulated and observed daily maximum 8-hour ozone concentrations for the 12-km grid for April through October is presented in Figure 5-18. The scatter plot provides a visual representation of how well the simulated values match the observations, and can reveal biases toward over- or underestimation of the observed values. Also included on the scatter plot is some statistical information further summarizing model performance. Note that these statistical measures are calculated using the 8-hour average ozone concentrations.

Figure 5-18. Comparison of Simulated and Observed Daily Maximum 8-Hour Average Ozone Concentration (ppb) for the 12-km Grid (April through October)



There is a general tendency for CMAQ to overestimate the 8-hour average ozone concentrations, especially for observed values within the range of 20 to 40 ppb. Higher concentrations are well simulated and there is good correlation overall as indicated by an index of agreement of 0.79.

Statistical Measures of Model Performance

Summary metrics and statistical measures calculated using hourly ozone concentrations for the 12-km grid are presented in Table 5-6. The recommended ranges for the normalized bias and normalized error shown in this table are no longer a part of current EPA guidance but are still widely used for urban- and regional-scale model performance evaluations (EPA, 2007). A lower bound of 40 ppb was used in calculating the normalized bias and error statistics.

Table 5-6. Summary Model Performance Statistics for Ozone for the 12-km Modeling Grid

Metric	Apr	May	Jun	Jul	Aug	Sep	Oct	Apr-Oct	Goal
Number of Data Pairs	71,699	76,484	53,128	60,778	56,356	40,801	34,978	394,224	
Mean Observed (ppb)	50.7	50.6	51.7	53.0	51.7	52.0	49.6	51.4	
Mean Simulated (ppb)	48.9	46.7	49.5	52.9	53.4	53.1	48.6	50.2	
Mean Bias (ppb)	-1.8	-3.9	-2.2	-0.1	1.7	1.5	-1.1	-1.1	
Normalized Bias (%)	-2.7	-7.2	-3.7	0.6	4.1	2.7	-1.6	-1.6	**± 15**
Normalized Mean Bias (%)	-3.5	-7.7	-4.3	-0.3	3.2	2.2	-2.2	-2.2	
Fractional Bias (%)	-5.6	-10.7	-7.6	-3.3	0.0	-0.9	-4.6	-5.1	
Mean Error (ppb)	7.8	8.6	9.3	9.9	10.4	9.3	7.9	9.0	
Normalized Error (%)	15.7	17.3	18.6	19.5	20.8	18.7	16.2	18.1	**≤ 35**
Normalized Mean Error (%)	15.3	16.9	18.0	18.7	20.1	17.9	15.9	17.5	
Fractional Error (%)	17.3	19.7	20.6	20.8	21.6	19.9	17.8	19.7	
Correlation (unitless)	0.49	0.49	0.52	0.52	0.47	0.55	0.49	0.51	
Index of Agreement (unitless)	0.67	0.64	0.68	0.69	0.65	0.70	0.66	0.68	

The statistical measures indicate very good agreement, on average, between the simulated and observed concentrations for all months. The normalized bias is well within ±15 percent and the normalized error is well within 35 percent for all months. Using a lower bound value of 60 ppb for the calculation of the statistics, the normalized mean bias for the multi-month period (April- October) is -7.3 percent and the normalized mean error is 13.6 percent, indicating some underestimation of the higher ozone values but also very good model performance.

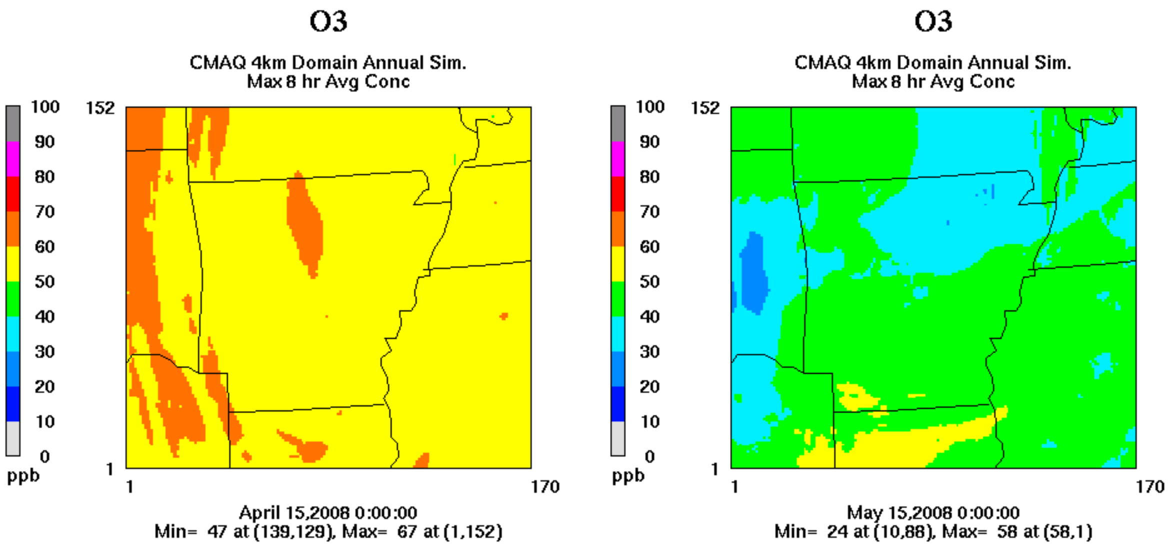
Ozone Model Performance for the 4-km Grid

Spatial Concentration Patterns

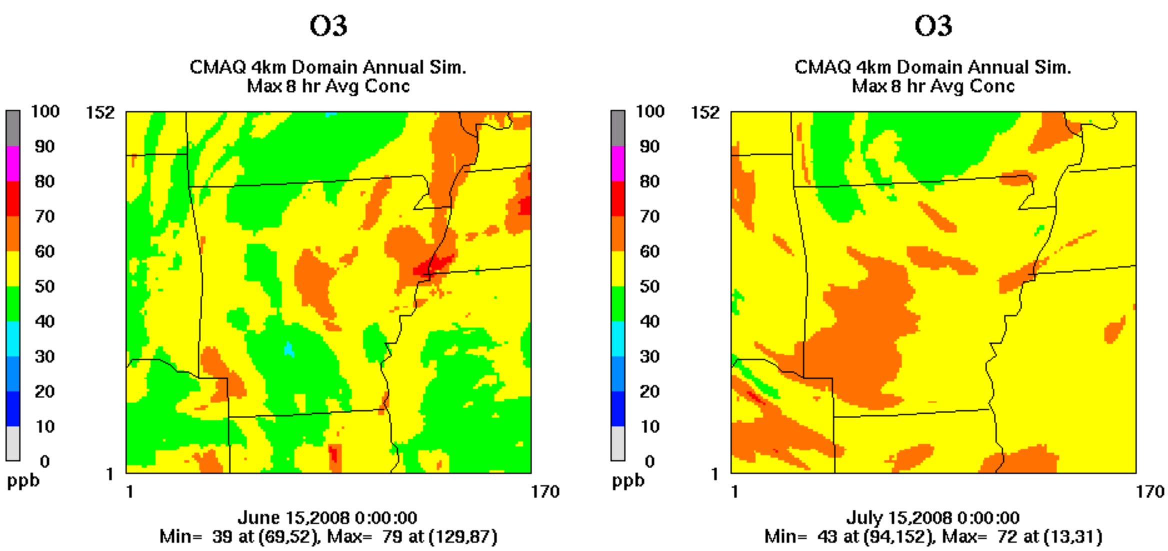
Spatial plots of the simulated ozone concentration patterns for the 4-km grid for selected days throughout the simulation period were plotted and examined. Figure 5-19 illustrates the daily maximum 8-hour average ozone concentration patterns for the 15th of each month (April – October). Units are parts per billion (ppb).

Figure 5-19. Simulated Daily Maximum 8-Hour Ozone Concentration (ppb) for Selected Days for the CMAQ 4-km Grid

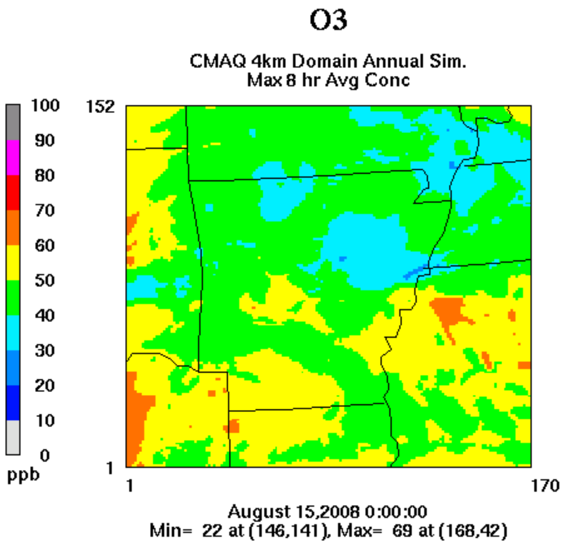
April 15/May 15

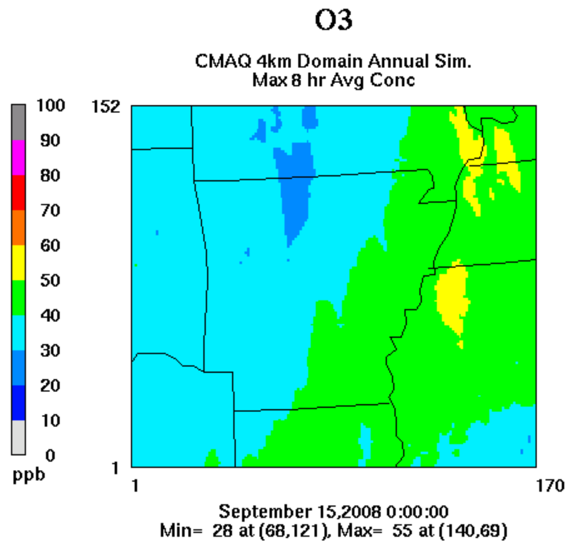


June 15/July 15

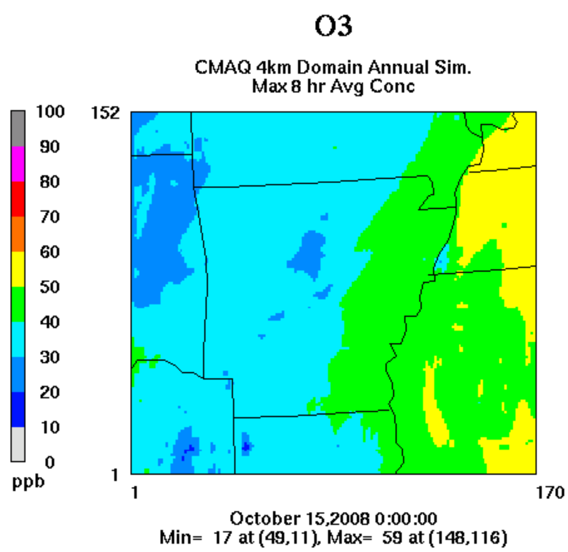


August 15/September 15





October 15

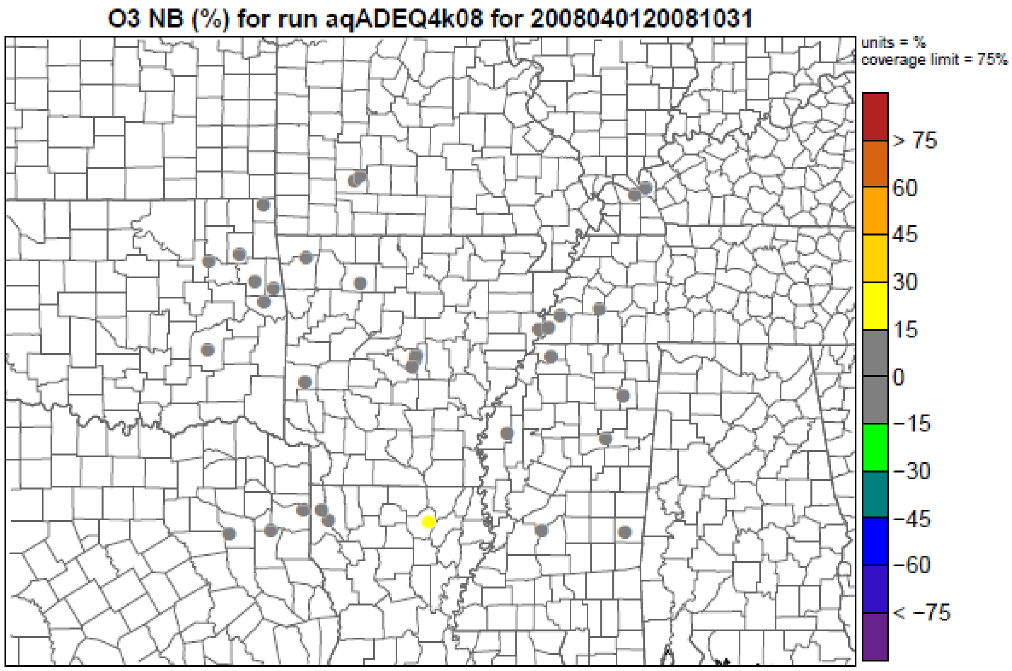


Simulated ozone concentrations over Arkansas for the selected days are mostly in the low to moderate range (40 to 60 ppb). Among the selected days, the highest simulated concentration (79 ppb) occurs near Memphis (Crittenden County) on July 15. Overall, the plots reflect the relatively low ozone concentrations that characterized the 2008 simulation period.

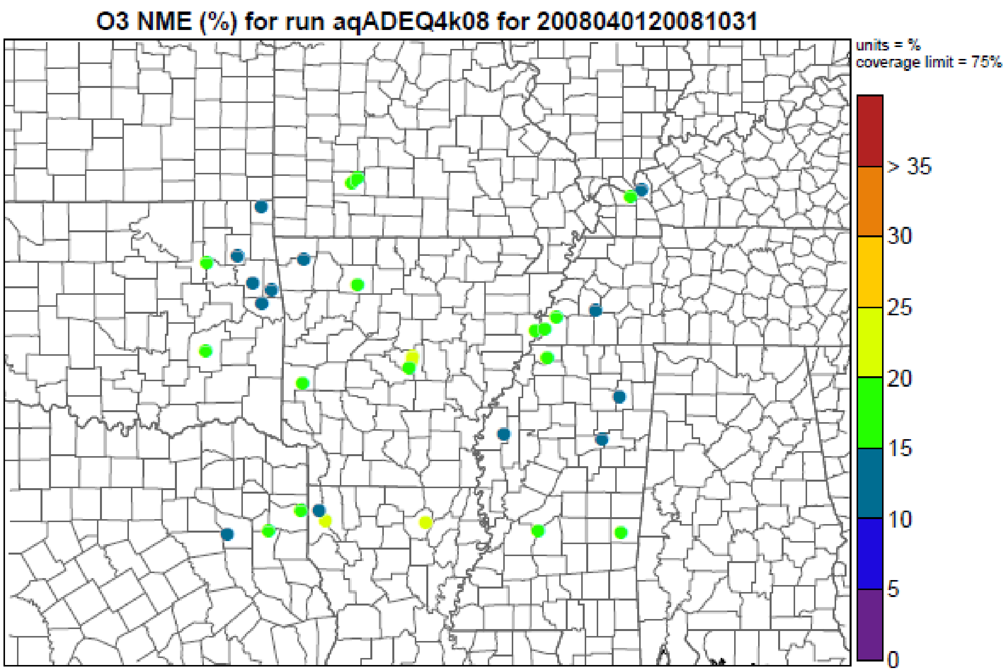
Figure 5-20 depicts the average bias and error for all sites in the 4-km modeling grid, based on daily maximum 8-hour ozone concentrations for the ozone season months (April through October). For the normalized bias, gray shaded circles indicate that the bias is within ± 15 percent; blue and green shading indicates underestimation of the observed concentrations and yellow, orange, and red shading indicates overestimation. For the normalized mean error, blue and green shading represent the smaller errors, while red indicates an error greater than 35 percent. A lower bound of 40 ppb was used in calculating the normalized bias and error statistics. Note that the plotted area is slightly larger than the 4-km grid, but that information is presented only for sites within the 4-km grid.

Figure 5-20. Normalized Bias (%) and Normalized Mean Error (%) Based on Daily Maximum 8-Hour Average Simulated and Observed Ozone Concentrations for April through October for the CMAQ 4-km Grid

Normalized Bias



Normalized Mean Error

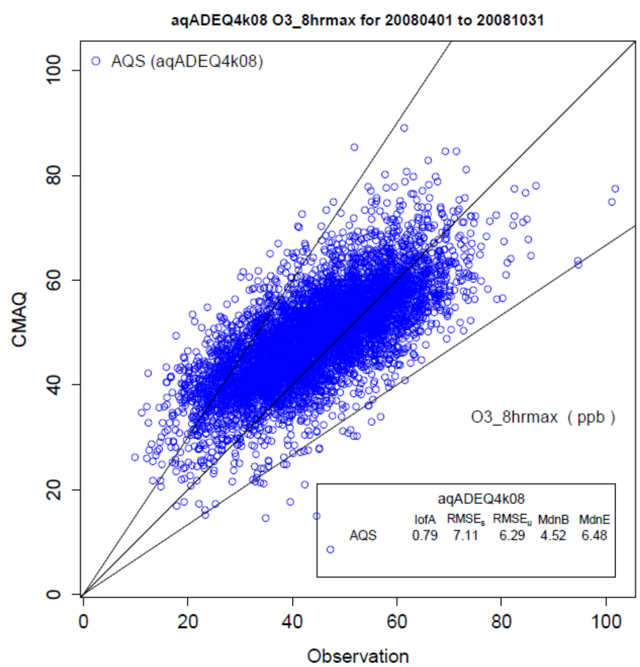


Model performance is consistently good throughout the 4-km grid and no distinct spatial patterns emerge. For all but one monitoring site, the normalized bias is within ± 15 percent (as indicated by the gray shading). The normalized mean error is less than 35 percent (actually less than 25 percent) for all sites and months.

Comparison of Simulated and Observed Concentrations

A scatter plot comparing simulated and observed daily maximum 8-hour ozone concentrations for the 4-km grid for April through October is presented in Figure 5-21. Again, note that the statistical measures given on the plot are calculated using the 8-hour average ozone concentrations.

Figure 5-21. Comparison of Simulated and Observed Daily Maximum 8-Hour Average Ozone Concentration (ppb) for the 4-km Grid (April through October)



There is a slight tendency for CMAQ to overestimate the lower concentrations and underestimate the highest concentrations, but there is good agreement overall as indicated by an index of agreement of 0.79.

Statistical Measures of Model Performance

Summary metrics and statistical measures calculated using hourly ozone concentrations for the 4-km grid are presented in Table 5-7. A lower bound of 40 ppb was used in calculating the normalized bias and error statistics.

Table 5-7. Summary Model Performance Statistics for Ozone for the 4-km Modeling Grid

Metric	Apr	May	Jun	Jul	Aug	Sep	Oct	Apr-Oct	Goal
Number of Data Pairs	9,527	9,099	5,747	8,406	7,148	4,451	5,125	49,503	
Mean Observed (ppb)	49.7	50.1	50.5	52.6	50.3	5.2	48.6	50.5	
Mean Simulated (ppb)	47.9	45.6	47.2	51.1	50.3	51.2	46.0	48.4	
Mean Bias (ppb)	-1.8	-4.5	-3.3	-1.6	0.0	0.0	-2.6	-2.1	
Normalized Bias (%)	-2.9	-8.2	-5.6	-2.1	0.5	0.8	-5.1	-3.5	**± 15**
Normalized Mean Bias (%)	-3.6	-8.9	-6.5	-3.0	0.1	0.0	-5.4	-4.1	
Fractional Bias (%)	-5.0	-11.1	-8.7	-5.3	-3.5	-1.6	-7.5	-6.4	
Mean Error (ppb)	7.0	6.4	8.6	9.1	9.6	7.8	6.8	8.2	
Normalized Error (%)	14.2	16.5	17.1	17.8	19.7	15.8	14.1	16.5	**≤ 35**
Normalized Mean Error (%)	14.0	16.4	17.0	17.2	19.1	15.3	13.9	16.2	
Fractional Error (%)	15.3	18.7	19.0	19.2	21.3	16.5	15.8	18.1	
Correlation (unitless)	0.48	0.42	0.49	0.49	0.47	0.51	0.51	0.48	
Index of Agreement (unitless)	0.67	0.60	0.66	0.68	0.63	0.70	0.66	0.66	

The statistical measures for the 4-km grid show underestimation of ozone for most months, with the exception of August and September. The normalized bias is well within ±15 percent and the normalized error is well within 35 percent for all months and for the ozone season. Using a lower-bound value of 60 ppb, the normalized mean bias for the multi-month period (April- October) is –10.7 percent and the normalized mean error is 14.4 percent, also within the model performance goals.

5.2.2 Summary of Model Performance for $PM_{2.5}$

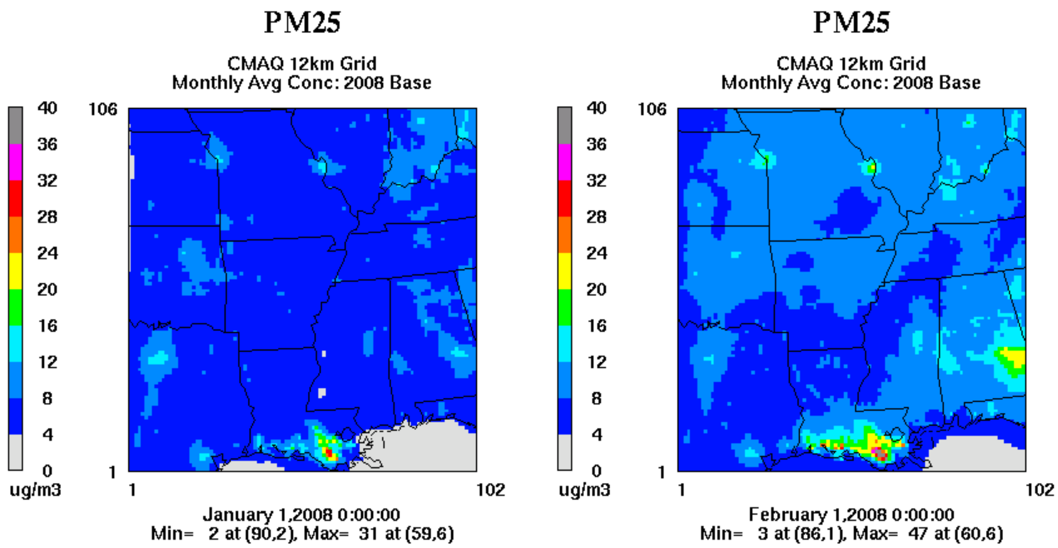
12-km Grid

Spatial Concentration Patterns

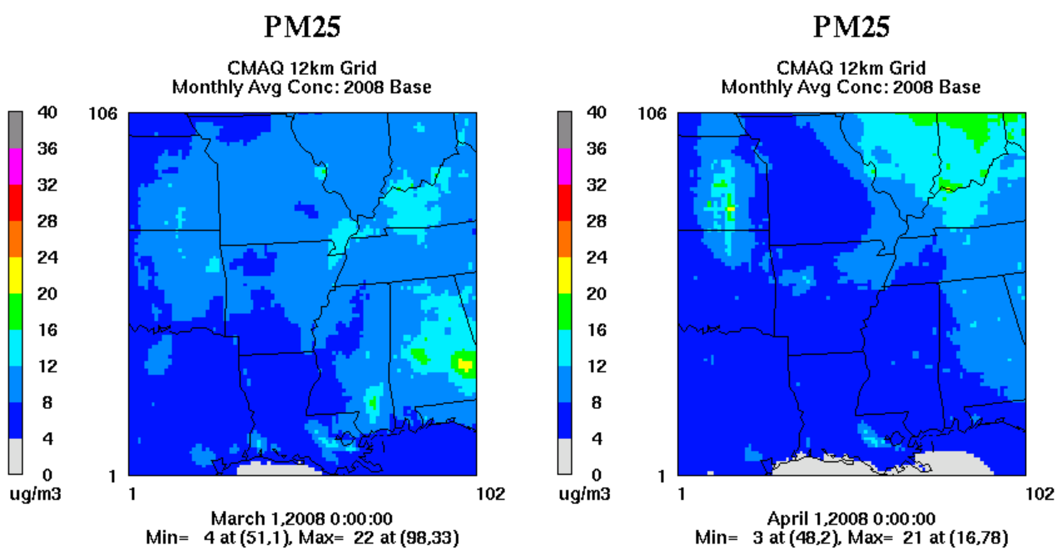
Spatial plots of the monthly average simulated $PM_{2.5}$ concentration patterns for the 12-km grid are illustrated in Figure 5-22. The units are micrograms per cubic meter (µg/m^3).

Figure 5-22. Simulated Monthly Average $PM_{2.5}$ Concentration ($\mu g/m^3$) for the CMAQ 12-km Grid

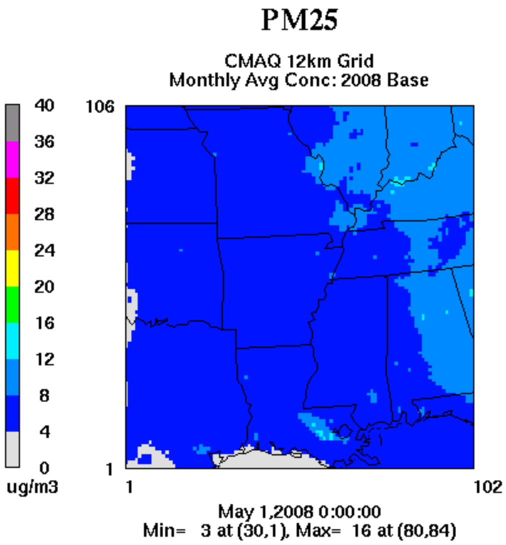
January/February

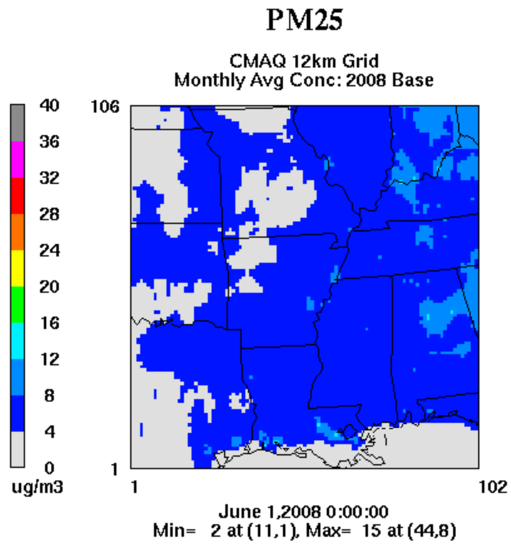


March/April

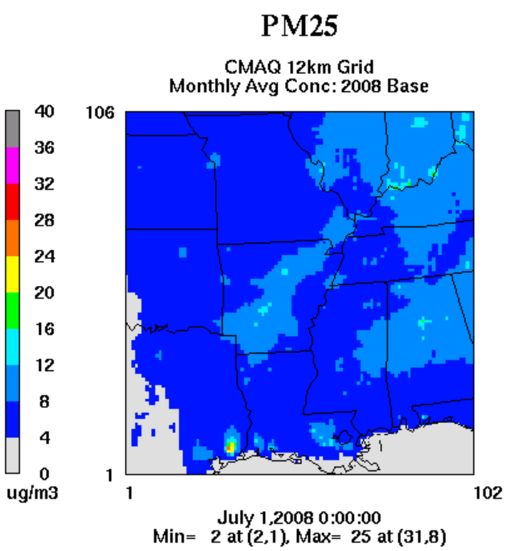


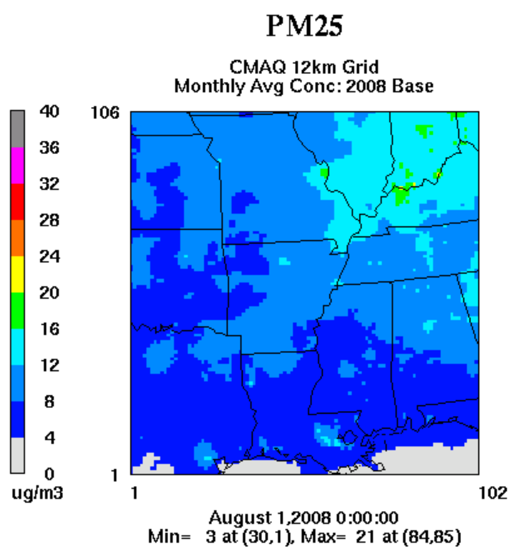
May/June



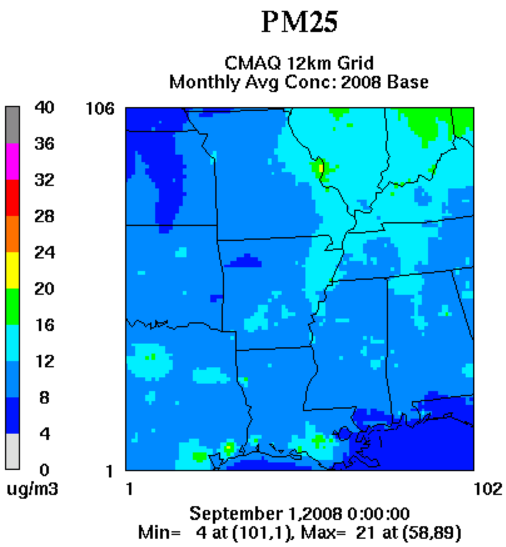


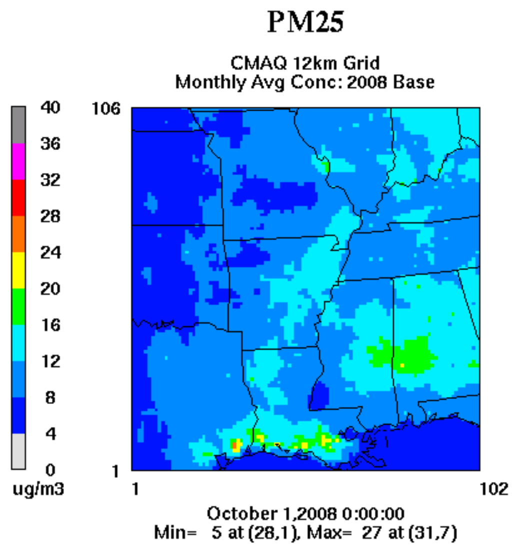
July/August



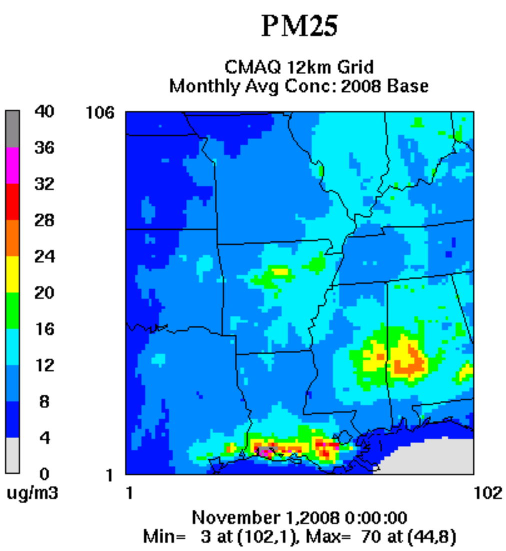


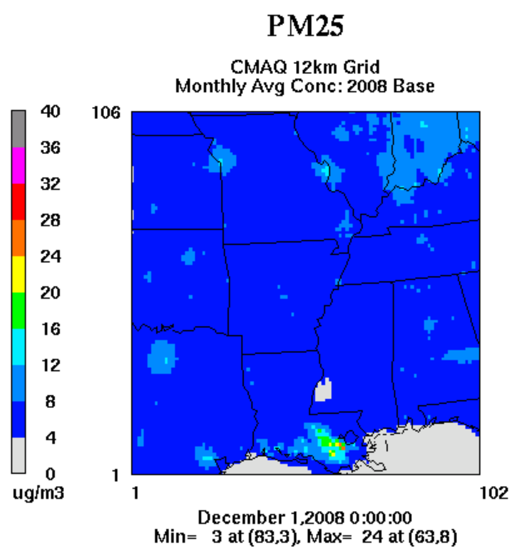
September/October





November/December

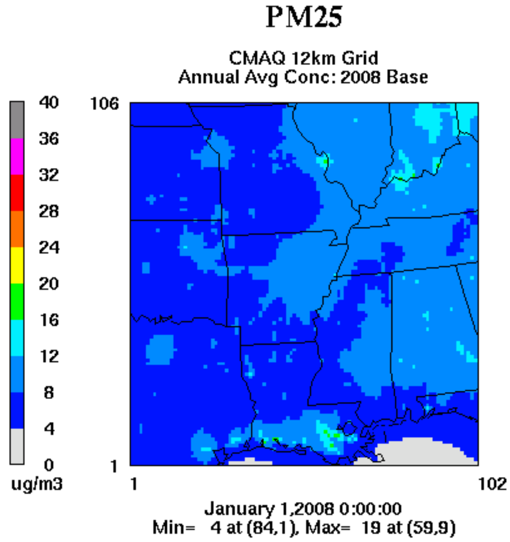




For most months, the simulated monthly average $PM_{2.5}$ concentrations over Arkansas are low – in some cases less than 8 µg/m^3 and in most cases less than 12 µg/m^3. The simulated concentrations are highest for September, October and November. For November, concentrations greater than 20 µg/m^3 occur over the north-central and northeastern portions of the state.

Figure 5-23 displays the annual average simulated $PM_{2.5}$ concentration pattern for the 12-km grid.

Figure 5-23. Simulated Annual Average $PM_{2.5}$ Concentration (µg/m^3) for the CMAQ 12-km Grid

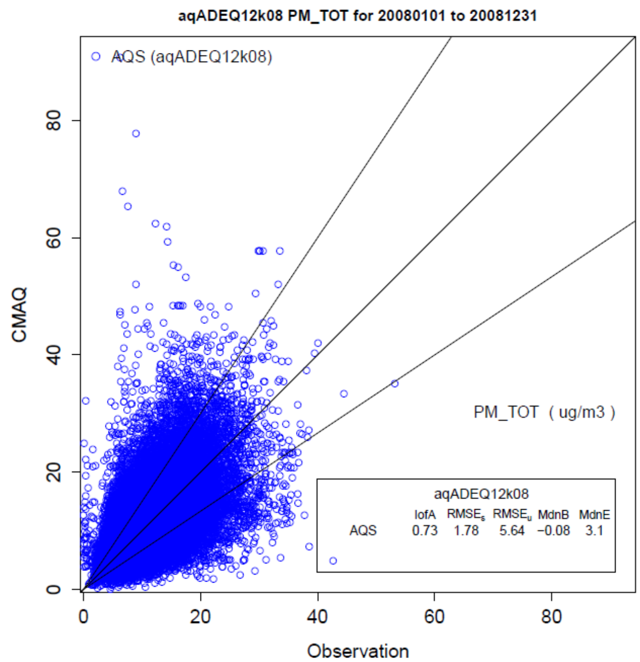


The simulated annual average concentrations range from about 4 to 12 µg/m^3 over Arkansas and across most of the 12-km grid. The maximum simulated annual average $PM_{2.5}$ concentration is only 19 µg/m^3 and is located along the coast of Louisiana.

Comparison of Simulated and Observed Concentrations

Scatter plots comparing simulated and observed 24-hour $PM_{2.5}$ concentrations for AQS sites within the 12-km grid for the annual simulation period are presented in Figure 5-24.

Figure 5-24. Comparison of Simulated and Observed 24-Hour Average $PM_{2.5}$ Concentration ($\mu g/m^3$) for the 12-km Grid (All Months)



The scatter plot indicates both over and underestimation of the observed annual average $PM_{2.5}$ concentrations within the 12-km grid, but overall good correlation as indicated by an index of agreement of 0.73.

Statistical Measures of Model Performance

Summary metrics and statistical measures calculated using 24-hr $PM_{2.5}$ concentrations for the 12-km grid are presented in Table 5-8. The recommended ranges for the fractional bias and fractional error are based on Boylan (2005) and are widely used for regional-scale model performance evaluation for $PM_{2.5}$. No lower bound was applied in calculating the statistics.

Table 5-8. Summary Model Performance Statistics for $PM_{2.5}$ for the 12-km Modeling Grid

Metric	Jan-Mar	Apr-Jun	Jul-Sep	Oct-Dec	Annual	Goal
Number of Data Pairs	6,717	6,363	6,526	6,511	26,135	
Mean Observed (ppb)	10.7	11.0	14.6	10.3	11.6	
Mean Simulated (ppb)	11.6	10.0	12.5	13.4	11.9	
Mean Bias (ppb)	0.9	-1.0	-2.1	3.0	0.2	
Fractional Bias (%)	3.7	-13.9	-18.7	21.2	-1.8	**± 60**
Mean Error (ppb)	4.0	3.8	4.8	4.4	4.3	
Fractional Error (%)	35.1	36.8	37.7	36.2	36.4	**≤ 75**
Correlation (unitless)	0.55	0.50	0.58	0.70	0.56	
Index of Agreement (unitless)	0.71	0.69	0.74	0.75	0.73	

On average, $PM_{2.5}$ concentrations are overestimated for first and fourth quarters and underestimated for the second and third quarters. The lowest bias and error values and thus the best model performance are achieved for the first quarter, when observed $PM_{2.5}$ concentrations are relatively low. The statistical measures for fractional bias and fractional error are well within the model performance goals for all periods.

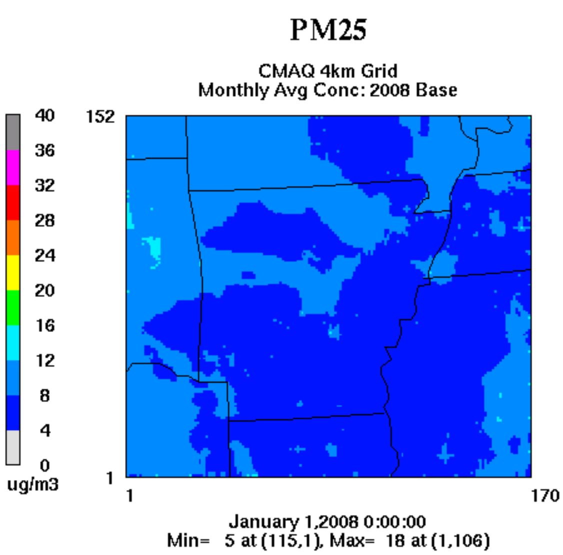
4-km Grid

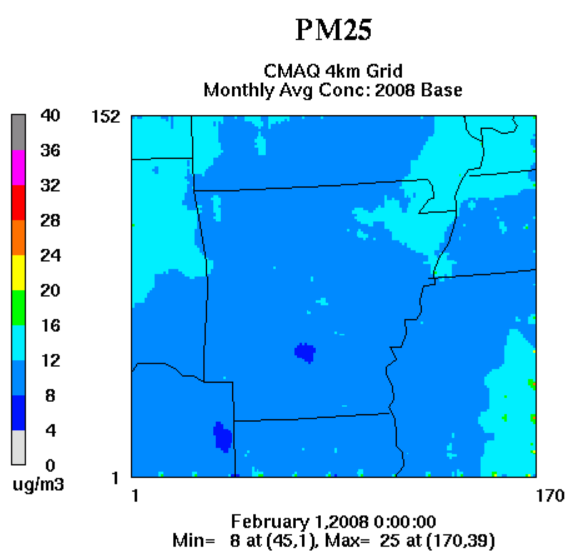
Spatial Concentration Patterns

Spatial plots of the monthly average simulated $PM_{2.5}$ concentration patterns for the 4-km grid are illustrated in Figure 5-25. The units are micrograms per cubic meter (µg/m^3).

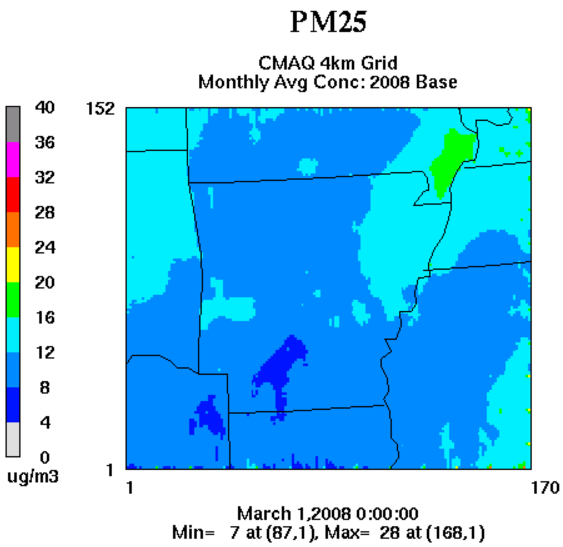
Figure 5-25. Simulated Monthly Average $PM_{2.5}$ Concentration (µg/m^3) for the CMAQ 4-km Grid

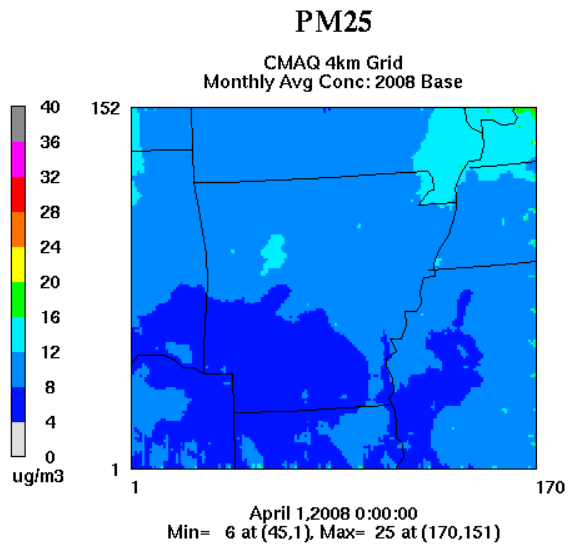
January/February



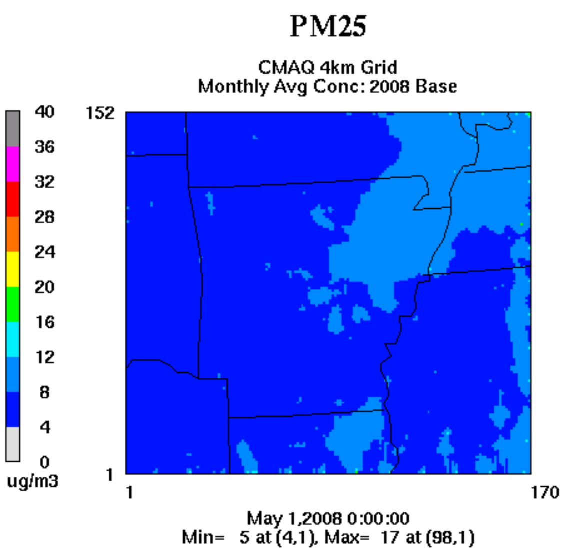


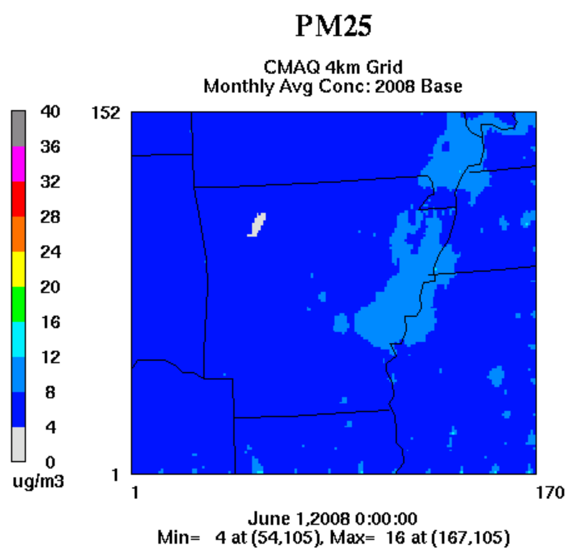
March/April



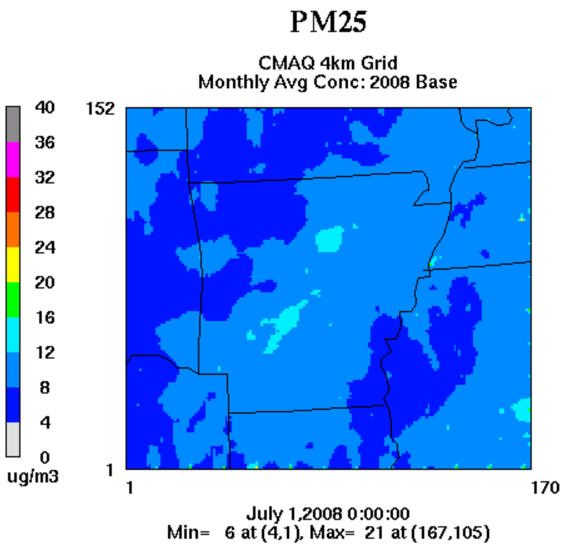


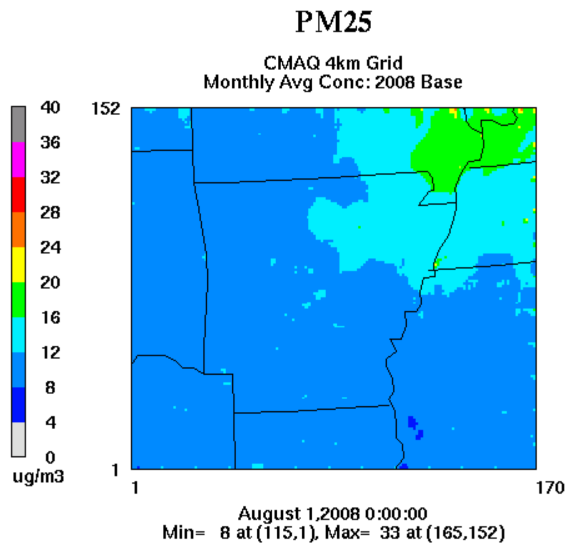
May/June



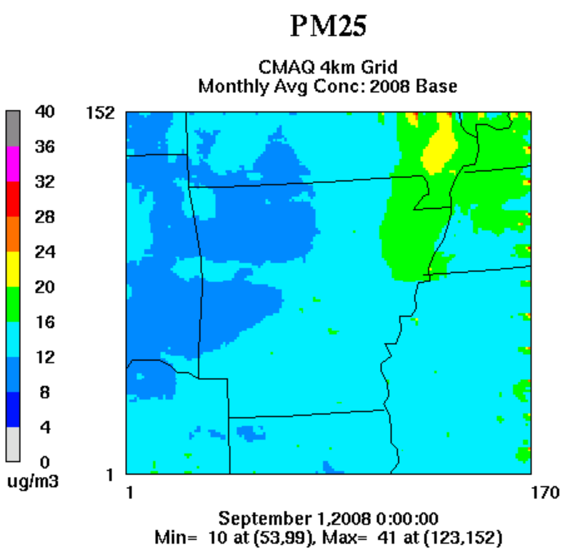


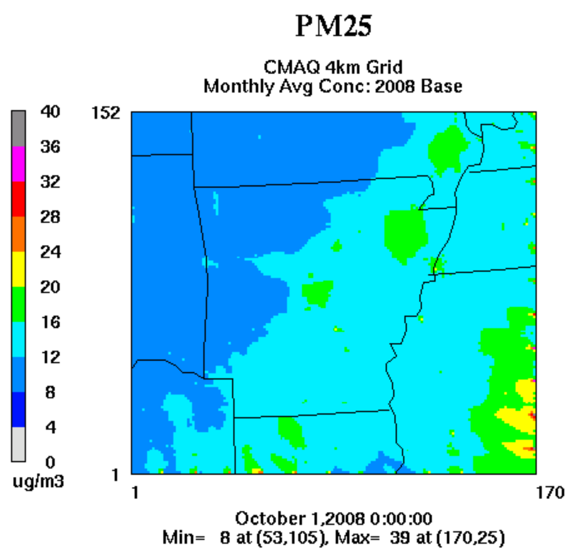
July/August



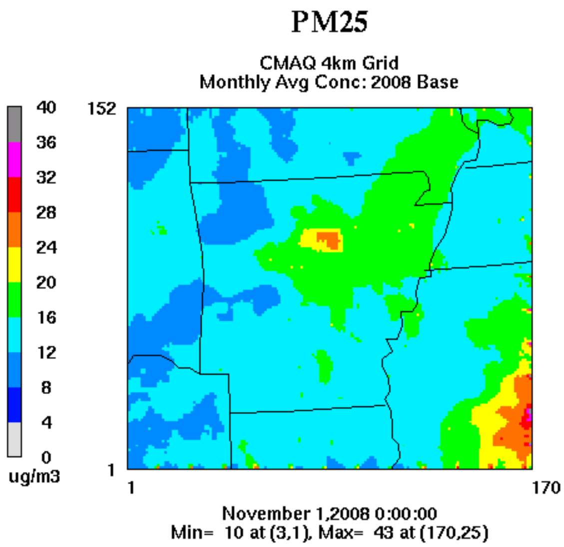


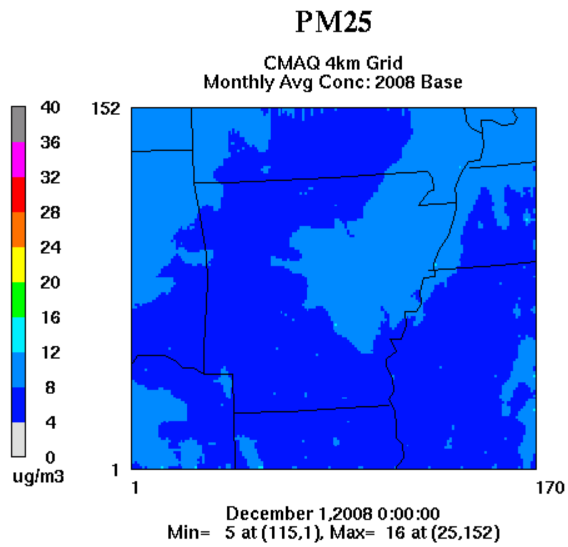
September/October





November/December

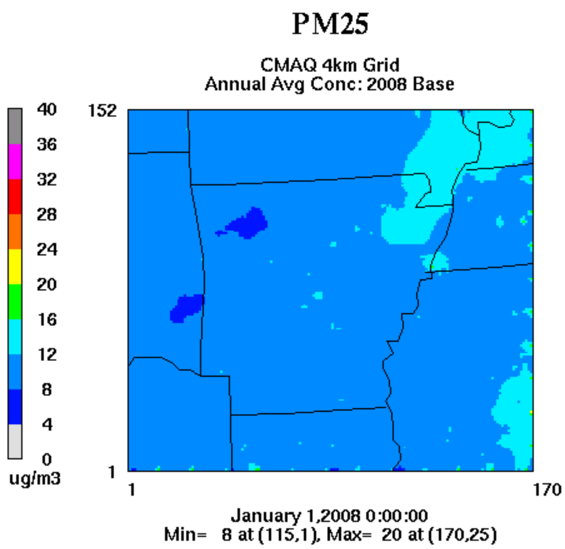




For most months, the simulated monthly average $PM_{2.5}$ concentrations over Arkansas are generally within the range of 4 to 16 µg/m^3. A few months (May, June, and December) are characterized by lower concentrations. September, October, and November have somewhat higher concentrations (with maximum values in the 16 to 28 µg/m^3 range).

Figure 5-26 displays the annual average simulated $PM_{2.5}$ concentration pattern for the 4-km grid.

Figure 5-26. Simulated Annual Average $PM_{2.5}$ Concentration (µg/m^3) for the CMAQ 4-km Grid

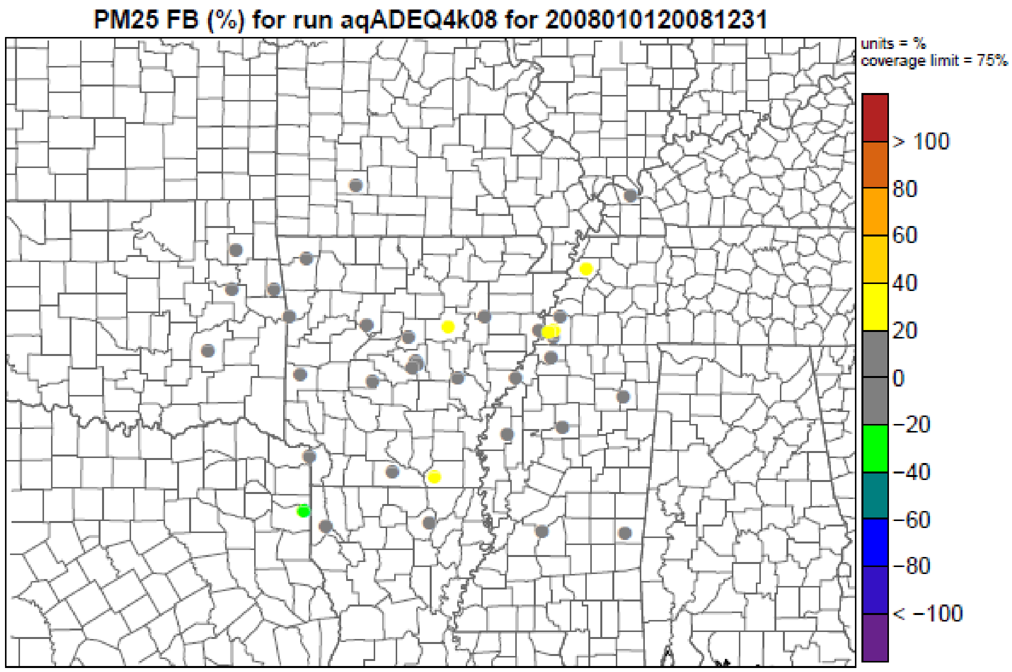


The simulated annual average $PM_{2.5}$ concentrations for 2008 are less than 16 µg/m^3 throughout the state of Arkansas. The highest concentrations occur near Little Rock and Memphis, and in the northeast portion of the state.

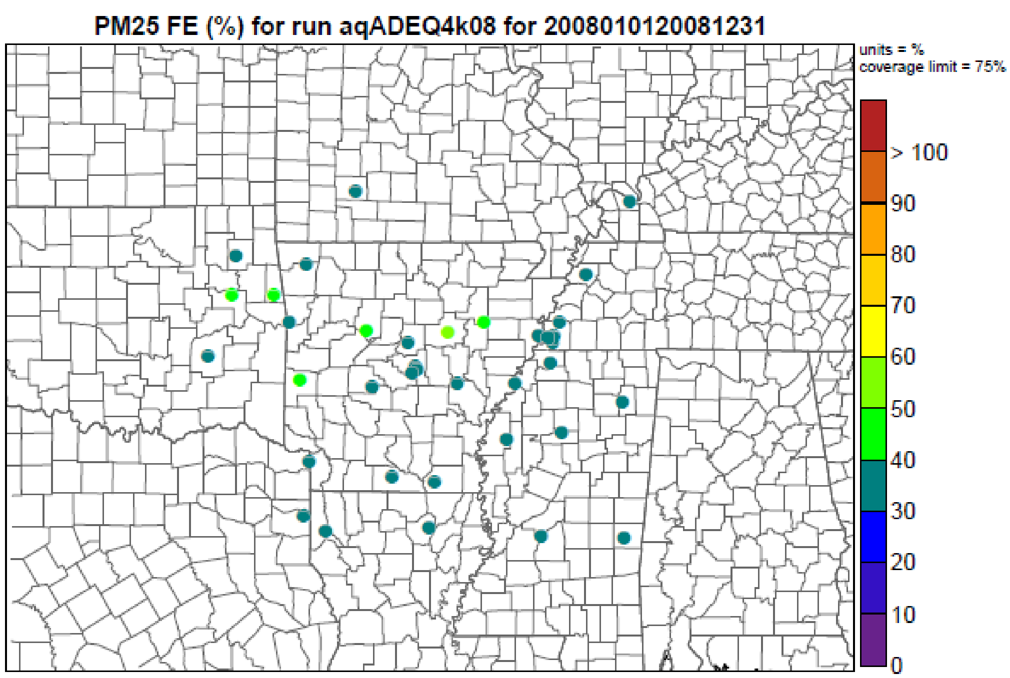
To illustrate the agreement between the simulated and observed values, Figure 5-27 depicts the fractional bias and fractional error statistics for the 4-km modeling domain. The statistics are calculated using 24-hour average $PM_{2.5}$ concentrations and are calculated using data for the annual simulation period. Again, each monitoring site is represented by a circle and the shading of the circle provides information about how well the 24-hour observed $PM_{2.5}$ concentrations are represented by the simulation results, on average. For the fractional bias, gray shaded circles indicate that the fractional bias is within ± 20 percent and, in general, values within ±60 percent (lighter colors) correspond to acceptable model performance. Blue and green shading indicates underestimation of the observed concentrations and yellow, orange, and red shading indicates overestimation. For the fractional error, blue and green shading represent the smaller errors, while red indicates an error greater than 100 percent. Values less than 75 percent are considered to represent reasonable model performance for $PM_{2.5}$.

Figure 5-27. Fractional Bias (%) and Fractional Error (%) Based on 24-Hour Average Simulated and Observed $PM_{2.5}$ Concentrations for CMAQ 4-km Grid (All Months)

Fractional Bias



Fractional Error

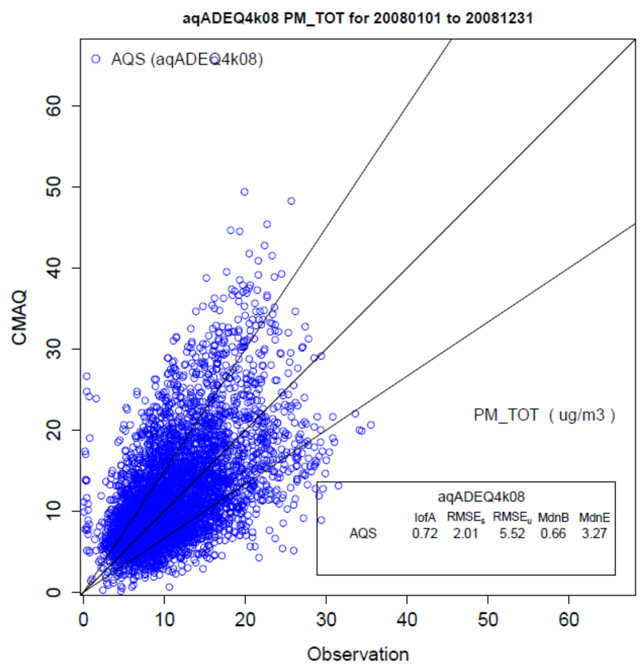


The fractional bias is within the range of -40 to 40 percent (as indicated by the green, gray and yellow shading) and the fractional error is less than 60 percent for all sites.

Comparison of Simulated and Observed Concentrations

Scatter plots comparing simulated and observed 24-hour $PM_{2.5}$ concentrations for AQS sites within the 4-km grid for the annual simulation period are presented in Figure 5-28.

Figure 5-28. Comparison of Simulated and Observed 24-Hour Average $PM_{2.5}$ Concentration (µg/m^3) for the 4-km Grid (All Months)



The scatter plot shows a tendency for overestimation but otherwise fairly good agreement between the simulated and observed $PM_{2.5}$ concentrations.

Statistical Measures of Model Performance

Summary metrics and statistical measures calculated using 24-hr $PM_{2.5}$ concentrations for the 4-km grid are presented in Table 5-9. The recommended ranges for the fractional bias and fractional error are based on Boylan (2005) and are widely used for regional-scale model performance evaluation for $PM_{2.5}$. No lower bound was applied in calculating the statistics.

Table 5-9. Summary Model Performance Statistics for $PM_{2.5}$ for the 4-km Modeling Grid

Metric	Jan–Mar	Apr–Jun	Jul–Sep	Oct–Dec	Annual	Goal
Number of Data Pairs	1,258	1,161	1,201	1,174	4,794	
Mean Observed (ppb)	9.5	10.4	14.8	10.5	11.3	
Mean Simulated (ppb)	11.6	9.4	13.3	14.8	12.3	
Mean Bias (ppb)	2.2	-1.0	-1.5	4.2	1.0	
Fractional Bias (%)	19.9	-11.0	-16.0	31.4	6.2	**± 60**
Mean Error (ppb)	3.9	3.1	5.1	5.4	4.4	
Fractional Error (%)	36.7	32.9	38.2	42.5	37.6	**≤ 75**
Correlation (unitless)	0.51	0.51	0.55	0.67	0.54	
Index of Agreement (unitless)	0.66	0.70	0.72	0.71	0.72	

On average, $PM_{2.5}$ concentrations are overestimated for the 4-km grid for the first and fourth quarters and underestimated for the second and third quarters. Thus, model performance is a bit inconsistent throughout the simulation period. Overestimation during the winter months was also noted for the 2005 simulation period. The fractional bias and error values are well within the model performance goals for all periods.

5.2.3 Summary of Model Performance for PM_{10}, NO_x, SO_2 and CO

Model performance for PM_{10}, NO_x, SO_2 and CO was examined with emphasis on quarterly and annual average concentrations. Observed concentrations of these criteria pollutants are generally expected to represent local rather than regional scale concentrations. This is due to the fact that these pollutants are directly emitted into the atmosphere and also because the monitoring sites are typically located in urban areas and near roadways. A grid-based model like CMAQ may not be able to capture the sub grid-scale variations in concentration reflected in the data that are due to local emissions sources and thus may not agree with the observed data unless the data are representative of area encompassed by a grid cell. Thus, model performance for these species was examined only for the 4-km grid.

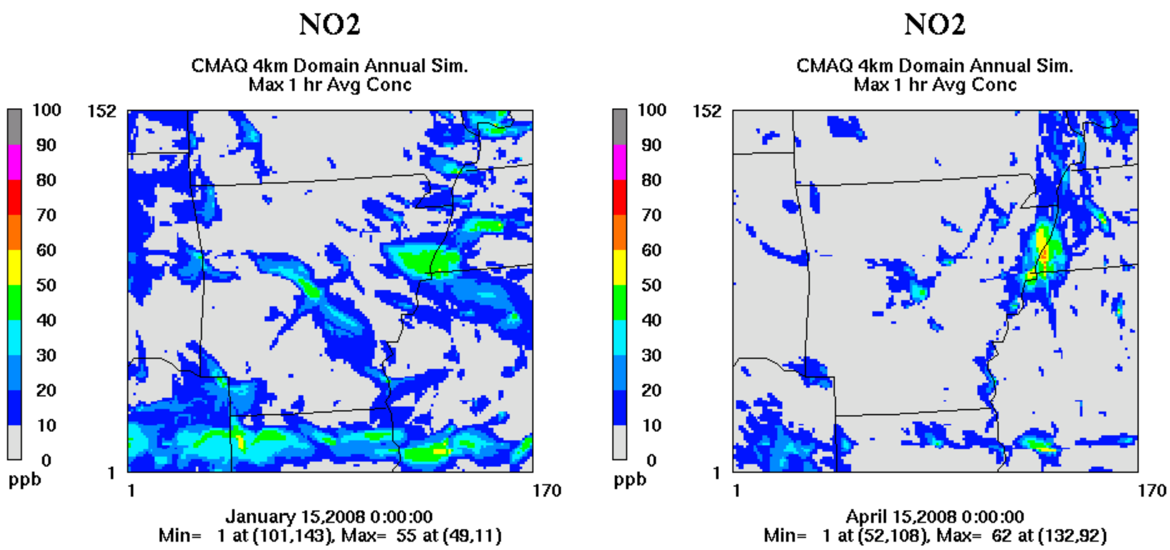
4-km Grid

Spatial Concentration Patterns for NO_2 and SO_2

Spatial plots of the simulated NO_2 and SO_2 concentration patterns for the 4-km grid for selected days throughout the simulation period were plotted and examined. Figures 5-29 and 5-30 illustrate the daily maximum 1-hour average NO_2 concentration patterns and daily maximum 1-hour average SO_2 concentration patterns, respectively, for the 15th of January, April, July, and October (one day per quarter). These are provided primarily as a point of reference for the difference plots presented in Section 6. Units are parts per billion (ppb).

Figure 5-29. Simulated Daily Maximum 1-NO_2 Concentration (ppb) for Selected Days for the CMAQ 4-km Grid

January 15/April 15



July 15/October 15

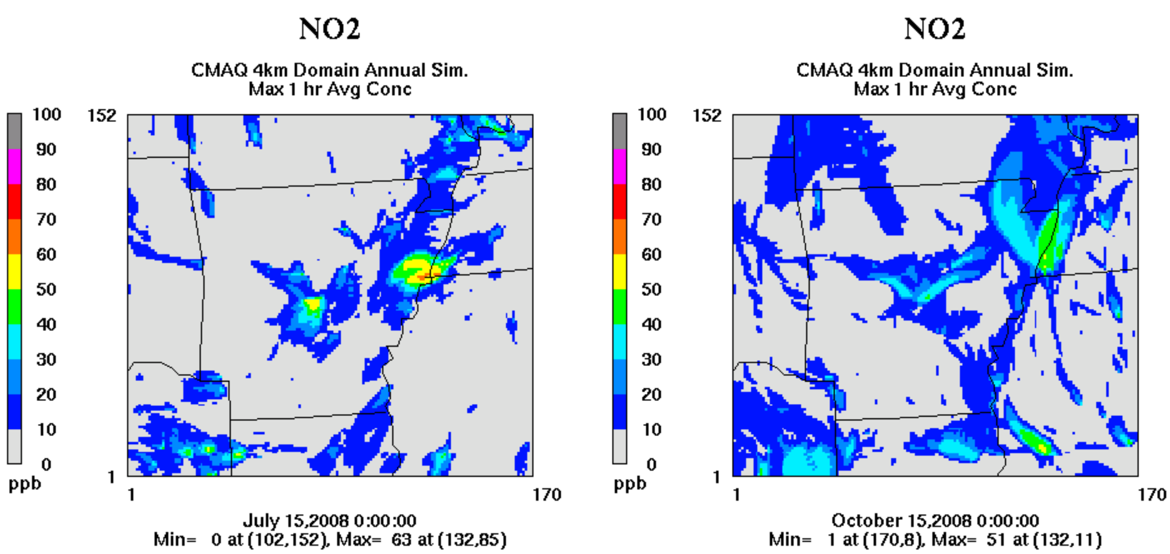
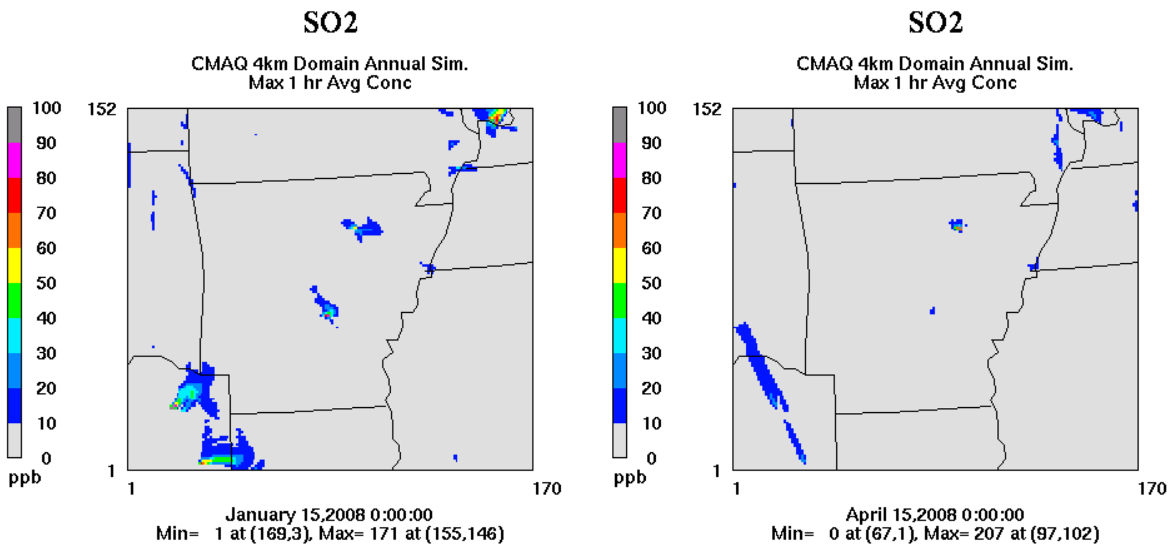
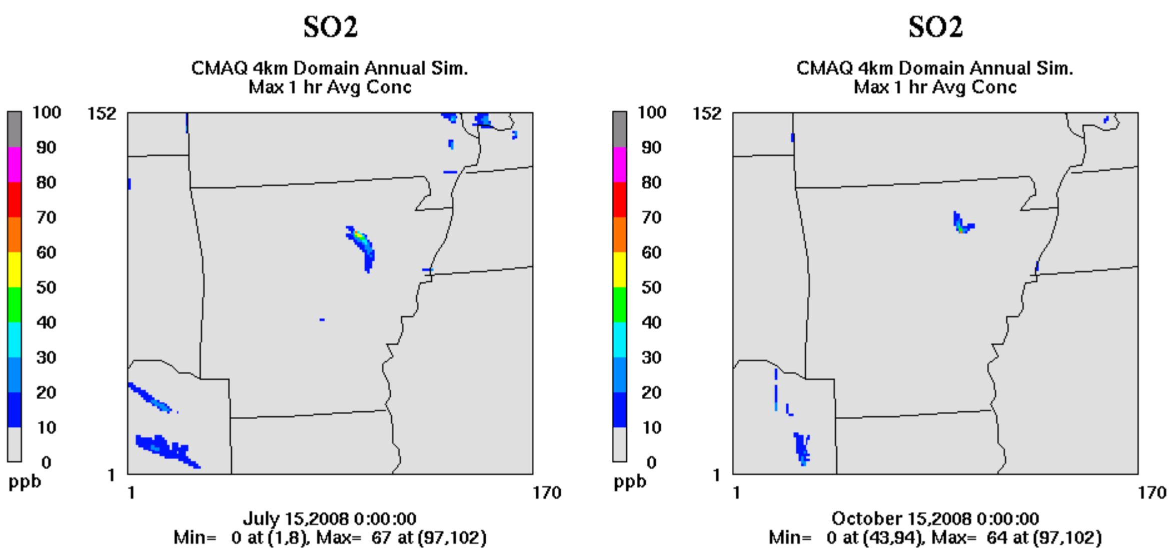


Figure 5-30. Simulated Daily Maximum 1-SO_2 Concentration (ppb) for Selected Days for the CMAQ 4-km Grid

January 15/April 15



July 15/October 15

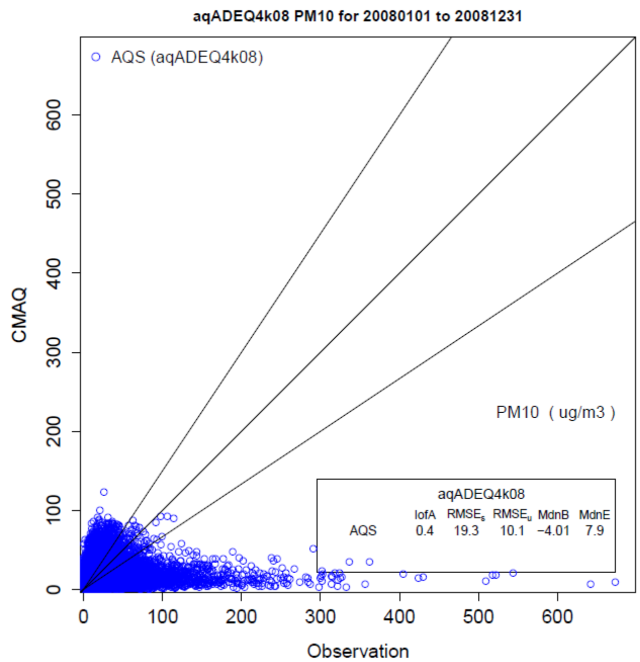


As for 2005, the simulated NO_2 concentrations for 2008 are highest over and downwind of Memphis, Little Rock, and (in some cases) other urban areas. There are a couple of areas of high SO_2 concentrations within Arkansas, as well as in southern Illinois and northeastern Texas. The majority of these areas are located downwind of various EGUs or other large industrial sources. For example, the high SO_2 “plumes” in northeastern Arkansas (near Batesville), depicted in the monthly plots, are from the FutureFuel Chemical Co. source, the former Eastman Chemical Co. facility. The FutureFuel facility started operations in 2006 and for 2008 was the largest non-EGU SO_2 source in the state with SO_2 emission levels of 2,881 tons per year.

Comparison of Simulated and Observed Concentrations

Scatter plots comparing simulated and observed 24-hour PM_{10} concentrations for AQS sites within the 4-km grid for the annual simulation period are presented in Figure 5-31. Units for PM_{10} are $\mu g/m^3$.

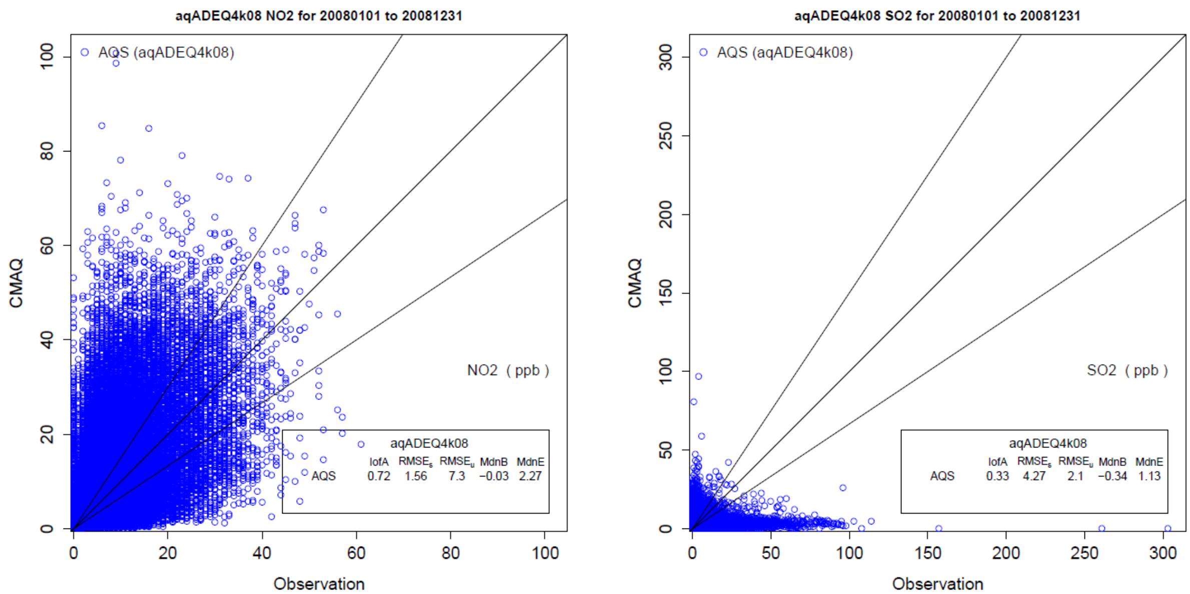
Figure 5-31. Comparison of Simulated and Observed 24-Hour Average PM_{10} Concentration ($\mu g/m^3$) for the 4-km Grid (All Months)



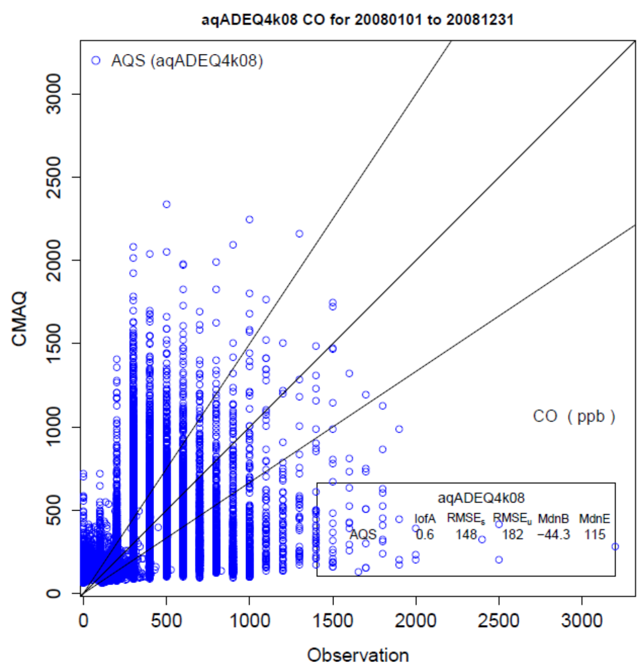
Scatter plots comparing simulated and observed hourly NO_x, SO_2, and CO concentrations for AQS sites within the 4-km grid for the annual simulation period are presented in Figure 5-32. Units for the gaseous species are ppb.

Figure 5-32. Comparison of Simulated and Observed Hourly Average NO_2, SO_2, and CO Concentrations (ppb) for the 4-km Grid (All Months)

NO_2/SO_2



CO



PM_{10} concentrations are mostly underestimated, but there is a lot of scatter about the 1:1 line. The higher PM_{10} concentrations are consistently underestimated while the low observed values are both under- and overestimated. Model performance for 1-hour NO_2, SO_2, and CO concentrations is characterized by a good deal of scatter about the 1:1 line and a tendency for overestimation of NO_2, and underestimation of SO_2 and CO.

Statistical Measures of Model Performance

Summary metrics and statistical measures for PM_{10}, NO_x, and SO_2 for the 4-km grid are presented in Table 5-10. No lower bound was applied in calculating the statistics; fractional bias and error are emphasized.

Table 5-10. Summary Model Performance Statistics for PM_{10}, NO_2, SO_2 and CO for the 4-km Modeling Grid

Metric	PM_{10} (µg/m$^{3)}$	NO_2 (ppb)	SO_2 (ppb)	CO (ppb)
Number of Data Pairs	3,148	83,448	130,236	34,383
Mean Observed (ppb)	18.6	6.4	3.6	309
Mean Simulated (ppb)	15.1	7.8	1.6	264
Mean Bias (ppb)	-3.6	1.4	-0.9	-45.3
Fractional Bias (%)	-19.7	-3.2	-54.2	-8.1
Mean Error (ppb)	10.1	4.5	2.3	162
Fractional Error (%)	57.9	62.2	91.0	58.3

Overall, the errors for these pollutants are somewhat worse than for the 2005 simulation period. For all pollutants, the simulated values are, on average, within a factor of two of the observed values. The fractional error values are large and do not indicate a great deal of skill in replicating the observed concentrations.

6 Future-Year Modeling Results

The future-year modeling and criteria pollutant assessment results are presented in this section. The following summary of the future-year modeling results is based on the modeling results for the 4-km grid and focuses on changes in pollutant concentrations throughout the State of Arkansas and design values and design-value-related metrics at monitoring sites and unmonitored areas throughout the state.

Note that, for consistency with the 2015 emissions, the 2008 simulation was first rerun with "current-year" emissions, in which the anthropogenic emissions were consistent with 2005 and 2015 in terms of methodology, but the biogenic emissions were consistent with the 2008 meteorological conditions. The "current year" modeling results were used as the basis for the criteria pollutant assessment for 2008, as presented in the remainder of this section.

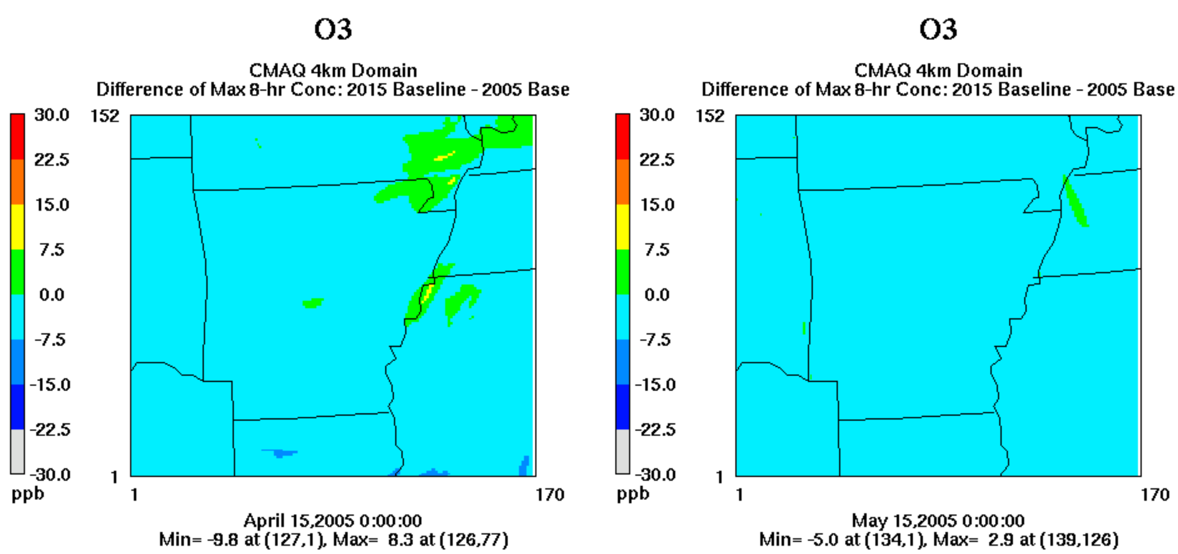
6.1 Overview of Future-Year Modeling Results

6.1.1 Ozone

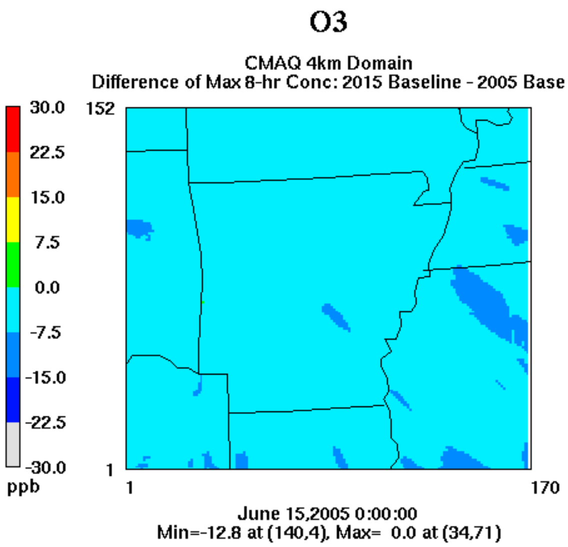
Figures 6-1 and 6-2 illustrate the difference in daily maximum 8-hour average ozone concentration for the 4-km grid and the 15th of each month (April – October) for the 2005/2015 and 2008/2015 simulation pairs. The differences are calculated as future year minus base year, specifically 2015 minus 2005 in Figure 6-1 and 2015 minus 2008 in Figure 6-2. The units are ppb. The date and time given on these and all subsequent difference plots refer to the meteorological base year and start hour for the selected day or averaging period. The minimum and maximum difference values for any location within the domain are also provided, along with their grid cell (x,y) locations.

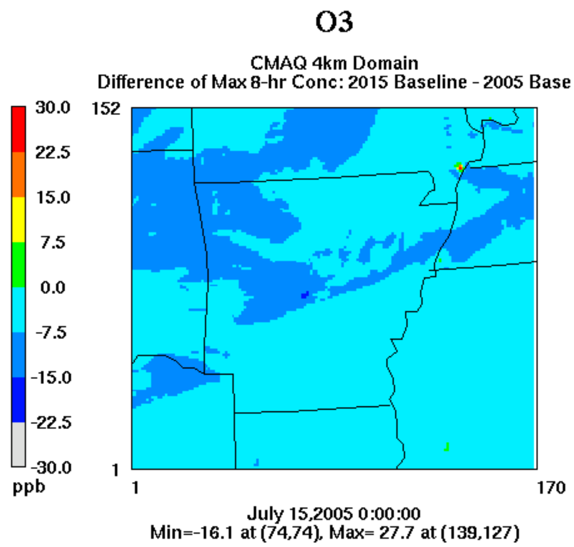
Figure 6-1. Difference in Simulated Daily Maximum 8-Hour Ozone Concentration (ppb) for Selected Days for the CMAQ 4-km Grid: 2015 - 2005

April 15/May 15

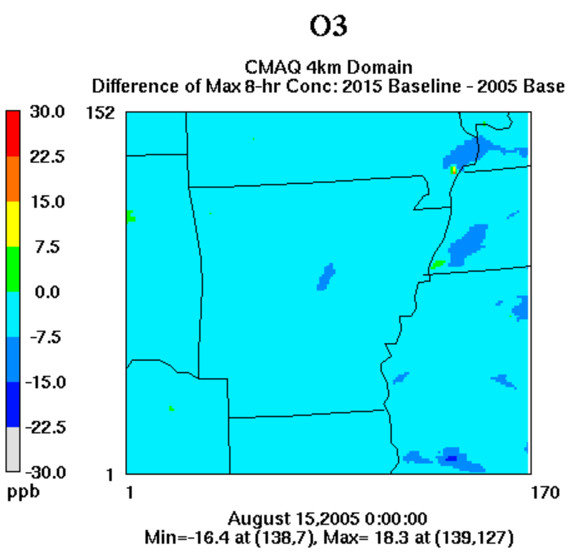


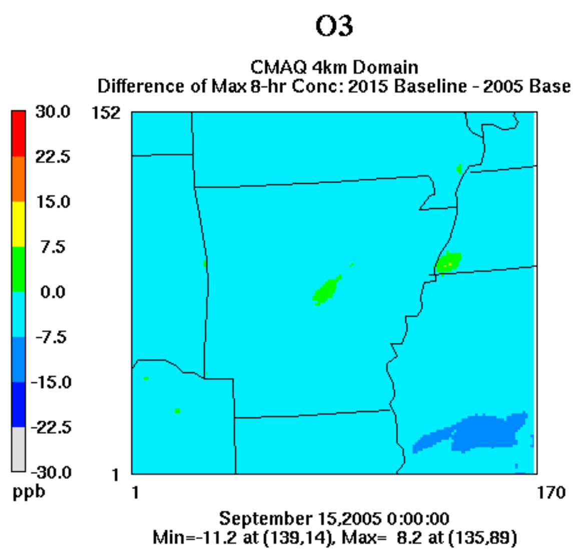
June 15/July 15





August 15/September 15





October 15

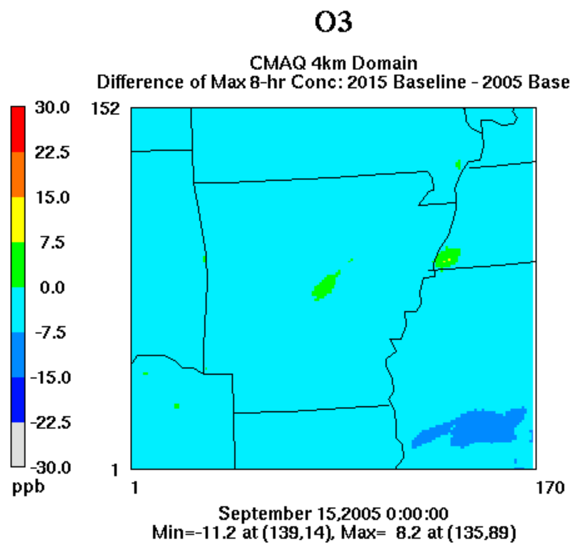
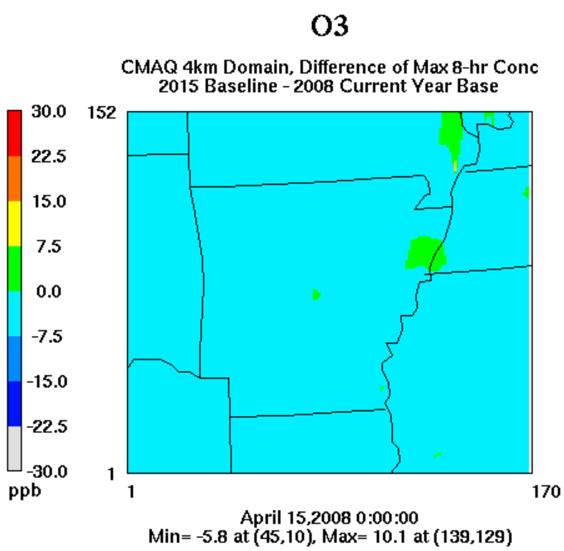
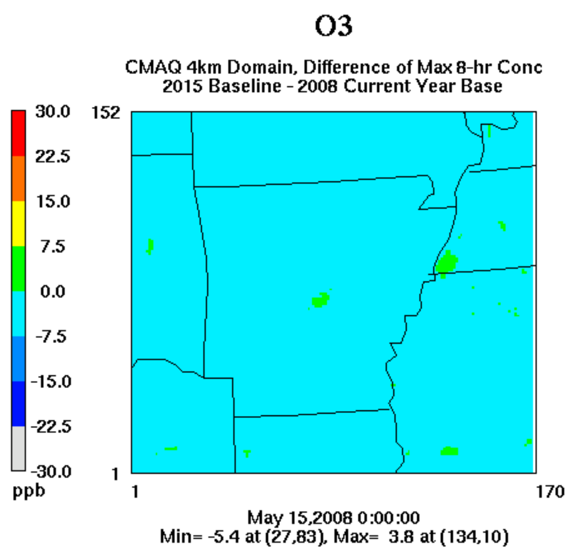


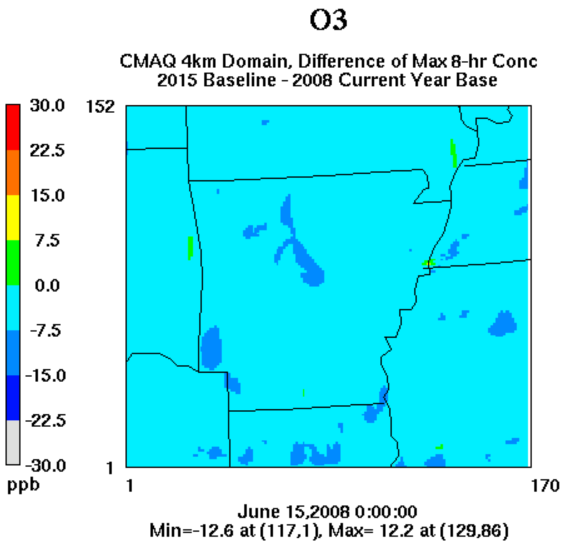
Figure 6-2. Difference in Simulated Daily Maximum 8-Hour Ozone Concentration (ppb) for Selected Days for the CMAQ 4-km Grid: 2015 - 2008

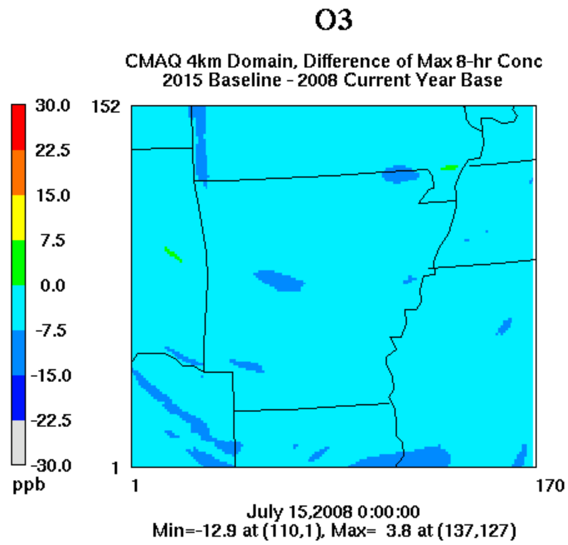
April 15/May 15



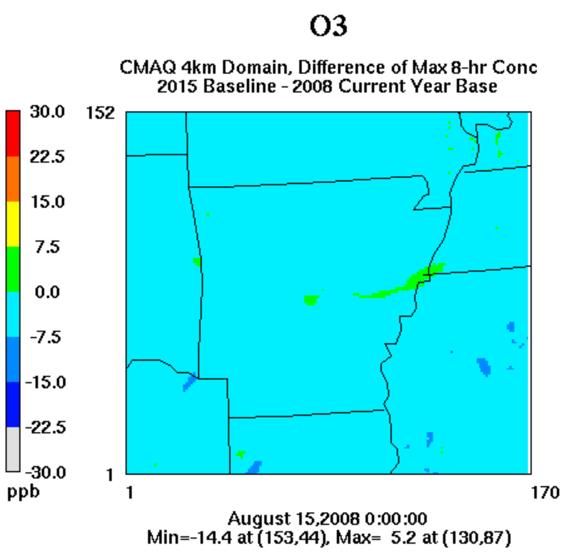


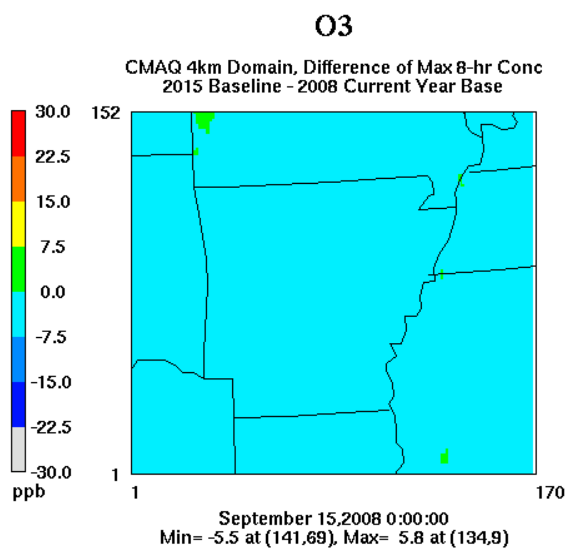
June 15/July 15



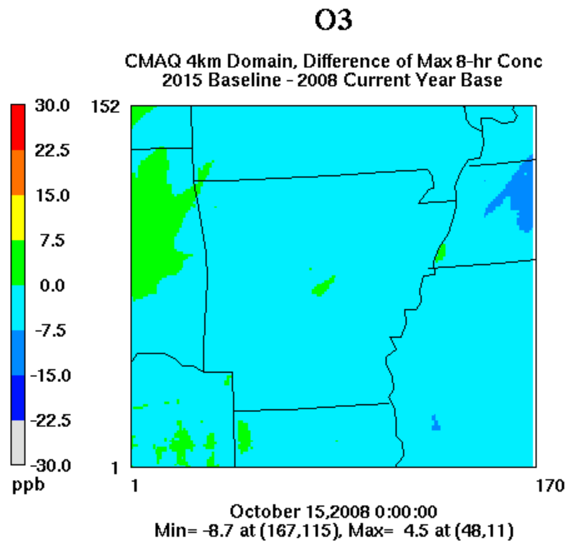


August 15/September 15





October 15



The plots show a mix of small increases and decreases in daily maximum 8-hour ozone concentrations for the selected days. The largest decreases for the selected days range from -5.0 to -16.4 ppb for the 2005/2015 simulation pair, and from -5.4 to -14.4 ppb for the 2008/2015 simulation pair. There are a few days (for example, July 15, 2005) for which the decreases over Arkansas are as much as 15 ppb.

Based on the CMAQ results, Table 6-1 summarizes the 4th high 8-hour ozone concentration (a key NAAQS related metric) for the base- and future-year simulations. Included in the table are the simulated concentrations and differences in simulated concentration for current ozone monitoring sites and any grid locations with an increase in the value of a key NAAQS metric (for any criteria pollutant) between the base and future year. The three unmonitored locations listed in Table 6-1 represent grid cells where the NAAQS-relevant concentration of any criteria pollutant (in this case SO_2) is higher for 2015 compared to both base years.

Table 6-1. Simulated 4th High Daily Maximum 8-Hour Ozone Concentration (ppb) for Monitoring Sites and Selected Unmonitored Locations within Arkansas

Site/Location	County	2005/2015 4th High 8-Hr Ozone (ppb)			2008/2015 4th High 8-Hr Ozone (ppb)		
		2005 Base Year	2015 Future Year	Diff-erence	2008 Current Year	2015 Future Year	Diff-erence
North Little Rock (Pike Ave)	Pulaski	76.3	65.7	-10.5	70.9	64.0	-6.9
North Little Rock Airport	Pulaski	74.3	66.0	-8.3	79.2	68.1	-11.2
Little Rock (Doyle Springs Rd)	Pulaski	80.3	69.3	-11.0	70.9	64.9	-6.0
Marion	Crittenden	89.8	75.4	-14.4	70.3	62.9	-7.4
Deer	Newton	66.4	59.1	-7.3	64.2	57.6	-6.6
Springdale	Washington	72.7	63.8	-8.9	69.6	59.7	-9.9
Fayetteville	Washington	74.8	65.2	-9.6	65.5	58.1	-7.4
Mena	Polk	65.8	59.7	-6.2	64.2	58.9	-5.3
Arkadelphia	Clark	75.7	65.7	-9.9	70.2	62.5	-7.7
Unmonitored 1	Benton	69.7	61.9	-7.7	71.3	65.2	-6.0
Unmonitored 2	Jefferson	70.4	62.4	-8.0	69.3	62.0	-7.3
Unmonitored 3	Independence	72.8	63.9	-8.9	66.3	58.1	-8.3

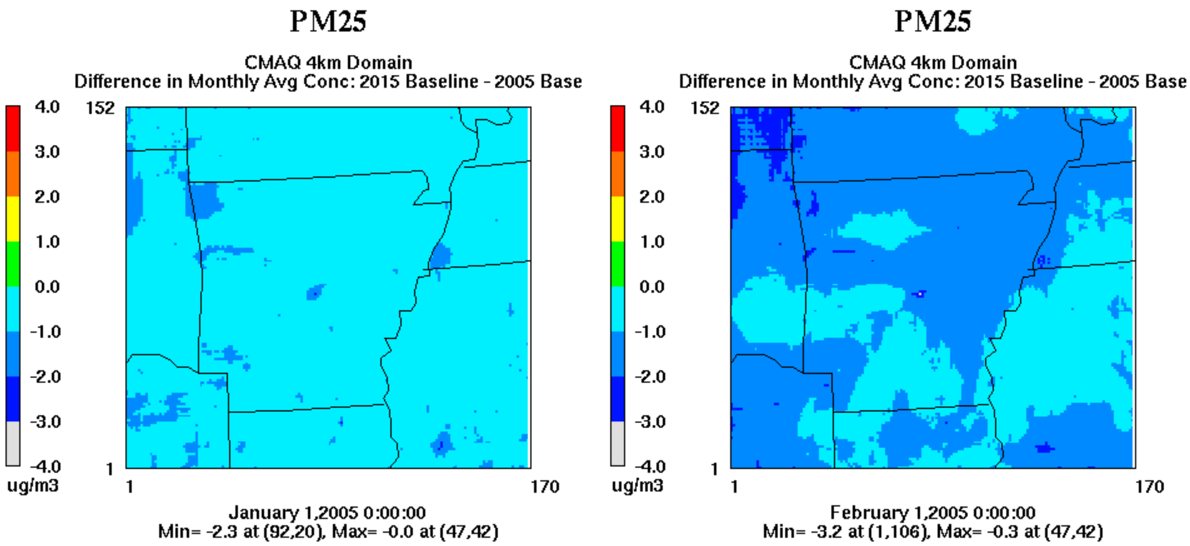
For the 2005/2015 simulation pair, the simulated 4th high 8-hour ozone concentration is lower for 2015 for all ozone monitoring sites and all locations in the 4 km grid. The average decrease is 9.2 ppb (9.6 ppb when only actual monitoring sites are included). Similarly, for the 2008/2015 simulation pair the simulated 4th high 8-hour ozone concentration is lower for 2015 for all ozone monitoring sites and all locations in the 4 km grid. The average decrease is 7.5 ppb (7.6 ppb when only actual monitoring sites are included).

6.1.2 $PM_{2.5}$

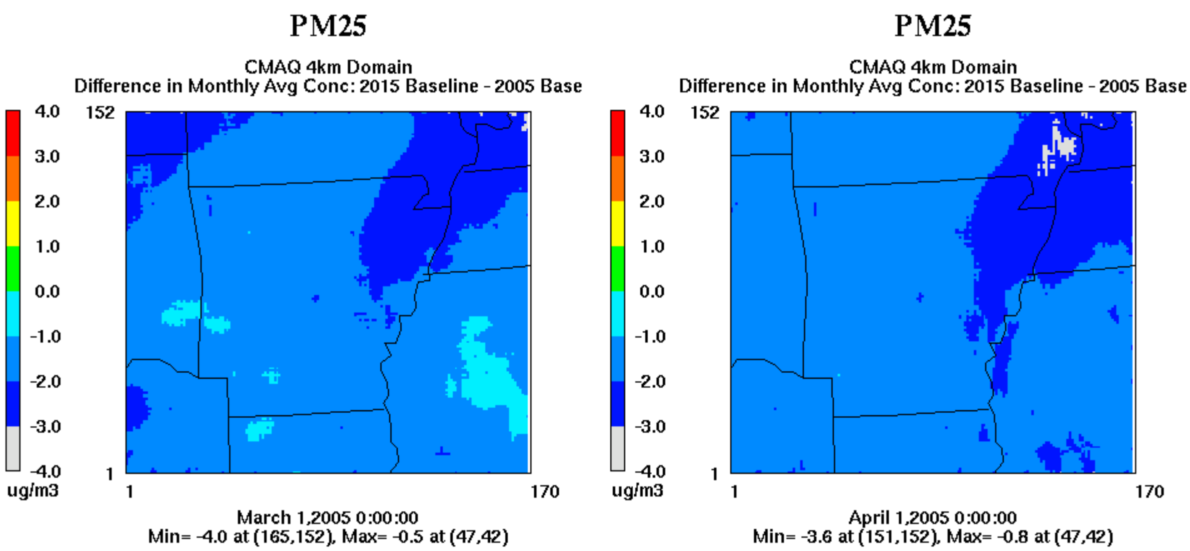
Figures 6-3 and 6-4 illustrate the difference in monthly average simulated $PM_{2.5}$ concentration for the 4-km grid for the 2005/2015 and 2008/2015 simulation pairs. The differences are calculated as future year minus base year, specifically 2015 minus 2005 in Figure 6-3 and 2015 minus 2008 in Figure 6-4. The units are $\mu g/m^3$.

Figure 6-3. Difference in Simulated Monthly Average 24-Hour $PM_{2.5}$ Concentration ($\mu g/m^3$) for the CMAQ 4-km Grid: 2015 - 2005

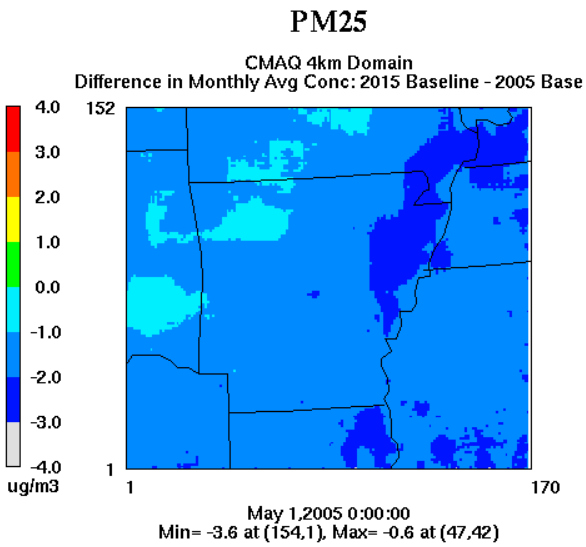
January/February

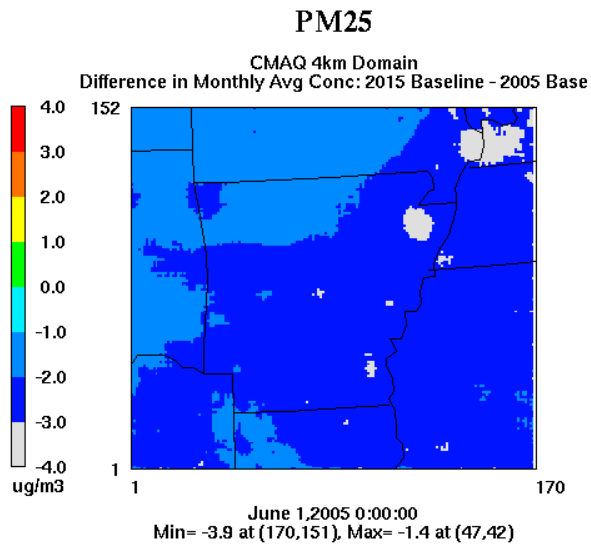


March/April

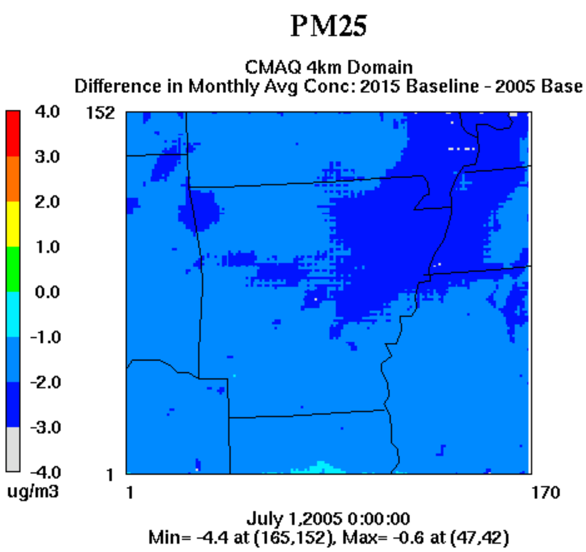


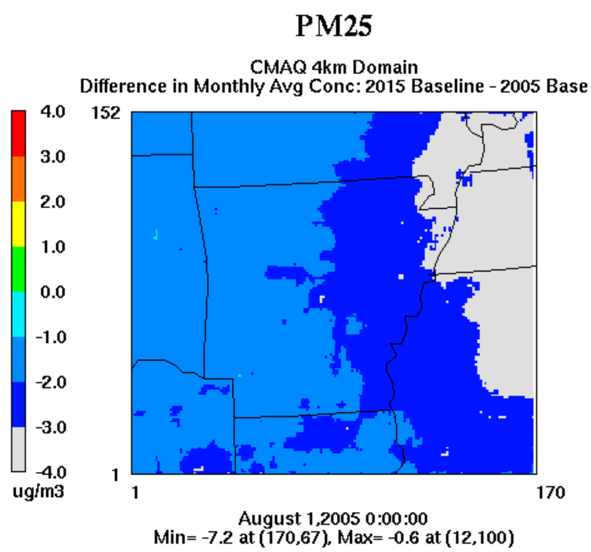
May/June



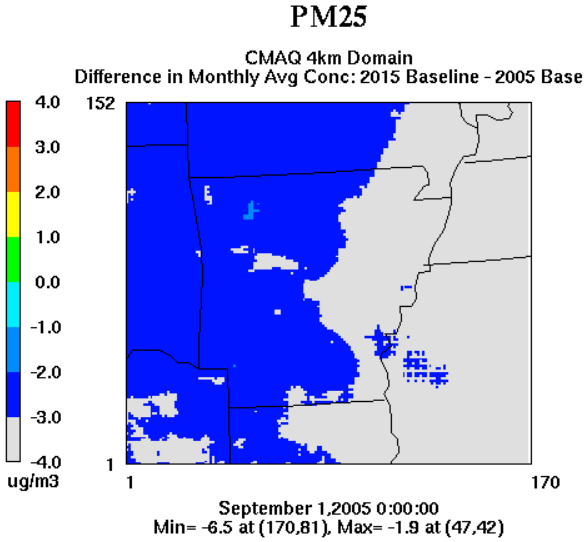


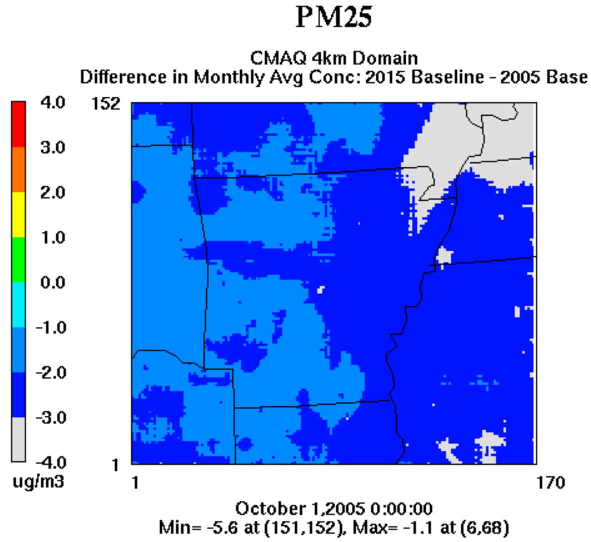
July/August



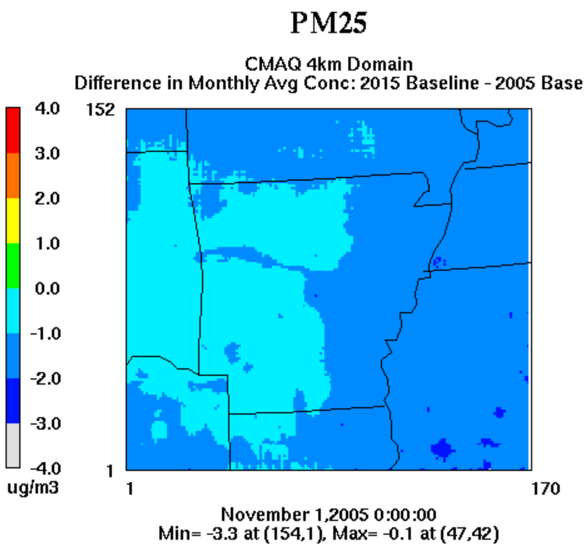


September/October





November/December



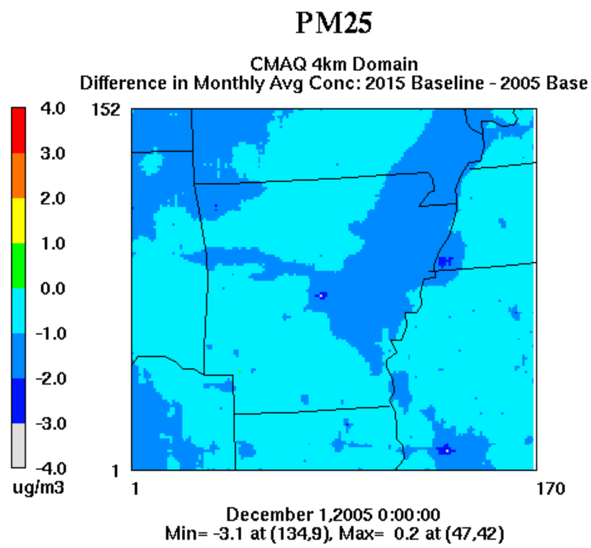
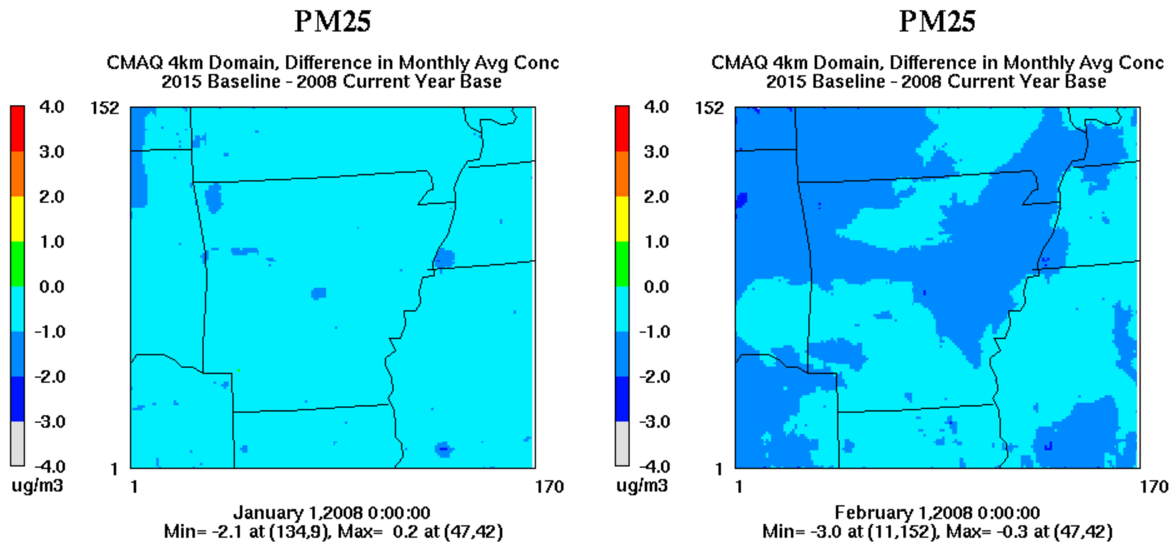
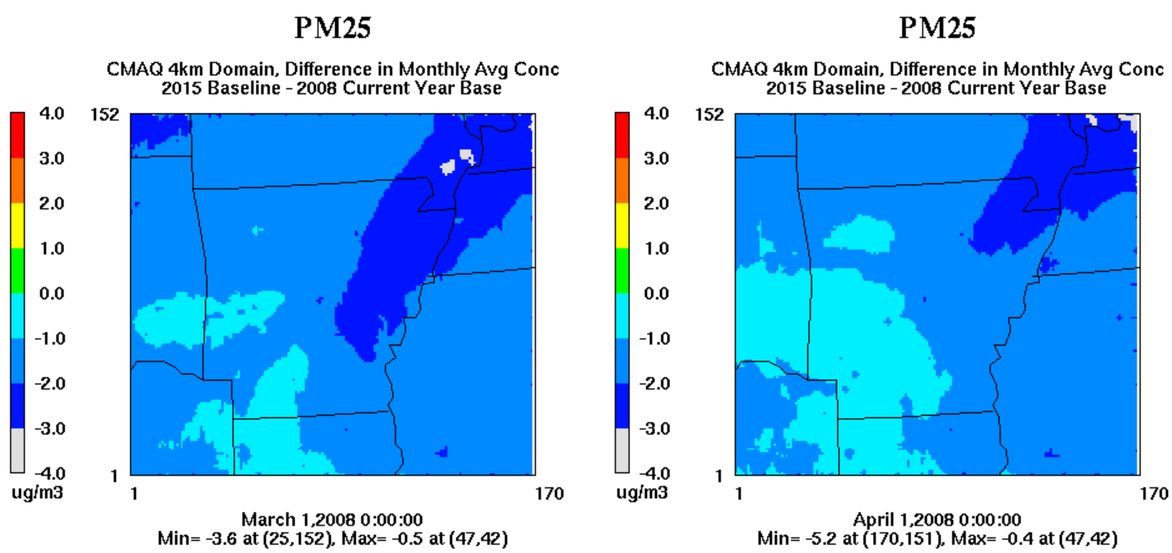


Figure 6-4. Difference in Simulated Monthly Average 24-Hour $PM_{2.5}$ Concentration ($\mu g/m^3$) for the CMAQ 4-km Grid: 2015 - 2005

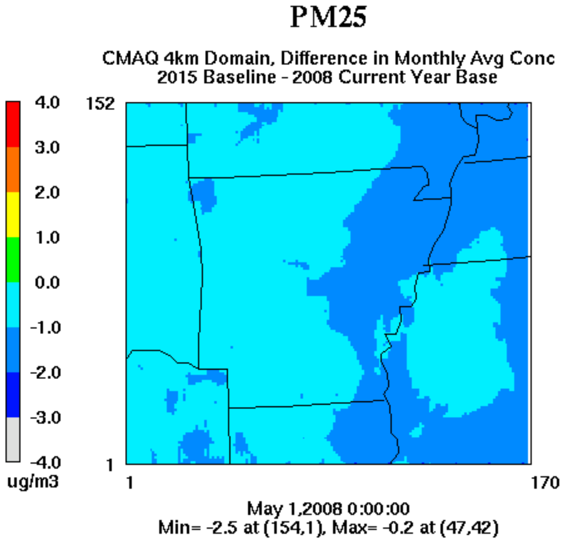
January/February

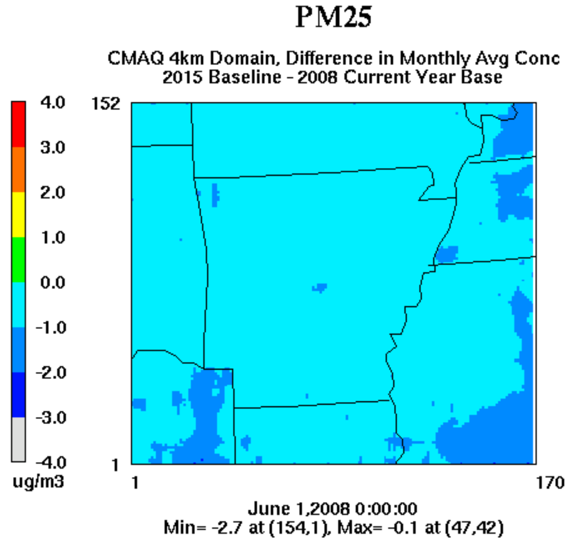


March/April

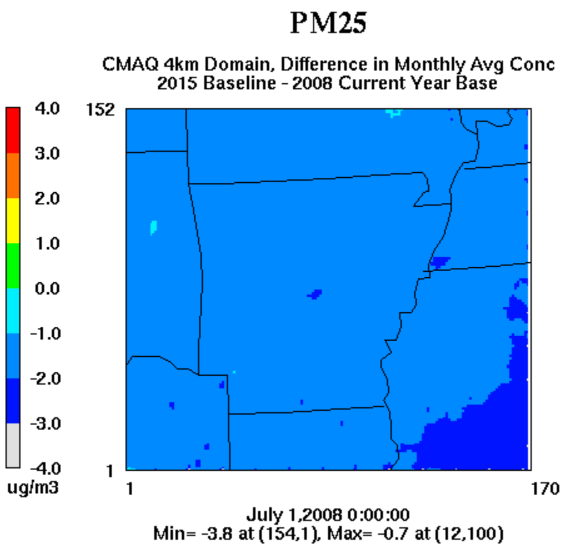


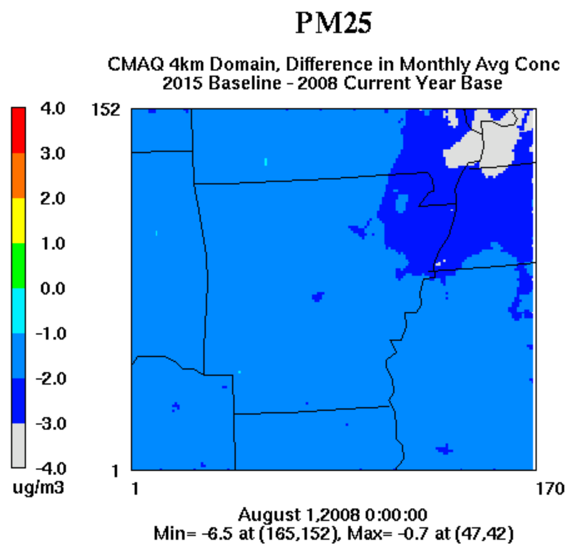
May/June



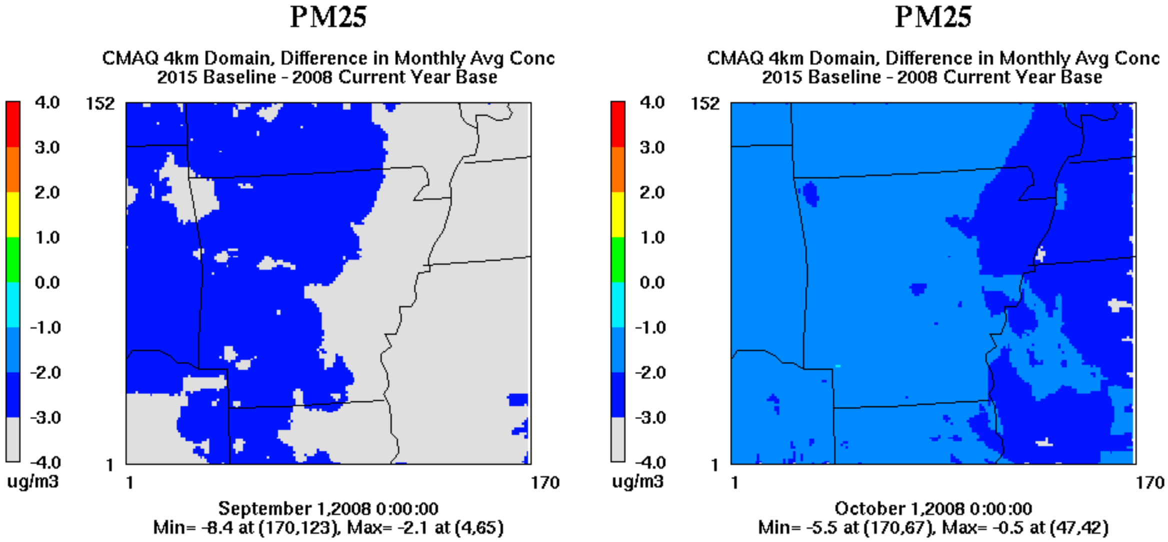


July/August

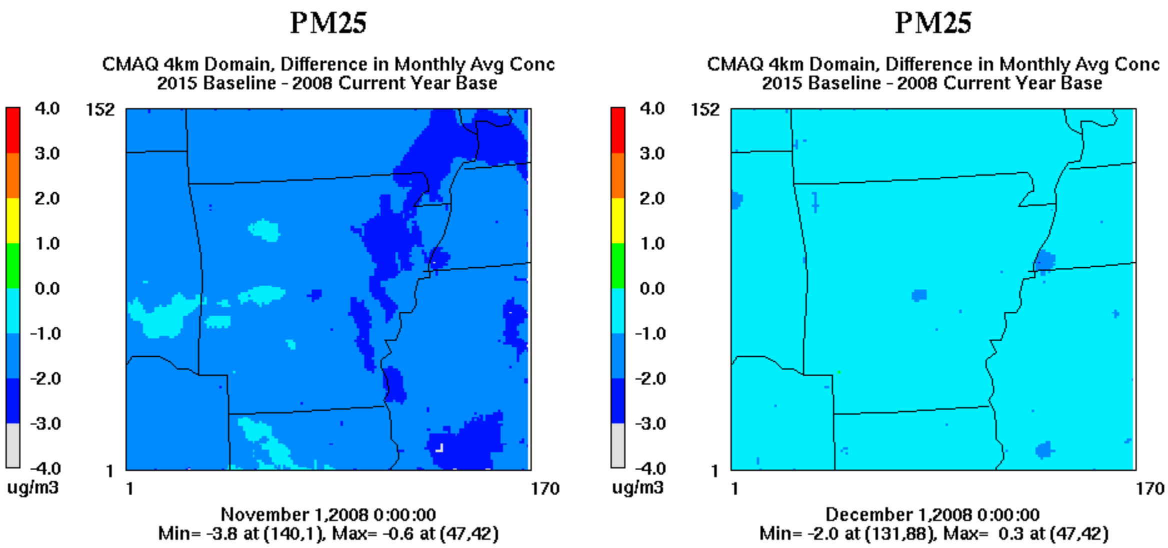




September/October



November/December



The plots show consistent decreases in $PM_{2.5}$ between 2005 and 2015 and 2008 and 2015 for the selected days. The largest decreases for the selected days range from -2.3 to -7.2 μg/m^3 for the 2005/2015 simulation pair, and from -2.0 to -8.4 for the 2008/2015 simulation pair.

Table 6-2 summarizes the 8^{th} high 24-hour $PM_{2.5}$ concentration (one of the two key NAAQS related metrics for $PM_{2.5}$) for the base- and future-year simulations. Included in the table are the simulated concentrations and differences in simulated concentration for current $PM_{2.5}$ monitoring sites and any grid locations with an increase in the value of a key NAAQS metric between the base and future year. The three unmonitored locations listed in Table 6-2 represent grid cells where the NAAQS-relevant concentration of any pollutant (in this case SO_2) is higher for 2015 than the base years.

Table 6-2. Simulated 8th High 24-Hour $PM_{2.5}$ Concentration (µg/m^3) for Monitoring Sites and Selected Unmonitored Locations within Arkansas

Site/Location	County	2005/2015 8th High 24-Hr $PM_{2.5}$ (µg/m^3)			2008/2015 8th High 24-Hr $PM_{2.5}$ (µg/m^3)		
		2005 Base Year	2015 Future Year	Diff-erence	2008 Current Year	2015 Future Year	Diff-erence
North Little Rock (Pike Ave)	Pulaski	37.6	30.2	-7.4	31.1	25.1	-6.0
Little Rock (Adams Field)	Pulaski	33.5	28.4	-5.1	29.0	23.6	-5.4
Little Rock (Doyle Springs Rd)	Pulaski	41.0	33.4	-7.6	34.1	27.0	-7.1
Marion	Crittenden	37.6	31.8	-5.8	32.3	25.6	-6.7
Stuttgart	Arkansas	35.5	29.9	-5.6	31.8	25.7	-6.1
Newport	Jackson	36.2	29.8	-6.4	33.9	27.7	-6.2
Springdale	Washington	33.1	30.1	-3.0	27.5	24.8	-2.7
Mena	Polk	26.0	21.7	-4.3	22.8	19.0	-3.8
Hot Springs	Garland	27.3	23.6	-3.7	24.8	19.9	-4.9
El Dorado	Union	28.8	24.7	-4.1	26.8	22.6	-4.2
Crossett	Ashley	27.3	23.6	-3.7	24.8	19.9	-4.9
Roland	Sequoyah (OK)	33.6	30.1	-3.5	26.7	23.8	-2.9
Unmonitored 1	Benton	32.6	27.5	-5.1	26.5	23.0	-3.5
Unmonitored 2	Jefferson	38.3	32.7	-5.6	31.3	26.4	-4.9
Unmonitored 3	Independence	36.3	30.5	-5.8	32.8	26.3	-6.5

For the 2005/2015 simulation pair, the simulated 98th percentile 24-hr $PM_{2.5}$ concentration is lower for all $PM_{2.5}$ monitoring sites and all locations. The average decrease is 5.1 µg/m^3 (5.0 µg/m^3 when only actual monitoring sites are included). Similarly, for the 2008/2015 simulation pair, this metric is lower for all monitoring sites and all locations. The average decrease is 5.1 µg/m^3 (both with and without the pseudo sites).

Figures 6-5 and 6-6 illustrate the difference in annual average simulated $PM_{2.5}$ concentration for the 4-km grid for the 2005/2015 and 2008/2015 simulation pairs. The units are µg/m^3.

Figure 6-5. Difference in Simulated Annual Average $PM_{2.5}$ Concentration (μg/m^3) for the CMAQ 4-km Grid: 2015 - 2005

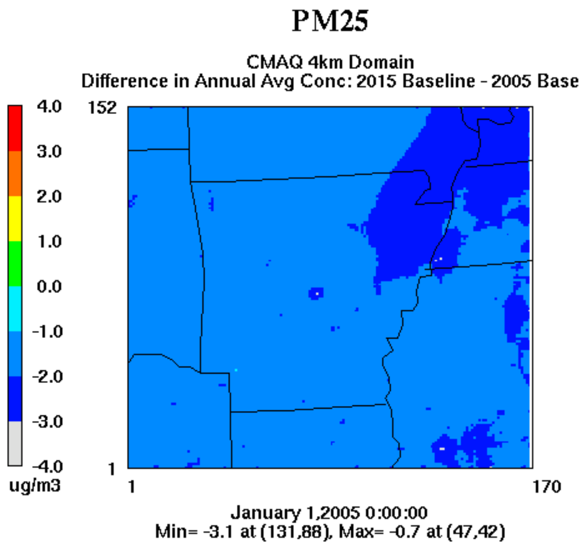
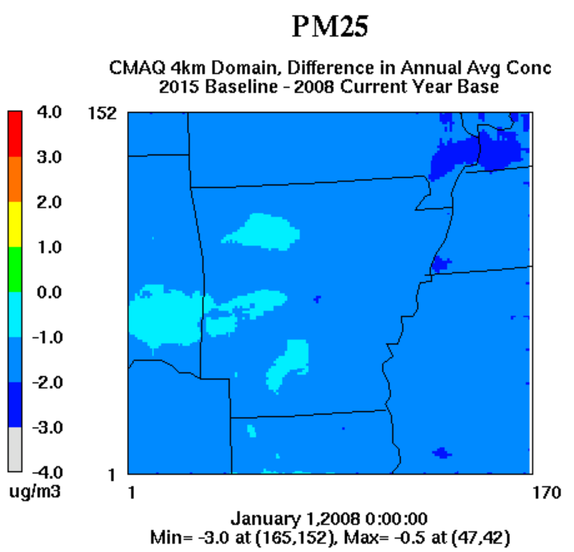


Figure 6-6. Difference in Simulated Annual Average $PM_{2.5}$ Concentration (μg/m^3) for the CMAQ 4-km Grid: 2015 - 2008



The annual difference plots also show a regional decrease in $PM_{2.5}$ between the base/current and future years, averaged over all simulation days. The magnitude of the decreases is similar (-0.7 to -3.2 ppb for the 2005/2015 simulation pair and -0.5 to -3.0 ppb for the 2008/2015 simulation pair), but the difference patterns are different for the two years. Decreases of 1 ppb or more are more widespread for the 2005/2015 simulation pair.

Table 6-3 summarizes the annual average $PM_{2.5}$ concentration for the base-/current- and future-year simulations. Included in the table are the simulated concentrations and differences in simulated concentration for current $PM_{2.5}$ monitoring sites and any grid locations with an increase in the value of this metric between the base and future year. The three unmonitored locations listed in Table 6-3 represent grid cells where the NAAQS-relevant concentration of any pollutant (in this case SO_2) is higher for 2015, compared to both base years.

Table 6-3. Simulated Annual Average $PM_{2.5}$ Concentration (µg/m^3) for Monitoring Sites and Selected Unmonitored Locations within Arkansas

Site/Location	County	2005/2015 Annual Average $PM_{2.5}$ (µg/m^3)			2008/2015 Annual Average $PM_{2.5}$ (µg/m^3)		
		2005 Base Year	2015 Future Year	Diff-erence	2008 Current Year	2015 Future Year	Diff-erence
North Little Rock (Pike Ave)	Pulaski	15.5	12.8	-2.7	13.1	11.0	-2.1
Little Rock (Adams Field)	Pulaski	13.4	11.5	-1.9	11.3	9.8	-1.5
Little Rock (Doyle Springs Rd)	Pulaski	16.7	14.1	-2.6	13.7	11.7	-2.0
Marion	Crittenden	14.8	12.6	-2.2	13.0	11.3	-1.7
Stuttgart	Arkansas	13.2	11.2	-2.0	11.7	10.1	-1.6
Newport	Jackson	14.2	12.1	-2.1	12.4	10.7	-1.7
Springdale	Washington	13.1	11.4	-1.7	11.1	9.6	-1.5
Mena	Polk	10.1	8.8	-1.3	8.7	7.6	-1.1
Hot Springs	Garland	11.2	9.7	-1.5	9.4	8.2	-1.2
El Dorado	Union	12.3	10.7	-1.6	10.5	9.2	-1.3
Crossett	Ashley	11.2	9.7	-1.5	9.4	8.2	-1.2
Roland	Sequoyah (OK)	13.5	11.9	-1.6	11.1	9.8	-1.3
Unmonitored 1	Benton	13.7	12.0	-1.7	11.8	10.2	-1.6
Unmonitored 2	Jefferson	14.8	12.8	-2.0	12.2	10.7	-1.5
Unmonitored 3	Independence	14.4	12.4	-2.0	12.3	10.7	-1.6

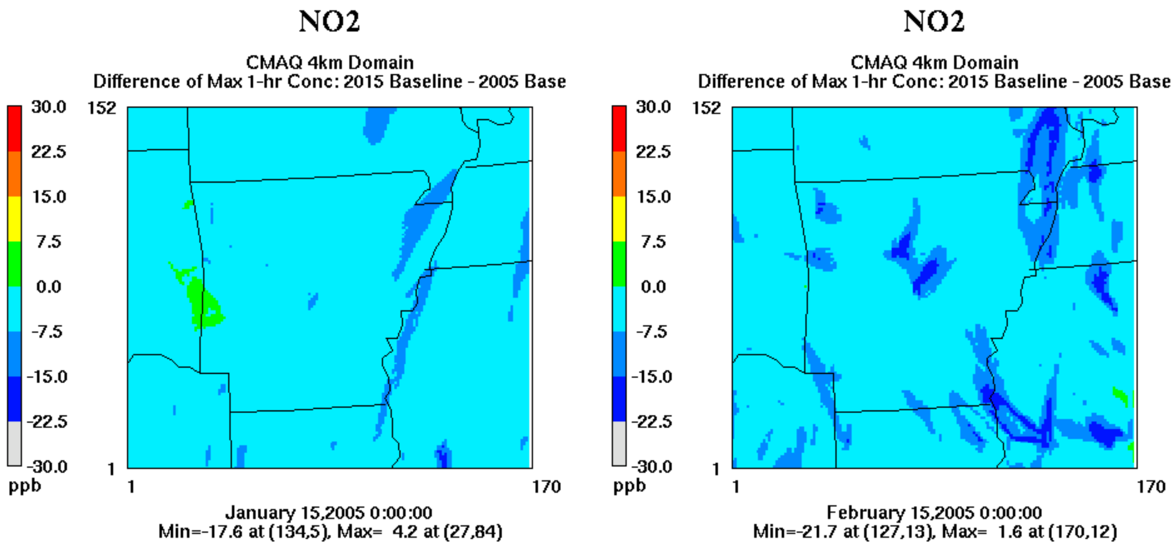
For the 2005/2015 simulation pair, the simulated annual average $PM_{2.5}$ concentration is lower for all $PM_{2.5}$ monitoring sites and all locations. The average decrease is 1.9 µg/m^3 (both with and without the pseudo sites). Similarly, this metric is lower for the 2008/2015 simulation pair for all monitoring sites and all locations. The average decrease is 1.5 µg/m^3 (both with and without the pseudo sites).

6.1.3 NO_2

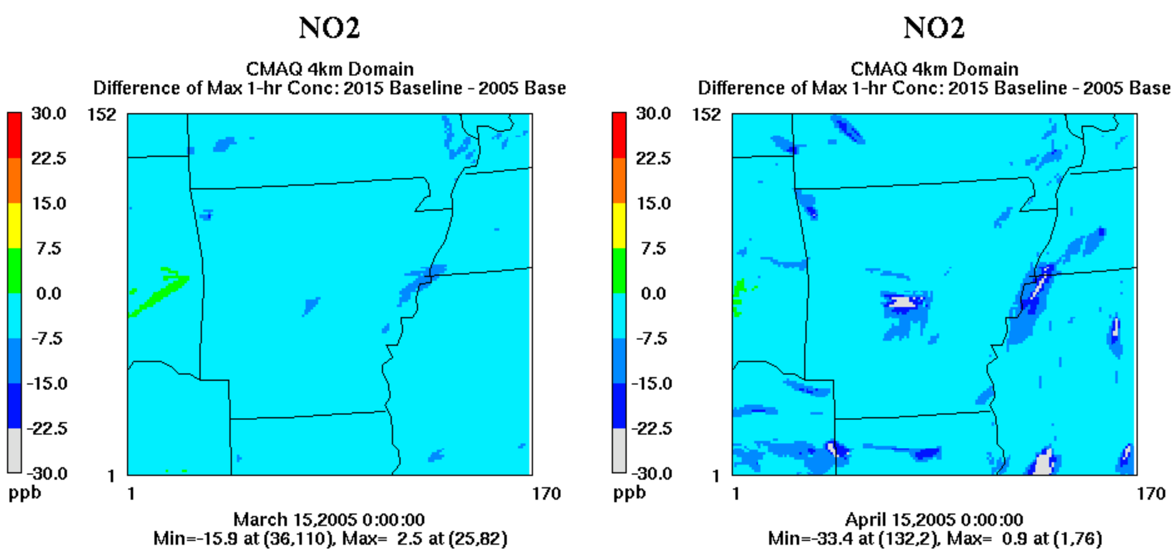
Figures 6-7 and 6-8 illustrate the difference in daily maximum 1-hour average NO_2 concentration for the 4-km grid and the 15th of each month for the 2005/2015 and 2008/2015 simulation pairs. The units are ppb.

Figure 6-7. Difference in Simulated Monthly Average 1-Hour NO_2 Concentration (ppb) for the CMAQ 4-km Grid: 2015 - 2005

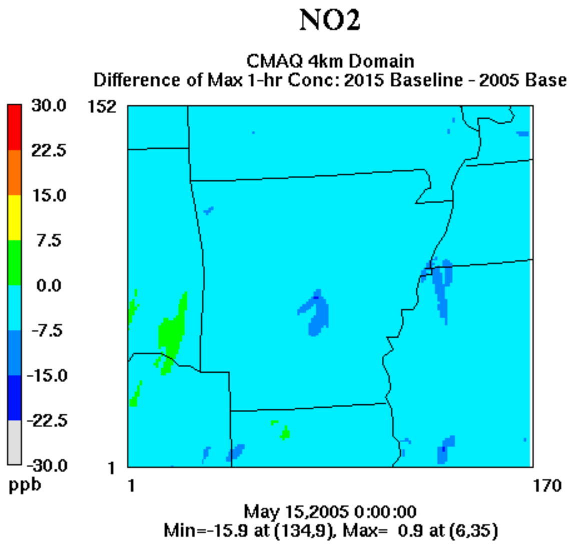
January/February

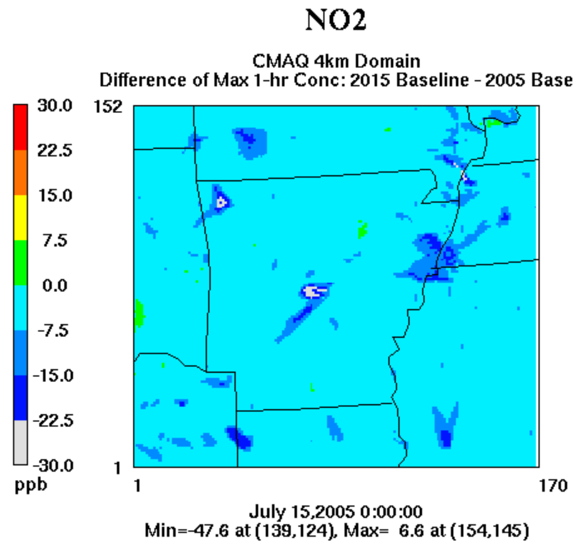


March/April

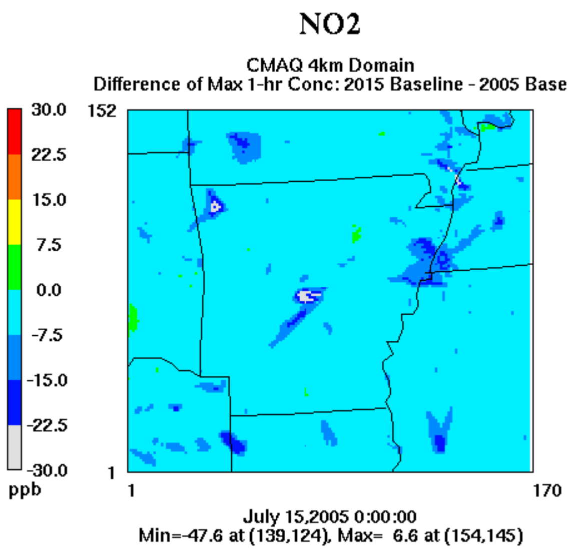


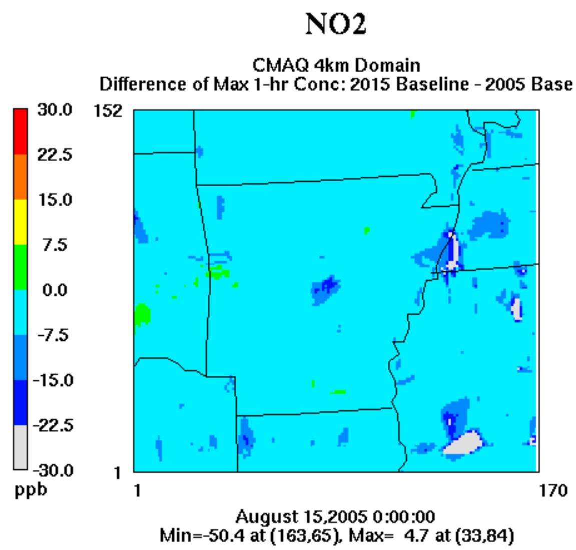
May/June



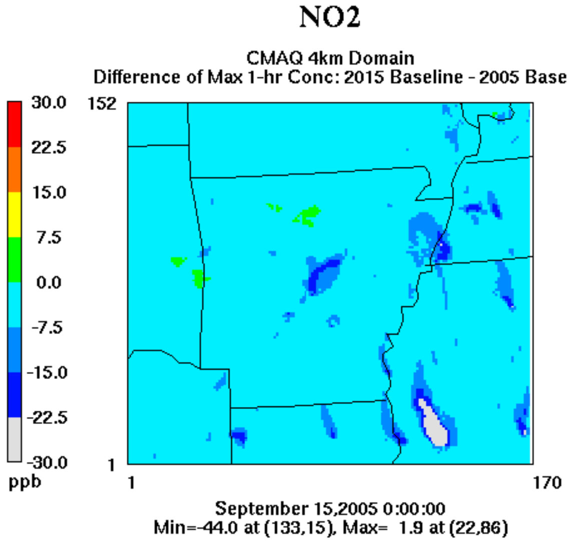


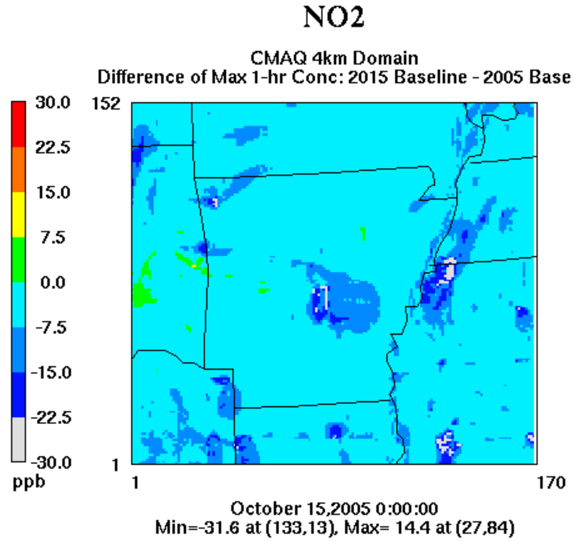
July/August



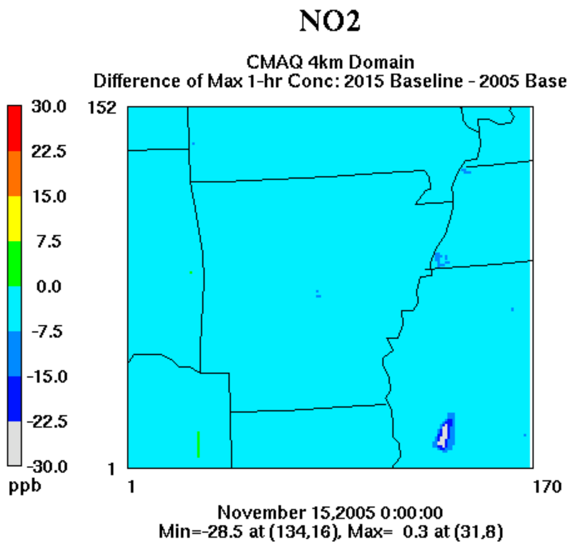


September/October





November/December



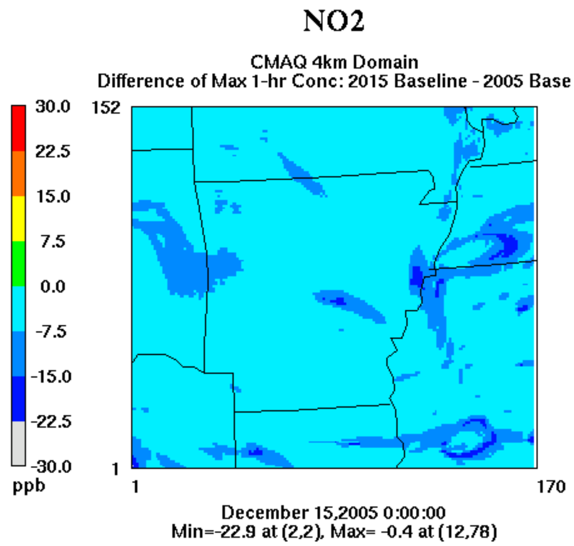
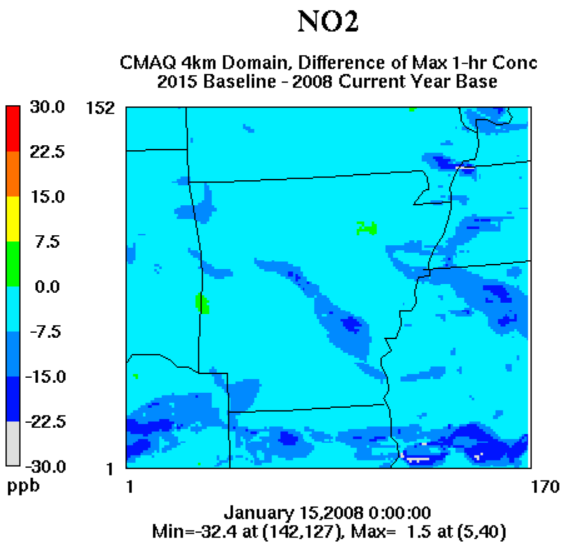
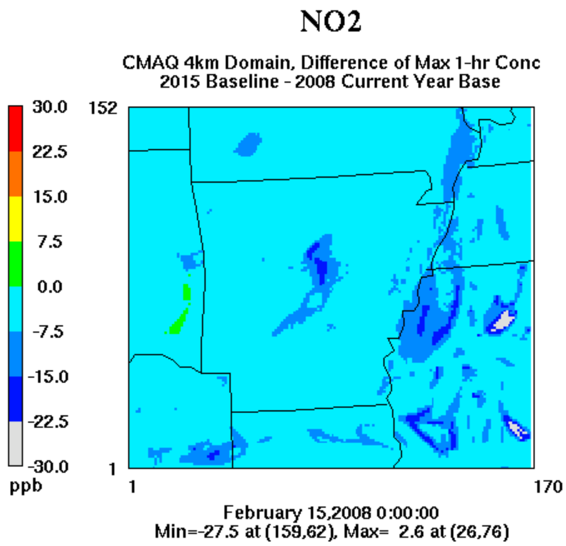


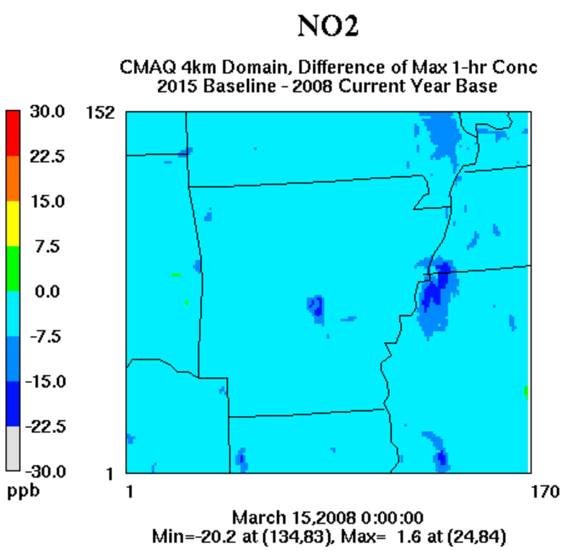
Figure 6-8. Difference in Simulated Monthly Average 1-Hour NO_2 Concentration (ppb) for the CMAQ 4-km Grid: 2015 - 2008

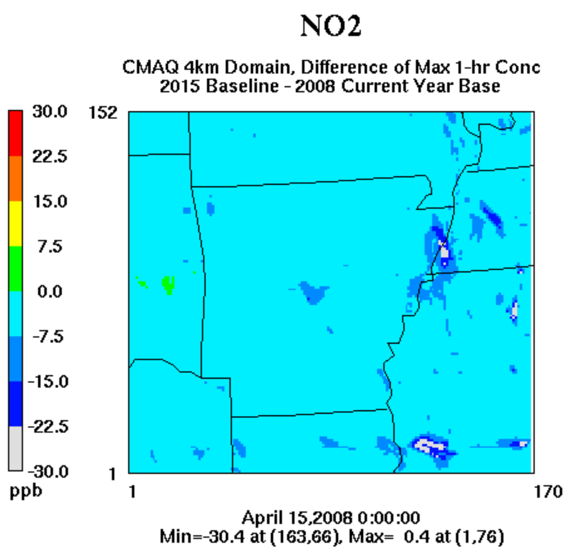
January/February



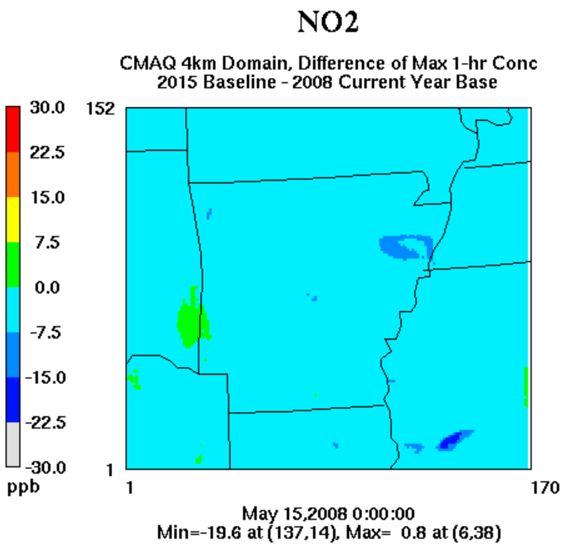


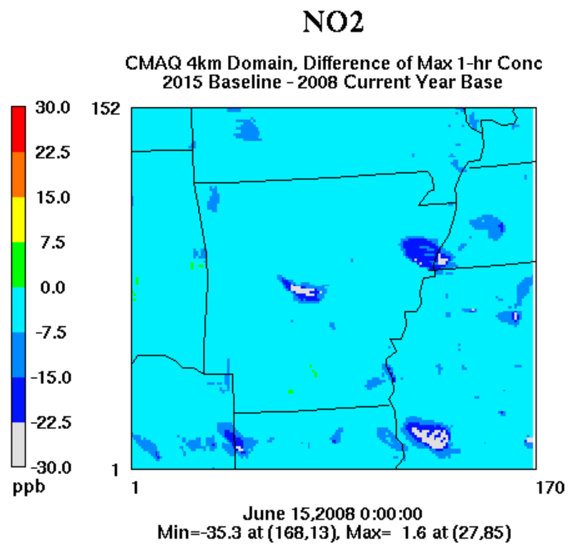
March/April



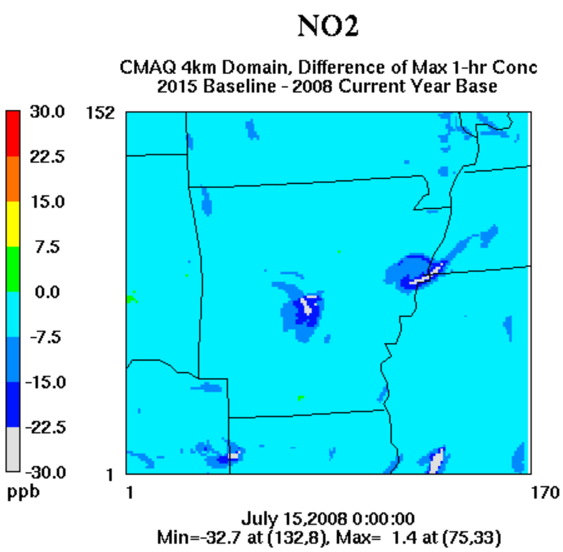


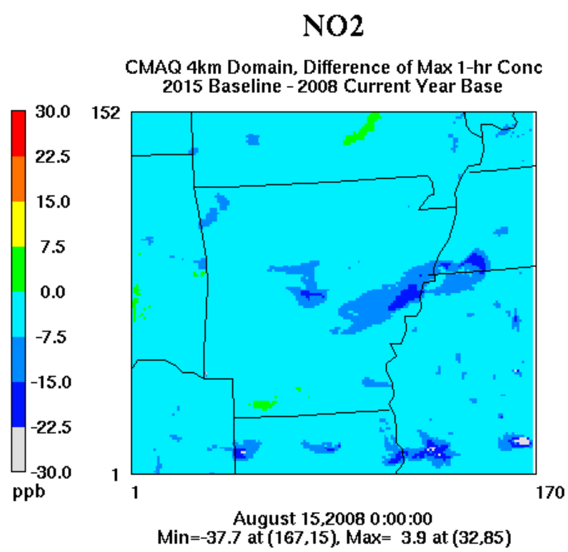
May/June



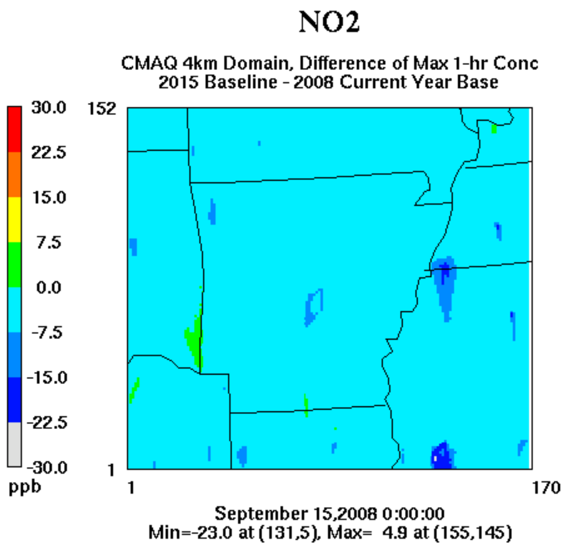


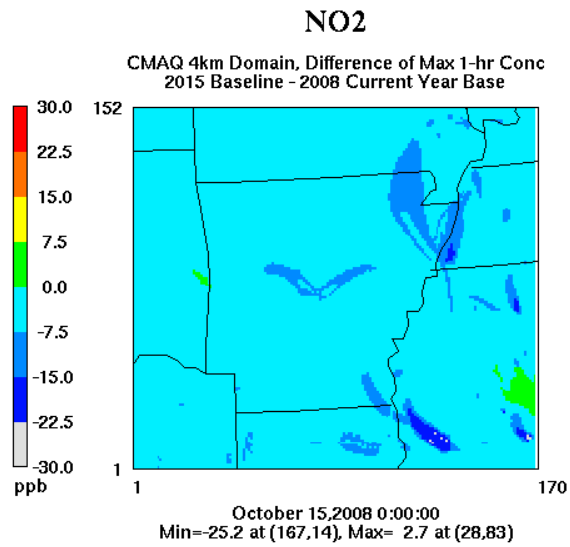
July/August



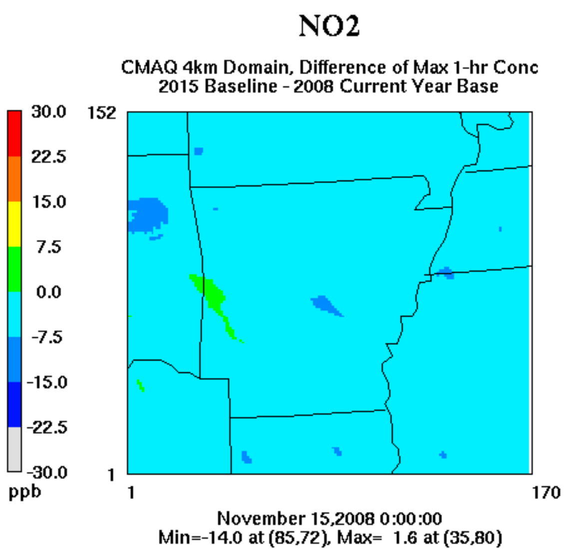


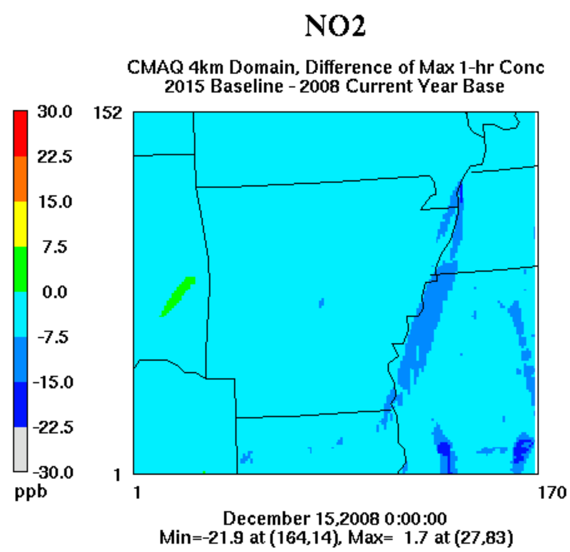
September/October





November/December





For NO_2, the plots show a mix of increases and decreases between both simulation pairs. The decreases are greater in magnitude and more widespread than the increases.

Table 6-4 summarizes the 8^{th} high daily maximum 1-hour NO_2 concentration (equivalent to the 98^{th} percentile value as used in the NAAQS) for the base- and future-year simulations. Included in the table are the simulated concentrations and differences in simulated concentration for current NO_2 monitoring sites and any grid locations with an increase in the value of this metric between the base and future year. The three unmonitored locations listed in Table 6-4 represent grid cells where the NAAQS-relevant concentration of any pollutant (in this case SO_2) is higher for 2015, compared to both base years.

Table 6-4. Simulated 8th High Daily Maximum 1-Hour NO_2 Concentration (ppb) for Monitoring Sites and Selected Unmonitored Locations within Arkansas

Site/Location	County	2005/2015 8th High 1-Hr NO_2 (ppb)			2008/2015 8th High 1-Hr NO_2 (ppb)		
		2005 Base Year	2015 Future Year	Diff-erence	2008 Current Year	2015 Future Year	Diff-erence
North Little Rock (Pike Ave)	Pulaski	66.0	50.3	-15.7	72.5	57.4	-19.4
Marion	Crittenden	71.8	55.8	-16.0	73.1	58.1	-15.0
Unmonitored 1	Benton	32.8	22.3	-10.5	27.4	18.8	-8.6
Unmonitored 2	Jefferson	49.0	42.7	-6.3	43.4	28.7	-14.7
Unmonitored 3	Independence	30.5	28.4	-2.1	26.3	19.5	-6.8

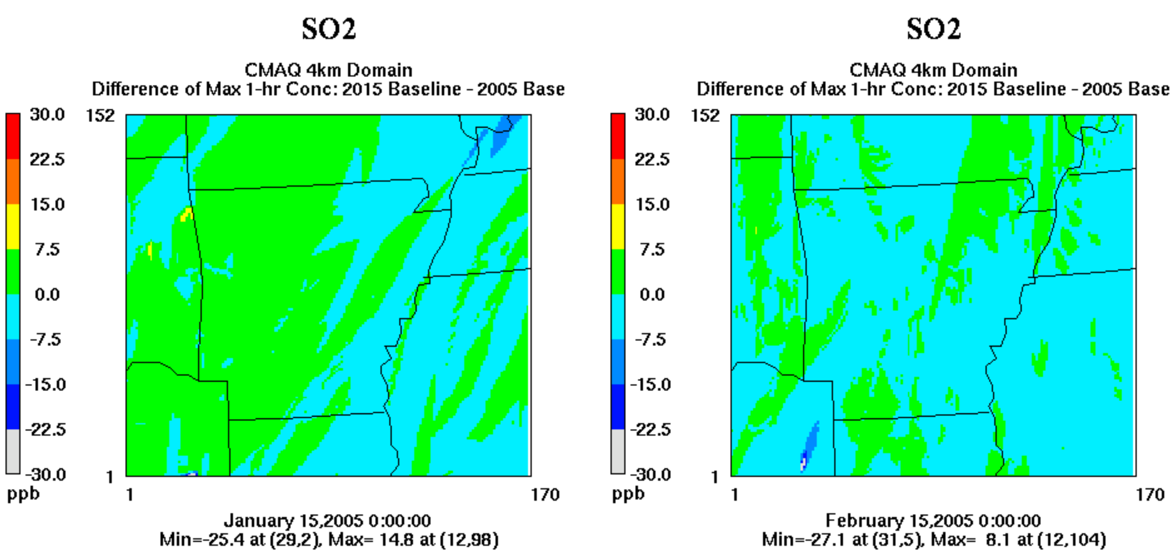
For the 2005/2015 simulation pair, the 8th high daily maximum 1-hour NO_2 concentration is lower for all monitoring sites. The average decrease is 10.1 ppb (15.9 ppb when only actual monitoring sites are included). This metric is also lower for the 2008/2015 simulation pair for all monitoring sites. The average decrease is 12.9 ppb (17.2 ppb when only actual monitoring sites are included).

6.1.4 SO_2

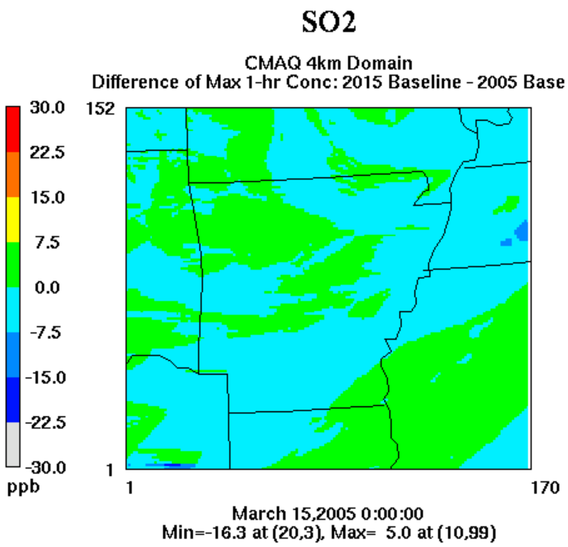
Figures 6-9 and 6-10 illustrate the difference in daily maximum 1-hour average SO_2 concentration for the 4-km grid and the 15th of each month for the 2005/2015 and 2008/2015 simulation pairs. The units are ppb.

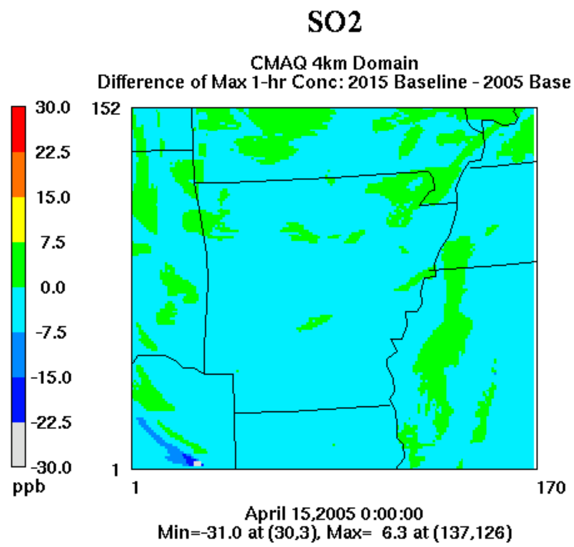
Figure 6-9. Difference in Simulated Monthly Average 1-Hour SO_2 Concentration (ppb) for the CMAQ 4-km Grid: 2015 - 2005

January/February

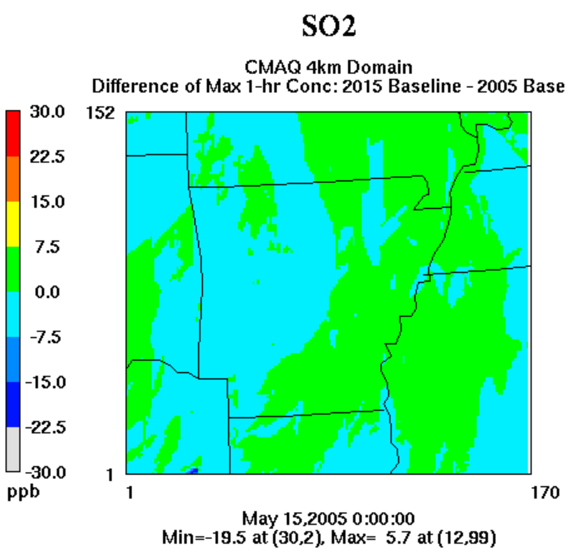


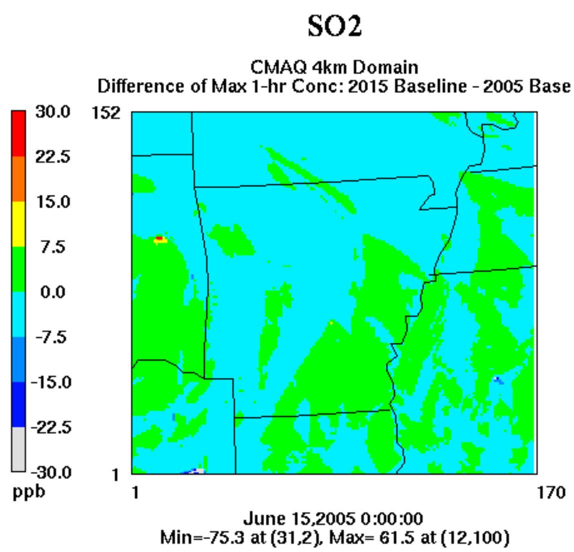
March/April





May/June





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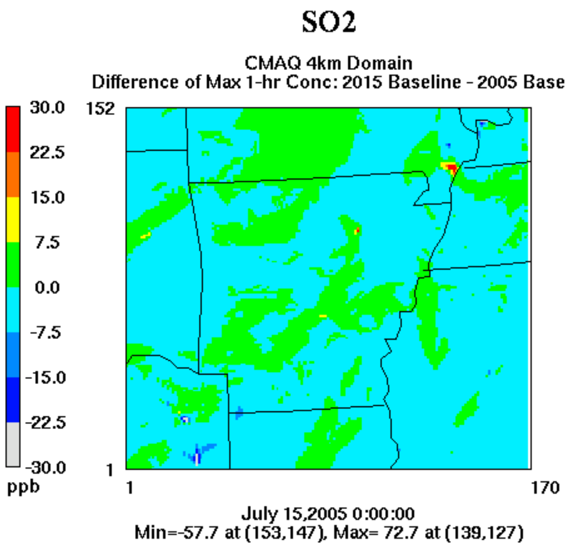
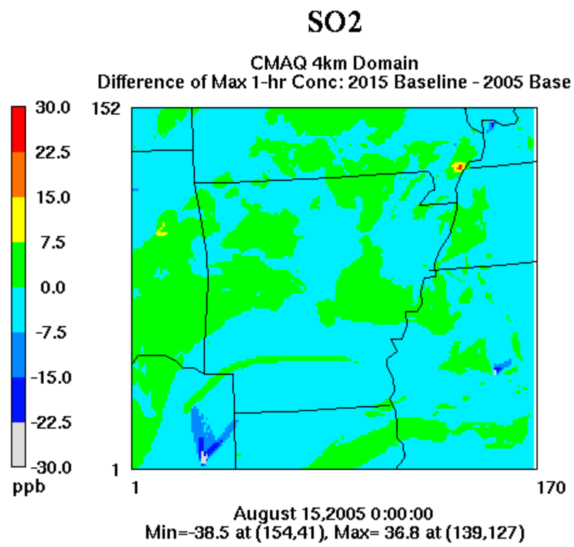
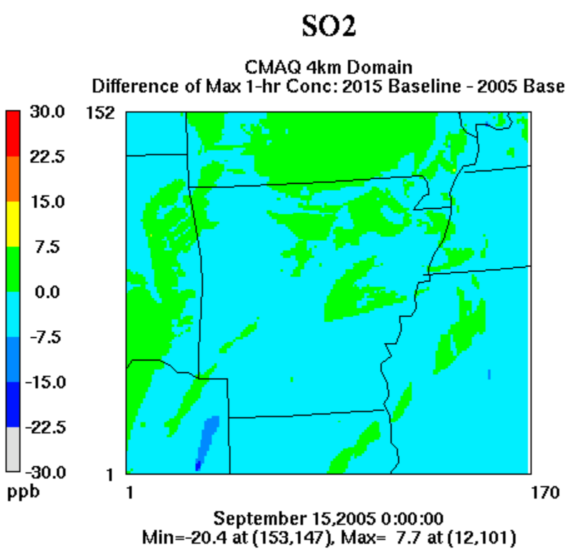
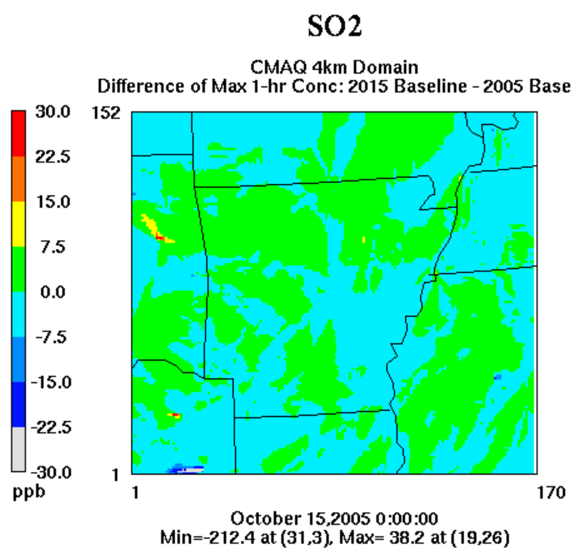




September/October





November/December

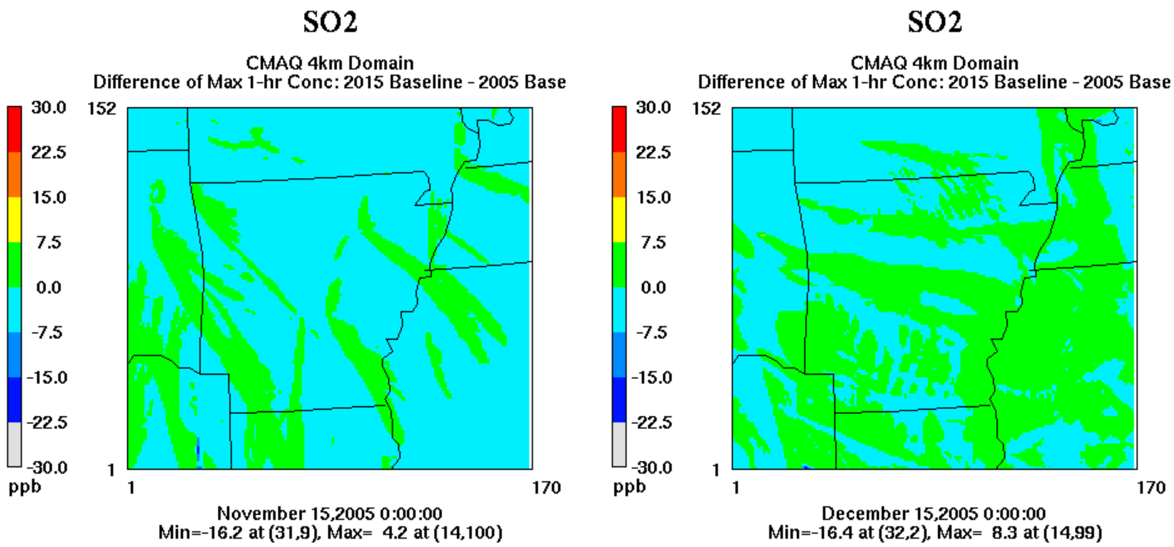
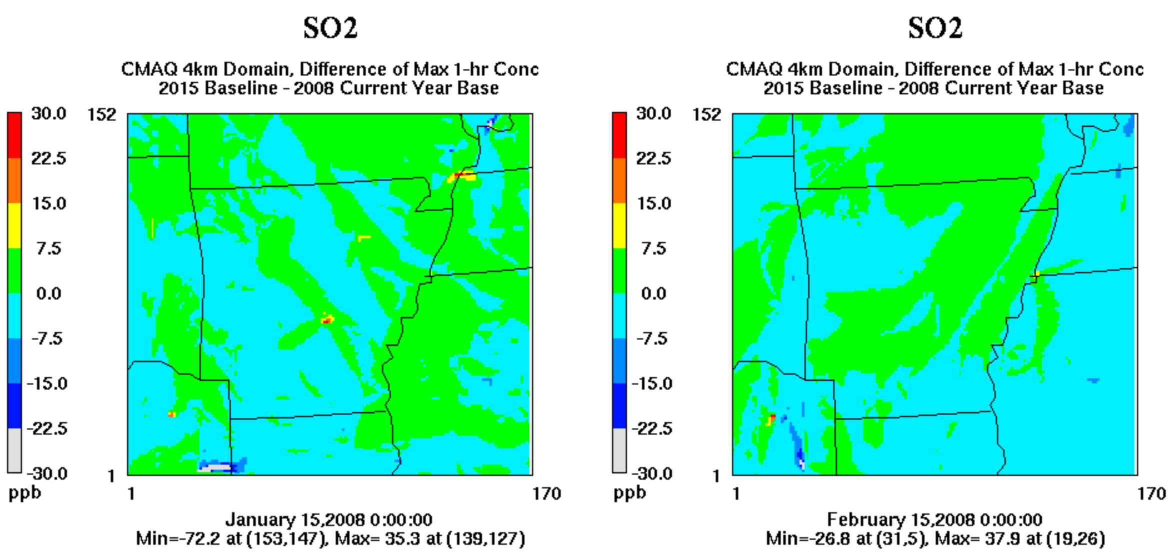
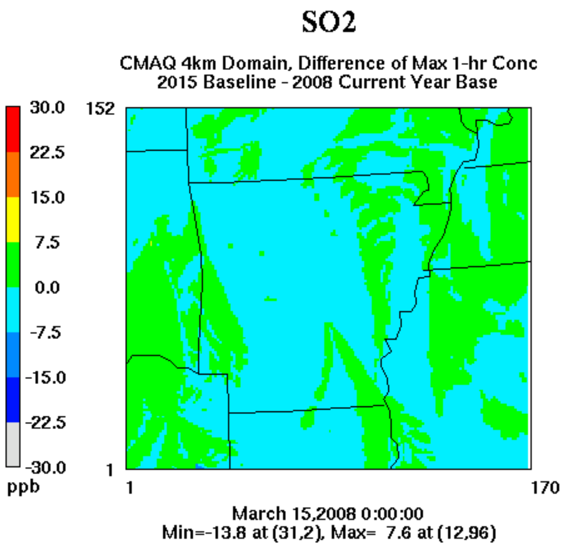


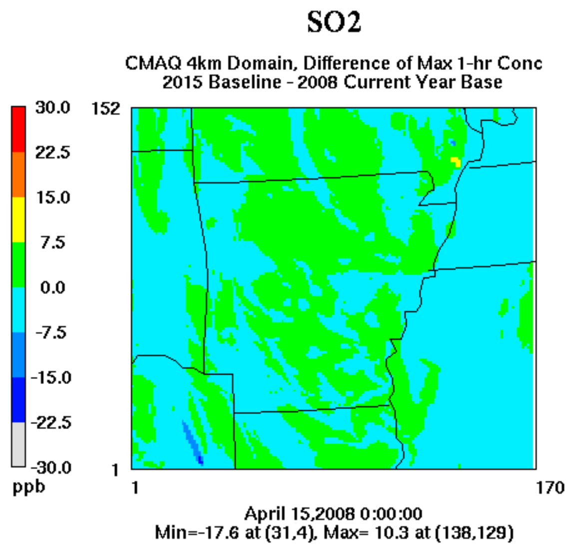
Figure 6-10. Difference in Simulated Monthly Average 1-Hour SO_2 Concentration (ppb) for the CMAQ 4-km Grid: 2015 - 2008

January/February

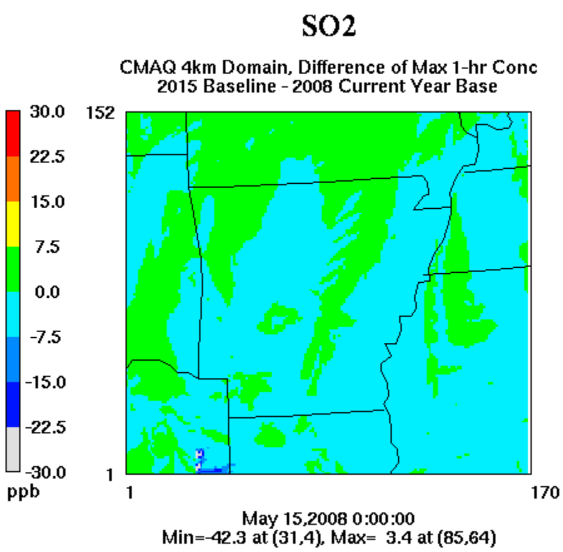


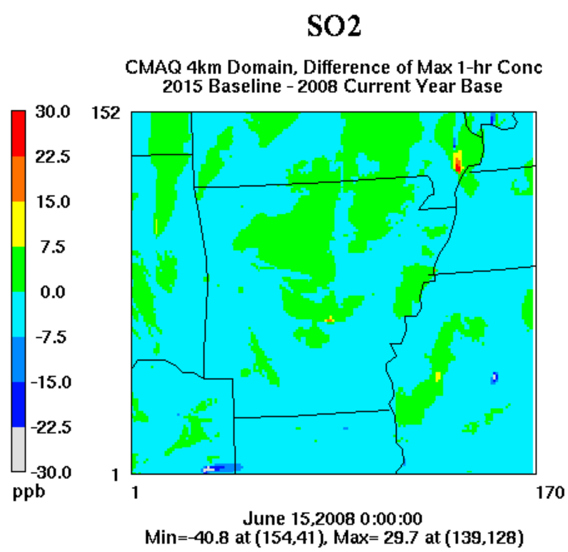
March/April



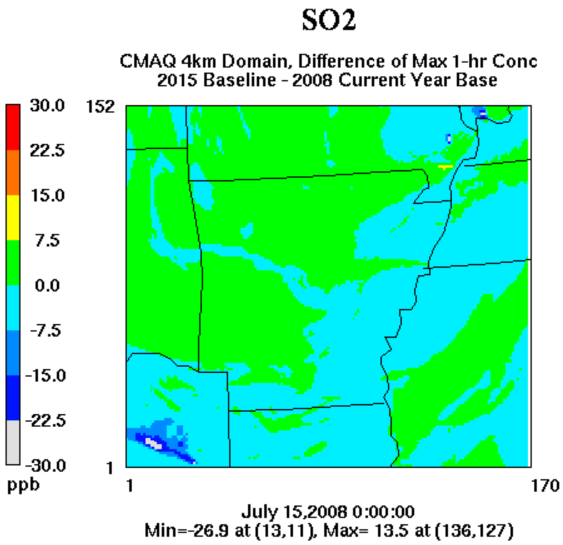


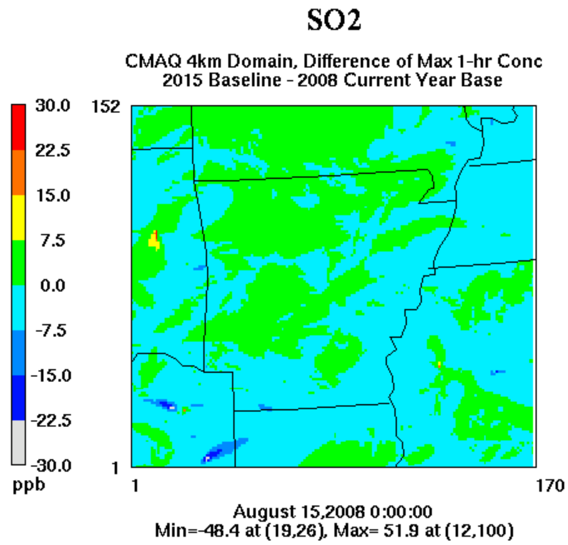
May/June



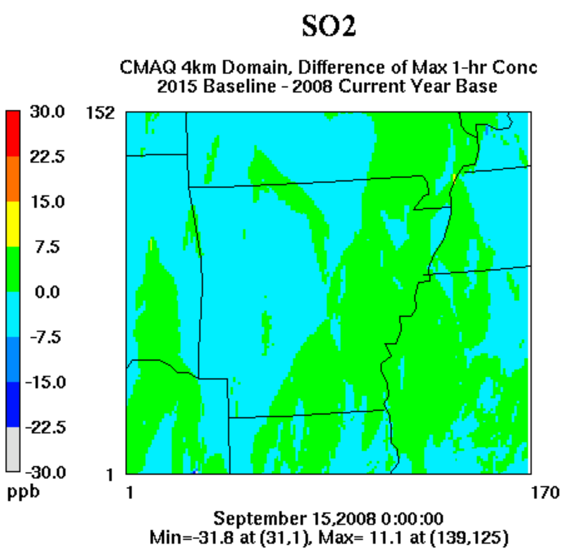


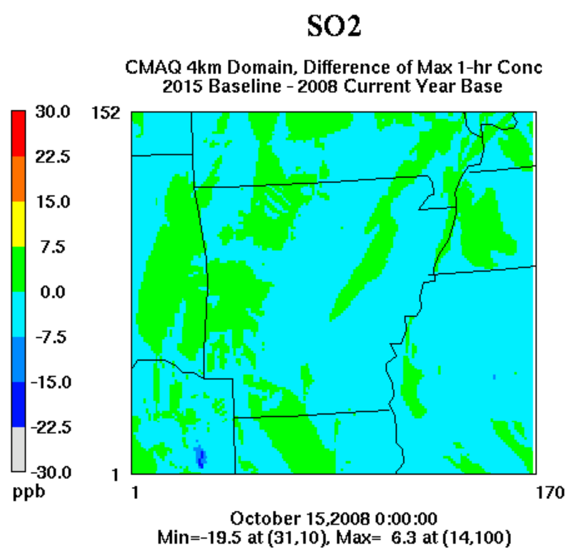
July/August



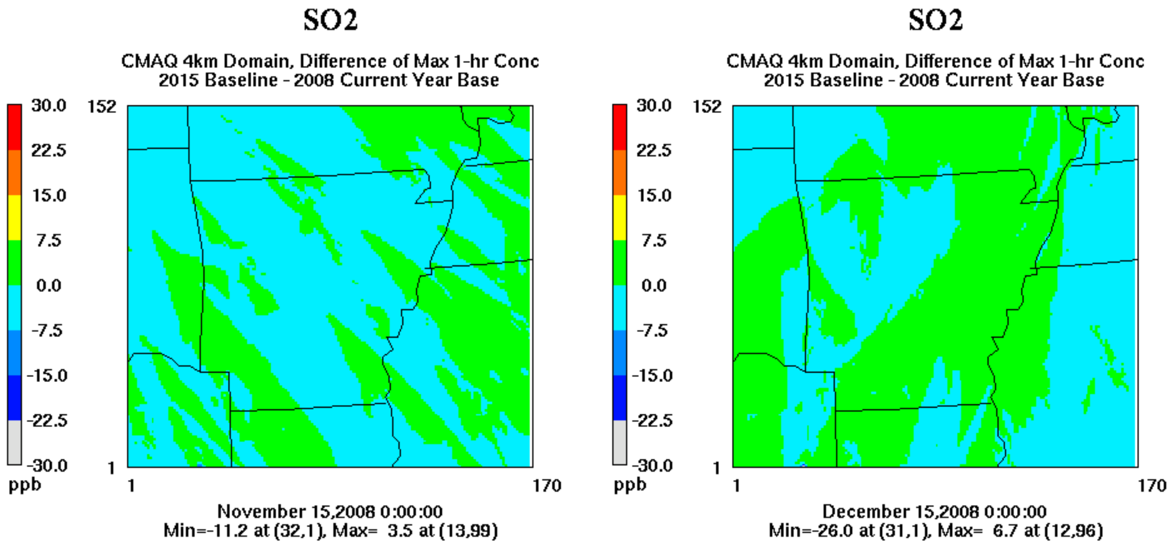


September/October





November/December



For SO_2, the difference plots show a mix of increases and decreases between 2005 and 2015 and between 2008 and 2015. For most of the selected days, the decreases are larger in magnitude than the increases, but the increases tend to be more widespread.

Table 6-5 summarizes the 4th high daily maximum 1-hour SO_2 concentration (equivalent to the 99th percentile value as used in the NAAQS) for the base- and future-year simulations. Included in the table are the simulated concentrations and differences in simulated concentration for current monitoring sites and any grid locations with an increase in the value of this metric between the base and future year. There are three primary areas of increase within the state and the unmonitored locations represent the grid cells with the maximum increase for each of these areas.

Table 6-5. Simulated 4th High Daily Maximum 1-Hour SO_2 Concentration (ppb) for Monitoring Sites and Selected Unmonitored Locations within Arkansas

Site/Location	County	2005/2015 4th High 1-Hour SO_2 (ppb)			2008/2015 4th High 1-Hour SO_2 (ppb)		
		2005 Base Year	2015 Future Year	Diff-erence	2008 Current Year	2015 Future Year	Diff-erence
North Little Rock (Pike Ave)	Pulaski	18.6	15.4	-3.2	15.3	13.6	-1.7
Marion	Crittenden	16.4	19.8	3.4	21.3	24.0	2.7
El Dorado	Union	13.5	12.3	-1.2	10.2	9.6	-0.6
Unmonitored 1	Benton	26.8	43.6	16.8	31.7	46.8	15.1
Unmonitored 2	Jefferson	77.1	109.0	31.9	59.3	84.0	24.7
Unmonitored 3	Independence	55.3	77.7	22.4	38.1	54.1	16.0

For both simulation pairs, the 4th high daily maximum 1-hour SO_2 concentration is lower for 2015 for the current SO_2 monitoring site locations but higher for 2015 for a number of grid cells including one non-SO_2 monitoring site (Marion). The greatest increases are 31.7 ppb for 2005/2015 and 24.7 ppb for 2008/2015 and occur at the Jefferson County pseudo site location.

6.2 Criteria Pollutant Assessment

To complete the criteria pollutant assessment, the MATS software was applied using the base-/current-year and future-year modeling results and was used to estimate future-year design values at both monitored and unmonitored locations throughout the state. The MATS input parameters were set to the EPA-recommended default values. “Monitored” data (current year design values) for both new monitoring sites (that were not operational during the base year period) and the unmonitored locations relied on data for the nearest monitoring site or were estimated using inverse-distance-weighted interpolation of the data from multiple nearby monitoring sites.

6.2.1 Ozone

Table 6-6 summarizes the modeled attainment test results for 8-hour ozone. The current-year design values used for this summary were calculated as the average of the design values for the two overlapping three-year periods that include the modeled years (2005-2007 and 2006-2008). This is not an attainment demonstration and the data for these years were used in order to represent the emissions base year (2005) and the meteorological base years (2005 and 2008), and to allow a direct comparison of the projected future-year design values for the two simulation pairs. The current-year design values are based on the data contained with the MATS database and are calculated within MATS.

Table 6-6. Estimated Future-Year 8-Hour Ozone Design Values (ppb) for Monitoring Sites and Selected Unmonitored Locations within Arkansas

Site/Location	County	2005/2015 8-Hr Ozone Design Values (ppb)			2008/2015 8-Hr Ozone Design Values (ppb)		
		Current Year DV	Future Year DV	Diff-erence	Current Year DV	Future Year DV	Diff-erence
North Little Rock (Pike Ave)	Pulaski	77	66	-11	77	68	-9
North Little Rock Airport	Pulaski	81	70	-11	81	71	-10
Little Rock (Doyle Springs Rd)	Pulaski	71	61	-10	71	62	-9
Marion	Crittenden	85	74	-11	85	77	-8
Deer	Newton	71	62	-9	71	63	-8
Springdale	Washington	61*	53	-8	61*	54	-7
Fayetteville	Washington	66	57	-9	66	57	-9
Mena	Polk	74	66	-8	74	67	-7
Arkadelphia	Clark	64*	56	-8	64*	57	-7
Unmonitored 1	Benton	61*	55	-6	61*	55	-6
Unmonitored 2	Jefferson	77*	68	-9	77*	69	-8
Unmonitored 3	Independence	76*	67	-9	76*	67	-9

Note: The NAAQS for 8-hour average ozone concentration is 75 ppb. * Current Year DV is estimated.

Ozone design values for 2015 are estimated to be 6 to 11 ppb lower than the current-year value for the 2005/2015 simulation pair, and 6 to 10 ppb lower for the 2008/2015 simulation pair. The average reduction is 9 ppb for the 2005/2015 simulation pair and 8 ppb for the 2008/2015 simulation pair. Although the current-year design values are the same, there are differences in the estimated future-year design values for many of the sites. For Marion, for example, the estimated future-year design value is 74 ppb for the 2005/2015 simulation pair and 77 ppb for the 2008/2015 simulation pair. One could interpret these results to mean that the 8-hour ozone design value for 2015 for the Marion site is estimated to be in the range of 74 to 77 ppb. For reference, the 2010-2012 design value is 79 ppb and the 2011-2013 design value is currently expected to be 75 ppb (although the data for 2013 have not been finalized). The differences in the results reflect the difference in the response of the model to changes in emissions under different meteorological conditions. The estimated future-year design values for the remaining sites are all well below the NAAQS and range from 53 to 70 ppb for the 2005/2015 simulation pair and from 54 to 71 for the 2008/2015 simulation pair.

6.2.2 $PM_{2.5}$

Table 6-7 summarizes the modeled attainment test results for 24-hour $PM_{2.5}$. The current-year design values used for this summary are calculated as the average of the design values for the two overlapping three-year periods that include the modeled years (2005-2007 and 2006-2008). For each three-year period, the design value is calculated as the three-year average of the 98th percentile 24-hour $PM_{2.5}$

concentration for each of the years. The current-year design values are based on the data contained with the MATS database and are calculated within MATS.

Table 6-7. Estimated Future-Year 24-Hour $PM_{2.5}$ Design Values (µg/m^3) for Monitoring Sites and Selected Unmonitored Locations within Arkansas

Site/Location	County	2005/2015 24-Hr $PM_{2.5}$ Design Values (µg/m^3)			2008/2015 24-Hr $PM_{2.5}$ Design Values (µg/m^3)		
		Current Year DV	Future Year DV	Diff-erence	Current Year DV	Future Year DV	Diff-erence
North Little Rock (Pike Ave)	Pulaski	29.1	24.7	-4.4	29.1	25.3	-3.8
Little Rock (Adams Field)	Pulaski	30.9	26.1	-4.8	30.9	26.3	-4.6
Little Rock (Doyle Springs Rd)	Pulaski	29.5	24.9	-4.6	29.5	25.1	-4.4
Marion	Crittenden	32.8	25.7	-7.1	32.8	27.0	-5.8
Stuttgart	Arkansas	28.1	23.0	-5.1	28.1	24.0	-4.1
Newport	Jackson	30.5	25.1	-5.4	30.5	24.5	-6.0
Springdale	Washington	26.7	23.6	-3.1	26.7	21.5	-5.2
Mena	Polk	26.3	21.9	-4.4	26.3	22.6	-3.7
Hot Springs	Garland	27.2	22.3	-4.9	27.2	22.8	-4.4
El Dorado	Union	27.0	22.5	-4.5	27.0	23.3	-3.7
Crossett	Ashley	27.7	23.5	-4.2	27.7	24.1	-3.6
Roland	Sequoyah (OK)	26.5	23.0	-3.5	26.5	21.4	-5.1
Unmonitored 1	Benton	26.7	23.0	-3.7	26.7	20.9	-5.8
Unmonitored 2	Jefferson	29.5	24.9	-4.6	29.5	24.5	-5.0
Unmonitored 3	Independence	30.0	25.1	-4.9	30.0	24.2	-5.8

Note: The NAAQS for 24-hour average $PM_{2.5}$ is 35 µg/m^3. * Current Year DV is estimated.

Estimated daily $PM_{2.5}$ design values are lower than the current-year values by approximately 3 to 7 µg/m^3 for the 2005/2015 simulation pair and approximately 3.5 to 6 µg/m^3 for the 2008/2015 simulation pair. Again, the differences in the results reflect the difference in the response of the model to changes in emissions under different meteorological conditions. In both cases, the greatest reduction is simulated to occur at the Marion site in Crittenden County. The resulting future-year design values are all lower than the NAAQS.

Table 6-8 summarizes the modeled attainment test results for annual $PM_{2.5}$. The current-year design values used for this summary are calculated as the average of the design values for the two overlapping three-year periods that include the modeled years (2005-2007 and 2006-2008). For each three-year period, the design value is calculated as the three-year average of the annual average $PM_{2.5}$ concentration for each of the three years. The current-year design values are based on the data contained with the MATS database and calculated within MATS.

Table 6-8. Estimated Future-Year Annual Average $PM_{2.5}$ Design Values ($\mu g/m^3$) for Monitoring Sites and Selected Unmonitored Locations within Arkansas

Site/Location	County	2005/2015 Annual $PM_{2.5}$ Design Values ($\mu g/m^3$)			2008/2015 Annual $PM_{2.5}$ Design Values ($\mu g/m^3$)		
		Current Year DV	Future Year DV	Diff-erence	Current Year DV	Future Year DV	Diff-erence
North Little Rock (Pike Ave)	Pulaski	12.7	11.0	-1.7	12.7	11.1	-1.6
Little Rock (Adams Field)	Pulaski	13.2	11.5	-1.7	13.2	11.7	-1.5
Little Rock (Doyle Springs Rd)	Pulaski	13.2	11.5	-1.7	13.2	11.7	-1.5
Marion	Crittenden	12.9	11.1	-1.8	12.9	11.3	-1.6
Stuttgart	Arkansas	12.2	10.7	-1.5	12.2	10.9	-1.3
Newport	Jackson	12.6	10.7	-1.9	12.6	10.9	-1.7
Springdale	Washington	11.9	10.3	-1.6	11.9	10.3	-1.6
Mena	Polk	11.7	10.4	-1.3	11.7	10.5	-1.2
Hot Springs	Garland	12.1	10.8	-1.3	12.1	11.0	-1.1
El Dorado	Union	12.4	10.9	-1.5	12.4	11.1	-1.3
Crossett	Ashley	12.7	11.2	-1.5	12.7	11.4	-1.3
Roland	Sequoyah (OK)	11.8	10.3	-1.5	11.8	10.4	-1.4
Unmonitored 1	Benton	11.9	10.3	-1.6	11.9	10.3	-1.6
Unmonitored 2	Jefferson	12.9	11.2	-1.7	12.9	11.3	-1.6
Unmonitored 3	Independence	12.8	11.1	-1.7	12.8	11.1	-1.7

Note: The NAAQS for annual average $PM_{2.5}$ is 12 $\mu g/m^3$. * Current Year DV is estimated.

Estimated annual $PM_{2.5}$ design values are lower than the current-year values by approximately 1 to 2 $\mu g/m^3$ for both simulation pairs. In both cases, the greatest reductions are simulated to occur at the Newport site in Jackson County. The resulting future-year design values are all lower than the NAAQS.

6.2.3 NO_2

MATS does not accommodate NO_2. The results presented in this section were calculated using the MATS procedures, but in this case the procedures were applied manually within spreadsheets containing the model output for NO_2.

Table 6-9 summarizes the modeled attainment test results for 1-hour NO_2. For this summary, the current-year design value is calculated as the average design value for the two periods 2005-2007 and 2006-2008, where the design value for each of these periods is the three-year average of the of 98th percentile daily maximum 1-hour NO_2 concentration for each of the three years. The current-year design values were calculated manually, based on observed data.

Table 6-9. Estimated Future-Year 1-Hour NO_2 Design Values (ppb) for Monitoring Sites and Selected Unmonitored Locations within Arkansas

Site/Location	County	2005/2015 1-Hr NO_2 Design Values (ppb)			2008/2015 1-Hr NO_2 Design Values (ppb)		
		Current Year DV	Future Year DV	Diff-erence	Current Year DV	Future Year DV	Diff-erence
North Little Rock (Pike Ave)	Pulaski	47.5	35.5	-12.0	47.5	38.4	-9.1
Marion	Crittenden	52.0	38.6	-13.4	52.0	42.6	-9.4
Unmonitored 1	Benton	52.0	30.8	-21.2	52.0	34.0	-18.0
Unmonitored 2	Jefferson	52.0	42.0	-10.0	52.0	37.7	-14.3
Unmonitored 3	Independence	52.0	41.4	-10.6	52.0	35.7	-16.3

Note: The NAAQS for 1-hour average NO_2 is 100 ppb. * Current Year DV is estimated.

Future-year NO_2 design values are estimated to be lower than the current-year values by approximately 12 to 13 ppb at the monitoring sites and by approximately 10 to 20 ppb at the unmonitored locations for the 2005/2015 simulation pair. The differences are approximately 9 ppb at the monitoring sites and 14 to 18 ppb at the unmonitored locations for the 2008/2015 simulation pair. The estimated future-year design values for all locations range from about 30 to 40 ppb (well below the NAAQS).

6.2.4 SO_2

MATS also does not accommodate SO_2. The results presented in this section were calculated using the MATS procedures, but in this case the procedures were applied manually within spreadsheets containing the model output for SO_2.

Table 6-10 summarizes the modeled attainment test results for 1-hour SO_2. For this summary, the current-year design value is the average design value for the two periods 2005-2007 and 2006-2008, where the design value for each of these periods is the three-year average of the of 99th percentile daily maximum 1-hour SO_2 concentration for each of the three years. The current-year design values were calculated manually, based on observed data.

Table 6-10. Estimated Future-Year 1-Hour SO_2 Design Values (ppb) for Monitoring Sites and Selected Unmonitored Locations within Arkansas

Site/Location	County	2005/2015 1-Hr SO_2 Design Values (ppb)			2008/2015 1-Hr SO_2 Design Values (ppb)		
		Current Year DV	Future Year DV	Diff-erence	Current Year DV	Future Year DV	Diff-erence
North Little Rock (Pike Ave)	Pulaski	11.0	8.5	-2.5	11.0	9.9	-1.1
Marion	Crittenden	20.2*	24.4	4.2	20.2*	26.1	5.9
El Dorado	Union	34.0	29.7	-4.3	34.0	32.0	-2.0
Unmonitored 1	Benton	20.9*	35.9	15.0	20.9*	33.3	12.4
Unmonitored 2	Jefferson	16.3*	23.2	6.9	16.3*	22.7	6.4
Unmonitored 3	Independence	18.1*	26.0	7.9	18.1*	25.6	7.5

Note: The NAAQS for 1-hour average SO_2 is 75 ppb. * Current Year DV is estimated.

For both simulation pairs, SO_2 design values are estimated to be lower than the current-year values at the actual monitoring sites and higher at the unmonitored locations. Despite the increases all estimated future-year design values are below the NAAQS.

6.2.5 Visibility

MATS was also applied for visibility, focusing on the two Class I areas in Arkansas. Table 6-11 summarizes the modeled attainment test results for visibility – first for the 20 percent best visibility days and then for the 20 percent worst visibility days. The current year design values are based on the best and worst visibility days for the four-year period 2005-2008. The units are deciviews (dV).

Table 6-11a. Estimated Future-Year Visibility (dV) for IMPROVE Monitoring Sites within Arkansas: 20 Percent Best Days

Site/Location	County	2005/2015 Visibility Values (dV)			2008/2015 Visibility Values (dV)		
		Current Year DV	Future Year DV	Diff-erence	Current Year DV	Future Year DV	Diff-erence
Caney Creek Wilderness	Newton	12.2	11.7	-0.5	12.2	11.6	-0.6
Upper Buffalo Wilderness	Union	12.3	11.6	-0.7	12.3	11.7	-0.6

Table 6-11b. Estimated Future-Year Visibility (dV) for IMPROVE Monitoring Sites within Arkansas: 20 Percent Worst Days

Site/Location	County	2005/2015 Visibility Values (dV)			2008/2015 Visibility Values (dV)		
		Current Year DV	Future Year DV	Diff-erence	Current Year DV	Future Year DV	Diff-erence
Caney Creek Wilderness	Newton	26.3	23.9	-2.4	26.3	24.0	-2.3
Upper Buffalo Wilderness	Union	26.7	24.5	-2.2	26.7	24.6	-2.1

The CMAQ/MATS modeling results indicate an improvement in visibility at the two Class I sites, on both the 20 percent best and worst days between the current-year period and 2015.

7 References

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Appendix D

Air Quality Modeling Analysis of Minor Source Permit Thresholds

MEMORANDUM

To: Mark McCorkle and David Clark, Arkansas Department of Environmental Quality (ADEQ)

From: Sharon Douglas, Jay Haney, Belle Hudischewskyj, Yihua Wei and Tom Myers, ICF

Date: September 30, 2015

Re: Air Quality Modeling Analysis of Minor Source Permit Thresholds

Introduction

This memorandum summarizes the methods and results of an air quality modeling exercise designed to inform minor source permit applications and future-year attainment of the National Ambient Air Quality Standards (NAAQS) for the State of Arkansas. Air quality modeling was used to demonstrate that sources permitted under the Minor New Source Review (NSR) program with emissions increases less than proposed permit thresholds will not cause or contribute to a violation of the NAAQS or interfere with the maintenance of the NAAQS.

In a February 17, 2015 letter "EPA Comments on Proposed Revisions to the Arkansas Plan of Implementation for Air Pollution Control - Regulation No. 19 (Docket No. 14-010-R)," EPA states that one of the requirements for approval of Reg. 19.305 is for ADEQ to demonstrate how all sources permitted under the Minor NSR Program will not cause or contribute to a NAAQS violation or interfere with the maintenance of the NAAQS. EPA further states "the ADEQ may achieve this by providing a detailed analysis and supporting documentation, such as generic air quality modeling, to demonstrate that all sources permitted under the Minor NSR program will not interfere with NAAQS attainment or maintenance for all NAAQS." As part of this demonstration "the ADEQ needs to provide additional technical information to demonstrate that proposed changes with emissions increases less than the referenced thresholds will not cause or contribute to a violation of the NAAQS or interfere with the maintenance of the NAAQS. The referenced thresholds are the proposed permit threshold/de minimus levels listed in the 2010 Arkansas State Implementation Plan Revision. For criteria pollutants, these are as follows: carbon monoxide (CO) 75 tons per year (tpy), oxides of nitrogen (NO_x) 40 tpy, sulfur dioxide (SO_2) 40 tpy, volatile organic compounds (VOC) 40 tpy, particulate matter (PM) 25 tpy, PM_{10} 15 tpy, and $PM_{2.5}$ 10 tpy.

To examine the potential impacts on these pollutants from new sources or existing sources with emissions increases less than the proposed permit thresholds, ICF conducted a combined AERMOD/CMAQ analysis. The CMAQ modeling for the 2008 base year and the 2008/2015 future year from the Arkansas DEQ statewide modeling effort (ICF, 2014) was used for the regional-scale component of the modeling analysis.

Description of Minor Point Sources

As part of this study, hypothetical minor point sources were modeled using both regional-scale and source-specific modeling methods.

The sources were assumed to emit VOC, NO_x, SO_2, CO, $PM_{2.5}$, and PM_{10}. The emissions for each species were set equal to the permit threshold values, as follows:

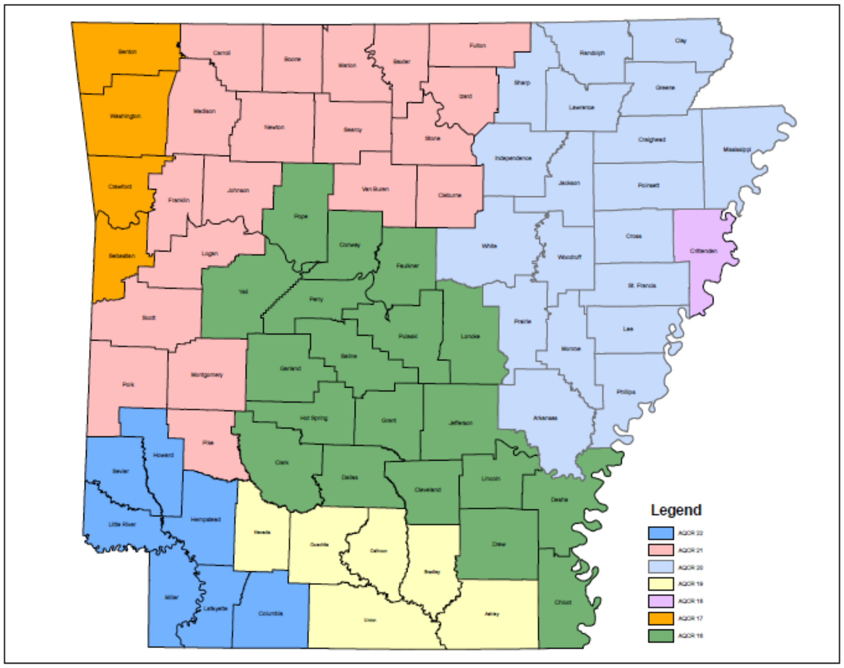
- VOC: 40 tpy
- NO_x: 40 tpy
- SO_2: 40 tpy
- CO: 75 tpy
- $PM_{2.5}$: 10 tpy
- PM_{10}: 15 tpy

The stack parameters were set equal to the median values of stack height, stack diameter, exit temperature, and exit velocity of all minor point sources in Arkansas, based on the 2011 National Emission Inventory (NEI). These values are as follows:

- Stack height: 12.7 meters (m)
- Stack diameter: 0.67 m
- Temperature: 337.8 degrees Kelvin
- Exit velocity: 9.2 meters per second (m/s)

Eight hypothetical sources were approximately centrally located within each State of Arkansas air quality control region (AQCR) identified in Figure 1. AQCR 21 (pink) includes two locations, since it covers two distinct geographical areas. Specifically, the sites were placed in the approximate centers of the following counties: Pulaski, Washington, Crittenden, Union, Craighead, Van Buren, Polk and Miller. The locations were shifted slightly from the center of the county for Polk, Van Buren, and Washington Counties to ensure that the source locations would be accessible (and near a populated or urban area).

Figure 1. Arkansas DEQ Air Quality Control Regions.



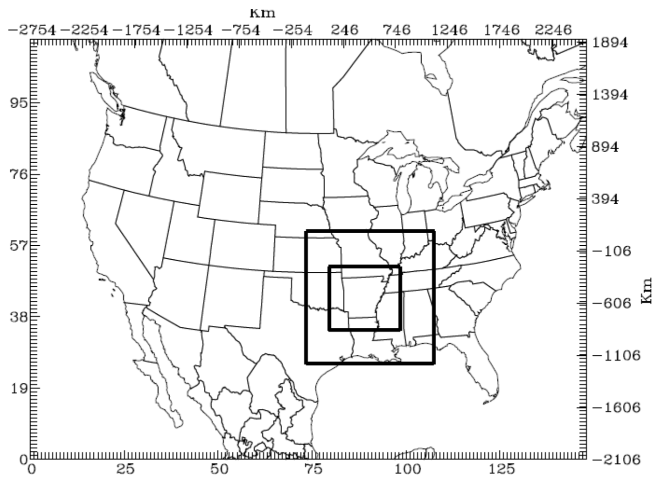
Regional-Scale Modeling

Methodology

Photochemical modeling was used to examine the potential impacts of emission increases from new sources on ozone and $PM_{2.5}$ concentrations. Specifically, the Community Multiscale Air Quality (CMAQ) model was used to simulate the potential impacts from the hypothetical sources described in the previous section. While the photochemical modeling exercise was specifically designed to examine ozone and $PM_{2.5}$, CMAQ also simulates NO_2, SO_2, and PM_{10} so the results for those pollutants were also examined. The CMAQ modeling for the 2008 base year (2008 current year scenario) and the 2008/2015 future year (2015 baseline scenario) from the Arkansas DEQ statewide modeling effort (ICF, 2014) was used as the basis for the regional-scale component of the modeling analysis.

The CMAQ future-year (2015) emission inventory was modified to include the eight hypothetical new point sources, distributed throughout the AQCRs. The emission sources were characterized as single low-level point sources with emission rates set to the threshold values. CMAQ was run (for the 4-km grid only) for the annual simulation period. The full CMAQ modeling domain is presented in Figure 2 and includes a 36-km resolution outer grid encompassing the continental U.S.; a 12-km resolution intermediate grid; and a 4-km resolution inner grid encompassing Arkansas. Only the 4-km grid was used for this application; the boundary conditions were obtained from the 12-km modeling results for the statewide modeling effort (ICF, 2014).

Figure 2. CMAQ Modeling Domain for the Arkansas Statewide Criteria Pollutant Air Quality Modeling Analysis.



The maximum CMAQ-derived impact on daily maximum 8-hour ozone, 24-hour average $PM_{2.5}$, and annual average $PM_{2.5}$ for any location in Arkansas was calculated. In addition, the maximum CMAQ-derived impact on daily maximum 1-hour NO_2, daily maximum 1-hour SO_2, and 24-hour average PM_{10} was also calculated. The statewide maximum impact for each simulation day (maximum over all AQCRs and grid cells in Arkansas) was used for the remaining steps of this analysis.

The daily maximum CMAQ-derived impact was then added to the simulated CMAQ-derived concentrations for each day and grid cell for the future-year (2015) simulation. The resultant values are intended to represent the future-year concentrations assuming worst-case impacts from threshold emission increases at any location within the modeling grid. The adjusted 2015 modeling results will be referred to as the 2015 plus maximum impact dataset or 2015 PMI throughout the remainder of this memorandum.

The 2015 PMI values were used in conjunction with the 2008 current-year modeling results (again from the statewide modeling analysis) to calculate relative reduction factors (RRFs) and estimated future-year design values (FDVs) (for 2015) for both monitored and unmonitored locations. These results were compared with the prior 2015 results (from the original statewide modeling analysis) as well as with the NAAQS to examine whether emission increases less than the referenced thresholds will cause or contribute to a violation of the NAAQS or potentially interfere with the maintenance of the NAAQS.

EPA's MATS software was used to calculate RRFs and future-year design values for ozone and $PM_{2.5}$, following the recommendations outlined in the updated draft guidance issued by EPA in December 2014 (Modeling Guidance for Demonstrating Attainment of Air Quality Goals for Ozone, PM2.5, and Regional Haze [EPA, 2014]). MATS was also used to calculate RRFs for NO_2, SO_2 and PM_{10} using the same methodology as used for ozone.

This methodology is based on relative (rather than absolute) use of the modeling results, and relies on the ability of the air quality modeling system to simulate the change in concentration due to changes in emissions, but not necessarily its ability to simulate exact values for future-year concentrations. For each air quality metric, a future-year estimated design value (FDV) is calculated using the "current-year" design value and the future-year and base-year modeling results.

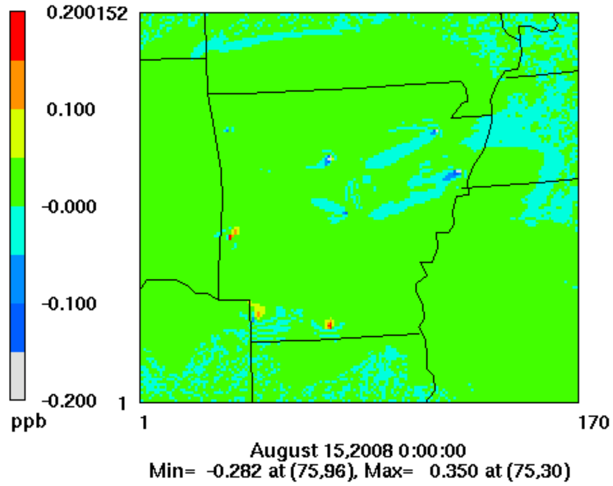
The current-year design value for each pollutant and monitoring site within Arkansas was calculated in accordance with the form of the standard for that pollutant. For this analysis (which is not an attainment demonstration) the current-year design values were based on data for 2006 through 2010. Calculation of the current year design values differs among the pollutants and the procedures outlined in the guidance document were followed. Additional detail for each pollutant is provided in the results sections.

The current-year design value for each site was then multiplied by a relative response factor (RRF), which is defined as ratio of the future-year to base-year simulated concentration in the vicinity of the monitoring site. The resulting value is referred to as the future-year design value or FDV. The methodology has additional layers of complexity for multi-species pollutants such as $PM_{2.5}$; these are outlined in the guidance document and were accounted for in this analysis. The resulting values were compared with the NAAQS. The analysis was conducted for both the 2008 current-year/2015 baseline and 2008 current year/2015 PMI simulation pairs. Tabular and graphical summaries of the RRFs and EDVs were prepared and average values of the RRFs for each county and AQCR were calculated.

Results for Ozone

The simulated maximum impacts on 8-hour ozone concentration occur near and downwind of the hypothetical sources. The maximum difference varies by location and by day and ranges from approximately zero to 1.1 parts per billion (ppb). An example difference plot illustrating the impacts for 15 August is provided in Figure 3.

Figure 3. Example Difference in CMAQ-Derived Daily Maximum 8-Hour Average Ozone Concentration with the Addition of Emissions from the Eight Hypothetical Minor Point Sources (August 15).



The plot shows a mix of small increases and decreases in simulated daily maximum 8-hour ozone concentrations for the selected day, near and downwind of the source locations. The largest increase is 0.35 ppb. The largest decrease is -0.28. Decreases in ozone are likely due to the added NO_x emissions from the hypothetical sources. The response of the CMAQ model to the changes in emissions is influenced by the complex photochemistry represented by the model. Under certain conditions increases in NO_x emissions can lead to decreases in ozone. This occurs when the conversion of NO to NO_2 is inhibited (due to either relatively low VOC concentrations or limited photolysis conditions – as might be expected to occur during the nighttime hours or on cloudy days).

The maximum differences for each day considering all grid cells in the 4-km grid were compiled and added to the 2015 baseline daily maximum 8-hour ozone concentration for each day and each grid cell to create the 2015 PMI dataset for ozone. The 2015 PMI resultant values are intended to represent the future-year concentrations assuming worst-case impacts from threshold emission increases at any location within the modeling grid.

Next, MATS was applied for both monitoring sites and unmonitored areas.

Site-specific Modeling Results for Ozone

Table 1 summarizes the site-specific MATS results for 8-hour ozone. In this case, the results for each monitoring site assume that a hypothetical source identical to those modeled is located such that the worst-case impact occurs at the monitoring site. The current-year design values used for this summary were calculated as the average of the design values for the three overlapping three-year periods that include the modeled year (2006-2008, 2007-2009, and 2008-2010). All sites with data during the 2006 to 2010 period are included in the table. The current-year design values are based on the data contained within the MATS database and are calculated within MATS. The MATS input parameters were set to the EPA-recommended default values. Per current EPA guidance, the ten highest concentrations, based on the baseline simulation results, were used in the calculation of the RRFs for each site. Units for the FDVs are ppb. The RRF values are unitless.

Table 1. RRFs and Estimated Future-Year 8-Hour Ozone Design Values (ppb) for Monitoring Sites within Arkansas.

Site/Location	County	Current-Year 8-Hr Ozone Design Values (ppb)	2015 Baseline		2015 PMI		Difference in FDV (ppb)
			RRF	FDV (ppb)	RRF	FDV (ppb)	
North Little Rock (Pike Ave)	Pulaski	72.3	0.8837	63.8	0.8881	64.2	0.4
North Little Rock Airport	Pulaski	74.3	0.8773	65.1	0.8813	65.4	0.3
Little Rock (Doyle Springs Rd)	Pulaski	68.0	0.8762	59.5	0.8806	59.8	0.3
Marion	Crittenden	77.3	0.9059	70.0	0.9094	70.2	0.2
Deer	Newton	68.0	0.8966	60.9	0.8988	61.1	0.3
Springdale	Washington	64.0	0.8787	56.2	0.8823	56.4	0.2
Mena	Polk	71.7	0.8932	64.0	0.8966	64.2	0.2

Note: The NAAQS for 8-hour average ozone concentration is 75 ppb.

Ozone design values for 2015 PMI are estimated to be 0.2 to 0.4 ppb higher than the 2015 baseline values. The estimated future-year design values for all sites are below the NAAQS. Addition of the modeled worst-case impacts to the 2015 baseline does not affect attainment or maintenance of the NAAQS for any monitoring site.

Statewide Modeling Results for Ozone

MATS was also used to conduct a spatial-fields analysis. This analysis consisted of several steps: 1) the modeled concentrations were used to calculate RRFs for every grid cell, 2) the model-derived gradients were used in conjunction with observed data to estimate current-year design values for every grid cell, and 3) the results of steps 1 and 2 were used to estimate future-year design values for every grid cell. The objective was to determine whether there are unmonitored areas within the domain that are more sensitive to the addition of emissions corresponding to amount and type modeled than other areas.

The average RRF for 8-hour ozone for Arkansas (based on all grid cells that comprise the state) is 0.8910 for the 2015 baseline and 0.8942 for the 2015 PMI scenario. This increase in average RRF (0.0032) represents a 0.2 ppb increase relative to a base concentration of 70 ppb. Table 2 summarizes the RRFs by AQCR.

Table 2. RRFs for Each AQCR for the 2015 Baseline and 2015 PMI Scenarios: 8-Hour Ozone.

AQCR	2015 Baseline	2015 PMI	Difference (PMI – Baseline)
AQCR 16	0.8842	0.8876	0.0034
AQCR 17	0.8974	0.9012	0.0038
AQCR 18	0.8880	0.8912	0.0032
AQCR 19	0.8959	0.8990	0.0031
AQCR 20	0.8878	0.8906	0.0027
AQCR 21	0.8987	0.9018	0.0031
AQCR 22	0.8896	0.8935	0.0039

For the AQCRs, the worst-case impacts are expected to increase the average RRFs by 0.0027 to 0.0039. In no case is the average RRF increased to a value greater than one (which would indicate an increase rather than a decrease in ozone over time). Overall, there is little variation among the AQCRs. RRFs by county are provided in Attachment A.

Figure 4 displays the calculated RRF values for the 4-km grid for the 2015 baseline and 2015 PMI scenarios and the difference between the two, calculated as PMI minus baseline. The difference plot is intended to examine whether there are areas within the state where the estimated worst-case impacts would have a greater effect on the RRFs compared to other areas.

Figure 4. RRFs and Differences Based on MATS Spatial-Fields Analysis for the 2015 Baseline and 2015 PMI Scenarios: 8-Hour Ozone.

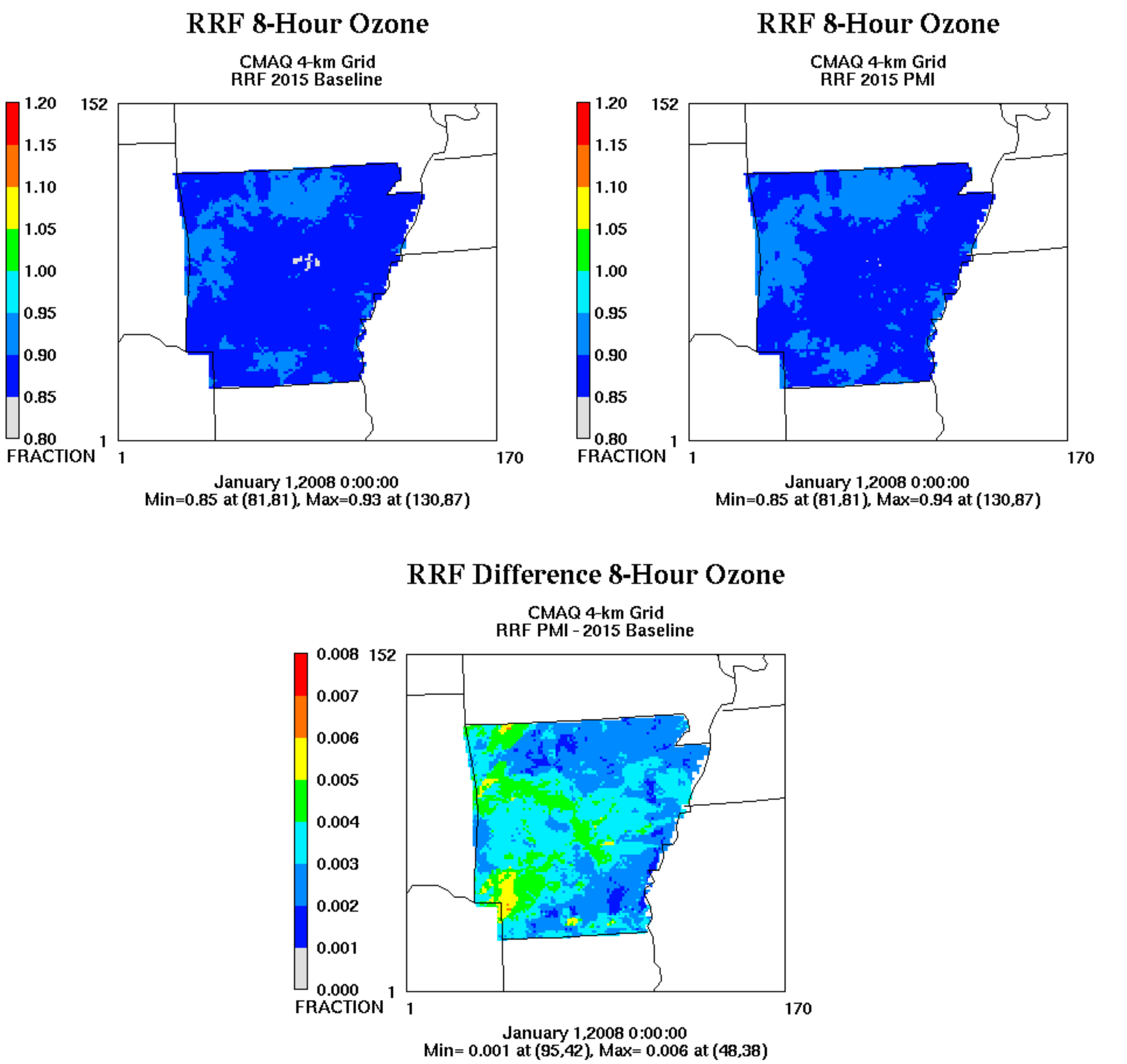
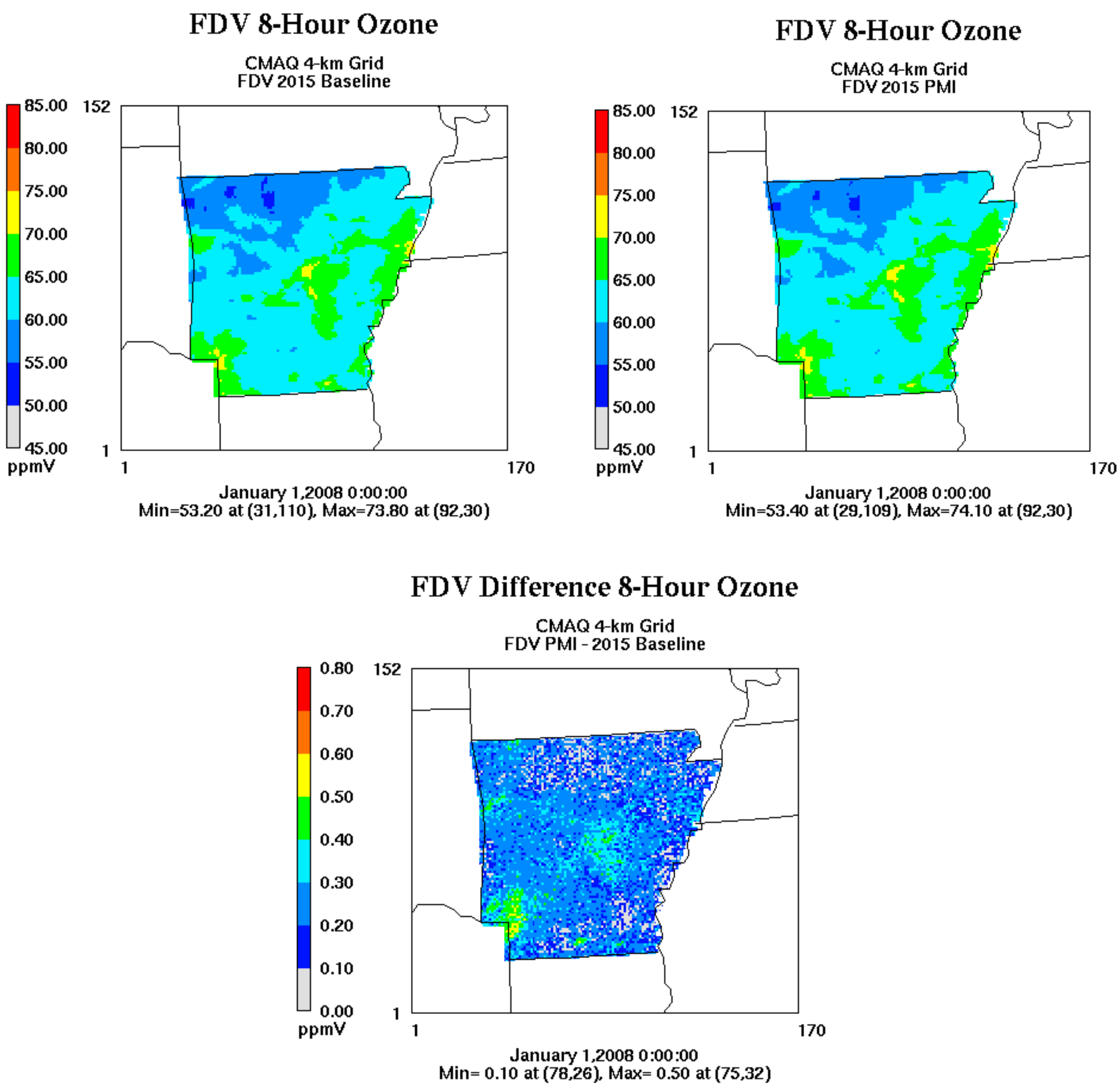


Figure 5 displays the estimated FDVs for the 4-km grid for the 2015 baseline and 2015 PMI scenarios and the difference between the two, calculated as PMI minus baseline.

Figure 5. FDVs and Differences Based on MATS Spatial-Fields Analysis for the 2015 Baseline and 2015 PMI Scenarios: 8-Hour Ozone.



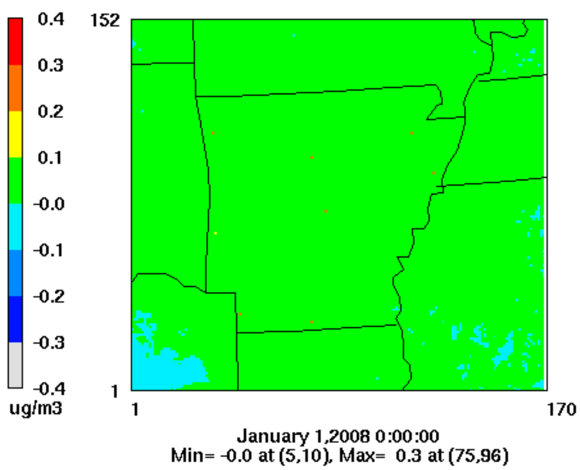
The difference plots show that that the addition of the worst-case impacts tends to increase the RRFs and FDVs by a greater amount for some areas in central and southwestern Arkansas compared to the rest of the State. This is likely because the impacts represent a greater percentage of the simulated concentrations on the days with the highest concentrations (those included in the calculation of the RRF) for these areas than for other areas. One possible conclusion is that worst-case impacts are more likely to affect the design values in these areas. Nevertheless, the impacts are small relative to the base concentrations.

Note that the FDVs for some unmonitored locations are greater than those projected for the monitoring sites (as presented in Table 1), for both the 2015 baseline and the 2015 PMI scenarios. This is due to the fact that the modeled concentration gradients are used in MATS to estimate current and future design values for unmonitored areas and this can result in estimated current-year design values for unmonitored areas that are greater than at any monitoring site. Without use of the modeled concentration gradients, the monitored data are simply interpolated to each grid cell. This results in more uniform FDVs and slightly lower peak values (by about 2 ppb). The spatial-fields analysis of the FDVs is not intended to examine if there are unmonitored areas for which the minor source impacts could potentially result in nonattainment issues. Since the result depends on the current-year design value at each unmonitored grid cell, which is unknown, this analysis is most useful at identifying those areas where the impacts are likely to have a greater effect on the design values. Nevertheless, the FDVs are less than 75 ppb (the current or 2015 NAAQS) for all grid cells within Arkansas for both the 2015 baseline and 2015 PMI scenarios, and the maximum impact at any grid cell is 0.5 ppb.

Results for $PM_{2.5}$

The simulated maximum impacts on 24-hour and annual average $PM_{2.5}$ concentration occur at or near the hypothetical sources. The maximum difference varies by location and ranges from approximately 0.2 to 0.3 micrograms per cubic meter (µg/m^3) on a monthly average basis. An example difference plot illustrating the impacts for annual average $PM_{2.5}$ is provided in Figure 6.

Figure 6. Example Difference in CMAQ-Derived Annual Average $PM_{2.5}$ Concentration with the Addition of Emissions from the Eight Hypothetical Minor Point Sources.



The plot shows small increases in simulated annual average $PM_{2.5}$ concentration at or near the source locations. The largest increase is 0.3 µg/m^3.

The maximum differences in 24-hour average $PM_{2.5}$ concentration for each day considering all grid cells in the 4-km grid were compiled and added to the 2015 baseline 24-hour $PM_{2.5}$ concentration for each day and each grid cell to create the 2015 PMI dataset for $PM_{2.5}$. The 2015 PMI resultant values are intended to represent the future-year concentrations assuming worst-case impacts from threshold emission increases at any location within the modeling grid.

Next, MATS was applied for monitoring sites (for both 24-hour and annual average $PM_{2.5}$) and for unmonitored areas (for annual average $PM_{2.5}$ only). MATS does not support spatial-fields analysis for 24-hour $PM_{2.5}$.

Site-specific Modeling Results for $PM_{2.5}$

Table 3 summarizes the site-specific MATS results for 24-hour $PM_{2.5}$ and Table 4 summarizes the results for annual average $PM_{2.5}$. The results for each monitoring site assume that a hypothetical source identical to those modeled is located such that the worst-case impact occurs at the monitoring site. The current-year design values used for this summary were calculated as the average of the design values for the three overlapping three-year periods that include the modeled year (2006-2008, 2007-2009, and 2008-2010). All currently operating sites with data during the 2006 to 2010 period are included in the table. The current-year design values are based on the data contained within the MATS database and are calculated within MATS. The MATS input parameters were set to the EPA-recommended default values. Per current EPA guidance, the ten percent highest concentrations, based on the baseline simulation results, were used in the calculation of the RRFs for each site. Units for the FDVs are $\mu g/m^3$. For $PM_{2.5}$, the RRF values are calculated for each component species and are therefore not included in the table.

Table 3. RRFs and Estimated Future-Year 24-Hour $PM_{2.5}$ Design Values ($\mu g/m^3$) for Monitoring Sites within Arkansas.

Site/Location	County	Current-Year 24-Hr $PM_{2.5}$ Design Values ($\mu g/m^3$)	2015 Baseline FDV ($\mu g/m^3$)	2015 PMI FDV ($\mu g/m^3$)	Difference in FDV ($\mu g/m^3$)
North Little Rock (Pike Ave)	Pulaski	25.4	21.6	22.0	0.4
Little Rock (Adams Field)	Pulaski	28.1	23.7	23.9	0.2
Little Rock (Doyle Springs Rd)	Pulaski	25.9	21.8	22.1	0.3
Marion	Crittenden	27.2	22.1	22.4	0.3
Stuttgart	Arkansas	25.4	21.2	21.5	0.3
Mena	Polk	23.3	20.6	22.2	0.6
Hot Springs	Garland	23.4	19.9	20.3	0.4
El Dorado	Union	23.0	19.7	19.9	0.2
Crossett	Ashley	22.9	19.3	19.5	0.2

Note: The NAAQS for 24-hour average $PM_{2.5}$ concentration is 35 $\mu g/m^3$.

Daily $PM_{2.5}$ design values for 2015 PMI are estimated to be 0.2 to 0.6 µg/m^3 higher than the 2015 baseline values. The estimated future-year design values for all sites are well below the NAAQS. Addition of the modeled worst-case impacts to the 2015 baseline does not affect attainment or maintenance of the 24-hour $PM_{2.5}$ NAAQS for any monitoring site.

Table 4. RRFs and Estimated Future-Year Annual Average $PM_{2.5}$ Design Values (µg/m^3) for Monitoring Sites within Arkansas.

Site/Location	County	Current-Year Annual $PM_{2.5}$ Design Values (µg/m^3)	2015 Baseline FDV (µg/m^3)	2015 PMI FDV (µg/m^3)	Difference in FDV (µg/m^3)
North Little Rock (Pike Ave)	Pulaski	11.8	10.4	10.6	0.2
Little Rock (Adams Field)	Pulaski	12.2	10.8	11.0	0.2
Little Rock (Doyle Springs Rd)	Pulaski	12.0	10.7	11.0	0.3
Marion	Crittenden	11.8	10.4	10.6	0.2
Stuttgart	Arkansas	11.3	10.2	10.4	0.2
Mena	Polk	10.9	9.8	10.2	0.4
Hot Springs	Garland	11.1	10.1	10.4	0.3
El Dorado	Union	11.3	10.1	10.4	0.3
Crossett	Ashley	11.1	10.0	10.2	0.2

Note: The NAAQS for annual average $PM_{2.5}$ concentration is 12 µg/m^3.

Annual $PM_{2.5}$ design values for 2015 PMI are estimated to be 0.2 to 0.4 µg/m^3 higher than the 2015 baseline values. The estimated future-year design values for all sites are all below the NAAQS. Addition of the modeled worst-case impacts to the 2015 baseline does not affect attainment or maintenance of the annual $PM_{2.5}$ NAAQS for any monitoring site.

Statewide Modeling Results for $PM_{2.5}$

MATS was also used to conduct a spatial-fields analysis for annual $PM_{2.5}$. This analysis consisted of several steps: 1) the modeled concentrations were used to calculate RRFs for every grid cell, 2) the model-derived gradients were used in conjunction with observed data to estimate current-year design values for every grid cell, and 3) the results of steps 1 and 2 were used to estimate future-year design values for every grid cell. The objective was to determine whether there are unmonitored areas within the domain that are more sensitive to the addition of emissions corresponding to amount and type modeled than other areas.

The average RRF for Arkansas (based on all grid cells that comprise the state) is 0.8619 for the 2015 baseline and 0.9045 for the 2015 PMI scenario. This increase (0.0425) represents a 0.4 µg/m^3 increase relative to a base concentration of 10 µg/m^3. Table 5 summarizes the RRFs by AQCR.

Table 5. RRFs for Each AQCR for the 2015 Baseline and 2015 PMI Scenarios: Annual Average $PM_{2.5}$.

AQCR	2015 Baseline	2015 PMI	Difference (PMI – Baseline)
AQCR 16	0.8619	0.9040	0.0421
AQCR 17	0.8633	0.9056	0.0424
AQCR 18	0.8530	0.8814	0.0284
AQCR 19	0.8629	0.9098	0.0469
AQCR 20	0.8587	0.8918	0.0330
AQCR 21	0.8661	0.9162	0.0501
AQCR 22	0.8588	0.9062	0.0474

For the AQCRs, the worst-case impacts are expected to increase the average RRFs by 0.0284 to 0.0501. In no case is the average RRF increased to a value greater than one (which would indicate an increase rather than a decrease in $PM_{2.5}$ over time). Overall, RRFs are increased the most for AQCRs 19, 21 and 22, which encompass most of the southwestern part of the State. RRFs by county are provided in Attachment B.

Figure 7 displays the calculated RRF values for the 4-km grid for the 2015 baseline and 2015 PMI scenarios and the difference between the two, calculated as PMI minus baseline.

Figure 7. RRFs and Differences Based on MATS Spatial-Fields Analysis for the 2015 Baseline and 2015 PMI Scenarios: Annual Average $PM_{2.5}$.

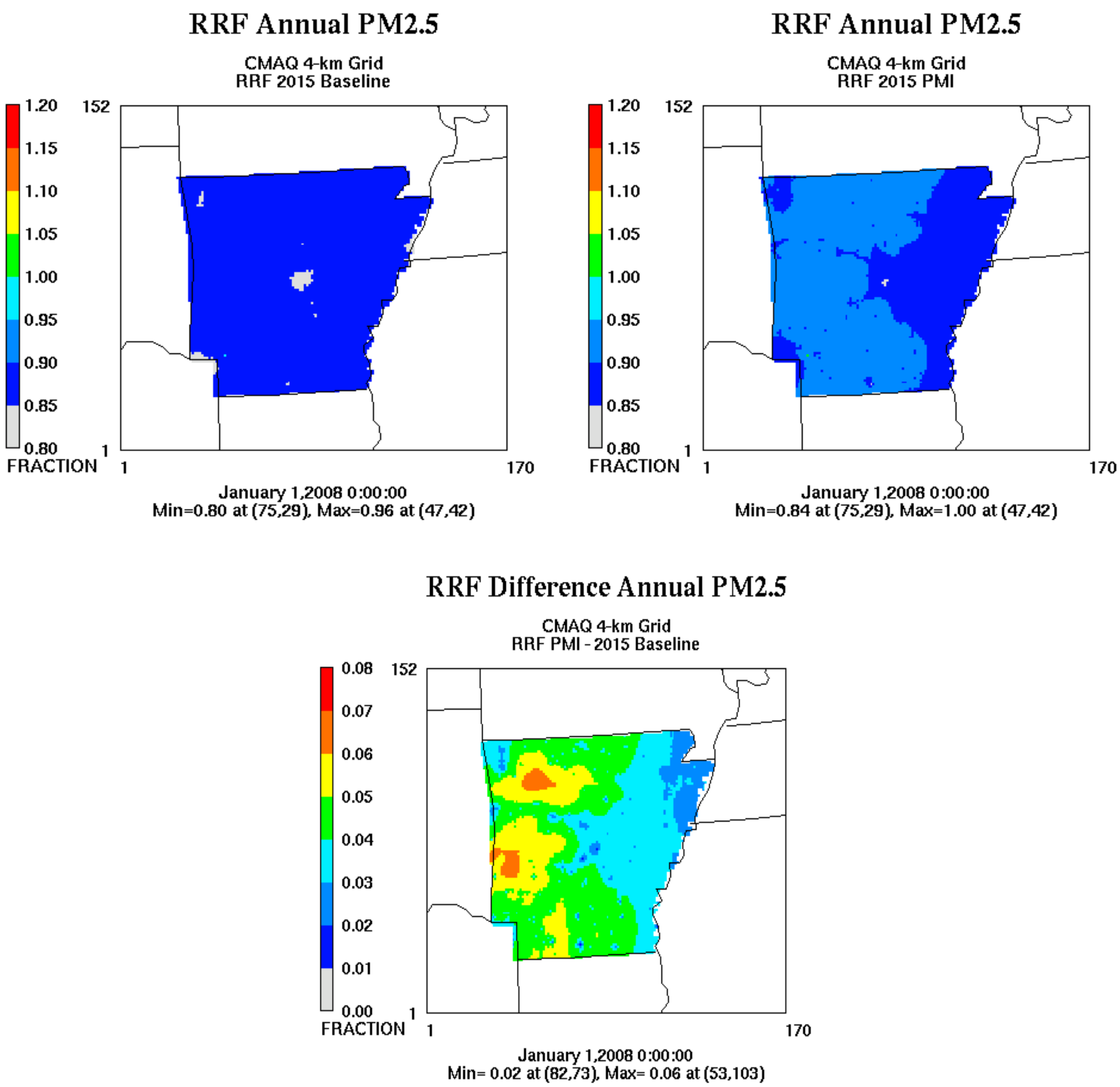
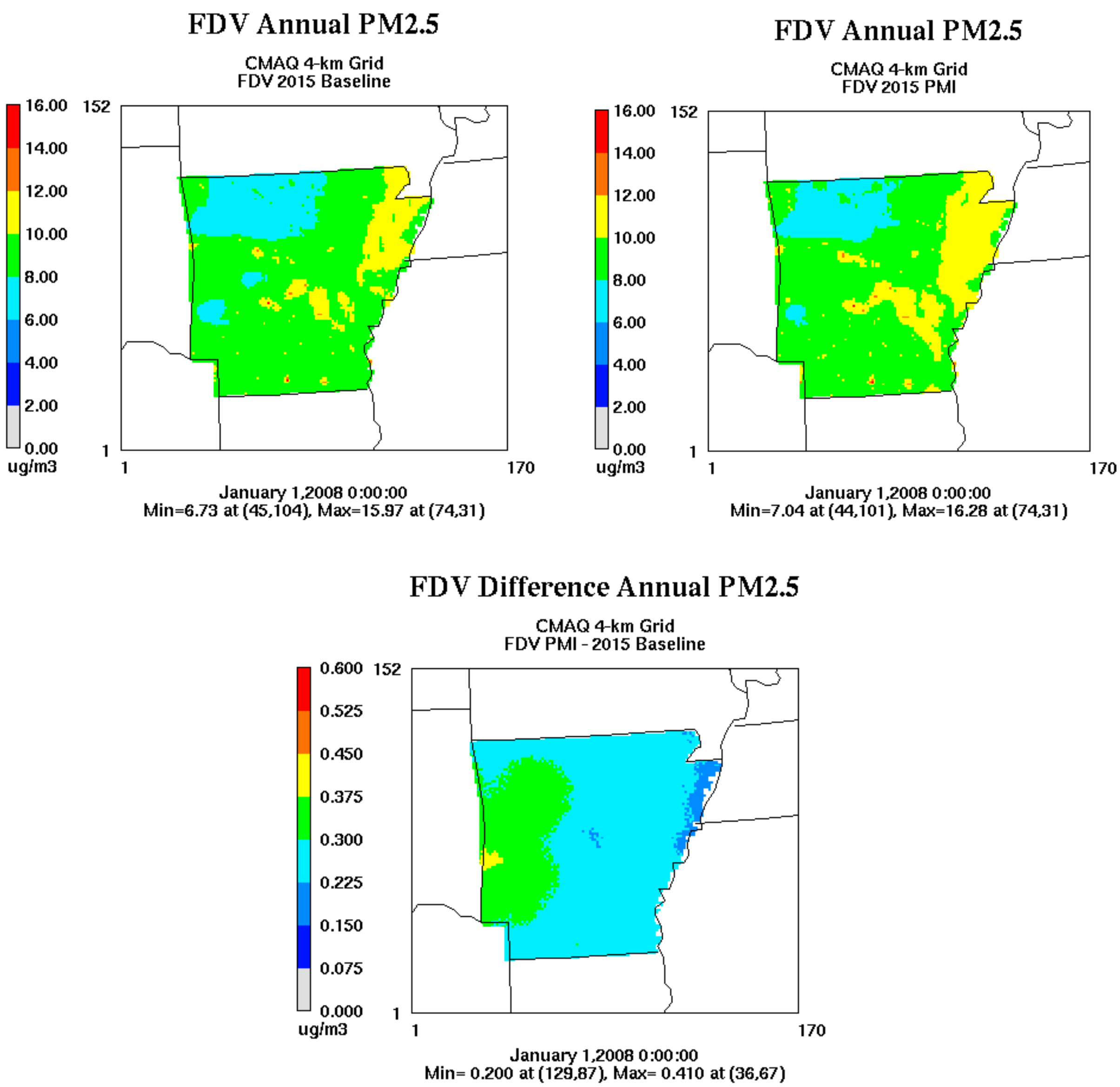


Figure 8 displays the estimated FDVs for the 4-km grid for the 2015 baseline and 2015 PMI scenarios and the difference between the two, calculated as PMI minus baseline.

Figure 8. FDVs and Differences Based on MATS Spatial-Fields Analysis for the 2015 Baseline and 2015 PMI Scenarios: Annual Average $PM_{2.5}$.



The difference plots show that the addition of the worst-case impacts tends to increase the RRFs and FDVs by a greater amount for some areas in western Arkansas compared to the rest of the state. Worst-case impacts in these areas are more likely to affect the RRF and FDV values. Nevertheless, the impacts are small relative to the base concentrations.

The MATS projected FDVs show several isolated unmonitored areas throughout the state with annual average $PM_{2.5}$ concentrations greater than 12 µg/m^3. These appear in both the 2015 baseline and 2015 PMI plots. The values are greater than those projected for the monitoring sites (as presented in Table 4). This is due to the fact that the modeled concentration gradients are used in MATS to estimate current and future design values for unmonitored areas and this can result in estimated current-year design values for unmonitored areas that are greater than at any monitoring site. Without use of the modeled concentration gradients, the monitored data are simply interpolated to each grid cell. This results in more uniform FDVs and lower peak values (by up to 5 $\mu g/m^3$). The spatial-fields analysis is not intended to examine if there are unmonitored areas for which the minor source impacts would potentially result in nonattainment issues. Since the result depends on the assumed current-year design value at each unmonitored location, which is unknown, this analysis is most useful at identifying those areas where the impacts are likely to have a greater effect on the design values. Nevertheless, the FDVs indicate a few isolated areas/grid cells within Arkansas greater than 12 $\mu g/m^3$ for the gradient-adjusted case and no grid cells greater than 12 $\mu g/m^3$ for the straight interpolation case for both the 2015 baseline and 2015 PMI scenarios. The maximum impact at any grid cell is 0.41 $\mu g/m^3$.

Results for NO_2

The simulated maximum impacts on 1-hour NO_2 concentration occur near and downwind of the hypothetical sources. The maximum difference varies by location and by day and ranges from approximately zero to 6 parts per billion (ppb). The maximum differences for each day considering all grid cells in the 4-km grid were compiled and added to the 2015 baseline daily maximum 1-hour NO_2 concentration for each day and each grid cell to create the 2015 PMI dataset for ozone. The 2015 PMI resultant values are intended to represent the future-year concentrations assuming worst-case impacts from threshold emission increases at any location within the modeling grid.

Next, MATS was applied to calculate RRF values only for both monitoring sites and unmonitored areas. MATS does not accommodate NO_2 but can be used to calculate RRFs for any two datasets.

Site-specific Modeling Results for NO_2

Table 6 summarizes the site-specific RRFs and FDVs for 1-hour NO_2. There are two NO_2 monitoring sites in Arkansas, and the results for each monitoring site assume that a hypothetical source identical to those modeled is located such that the worst-case impact occurs at the monitoring site. The current-year design values used for this summary were calculated as the average of the design values for the three overlapping three-year periods that include the modeled year (2006-2008, 2007-2009, and 2008-2010). All sites with data during the 2006 to 2010 period are included in the table. The MATS input parameters were set to the EPA-recommended default values for ozone and only the RRFs were calculated using MATS. The FDVs were then calculated by hand. Units for the FDVs are ppb. The RRF values are unitless.

Table 6. RRFs and Estimated Future-Year 1-Hour NO_2 Design Values (ppb) for Monitoring Sites within Arkansas.

Site/Location	County	Current-Year 1-Hr NO_2 Design Values (ppb)	2015 Baseline		2015 PMI		Difference in FDV (ppb)
			RRF	FDV (ppb)	RRF	FDV (ppb)	
North Little Rock (Pike Ave)	Pulaski	43.7	0.6846	29.9	0.7150	31.2	1.3
Marion	Crittenden	48.3	0.7986	38.6	0.8308	40.1	1.5

Note: The NAAQS for 1-hour average NO_2 concentration is 100 ppb.

NO_2 design values for 2015 PMI are estimated to be 1.3 to 1.5 ppb higher than the 2015 baseline values. The estimated future-year design values for both sites are well below the NAAQS. Addition of the modeled worst-case impacts to the 2015 baseline does not affect attainment or maintenance of the NAAQS for either monitoring site.

Statewide Modeling Results for NO_2

A simple spatial-fields analysis was also conducted for NO_2. This analysis consisted of several steps: 1) the modeled concentrations were used to calculate RRFs for every grid cell, 2) an average design value for Arkansas (based on data for the two sites) was calculated, and 3) the results of steps 1 and 2 were used to estimate future-year design values for every grid cell. The objective was to determine whether there are unmonitored areas within the domain that are more sensitive to the addition of emissions corresponding to amount and type modeled than other areas.

The average RRF for 1-hour NO_2 for Arkansas (based on all grid cells that comprise the state) is 0.6617 for the 2015 baseline and 0.7630 for the 2015 PMI scenario. This increase (0.0743) represents a 3.3 ppb increase relative to a base concentration of 45 ppb. Table 7 summarizes the RRFs by AQCR.

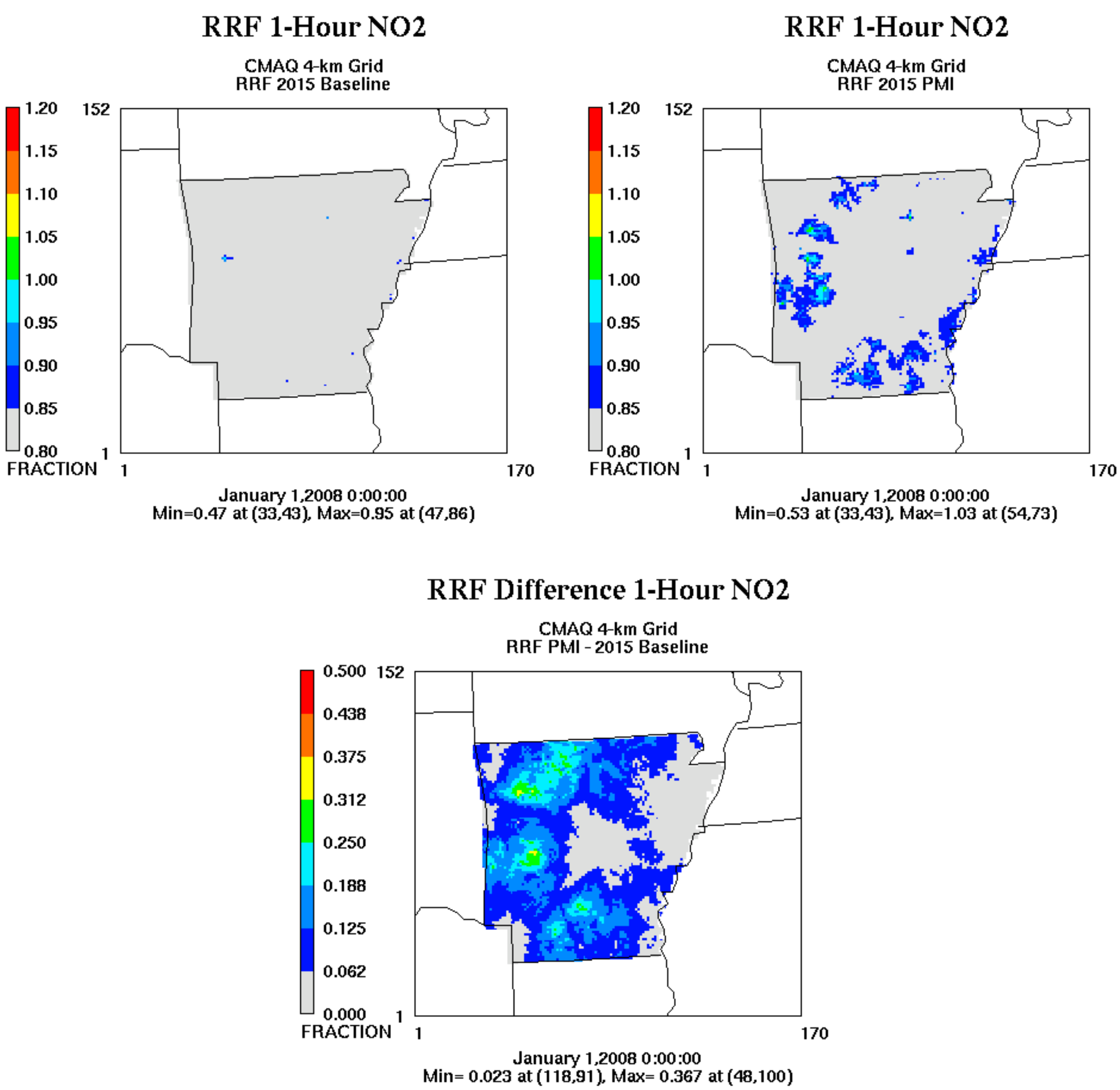
Table 7. RRFs for Each AQCR for the 2015 Baseline and 2015 PMI Scenarios: 1-Hour NO_2.

AQCR	2015 Baseline	2015 PMI	Difference (PMI – Baseline)
AQCR 16	0.6464	0.7401	0.0937
AQCR 17	0.6462	0.7277	0.0816
AQCR 18	0.7997	0.8311	0.0314
AQCR 19	0.7049	0.8335	0.1286
AQCR 20	0.6861	0.7472	0.0611
AQCR 21	0.6307	0.7826	0.1519
AQCR 22	0.6735	0.7648	0.0912

On average for the AQCRs, the worst-case impacts are expected to increase the RRFs by 0.0314 to 0.1519. In no case is the average RRF increased to a value greater than one (which would indicate an increase rather than a decrease in $PM_{2.5}$ over time). Overall, RRFs are increased the most for AQCRs 19 and 21, which represent the south-central and southwestern portions of the State. RRFs by county are provided in Attachment C.

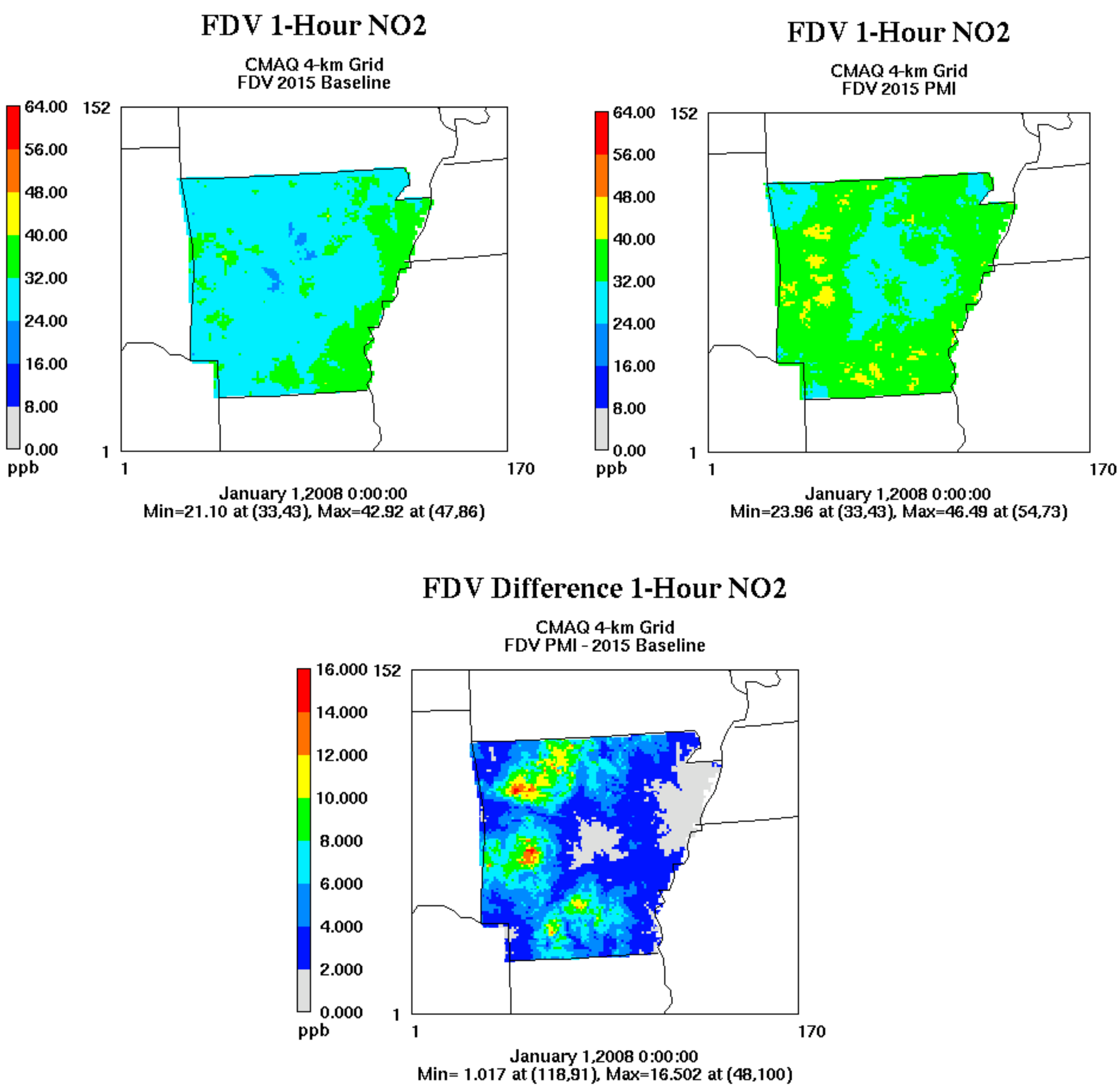
Figure 9 displays the calculated RRF values for the 4-km grid for the 2015 baseline and 2015 PMI scenarios and the difference between the two, calculated as PMI minus baseline.

Figure 9. RRFs and Differences Based on MATS Spatial-Fields Analysis for the 2015 Baseline and 2015 PMI Scenarios: 1-Hour NO_2.



FDVs were calculated using a current-year value of 45 ppb for every grid cell. This was based on an average (approximately) of the current-year design values for the Little Rock and Marion monitoring sites. Figure 20 displays the estimated FDVs for the 4-km grid for the 2015 baseline and 2015 PMI scenarios and the difference between the two, calculated as PMI minus baseline.

Figure 10. FDVs and Differences Based on MATS Spatial-Fields Analysis for the 2015 Baseline and 2015 PMI Scenarios: 1-Hour NO_2.



The difference plots show that that the addition of the worst-case impacts tends to increase the RRFs and FDVs by a greater amount for some areas in northwestern, western, and southwestern Arkansas compared to the rest of the State. Thus these areas may be more sensitive to the addition of NO_2 emissions, relative to the calculation of 1-hour NO_2 NAAQS-relevant metrics. Despite the increased

RRFs, the FDVs are all well below 100 ppb for all grid cells within Arkansas for both the 2015 baseline and 2015 PMI scenarios.

Regional-scale modeling may not be the best tool for the analysis of NO_2 impacts. NO_2 is directly emitted into the atmosphere and a grid-based model like CMAQ is not likely to capture the sub grid-scale impacts due to individual emissions sources. Additional analysis of NO_2 (both 1-hour and annual average concentrations) was performed using the AERMOD model and is presented later in the memorandum.

Results for SO_2

The simulated maximum impacts on 1-hour SO_2 concentration occur near and downwind of the hypothetical sources. The maximum difference varies by location and by day and ranges from approximately zero to 4 parts per billion (ppb). The maximum differences for each day considering all grid cells in the 4-km grid were compiled and added to the 2015 baseline daily maximum 1-hour SO_2 concentration for each day and each grid cell to create the 2015 PMI dataset for ozone. The 2015 PMI resultant values are intended to represent the future-year concentrations assuming worst-case impacts from threshold emission increases at any location within the modeling grid.

Next, MATS was applied to calculate RRF values only for both monitoring sites and unmonitored areas. MATS does not accommodate SO_2 but can be used to calculate RRFs for any two datasets.

SITE-SPECIFIC MODELING RESULTS FOR SO_2

Table 8 summarizes the site-specific RRFs and FDVs for 1-hour SO_2. There are two SO_2 monitoring sites in Arkansas, and the results for each monitoring site assume that a hypothetical source identical to those modeled is located such that the worst-case impact occurs at the monitoring site. The current-year design values used for this summary were calculated as the average of the design values for the three overlapping three-year periods that include the modeled year (2006-2008, 2007-2009, and 2008-2010). All sites with data during the 2006 to 2010 period are included in the table. The MATS input parameters were set to the EPA-recommended default values for ozone and only the RRFs were calculated using MATS. The FDVs were then calculated by hand. Units for the FDVs are ppb. The RRF values are unitless.

Table 8. RRFs and Estimated Future-Year 1-Hour SO_2 Design Values (ppb) for Monitoring Sites within Arkansas.

Site/Location	County	Current-Year 1-Hr SO_2 Design Values (ppb)	2015 Baseline		2015 PMI		Difference in FDV (ppb)
			RRF	FDV (ppb)	RRF	FDV (ppb)	
North Little Rock (Pike Ave)	Pulaski	12.3	0.7560	9.4	0.8412	10.3	0.9
El Dorado	Union	26.0	0.8914	23.2	1.0421	27.1	3.9

Note: The NAAQS for 1-hour average SO_2 concentration is 75 ppb.

SO_2 design values for 2015 PMI are estimated to be 0.9 to 3.9 ppb higher than the 2015 baseline values. The estimated future-year design values for both sites are well below the NAAQS. Addition of the modeled worst-case impacts to the 2015 baseline does not affect attainment or maintenance of the NAAQS for either monitoring site.

Statewide Modeling Results for SO_2

A simple spatial-fields analysis was also conducted for SO_2. This analysis followed the same steps as that for NO_2: 1) the modeled concentrations were used to calculate RRFs for every grid cell, 2) an average design value for Arkansas (based on data for the two sites) was calculated, and 3) the results of steps 1 and 2 were used to estimate future-year design values for every grid cell. The objective was to determine whether there are unmonitored areas within the domain that are more sensitive to the addition of emissions corresponding to amount and type modeled than other areas.

The average RRF for 1-hour SO_2 for Arkansas (based on all grid cells that comprise the state) is 0.9943 for the 2015 baseline and 1.1809 for the 2015 PMI scenario. This increase (0.1866) represents a 3.7 ppb increase relative to a base concentration of 20 ppb. Table 9 summarizes the RRFs by AQCR.

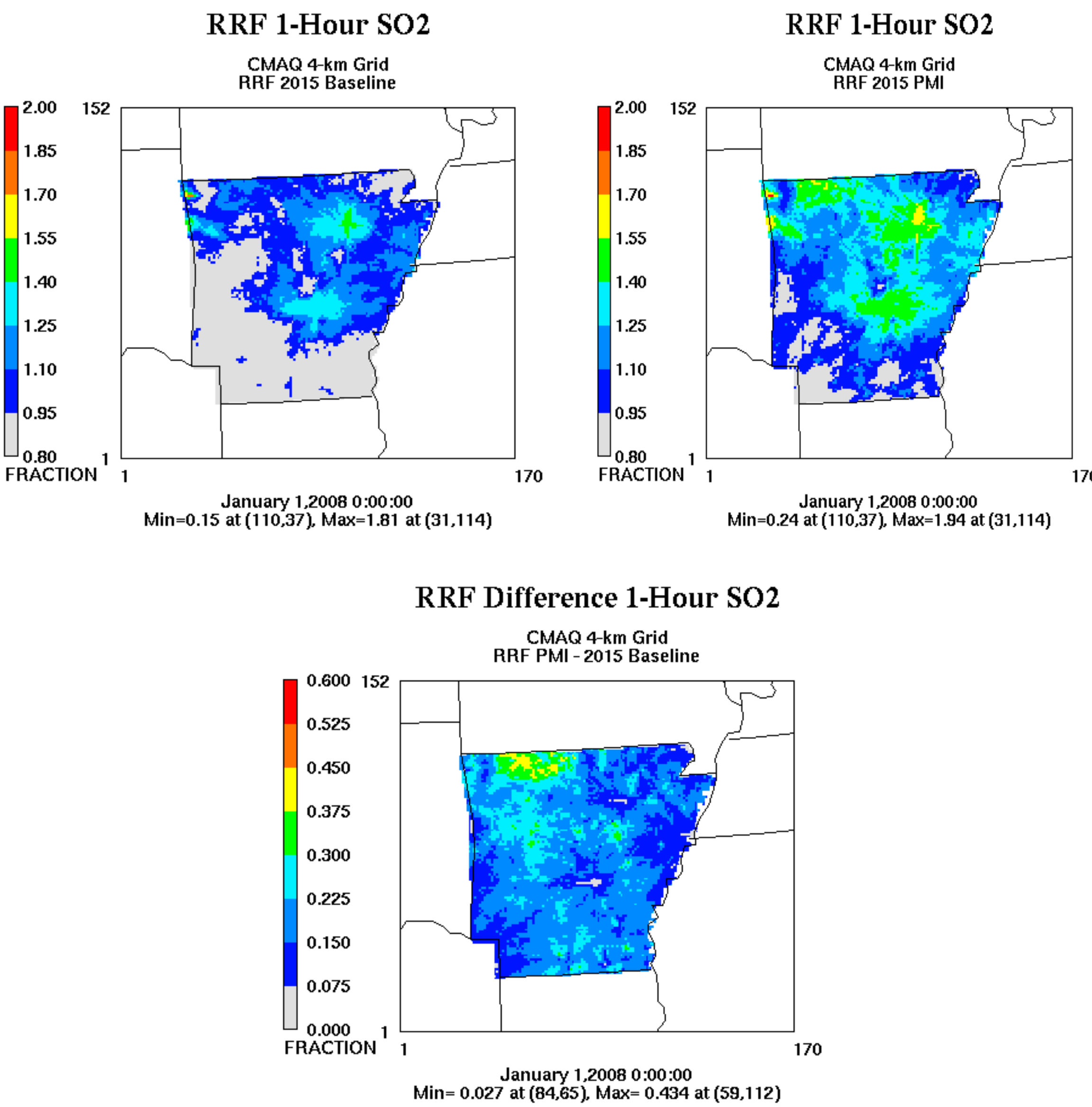
Table 9. RRFs for Each AQCR for the 2015 Baseline and 2015 PMI Scenarios: 1-Hour SO_2.

AQCR	2015 Baseline	2015 PMI	Difference (PMI – Baseline)
AQCR 16	1.0081	1.1978	0.1897
AQCR 17	1.0302	1.2201	0.1899
AQCR 18	1.1552	1.2641	0.1089
AQCR 19	0.7994	0.9999	0.2005
AQCR 20	1.0926	1.2510	0.1584
AQCR 21	1.0092	1.2341	0.2249
AQCR 22	0.7734	0.9217	0.1483

On average for the AQCRs, the worst-case impacts are expected to increase the RRFs by 0.1089 to 0.2249. In no case is the average RRF increased from a value less than one to a value greater than one. However, for several of the AQCRs the baseline values are already greater than one and are increased further. This finding is consistent with that statewide modeling effort (ICF, 2014), which found that SO_2 concentrations in several areas were projected to increase between the base year and 2015. Overall, RRFs are increased the most for AQCR 21 which represents the western to northwestern portion of the State. RRFs by county are provided in Attachment D.

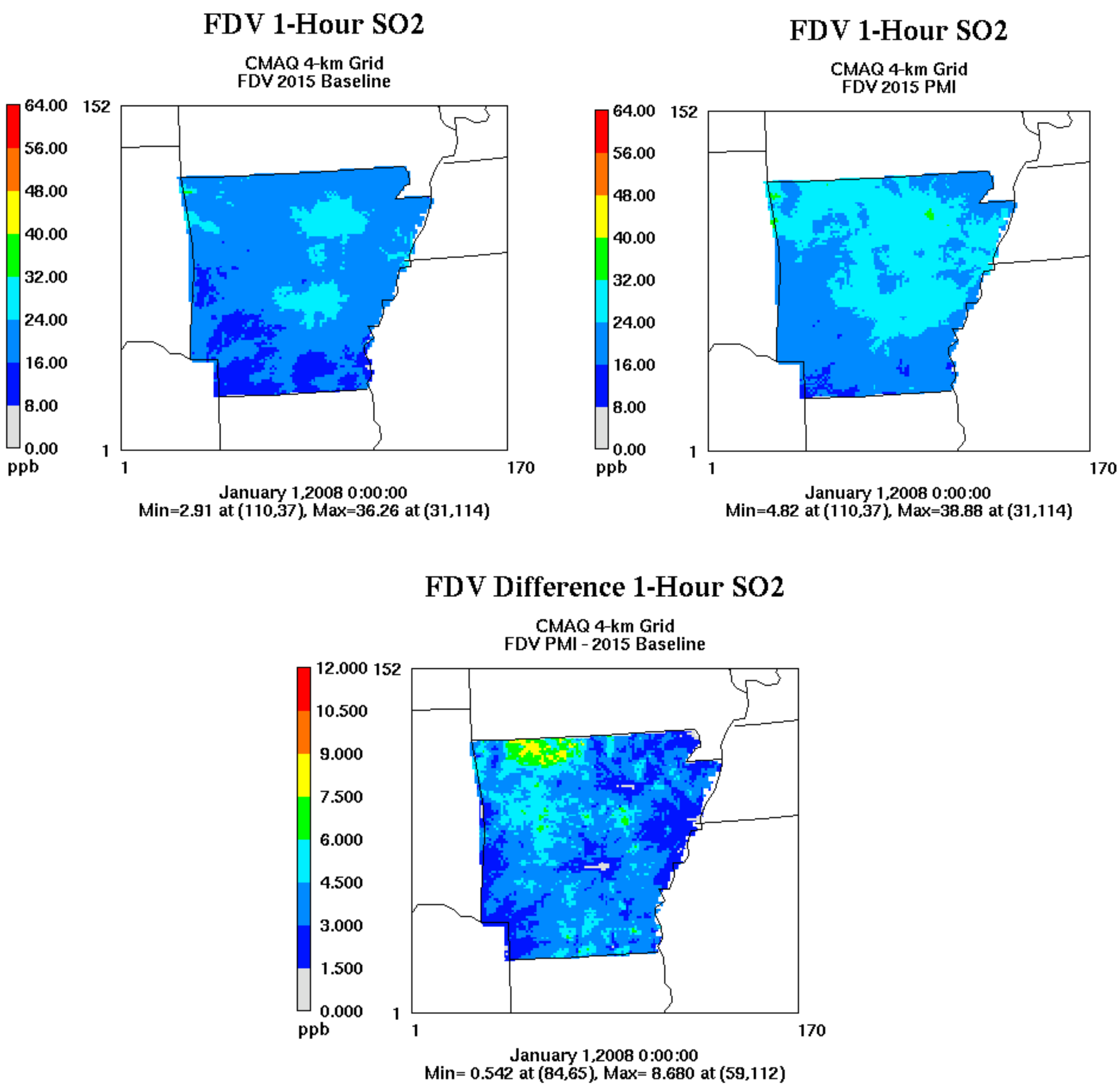
Figure 11 displays the calculated RRF values for the 4-km grid for the 2015 baseline and 2015 PMI scenarios and the difference between the two, calculated as PMI minus baseline.

Figure 11. RRFs and Differences Based on MATS Spatial-Fields Analysis for the 2015 Baseline and 2015 PMI Scenarios: 1-Hour SO_2.



FDVs were calculated using a current-year value of 20 ppb for every grid cell. This was based on an average (approximately) of the current-year design values for the Little Rock and El Dorado monitoring sites. Figure 12 displays the estimated FDVs for the 4-km grid for the 2015 baseline and 2015 PMI scenarios and the difference between the two, calculated as PMI minus baseline.

Figure 12. FDVs and Differences Based on MATS Spatial-Fields Analysis for the 2015 Baseline and 2015 PMI Scenarios: 1-Hour SO_2.



The difference plots show that that the addition of the worst-case impacts tends to increase the RRFs and FDVs by a greater amount for northwestern Arkansas compared to the rest of the State. This area may be more sensitive to the addition of SO_2 emissions, relative to the calculation of 1-hour SO_2 NAAQS-relevant metrics. Despite the increased RRFs, the FDVs are all well below 75 ppb for all grid cells within Arkansas for both the 2015 baseline and 2015 PMI scenarios. Note that the statewide criteria pollutant modeling analysis (ICF, 2014) also showed increases in SO_2 concentrations between the base year and 2015. This is attributable to a projected increase in SO_2 emissions for electric generating units (EGUs) throughout the state. The 2015 emissions used for this analysis reflect Clean Air Interstate Rule

(CAIR) controls. However, Arkansas was identified as one of the states for which CAIR calls for NO_x controls only; no controls are imposed on SO_2 emissions and the emission inventory for 2015 reflects a significant increase in SO_2 emissions for the larger EGU's compared to the base year.

Similar to NO_2, regional-scale modeling may not be the best tool for the analysis of SO_2 impacts. SO_2 is directly emitted into the atmosphere and a grid-based model like CMAQ is not likely to capture the sub grid-scale impacts due to individual emissions sources. Additional analysis of SO_2 was performed using the AERMOD model and is presented later in the memorandum.

Results for PM_{10}

The simulated maximum impacts on 24-hour PM_{10} concentration occur at or near the hypothetical sources. The maximum difference varies by location and by day and ranges from approximately 0.1 to 2.7 µg/m^3. The maximum differences for each day considering all grid cells in the 4-km grid were compiled and added to the 2015 baseline daily maximum 24-hour PM_{10} concentration for each day and each grid cell to create the 2015 PMI dataset for ozone. The 2015 PMI resultant values are intended to represent the future-year concentrations assuming worst-case impacts from threshold emission increases at any location within the modeling grid.

Next, MATS was applied to calculate RRF values only for both monitoring sites and unmonitored areas. MATS does not accommodate PM_{10} but can be used to calculate RRFs for any two datasets.

SITE-SPECIFIC MODELING RESULTS FOR PM_{10}

Table 10 summarizes the site-specific RRFs and FDVs for 24-hour PM_{10}. There is only one PM_{10} monitoring sites in Arkansas, and the results assume that a hypothetical source identical to those modeled is located such that the worst-case impact occurs at the monitoring site. The current-year design values used for this summary were calculated as the maximum 2nd highest PM_{10} concentration for the three years ending with the modeled year 2006-2008. For PM_{10}, the MATS input parameters were set to the EPA-recommended default values for ozone and only the RRFs were calculated using MATS. The FDVs were then calculated by hand. Units for the FDVs are µg/m^3. The RRF values are unitless.

Table 10. RRFs and Estimated Future-Year 24-Hour PM_{10} Design Values (µg/m^3) for Monitoring Sites within Arkansas.

Site/Location	County	Current-Year 24-Hr PM_{10} Design Values (µg/m^3)	2015 Baseline		2015 PMI		Difference in FDV (µg/m^3)
			RRF	FDV (µg/m^3)	RRF	FDV (µg/m^3)	
North Little Rock (Pike Ave)	Pulaski	41.0	0.8434	34.6	0.8621	35.3	0.8

Note: The NAAQS for 24-hour PM_{10} concentration is 150 µg/m3.

The PM_{10} design value for 2015 PMI is estimated to be 0.8 µg/m^3 higher than the 2015 baseline values. The estimated future-year design values for both sites are well below the NAAQS. Addition of the modeled worst-case impacts to the 2015 baseline does not affect attainment or maintenance of the NAAQS for the monitoring site.

Statewide Modeling Results for PM_{10}

A simple spatial-fields analysis was also conducted for PM_{10}. This analysis followed the same steps as that for NO_2: 1) the modeled concentrations were used to calculate RRFs for every grid cell, 2) the design value for Arkansas was set equal to the value for the only monitoring site, and 3) the results of steps 1 and 2 were used to estimate future-year design values for every grid cell. The objective was to determine whether there are unmonitored areas within the domain that are more sensitive to the addition of emissions corresponding to amount and type modeled than other areas.

The average RRF for 24-hour PM_{10} for Arkansas (based on all grid cells that comprise the state) is 0.8829 for the 2015 baseline and 0.9067 for the 2015 PMI scenario. This increase (0.0238) represents a 0.95 µg/m^3 increase relative to a base concentration of 40 µg/m^3. Table 11 summarizes the RRFs by AQCR.

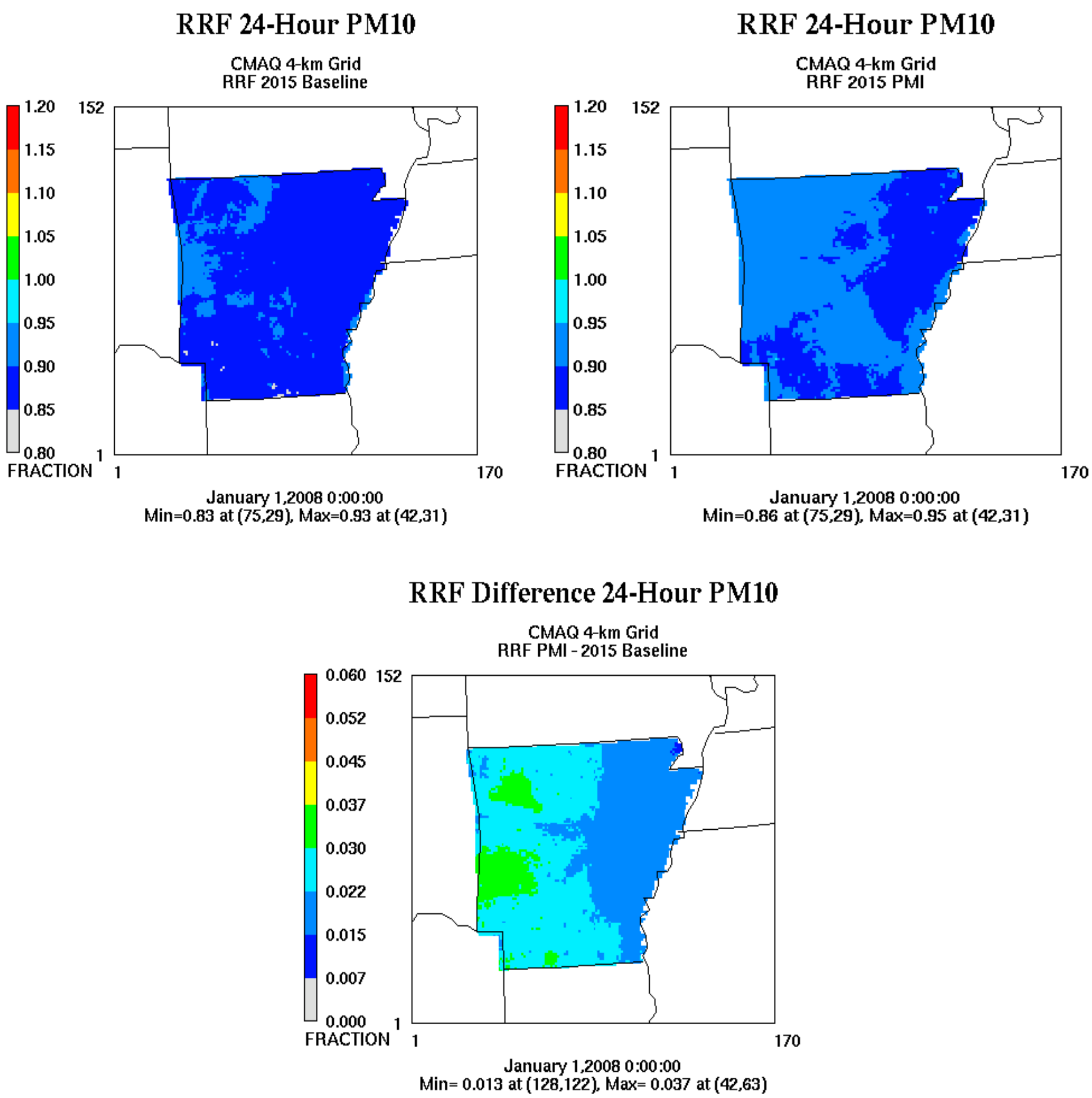
Table 11. RRFs for Each AQCR for the 2015 Baseline and 2015 PMI Scenarios: 24-Hour PM_{10}.

AQCR	2015 Baseline	2015 PMI	Difference (PMI – Baseline)
AQCR 16	0.8876	0.9112	0.0236
AQCR 17	0.9017	0.9275	0.0258
AQCR 18	0.8793	0.8963	0.0170
AQCR 19	0.8726	0.8985	0.0259
AQCR 20	0.8727	0.8908	0.0181
AQCR 21	0.8917	0.9192	0.0275
AQCR 22	0.8725	0.9005	0.0280

On average for the AQCRs, the worst-case impacts are expected to increase the RRFs by 0.0170 to 0.0280. In no case is the average RRF increased to a value greater than one (which would indicate an increase rather than a decrease in PM_{10} over time). Overall, RRFs are increased the most for AQCRs 21 and 22, which represent the western and southwestern portions of the State. RRFs by county are provided in Attachment E.

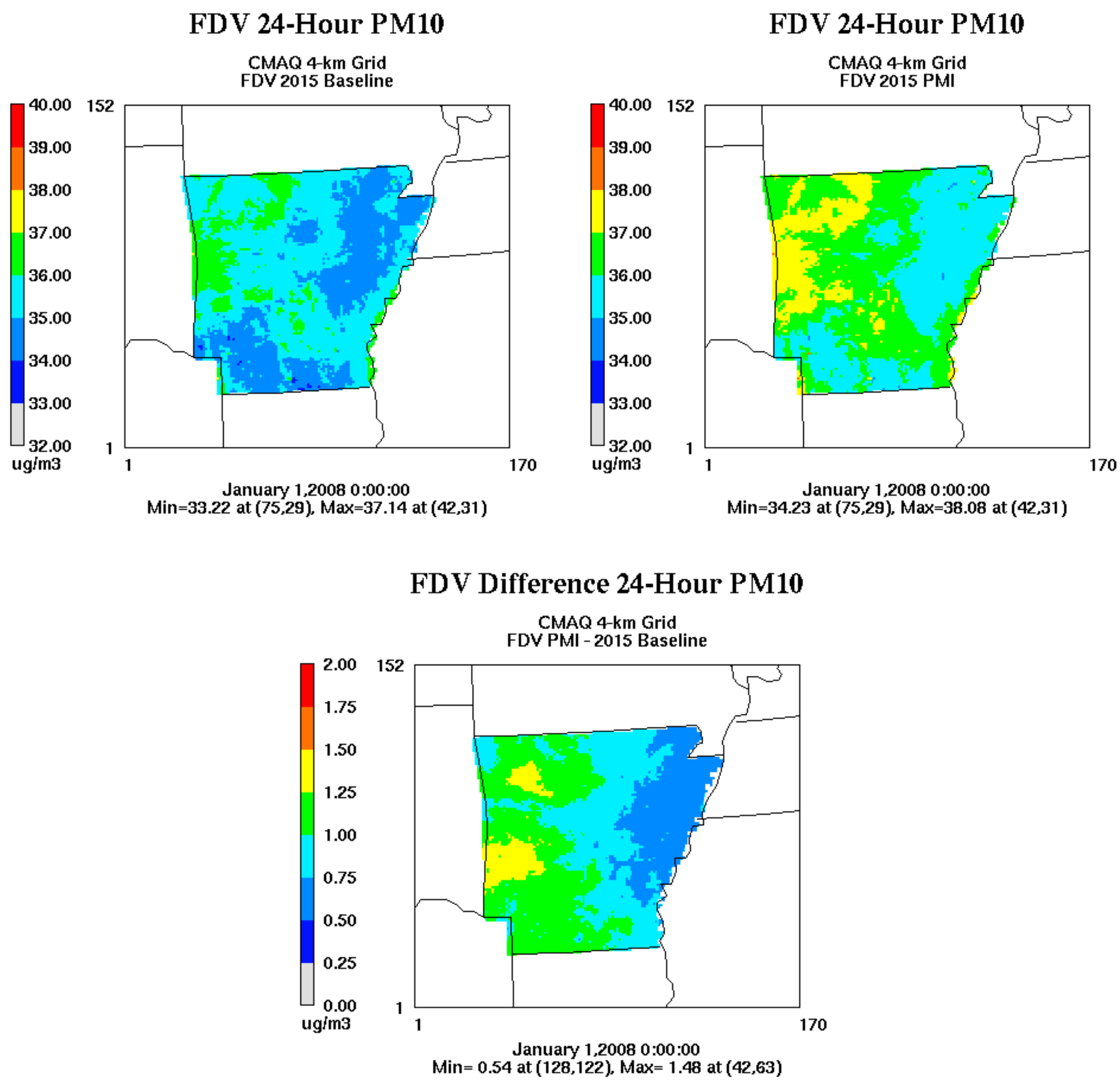
Figure 13 displays the calculated RRF values for the 4-km grid for the 2015 baseline and 2015 PMI scenarios and the difference between the two, calculated as PMI minus baseline.

Figure 11. RRFs and Differences Based on MATS Spatial-Fields Analysis for the 2015 Baseline and 2015 PMI Scenarios: 24-Hour PM_{10}.



FDVs were calculated using a current-year value of 40 µg/m^3 for every grid cell. This was based the current-year design value for the Little Rock monitoring site. Figure 12 displays the estimated FDVs for the 4-km grid for the 2015 baseline and 2015 PMI scenarios and the difference between the two, calculated as PMI minus baseline.

Figure 12. FDVs and Differences Based on MATS Spatial-Fields Analysis for the 2015 Baseline and 2015 PMI Scenarios: 24-Hour PM_{10}.



The difference plots show that that the addition of the worst-case impacts tends to increase the RRFs and FDVs by a greater amount for western and northwestern Arkansas compared to the rest of the State. This area may be more sensitive to the addition of PM_{10} emissions, relative to the calculation of 24-hour PM_{10} NAAQS-relevant metrics. Despite the increased RRFs, the FDVs are all well below 150 $\mu g/m^3$ for all grid cells within Arkansas for both the 2015 baseline and 2015 PMI scenarios, and the maximum impact for any grid cell is 1.48 $\mu g/m^3$.

Additional analysis of PM_{10} was performed using the AERMOD model and is presented later in the memorandum.

Combined Near-Field/Regional Modeling

Methodology

To further examine the potential near-field impacts from new or existing sources with emissions increases less than the proposed permit thresholds, a combined AERMOD/CMAQ analysis was also conducted. The CMAQ modeling for the 2008 base year and the 2015 future year from the statewide modeling effort (ICF, 2014) was also used for this analysis.

AERMOD (version 15181) was applied for the same eight hypothetical sources used for the regional analysis, distributed throughout the AQCRs. Emissions for all species were set equal to permit thresholds (converted to emission rates in grams per second) and stack parameters were set to a median value for minor point sources in Arkansas.

Meteorological inputs for AERMOD were derived from the same gridded meteorological fields used for the CMAQ inputs. Specifically, the meteorological inputs were prepared based on Weather Research and Forecasting (WRF) meteorological inputs for the 2008 base year, using the Meteorological Model Interface (MMIF) program.

The receptor grid for each source consists of receptor cells spaced at 100 m intervals beginning 100 m from the source. This spacing continues out to 1000 m. The spacing then increases to 200 m and continues out to 2000 m from the source. The overall area covered by the receptor grid is 4000 x 4000 m (4 x 4 km), which is the size of one CMAQ grid cell.

For each source location, digital topographical data (in the form of 7.5 minute Digital Elevation Model (DEM) files) for the analysis region were obtained from the U.S. Geological Survey (USGS) and processed for use in AERMOD using the AERMAP preprocessor program.

AERMOD was applied for one year for each of NO_x, SO_2 CO and PM_{10}. For NO_2, the Ozone Limiting Method (OLM) module was used. Hourly ozone values were extracted from the CMAQ regional-scale modeling results and were used by AERMOD to approximate the rate of conversion of nitrogen oxide (NO) to NO_2. In addition, an ambient NO_2/NO_x ratio of 90 percent and an in-stack NO_2/NO_x ratio of 50 percent by mass was used. These values are consistent with EPA guidance. The maximum AERMOD-derived impacts on daily maximum 1-hour NO_2, annual average NO_2, daily maximum 1-hour SO_2, daily maximum 1-hour CO, daily maximum 8-hour average CO, and 24-hour average PM_{10} were calculated for each AQCR.

For each source location, daily AERMOD-derived concentrations (for the receptor with the maximum annual average value) were added to the CMAQ-derived concentrations for that same location. In this manner, the CMAQ values were used as “background”. The statewide daily maximum impact (maximum over all locations/AQCRs) and statewide average impacts (average over all locations/AQCRs) were obtained and used for the remaining steps of this analysis. The resultant values are expected to represent the near-field future-year concentrations assuming worst-case impacts from threshold emission increases at a range of locations throughout the State.

The daily maximum AERMOD-derived impacts were added to the simulated CMAQ-derived concentrations for each day and grid cell for the "future-year" (2015) simulation. The resultant values are expected to represent the future-year concentrations assuming worst-case impacts from threshold emission increases at any location within the modeling grid.

The adjusted (CMAQ + AERMOD) modeling results were used in conjunction with the 2008 current-year modeling results (again from the statewide modeling analysis) to calculate relative reduction factors (RRFs) and estimated future-year design values (FDVs) (for 2015) for monitored locations. These results were compared with the prior 2015 results (from the original statewide modeling analysis), the regional-scale (PMI) modeling results, and the NAAQS to examine whether emission increases less than the referenced thresholds could cause or contribute to a violation of the NAAQS or potentially interfere with the maintenance of the NAAQS. For this analysis the RRFs were calculated by hand, using the MATS methodology.

As for the regional-scale analysis, the current-year design value for each pollutant and monitoring site within Arkansas was calculated based on data for 2006 through 2010, in accordance with the form of the standard for that pollutant. Tabular summaries of the RRFs and FDVs were prepared and are presented in the results section.

Results

Maximum AERMOD-Derived Impacts

Tables 12 and 13 provide the AERMOD-derived impacts for each species and relevant NAAQS metric. Table 12 lists the AERMOD-derived impact without background and Table 13 includes the estimated (CMAQ-derived) background concentration. All metrics were calculated in accordance with the form of the standard for each species. For example the 1-hour NO_2 concentration is based on the 98^{th} percentile (or eight highest) value for each modeled location. The maximum and average of these over all locations is presented in the table. Day-specific background values were obtained from the CMAQ results and paired in space and time with the AERMOD concentrations.

Table 12. Maximum and Average AERMOD-Derived Concentrations: No Background.

Species/ Metric	AERMOD (Max Over All Locations)	AERMOD (Average Over All Locations)	NAAQS
1-Hour NO_2 (ppb)	47.7	37.3	100
Annual NO_2 (ppb)	6.7	3.6	53
1-Hour SO_2 (ppb)	42.5	34.7	75
1-Hour CO (ppb)	241	202	35,000
24-Hour PM_{10} (µg/m^3)	31.1	22.3	150

Table 13. Maximum and Average AERMOD-Derived Concentrations: With CMAQ-Derived Background.

Species/ Metric	AERMOD + Background (Max Over All Locations)	AERMOD + Background (Average Over All Locations)	NAAQS
1-Hour NO2 (ppb)	67.8	53.6	100
Annual NO_2 (ppb)	12.8	8.4	53
1-Hour SO_2 (ppb)	45.1	37.8	75
1-Hour CO (ppb)	972	562	35,000
24-Hour PM_{10} ($\mu g/m^3$)	47.6	39.0	150

For all species and metrics the resultant AERMOD plus background concentrations are much less than the NAAQS. This indicates that for the range of locations modeled, worst-case near-field (or local) impacts would not result in an exceedance of the NAAQS for any species.

Site-Specific RRFs and FDVs with AERMOD-Derived Impacts

The daily maximum AERMOD-derived impacts were then added to the simulated CMAQ-derived concentrations for each day and used in conjunction with the 2008 current-year modeling results to calculate RRFs and FDVs (for 2015) for monitored locations. The results are presented in Tables 14 through 17 for 1-hour NO_2, 1-hour SO_2, 1-hour CO, and 24-hour PM_{10}. Annual NO_2 and 8-hour CO were not included since the results for 1-hour are expected to be larger than for other averaging periods. Note that the RRFs calculated to reflect the AERMOD-derived impacts (AERMOD plus background) are larger (in some cases much larger) than those calculated using the CMAQ-derived impacts (2015 PMI scenarios, as presented earlier in this memorandum). This is consistent with the interpretation that AERMOD is able to represent the local impacts that may not be captured by CMAQ, especially for primary pollutants.

Table 14. RRFs and Estimated Future-Year 1-Hour NO_2 Design Values (ppb) for Monitoring Sites within Arkansas Considering Worst-Case Near-Field Impacts.

Site/Location	County	Current-Year 1-Hr NO_2 Design Values (ppb)	2015 Baseline		AERMOD + Background		Difference in FDV (ppb)
			RRF	FDV (ppb)	RRF	FDV (ppb)	
North Little Rock (Pike Ave)	Pulaski	43.7	0.6846	29.9	0.8281	36.2	6.3
Marion	Crittenden	48.3	0.7986	38.6	0.9764	47.2	8.6

Note: The NAAQS for 1-hour average NO_2 concentration is 100 ppb.

Table 15. RRFs and Estimated Future-Year 1-Hour SO_2 Design Values (ppb) for Monitoring Sites within Arkansas Considering Worst-Case Near-Field Impacts.

Site/Location	County	Current-Year 1-Hr SO_2 Design Values (ppb)	2015 Baseline		AERMOD + Background		Difference in FDV (ppb)
			RRF	FDV (ppb)	RRF	FDV (ppb)	
North Little Rock (Pike Ave)	Pulaski	12.3	0.7560	9.4	1.6986	20.0	11.6
El Dorado	Union	26.0	0.8918	23.2	1.5221	39.6	16.4

Note: The NAAQS for 1-hour average SO_2 concentration is 75 ppb.

Table 16. RRFs and Estimated Future-Year 1-Hour CO Design Values (ppb) for Monitoring Sites within Arkansas Considering Worst-Case Near-Field Impacts.

Site/Location	County	Current-Year 1-Hr CO Design Values (ppb)	2015 Baseline		AERMOD + Background		Difference in FDV (ppb)
			RRF	FDV (ppb)	RRF	FDV (ppb)	
North Little Rock (Pike Ave)	Pulaski	3200	0.5781	1850	0.6022	1927	77

Note: The NAAQS for 1-hour CO concentration is 35,000 ppb.

Table 17. RRFs and Estimated Future-Year 24-Hour PM_{10} Design Values (µg/m^3) for Monitoring Sites within Arkansas Considering Worst-Case Near-Field Impacts.

Site/Location	County	Current-Year 24-Hr PM_{10} Design Values (µg/m^3)	2015 Baseline		AERMOD + Background		Difference in FDV (µg/m^3)
			RRF	FDV (µg/m^3)	RRF	FDV (µg/m^3)	
North Little Rock (Pike Ave)	Pulaski	41.0	0.8434	34.6	0.8992	36.9	2.3

Note: The NAAQS for 24-hour PM_{10} concentration is 150 µg/m3.

Even with the higher RRFs, the FDVs for all species are less than the NAAQS values. This indicates that for the range of locations modeled, worst-case local impacts would not result in an exceedance of the NAAQS for any species at the monitoring sites. For all species, with the exception of SO_2 the FDVs are lower than the current year values for both the baseline and local impact scenarios.

Key Findings/Conclusions

This analysis utilized two air quality modeling systems (both separately and in combination) as well as a variety of postprocessing and analysis techniques to examine the potential impacts from new minor point sources with emissions increases less than proposed permit thresholds for Arkansas. The emissions were set to the threshold level for all pollutants and the maximum impacts were used in the analysis results and for comparison with the NAAQS for each pollutant. The potential worst-case impacts were applied to every part of the state – including every grid cell based on the 4-km resolution CMAQ modeling domain, all air quality monitoring sites, and specific near-source locations. A variety of modeling and postprocessing techniques was applied in order to ensure the appropriate treatment of primary and secondary pollutants and the resolution of both regional and near-field (or local) impacts. The effects of topography and meteorology on air quality were accounted for in determining the maximum or worst-case impacts.

The regional-scale modeling and impact assessment methodology was designed to examine worst-case impacts from threshold emission increases at each location within the modeling grid. The results indicate:

- Addition of the modeled worst-case impacts (based on 40 tpy of both VOC and NO_x emissions) to the 2015 baseline does not affect attainment or maintenance of the ozone NAAQS for any monitoring site. The worst-case impacts result in estimated 2015 FDVs that are 0.2 to 0.4 ppb higher than the 2015 baseline values. The estimated future-year design values for all sites are below the NAAQS.

- Difference plots show that the addition of the worst-case impacts tends to increase the calculated RRFs and FDVs for ozone by a greater amount for some areas in central and southwestern Arkansas compared to the rest of the State. Thus these areas may be more sensitive to the addition of ozone-related (VOC or NO_x) emissions, relative to the calculation of 8-hour ozone NAAQS-relevant metrics.

- Addition of the modeled worst-case impacts to the 2015 baseline does not affect attainment or maintenance of the 24-hour or annual $PM_{2.5}$ NAAQS for any monitoring site. The worst-case impacts result in estimated 2015 FDVs for 24-hour $PM_{2.5}$ that are 0.2 to 0.6 $\mu g/m^3$ higher than the 2015 baseline values and estimated 2015 FDVs for annual average $PM_{2.5}$ that are 0.2 to 0.4 $\mu g/m^3$ higher than the 2015 baseline values. The estimated future-year design values for all sites and both metrics are below the NAAQS.

- Difference plots show that the addition of the worst-case impacts tends to increase the calculated RRFs and FDVs for $PM_{2.5}$ by a greater amount for some areas in central and southwestern Arkansas compared to the rest of the State. Thus these areas may be more sensitive to the addition of PM-related (VOC, NO_x, SO_2, and primary $PM_{2.5}$) emissions, relative to the calculation of $PM_{2.5}$ NAAQS-relevant metrics.

- Addition of the modeled worst-case impacts to the 2015 baseline does not affect attainment or maintenance of the 1-hour NO_2, 1-hour SO_2 or 24-hour PM_{10} NAAQS for any monitoring site (although the number of monitors for these pollutants is very limited).

- Difference plots show that that the addition of the worst-case impacts tends to preferentially increase the calculated RRFs and FDVs in northwestern, western and southwestern Arkansas for NO_2, in northwestern Arkansas for SO_2, and in western and northwestern Arkansas for PM_{10}.

The combined near-field/regional-scale modeling and impact assessment was designed to examine worst-case impacts from threshold emission increases for each AQCR and the maximum impacts were applied for each selected source and each monitoring site location. The results indicate:

- For all species and metrics the resultant AERMOD plus background concentrations are much less than the NAAQS. This indicates that for the range of locations modeled, worst-case near-field (or local) impacts would not result in an exceedance of the NAAQS for any species.

- When applied to the monitoring sites, the modeled, worst-case local impacts increase the FDVs but the resultant values for all species are all less than the NAAQS values.

- For all species, with the exception of $SO_{2,}$ the FDVs are lower than the current year values for both the baseline and local impact scenarios.

The analysis is based on one source per location (for modeling purposes this was assumed to be one grid cell). Since the modeled impacts occur within or nearby to the source location, cumulative effects from sources in multiple grid cells are expected to be small. Cumulative effects from multiple sources at any given location (or within approximately one grid cell) with emissions totals that sum to greater than the threshold levels should be examined on a case-by-case basis.

References

EPA. 2014. “Modeling Guidance for Demonstrating Attainment of Air Quality Goals for Ozone, $PM_{2.5}$, and Regional Haze.” U.S. EPA Office of Air Quality Planning and Standards, Research Triangle Park, North Carolina (December 2014, Draft).

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Appendix E

Air Quality Review of PM2.5 Emissions from Stationary Sources in Arkansas

Air Quality Review of $PM_{2.5}$ Emissions from Stationary Sources in Arkansas

Background

The Arkansas Department of Environmental Quality ("the Department") is charged with the duty to issue permits, through both federally-delegated and State programs, that help maintain and improve the air quality for all citizens in the State. Part of this duty is to ensure that construction of new stationary sources or modification of existing stationary sources, including construction or modification authorized via minor new source review (minor NSR) permitting actions, do not cause or contribute to an exceedance of the National Ambient Air Quality Standards (NAAQS) or interfere with the maintenance of the NAAQS. This report focuses on a review of the science behind particulate matter with an aerodynamic diameter of 2.5 micrometers or less ($PM_{2.5}$) and the resulting implications for NAAQS evaluations for minor NSR permitting.

On July 18, 1997, the United States Environmental Protection Agency (EPA) issued NAAQS for $PM_{2.5}$. The NAAQS for $PM_{2.5}$ were revised in 2006 and 2012. The current and historical $PM_{2.5}$ NAAQS are listed in Table 1. Historically, EPA policy allowed permit applicants to rely on particulate matter with an aerodynamic diameter of 10 micrometers or less (PM_{10}) as a surrogate for demonstrating compliance with the $PM_{2.5}$ NAAQS. On May 10, 2011, EPA issued a final rule which eliminated this surrogate approach (76 FR 28646). As a result of this surrogacy policy, the Department does not have extensive experience modeling for the $PM_{2.5}$ NAAQS for minor NSR permitting actions; therefore, the Department has undertaken an analysis of the chemical nature of $PM_{2.5}$, emissions trends, and monitoring trends to evaluate the utility of dispersion modeling for minor NSR permitting actions.

Table 1. Current and Historical $PM_{2.5}$ NAAQS

Final Rule	Primary/Secondary	Averaging Time	Level*	Form
1997 65 FR 38652	Primary and Secondary	24-hour	65 µg/m^3	98th percentile, averaged over 3 years
		Annual	15 µg/m^3	Annual arithmetic mean, averaged over 3 years
2006 71 FR 61144	Primary and Secondary	24-hour	35 µg/m^3	98th percentile, averaged over 3 years
		Annual	15 µg/m^3	Annual arithmetic mean, averaged over 3 years
2012 78 FR 3086	Primary	Annual	12 µg/m^3	Annual arithmetic mean, averaged over 3 years
	Secondary	Annual	15 µg/m^3	Annual arithmetic mean, averaged over 3 years
	Primary and Secondary	24-hour	35 µg/m^3	98th percentile, averaged over 3 years

*Micrograms per cubic meter.

The Department has examined the science behind $PM_{2.5}$ to determine what NAAQS evaluation methods should be required for minor NSR permitting actions. Additionally, the Department has examined historical trends in emissions of $PM_{2.5}$ and two of its major precursors—nitrogen oxides (NOx) and sulfur dioxide (SO_2). Trends in ambient monitor data and speciation data have also been examined. Based on this evaluation, the Department has determined that dispersion modeling of direct $PM_{2.5}$ emissions is not necessary for minor NSR permitting actions.

The Science behind $PM_{2.5}$[1][2]

Particulate matter is a mixture of solid particles and liquid droplets with different sizes, compositions, and properties. Some particles are directly emitted from a source (direct PM, primary PM), while others are formed by chemical reactions of gaseous precursor compounds, such as NOx and SO_2, in the atmosphere (secondary PM). Particulate matter can be divided into size fractions, based on its aerodynamic diameter, which differs in formation mechanisms, sources, health effects, and persistence in the atmosphere.

$PM_{2.5}$ in the atmosphere is primarily produced by combustion or chemical reactions of precursor compounds. Common sources of direct $PM_{2.5}$ include diesel engines, combustion sources, and smelters. Because secondary $PM_{2.5}$ is formed from complex reactions of precursor compounds, relating ambient concentrations of secondary PM to sources of precursor emissions is difficult. $PM_{2.5}$ composition varies widely depending upon the source of the direct and secondary PM. $PM_{2.5}$ may be composed of sulfate, nitrate, ammonium, and/or hydrogen ions. $PM_{2.5}$ may also be composed of elemental carbon, metal compounds, organic compounds, or particle-bound water. Table 2 provides a list of particulate species and their major sources.

Table 2. Major Sources of $PM_{2.5}$ Species[3]

Species	Direct $PM_{2.5}$ sources		Secondary $PM_{2.5}$ sources	
	Natural	Anthropogenic	Natural	Anthropogenic
Sulfate (SO_4)	Sea Spray	Fossil Fuel Combustion	Oceans Wetlands Volcanoes Forest Fires	Fossil Fuel Combustion
Nitrate (NO_3)			Soils Forest Fires Lightning	Fossil Fuel Combustion Motor Vehicles Exhaust

[1] USEPA. "Air Quality Criteria for Particulate Matter" (October 2004) Volume I Chapter 2, 3. http://cfpub.epa.gov/ncea/cfm/recordisplay.cfm?deid=87903#Download

[2] USEPA memorandum: Guidance for $PM_{2.5}$ Permit Modeling, (May 20, 2014) http://www3.epa.gov/scram001/guidance/guide/Guidance_for_PM25_Permit_Modeling.pdf

[3]I USEPA. "Air Quality Criteria for Particulate Matter" (October 2004) Volume I Chapter 2, 3. http://cfpub.epa.gov/ncea/cfm/recordisplay.cfm?deid=87903#Download. Table 3-8.

Species	Direct $PM_{2.5}$ sources Natural	 Anthropogenic	Secondary $PM_{2.5}$ sources Natural	 Anthropogenic
Minerals	Erosion Entrainment	Paved and Unpaved Roads Agriculture Forestry Construction Demolition		
Ammonium (NH_4)			Animals Soil	Animal Husbandry Sewage Fertilized Land
Organic Carbon	Wildfires	Prescribed Burning Wood Burning Motor Vehicle Exhaust Cooking	Vegetation Wildfires	Motor Vehicle Emissions Prescribed Burning Wood Burning
Elemental Carbon	Wildfires	Motor Vehicle Exhaust Wood Burning Cooking		
Metals	Volcanoes	Fossil Fuel Combustion Smelting Brake Wear		
Bioaerosols	Viruses Bacteria			

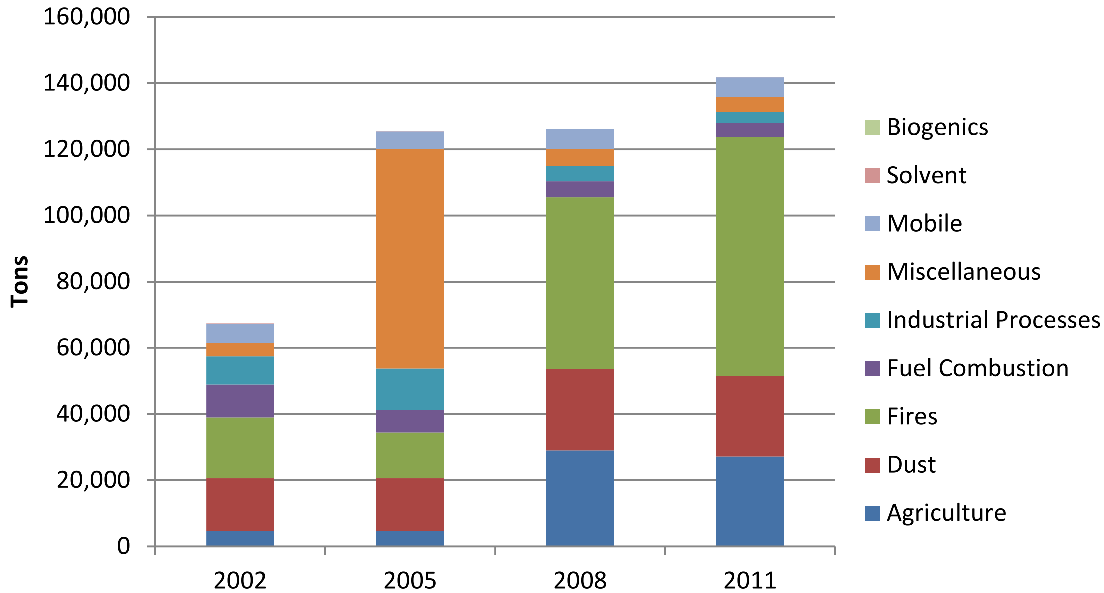
Due to the nature of $PM_{2.5}$, modeling for minor NSR permitting NAAQS evaluations is not as straightforward as modeling for other NAAQS, such as SO_2, NO_2, lead, etc. Depending on the chemical composition and atmospheric and meteorological conditions, $PM_{2.5}$ may remain in the atmosphere for days to weeks and travel thousands of kilometers. $PM_{2.5}$ may be removed from the atmosphere by precipitation or dry deposition. The AERMOD air dispersion model may be used to model directly-emitted particulate matter, but cannot account for chemical reactions that occur in the atmosphere and produce $PM_{2.5}$ from precursor pollutants such as NOx and SO_2. Due to the potentially important contribution from secondary formation of $PM_{2.5}$ and the more prominent role of ambient monitoring data in the cumulative analysis to represent background $PM_{2.5}$ concentrations including secondary formation from precursors from nearby sources, certain aspects of standard modeling practices used for PM_{10} and other criteria pollutants may not be appropriate for $PM_{2.5}$. The provisions of 40 Code of Federal Regulations Part 51 Appendix W Section 10.2.2 acknowledge that there are circumstances where there is no applicable model for a particular NAAQS compliance demonstration and that data from an array of ambient monitors surrounding the facility to be permitted could be used in lieu of modeling if appropriately justified.

$PM_{2.5}$, SO_2, and NOx Emission Trends

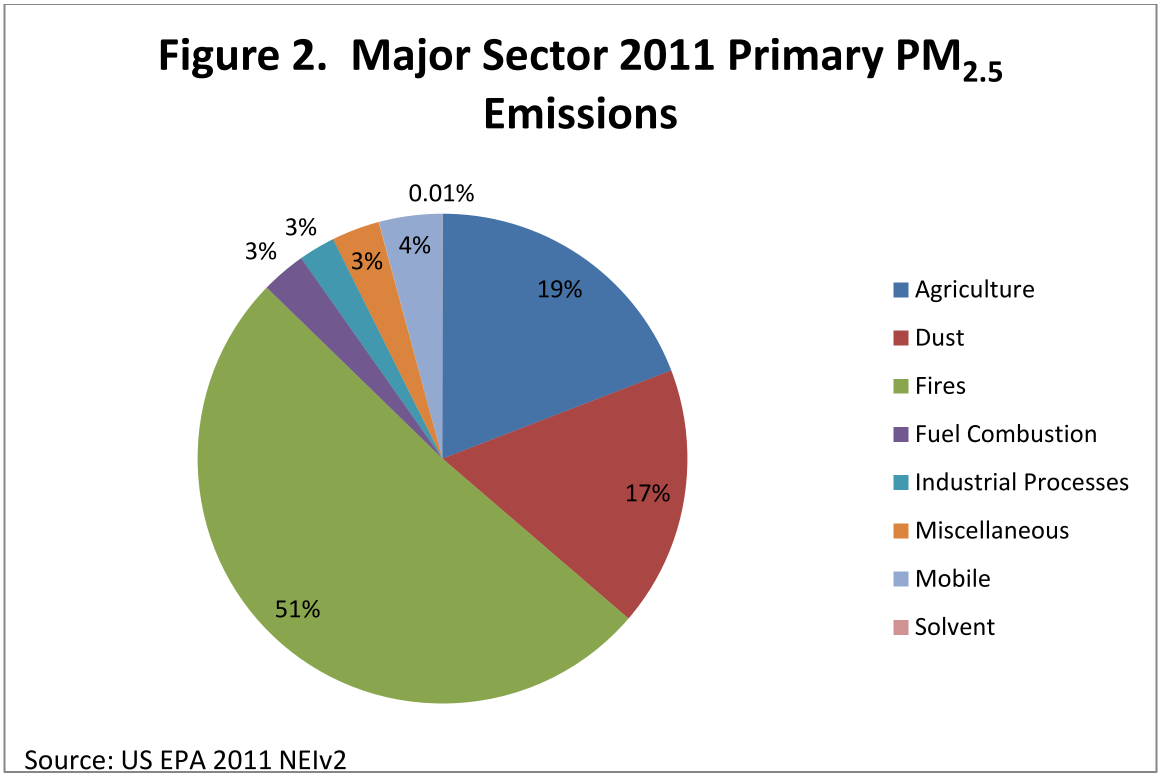
Every three years, the EPA publishes a national emissions inventory (NEI) which quantifies the annual emissions of various pollutants from each data category, sector, or source classification code. An examination of trends across NEI years can provide an understanding of which types of sources are contributing to a primary pollutant and whether the level of emissions changes over time. One limitation to comparison of emissions across NEI years is that the methodology used to estimate emissions for certain sectors has changed over time. The paragraphs below discuss trends in emissions of direct $PM_{2.5}$ as well as two major $PM_{2.5}$ precursors, NOx and SO_2, in Arkansas based on the 2002, 2005, 2008, and 2011 (most recent) NEI.

According to NEI data, emissions of primary $PM_{2.5}$ have increased in Arkansas between 2002 and 2011. This increase is largely due to increased estimations of emissions from prescribed and wild fires. The contribution of industrial processes, fuel combustion, solvent, and miscellaneous sources—which may be permitted depending on the level of emissions of an individual facility—have decreased over time indicating that stationary sources are not the driver for the increase in emissions of primary $PM_{2.5}$. Miscellaneous sources include bulk gasoline terminals, commercial cooking, gas stations, non-industrial not elsewhere classified (NEC), and waste disposal sources. A look at the relative contribution of primary $PM_{2.5}$ from major sectors for the 2011 NEI year shows that emissions from fires constituted 51 % of the emission inventory. Industrial processes, miscellaneous sources, fuel combustion, and solvent sources contributed less than 9 % combined. Trends in primary $PM_{2.5}$ for NEI years 2002 – 2011 are displayed in Figure 1. The relative contributions of major sectors to the primary $PM_{2.5}$ inventory for the 2011 NEI are displayed in Figure 2.

Figure 1. Major Sector Primary $PM_{2.5}$ Emission Trends 2002 – 2011

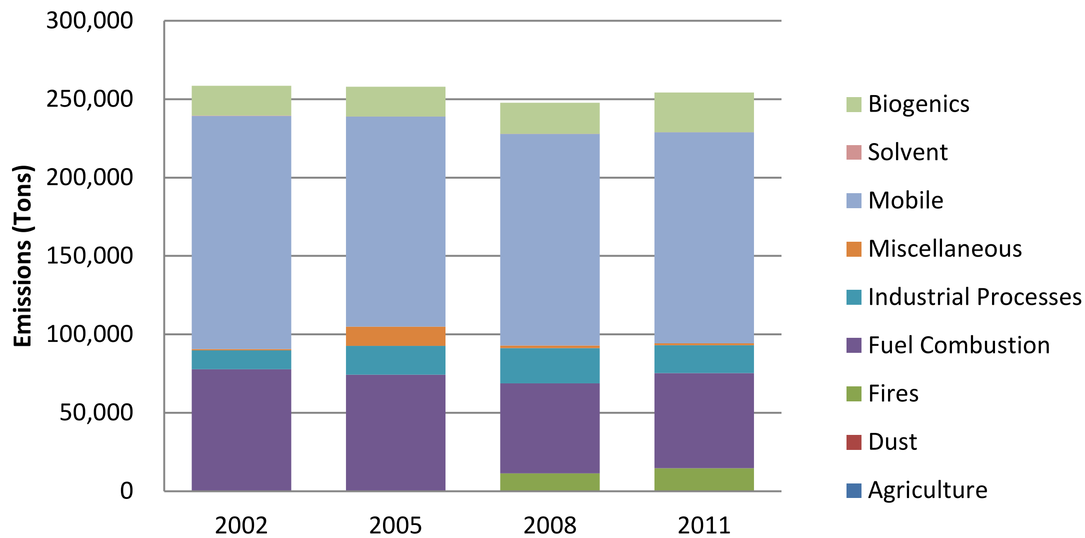


Source: US EPA 2002, 2005, 2008, and 2011 NEI; 2002 BEIS 3.12; and 2005 BEIS_2005



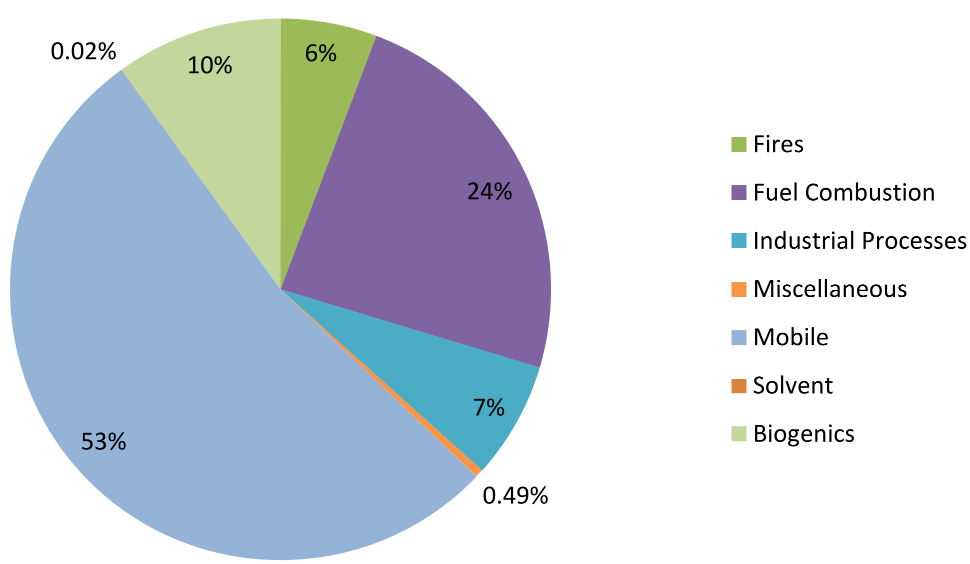
According to NEI data, emissions of NOx, a secondary $PM_{2.5}$ precursor have remained steady in Arkansas between 2002 and 2011. Emissions of NOx from fuel combustion and solvents sources have decreased since 2002. Emissions of NOx from industrial processes and miscellaneous sources have increased from 2002; however, the 2011 NEI shows that emissions from these sources have decreased since 2005 and 2008. A look at the relative contribution of NOx from major sectors for the 2011 NEI year shows that emissions from mobile sources constituted 53 % of the emission inventory. Emissions from industrial processes, miscellaneous sources, fuel combustion, and solvent sources make up approximately 31 % of the inventory. Trends in NOx emissions for NEI years 2002 – 2011 are displayed in Figure 3. The relative contributions of major sectors to the NOx inventory for the 2011 NEI are displayed in Figure 4.

Figure 3. Major Sector NOx Emission Trends (2002 - 2011)



Source: US EPA 2002, 2005, 2008, and 2011 NEI; 2002 BEIS 3.12; and 2005 BEIS_2005

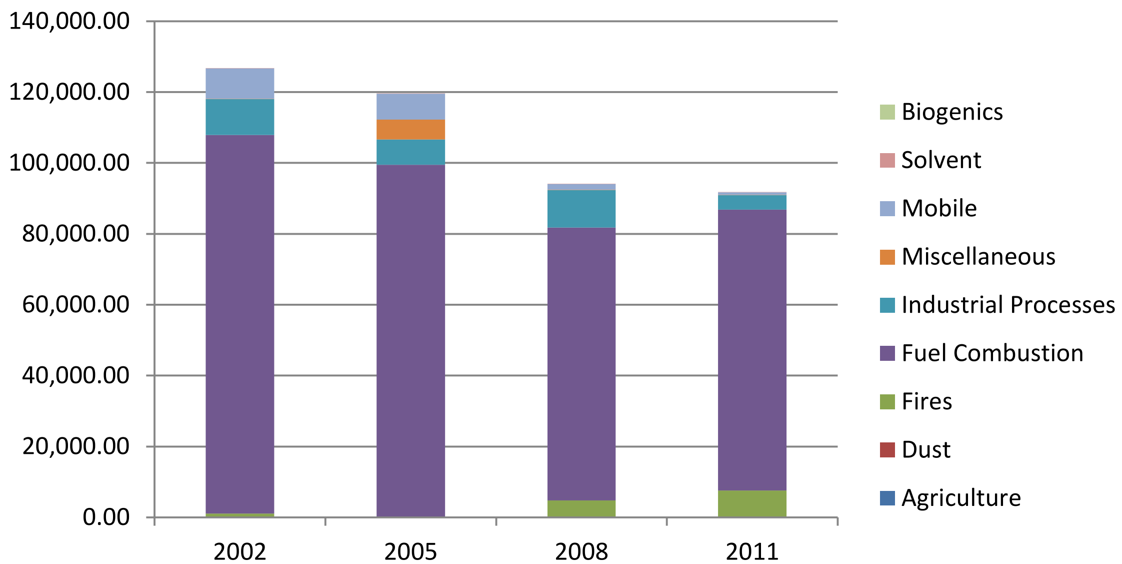
Figure 4. Major Sector 2011 NOx Emissions



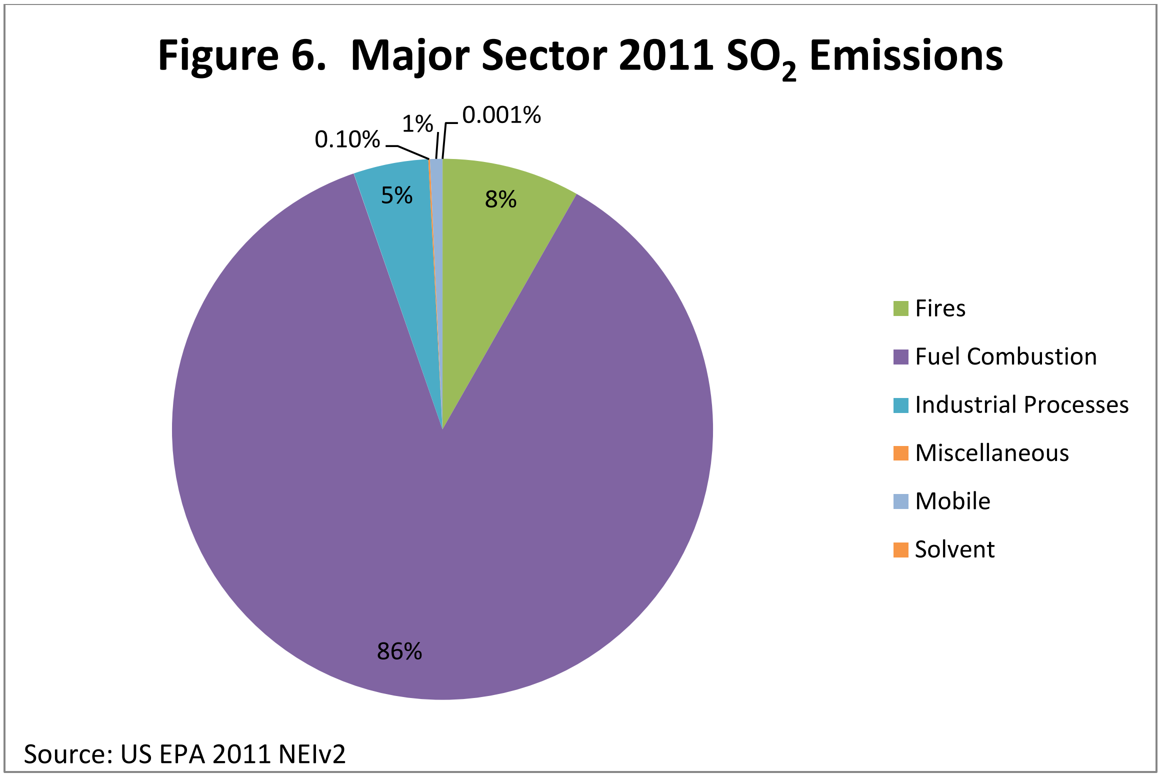
Source: US EPA 2011 NEIv2

According to NEI data, emissions of SO_2, a secondary $PM_{2.5}$ precursor, have decreased in Arkansas between 2002 and 2011. A look at the relative contribution of SO_2 from major sectors for the 2011 NEI year shows that emissions from fuel combustion sources constituted 86 % of the emission inventory. The next largest contributor to the SO_2 emissions inventory was fire. Emissions from industrial processes, miscellaneous sources, and solvent sources make up less than 5 % of the inventory. Trends in SO_2 emissions for NEI years 2002 – 2011 are displayed in Figure 5. The relative contributions of major sectors to the SO_2 inventory for the 2011 NEI are displayed in Figure 6.

Figure 5. Major Sector SO_2 Emission Trends 2002 – 2011



Source: US EPA 2002, 2005, 2008, and 2011 NEI; 2002 BEIS 3.12; and 2005 BEIS_2005



Although trends in direct $PM_{2.5}$ emissions in Arkansas increased between 2002 and 2011, emissions of major precursors of secondary $PM_{2.5}$, NOx, and SO_2, have remained steady or decreased, respectively. Additionally, the increase in direct $PM_{2.5}$ is largely caused by increased estimations of emissions from fires and not due to stationary sources. Stationary sources for which the Department issues permits make up a very small fraction of the total sources which contribute to direct $PM_{2.5}$. Stationary sources permitted by the Department do contribute the majority of SO_2 emissions to the inventory; however, SO_2 emissions overall and emissions from major sectors likely to include permitted sources have decreased since 2002. Due to the nature of $PM_{2.5}$ as both a primary and secondary pollutant, examination of the emission trends for direct $PM_{2.5}$ and two of the major precursors for secondary $PM_{2.5}$ cannot provide a full picture due to the complex chemical reactions involved in the formation of secondary $PM_{2.5}$.

Trends in Monitor Data

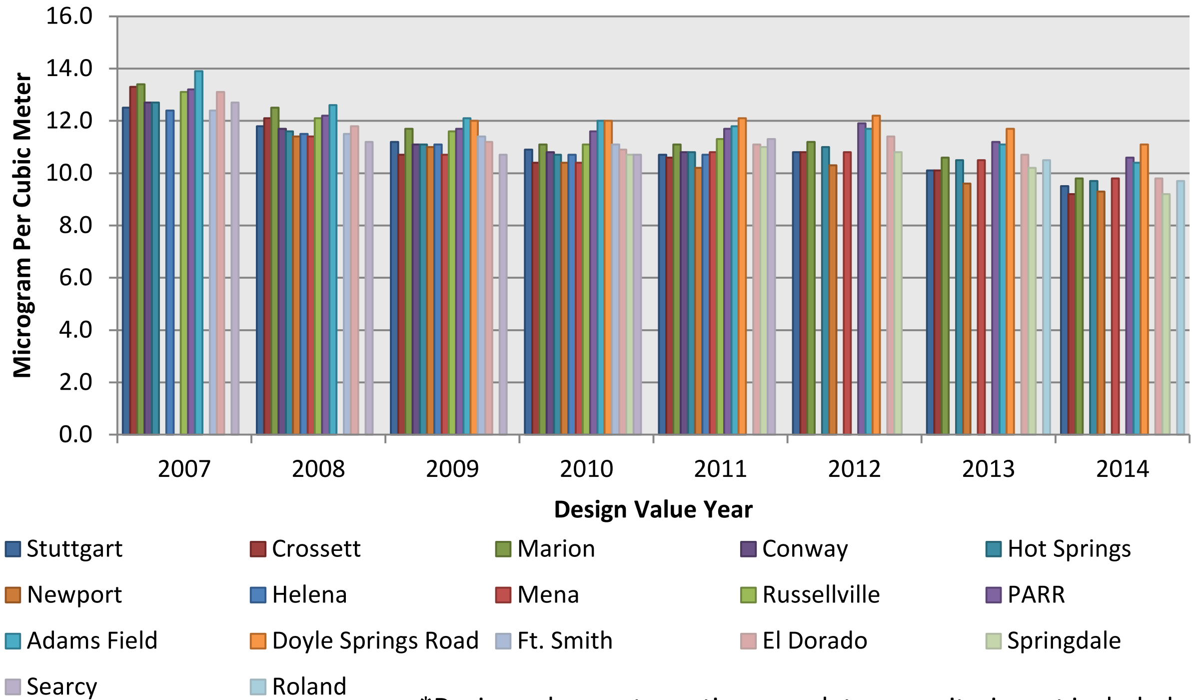
As of 2014, Arkansas operates 12 $PM_{2.5}$ ambient air quality monitors and three $PM_{2.5}$ speciation monitors. Trends in ambient air monitor data between 2007 and 2014 and trends in $PM_{2.5}$ speciation between 2002 and 2014 are discussed below. Over the course of the analysis period, 17 ambient air monitors have been operated; however, design values at some monitors were not available for every year due to installation after or within two years of analyzed timeframe, retirement, or failure to meet completeness criteria for a given design value year.

Ambient Air Monitoring Network Data

The measured ambient concentrations of $PM_{2.5}$ in Arkansas have decreased in recent years. Seventeen ambient air $PM_{2.5}$ monitors have operated during the analyzed 2007 – 2014 timeframe; however, some monitors did not have design values for every year due to installation after or within two years of analyzed timeframe, retirement, or failure to meet completeness criteria for a given design value year. Figures 7 – 10 show trends between 2007 and 2014 in design values for the $PM_{2.5}$ annual NAAQS and $PM_{2.5}$ 24-hour NAAQS at Arkansas monitors. The downward trend in design values is likely due to reduced emissions of precursors of secondary $PM_{2.5}$, such as NO_x and SO_2. The previously discussed NEI data show emissions of direct $PM_{2.5}$ increasing by 15,650 tons per year between 2008 and 2011—the two NEI years included within the timeframe examined for ambient monitor data. The monitor data further indicate that the quantification of direct $PM_{2.5}$ emissions is not a good predictor of ambient air concentrations of the pollutant.

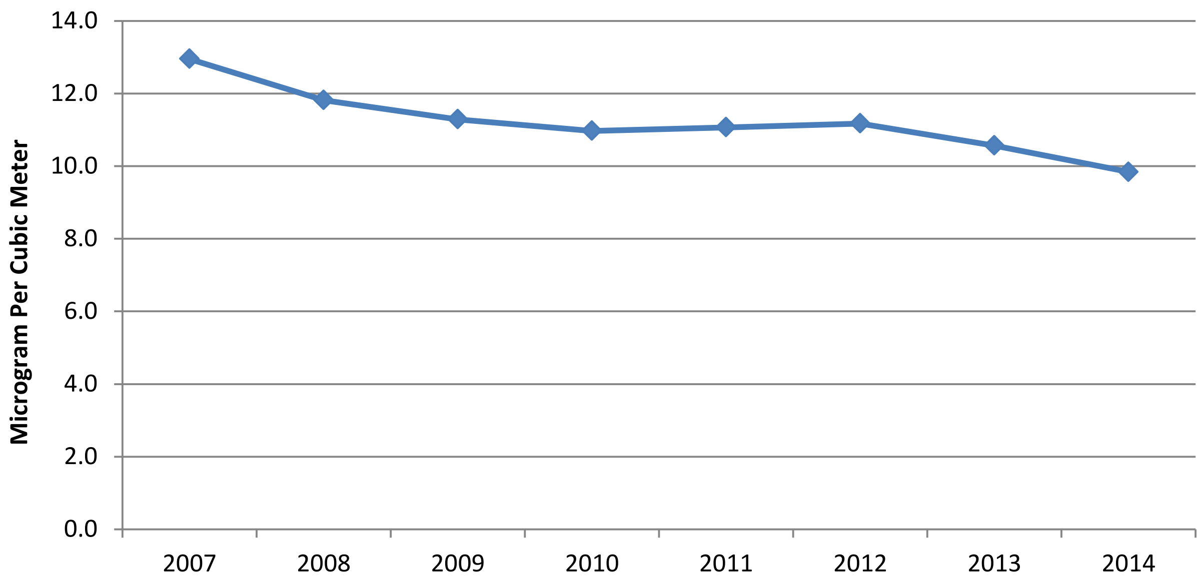
Figure 7 displays the trends in design value for the annual $PM_{2.5}$ NAAQS for each $PM_{2.5}$ monitor in the State. Figure 8 displays the statewide average of monitor design values for the annual $PM_{2.5}$ NAAQS. As of 2014, no monitor in the State had a design value exceeding the annual $PM_{2.5}$ NAAQS of 12 $\mu g/m^3$. All monitors have shown a decrease in annual hour $PM_{2.5}$ design value since 2007. The highest design value in 2014 was located in Pulaski County at the Doyle Springs Road monitor. The Doyle Springs Road monitor has shown a 0.9 $\mu g/m^3$ decrease in design value with respect to the annual $PM_{2.5}$ NAAQS since 2009. On a statewide average, the design value for the annual $PM_{2.5}$ NAAQS has decreased by 3.1 $\mu g/m^3$ between 2007 and 2014.

Figure 7. $PM_{2.5}$ Annual NAAQS Design Value Trends (2007 – 2014)*



*Design values not meeting completeness criteria not included

Figure 8. Statewide Average Annual $PM_{2.5}$ NAAQS Design Value Trends (2007 – 2014)*



*Design values not meeting completeness criteria not included

Figure 9 displays the trends in design value for the24-hour $PM_{2.5}$ NAAQS for each $PM_{2.5}$ monitor in the State. Figure 10 displays the statewide average of monitor design values for the 24-hour $PM_{2.5}$ NAAQS. As of 2014, no monitor in the State had a design value exceeding the24-hour $PM_{2.5}$ NAAQS of 35 $\mu g/m^3$ and all design values were at least 25 % lower than the value of the NAAQS. All monitors have shown a decrease in 24-hour $PM_{2.5}$ design value since 2007. On a statewide average, the design value for the 24-hour $PM_{2.5}$ NAAQS has decreased by 8 $\mu g/m^3$ between 2007 and 2014.

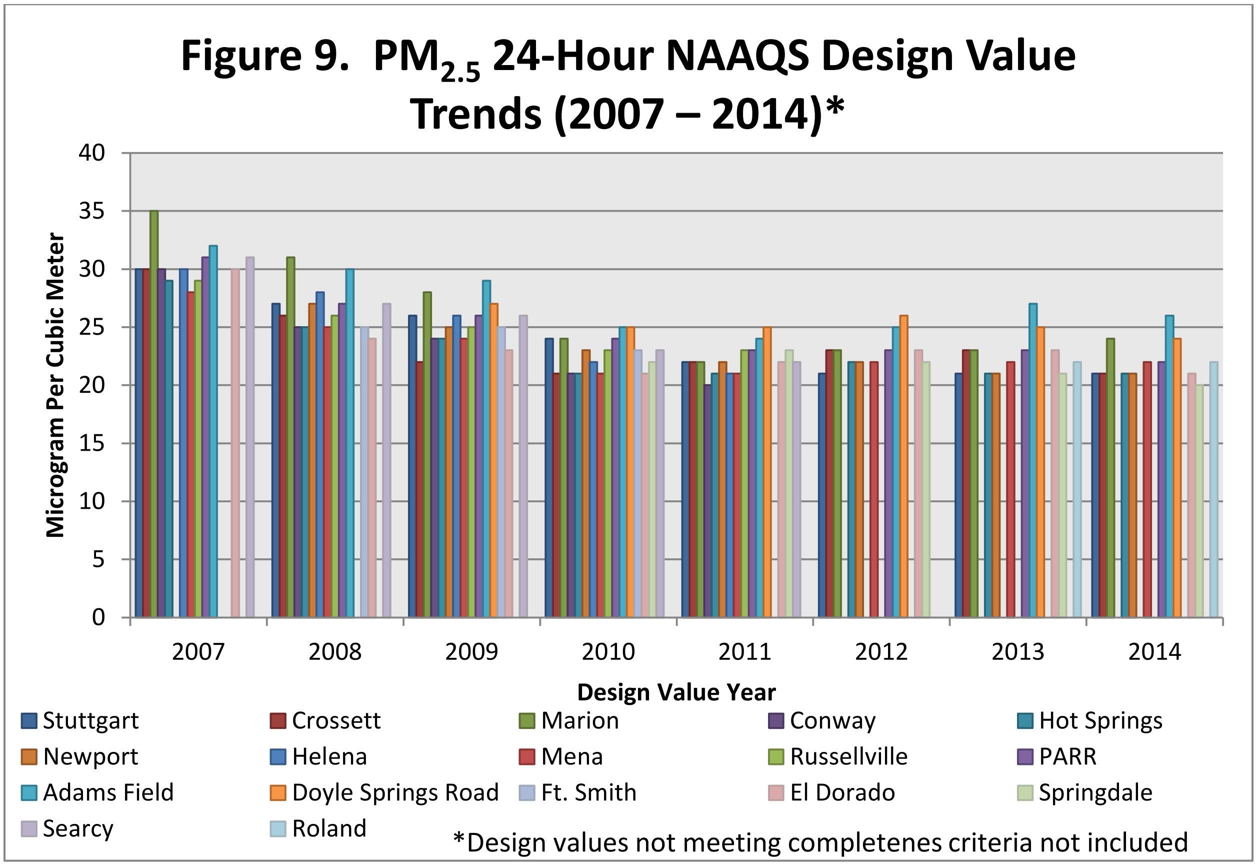
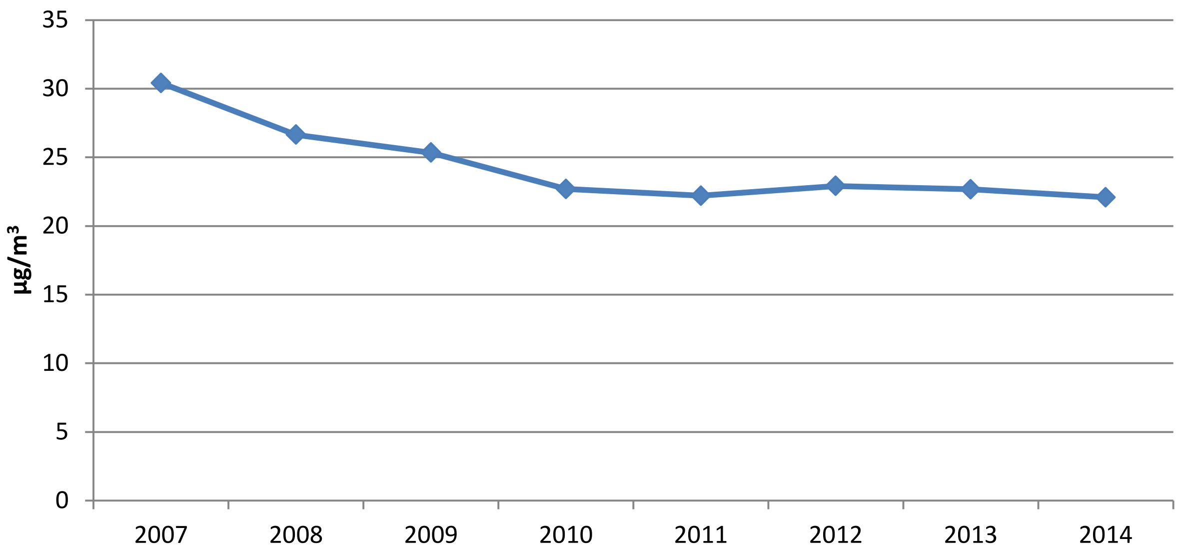


Figure 10. Statewide Average 24-Hour $PM_{2.5}$ NAAQS Design Value Trends (2007 – 2014)*



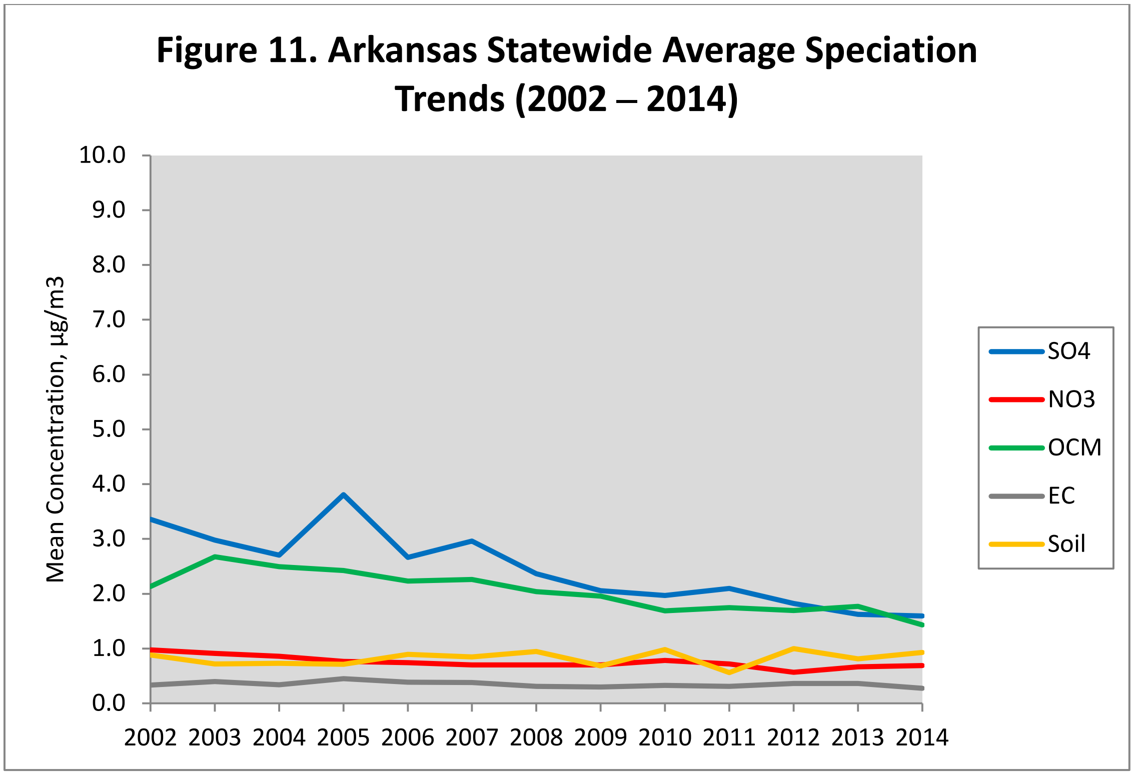
*Design values not meeting completenes criteria not included

A review of the monitoring data indicates that $PM_{2.5}$ annual and 24-hour NAAQS design values have decreased at all monitoring locations in Arkansas. On a statewide average, the annual $PM_{2.5}$ design value has decreased by 3.1 µg/m^3 and the 24-hour $PM_{2.5}$ design value has decreased by 8 µg/m^3. The downward trends in monitored design values for the $PM_{2.5}$ annual and 24-hour NAAQS and the upward trend in overall direct $PM_{2.5}$ emissions demonstrate that direct $PM_{2.5}$ emissions are not an accurate predictor of $PM_{2.5}$ concentrations in ambient air.

Speciation Data

$PM_{2.5}$ speciation data is collected in Arkansas's two federal Class I areas, Upper Buffalo Wilderness area (Upper Buffalo monitor) and Caney Creek Wilderness area (Eagle Mountain monitor), and in North Little Rock (PARR monitor). Trends in species concentration for sulfates (SO_4), nitrates (NO_3), organic carbon material (OCM), elemental carbon (EC), and soil are discussed below. Speciated data for soil was not available for PARR.

Figure 11 demonstrates the average statewide trends in $PM_{2.5}$ species concentrations at Arkansas speciation monitors between 2002 and 2014. The SO_4 $PM_{2.5}$ species peaked during 2005 but has generally shown a decrease in concentration between 2002 and 2014. NO_3 $PM_{2.5}$ species have also decreased during the 2002 – 2014 timeframe. SO_4 and NO_3 $PM_{2.5}$ species are formed secondarily through chemical reactions in the atmosphere. The decreasing trend in SO_4 and NO_3 $PM_{2.5}$ species observed on average in the State occurs as NEI data for Arkansas also show a decreasing trend in SO_2 and NOx emissions. A downward trend was also observed for the OCM species, which is also primarily formed secondarily through chemical reactions. EC, which is a primary species constituent of direct $PM_{2.5}$, has remained fairly steady, showing only a slight decrease between 2002 and 2014.



Conclusion

Based on this analysis, the Department has determined that traditional dispersion modeling for direct $PM_{2.5}$ is not an appropriate method to determine compliance with the $PM_{2.5}$ NAAQS for minor NSR permit applications. A comparison of the emission trends for $PM_{2.5}$ and its precursors and the ambient air and speciated $PM_{2.5}$ monitoring trends demonstrates that direct emissions of $PM_{2.5}$, including emission from stationary sources, have little influence on ambient $PM_{2.5}$ concentrations. Decreasing trends in $PM_{2.5}$ concentrations and in SO_4 and NO_3 $PM_{2.5}$ species in Arkansas appear to relate more to the decreasing trends in NOx and SO_2 emissions in the State and not to the upward trend in direct $PM_{2.5}$ emissions. Furthermore, the increase in direct $PM_{2.5}$ emissions can be attributed to increased estimates of emissions from fires. The solvent, miscellaneous, fuel combustion, and industrial processes from major sectors, which include stationary sources that may or may not be permitted depending on level of emissions for an individual facility, make up less than 9 % of the total emissions inventory based on the 2011 NEI data. The Department concludes that direct emissions of $PM_{2.5}$ from a single stationary source will not interfere with attainment or maintenance of the annual or 24-hour $PM_{2.5}$ NAAQS. Arkansas will continue to regulate NOx and SO_2 emissions and will follow EPA guidance on assessing the impact of direct and secondary $PM_{2.5}$ under the Prevention of Significant Deterioration permit program.

Appendix F

Developing the NAAQS SIP: A Look at Minor NSR Permitting White Paper and Stakeholder Feedback

ADEQ
ARKANSAS
Department of Environmental Quality

Developing the NAAQS SIP: A Look at Minor Stationary Source Permitting

Purpose

The Arkansas Department of Environmental Quality ("the Department") is charged with the duty to issue permits, through both federally-delegated and State programs, that help maintain and improve the air quality for all citizens in the State. Part of this duty is to ensure that construction of new stationary sources or modification of existing stationary sources, including construction or modification authorized via Minor new source review (NSR) permitting actions, do not cause or contribute to an exceedance of the national ambient air quality standards (NAAQS) or interfere with the maintenance of the NAAQS. To address the requisite level of analysis required for Minor NSR permitting actions, the Department has been engaged in a series of robust meetings with stakeholders to develop an approach which will adequately ensure that the NAAQS are protected and which complies with State statutes and federal requirements. The ultimate goal is to decide upon a policy, to be included in the NAAQS SIP, which will detail both the steps a permittee must undertake to reasonably satisfy the Department that the construction or modification will not interfere with attainment or maintenance of the NAAQS in the Minor NSR permitting process and the roles and obligations of the Department in implementing that process. The purpose of this document is not to propose a particular selection of approaches and measures, but rather to encapsulate and discuss the approaches and measures which have been identified through the stakeholder process, to solicit comment on the advantages or deficiencies of each approach and/or combination of approaches to ensure that minor source construction or modification activities do not cause or contribute to an exceedance or interfere with the maintenance of the NAAQS, and to solicit comment on any other alternative approaches not discussed in this document, as well as their advantages and deficiencies.

NAAQS Protection Levels

The Department examines protection of the NAAQS at two levels:

1) Attainment

Attainment is determined based on time-weighted average concentrations measured at monitors in the Arkansas Ambient Air Quality Monitoring Network (AAAQM Network). A map of the AAAQM Network can be found in Appendix A: Arkansas Ambient Air Monitoring Network.

2) Local Ambient Air Quality/Near-Field Receptors

The Department must ensure that people in all areas of the State, not just those locations with monitors, are protected from exposure to pollutant concentrations exceeding the NAAQS.

Identified Potential Measures and Approaches

The Department is soliciting comments on what combination of measures and approaches could be implemented to create a strategy which adequately addresses the Minor NSR permitting aspect of protecting the NAAQS. Listed below are possible measures and approaches which have been identified through the stakeholder process. The Department reiterates that, at this time, it is not proposing a particular selection of measures and approaches; however, the Department solicits comment on the advantages or deficiencies of each approach and/or combination of approaches to ensure that new minor source permit activities do not cause or contribute to an exceedance or interfere with the maintenance of the NAAQS. The Department also solicits comment on other alternative approaches not listed below, as well as their advantages or deficiencies.

Enhanced Planning Measures and Approaches

1) Regional Modeling of Current Emissions and Projected Growth

The Department contracted regional scale modeling to evaluate future areas of concern for criteria pollutants throughout the State and examine expected changes in these pollutants between the base years (2005 and 2008) and a future year (2015). This modeling was conducted at a 4 km grid resolution and can be used for regional planning efforts to evaluate air quality in unmonitored areas and identify areas that may require additional monitoring. The Department is considering updating this modeling to evaluate future growth.

2) Identification of Sensitive Areas Using Regional Modeling

This approach would identify sensitive areas where increased emissions might result in future-year design values close to or exceeding the NAAQS.

The Department consulted its modeling contractor, ICF, to discuss the feasibility of this approach. ICF proposed tasks to use 2008 and 2015 regional scale modeling results for Arkansas to determine if concentrations of criteria pollutants are increasing and perform an emissions sensitivity analysis to determine whether increasing anthropogenic emissions in an Air Quality Control Region (AQCR) by 10% would result in future-year design values close to or greater than the NAAQS. This modeling effort could identify sensitive areas where a more robust NAAQS analysis, which may include dispersion modeling or monitoring, may be required. The emissions sensitivity analysis would be conducted at a 12 km grid resolution and therefore may not provide sufficient resolution to ensure against exceedances of the NAAQS at near-field receptors

3) Monitoring Network Review

Every year, the Department submits an Annual Network Review to notify EPA of any changes to the AAAQM Network. Every five years, the Department conducts a more extensive review to evaluate the AAAQM Network. The monitors in the AAAQM Network are used to determine attainment status.

4) Emissions Inventory Improvements

Currently, the Department collects emissions inventory data from larger point sources. Type A facilities; which are those facilities permitted to emit 2500 tons per year (tpy) or more of SOx, NOx, or CO or 250 tpy or more of VOCs, PM_{10}, $PM_{2.5}$,or NH_3; are required to report emissions to the Department every year. Type B facilities; which include facilities permitted to emit 1000 tpy or more of CO, facilities permitted to emit 100 tpy or more of SOx, NOx, VOCs, PM_{10}, $PM_{2.5}$, or NH_3, and facilities with actual lead (Pb) emissions of 0.5 tpy or more; are required to report emissions to the Department every three years. The Department uses EPA emissions estimates for nonpoint, onroad, nonroad, and event sources (i.e. wildfires, wild land fire use, prescribed burns).

Future considerations for emissions inventory improvements may include collection of local data inputs for onroad and nonroad sources; collection of local data and emissions estimates for nonpoint and minor sources; collection, analysis, and submittal of prescribed and wildfire occurrence data to EPA for use in emissions modeling; and conducting surveys of agricultural burning practices to verify EPA inputs for emissions modeling.

5) Periodic Multi-Source Modeling for Near-Field Receptor Impacts

Under this approach, the Department would periodically perform air dispersion modeling of multiple sources within an area to examine impacts at near-field receptors. If near NAAQS concentrations or NAAQS exceedances are identified based on the multi-source modeling, the Department would re-evaluate the level of NAAQS analysis required by permit actions in that area and potentially locate a temporary monitor to verify modeled results.

6) Risk-Based Monitoring

This measure would utilize temporary monitors installed, as needed, in areas identified as at risk of exceeding the NAAQS. This measure could be done in conjunction with regional-scale modeling, multi-source modeling, or as a stand-alone task.

7) NAAQS SIP Updates

The NAAQS SIP will be reviewed regularly to re-evaluate attainment status issues due to growth of emissions in the State and revisions, if any, to the NAAQS. The SIP will be updated, as needed to ensure protection from exceedances of the NAAQS. The Department will continue to solicit public input on any future NAAQS SIP Updates

Minor NSR NAAQS Evaluation Flowchart

The Department has created a flowchart to assist in the decision of what level of analysis would be acceptable for a Minor NSR permitting action to ensure that the NAAQS are not exceeded. If such a flowchart were ultimately included in the NAAQS SIP, the Department would develop guidance on good dispersion practices, whether there is sufficient historical modeling data available to identify possible issues with maintaining the NAAQS, and whether any identified issues can be resolved by incorporating standard conditions or control strategies in the permit. The current draft of the Minor NSR NAAQS Evaluation Flowchart can be found in Appendix B: Minor NSR NAAQS Evaluation Flowchart.

Approaches to Assess Cumulative Impact

1) Development of a Growth Allocation Based on Regional Modeling

This stakeholder-proposed approach involves the creation of growth allowances—based on predictive modeling of hypothetical sources—which could be consumed by new projects without causing concentrations of a criteria pollutant to exceed the NAAQS in the AQCR. Emissions increase allowances would be based on the potential-to-emit (PTE).

The Department consulted ICF to discuss the feasibility of this approach. ICF indicated that the regional scale modeling platform has neither sufficient resolution nor appropriately refined inputs to provide for a growth allocation which is protective of local impacts. The primary usefulness of this approach is in regional planning.

2) Emissions-Distance Threshold

This approach would look at the cumulative PTE of all facilities within close proximity of a new minor source or minor modification. If the cumulative emissions within a defined distance exceeded a threshold value, a more robust analysis, such as dispersion modeling, would be required. Examining the cumulative emissions of sources has been used by other states as part of their Minor NSR NAAQS evaluation program. The appropriate distance and threshold value would need to be determined and supported by evidence from a technical analysis.

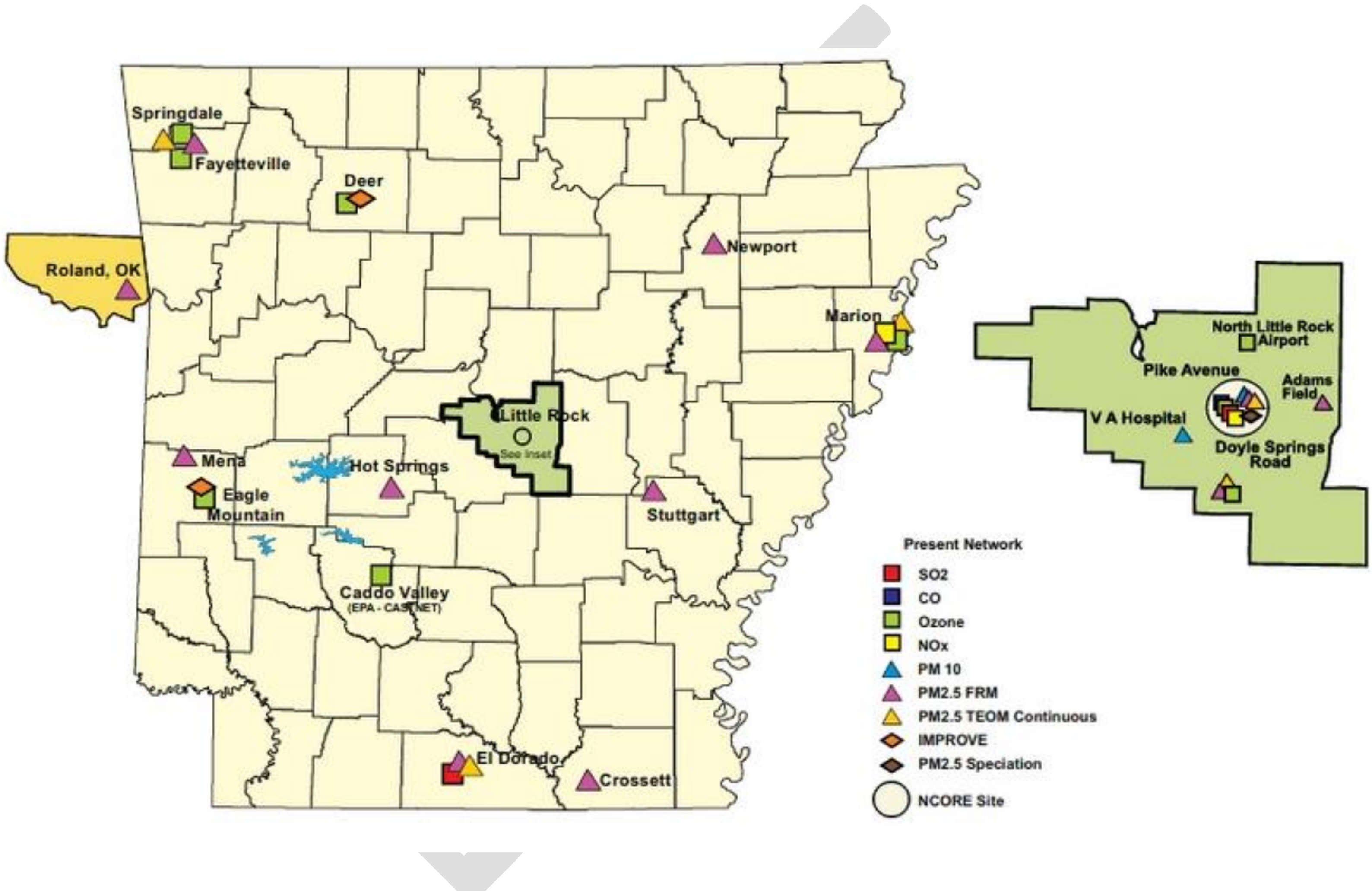
To facilitate this approach, the Department could develop a GIS-based tool that would allow a facility interested in locating a new minor source or minor modification to quickly receive information about the cumulative emissions of their proposed new facility and all existing sources in a particular area.

Conclusion

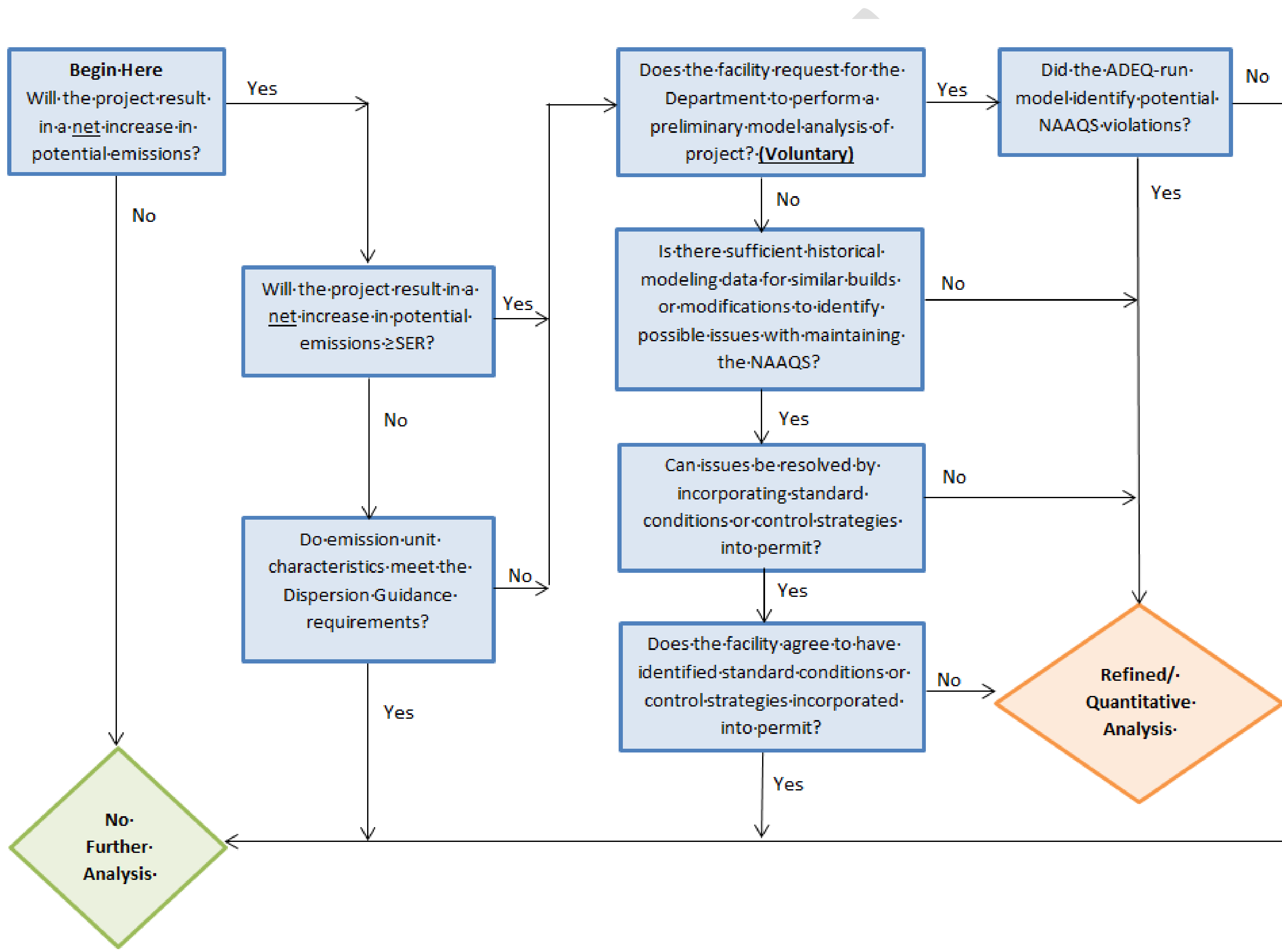
The Department solicits comment on the adequacy or deficiencies of the measures and approaches described above in addressing requirements for NAAQS evaluations for the Minor NSR permitting program. The Department also solicits comment on other measures and approaches not identified above. The Department intends to use feedback received in response to this document to develop a policy, to be included in the NAAQS SIP, which will detail both the steps a permittee must undertake to demonstrate protection of the NAAQS in the Minor NSR permitting process and the roles and obligations of the Department in implementing that process.

Please submit your feedback on the proposed guidance document to Tricia Jackson at: jacksonp@adeq.state.ar.us **by July 2, 2015**.

Appendix A: Arkansas Ambient Air Monitoring Network



Appendix B: Minor NSR NAAQS Evaluation Flowchart



Proper Implementation of the National Ambient Air Quality Standards Through the State Implementation Plan Process

Congress designed the Clean Air Act (CAA or Act) with two principal mechanisms for assuring the quality of air across our nation: first, a system of "cooperative federalism" in which states develop and implement plans to meet health and welfare-based air quality standards established by the Environmental Protection Agency (EPA), and second, a series of programs providing minimum federal requirements for large facilities and hazardous pollutants. The Arkansas Pollution Control & Ecology Commission (APC&EC), in turn, implements the CAA and the Arkansas Water & Air Pollution Control Act by regulation, including Regulation 18 (the "Arkansas Air Pollution Control Code"), Regulation 19 (the "Regulations of the Arkansas Plan of Implementation for Air Pollution Control") and Regulation 26 ("Regulations of the Arkansas Operating Air Permit Program"). Based on the structure, language, history, and interpretation of the CAA and relevant EPA and APC&EC regulations the following are clear:

- National Ambient Air Quality Standards (NAAQS) are meant to be implemented by states through state implementation plans (SIPs), based on the consideration of a broad range of factors and tools identified by Congress and EPA.

- NAAQS are not directly applicable to individual facilities. They are neither "emissions standards or limitations" generally, nor are they "applicable requirements" specifically under the Title V program.

- Routine NAAQS modeling at the facility level is neither required by federal or state law nor sensible. Modeling is required for certain large new facilities and modifications, and any broader requirement would exceed federal standards.

- Arkansas can best achieve and maintain the most recent EPA NAAQS through the SIP development process, not *per se* application of the NAAQS to individual facilities.

Arkansans deserve the highest air quality, and the APC&EC should ensure that the burdens of achieving and maintaining that quality are fairly distributed and that all relevant factors and tools have been adequately considered through the SIP development process.

I. The Role of NAAQS in the CAA

The Clean Air Act of 1970 (1970 CAA)[1] established the modern framework for air pollution control in the United States. The centerpiece of the law was the creation of a system whereby EPA establishes the NAAQS, which serve as nationwide benchmarks for clean air, and states develop SIPs, which must be reviewed and approved by EPA, in order to achieve and maintain the NAAQS.[2] Under this framework, EPA is responsible for setting national air quality goals, while states have "the primary responsibility for assuring air quality" within their borders through their SIPs.[3]

Under CAA Section 109, EPA is charged with promulgating "primary" and "secondary" NAAQS for pollutants which, in the judgment of the EPA Administrator, "cause or contribute to air pollution which may reasonably be anticipated to endanger public health or welfare."[4] The primary standards are set at levels requisite to protect public health "with an adequate margin of safety," while the secondary standards are set at levels protective of public welfare, which includes considerations such as visibility and effects on soils, crops, wildlife and buildings.[5] The NAAQS are required to undergo scientific review every five years, and the Administrator must revise the existing standards or issue new ones as appropriate based on that review.[6]

The primary NAAQS are set at inherently conservative levels. They must protect the health of any "sensitive group" in the population, such as persons with preexisting respiratory illness, children, and the elderly.[7] Further, the statutory requirement that the primary standards include an "adequate margin of safety" is intended to address uncertainties associated with inconclusive scientific and technical information available at the time of standard setting, and to provide a reasonable degree of protection against hazards that research has not yet identified.[8]

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[1] Pub. L. No. 91-604 (1970).

[2] *See* 42 U.S.C. §§ 7409-7410.

[3] *Id.* § 7407.

[4] *Id.* §§ 7408, 7409. Pollutants that meet these requirements (*i.e.* for which EPA has set a NAAQS) are often referred to as "criteria pollutants."

[5] *Id.* §§ 7409(b), 7602(h).

[6] *Id.* § 7409(d).

[7] *See, e.g.*, Primary National Ambient Air Quality Standards for Nitrogen Dioxide; Final Rule, 75 Fed. Reg. 6474, 6475, 6480 (Feb. 9, 2010).

[8] *Id.* at 6475-76 (citing *Lead Indus. Ass'n v. EPA*, 647 F.2d 1130, 1154 (D.C. Cir. 1980); *Am. Petroleum Inst. v. Costle*, 665 F.2d 1176, 1186 (D.C. Cir. 1981)).

EPA has set primary NAAQS for six pollutants: carbon monoxide (CO), lead (Pb), nitrogen dioxide (NO_2), ozone (O_3), particulate matter (PM_{10} and $PM_{2.5}$) and sulfur dioxide (SO_2). It has set secondary NAAQS for SO_2 and NO_2.[9] New or revised NAAQS are implemented in two basic steps. First, EPA designates areas as "attainment" (meeting the standard), "nonattainment" (not meeting the standard), or "unclassifiable" (cannot be determined based on available information).[10] Second, each state must adopt and submit SIPs to EPA which provide for the implementation, achievement, and maintenance of the NAAQS at issue within the state.[11]

In addition to the NAAQS/SIP process, two other major programs were added to the CAA in 1970. Section 111 established the New Source Performance Standards (NSPS) program, under which new sources of pollution in designated industrial categories are assigned technology-based emissions standards developed by EPA.[12] Section 112 established the national emission standards for hazardous air pollutants (NESHAPs), under which EPA develops emission limits applicable to stationary sources for pollutants that cause irreversible or incapacitating illness at low concentrations.[13] Finally, these two source-focused programs were augmented in 1977 by the addition of the Prevention of Significant Deterioration (PSD) and nonattainment new source review (NNSR) programs.[14] These programs also apply directly to sources, depending on the pollutants at issue and their attainment status at the source location, through case-by-case application of best available technology or lowest achievable emission rates.

Thus, overall, the CAA contains a four-pronged approach to the protection of air quality. Three of those prongs—the NSPS, NESHAP, and PSD/NNSR programs—regulate *sources* of air pollution.[15] The NAAQS/SIP prong, in contrast, creates obligations for *states*, which are charged with implementing control measures designed to attain the NAAQS, as discussed in more detail below.

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[9] *See* 40 C.F.R. Part 50 (National Primary & Secondary Ambient Air Quality Standards).

[10] 42 U.S.C. § 7407(d)(1). Unclassifiable areas are effectively treated as being in attainment in most instances.

[11] *Id.* §§ 7410(a)(2) (required elements of infrastructure SIPs), 7502(c) (required elements of nonattainment SIPs).

[12] *See* 42 U.S.C. § 7411.

[13] *See id.* § 7412.

[14] Pub. L. No. 95-95 (1977); CAA Subchapter I, Parts C & D.

[15] The Title V operating permit program, discussed further below, also applies to sources but does not impose new substantive requirements on such sources. Several other programs (*e.g.,* the acid rain and stratospheric ozone programs) are not relevant to this paper.

II. States Are Responsible for Implementing NAAQS Through SIPs

Once EPA establishes a new or revised NAAQS, the SIP development process is set in motion in each state. The legislative history of the 1970 CAA demonstrates the importance that Congress ascribed to the SIP development process:

> The establishment alone of ambient air quality standards has little effect on air quality. Standards are only the reference point for the analysis of the factors contributing to air pollution and the imposition of control strategy and tactics. This program is an implementation plan.... [T]he implementation plan is the principal component of control efforts for pollution agents for which national standards are established.... The Committee expects that appropriate Federal, State, and local officials, citizens and affected industry groups will consider the development of the implementation plan the central element of this aspect of the legislation.[16]

The CAA prescribes an implementation timeline for the attainment of new or revised NAAQS of up to approximately five years, total. As an initial matter, EPA has two years under Section 107 to make its designations (attainment, nonattainment, or unclassifiable) for the areas within each of the states.[17] The designations are based on recommendations by each state's governor for areas within that state; if EPA disagrees with a recommendation, it is required to notify the state of any intended modifications prior to EPA's promulgation of the final designation.[18]

EPA makes attainment and nonattainment decisions on a NAAQS-by-NAAQS basis using a combination of regulatory criteria and guidance.[19] A measured or modeled exceedance of a NAAQS at any given location, such as an individual facility, does *not* equate with "nonattainment." Rather, EPA typically

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[16] S. Rep. No. 91-1196, at 10-11 (1970).

[17] 42 U.S.C. § 7407(d)(1)(B)(i). The deadline may be extended for up to one additional year if the Administrator has insufficient information to promulgate the designations. *Id.*

[18] *Id.* §§ 7607(d)(1)(A) & (B)(ii) Areas of the country currently designated as nonattainment are listed at www.epa.gov/airquality/greenbook/astate.html. Arkansas has only one county, Crittenden, which is in marginal nonattainment for the 8-hour ozone standard. *Id.* That county did not actually exceed the NAAQS; rather, EPA believed it was contributing to an exceedance in neighboring Shelby County, Tennessee, due to meteorological conditions and ozone precursor emissions from mobile sources and small ("area") sources. www.epa.gov/ozonedesignations/2008standards/documents/R46_Memphis_TSD_Final.pdf.

[19] Because NAAQS are not emissions standards, limitations, or applicable requirements, they are not "violated" but rather "exceeded." *See, e.g.*, 40 C.F.R. § 50.1(l) (definition of "exceedance" with respect to NAAQS).

looks at *average* values over a multi-year period at an EPA-compliant monitoring location to determine compliance with annual NAAQS standards, and it typically excludes a certain number of high data points when determining compliance with short-term NAAQS, such as 1-, 8-, and 24-hour standards.[20] This approach makes sense given the conservative nature of the NAAQS themselves, as discussed above.

Next, within three years after the promulgation of a new or revised NAAQS, states must adopt and submit what is generally referred to as an "infrastructure SIP," which shows they have the basic air quality management program components in place to implement the specific NAAQS at issue—including ambient air quality monitoring and data systems, programs for enforcement of control measures, and adequate authority and resources to implement the plan.[21] EPA reviews the submitted SIP and proposes to approve or disapprove of all or part of it based on whether the minimal requirements are met.[22] Upon approval, the provisions in the SIP become federally enforceable.[23] If the SIP is disapproved, EPA must develop a federal implementation plan (FIP) to implement the NAAQS within two years, unless the state corrects the deficiency.[24]

Finally, within 18 months to three years after designations are made, states with nonattainment areas must submit SIPs outlining the specific strategies and emissions control measures that will be employed to attain the relevant NAAQS by a specified deadline no later than five years after the nonattainment designation.[25] Nonattainment SIPs must include several specific program requirements aimed at tracking and reducing the emissions of the nonattainment pollutant.[26]

Three important conclusions flow from the structure that Congress selected. First, Congress did not envision a "one-size-fits-all" strategy for attaining the NAAQS. Instead, it recognized that the strategies for attaining and maintaining the NAAQS would differ from state to state and for the various areas within the states. Second, the process of coming into attainment with

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[20] *See, e.g.*, 40 C.F.R. Part 50, Appendices H, I, K, N, & P (discussing criteria for nonattainment determinations). EPA can also designate an area in nonattainment regardless of the results of monitoring if the area "contributes" to nonattainment in another area. 42 U.S.C. § 7407(d)(1)(A)(i).

[21] 42 U.S.C. § 7410(a)(2).

[22] *Id.* § 7410(k).

[23] *See id.* § 7413(a)(1), (b)(1), (c)(1), (d)(1)(A).

[24] *Id.* § 7410(c).

[25] *Id.* § 7502.

[26] *Id.* § 7502(c).

the NAAQS, or providing for continued maintenance of the NAAQS, was not designed to occur instantly, but over a period of years. Congress did not intend or expect that emission reductions aimed at achieving the NAAQS would occur until this process played out. Finally, both Congress (in the CAA) and EPA (in its implementing regulations) provide for public notice and comment opportunities at numerous stages throughout the SIP development process.[27] This evidences a clear intent to allow for ample public input into the strategies used to achieve the NAAQS in each state.

EPA has emphasized that states should consider a wide range of options and their potential benefits while developing their SIPs. The development process is not intended to focus solely on large stationary sources, as those sources are already covered by the NSPS, NESHAP, and PSD/NNSR programs discussed above. Instead, relevant "control strategies" apply to all types of sources, stationary and mobile, and include but are not limited to:

- Economic incentive or disincentive programs;
- Scheduling, relocation, and closure programs;
- Mobile source inspection and maintenance programs;
- Fuel or fuel additive programs for mobile sources; and
- Emissions limitations on stationary sources.[28]

EPA furthermore stipulates that nothing in its regulations should be construed, among other things, "[t]o encourage a State to adopt any particular control strategy without taking into consideration the cost-effectiveness of such control strategy in relation to that of alternative control strategies," "[t]o encourage a State to prepare, adopt or submit a plan without taking into consideration the social and economic impact of the control strategy set forth in such plan," or "[t]o encourage a State to adopt a control strategy uniformly

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[27] *See, e.g.*, *id.* § 7409(a)(1)(B) (requiring EPA's promulgation of NAAQS to occur "after a reasonable time for interested persons to submit written comments thereon"); *id.* § 7410(a)(1) (requiring states' infrastructure SIP submittals to EPA to occur "after reasonable notice and public hearing"); *id.* § 7410(a)(2) (requiring states' adoption of infrastructure SIPs to occur "after reasonable notice and public hearing"); *id.* § 7502(b) (same for nonattainment SIPs); *id.* § 7410(l) (requiring each SIP revision to be adopted by states "after reasonable notice and public hearing"); 40 C.F.R. § 51.102 (requiring states to provide notice, opportunity to submit written comments, and opportunity for public hearing prior to adoption and submission to EPA of enumerated SIP materials); *see also* S. Rep. No. 91-1196, at 11 (1970) ("Any implementation plan could be developed by a region only after participation by the public. Public participation can only be meaningful if there is reasonable notice and full disclosure of information prior to public hearings.").

[28] 40 C.F.R. § 51.100(n); *see also* 42 U.S.C. § 7410(a)(2)(A), (F).

applicable throughout a region unless there is no satisfactory alternative way of providing for attainment and maintenance of a national standard throughout such region."[29]

III. EPA Does Not Require NAAQS Implementation at the Facility Level

While states are obligated to implement the NAAQS through SIP development in accordance with the multi-step process described above, the corollary is equally true: the NAAQS themselves do *not* impose any obligation upon individual sources of air pollution with respect to their emissions. Doing so in Arkansas would significantly exceed federal requirements, to the detriment of the SIP development process envisioned by Congress.

A. NAAQS Are Not "Emissions Standards or Limitations"

If Congress had intended to make the NAAQS directly applicable to sources, it could have done so using language similar to the explicit prohibition language it employed in the Section 111 NSPS program or the Section 112 NESHAP program.[30] Instead, it chose to make NAAQS attainment a *state* obligation to be addressed through the development of a SIP. As EPA has explained:

> *The NAAQS should not be confused with emission standards.* The latter standards apply to individual sources of air pollution or categories of industrial sources. The NAAQS, on the other hand, serve as benchmarks from which each state derives the total emission reductions necessary to be accomplished in a given area. The requisite total emission reductions are translated into specific emission limitations that sources must meet on a continuous basis. Consequently, EPA does not enforce the NAAQS *per se*. Instead, EPA enforces emission standards designed to contribute to achievement and maintenance of the NAAQS.[31]

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[29] 40 C.F.R. § 51.101. Arkansas law echoes these directives in Ark. Code Ann. § 8-4-312, which requires that in the discharge of their duties that the APC&EC and ADEQ consider a list of factors including economic and industrial development of the state, the social and economic value of emission sources, economic feasibility of pollution control, effect of controls on industrial efficiency, etc.

[30] Pub. L. No. 91-604, §§ 111(e) ("After the effective date of standards of performance promulgated under this section, it shall be unlawful for any owner or operator of any new source to operate such source in violation of any standard of performance applicable to such source"), 112(c) ("After the effective date of any emission standard under this section … no air pollutant to which such standard applies may be emitted from any stationary source in violation of such standard…").

[31] Clean Air Act Compliance/Enforcement Guidance Manual (U.S. EPA, 1986), *available at* http://envinfo.com/caain/enforcement/caad131.html (emphasis added).

By the same token, "the overwhelming weight of case law" holds that the NAAQS themselves are not "emission standards or limitations" that are enforceable by citizen suit under CAA Section 304.[32] As one court noted, "[a] cornerstone of this Court's interpretation of the citizen suit provision is the principle that an air quality standard established under the Clean Air Act is not an 'emission standard or limitation'."[33] Instead, in order to maintain a citizen suit for violation of an emission standard or limitation (either by a regulated source or a governmental agency), a plaintiff must allege a violation of a specific provision in the SIP, and describe with some particularity the respects in which compliance with the provision is deficient, rather than alleging a violation of the NAAQS itself.[34]

B. NAAQS Are Not "Applicable Requirements"

EPA re-examined the issue of whether NAAQS are directly applicable to sources when it developed the Part 70 regulations to implement the Title V operating permitting program in accordance with the Clean Air Act Amendments of 1990.[35] Title V permits must include all pollution control obligations under the CAA that are applicable to a source under a SIP (or FIP), the acid rain program, the air toxics program, or other provisions of the Act and must assure compliance with each applicable standard, regulation or requirement.[36] EPA perceived a major benefit of the Title V permitting program to be the codification of all CAA requirements that apply to a source into a single document, thus enhancing compliance with the Act.[37]

EPA proposed to require states to issue Title V permits that include all "applicable requirements" of the Act or the state's SIP, and EPA envisioned objecting to permits that failed to assure compliance with the applicable requirements.[38] EPA interpreted "applicable requirements" to include "limitations, standards, and/or requirements directly applicable to sources."[39]

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[32] *Cate v. Transcontinental Gas Pipe Line Corp.*, 904 F. Supp. 526, 530-31 (W.D. Va. 1995) (citing *Coal. Against Columbus Ctr. v. New York*, 967 F.2d 764, 769 (2d Cir. 1992); *Atl. Terminal Urban Renewal Area Coal. v. N.Y. City Dep't of Envtl. Prot.*, 697 F. Supp. 157, 161 (S.D.N.Y. 1988); *Citizens for a Better Env't v. Deukmejian*, 731 F. Supp. 1448 (N.D. Cal. 1990), *modified*, 746 F. Supp. 976 (N.D. Cal. 1990); *League to Save Lake Tahoe, Inc. v. Trounday*, 427 F. Supp. 1350 (D. Nev. 1977), *aff'd* 598 F.2d 1164, 1173 (9th Cir. 1979)).

[33] *Coal. Against Columbus Ctr.,* 967 F.2d at 769.

[34] *E.g.*, *Wilder v. Thomas*, 854 F.2d 605, 610 (2d Cir. 1981); *Cate*, 904 F. Supp. at 531.

[35] *See* Pub. L. No. 101-549 (1990), CAA Subchapter V, 42 U.S.C. §§ 7601a-7601f.

[36] *See* 42 U.S.C. §§ 7661a(b)(5)(A), 7661c(a), 7661(b)(1).

[37] Operating Permit Program; Proposed Rule; Notice of Opportunity for Public Hearing, 56 Fed. Reg. 21,712, 21,713 (May 10, 1991).

[38] *Id.* at 21,738.

[39] *Id.*

NAAQS, EPA reasoned, do not fall into this category because they impose planning obligations on *states*, not on individual sources. Thus, EPA would not require Title V permits to assure attainment and maintenance of the NAAQS.[40] Nor would it object to a permit on the grounds that it does not assure attainment of the NAAQS: "It is the State's responsibility to decide what limits the SIP should impose on the various sources. … EPA's review of individual permits will not be the appropriate forum for reviewing the adequacy of such planning decisions."[41]

EPA adopted this approach in the final Part 70 rules—for all but "temporary sources," whose permits are expressly required by CAA Section 504(e) to assure compliance with the NAAQS.[42] Some commenters argued that NAAQS should not be excluded from the "applicable requirements" in Title V permits for permanent facilities, because it would be "anomalous" for Congress to impose more comprehensive permit requirements for temporary sources than for permanent ones.[43] EPA rejected those comments. It reasoned that permits for temporary sources, unlike for permanent ones, must include the ambient standards as applicable requirements because states were unlikely to have performed attainment demonstrations on temporary sources as part of SIP development.[44] But to require ambient demonstrations with respect to the NAAQS (*i.e.*, air quality modeling) for all sources, it reasoned, would be overly burdensome and of little overall value:

> To require such demonstration … on every permitted source would be unduly burdensome, and in the case of area-[w]ide pollutants like ozone where a single source's contribution to any NAAQS violation is extremely small, performing this demonstration would be meaningless. Under the Act, NAAQS implementation is a requirement imposed on States in the SIP; *it is not imposed directly on a source.*[45]

Thus, EPA's Part 70 rules define "applicable requirement" as including, *inter alia*, "[a]ny national ambient air quality standard or increment or visibility requirement under part C of title I of the Act, *but only as it would apply to*

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[40] *Id.*

[41] *Id.*

[42] Operating Permit Program; Final Rule, 57 Fed. Reg. 32,250, 32,276 (July 21, 1992); 42 U.S.C. § 7661c(e).

[43] 57 Fed. Reg. at 32,276. In any event, this logic is completely inconsistent with normal principles of statutory interpretation. Congress' decision to require NAAQS compliance at temporary sources is evidence that no such requirement was intended for other sources.

[44] *Id.*

[45] *Id.* (emphasis added).

temporary sources permitted pursuant to section 504(e) of the Act."[46] In sum, just as the NAAQS are not enforceable "emission standards or limitations" under the CAA, they are also not "applicable requirements" to permanent facilities under the CAA Title V permitting program, because the NAAQS are implemented at the state level through SIPs, not at the individual facility level.

Time and again, EPA has affirmed this principle in response to petitions to object to proposed Title V permits. For example, one petitioner argued that a Title V permit's failure to include enforceable heat input limits meant it would not ensure compliance with the NAAQS for SO_2. The Administrator refused to object to the permit on this ground, observing:

> [T]he NAAQS themselves are not 'applicable requirements,' rather, the measures contained in each state's EPA-approved SIP to achieve the NAAQS are applicable requirements. … As EPA has explained in prior orders, a NAAQS by itself does not impose any obligation on sources. … It is the EPA-approved measures contained in the Kentucky SIP that assure the attainment and maintenance of the NAAQS and that constitute the applicable requirements for purposes of Title V.[47]

Similarly, the Administrator refused to object to a Title V permit for a paper-waste recycling facility on the grounds that it did not assure compliance with the new NAAQS for $PM_{2.5}$, rejecting the petitioner's argument that the state must implement the $PM_{2.5}$ NAAQS with respect to the facility at issue for environmental justice reasons:

> EPA finds DEP's plan to act in accordance with federal requirements regarding $PM_{2.5}$ acceptable. EPA establishes [NAAQS] for certain pollutants, pursuant to section 109 of the CAA, 42 U.S.C. § 7409, and States are required to attain those standards. The SIP is the means by which States comply with CAA requirements to attain the NAAQS, pursuant to section 110(a) of the CAA… The national designations for the $PM_{2.5}$ NAAQS were published in the Federal Register on January 5, 2005. … Under the Clean Air Act, New Jersey is required to submit its SIP for any area designated by EPA as non-attainment showing how it will attain the new $PM_{2.5}$ standard no later than three years from the effective date of the non-attainment designation (*i.e*. by April 5, 2008).

[46] 40 C.F.R. § 70.2 (emphasis added); *see also* CAA section 504(e), 42 U.S.C. § 7661c(e).

[47] *In re E. Ky. Power Coop.*, Order Responding to Petitioner's Request that the Administrator Object to Issuance of State Operating Permit (Adm'r Dec. 14, 2009).

> The new $PM_{2.5}$ standard does not by itself impose any obligation on sources. *A source is not obligated to reduce emissions as a result of the standard until the State identifies a specific emission reduction measure needed for attainment (and applicable to the source), and that measure is incorporated into a SIP approved by EPA.*[48]

This opinion is particularly instructive because it demonstrates that EPA does not expect or anticipate that facilities should demonstrate NAAQS compliance or implement emissions reductions measures upon promulgation of a new or revised NAAQS. Rather, *facilities are not subjected to new obligations until the SIP-development process has played out in accordance with the CAA requirements*.

IV. Except for PSD Permits, the CAA Does Not Require Modeling of Ambient Air Quality Impacts to Ensure Attainment and Maintenance of the NAAQS

EPA has been very specific about what types of permits require modeling to determine potential impacts on attainment and maintenance of NAAQS: PSD permits require modeling, but no such requirement exists for other permits, including Title V and minor source permits.

A. Modeling Is Required for PSD Permits

In 1972, one court concluded that EPA, in exercising its SIP approval authority, had a duty to prevent the degradation of existing clean air in attainment areas.[49] In response to the court's preliminary injunction, EPA developed the first PSD regulations.[50] Not long thereafter, Congress formally adopted detailed "Prevention of Significant Deterioration of Air Quality" permitting requirements into the statute as part of the CAA Amendments of 1977.[51]

The PSD preconstruction permitting program is intended to ensure that large new facilities, or major modifications to existing large facilities, do not cause air quality to deteriorate beyond prescribed levels in areas that are in

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[48] *In re Marcal Paper Mills, Inc.*, Order Granting in Part & Denying in Part Petition for Objection to Permit (Adm'r Nov. 30, 2006) (emphasis added).

[49] *Sierra Club v. Ruckelshaus*, 344 F. Supp. 253, 256 (D.D.C. 1972), *aff'd per curiam*, 4 E.R.C. 1815 (D.C. Cir. 1972), *aff'd per curiam by an equally divided Court, sub nom. Fri v. Sierra Club*, 412 U.S. 541 (1973).

[50] *See* Approval and Promulgation of Implementation Plans; Prevention of Significant Air Quality Deterioration, 39 Fed. Reg. 42,510 (Dec. 5, 1974).

[51] Pub. L. No. 95-95 (1977), CAA sections 160-169, 42 U.S.C. §§ 7470-7479.

attainment with the NAAQS.[52] New and modified sources subject to PSD must demonstrate that construction will not cause air quality to degrade beyond specified "increments" above existing baseline concentrations of pollutants in attainment or unclassifiable areas.[53] The PSD "increments" for criteria pollutants represent the maximum allowable increases in pollutant concentrations over baseline levels—*i.e.*, the amount of pollution an area is allowed to increase up to the maximum levels, which are the NAAQS.[54] Permittees must also employ "best available control technology" to minimize air pollution.[55]

An applicant for a PSD permit is required to conduct an air quality modeling analysis of the ambient impacts associated with the construction and operation of the proposed new source or modification.[56] The main purpose of the air quality analysis is to demonstrate that new emissions emitted from the proposed new source or modification, in conjunction with other applicable emissions increases and decreases from existing sources, will not cause or contribute to a violation of any applicable NAAQS or PSD increment.[57] The modeling is generally required to be conducted in accordance with specifications set forth in EPA's *Guideline on Air Quality Models*.[58]

When it developed the first PSD regulations, EPA was confronted with the issue of which sources should be subject to PSD permitting requirements. From the outset, the agency recognized that it was "not possible" to conduct preconstruction review for each and every source.[59] Instead, the agency chose early on to "concentrate the effort on the important large sources," and thus confined the program requirements to certain "major" stationary sources.[60] In describing how large stationary sources would determine their incremental impact, EPA observed:

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[52] *See id.* The 1977 Amendments also established a detailed NNSR program for major sources located in nonattainment areas, but that program does not require modeling. *See* 42 U.S.C. §§ 7501-7509a.

[53] *Id.* § 7473, 7475.

[54] *Id.*

[55] *Id.* § 7475(a)(4).

[56] *Id.* § 7475(a)(3),

[57] *Id.*; 40 C.F.R. §§ 51.166(k), 52.21(k).

[58] *Id.* §§ 51.166(l), 52.21(l); *see also* 40 C.F.R. Part 51, Appendix W ("Guideline on Air Quality Models").

[59] Approval and Promulgation of Implementation Plans; Prevention of Significant Air Quality Deterioration; Proposed Rule, 39 Fed. Reg. 31,000, 31,003 (Aug. 27, 1974).

[60] *Id.*

> It should be noted that the impacts of sources which are not subject to the review procedures are not necessarily reviewed unless a major source proposes to locate in the area. This feature is necessary because the impact of the very large numbers of very small sources could only be assessed by either modeling or air quality measurement. *To model each individual source during an individual pre-construction review would be an extremely laborious task, and the end result would be of questionable accuracy.*[61]

Thus, EPA recognized from the beginning of the PSD program that it was necessary to set some sort of threshold for sources that would be subject to ambient impact assessment. The approach that ultimately prevailed, which Congress adopted in the 1977 CAA Amendments, was to apply the PSD permitting program to "major emitting facilities," which are defined by CAA section 169 as sources in any of 28 categories that have the potential to emit 100 tpy of any pollutant, or any other source with the potential to emit more than 250 tpy of any pollutant.[62] Accordingly, under EPA regulations, PSD requirements apply only to "new major stationary sources" and "major modifications" of existing major stationary sources.[63]

The PSD program represents the considered judgment of Congress and EPA regarding the measures that are necessary to preserve air quality in areas that are already in attainment with the NAAQS. Requiring routine air quality modeling for other types of permitting goes beyond what Congress envisioned and EPA requires in order to prevent air quality degradation in clean air areas.

B. Modeling Is Not Required by EPA for Other Permits

Since before the establishment of the PSD program, the CAA has required states to address minor sources (i.e., sources that are not "major" sources subject to PSD or NNSR permitting) through so-called "Minor NSR" programs in their SIPs.[64] Specifically, Section 110(a)(2)(C) requires each SIP to "include a program to provide for the … regulation of the modification and construction of any stationary source within the areas covered by the plan as necessary to assure that the national ambient air quality standards are

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[61] *Id.* at 31,005.

[62] 42 U.S.C. § 7479(1).

[63] 40 C.F.R. §§ 51.166(a)(7); 52.21(a)(2).

[64] *See* Clean Air Amendments of 1970, Pub. L. 91-604 at §§ 110(a)(2)(D), 110(a)(4) (requiring procedure for review of location of new source prior to construction or modification to ensure it will not prevent attainment or maintenance of the NAAQS).

achieved."[65] The basic requirements for Minor NSR programs are set forth in EPA regulations.[66]

Despite this longstanding requirement to consider the ambient air impacts of *all* new and modified stationery sources prior to construction, EPA has never interpreted the CAA as requiring air quality modeling for minor sources (meaning non-PSD sources). It is clear from the preamble to the 1978 PSD regulations that, while modeling is required for PSD permitting, EPA presumed that non-PSD sources do *not* require modeling:

> *The rulemaking allows States generally to exempt from air quality reviews those sources with minimal emissions.* Only those sources which would have allowable emissions equal to or greater than [PSD emissions thresholds], or would impact a class I area or an area where the increment is known to be violated, must receive an ambient review.[67]

This presumption remains true today, as recently illustrated by EPA's "Model Rule for Minor NSR Program"[68] which was released in 2012 as part of its "Tribal NSR Implementation Manual."[69] The model rule does not require routine modeling. Rather, it provides that the permitting authority *could* require an air quality impacts analysis from a minor source or modification only if it is "concerned" that the construction of the minor source or modification would cause or contribute to a NAAQS or PSD increment violation.[70]

The point is further echoed in the Title V context. As EPA recognized in its original Part 70 rulemaking to implement the Title V program, requiring modeling demonstrations for every permitted source would be "*unduly burdensome*."[71] In that rulemaking, EPA also declined to require Title V permit applications to include ambient impact assessment information (*i.e.*, source-specific data necessary for input to air quality impact dispersion models, such

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[65] *Id.* § 7410(a)(2)(C).

[66] *See* 40 C.F.R. § 51.160.

[67] Requirements for Preparation, Adoption, and Submittal of Implementation Plans; Prevention of Significant Air Quality Deterioration, 43 Fed. Reg. 26,380, 26,381 (June 19, 1978) (emphasis added).

[68] EPA, Model Rule for Minor New Source Review Program, *available at* http://www.epa.gov/air/tribal/pdfs/model_rule_for_minor_nsr_program.pdf (hereafter, "Model Minor NSR Rule").

[69] The entire Manual and appendices are available at http://www.epa.gov/air/tribal/tribalnsr.html.

[70] Model Minor NSR Rule at 9.

[71] 57 Fed. Reg. at 32,276 (emphasis added).

as stack parameters and building height).[72] EPA explained that, in addition to the NAAQS not being an applicable requirement, "[a]ir quality modeling is not typically required for individual sources by the Clean Air Act (*i.e.*, *it is normally assumed that no individual source can affect attainment or maintenance of an ambient standard on an area-wide basis*)."[73]

Thus, under the federal CAA regulations, air quality modeling is not required for any type of permitting other than PSD permits. Under EPA's interpretation of the CAA and its regulations, PSD-triggering projects are the threshold at which ambient air quality modeling is presumed necessary, and thus required.

V. Nothing in the APC&EC Regulations Makes NAAQS Directly Applicable to Arkansas Facilities, Except through the PSD Program

The APC&EC regulatory provisions that have been SIP-approved by EPA are identified at 40 C.F.R. § 52.170. These include (but are not limited to) most provisions of Regulation 19 and parts of Regulation 26. Nothing in those SIP-approved provisions or any other APC&EC regulations requires NAAQS to be stated or enforced as permit limits in any state permit or to be modeled as part of the permitting process, except for PSD permits.[74]

A. Regulation 18

Regulation 18 is a state-only regulation; none of its provisions are part of any EPA-approved Arkansas SIP.[75] Thus, from a federal perspective, none of the provisions of Regulation 18 are requisite to satisfy Arkansas' obligation to achieve and maintain the NAAQS. Nothing in Regulation 18 imposes an obligation on ADEQ to evaluate whether a source will cause an exceedance of the NAAQS as part of the permitting process.

Regulation 18.302 provides as follows:

> No permit shall be granted or modified under this chapter unless the owner/operator demonstrates to the reasonable satisfaction of the Department that the stationary source will be constructed or

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[72] *Id.* at 32,273.

[73] *Id.* (emphasis added).

[74] As discuss below, only SIP-approved provisions that are specifically applicable to emissions units at sources subject to Title V permits are "applicable requirements." The mere fact that EPA has approved a state submission as part of the SIP does not automatically make that provision applicable to all sources.

[75] *See* 40 C.F.R. § 52.170.

> modified to operate without resulting in a violation of applicable portions of this regulation and without causing air pollution.

Further, "air pollution" is defined under Regulation 18 as:

> [T]he presence in the outdoor atmosphere of one (1) or more air contaminants in quantities, of characteristics, and of a duration that are materially injurious or can be reasonably expected to become materially injurious to human, plant, or animal life or to property, or that unreasonably interfere with enjoyment of life or use of property throughout the state or throughout the area of the state as shall be affected thereby.[76]

One might contend that, with respect to criteria pollutants, "air pollution" is determined by reference to the NAAQS (such that pollution levels that exceed the NAAQS are deemed to be "air pollution" for the purpose of permit decisions under Regulation 18.302).[77] This interpretation cannot be correct. First, the Regulation 18 definition of "air pollution" is identical to the statutory definition in the Arkansas Water & Air Pollution Control Act;[78] thus, its purpose is to implement the state statute, not the federal Clean Air Act. Second, such an interpretation ignores the fact that Regulation 18 separately defines "conditions of air pollution" as follows:

> "Conditions of air pollution" *as distinguished from "air pollution"* in a given area shall be deemed to exist when the Director finds that the National Ambient Air Quality Standards, as established from time to time by the EPA, have been exceeded in such area, or when the Director finds that extraordinary measures are necessary to prevent them from being exceeded.[79]

The term "condition of air pollution" is used in another Regulation18 definition: "air contamination" means "the presence in the outdoor atmosphere of one (1) or more air contaminants which contribute to a condition of air pollution."[80] Therefore, under Regulation 18, the term "air contamination," not "air pollution," is linked to an exceedance of a NAAQS. Regulation 18 only uses the term "air contamination" in one instance: in Chapter 13. In that chapter, the APC&EC established that ADEQ's authority to address areas "affected by levels of air contamination" (*i.e.* areas where the NAAQS are exceeded) is

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[76] APC&EC Reg. 18, Ch. 2.

[77] *Id.*

[78] Ark. Code Ann. § 8-4-303(5).

[79] APC&EC Reg. 18, Ch. 2 (emphasis added).

[80] *Id.*

limited to those that "constitute a *significant departure* from the [NAAQS]."[81] Thus, Regulation 18 has a wholly distinct set of terms for air quality that exceeds the NAAQS, which is purposefully distinguished from the definition of "air pollution." Interpreting the term "air pollution" as being equivalent to "conditions of air pollution" would vitiate the distinct meaning given to those terms by the APC&EC. Moreover, to the extent Regulation 18 addresses exceedances of the NAAQS, it limits the ADEQ's authority to instances of *significant* departures.

In sum, Regulation 18.302 does not obligate ADEQ to assess a stationary source's emissions against the NAAQS during routine permitting. Furthermore, nothing in Regulation 18 purports to impose modeling requirements on permittees.

B. Regulation 19

In general, Chapter 3 of Regulation 19 delineates the responsibilities of ADEQ and of regulated sources, respectively, in meeting and maintaining the NAAQS. Specifically, Regulation 19.303 provides that regulated sources must do three things to prevent any of the NAAQS from being exceeded: (i) obtain a permit from ADEQ prior to construction of a new source or modification of an existing source of federally regulated air pollutant emissions; (ii) operate equipment in accordance with applicable permit requirements and regulations, and (iii) repair malfunctioning equipment and pollution control equipment as quickly as possible, and if the malfunctioning equipment is causing or contributing to a violation of the NAAQS, cease operating the affected equipment until it is repaired.[82]

Notably, Regulation 19.303 does *not* include a general requirement for all regulated sources to demonstrate in routine permitting that the NAAQS will not be exceeded (much less a demonstration through modeling). The only specific modeling requirement applicable to sources is contained in Regulation 19, Chapter 9, the Arkansas PSD program. Arkansas incorporates by reference the federal PSD regulations in which air quality modeling requirements are limited to the permitting of major stationary sources and major modifications.[83]

Regulation 19.302 sets forth the "precautions" ADEQ is responsible for taking to prevent the NAAQS from being exceeded:

(A) Ambient air monitoring in any area that can reasonably be expected to be in excess of the NAAQS.

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[81] APC&EC Reg. 18.1301 (emphasis added).

[82] APC&EC Reg. 19.303.

[83] APC&EC Reg. 19.904, incorporating by reference, *inter alia*, 40 C.F.R. § 52.21(k).

(B) Computer modeling of regulated air pollutant emissions for any area that can reasonably be expected to be in excess of the NAAQS, and review of the ambient air impacts of any new or modified source of federally regulated air emission that is the subject of the requirements of this Plan. All computer modeling shall be performed using EPA-approved models, and using averaging times commensurate with averaging times stated in the NAAQS.

This regulation does not obligate ADEQ to ensure that the NAAQS are met at every geographic point for every permit that it issues. The only "computer modeling" required by this provision is for "area[s] that can reasonably be expected to be in excess of the NAAQS." Where there is no such reasonable expectation, the provision does not compel ADEQ to perform modeling. The "review" required for new or modified sources is a separate obligation from the "computer modeling." As with the federal Minor NSR requirements, there is no reason to assume that this review should routinely include modeling.[84]

Nor does Regulation 19.402 (the "Approval Criteria") provide a basis for requiring modeling as a routine requirement for all permits. This provision states:

> No permit shall be granted or modified under this chapter unless the owner/operator demonstrates to the reasonable satisfaction of the Department that the stationary source will be constructed or modified to operate without resulting in a violation of applicable portions of this regulation or without interfering with the attainment or maintenance of a national ambient air quality standard.

First, this provision does not apply to major sources. It is part of Regulation 19, Chapter 4, which is titled "Minor Source Review." It is also SIP-approved to meet the federal Minor NSR requirements.[85] As described above in Section IV.B, above, EPA does not generally require modeling as a part of Minor NSR, and therefore SIP approval of this particular provision could not be construed as an EPA requirement to model.

Regulation 19.402 has existed in some form since before the federal PSD program was enacted—*i.e.*, before the federal regulations divided sources into "major" and "minor" categories such that construction of major sources and

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[84] *See generally* Section IV.B, *supra*.

[85] Approval and Promulgation of Implementation Plans; Arkansas; Regulation 19 and 26; Final Rule, 65 Fed. Reg. 61,103, 61,104 (Oct. 16, 2000).

major modifications required air quality impact analyses, but minor sources did not.[86] Subsequently, Arkansas divided and recodified its regulations such that Chapter 4 prescribed the permitting procedures for *minor sources*, and Chapters 9 and 11 prescribed the permitting requirements for *major sources*.[87] The fact that Arkansas chose to preserve this requirement only in the "Minor Source Review" section evidences the intention that it not apply to major sources. From the standpoint of the federal interpretation and enforceability of Chapter 4, EPA's understanding is that "[t]he provisions of Regulation 19, Chapter 4 *apply only to sources which are not 'major' under [the federal CAA] definition*."[88]

In addition, Regulation 19.402 is further restricted by its plain language to apply only to permits to "construct" or "modify" a source. It does *not* apply to operating permits or renewals thereof. Moreover, Regulation 19's definition of "modification" is limited to a "physical change in, or change in the method of operation of, a stationary source which increases the emission rate of any federally regulated air pollutant over permitted rates or which results in the emission of a federally regulated air pollutant not previously emitted."[89] In addition to other explicit exceptions, it expressly *excludes* changes which meet the "*de minimis*" criteria set forth in Regulation 19.407(C).[90] Thus, the provision cannot apply to modifications whose associated emissions increases are reasonably expected to be relatively insignificant.[91]

Finally, Regulation 19.502 provides:

> No person shall cause or permit the construction or modification of equipment which would cause or allow the following standards or limitations which are in effect as of the effective date of this regulation, to be exceeded:

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[86] For example, an earlier version of the provision as published in the 1973 Arkansas Air Code applied to all permits, just as the CAA did not distinguish between "major" and "minor" sources for preconstruction review purposes prior to the 1977 Amendments. Ark. Air Pollution Control Code, As Amended (July 30, 1973), Section 3(f) (Section 3 applied to all "permits and registrations").

[87] Regulation 19, Chapter 9 is the PSD program; Chapter 11 provides that sources subject to the Arkansas operating permit program are required to have their permit applications processed in accordance with the procedures of Regulation 26, which it incorporates by reference.

[88] Approval and Promulgation of Implementation Plans; Arkansas; Regulation 19; Proposed Rule, 65 Fed. Reg. 26,792, 26,795-96 (May 9, 2000) (emphasis added).

[89] APC&EC Reg. 19, Ch. 2.

[90] *Id.*

[91] See APC&EC Reg. 19.407(C)

(A) Any National Ambient Air Quality Standard or ambient air increment (as listed in 40 CFR 52.21)….

Thus, like Regulation 19.402, this provision is limited only to permits to "construct" or "modify" and does not apply to routine permitting of sources with *de minimis* emissions, *i.e.*, emissions less than the threshold amounts set forth in Regulation 19.407(C)(2). These are essentially the same as the PSD Significant Emissions Rates (SERs), the threshold levels at which PSD requirements apply to new major sources or existing sources making modifications that result in significant (*i.e*. PSD-level) emission increases.[92] For all intents and purposes, non-PSD permits are excluded from the requirements of Regulation 19.502.

C. Regulation 26

Regulation 26 sets forth the requirements of the Arkansas Operating Air Permit Program. Regulation 26.304 requires operating permits to include all "applicable requirements" for all relevant emissions units in the source. The Regulation 26 definition of "applicable requirement" is virtually identical to EPA's definition of that term.[93] It includes, *inter alia*, "*[a]ny national ambient air quality standard* or increment or visibility requirement under part C of Title I of the Act, *but only as it would apply to temporary sources* permitted pursuant to section 504(e) of the Act."[94] Thus, the Arkansas operating permits program, like the federal Title V rules, expressly provides that the NAAQS do *not* impose direct regulatory obligations on any *non-temporary* stationary sources permitted under that program. To construe the NAAQS as "applicable requirements" to such sources would be squarely at odds with the state and federal regulatory definitions of that term, which explicitly exclude the NAAQS from direct application to non-temporary sources. It would also be in direct opposition to EPA's longstanding interpretation that the NAAQS are not "applicable requirements" for such sources.[95]

"Applicable requirements" also include "[a]ny standard[s] or other requirement[s]" provided for in the SIP that implement requirements of the CAA, "*as they apply to emissions units in a part 70 source*."[96] Put simply, this means "all the requirements in the SIP *which are applicable to a particular*

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92 *Compare* APC&EC Reg. 19.407(C)(2) *with* 40 C.F.R. § 52.21(b)(23)(i).

93 The only material difference between the two definitions is that the EPA definition includes "[a]ny standard or other requirement under section 126(a)(1) and (c) of the Act," while the Arkansas definition does not. *Compare* APC&EC Reg. 26, Ch. 2 *with* 40 C.F.R. § 70.2.

94 APC&EC Reg. 26, Chapter 2 (emphasis added).

95 *See* Section III.B, *supra*.

96 APC&EC Reg. 26, Chapter 2 (emphasis added).

source."[97] Thus, all Arkansas SIP provisions are not automatically imposed through the operating permits program as "applicable requirements" on all permit holders. Rather, only those SIP provisions that apply to a particular source are "applicable requirements" to that particular source.[98] SIP requirements that impose obligations on ADEQ, rather than on sources (such as Regulation 19.302), are not "applicable requirements" for *any* source. Any contrary interpretation would result in the absurdity that all SIP provisions would be applicable to all sources, simply because EPA had approved them. There is no support anywhere for that proposition. Moreover, as discussed above, Regulation 19 does not establish NAAQS compliance as a source-specific obligation for any type of source. Thus, NAAQS "compliance" is not an "applicable requirement" under Regulation 26 for any non-temporary sources.

The logical interpretation that flows from the language, organization, and history of Regulations 18, 19 and 26 is that no facilities in Arkansas are subject to NAAQS as emissions standards or limitations or applicable requirements, and no such facilities should routinely require modeling to analyze their effects on NAAQS attainment and maintenance, except where PSD requirements apply. Routine modeling for all permits would be just the type of exercise that EPA described as "unduly burdensome" and potentially "meaningless."[99]

VI. Conclusion

Congress envisioned that states, in the first instance, would determine both the amount of pollution control necessary to achieve and maintain NAAQS and the most appropriate control strategies, in light of the costs and benefits of each available tool in the broad toolkit available to the states. Neither Congress nor EPA—nor the APC&EC—require the application of NAAQS to individual stationary sources, except where PSD requirements are triggered.

Arkansans should be proud that their state is overwhelmingly in attainment with all NAAQS at almost all locations. To the extent the APC&EC and ADEQ are concerned with achieving or maintaining the NAAQS, they should follow the process envisioned by Congress. Air quality is impacted by

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[97] U.S. EPA, Office of Air Quality Planning & Standards, "White Paper for Streamlined Development of Part 70 Permit Applications" (1995).

[98] *See generally* EPA Region 9, "Title V Permit Review Guidelines" (draft), at III-7 (instructing Title V permit reviewers to identify "applicable requirements" by scanning the contents of an approved SIP, identifying each provision potentially related to the source at issue, and "determin[ing] if it is applicable to the source based on source size, fuel type, source construction or modification dates, or other criteria given in the rule."). *Available at* http://www.epa.gov/region9/air/ permit/titlev-public-part.html (*see* Chapter III, "Applicable Requirements").

[99] 57 Fed. Reg. at 32,276; *see also* 43 Fed. Reg. at 26,381.

many types of sources, mobile and stationary, from residential to industrial. All options should be explored, and a reasoned SIP should be developed as needed. It is equally clear that the state should *not* exceed the federal requirements for NAAQS by making those standards disproportionally applicable to certain stationary sources through routine modeling requirements or NAAQS permit limits.

NAAQS Reviews and Modeling for Minor New Source Review under the Arkansas Infrastructure SIP

January 22, 2014

AGENDA

I. Introduction of participants – 5 minutes

II. Review of Objectives by Business Community Stakeholders, ADEQ & EPA – 10 minutes

III. Brief overview of CAA and CFR requirements for minor NSR SIPs – 15 minutes

IV. Review of AR SIP elements with focus on minor NSR – 40 minutes

V. Articulation of specific conflicts between Act 1302 and AR SIP – 10 minutes

VI. Wrap up and action items – 5 minutes

VII. Future meetings on this topic? – 5 minutes

II. OBJECTIVES

- Articulate exact conflicts between the AR SIP and Act 1302
- Expectations of ADEQ for this conference
- Expectations of U.S. EPA for this conference
- List of action items following conference

III. OVERVIEW OF CAA AND CFR REQUIREMENTS

§110(a)(2) Infrastructure SIP Elements

(A) Emission Limits and Other Control Measures

(B) Ambient Air Quality Monitoring/Data System

(C) Programs for Enforcement of Control Measures and for Construction or Modification of Stationary Sources *(excluding Nonattainment NSR)*

(D) Interstate Pollution Transport and Abatement; International Air Pollution

(E) Adequate Resources and Authority

(F) Stationary Source Monitoring and Reporting

(G) Emergency Episodes

(H) SIP Revisions

(I) Consultation with Gov't Officials, Public Notice, Visibility Protection

(J) Air Quality Modeling and Submission of Modeling Data

K) Permitting Fees

(L) Consultation and Participation by Affected Local Entities

CAA §110(a)(2)(C) Includes 3 Infrastructure SIP Sub-elements

1) **Enforcement** - A program for enforcement of the emission limits and control measures described in 110(a)(2)(A)
2) **Minor New Source Review** - A state-wide program to regulate
   - new construction and modification of minor stationary sources *and*
   - minor modification of major stationary sources
   - A "PSD *major* source" is often subject to *minor* NSR
   - All Title V (Reg. 26) minor permit modifications and many significant permit modifications are PSD minor modifications, even when the source is a major PSD source
3) **Major New Source Review** – A preconstruction permitting program to regulate
   - new construction of major stationary sources *and*
   - major modification of major stationary sources
   - in areas designated attainment or unclassifiable for the subject NAAQS as required by CAA Title I Part C (i.e., PSD)

What is the federal legal basis for “NAAQS Review” in permitting?

- **Section 110(a)(2)(C) of the CAA**
  - “a program to provide for *the…regulation of* the modification and construction of *any stationary source* within the areas covered by the plan *as necessary to assure that the national ambient air quality standards are achieved*, including a permit program as required in parts C and D;”
- **40 CFR 51.160(a)**
  - “procedures…to determine whether the construction or modification of a facility…will result in a violation of applicable portions of the control strategy; *or interference with attainment or maintenance* of a national standard…”

What is New Source Review (NSR)?

- A program to review the construction and modification of minor and major stationary sources, *as necessary*, to assure that SIP control measures are met and that the NAAQS are achieved
- NSR often involves a case-by-case permitting review at the time of initial construction and/or modification of a stationary source
- NSR requirements are sometimes met programmatically without a case-by-case review and/or without issuance of a permit
- Depending on the specific circumstances, NSR may include
  - Control technology reviews (e.g., RACT, BACT, LAER)
  - Emission reduction offset requirements (e.g., NNSR offsets)
  - Ambient monitoring
  - Dispersion modeling
  - Visibility and other impacts analyses
- Major NSR is comprised of highly prescribed requirements
- Minor NSR varies widely from state to state

What is Major NSR?

- Major NSR applies to
  - The initial construction of a stationary source with PTE equal to or greater than the PSD and/or NNSR major source thresholds
    - Includes a change to an existing minor source if the change would constitute a major source by itself
  - The major modification of a PSD or Nonattainment major stationary source
    - Project emissions increase and net emissions increase are equal to or greater than the PSD and/or NNSR significant emission rates

- Major NSR includes
  - Prevention of Significant Deterioration (PSD)
    - For any pollutant for which a NAAQS is established or any precursor of the NAAQS pollutant, PSD applies in attainment and unclassifiable areas
    - PSD also applies to NSR-regulated pollutants for which there is no NAAQS (e.g., H_2S)
  - Nonattainment NSR (NNSR)
    - For any pollutant for which a NAAQS is established or any precursor of the NAAQS pollutant, NNSR applies in designated nonattainment areas
  - Both PSD and NNSR can apply simultaneously to the same project for different NAAQS

What is Minor NSR?

- "The procedures [*SIP*] must identify the types and sizes of facilities…which will be subject to review…" 40 CFR 51.160(e)

- Generally, Minor NSR applies, *as specified in the applicable SIP,* to
  - The construction of any minor stationary source (i.e., with PTE less than the applicable PSD/NNSR major source thresholds)
  - The modification of any minor stationary source
  - The modification of any major stationary source resulting in emissions increases less than the applicable PSD/NNSR significant increase thresholds
- Minor NSR requirements
  - May include a case-by-case permit review and issuance
  - May include controls or other substantive requirements
  - May include modeling, source testing, or monitoring
  - Vary widely from state to state

Minor NSR Flexibility

Excerpts from U.S. Court of Appeals 5th Circuit, 2012

Luminant Generation Company, LLC et al vs. EPA

- In stark contrast [*to major NSR*] the CAA prescribes only the barest of requirements for "minor" NSR
- For minor NSR, the Act requires simply that each SIP "include . . . regulation of the modification and construction of any stationary source within the areas covered by the plan as necessary to assure that [NAAQS] are achieved." 42 U.S.C. § 7410(a)(2)(C).
- The implementing regulations for minor NSR are likewise sparse, spanning less than two pages in the Code of Federal Regulations. See 40 C.F.R. §§ 51.160–51.164.
- The EPA has recognized that because "the Act includes no specifics regarding the structure or functioning of minor NSR programs" and because the implementing regulations are "very general[,] . . . SIP-approved minor NSR programs can vary quite widely from State to State." 74 Fed. Reg. 51,418, 51,421 (Oct. 6, 2009).
- Minor NSR is "a cooperative federalism regime that affords sweeping discretion to the states to develop implementation plans and assigns to the EPA the narrow task of ensuring that a state plan meets the minimum requirements of the Act."

Examples of Minor NSR occurring without case-by-case permit reviews

- General permits
- Permits by rule
- Construction of a stationary source with emissions below SIP-established permitting thresholds
- Physical changes and changes in the method of operation at a stationary source resulting in increases below SIP-established permitting thresholds
- Insignificant activities

In all of these examples, the "NAAQS Review" occurs on a programmatic basis

Arkansas SIP

What is the Arkansas Approved SIP for New Source Review?

1. Major NSR (PSD)

   EPA approved Regulation 19, Chapter 9 as meeting 40 CFR 51.165

2. Minor NSR is divided into 2 categories

   A. Major source review (Title V Non-PSD NSR or Reg. 26 Sources)

   B. Minor source review (Non-Title V Minors or Reg. 19 Sources)

What is the Arkansas Approved SIP for New Source Review? (continued)

2. Minor NSR
   A. Major source review (Title V Non-PSD NSR, or Reg. 26 Sources)
      - Includes construction of sources that are *"major" as defined under Title V of the CAA, but "minor" as defined under PSD*
      - Includes modification of *"major" sources as defined under Title V (including "major" PSD sources) but for which the modification results in emissions increases that are less than the PSD significant increase thresholds*
      - EPA approved as meeting 40 CFR 51.160 – 51.164 requirements for NSR:
        – Reg. 19 Chapter 11 (which incorporates parts of Reg. 26 by reference);
        – Reg. 19.302 and 19.303
        – Reg. 19.502 and 19.504

What is the Arkansas Approved SIP for New Source Review? (continued)

2. Minor NSR

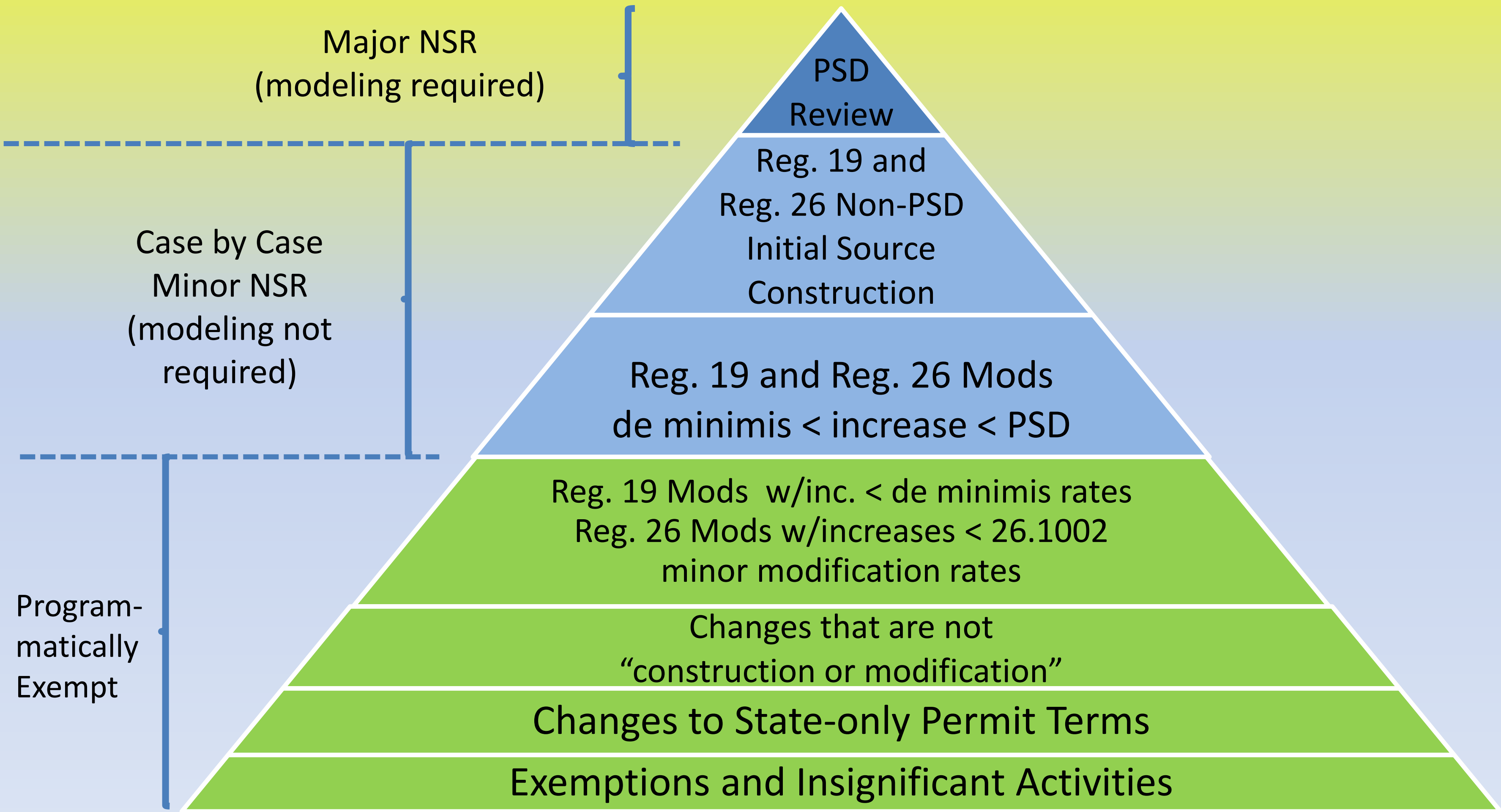
   B. Minor source review (Non-Title V Minors, or Reg. 19 Sources)

      - Includes construction and modification of sources that are *“minor” as defined under Title V of the CAA*
      - EPA approved as meeting 40 CFR 51.160 – 51.164 requirements for NSR:
        - Reg. 19 Chapter 4;
        - Reg. 19.303; and,
        - Reg. 19.502 and 19.504

When is a case-by-case "NAAQS Review" required under the Arkansas SIP?

- What is meant by a "NAAQS review"?
  - A review "to determine whether the construction or modification of a facility…will result in…interference with attainment or maintenance of a national standard…" (40 CFR 51.160(a))
- The SIP requirement for conducting a NAAQS review and the level of rigor of the NAAQS review are contingent on the environmental significance of the construction or modification proposed
- A case-by-case NAAQS review is ***not*** required for several categories of sources and changes that have trivial environmental impact

The Arkansas NSR NAAQS Review Pyramid



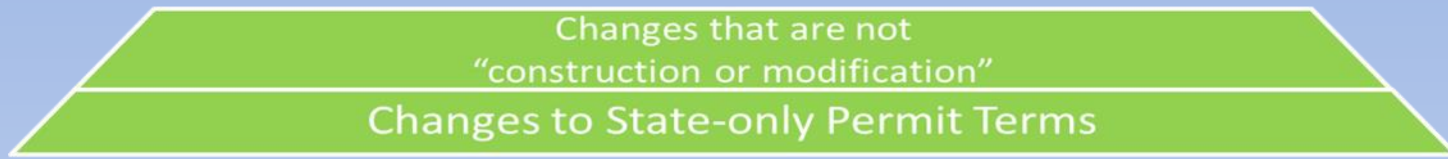
A NAAQS Review is NOT Required for…

Exemptions and Insignificant Activities

- Changes and Activities Exempt from Permitting
  - Construction of or changes to sources with emissions below the Reg. 18.315 registration thresholds
  - Construction of or changes to sources with emissions below the Reg. 19.401 permitting thresholds
  - Insignificant Activities
  - Changing among Alternative Operating Scenarios
  - Changes resulting in no emission increases (Reg. 19.415 and 26.802)
  - Changes that involve a physical change or change in the method of operation but do not result in an increase in emissions over permitted rates

No NAAQS review is required because the approved SIP has identified these categories as exempt from NSR procedures, i.e., exempt from a case-by-case NAAQS review

A NAAQS Review is NOT Required for…



- Changes to State-only Permit Terms

No NAAQS review is required because federal NSR requirements do not apply to state-only terms

- Permits for changes at Reg. 19 or Reg. 26 sources that do not involve "construction or modification", such as
  - Administrative Amendments
  - Reg. 19.407(C) De minimis changes
  - Reg. 26 minor modifications that satisfy Reg. 19.407 de minimis criteria
  - Reg. 26 significant modifications involving only changes to monitoring, recordkeeping, reporting or adding an applicable requirement
  - Modifications resulting in emissions increases only of non-NAAQS pollutants
  - Changes that increase emissions but do not involve a physical change or change in the method of operation

No NAAQS review is required because federal NSR requirements only apply to the construction and modification of stationary sources

A NAAQS Review is NOT Required for…

Reg. 19 Mods w/inc. < de minimis rates
Reg. 26 Mods w/increases < 26.1002
minor modification rates

- Modifications at Reg. 19 or Reg. 26 sources
  - with emissions increases below the respective de minimis or minor modification emission thresholds
  - Includes some permit revisions under
    - Reg. 19, Chapter 4, Minor Source Review
    - Reg. 26.1010, Significant Modifications
- All Reg. 26.1002 Minor Modifications are programmatically exempt from NAAQS Review

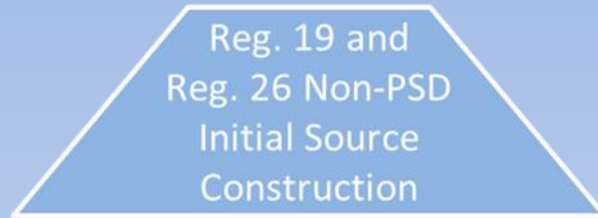
No further NAAQS review is required because the approved SIP has already made a programmatic determination that de minimis increases have a trivial environmental impact

A NAAQS Review is required for…

Reg. 19 and Reg. 26 Mods
de minimis < increase < PSD

- Modifications at Reg. 19 or Reg. 26 sources
  - with emissions increases over permitted rates greater than or equal to the de minimis/Minor Modification thresholds, but which do not trigger PSD review
  - Includes *some* permit revisions under
    - Reg. 19, Chapter 4, Minor Source Review
    - Reg. 26.1010, Significant Modifications
  - No programmatic determination for these minor NSR modifications
  - The permit review must consider whether the modification would interfere with attainment or maintenance of the NAAQS
  - Modeling is not explicitly required by the AR SIP, 40 CFR or CAA

A NAAQS Review is required for…



- Initial permit for construction of a Reg. 26 source (Title V non-PSD)
  - With PTE equal to or greater than Reg. 26 major source thresholds but less than PSD major source thresholds
  - Includes all permits for initial source construction under Reg. 26.404 with emissions of NAAQS pollutants
- Initial permit for construction of a Reg. 19 source (non-Title V Minors)
  - With PTE equal to or greater than Reg. 19.401 permitting thresholds but less than Title V major source thresholds
  - Includes all permits for initial source construction under Reg. 19.401 with emissions of NAAQS pollutants
- No programmatic determination for these minor NSR modifications
- The permit review must consider whether the modification would interfere with attainment or maintenance of the NAAQS
- Modeling is not explicitly required by the AR SIP, 40 CFR or CAA

A NAAQS Review is required for…

- Initial permit for Construction of a PSD major source
  - PTE greater than the PSD major source thresholds
  - Includes a change to an existing minor source if the change would constitute a major source by itself
- The major modification of a PSD major stationary source
  - Project emissions increase and net emissions increase are equal to or greater than the PSD and/or NNSR significant emission rates
- A detailed NAAQs Review is specifically prescribed by the SIP, CFR and CAA for each pollutant triggering review
  - Ambient Air Quality Impact Analysis (AAQIA) is required
  - Modeling is specifically required
- Class I impact analysis is required
- Other impacts analysis is required
- Must follow Reg. 19 Chapter 9 in addition to Reg. 26

Reg. 26 Permitting and NSR NAAQS Review Requirements

- Initial permit for a proposed Part 70 stationary source, Reg. 26.404
  - NAAQS review based on PSD modeling required if proposed source is major under PSD, for any PSD pollutant above significance thresholds
  - NAAQS review required for any other NAAQS pollutant with emissions above de minimis threshold, but modeling not required
- Administrative permit amendments, Reg. 26.901
  - No NAAQS review required
- Minor permit modifications, Reg. 26.1002
  - No NAAQS review required

Reg. 26 Permitting and NSR NAAQS Review Requirements (continued)

- Significant permit modifications, Reg. 26.1010
  - NAAQS review based on PSD modeling required if proposed change is a major modification under PSD, for any PSD pollutant above significance thresholds
  - NAAQS review required for any other NAAQS pollutant with emissions above de minimis threshold, but modeling not required
  - No NAAQS review required for NAAQS pollutants with increases less than de minimis
  - No NAAQS review required for any NAAQS pollutant if the proposed change is not a physical change or change in method of operation with increases greater over permitted rates
- Title V Permit Renewals
  - No NAAQS review required unless the renewal will authorize construction or modification otherwise subject to a NAAQS review

How is a NAAQS review performed for minor NSR changes?

The NAAQS review can be satisfied by consideration of several factors, such as:

- The level of the emissions increase
  - in comparison to the de minimis thresholds or PSD significance thresholds,
  - in comparison to the facility PTE or area-wide emissions inventory, and/or
  - in comparison to previous NAAQS evaluations.
- The location of the construction or modification
  - in an attainment or unclassifiable area,
  - in relation to other pollutant-emitting activities or industrial sources,
  - in relation to ambient monitoring stations, and/or
  - in relation to potentially sensitive receptors
- The nature of the source or emissions unit

Impact of Act 1302 on SIP Implementation

- The approved SIP does not require a NAAQS review for many permitting actions for which ADEQ was routinely conducting modeling
- For minor NSR changes for which the SIP does require a NAAQS review as part of the permitting process, modeling is not required to conduct the review
- The SIP requires modeling as part of the permit review only for PSD permitting
- Act 1302 does not affect PSD permitting and does not restrict ADEQ from conducting NAAQS reviews for minor NSR

Remaining Agenda Items

V. Articulation of specific conflicts between Act 1302 and AR SIP – 10 minutes

VI. Wrap up and action items – 5 minutes

VII. Future meetings on this topic? – 5 minutes

July 2, 2015

Comments on ADEQ's NAAQS SIP/Minor NSR Permitting Guidance Document

AEF submits the following comments on the ADEQ document entitled "Developing the NAAQS SIP: A Look at Minor Stationary Source Permitting".

BACKGROUND INFORMATION

Under the Clean Air Act (CAA), state and local governments are primarily responsible for the prevention and control of air pollution. Air pollution is controlled by rules and guidelines issued by the U.S. EPA under the CAA. These rules and guidelines must be included in a state's implementation plan (SIP). SIPs contain a state's strategy for attaining and maintaining the National Ambient Air Quality Standards (NAAQS), which exist for carbon monoxide (CO), fine particulate matter (PM_{10} and $PM_{2.5}$), lead, nitrogen dioxide (NO_2), ozone, and sulfur dioxide (SO_2). SIPs may be revised at the impetus of EPA or at a state's instigation, always subject to EPA approval.

SIPs are concerned primarily with <u>nonattainment</u>, and states are required to estimate the emissions reductions required to attain the NAAQS and establish their own unique control program to achieve the necessary reductions. Due to the nonattainment focus of SIPs, all state regulations are focused first toward reducing pollution in known problem areas. For a SIP to be valid, its provisions must be supported by state enabling legislation and a regulatory framework that can be applied broadly. In developing SIPs, States are encouraged to take into consideration the social and economic impact of their strategies—including the impact on availability of fuels, energy, and employment—but are not required to do so. Over the decades since the CAA has been in place, Arkansas' air quality has been very good and there have been very few areas where the NAAQS has not been attained.[1] Therefore, Arkansas' SIPs have been relatively simple and have generally conformed to the minimum standards required by EPA. The last Arkansas SIP was approved by EPA in October 2000.[2] However, a more recent SIP submittal is still pending with EPA.

ADEQ is currently developing a SIP (or SIPs) for several outstanding NAAQS. The NAAQS SIPs to be developed include:

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[1] The current exception is Crittenden County, which is part of the Memphis TN-AR-MS interstate area that is currently nonattainment for the 2008 ozone NAAQS.

[2] 65 FR 61103, October 16, 2000.

1. 2006 $PM_{2.5}$ – Update needed for minor New Source Review (NSR) only. The major NSR/PSD portion of the 2006 $PM_{2.5}$ SIP was completed in November 2014, following promulgation of updates to Regulations 18/19/26.
2. 2008 Ozone
3. 2008 Lead
4. 2010 SO_2 (1-hour NAAQS)
5. 2010 NO_2 (1-hour NAAQS)
6. 2012 $PM_{2.5}$ – These standards reduced the annual $PM_{2.5}$ NAAQS to 12 $\mu g/m^3$, down from 15.

The CAA requires states to submit SIPs that provide for the implementation, maintenance and enforcement of a new or revised NAAQS within 3 years following the promulgation of the new or revised NAAQS. ADEQ is past the 3-year deadline for submittal of the required SIPs, and the concern is that EPA will eventually take formal action against Arkansas.

As with past SIP submittals, Arkansas is currently <u>in attainment with all of these standards</u> (except for ozone in Crittenden County). Therefore, these "new" NAAQS SIPs do not necessarily require any additional control measures to "attain the NAAQS".

COMMENTS ON "DEVELOPING THE NAAQS SIP" DOCUMENT

One element of the SIP is the minor New Source Review (NSR) permitting program. ADEQ has an existing minor NSR program under Arkansas Regulation No. 19. The vast majority of Regulation No. 19 has been unchanged for many years, and was approved by EPA in the October 2000 SIP approval. As part of the SIP development process, ADEQ is considering when and if an air quality dispersion modeling analysis needs to be conducted as part of the Minor NSR permitting process.

Comment #1 - Purpose

In the Purpose section of the document, ADEQ makes the following statement:

Part of this duty is to ensure that construction of new stationary sources or modification of existing stationary sources, including construction or modification authorized via Minor new source review (NSR) permitting actions, do not cause or contribute to an exceedance of the national ambient air quality standards (NAAQS) or interfere with the maintenance of the NAAQS.

The phrase "do not cause or contribute to an exceedance of the NAAQS" is not a requirement of an approvable Minor NSR program within a SIP (see 40 CFR 51.160(a)), and should not be used in the Minor NSR context. This phrase implies a site-specific, quantitative determination of the ambient air quality impact from proposed stationary source construction or modification (i.e., dispersion modeling). <u>It is a requirement</u> of the major NSR/PSD permitting program (see 40 CFR 51.165(b)), but not minor NSR. The Minor NSR program must only insure that construction or modification does not cause "interference with attainment or maintenance" of the NAAQS. "Attainment" and "maintenance" specifically refer to the attainment/nonattainment determination process, which is based on monitored air quality concentrations in the area.

The NAAQS Implementation White Paper provided to ADEQ in November 2012 provides an in-depth evaluation of the NAAQS in relation to stationary source permitting. A copy of this White Paper is enclosed with these comments.

Comment #2 – Enhanced Planning Measures and Approaches

AEF supports the ADEQ's use of measures outside of the stationary source permitting process to evaluate the potential for future nonattainment. For example, the pollutant with monitored concentrations closest to the NAAQS in Arkansas is $PM_{2.5}$, and the emissions inventory data shared by ADEQ during the stakeholder process showed that the overwhelming majority of $PM_{2.5}$ emissions are from non-stationary sources, such as wildfires, prescribed burning, and on-road/off-road mobile sources. If $PM_{2.5}$ nonattainment were to occur in Arkansas, emission reductions from these non-stationary sources would have to be an important element in any nonattainment SIP. Given the emission inventory data, reducing or even eliminating $PM_{2.5}$ emissions from stationary sources would be unlikely to have any measurable impact on $PM_{2.5}$ attainment.

Comment #3 – Minor NSR NAAQS Evaluation Flowchart

In January 2014, AEF, EEAA, and other industry representatives met with ADEQ and EPA Region 6 (via a videoconference). A copy of the PowerPoint presentation from this meeting is enclosed.

The purpose of the January 2014 meeting was to discuss NAAQS reviews and modeling for minor NSR under the Arkansas infrastructure SIP. During the meeting, it was explained that the "NAAQS review" for many types of minor NSR under the Arkansas regulations occurs on a programmatic basis, and thus case-by-case NAAQS reviews are not required in these instances. The role of modeling in the NAAQS reviews was also discussed.

Figure 1 shows the various levels of Arkansas NSR permitting and describes how the NAAQS review is satisfied for each type. The EPA did not disagree with the explanation of how the Arkansas minor NSR program functions regarding NAAQS reviews. The second level of the Pyramid ("Reg. 19 and Reg. 26 non-PSD Initial Source Construction") right below "PSD Review" rises to the level of a case-by-case NAAQS review for minor NSR (but not necessarily modeling).

Given that the definition of "major source" under the CAA (and thus Reg. 26) is 100 tons per year (tpy) of a regulated pollutant, AEF recommends that ADEQ's NAAQS Evaluation Flowchart adopt an "SER" (as that term is used in the Flowchart) modeling threshold of 100 tpy or more of any single criteria pollutant, i.e. any pollutant with a NAAQS (except $PM_{2.5}$), calculated on a net emissions increase basis (defined as allowable-to-allowable). The recommended $PM_{2.5}$ threshold is 50 tpy due to existing $PM_{2.5}$ monitored background concentrations near the NAAQS in most areas of the state. The establishment of defined levels where modeling would be conducted would minimize use of a subjective determination that a new or modified source would

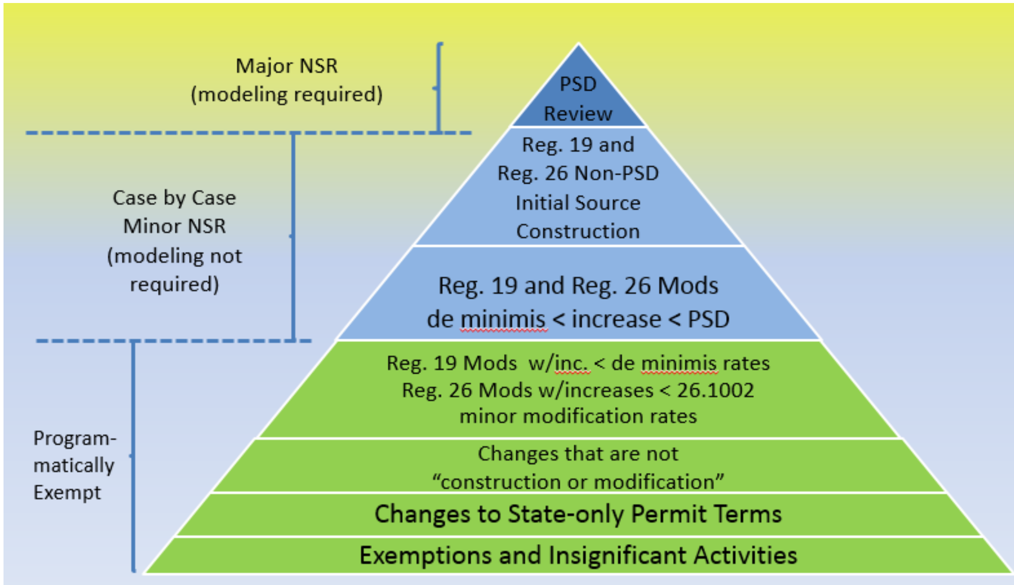

Figure 1. The Arkansas NSR NAAQS Review Pyramid

need a detailed NAAQS review. Emission increases at stationary sources below 100 tpy (or 50 tpy PM2.5) in attainment areas would generally be in the "noise level' of overall area emissions and would not be expected to interfere with maintenance or attainment of the NAAQS. The November 2012 White Paper provides citations to EPA statements in this same vein.

The net emissions increase would be the change in permit allowable emissions (on a pollutant-by-pollutant basis) as a result of the proposed construction or modification requiring a minor NSR permit decision. Only the pollutant(s) with a net emissions increase exceeding the modeling threshold would be subject to a dispersion modeling analysis. For example, if an existing source had facility-wide allowable NO_X emissions of 50 tpy and proposed construction or modification of equipment such that the post-project facility-wide NO_X emissions would exceed 150 tpy, then an NO_2 modeling analysis would be required. Note that the proposed modeling threshold will have no effect on existing PSD major stationary sources, since those large sources have emission increase thresholds much lower than 100 tpy (e.g., 40 tpy NO_X) that subject them to an air quality modeling analysis as part of the major NSR/PSD permit process.

In some cases, an increase of over 100 tpy may not warrant an air quality modeling analysis; for example, in very rural areas or areas where monitored concentrations are far below the NAAQS. AEF recommends that the Flowchart include another decision point for a qualitative analysis. In the event that the tpy thresholds are exceeded, ADEQ may still determine that modeling is not necessary based on an examination of the source type; emission parameters; the emissions increase from the proposed construction or modification relative to the overall emissions (from stationary sources, mobile sources, other anthropogenic sources, and biogenic sources) in this area; population growth and density, and land use in the area; recent and historical ambient monitoring data and trends within this Air Quality Control Region; and meteorological data.

The resulting Flowchart would mean that a NAAQS modeling analysis would never be required if the emissions increases were below the tpy thresholds, but modeling would be required if the increases were above the thresholds unless ADEQ determined that its qualitative examination satisfied the NAAQS review.

AEF does not agree that historical modeling data should be used to identify possible issues with maintaining the NAAQS and/or be a factor in requiring future modeling. Historical NAAQS modeling completed or required by ADEQ was in many cases overly conservative and did not appropriately use the Minor NSR concept of “attainment or maintenance of the NAAQS”.

CONCLUSION

AEF appreciates ADEQ’s efforts in conducting the stakeholder process and in providing ample time and opportunity for stakeholder input. There are still many details to work out in the SIP process, and we look forward to continuing our partnership with ADEQ toward a timely, effective and approvable SIP submittal package.

Sincerely,

Charles M. Miller
Executive Director

From:	Ashley N Ullstrom
To:	Jackson, Tricia
Cc:	Bruce W Moore; David J Long
Subject:	AEP Comments - Minor NSR Permitting Guidance Documant
Date:	Thursday, July 02, 2015 3:40:04 PM

Ms. Jackson,

AEP-Southwestern Electric Power Company appreciates this opportunity to comment on the draft Minor NSR Permitting Guidance Document. Dave Long of AEP Service Corporation has provided the following comments and concerns regarding issues covered in this document on behalf of AEP-SWEPCO:

We note the apparent heavy reliance on modeling in the Draft Document. We recognize that in some cases a predictive model may be the only tool available to attempt to evaluate the impacts from a prospective project, but our experience with air quality models suggests that, especially for small sources, modeling may not be a reliable means of analyzing impacts.

AEP has a long history of working in the air quality modeling community, working with Gaussian, Lagrangian, and Eulerian models. In addition we participate in various forums where current air quality modeling issues are discussed and ideas exchanged. Based on our participation in these forums, we are aware of significant concerns about the ability of the current USEPA preferred model AERMOD to accurately predict ambient impacts. We would reference several studies published by the Indiana Department of Environmental Management, with the most recent version available on their web site at http://www.in.gov/idem/airquality/files/modeling_aermod_case_study.pdf . In addition, our experience suggests that other than for broad indications of average air quality, the use of regional models for determining impacts of individual small sources is probably not going to be useful to the agency.

As a final concern, our long experience in using air quality models suggests that without careful examination of the inputs being used, especially the mixing height values calculated in the meteorology preprocessor, unrealistic results may occur that can needlessly penalize new or existing sources. The problems we have observed are somewhat random in nature, but result in very low mixing heights that can cause unrealistic concentrations for periods of one to several hours. Smaller sources are more likely to be impacted by this issue since they may have cooler discharges coming from low levels that would not be able to penetrate out of the mixed layer being simulated by the model.

We would recommend that ADEQ undertake a study of the performance of any model they would propose to use and compare its performance to air quality monitoring in various areas around the state. Depending on the outcome of this work, the model may prove itself capable for some pollutant and meteorology combinations and not others. Such a study could also demonstrate that the model does work well in the meteorologic regimes and terrain conditions present in Arkansas. Releasing the results of the study to USEPA and the broader modeling community would be useful in showing both the strengths and weaknesses of the suggested tools that ADEQ is considering for use in these analyses. Should this study show that modeling is not good approach, ADEQ should consider enhancing the ambient monitoring available in areas where growth is expected to allow a better evaluation of current ambient conditions can be made and compared to the emissions density present in the region that is impacting the monitor.

If you have any questions regarding these comments, please don't hesitate to contact me.

Thank You,

Ashley Ullstrom
American Electric Power
Air Quality Services
214-777-1282

From:	Gesser, Ryan
To:	Jackson, Tricia; Hemann, Chris
Cc:	Ruppel, Mark S.; Thomas, Alan
Subject:	Arkansas NAAQS SIP Comments
Date:	Thursday, July 02, 2015 2:21:44 PM

Dear Ms. Jackson…

Thank you for allowing the opportunity to provide the following comments on Arkansas' NAAQS SIP guidance…

- GP generally agrees with DEQ's approach to the NAAQS SIP for minor source permitting by promoting planning measures that focus on regional trends in air quality. This emphasis is particularly important for ozone and fine particulate matter, for which the NAAQS are typically most challenging to attain due to the increasing stringency of the standards relative to existing and background conditions, and that are affected by significant emissions of precursor pollutants to a far greater extent than emissions from minor sources and modifications. Items 1 through 4 of "Enhanced Planning Measures and Approaches" appropriately examine statewide air quality by recognizing that emissions from major sources within Arkansas, upwind sources outside the state, and non-road, on-road, non-major, and natural episodic emissions (e.g., forest fires and prescribed burns) are best managed using sound data collected through emissions inventories, monitoring networks, and regional-scale modeling that reflect actual emissions and impacts on air quality.

- Periodic Multi-source Modeling (Item 5) may be a useful tool; however, the guidelines for conducting such modeling should be made clear and generally conform to current (at the time of analysis) EPA modeling guidance, tools, and data resources. GP suggests such analyses be limited to circumstances that suggest a review is necessary, such as when a concentrated number of minor sources locate or increase emissions in a certain area. Otherwise, benefits are more likely realized from regional-scale modeling or cumulative PSD modeling from a major source or modification. GP encourages ADEQ to notify sources considered in multi-source modeling in advance of such analyses being conducted and provide the opportunity to review and refine model inputs that may be important due to changes in emissions factors and other relevant modeling parameters. GP recognizes that EPA guidance provides for use of monitoring in lieu of modeling in limited and constrained circumstances and as a tool to inform, interpret, and validate the modeling analyses because ambient monitors better reflect the inherent variability of emissions, background concentrations (i.e., unmodeled sources), and atmospheric conditions that are critical to characterizing ambient air quality but are approximated (and in the case of variable emissions and background concentrations, ignored) in dispersion models. When used for any purpose, DEQ should make clear that the use of temporary monitors could be used only to identify areas of interest because Federal Reference (or Equivalent) Method ambient monitoring of sufficient quality and duration would be necessary to designate an area as nonattainment. Just as when multi-source modeling is initiated, GP recommends that ADEQ notify sources in advance of temporary monitoring so that sources can provide information that may be meaningful in siting the temporary monitor and potentially collect operational data that might not otherwise be recorded but would assist in interpreting measured concentrations. The preceding comments also apply to "Risk-based Monitoring" (item 6) deployed temporarily on a stand-alone basis or in conjunction with regional-scale or multi-source modeling.

- GP generally supports the evaluation process represented by the Minor NSR NAAQS Evaluation Flowchart and the opportunity to qualitatively assess ambient concentrations without modeling. This approach is appropriate because, by definition, minor sources and emissions increases that are less than significant emission rates are not expected to cause or contribute to NAAQS exceedances or otherwise interfere with maintenance of attainment. DEQ should be aware of, and its guidance flexible enough to incorporate, emerging EPA methods for assessing significant emissions and impacts through new "modeled emission rates for precursors" ("MERPs") that are critical for regional pollutants like ozone and PM2.5 and pending rulemaking to re-establish significant impact levels (and any associated changes to significant emission rates) for PM2.5 and any other criteria pollutants and precursors. GP is concerned that ADEQ suggested the flowchart would be included in the SIP insofar as that may make it difficult by minimizing flexibility to revise the procedures as frequently as may be appropriate in response to changes in federal and state permitting requirements and modeling techniques.

  GP supports the use of net changes in potential emissions relative to significant emission rates (SERs) and qualitative assessment of emission unit characteristics to support a determination that "no further analysis" would be required. GP has seen this approach applied reasonably and successfully in other states that rely on information other than dispersion modeling for minor source permitting. GP is not aware of the referenced "Dispersion Guidance" being available for review, but based on preliminary discussion during the SIP development process and experience in other states, we anticipate that good engineering design and operating practices and vertical exhaust discharges would be examples of acceptable criteria. We urge DEQ to make these criteria available for review and comment before finalizing the policy.

  GP encourages ADEQ to clearly establish the SERs that would be used for such a comparison to avoid confusion among the federal PSD SERs (e.g., 40 CFR 52.21) or other *de minimis* thresholds that may exist in federal and Arkansas regulations. The federal PSD SERs would be an appropriate basis because, again by definition, minor sources and emissions increases that are less than these SERs are not expected to cause or contribute to NAAQS exceedances or otherwise interfere with maintenance of attainment.

  By convention, we recommend against describing "modeled NAAQS *violations*" and instead suggest "potential exceedances" or "high concentrations" because attainment or nonattainment demonstrations can only be made through ambient monitoring with an approved reference or equivalent method.

Please let me know if we can provide and additional information to support the preceding recommendations and comments. Thank you once again for the opportunity to provide comment and we look forward to continuing to participate in the NAAQS SIP development process.

…Ryan

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Ryan A. Gesser, CCM
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Georgia-Pacific LLC
133 Peachtree Street NE
Atlanta, GA 30303
404-652-6933 (office)
404-314-7931 (mobile)
ryan.gesser@gapac.com

From: Hemann, Chris [mailto:HEMANN@adeq.state.ar.us]
Sent: Monday, June 15, 2015 10:40 AM
Subject: NAAQS SIP Development Stakeholders' Feedback Solicited by July 2, 2015

Sent by an external sender

Over the past several months, the ADEQ Air Planning and Permitting staff has conducted meetings with stakeholders to discuss and develop concepts for National Ambient Air Quality Standards State Implementation Plan (NAAQS SIP) development.

After a series of meetings with the NAAQS SIP Development stakeholder "Modeling Subgroup", ADEQ staff and stakeholders have identified a number of proposed approaches and measures that resulted in the development of a NAAQS SIP/Minor NSR permitting guidance draft document attached.

ADEQ's Air Planning Branch is soliciting comments and feedback on the merits and utility of each approach and/or combination of proposed approaches to ensure that minor source construction or modification activities do not cause or contribute to an exceedance or interfere with the maintenance of the NAAQS, and on any other alternative approaches not proposed in this document.

Please provide feedback on the proposed guidance document by July 2, 2015, to Tricia Jackson at jacksonp@adeq.state.ar.us.

http://www.adeq.state.ar.us/air/planning/#naaqsFeedback

http://www.adeq.state.ar.us/air/planning/naaqs_sip/

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 6
1445 ROSS AVENUE, SUITE 1200
DALLAS TX 75202-2733

JUL 02 2015

Ms. Tricia Jackson
Air Division
Arkansas Department of Environmental Quality
5301 Northshore Drive
North Little Rock, Arkansas 72118

RE: EPA Comments on the Draft NAAQS SIP/Minor NSR Permitting Guidance Document

Dear Ms. Jackson:

Thank you for the opportunity to review and provide comments on the draft National Ambient Air Quality Standards (NAAQS) State Implementation Plan (SIP)/Minor New Source Review (NSR) Permitting guidance document. We understand that the Arkansas Department of Environmental Quality (ADEQ) has developed this document to summarize and discuss the various proposed approaches and measures to address Minor NSR NAAQS demonstration requirements that were identified through the NAAQS SIP development stakeholders' process.

The EPA agrees with ADEQ's statement in the guidance document that the Department is required to ensure that the construction of new stationary sources or modification of existing stationary sources, including Minor NSR permitting actions, do not cause or contribute to an exceedance of the NAAQS or interfere with the maintenance of the NAAQS. Our enclosed comments provide feedback on the specific approaches and measures proposed in the document to assist ADEQ in meeting this requirement. We also identify our concerns regarding elements and/or requirements that are not addressed by the draft guidance document.

We look forward to working with you as you address our comments and continue to develop the referenced NAAQS SIP and any associated guidance document(s). Please note that our comments today do not constitute final determinations concerning the approvability of any associated revisions to the Arkansas SIP or the appropriateness of any final guidance document

developed by ADEQ. If you have any questions about the EPA's review of the draft guidance document, please feel free to contact Ms. Ashley Mohr of my staff at (214) 665-7289.

Sincerely,

Jeff Robinson
Section Chief
Air Permits Section

Enclosure

cc: Tammy Harrelson, Arkansas Department of Environmental Quality
Stuart Spencer, Arkansas Department of Environmental Quality

Enclosure

Comments on Enhanced Planning Measures and Approaches

1. The draft guidance document references regional-scale modeling to aid in assessing impacts of projected growth on ambient air quality, as well as, to identify areas that may be sensitive to potential NAAQS exceedances as a result of emission increases. We do not believe that the resolution of a regional-scale modeling analysis provides sufficient information to assess the local-scale ambient impacts, specifically localized concentration gradients or "hotspots", resulting from a single facility or to quantify the cumulative local-scale impacts on ambient air from a group of facilities. While regional modeling may be helpful in certain situations, such as regional air quality planning, this scale of modeling does not have sufficient resolution to appropriately characterize or evaluate local-scale impacts.

2. The draft guidance document discusses the importance of existing monitoring network reviews and the potential measure to utilize temporarily installed monitors in areas identified as at risk of NAAQS exceedances. We agree that the AAQM Network and its annual and 5-year monitoring reviews are important pieces in determining attainment status. We also support ADEQ in taking the initiative to identify areas at risk of exceeding the NAAQS and considering the option to install temporary monitors to assess ambient air quality. Please note, a monitor may be operated temporarily, however, if the monitor is above or near the NAAQS continued NAAQS comparable monitoring may be necessary.

3. Periodic multi-source modeling is discussed as a possible enhanced planning approach in the guidance document. While additional periodic multi-source modeling may be a useful tool to help ensure that cumulative impacts from existing sources and/or the addition of new sources do not result in NAAQS exceedances, it is not clear in the guidance document if this intended to take the place of multi-source modeling that may be required as part of a refined, cumulative NAAQS analysis in support of a Minor NSR permit action. We would like to point out that Minor NSR NAAQS compliance requires that a new or modified stationary source does not cause or contribute to a NAAQS exceedance. Therefore, we do not believe that periodic multi-source modeling should be considered as an alternative to or replacement of ADEQ's ability to require that a Minor NSR permit action include a cumulative modeling analysis, as necessary, to demonstrate that the source will not cause or contribute to a NAAQS exceedance.

4. Regular reviews of the NAAQS SIP are proposed in the guidance document to re-evaluate attainment status issues due to increases in emissions and NAAQS revisions. We agree that these types of reviews are necessary to ensure that the NAAQS SIP requirements continue to ensure compliance with the NAAQS. However, additional information regarding the frequency of these reviews, as well as, how a review of the SIP would be triggered as a result of a revision to a NAAQS should be included within the guidance document and the developed NAAQS SIP.

Comments on Minor NSR Evaluation Flowchart

5. The proposed Minor NSR NAAQS Evaluation Flowchart, as presented, does not contain sufficient information to determine if the proposed approach is protective of the NAAQS for all Minor NSR actions. As discussed below, additional information, including technical supporting documentation, is needed to support the proposed flowchart.

   a. The flowchart indicates that only those projects with a net increase in emissions would trigger potential additional analysis. It is unclear how Minor NSR projects that do not include net emissions increases but do contain other proposed changes (i.e., stack parameter changes) that may impact ambient impacts will be evaluated to ensure compliance with the NAAQS.

   b. The flowchart indicates that net emissions increases will be compared with specific values (SERs) to determine if additional analyses may be required. Additional information regarding the SERs and how they are developed is needed. If this flowchart, or a similar one, were included in the NAAQS SIP, additional technical information to support the SERs would be required to demonstrate the values are protective of the NAAQS and to support approval into the Arkansas SIP.

   c. Similar to Comment 5(a), additional information to support the referenced "historical modeling data," "standard conditions," and "control strategies" would be necessary if the NAAQS SIP submittal contained this evaluation flowchart, or a similar flowchart. The current documentation is not sufficient to determine if the proposed approach is protective of the NAAQS for all Minor NSR actions.

   d. The flowchart and draft guidance document do not clearly describe what would trigger additional refined/quantitative analysis. In addition, the flowchart does not explicitly reference the potential requirement for a case-specific air dispersion modeling. While we agree that an air quality analysis in support of a Minor NSR permit action may not always require a refined/quantitative analysis, such as air dispersion modeling, we do believe that ADEQ should retain the authority to require case-by-case air dispersion modeling when more qualitative or generic approaches are not adequate to demonstrate compliance with the NAAQS and that the guidance document should clearly reference this authority.

Comments on Approaches to Assess Cumulative Impact

6. As stated above in Comment 1, we have concerns regarding the use of a regional modeling to develop growth allocations intended to be protective of the NAAQS with respect to local impacts from emission sources. We agree with ICF and do not believe that regional modeling has sufficient resolution to characterize and evaluate local-scale impacts necessary in developing growth allocations for Minor NSR permitting.

7. While the Emissions-Distance Threshold approach may be useful in specific cases as a way to screen out of a more robust analysis, including air dispersion modeling, we agree that additional information and detailed technical analysis to support any developed distance threshold(s) would be required to determine if the approach was protective of the NAAQS. If the approach is included as part of the NAAQS SIP, this information would need to be included in the SIP submittal to support the proposed revision. This documentation should also clearly describe what type(s) of analysis would be potentially triggered if the threshold value was exceeded.

RICHARD H. MAYS
115 South Third Street
Heber Springs, AR 72543
(501) 362-0055

July 2, 2015

Ms. Tricia Jackson
Air Division
Arkansas Department of
Environmental Quality
5301 Northshore Drive
North Little Rock, AR 72118-5317

Re: Modeling Requirements for New Minor Source Construction Or Modification Activities for Compliance With National Ambient Air Quality Standards (NAAQS)

Dear Ms. Jackson:

I am submitting these brief comments on my understanding of a proposal that has been made by some of the stakeholders in the group formed to discuss and develop concepts for National Ambient Air Quality Standards State Implementation Plan (NAAQS SIP) development.

Of course, without having the benefit of the discussions among the members of the stakeholder's group, it is sometimes difficult to appreciate all of the nuances of a proposal. However, there is one proposal regarding the size of the facilities at which monitoring would be required in the event of remodeling, expansion or construction that seems on its face to be objectionable. That is the proposal that, I understand, would raise the minimum amount of emissions required for modeling to be performed from 40 tons/year to 140 tons/year.

As stated on ADEQ's website, one of ADEQ's missions is to <u>ensure</u> that minor source construction or modification activities do not cause or contribute to an exceedance or interfere with the maintenance of the NAAQS. This is to further <u>ensure</u>, according to the website, that people in <u>all</u> areas of the State, not just those locations with monitors, are protected from exposure to pollutant concentrations exceeding the NAAQS.

If ADEQ were to further limit the universe of facilities at which modeling was required as preface to an expansion, modification or other construction activity by increasing the minimum amount of emissions by the facilities at which the requirement for modeling was triggered, the State's air quality would be less well-monitored, the likelihood of deterioration of the State's air quality would increase, and those abovementioned missions of the agency would be made far more difficult.

I strongly urge that the Department reject any proposal to increase the minimum threshold for imposing the modeling requirements for minor source construction or modification activities.

Sincerely,

/s/ Richard H. Mays

From: McDaniel, Virginia L -FS
To: Jackson, Tricia
Subject: NAAQS SIP - fuel loading in Arkansas
Date: Tuesday, June 16, 2015 9:09:32 AM
Attachments: image001.png
image002.png
image003.png
image004.png

Dear Tricia,

I am writing in regards to the development of the NAAQS SIP. For the past 5 years I have been working with other researchers to document fuel loading in forest communities in Arkansas. We have found fuel loading estimates to be much lower than default fuel loads used by such cover type classifications such as Fuel Characteristic Classification System (FCCS) and Society of American Foresters/Society of Range Management (SAF/SRM) which are used in many smoke emission models (like CONSUME and FOFEM (First Order Fire Effects Model)).

I am wondering if you could tell me what fuel loading estimates you are using or the EPA is using to predict smoke emissions in forest communities in Arkansas and what models are being used to make those predictions? This information is critical to emphasizing why our research on fuel loading in Arkansas is important.

Thanks,
Virginia

Virginia McDaniel
Detailed Wildlife Biologist

Forest Service
Ouachita National Forest, Jessieville-Winona-Fourche Ranger District

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Appendix G

Historical Title V Modeling Results Technical Support Document

Historical Title V Modeling Results Technical Support Document

Beginning in the mid-1990s, the air permits branch of ADEQ conducted dispersion modeling for all Title V permits in accordance with an established protocol. This protocol, among other things, required modeling for criteria pollutants permitted for 100 tpy emissions or greater. Because of the nature of PM_{10} emission sources and background levels, PM_{10} was modeled regardless of permitted emission rates. This modeling protocol is no longer in effect.

The pollutants and averaging times historically modeled were:

Pollutant	Emission Rate	NAAQS Standard ($\mu g/m^3$)	Averaging Time
PM_{10}	Any	50	Annual*
		150	24-hour
SO_2	> 100 tpy	80	Annual*
		1300	3-hour
		365	24-hour*
VOC		0.12	1-hour (ppm)**
CO	> 100 tpy	10,000	8-hour
		40,000	1-hour
NO_x	> 100 tpy	100	Annual

* standard no longer in effect
** not usually modeled

The typical scenario was for ADEQ to conduct an initial screening model. If results were less than 50 % of the NAAQS, no further evaluation was done. If results were greater than 50 %, background was added and the results were compared to the NAAQS. If total concentrations—composed of predicted values plus background—were over the NAAQS, the facility was contacted for refined modeling analysis. The results of this modeling were summarized in the Statement of Basis for each permit issued.

As part of NAAQS SIP development, the Air Permit Branch compiled a list of every Title V issued in Arkansas; this consisted of 365 facilities (2039 permit versions issued). Approximately 240 of the facilities had modeling results. However the remainder of the facilities did not. This is mainly because they fell below the then applicable modeling thresholds. Single or multiple pollutants may have been included in any specific facility modeling. Any ADEQ modeling result that exceeded 50 % of the NAAQS was then identified for further investigation, including the addition of background values.

- There were a total of 3 instances in which the 1-hour or 8-hour CO impacts predicted over 50 % of NAAQS. One was from a source permitted at 1290 pounds per hour (lbs/hr), 80 % of the 8-hour and 65 % of the 1-hour, both of which included background. The other source, 55.8 lbs/hr was 59 % of the 8-hour NAAQS, including background. It does not appear that emission rates below major NSR levels would ever indicate a NAAQS compliance issue
- There were eight instances of the 3-hour SO_2 impacts predicted of 50 % of the NAAQS. Except for the case of some emergency diesel generators (LM Windpower) and the TEC unit at Riceland, emission rates modeled were in excess of 600 lb/hr. The LM scenario is an unrealistic event and the Riceland results were less than 52 % of the NAAQS. It does not appear that emission rates below major NSR levels would ever indicate a 3-hour SO_2 NAAQS compliance issue.
- Annual NO_x impacts approached the NAAQS on multiple occasions. There is no consistency or pattern of emission rates vs impact, however, the impacts do not approach 90 % of the NAAQS until around an equivalent emission rate of 250 tpy. It does not appear that emission rates below major NSR levels would ever indicate an annual NO_2 NAAQS compliance issue.
- PM_{10} – There is no correlation between PM_{10} emission rates and predicted impacts. This is probably due to the wide variation in PM emission sources and the tendency of these sources to be fugitive or otherwise with minimal dispersion. These types of sources are also the most difficult to model; emission rates are questionable and the performance of the actual model is questionable in predicting these impacts. Past permit review has resulted in some control requirements. The most common has been controlling fugitive dust from roads, but there have been other controls (Dust control nozzles, baghouses on PM sources, etc.). No generalization can be made about emission rates and 24-hour PM_{10} NAAQS.

Other issues based on historical ADEQ modeling

- 1-hour standards for NO_2 and SO_2 NAAQS have not been evaluated in minor NSR actions. Because of the much stricter 1-hour values and the shorter averaging times, any comparison to past modeling would not suffice to assure compliance with these NAAQS.
- Any modeling done by ADEQ is a screening tool. While the model may be able to simulate relative impacts, this requires considerable effort in obtaining source data, meteorological data, background and surround facility data and other parameters. ADEQ modeling is only the first level of an analysis that can be extremely complicated, time consuming and costly.

- Even with all the modeling conducted by ADEQ and facilities, the occurrences of emission reductions to demonstrate compliance with NAAQS were rare.

Notes: Data is extracted from the modeling section of the latest Statement of Basis with such data
Data only exists for pollutants above ADEQ modeling thresholds
If no emissions were above the modeling thresholds, standard language was included indicating modeling was not warranted
New Title V facilities permitted after Act 1302 either have no modeling data or the standard language about the ACT

AFIN	Facility Name	Facility City	NAICS	Permit Number	Status	Most Recent Modeling Results
01-00008	RICELAND FOODS, INC/SOY DIV.	STUTTGART	311224	0908-AOP-R0	V	
				0908-AOP-R1	V	
				0908-AOP-R2	V	
				0908-AOP-R3	V	
				0908-AOP-R4	V	
				0908-AOP-R5	V	
				0908-AOP-R6	V	
				0908-AOP-R7	A	
				0908-AOP-R8	P	

Pollutant	Emission Rate (lb/hr)	NAAQS Standard (μg/m³)	Averaging Time	Highest Concentration (μg/m³)	% of NAAQS
PM_{10}	50.2	150	24-Hour	148.102861	98.74%
SO_2	53.6	80	Annual	22.42251 (2010)	28.10%
		1300	3-Hour	673.11173	51.80%
		365	24-Hour	167.66471	50.00%
CO	49.3	10,000	8-Hour	73.5	0.74%
		40,000	1-Hour	150.7	0.38%
NO_x	132.4	100	Annual	21.59864 (2010)	21.60%
Pb	N/A	0.15	Rolling 3-month Period over 3 years (not to be exceeded in any 3 month period)	N/A	--

AFIN	Facility Name	Facility City	NAICS	Permit Number	Status	Most Recent Modeling Results
01-00022	BELLEVILLE SHOE SOUTH, INC.	DEWITT	316210	2079-AOP-R0	V	Examination of the source type, location, plot plan, land use, emission parameters, and other available information indicate that modeling is not warranted at this time
				2079-AOP-R1	V	
01-00228	RICELAND-ASH STORAGE SITE	STUTTGART	311222	2312-AOP-R0	V	Pursuant to Act 1302 of the Regular Session of the 89th General Assembly of the State of Arkansas, no dispersion modeling was performed by ADEQ because it was not voluntarily proposed and agreed to by the facility. No other information was submitted by the applicant. Criteria
				2312-AOP-R1	A	
02-00005	GEORGIA-PACIFIC PLYWOOD/STUD	CROSSETT	321219	0736-AOP-R0	V	
				0736-AOP-R1	V	

Pollutant	Emission Rate[1] (lb/hr)	NAAQS Standard (μg/m³)	Averaging Time	Background (μg/m³)	Highest Concentration[2] (μg/m³)	% of NAAQS

				0736-AOP-R10	P
				0736-AOP-R2	V
				0736-AOP-R3	V
				0736-AOP-R4	V
				0736-AOP-R5	V
				0736-AOP-R6	V
				0736-AOP-R7	V
				0736-AOP-R8	V
				0736-AOP-R9	A

PM_{10}	80.4	150	24-Hour	37	98.19	90.13
		80	Annual	5.2	12.76	22.45
SO_2	16	1300	3-Hour	39.3	251.35	22.58
		365	24-Hour	13.1	107.9	33.15
CO	460.5	10,000	8-Hour	1717.8	606.94	23.25
		40,000	1-Hour	2863	1230.05	10.23
NO_x	127.5	100	Annual	16.196	25.37	41.57
Pb	0.04	0.15	Rolling 3-month Period over 3 years (not to be exceeded in any 3 month period)		0.01625	10.84

[1] Emissions contributed by the Plywood facility only

[2] Total emission from the entire complex were included in the modeled results

The plywood facility shares the site with a paper and chemical facility also owned by GP. The emissions from the entire complex was modeled in order to demonstrate NAAQS for criteria pollutants. MET data from Shreveport from 2005 to 2009 was used for this model.

02-00013	GEORGIA-PACIFIC, LLC	CROSSETT	322110	0579-AOP-R14	N
				0597-AOP-R0	V
				0597-AOP-R1	V
				0597-AOP-R10	V
				0597-AOP-R11	V
				0597-AOP-R12	V
				0597-AOP-R13	V
				0597-AOP-R14	V
				0597-AOP-R15	V
				0597-AOP-R16	A
				0597-AOP-R2	V
				0597-AOP-R3	V
				0597-AOP-R4	V
				0597-AOP-R5	V
				0597-AOP-R6	V
				0597-AOP-R7	V
				0597-AOP-R8	V
				0597-AOP-R9	V

Pollutant	Emission Rate (lb/hr)	NAAQS Standard ($\mu g/m^3$)	Averaging Time	Background ($\mu g/m^3$)	Highest Concentration ($\mu g/m^3$)	% of NAAQS
PM_{10}	332.4	150	24-Hour	37	103.027	93.36
SO_2	1,539.80	80	Annual	5.2	12.76	22.45
		1300	3-Hour	39.3	251.35	22.58
		365	24-Hour	13.1	107.9	33.15
CO	2,649.60	10,000	8-Hour	1717.8	606.94	23.25
		40,000	1-Hour	2863	1230.05	10.23
NO_x	1,353.30	100	Annual	16.196	25.37	41.57
Pb	0.22	0.15	Rolling 3-month Period, NTBE		0.046	30.67

02-00028	GEORGIA-PACIFIC CHEMICALS, LLC	CROSSETT	325180	1177-AOP-R0	V
				1177-AOP-R1	V
				1177-AOP-R10	V
				1177-AOP-R11	V
				1177-AOP-R12	A
				1177-AOP-R13	P
				1177-AOP-R2	V

Pollutant	Emission Rate (lb/hr)	NAAQS Standard ($\mu g/m^3$)	Averaging Time	Highest Concentration ($\mu g/m^3$)	% of NAAQS
PM_{10}	131.4	50	Annual	15.9	32%
		150	24-hour	40.15	27%
SO_2	26.2	80	Annual	1.17	1.50%
		1,300	3-hour	31.9	2.50%
		365	24-hour	8.54	2.30%
NO_X	46.6	100	Annual	1.22	1.20%
CO	25.2	10,000	8-hour	16.478	0.10%
		40,000	1-hour	41.73	0.10%

				1177-AOP-R3	V	
				1177-AOP-R4	V	
				1177-AOP-R5	V	
				1177-AOP-R6	V	
				1177-AOP-R7	V	
				1177-AOP-R8	V	
				1177-AOP-R9	V	
02-00030	RAPID DIE & MOLDING	HAMBURG		1082-AOP-R0	V	
				1082-AOP-R1	V	Examination of the source type, location, plot plan, land use, emission parameters, and other available information indicate that modeling is not warranted at this time.
02-00065	ENABLE MISS. RIVER/ FTN. HILL	HAMBURG	486210	1433-AOP-R0	V	
				1433-AOP-R1	V	
				1433-AOP-R2	V	
				1433-AOP-R3	V	
				1433-AOP-R4	V	
				1433-AOP-R5	A	
				1433-AOP-R6	V	
				1433-AOP-R7	P	

Pollutant	Emission Rate (lb/hr)	NAAQS Standard (μg/m^3)	Averaging Time	Highest Concentration (μg/m^3)	% of NAAQS
PM_{10}	1	50	Annual	*20.2	40.4
		150	24-Hour	*28.1	18.7
SO_2	< 100 tpy	80	Annual	N/A	N/A
		1300	3-Hour	N/A	N/A
		365	24-Hour	N/A	N/A
VOC	N/A	0.12	1-Hour (ppm)	N/A	N/A
CO	306.8	10,000	8-Hour	1436.5	14.4
		40,000	1-Hour	2814.2	7
NO_x	257.7	100	Annual	64.17	64.2
Pb	N/A	0.15	Rolling 3-month Period over 3 years (not to be exceeded in any 3 month period)	N/A	N/A

03-00002	BAXTER HEALTHCARE-MT HOME	MOUNTAIN HOME	326113	0544-AOP-R0	V	
				0544-AOP-R1	V	
				0544-AOP-R2	V	
				0544-AOP-R3	V	Examination of the source type, location, plot plan, land use, emission parameters, and other available information indicate that modeling is not warranted at this time.
				0544-AOP-R4	V	
				0544-AOP-R5	V	
03-00081	BASS CAT BOATS	MOUNTAIN HOME	336612	1624-AOP-R0	V	
				1624-AOP-R1	V	
				1624-AOP-R2	V	
				1624-AOP-R3	V	

Pollutant	Emission Rate (lb/hr)	NAAQS Standard (μg/m^3)	Averaging Time	Highest Concentration (μg/m^3)	% of NAAQS
PM_{10}	0.2	50	Annual	0.47	0.94
		150	24-Hour	5.29	3.53

				1624-AOP-R4	A	
03-00082	CHAMPION BOATS, INC	MOUNTAIN HOME		1041-AOP-R0	V	No info
03-00111	VENOM BOATS, INC	MOUNTAIN HOME		1650-AOP-R0	V	Examination of the source type, location, plot plan, land use, emission parameters, and other available information indicate that modeling is not warranted at this time
				1650-AOP-R1	V	
04-00100	GLAD MANUFACTURING COMPANY	ROGERS	326113	0407-AOP-R0	V	Examination of the source type, location, plot plan, land use, emission parameters, and other available information indicate that modeling is not warranted at this time
				0407-AOP-R1	V	
				0407-AOP-R2	V	
				0407-AOP-R3	V	
				0407-AOP-R4	A	
04-00107	SWEPCO FLINT CREEK POWER PLNT	GENTRY	221112	0276-AOP-R0	V	
				0276-AOP-R1	V	
				0276-AOP-R2	V	
				0276-AOP-R3	V	
				0276-AOP-R4	V	
				0276-AOP-R5	V	
				0276-AOP-R6	V	
				0276-AOP-R7	A	
04-00111	TGRC-THE GATES CORP.	SILOAM SPRINGS	326220	0378-AOP-R0	V	Examination of the source type, location, plot plan, land use, emission parameters, and other available information indicate that modeling is not warranted at this time.
				0378-AOP-R1	V	

Pollutant	Emission Rate (lb/hr)	NAAQS Standard (μg/m^3)	Averaging Time	Highest Concentration (μg/m^3)	% of NAAQS
PM_{10}	827.96	150	24-Hour	119.1[a]	79.4
SO_2	7,590.70	80	Annual	6	7.4
		1300	3-Hour	201	15.4
		365	24-Hour	59	16.2
CO	828.5	10,000	8-Hour	39	0.4
		40,000	1-Hour	189	0.5
NO_x	4,454.90	100	Annual	15	15
Pb	0.07	0.15	Rolling 3-month Period over 3 years (not to be exceeded in any 3 month period)	0.00012	0.08

				0378-AOP-R2	V	
				0378-AOP-R3	V	
				0378-AOP-R4	V	
				0378-AOP-R5	V	
04-00120	KENNAMETAL, INC.	ROGERS	333515	0842-AOP-R0	V	Examination of the source type, location, plot plan, land use, emission parameters, and other available information indicate that modeling is not warranted at this time
				0842-AOP-R1	V	
				0842-AOP-R2	V	
				0842-AOP-R3	V	
				0842-AOP-R4	V	
				0842-AOP-R5	V	
				0842-AOP-R6	A	
04-00213	PREFORMED LINE PRODUCTS	ROGERS	335932	2232-AOP-R0	A	RESERVED
04-00246	FILMPRINT, INC.	GENTRY	326113	1097-AOP-R0	V	
04-00247	MIDAMERICA CABINETS INC	GENTRY	337110	1035-AOP-R0	V	(see table below)
				1035-AOP-R1	V	
				1035-AOP-R2	V	
				1035-AOP-R3	V	
				1035-AOP-R4	A	
				1035-AOP-R5	P	
04-00255	SUPERIOR INDUST.INTERNAT'L AR	ROGERS	331524	1304-AOP-R0	V	Examination of the source type, location, plot plan, land use, emission parameters, and other available information indicate that modeling is not warranted at this time
				1304-AOP-R1	V	
				1304-AOP-R2	V	
				1304-AOP-R3	V	
				1304-AOP-R4	V	

Pollutant	Emission Rate (lb/hr)	NAAQS Standard ($\mu g/m^3$)	Averaging Time	Highest Concentration ($\mu g/m^3$)	% of NAAQS
PM_{10}	4	150	24-Hour	7.42769	4.95%
SO_2	--	80	Annual	--	--
		1300	3-Hour	--	--
		365	24-Hour	--	--
VOC	206.8	0.12	1-Hour (ppm)	--	--
CO	--	10,000	8-Hour	--	--
		40,000	1-Hour	--	--
NO_x	--	100	Annual	--	--
Pb	--	0.15	Rolling 3-month Period over 3 years (not to be exceeded in any 3 month period)	--	--

04-00313	HENDREN PLASTICS	GRAVETTE	326140	1290-AOP-R0	A	Examination of the source type, location, plot plan, land use, emission parameters, and other available information indicate that modeling is not warranted at this time
04-00322	FM STRUCTURAL PLASTICS TECH	ROGERS	326113	1349-AOP-R0	V	Examination of the source type, location, plot plan, land use, emission parameters, and other available information indicate that modeling is not warranted at this time
				1349-AOP-R1	V	
05-00022	WABASH WOOD PRODUCTS, INC.	HARRISON	321918	1138-AOP-R0	V	(see table below)
05-00066	THORPE PLANT SERVICES, INC.	HARRISON	336612	1093-AOP-R0	V	
				1093-AOP-R1	V	
				1093-AOP-R2	V	
				1093-AOP-R3	V	
				1093-AOP-R4	V	
				1093-AOP-R5	V	

Pollutant	Emission Rate (lb/hr)	NAAQS Standard (μg/m^3)	Averaging Time	Highest Concentration (μg/m^3)	% of NAAQS
PM_{10}	52.9	50	Annual	12.09	24%
		150	24-hour	135	90%
SO_2	1.5	80	Annual		0%
		365	24-hour		0%
NO_X	3.9	100	Annual		0%
CO	51.9	10,000	8-hour	171.3	2%
		40,000	1-hour	325.9	1%
VOC	70.4	0.12	1-hour (ppm)	0.015	13%

				1093-AOP-R6	V	Examination of the source type, location, plot plan, land use, emission parameters, and other available information indicate that modeling is not warranted at this time
				1093-AOP-R7	A	
06-00001	OUACHITA HARDWOOD FLOORING	WARREN		1676-AOP-R0	V	
				1676-AOP-R1	V	
				1676-AOP-R2	V	
				1676-AOP-R3	V	
				1676-AOP-R4	V	

Pollutant	Emission Rate (lb/hr)	Guideline Concentration	Modeled Concentration	Pass ?
VOC	117.2	(.25)*(0.12) 1-hour = 0.03 ppm	0.0113	Yes
PM/PM_{10}	33.3	(.50) *150 24-hour = 75 µg/m^3	61.3c[1]	Yes
		(.50) *50 annual = 25 µg/m^3	1.99	Yes

06-00004	POTLATCH LAND & LUMBER, LLC	WARREN	321113	0356-AOP-R0	V	
				0356-AOP-R1	V	
				0356-AOP-R2	V	
				0356-AOP-R3	V	
				0356-AOP-R4	V	
				0356-AOP-R5	V	
				0356-AOP-R6	V	
				0356-AOP-R7	V	
				0356-AOP-R8	V	
				0356-AOP-R9	A	

Pollutant	Emission Rate (lb/hr)	NAAQS Standard (µg/m^3)	Averaging Time	Highest Concentration (µg/m^3)	% of NAAQS
PM_{10}	41.3	150	24-Hour	129.6*	86.40%
SO_2	N/A	80	Annual		
		1300	3-Hour		
		365	24-Hour		
CO	92.9	10,000	8-Hour	181	1.81%
		40,000	1-Hour	312	0.78%
NO_x	88.9	100	Annual	94.9**	94.90%
Pb	N/A	0.15	Rolling 3-month Period over 3 years (not to be exceeded in any 3 month period)		

06-00014	ARMSTRONG HARDWOOD FLOORING	WARREN	321918	0427-AOP-R0	V	
				0427-AOP-R1	V	
				0427-AOP-R10	V	
				0427-AOP-R11	A	
				0427-AOP-R2	V	
				0427-AOP-R3	V	
				0427-AOP-R4	V	
				0427-AOP-R5	V	
				0427-AOP-R6	V	
				0427-AOP-R7	V	
				0427-AOP-R8	V	
				0427-AOP-R9	V	
				0427-AOP-R10	V	
				0427-AOP-R11	A	

Pollutant	Emission Rate (lb/hr)	NAAQS Standard (µg/m^3)	Averaging Time	Highest Concentration (µg/m^3)	% of NAAQS
PM_{10}	29.2	50	Annual	9.95	19.9
		150	24-Hour	48.35	32.2
CO	23.1	10,000	8-Hour	73.3	0.733
		40,000	1-Hour	91.1	0.91
NOx	40	100	Annual	8.8	8.8

07-00033	ESTERLINE ARMTEC CNTERMEASURE	EAST CAMDEN	325998	1865-AOP-R1	V	
				1865-AOP-R2	V	

Pollutant	Emission Rate (lb/hr)	NAAQS Standard (µg/m^3)	Averaging Time	Highest Concentration (µg/m^3)	% of NAAQS

				1865-AOP-R3	V
				1865-AOP-R4	V
				1865-AOP-R5	V

PM_{10}	12	150	24-Hour	69.48	46%
		80	Annual	0.68	0.85%
SO_2	0.5	1300	3-Hour	177.65	14%
		365	24-Hour	22.72	7%
CO	4.3	10,000	8-Hour	239.76	3%
		40,000	1-Hour	953.85	3%
NO_x	2.6	100	Annual	4.46	5%

				1865-AOP-R6	V
				1865-AOP-R7	A
07-00035	AEROJET ROCKETDYNE, INC	EAST CAMDEN	332993	0617-AOP-R0	V
				0617-AOP-R1	V
				0617-AOP-R10	V
				0617-AOP-R11	V
				0617-AOP-R12	A
				0617-AOP-R13	P
				0617-AOP-R2	V
				0617-AOP-R3	V
				0617-AOP-R4	V
				0617-AOP-R5	V
				0617-AOP-R6	V
				0617-AOP-R7	V
				0617-AOP-R8	V
				0617-AOP-R9	V

Examination of the source type, location, plot plan, land use, emission parameters, and other available information indicate that modeling is not warranted at this time

				0617-AOP-R10	V
07-00212	GEORGIA-PACIFIC WOOD PRODUCTS	FORDYCE	321219	1803-AOP-R0	V
				1803-AOP-R1	V
				1803-AOP-R10	V
				1803-AOP-R11	V
				1803-AOP-R12	V
				1803-AOP-R13	V
				1803-AOP-R14	A
				1803-AOP-R2	V
				1803-AOP-R3	V

Pollutant	Emission Rate (lb/hr)	NAAQS Standard (µg/m^3)	Averaging Time	Highest Concentration (µg/m^3)	% of NAAQS
*PM_{10}	136.8	150	24-Hour	133	88.7
SO_2	11.2	80	Annual	0.09	0.12
		1300	3-Hour	1.75	0.14
		365	24-Hour	0.58	0.16
CO	226	10,000	8-Hour	137.12	1.37
		40,000	1-Hour	267.35	0.67
NO_x	143.9	100	Annual	7.54	7.54

*North Little Rock background values 2008 were used, since there are few PMIO

				1803-AOP-R4	V	monitors in Arkansas, the monitors from the urban areas (Little Rock) overestimate the background conditions in rural areas.
				1803-AOP-R5	V	
				1803-AOP-R6	V	
				1803-AOP-R7	V	
				1803-AOP-R8	V	
				1803-AOP-R9	V	
07-00216	NATIONAL TECHNICAL SERVICES	EAST CAMDEN		1911-AOP-R0	V	Examination of the source type, location, plot plan, land use, emission parameters, and other available information indicate that modeling is not warranted at this time
09-00053	LIVINGSTON PECAN & METAL INC	LAKE VILLAGE	331314	2047-AOP-R0	V	Examination of the source type, location, plot plan, land use, emission parameters, and other available information indicate that modeling is not warranted at this time
10-00004	REYNOLDS METALS-GUM SPRINGS	ARKADELPHIA	562211	1016-AOP-R0	V	
				1016-AOP-R1	V	
				1016-AOP-R2	V	
				1016-AOP-R3	V	
				1016-AOP-R4	V	
				1016-AOP-R5	V	
				1016-AOP-R6	V	
				1016-AOP-R7	V	
				1016-AOP-R8	A	
				1016-AOP-R9	P	
10-00005	GP WOOD PRODUCTS SOUTH, LLC	GURDON	321113	0463-AOP-R0	V	
				0463-AOP-R1	V	

Pollutant	Emission Rate (lb/hr)	NAAQS Standard (μg/m3)	Averaging Time	Highest Concentration (μg/m3)	% of NAAQS
PM_{10}	13.9	150	24-Hour	69.3	46.2
	427.9* 757.6**	80	Annual	3.97* 5.49**	4.96 6.86
SO_2		1300	3-Hour	116.65* 206.55**	8.97 15.88
		365	24-Hour	38.05* 67.35**	10.42 18.45
CO	24.8	10,000 40,000	8-Hour 1-Hour	20.4 12.6	0.2 0.032
NO_X	112.6	100	Annual	44.14+11***	55.14
Pb	0.1	0.15	Rolling 3-month Period over 3 years (not to be exceeded in any 3 month period)	0.002	1.4

Pollutant	Emission Rate (lb/hr)	NAAQS Standard (μg/m3)	Averaging Time	Highest Concentration (μg/m3)*	% of NAAQS
PM_{10}	76.2**	150	24-Hour	138.6	92.40%

				0463-AOP-R2	V	
				0463-AOP-R3	V	
				0463-AOP-R4	V	
				0463-AOP-R5	V	
				0463-AOP-R6	V	
				0463-AOP-R7	V	(modeling table below)

SO_2	1.7	80	Annual	-----	
		1300	3-Hour	-----	
		365	24-Hour	-----	
CO	451**	10,000	8-Hour	1717.8	17%
		40,000	1-Hour	2175.9	5%
NO_x	115.5**	100	Annual	42.86	43%
Pb	0.016**	0.15	Rolling 3-month Period over 3 years (not to be exceeded in any 3 month period)	0.002	1.30%

				0463-AOP-R8	A	
				0463-AOP-R9	P	
10-00070	ANTHONY TIMBERLANDS-BEIRNE	BEIRNE	321113	1355-AOP-R0	V	
				1355-AOP-R1	V	
				1355-AOP-R2	V	(modeling table below)
				1355-AOP-R3	A	
				1355-AOP-R4	P	

Pollutant	Emission Rate (lb/hr)	NAAQS Standard (μg/m^3)	Averaging Time	Highest Concentration (μg/m^3)	% of NAAQS
PM_{10}	24.6*	150	24-Hour	120.8	80.5
SO_2	N/A	80	Annual		
		1300	3-Hour		
		365	24-Hour		
CO	34.2	10,000	8-Hour	82.1	0.82
		40,000	1-Hour	131	0.33
NO_x	N/A	100	Annual		
Pb	0.00274	0.15	Rolling 3-month Period over 3 years (not to be exceeded in any 3 month period)	0.00088	0.59

10-00115	ENABLE GAS TRANS/BEIRNE	GURDON	486210	1451-AOP-R0	V	(modeling table below)
				1451-AOP-R1	V	
				1451-AOP-R2	V	

Pollutant	**Emissions (lb/hr)**	**Averaging Period**	**NAAQS (Fg/m3)**	**Modeled Concentration (Fg/m3)**	**Percent of NAAQS**
PM/PM_{10}	<100 tpy, therefore no modeling performed				
CO	65.5	8-hour	10,000	232.3	2.30%
		1-hour	40,000	331.8	0.80%
NO_X	314	Annual	100	37.5	37.50%

11-00067	L.A. DARLING CO	PIGGOTT	337122	0758-AOP-R0	V	
				0758-AOP-R1	V	
				0758-AOP-R2	V	
				0758-AOP-R3	V	Modeling is not required.
				0758-AOP-R4	N	
11-00070	PINNACLE FRAMES & ACCENTS, INC	PIGGOTT	321219	0784-AOP-R0	V	
				0784-AOP-R1	V	
				0784-AOP-R2	V	
				0784-AOP-R3	V	
				0784-AOP-R4	V	Examination of the source type, location, plot plan, land use, emission parameters, and other available information indicate that modeling is not warranted at this time

11-00075	PINNACLE FRAMES & ACCENTS #2	PIGGOTT	321219	0822-AOP-R0	V	Examination of the source type, location, plot plan, land use, emission parameters, and other available information indicate that modeling is not warranted at this time
				0822-AOP-R1	V	
				0822-AOP-R2	V	
				0822-AOP-R3	V	Examination of the source type, location, plot plan, land use, emission parameters, and other available information indicateS that modeling is not warranted at this time
				0822-AOP-R4	V	
12-00074	CALICO TRAILER MFG	QUITMAN	336214	1412-AOP-R0	V	
				1412-AOP-R1	V	
				1412-AOP-R2	V	
				1412-AOP-R3	V	
12-00445	DESOTO GATHERING/W CUTTHROAT 2	QUITMAN	486210	2203-AOP-R0	V	(see table below)
				2203-AOP-R1	V	
				2203-AOP-R2	A	

Pollutant	Emission Rate (lb/hr)	NAAQS Standard (μg/m^3)	Averaging Time	Highest Concentration (μg/m^3)	% of NAAQS
PM_{10}	3.5	50	Annual	21.4	14.2
		150	24-Hour	3.2	2.1
CO	44.4	10,000	8-Hour	74.3	0.7
		40,000	1-Hour	203	0.5
NO_x	54	100	Annual	7.2	7.2

12-00478	DESOTO GATHERING/MIDGE CPF-5	HEBER SPRINGS	211111	2350-AOP-R1	A	Reserved.
14-00004	WHITE ROCK OIL & GAS,LLC/MSPU	MAGNOLIA	211111	0871-AOP-R0	V	(see table below)
				0871-AOP-R1	V	
				0871-AOP-R2	V	
				0871-AOP-R3	V	
				0871-AOP-R4	A	

Pollutant	Emission Rate (lb/hr)	NAAQS Standard (μg/m^3)	Averaging Time	Highest Concentration (μg/m^3)	% of NAAQS
SO_2	642.7*	80	Annual	11.8	15%
		1300	3-Hour	330	25%
		365	24-Hour	117	32%

14-00008	WEYERHAEUSER NR CO	EMERSON	321113	0828-AOP-R0	V	(see table below)
				0828-AOP-R1	V	
				0828-AOP-R10	A	
				0828-AOP-R2	V	
				0828-AOP-R3	V	
				0828-AOP-R4	V	
				0828-AOP-R5	V	

Pollutant	**Emission Rate (lb/hr)**	**NAAQS Standard (μg/m^3)**	**Averaging Time**	**Highest Concentration (μg/m^3)**	**% of NAAQS**
PM_{10}	80.5	50	Annual	40.5	81%
		150	24-hour	132	88%
SO_2	7.9	Below 100 tpy			
NO_X	167.1	100	Annual	1.76	1.76%
VOC*	214.9	0.12	1-hour (ppm)	0.01572	<0.1%
CO	350.5	10,000	8-hour	412.4	<0.1%
		40,000	1-hour	1445	<0.1%

				0828-AOP-R6	V
				0828-AOP-R7	V
				0828-AOP-R8	V
				0828-AOP-R9	V
14-00028	ALBEMARLE-SOUTH	MAGNOLIA	325180	0762-AOP-R0	V
				0762-AOP-R1	V
				0762-AOP-R10	V
				0762-AOP-R11	V
				0762-AOP-R12	V
				0762-AOP-R13	V
				0762-AOP-R14	V
				0762-AOP-R15	V
				0762-AOP-R16	V
				0762-AOP-R17	V
				0762-AOP-R18	V
				0762-AOP-R19	V
				0762-AOP-R2	V
				0762-AOP-R20	V
				0762-AOP-R21	V
				0762-AOP-R22	V
				0762-AOP-R23	A
				0762-AOP-R3	V
				0762-AOP-R4	V
				0762-AOP-R5	V
				0762-AOP-R6	V
				0762-AOP-R7	V
				0762-AOP-R8	V
				0762-AOP-R9	V

Pollutant	Emission Rate(lb/hr)	NAAQS Standard ($\mu g/m^3$)	Averaging Time	Highest Concentration ($\mu g/m^3$)*	% of NAAQS
PM_{10}	29.68	50	Annual	31	62.00%
		150	24-hour	78.9	52.60%
SO_2	756.6	80	Annual	20.1	25.20%
		1,300	3-hour	1,178.50	90.70%
		365	24-hour	330	90.50%
NO_X	136.5	100	Annual	31.2	31.20%
VOC**	410.63	0.12	1-hour (ppm)	0.0191	16.00%
CO	215.48	10,000	8-hour	4531	45.30%
		40,000	1-hour	9933	24.80%

14-00037	DELTIC TIMBER-WALDO	WALDO	321113	0697-AOP-R0	V
				0697-AOP-R1	V
				0697-AOP-R10	V
				0697-AOP-R11	V
				0697-AOP-R12	V
				0697-AOP-R13	V
				0697-AOP-R14	V
				0697-AOP-R15	V
				0697-AOP-R16	A
				0697-AOP-R17	P
				0697-AOP-R2	V
				0697-AOP-R3	V
				0697-AOP-R4	V
				0697-AOP-R5	V

Pollutant	Emission Rate (lb/hr)	NAAQS Standard ($\mu g/m^3$)	Averaging Time	Highest Concentration ($\mu g/m^3$)	% of NAAQS
PM_{10}*	27.9	50	Annual	41.3	82.60%
		150	24-hour	133.3	88.90%
NO_X	64.1	100	Annual	10.7	10.70%
CO	100.8	10,000	8-hour	185	1.85%
		40,000	1-hour	225	<1%

				0697-AOP-R6	V
				0697-AOP-R7	V
				0697-AOP-R8	V
				0697-AOP-R9	V

14-00040	AMFUEL-MAGNOLIA	MAGNOLIA	326291	0982-AOP-R0	V
				0982-AOP-R1	V
				0982-AOP-R2	V
				0982-AOP-R3	V
				0982-AOP-R4	V
				0982-AOP-R5	A

Pollutant	Emission Rate(lb/hr)	NAAQS Standard(µg/m^3)	Averaging Time	Highest Concentration(µg/m^3)	% of NAAQS
PM_{10}	0.4	150	24-Hour	40.9	27%
		80	Annual	N/A	N/A
SO_2	0.3	1300	3-Hour	N/A	N/A
		365	24-Hour	N/A	N/A
CO	3.8	10,000	8-Hour	N/A	N/A
		40,000	1-Hour	N/A	N/A
NO_X	4.4	100	Annual	N/A	N/A
Pb	N/A	0.15	Rolling 3-month Period over 3 years (not to be exceeded in any 3 month period)	N/A	N/A

14-00046	SAPA EXTRUSIONS, INC	MAGNOLIA	332321	0576-AOP-R0	V
				0576-AOP-R1	V
				0576-AOP-R2	V
				0576-AOP-R3	V
				0576-AOP-R4	V
				0576-AOP-R5	V
				0576-AOP-R6	V

Pollutant	Emission Rate (lb/hr)	NAAQS Standard (µg/m^3)	Averaging Time	Highest Concentration (µg/m^3)	% of NAAQS
PM10	48.3	50	Annual	0.14	0.28
		150	24-Hour	2.89	1.9
		80	Annual	0.0015	0.002
SO_2	1.7	1300	3-Hour	0.283	0.02
		365	24-Hour	0.085	0.02
CO	9	10,000	8-Hour	1.17	0.01
		40,000	1-Hour	2.43	0.006
NO_x	45.3	100	Annual	0.13	0.13

14-00124	PETRO-CHEM OPERATING	MAGNOLIA	211111	1677-AOP-R0	V
				1677-AOP-R1	V
				1677-AOP-R2	V
				1677-AOP-R3	A

Pollutant	Emission Rate (lb/hr)	NAAQS Standard (µg/m^3)	Averaging Time	Highest Concentration (µg/m^3)	% of NAAQS
PM_{10}	1.5	50	Annual	36.81*	74
		150	24-Hour	67.55*	45
		80	Annual	7.95	10
SO_2	43.3	1300	3-Hour	78.84	6
		365	24-Hour	33.15	9

14-00145	CMC STEEL-ARKANSAS	MAGNOLIA	331221	0928-AOP-R0	V	Examination of the source type, location, plot plan, land use, emission parameters, and other available information indicate that modeling is not warranted at this time
				0928-AOP-R1	V	
				0928-AOP-R2	V	
				0928-AOP-R3	V	

14-00186	ENABLE GAS TRANS/TAYLOR	TAYLOR	486210	1202-AOP-R0	V
				1202-AOP-R1	V
				1202-AOP-R2	V
				1202-AOP-R3	V
				1202-AOP-R4	V
				1202-AOP-R5	A

Pollutant	Emission Rate (lb/hr)	NAAQS Standard (µg/m^3)	Averaging Time	Highest Concentration (µg/m^3)	% of NAAQS
NO_X	543.8	100	Annual	70.7	70.70%
CO	75.5	10,000	8-hour	441	4.40%
		40,000	1-hour	957	2.40%

15-00001	GREEN BAY PACKAGING/ARK KRAFT	MORRILTON	322130	0224-AOP-R0	V
				0224-AOP-R1	V

Pollutant	Emission Rate (lb/hr)	NAAQS Standard (µg/m^3)	Averaging Time	Highest Concentration (µg/m^3)	% of NAAQS

PM_{10}	312.8	50	Annual	20.42*	40.84%
		150	24-Hour	94.36*	62.91%
SO_2	125.6	80	Annual	2.59	3.24%
		1300	3-Hour	66.89	5.15%
		365	24-Hour	23.85	6.53%
CO	1338.2	10,000	8-Hour	524.65	5.25%
		40,000	1-Hour	2458.18	6.15%
NO_x	297.9	100	Annual	5.49	5.49%

				0224-AOP-R10	V
				0224-AOP-R11	V
				0224-AOP-R12	V
				0224-AOP-R13	V
				0224-AOP-R14	V
				0224-AOP-R15	V
				0224-AOP-R16	V
				0224-AOP-R17	A
				0224-AOP-R18	P
				0224-AOP-R2	V
				0224-AOP-R3	V
				0224-AOP-R4	V
				0224-AOP-R5	V
				0224-AOP-R6	V
				0224-AOP-R7	V
				0224-AOP-R8	V
				0224-AOP-R9	V
15-00019	PINECREST LUMBER-GREEN BAY PKG	PLUMERVILLE	321113	0670-AOP-R0	V
				0670-AOP-R1	V
				0670-AOP-R2	V
				0670-AOP-R3	V
				0670-AOP-R4	A
				0670-AOP-R5	P

Pollutant	Emission Rate (lb/hr)	NAAQS Standard (µg/m³)	Averaging Time	Highest Concentration (µg/m³)	% of NAAQS
PM_{10}	15	50	Annual	30.4*	60%
		150	24-Hour	102.09*	68%
SO_2	<100 tpy, therefore no modeling	80	Annual	-	-
		1300	3-Hour	-	-
		365	24-Hour	-	-
VOC	66.1	0.12	1-Hour (ppm)	0.018	15%
CO	24.2	10,000	8-Hour	1115	11%
		40,000	1-Hour	2847	7%
NO_x	<100 tpy, therefore no modeling performed	100	Annual	-	-

15-00068	ENABLE GAS TRANS/ROUND MTN	MORRILTON	486210	1725-AOP-R0	V
				1725-AOP-R1	V
				1725-AOP-R2	A

Pollutant	Emission Rate (lb/hr)	NAAQS Standard (µg/m³)	Averaging Time	Highest Concentration (µg/m³)	% of NAAQS
PM_{10}	0.7	50	Annual	0.36348*	0.73%
		150	24-Hour	6.34194*	4.23%
SO_2	7	80	Annual	0.34479	0.43%
		1300	3-Hour	17.86055	1.38%
		365	24-Hour	4.21601	1.16%
VOC	2.7	0.12	1-Hour (ppm)	N/A	
CO	71.1	10,000	8-Hour	3613	36.13%
		40,000	1-Hour	7806	19.52%
NO_x	55.2	100	Annual	7.57518	7.58%

15-00573	DESOTO GATHERING/SE RAINBOW 2	BEE BRANCH	486210	2191-AOP-R0	V
				2191-AOP-R1	A

Pollutant	Emission Rate (lb/hr)	NAAQS Standard (µg/m³)	Averaging Time	Highest Concentration (µg/m³)	% of NAAQS
PM_{10}	3.4	50	Annual	22.1	44.2
		150	24-Hour	6.6	4.4
CO	43.4	10,000	8-Hour	128.1	1.3
		40,000	1-Hour	188.3	0.5
NO_x	53	100	Annual	21.2	21.2

15-00590	DESOTO GATHERING/PHILLIPS MTN	CLEVELAND	486210	2200-AOP-R0	V
				2200-AOP-R1	V
				2200-AOP-R2	A

Pollutant	Emission Rate (lb/hr)	NAAQS Standard (µg/m³)	Averaging Time	Highest Concentration (µg/m³)	% of NAAQS
PM_{10}	3.5	50	Annual	21.48897*	42.98%
		150	24-Hour	4.8021*	3.20%
SO_2	1.9	80	Annual	0.36568	0.46%
		1300	3-Hour	12.70928	0.98%
		365	24-Hour	3.81832	1.05%
CO	43.7	10,000	8-Hour	59.16125	0.60%
		40,000	1-Hour	166.08958	0.42%
NO_x	55.7	100	Annual	7.10643	7.11%

15-00592	DESOTO GATHERING/COVE CRK.CPF3	CENTER RIDGE	213112	2207-AOP-R0	V
				2207-AOP-R1	V
				2207-AOP-R2	A

Pollutant	Emission Rate (lb/hr)	NAAQS Standard (µg/m^3)	Averaging Time	Highest Concentration (µg/m^3)	% of NAAQS
PM_{10}	3.5	50	Annual	21.4	42.8
		150	24-Hour	4.4	2.93
CO	43.7	10,000	8-Hour	105.7	1.1
		40,000	1-Hour	132.8	0.3
NO_x	55.7	100	Annual	7.3	7.3

15-00593	DESOTO GATHERING/ S.RAINBOW 4	CENTER RIDGE	486210	2201-AOP-R0	A
				2201-AOP-R1	P

Pollutant	Emission Rate (lb/hr)	NAAQS Standard (µg/m^3)	Averaging Time	Highest Concentration (µg/m^3)	% of NAAQS
PM_{10}	3.5	50	Annual	21.4*	42.8
		150	24-Hour	54.5*	36.3
CO	44.4	10,000	8-Hour	88.2	0.9
		40,000	1-Hour	125.5	0.3
NO_x	54	100	Annual	7	7

16-00002	ACME BRICK CO-WTP PLANT	JONESBORO	327120	2004-AOP-R0	V	Examination of the source type, location, plot plan, land use, emission parameters, and other available information indicate that modeling is not warranted at this time
				2004-AOP-R1	V	
				2004-AOP-R2	V	
				2004-AOP-R3	A	
16-00005	DELTA CONSOLIDATED INDUSTRIES	JONESBORO	332439	0994-AOP-R0	V	
				0994-AOP-R1	V	

Pollutant	**Emission Rate (lb/hr)**	**NAAQS Standard (µg/m^3)**	**Averaging Time**	**Highest Concentration (µg/m^3)**	**% of NAAQS**
PM_{10}	2.8	50	Annual	5.46	11%
		150	24-hour	21.9	15%
SO_2	1.4	80	Annual	2.73	3%
		1,300	3-hour	24.6	2%
		365	24-hour	10.93	3%
NO_X	19.4	100	Annual	37.9	38%
CO	4.6	10,000	8-hour	62.8	1%
		40,000	1-hour	89.8	0%

16-00014	GE MOTORS & INDUSTRIAL SYSTEMS	JONESBORO	335312	1047-AOP-R0	V	No info avail
16-00061	ARK GLASS CONTAINER	JONESBORO	327213	1440-AOP-R0	V	
				1440-AOP-R1	V	
				1440-AOP-R2	V	
				1440-AOP-R3	V	
				1440-AOP-R4	V	
				1440-AOP-R5	A	

Pollutant	Emission Rate (lb/hr)	NAAQS Standard (µg/m^3)	Averaging Time	Highest Concentration (µg/m^3) (model + background)	% of NAAQS
PM_{10}	30.6	50	Annual	9.6 + 12.3 = 21.9	43.8
		150	24-Hour	39.8 + 33 = 72.8	48.5
NO_x	104.9	100	Annual	38.2 + 7.2 = 45.4	45.4

16-00101	RICELAND-JONESBORO	JONESBORO	311212	0462-AOP-R0	V
				0462-AOP-R1	V

Pollutant	Emission Rate (lb/hr)	NAAQS Standard (µg/m^3)	Averaging Time	Highest Concentration (µg/m^3)	% of NAAQS

Pollutant	Emission Rate (lb/hr)	NAAQS Standard (µg/m³)	Averaging Time	Highest Concentration (µg/m³)	% of NAAQS
PM_{10}	49.3066	150	24-Hour	137.4*	91.60%
NO_x	54	100	Annual	22.5	22.50%

				0462-AOP-R10	V
				0462-AOP-R11	V
				0462-AOP-R12	V
				0462-AOP-R13	V
				0462-AOP-R14	V
				0462-AOP-R15	V
				0462-AOP-R16	V
				0462-AOP-R17	V
				0462-AOP-R18	V
				0462-AOP-R19	A
				0462-AOP-R2	V
				0462-AOP-R20	P
				0462-AOP-R3	V
				0462-AOP-R4	V
				0462-AOP-R5	V
				0462-AOP-R6	V
				0462-AOP-R7	V
				0462-AOP-R8	V
				0462-AOP-R9	V
16-00181	QG PRINTING II CORP-JONESBORO	JONESBORO	511120	0921-AOP-R0	V
				0921-AOP-R1	V
				0921-AOP-R2	V
				0921-AOP-R3	V
				0921-AOP-R4	V
				0921-AOP-R5	V
				0921-AOP-R6	V
				0921-AOP-R7	V

Pollutant	Emission Rate (lb/hr)	NAAQS Standard (µg/m³)	Averaging Time	Highest Concentration (µg/m³)	% of NAAQS
PM_{10}	0.8	50	Annual	0.5	1%
		150	24-Hour	4.7	3.20%

16-00197	ASSOCIATED PLASTICS INC	JONESBORO	326113	1037-AOP-R0	V

Pollutant	**Emission Rate (lb/hr)**	**NAAQS Standard (µg/m³)**	**Averaging Time**	**Highest Concentration (µg/m³)**	**% of NAAQS**
PM_{10}	7.3 lb/hr is less than 100 tpy □ modeling is not required	50	Annual		0%
		150	24-hour		0%

16-00199	CRAIGHEAD CO SWDA JONESBORO	JONESBORO	562212	2087-AOP-R0	V
				2087-AOP-R1	V
				2087-AOP-R2	A

Pollutant	Emission Rate (lb/hr)	NAAQS Standard (µg/m³)	Averaging Time	Highest Concentration (µg/m³)	% of NAAQS
PM_{10}	18.9	50	Annual	30.22	61%
		150	24-Hour	121.45	81%

16-00222	CRANE COMPOSITES, INC	JONESBORO	326113	2111-AOP-R0	V
				2111-AOP-R1	V

Examination of the source type, location, plot plan, land use, emission parameters, and other available information indicate that modeling is not warranted at this time.

2111-AOP-R2 A

16-00412	JONESBORO WATER & LIGHT-NW SUB	JONESBORO	221112	1819-AOP-R0 V 1819-AOP-R1 V 1819-AOP-R10 V 1819-AOP-R11 A 1819-AOP-R2 V 1819-AOP-R3 V 1819-AOP-R4 V 1819-AOP-R5 V 1819-AOP-R6 V 1819-AOP-R7 V 1819-AOP-R8 V 1819-AOP-R9 V

Pollutant	R9 Emission Rate (lb/hr)	NAAQS Standard (μg/m³)	Averaging Time	R8 Highest Concentration (μg/m³)	Calculated R9 Concentration (μg/m³)	% of NAAQS
PM_{10}	75.4	150	24-Hour	25.6	25.8	17.2
		80	Annual	0.99	1.01	1.27
SO_2	241	1300	3-Hour	39.01	39.88	3.07
		365	24-Hour	11.24	11.49	3.15
CO	125	10,000	8-Hour	14.7	15.24	0.15
		40,000	1-Hour	30.4	31.52	0.1
NO_x	300	100	Annual	0.56	0.59	0.59
Pb		0.15	Rolling 3-month Period over 3 years (not to be exceeded in any 3 month period)	0		0

16-01044	CITY OF JONESBORO/PUBLIC WORKS	JONESBORO	562213	2219-AOP-R0 V 2219-AOP-R1 V 2219-AOP-R2 A

Pollutant	Emission Rate (lb/hr)	NAAQS Standard (μg/m³)	Averaging Time	Highest Concentration (μg/m³)	% of NAAQS
PM_{10}	0.8	50	Annual	0.1	0.2
		150	24-Hour	0.5	0.4
SO_2	N/A	80	Annual	---	---
		1300	3-Hour	---	---
		365	24-Hour	---	---
VOC	N/A	0.12	1-Hour (ppm)	---	---
CO	N/A	10,000	8-Hour	---	---
		40,000	1-Hour	---	---
NO_X	25	100	Annual	6.1	6.1
Pb	N/A	0.15	Rolling 3-month Period over 3 years (not to be exceeded in any 3 month period)	---	---

17-00076	OXANE MATERIALS, LLC	VAN BUREN	212325	1263-AOP-R0 V

Pollutant	**Facility Total Emission Rate (lb/hr)**	**NAAQS (ug/m3)**	**Averaging Time**	**Model Prediction (ug/m3)**	**% of NAAQS**
PM/PM_{10}	<100 tpy, therefore no modeling performed				
SO_2	<100 tpy, therefore no modeling performed				
NO_x	<100 tpy, therefore no modeling performed				
CO	<100 tpy, therefore no modeling performed				

17-00077	TATE & LYLE , VAN BUREN	VAN BUREN	311221	0696-AOP-R0 V 0696-AOP-R1 V

Pollutant	Emission Rate (lb/hr)	NAAQS Standard (μg/m³)	Averaging Time	Highest Concentration (μg/m³)	% of NAAQS
PM_{10}	3.6	150	24-Hour	9.692	6.50%

				Permit		Modeling
				0696-AOP-R2	V	
				0696-AOP-R3	V	
				0696-AOP-R4	A	

	80	Annual
SO_2	1300	3-Hour
	365	24-Hour
CO	10,000	8-Hour
	40,000	1-Hour
NO_x	100	Annual
Pb	0.15	Rolling 3-month Period over 3 years (not to be exceeded in any 3 month period)

17-00100	ARK POLY INC	VAN BUREN	326112	1331-AOP-R0	V	
				1331-AOP-R1	V	
				1331-AOP-R2	V	
				1331-AOP-R3	V	
				1331-AOP-R4	V	
				1331-AOP-R5	A	Examination of the source type, location, plot plan, land use, emission parameters, and other available information indicate that modeling is not warranted at this time.
17-00136	NORAM GAS TRANS-HOBBS	DYER	486210	1203-AOP-R0	V	

Pollutant	**Emission Rate (lb/hr)**	**NAAQS Standard (µg/m³)**	**Averaging Time**	**Highest Concentration (µg/m³)**	**% of NAAQS**
PM_{10}	0	50	Annual		0%
		150	24-hour		0%
SO_2	0	80	Annual		0%
		365	24-hour		0%
NO_X	80.2	100	Annual	36	36%
CO	20.6	10,000	8-hour	295.05	3%
		40,000	1-hour	421.5	1%

18-00054	TROJAN LUGGAGE CO./AMERICO	WEST MEMPHIS	313320	1523-AOP-R0	V	
				1523-AOP-R1	V	Examination of the source type, location, plot plan, land use, emission parameters, and other available information indicate that modeling is not warranted at this time.
18-00081	BASF CORP	WEST MEMPHIS	325199	0860-AOP-R0	V	
				0860-AOP-R1	V	
				0860-AOP-R10	V	
				0860-AOP-R11	V	
				0860-AOP-R12	V	
				0860-AOP-R2	V	
				0860-AOP-R3	V	
				0860-AOP-R4	V	
				0860-AOP-R5	V	
				0860-AOP-R6	V	
				0860-AOP-R7	V	
				0860-AOP-R8	V	
				0860-AOP-R9	V	

Pollutant	Emission Rate (lb/hr)	NAAQS Standard (µg/m3)	Averaging Time	Background Value	Concentration (µg/m3)	% of NAAQS
PM_{10}	10.5	50	Annual	26	0.518	53
		150	24-Hour	47	13.24	40.6
SO_2	57.9	80	Annual	10.5	6.19	20.2
		1300	3-Hour	78.5	237.36	24.3
		365	24-Hour	28.8	82	30.4
VOC	135	0.12	1-Hour (ppm)	NMOC < NO_x		
CO	42.9	10,000	8-Hour	3206.5	117.28	33.2
		40,000	1-Hour	6756.6	681.49	18.6
NOx	149.5	100	Annual	23.4	9.09	32.5

18-00082	TRINITY ESC-PROCTOR	PROCTOR	327120	0280-AOP-R0	V	
				0280-AOP-R1	V	
				0280-AOP-R2	V	
				0280-AOP-R3	A	

Pollutant	Emission Rate (lb/hr)	NAAQS Standard (µg/m³)	Averaging Time	Highest Concentration (µg/m³)	% of NAAQS
PM10	66.3	50	Annual	4.98	10%
		150	24-Hour	51.42	34%
SO_2	58.5	80	Annual	0.2	0%
		1300	3-Hour	1.8	0%

Pollutant	Emission Rate (lb/hr)	NAAQS Standard (µg/m³)	Averaging Time	Highest Concentration (µg/m³)	% of NAAQS
		365	24-Hour	2.58	1%
CO	79	10,000	8-Hour	471.94	5%
		40,000	1-Hour	1092.21	3%
NO_x	121.3	100	Annual	0.72	1%

18-00094	CRITTENDEN COUNTY LANDFILL	MARION		1994-AOP-R0	V
				1994-AOP-R1	V

Examination of the source type, location, plot plan, land use, emission parameters, and other available information indicate that modeling is not warranted at this time.

18-00120	VALERO PARTNERS/W.MEMPHIS TERM	WEST MEMPHIS	424710	0668-AOP-R0	V
				0668-AOP-R1	V
				0668-AOP-R2	V
				0668-AOP-R3	V
				0668-AOP-R4	V
				0668-AOP-R5	V
				0668-AOP-R6	A

Pollutant	Emission Rate (lb/hr)	NAAQS Standard (µg/m³)	Averaging Time	Highest Concentration (µg/m³)	% of NAAQS
PM_{10}		50	Annual		0%
		150	24-hour		0%
SO_2		80	Annual		0%
		1,300	3-hour		0%
		365	24-hour		0%
NO_X		100	Annual		0%
VOC		0.12	1-hour (ppm)	0.045	38%
CO		10,000	8-hour		0%
		40,000	1-hour		0%

18-00148	AUTOMATED CONVEYOR SYSTEMS	WEST MEMPHIS	333922	1585-AOP-R0	V
				1585-AOP-R1	V
				1585-AOP-R2	V
				1585-AOP-R3	V
				1585-AOP-R4	V

Examination of the source type, location, plot plan, land use, emission parameters, and other available information indicate that modeling is not warranted at this time.

18-00230	STATESIDE STEEL & WIRE, LLC	WEST MEMPHIS	332618	1719-AOP-R0	V
				1719-AOP-R1	V
				1719-AOP-R2	V

The only criteria pollutant emitted above a major threshold is VOC. However, current Air Division policy only requires ozone modeling if VOC emissions exceed 500 ton/
This facility is limited to 249.32 ton/yr VOC; therefore, no modeling was performed for this pollutant.

19-00004	MUELLER COPPER TUBE PRODUCTS	WYNNE	331420	1027-AOP-R0	V
				1027-AOP-R1	V
				1027-AOP-R2	V
				1027-AOP-R3	V
				1027-AOP-R4	V
				1027-AOP-R5	V
				1027-AOP-R6	V

Pollutant	Emission Rate (lb/hr)	NAAQS Standard (µg/m³)	Averaging Time	Highest Concentration (µg/m³)*	% of NAAQS
PM_{10}	18.7	50	Annual	24.69	49.4
		150	24-Hour	101.34	67.6
CO	151.1	10,000	8-Hour	2,512.52	25.1
		40,000	1-Hour	4,321.81	10.8

* Includes background levels.

				1027-AOP-R7	V
				1027-AOP-R8	V
				1027-AOP-R9	A
19-00233	EAKAS ARKANSAS	WYNNE	336360	2053-AOP-R0	V
				2053-AOP-R1	V

Examination of the source type, location, plot plan, land use, emission parameters, and other available information indicate that modeling is not warranted at this time

20-00004	FORDYCE PLYWOOD PLANT	FORDYCE	321212	0233-AOP-R0	V
				0233-AOP-R1	V
				0233-AOP-R2	V
				0233-AOP-R3	V
				0233-AOP-R4	V

Pollutant	Emission Rate (lb/hr)	NAAQS Standard (µg/m3)	Averaging Time	Highest Concentration (µg/m3)	% of NAAQS
PM10	59.73	50	Annual	43.8*	87.60%
		150	24-hour	149.4*	99.60%
SO2	<100 tpy therefore no need to model				
NOX	35.3	100	Annual	4.5	4.50%
VOC	<500 tpy therefore no need to model				
CO	291.7	10,000	8-hour	261.2	2.60%
		40,000	1-hour	373.2	1.00%
* 24 hour (36.9 mg/m3)and Annual (22.6 mg/m3) background concentrations are included					

20-00017	IDAHO TIMBER CORP/CARTHAGE,LLC	CARTHAGE	321113	0551-AOP-R0	V
				0551-AOP-R1	V
				0551-AOP-R2	V
				0551-AOP-R3	V
				0551-AOP-R4	V
				0551-AOP-R5	V
				0551-AOP-R6	A

Pollutant	Emission Rate (lb/hr)	NAAQS Standard ($\mu g/m^3$)	Averaging Time	Highest Concentration ($\mu g/m^3$)	% of NAAQS
PM_{10}	17.28	50	Annual	19.6	39.2
		150	24-Hour	102.86	68.57
SO_2	1.74	80	Annual	1	1.25
		1300	3-Hour	8.9	0.68
		365	24-Hour	4.9	1.34
VOC	50.8	0.12	1-Hour (ppm)	N/A	N/A
CO	55.9	10,000	8-Hour	100.9	1
		40,000	1-Hour	136.1	0.34
NO_x	14.4	100	Annual	15.6	15.6
Pb	0.004	0.15	Rolling 3-month Period over 3 years (not to be exceeded in any 3 month period)	N/A	N/A

20-00058	RAY WHITE LUMBER COMPANY	SPARKMAN	321113	1468-AOP-R0	V
				1468-AOP-R1	V
				1468-AOP-R2	V
				1468-AOP-R3	V
				1468-AOP-R4	V
				1468-AOP-R5	A

Pollutant	Emission Rate (lb/hr)	NAAQS Standard ($\mu g/m^3$)	Averaging Time	Highest Concentration ($\mu g/m^3$)	% of NAAQS
PM_{10}	44.2	50	Annual	5	10
		150	24-Hour	36	24
SO_2	1.2	80	Annual	0.05	0.06
		1300	3-Hour	1.4	0.1
		365	24-Hour	0.486	0.13
VOC	47	0.12	1-Hour (ppm)	VOC and NOx are less than 100 tpy.	
CO	67.8	10,000	8-Hour	57.3	0.57
		40,000	1-Hour	96.3	0.24
NO_x	8.1	100	Annual	0.37	0.37
Pb	0.002	1.5**	Rolling 3-month Period over 3 years (not to be exceeded in any 3 month period)	0.00081*	0.54%

21-00036	CLEARWATER PAPER CORP	ARKANSAS CITY	322130	0271-AOP-R0	V
				0271-AOP-R1	V
				0271-AOP-R10	V
				0271-AOP-R11	V
				0271-AOP-R12	V
				0271-AOP-R13	V
				0271-AOP-R14	V

Pollutant	Emission Rate (lblhr)	NAAQS Standard (!lg/m3)	Averaging Time	Highest Concentration (!lg/m3)	%of NAAQS
PM10	132.1	150	24-Hour	55.36304	36.9%
SOz	535.3	80	Annual	2.13193	2.7%
		1300	3-Hour	68.00229	5.2
		365	24-Hour	27.0957	7.4
VOC	643.2	0.12	1-Hour	--	--
CO	491.5	10000	8-Hour	490.40011	4.9
		40000	1-Hour	637.87164	1.6
NOx	450.4	100	Annual	7.8509	7.9
Pb	0.07	0.15	Rolling 3-month period over 3 years (not to be exceeded in any 3 month period)	0.0166*	--

				0271-AOP-R15	V	
				0271-AOP-R16	V	
				0271-AOP-R17	V	
				0271-AOP-R18	V	
				0271-AOP-R19	A	
				0271-AOP-R2	V	
				0271-AOP-R20	P	
				0271-AOP-R3	V	
				0271-AOP-R4	V	
				0271-AOP-R5	V	
				0271-AOP-R6	V	
				0271-AOP-R7	V	
				0271-AOP-R8	V	
				0271-AOP-R9	V	
21-00067	TRANSMONTAIGNE OPERATING CO,LP	ARKANSAS CITY	493190	1605-AOP-R0	V	Examination of the source type, location, plot plan, land use, emission parameters, and other available information indicate that modeling is not warranted at this time.
				1605-AOP-R1	V	
				1605-AOP-R2	V	
				1605-AOP-R3	V	
				1605-AOP-R4	V	
21-00079	SAF-HOLLAND USA,INC.	DUMAS	332510	1951-AOP-R0	V	No SOB
22-00007	INTERFOR U.S.,INC.	MONTICELLO	321113	1567-AOP-R0	V	(see table below)
				1567-AOP-R1	V	
				1567-AOP-R2	A	
				1567-AOP-R3	P	
22-00018	BIG RIVERS OUTFITTERS, LLC	MONTICELLO	336611	1971-AOP-R0	V	Examination of the source type, location, plot plan, land use, emission parameters, and other available information indicate that modeling is not warranted at this time.
				1971-AOP-R1	V	

Pollutant	Emission Rate (lb/hr)	NAAQS Standard (µg/m3)	Averaging Time	Highest Concentration (µg/m3)	% of NAAQS
		50	Annual	2.2	4.4%
PM10	75.0	150	24-hour	20.9	13.9%

22-00046	DREW FOAM COMPANIES INC	MONTICELLO	326113	1292-AOP-R0	V	Examination of the source type, location, plot plan, land use, emission parameters, and other available information indicate that modeling is not warranted at this time.
				1292-AOP-R1	V	
				1292-AOP-R2	V	
22-00057	DREW FOAM CO., INC.	MONTICELLO	326140	2132-AOP-R0	V	Examination of the source type, location, plot plan, land use, emission parameters, and other available information indicate that modeling is not warranted at this time.
				2132-AOP-R1	V	
				2132-AOP-R2	V	
				2132-AOP-R3	A	
22-00065	AKIN INDUSTRIES, INC.	MONTICELLO		1695-AOP-R0	V	
				1695-AOP-R1	V	Examination of the source type, location, plot plan, land use, emission parameters, and other available information indicate that modeling is not warranted at this time.
				1695-AOP-R2	V	
				1695-AOP-R3	V	
				1695-AOP-R4	I	
22-00390	ZILKHA BIOMASS MONTICELLO, LLC	MONTICELLO	321999	2349-AOP-R0	A	Examination of the source type, location, plot plan, land use, emission parameters, and other available information indicate that modeling is not warranted at this time.

23-00001	VIRCO MFG	CONWAY		0135-AOP-R0	V	Examination of the source type, location, plot plan, land use, emission parameters, and other available information indicate that modeling is not warranted at this time.
23-00004	IC BUS, LLC	CONWAY	332322	0536-AOP-R0	V	
				0536-AOP-R1	V	
				0536-AOP-R2	V	
				0536-AOP-R3	V	
				0536-AOP-R4	V	
				0536-AOP-R5	V	

Pollutant	Emission Rate (lb/hr)	NAAQS Standard (µg/m3)	Averaging Time	Highest Concentration (µg/m3)	% of NAAQS
PM10	9.1	150	24-Hour	54.463	36.31%
		80	Annual	0.088	0.11%
SO2	0.1	1300	3-Hour	1.699	0.13%
		365	24-Hour	0.658	0.18%
CO	2	10,000	8-Hour	10.297	0.10%
		40,000	1-Hour	21.838	0.05%
NOX	7.3	100	Annual	4.454	4.45%

23-00006	PROGRESSIVE FOAM TECHNOLOGIES	CONWAY	333415	0418-AOP-R0	V	
				0418-AOP-R1	V	Examination of the source type, location, plot plan, land use, emission parameters, and other available information indicate that modeling is not warranted at this time.
				2086-AOP-R0	V	
23-00007	BALDWIN PIANO, INC.	CONWAY	339992	0609-AOP-R0	V	
				0609-AOP-R1	V	Examination of the source type, location, plot plan, land use, emission parameters, and other available information indicate that modeling is not warranted at this time.
23-00010	CITY/CONWAY SANITARY LANDFILL	CONWAY	921110	2148-AOP-R0	V	
				2148-AOP-R1	V	
				2148-AOP-R2	A	

Pollutant	Emission Rate (lb/hr)	NAAQS Standard (µg/m3)	Averaging Time	Highest Concentration (µg/m3)	% of NAAQS
PM10	65	150	24-Hour	122.5	81.67%

23-00084	CONWAY REGIONAL HOSPITAL	CONWAY	622110	1955-AOP-R0	V	Examination of the source type, location, plot plan, land use, emission parameters, and other available information indicate that modeling is not warranted at this time.
23-00237	SAN ANTONIO SHOE CO.	CONWAY	316219	1683-AOP-R0	V	Examination of the source type, location, plot plan, land use, emission parameters, and other available information indicate that modeling is not warranted at this time.
				1683-AOP-R1	V	
				1683-AOP-R2	V	
				1683-AOP-R3	V	
23-00244	TOKUSEN USA, INC	CONWAY	314994	0992-AOP-R0	V	
				0992-AOP-R1	V	
				0992-AOP-R2	V	
				0992-AOP-R3	V	
				0992-AOP-R4	V	
23-00294	STEELE PLASTICS INC	CONWAY	326113	1629-AOP-R0	V	
				1629-AOP-R1	V	Examination of the source type, location, plot plan, land use, emission parameters, and other available information indicate that modeling is not warranted at this time.
				1629-AOP-R2	V	
				1629-AOP-R3	V	
				1629-AOP-R4	V	
				1629-AOP-R5	V	
				1629-AOP-R6	A	
23-00969	DESOTO GATHERING/NEW QUITMAN 2	QUITMAN	486210	2216-AOP-R0	V	

Pollutant	Emission Rate (lb/hr)	NAAQS Standard (µg/m3)	Averaging Time	Highest Concentration (µg/m3)	% of NAAQS
PM10	10.3	150	24-Hour	64.59	43.06%
		80	Annual	0.1	0.13%
SO2	0.2	1300	3-Hour	1.61	0.12%
		365	24-Hour	0.82	0.22%
CO	3.5	10,000	8-Hour	39.81	0.40%
		40,000	1-Hour	64.67	0.16%
NOX	5.9	100	Annual	4.39	4.39%

						Examination of the source type, location, plot plan, land use, emission parameters, and other available information indicate that modeling is not warranted at this time.
				2216-AOP-R1	A	
24-00012	ARK ELECTRIC COOP FITZHUGH	OZARK	221112	1165-AOP-R0	V	
				1165-AOP-R1	V	
				1165-AOP-R2	V	
				1165-AOP-R3	V	
				1165-AOP-R4	V	
				1165-AOP-R5	V	
				1165-AOP-R6	A	
24-00014	SGL CARBON LLC	OZARK	335991	0429-AOP-R0	V	
				0429-AOP-R1	V	
				0429-AOP-R10	V	
				0429-AOP-R11	V	
				0429-AOP-R12	V	
				0429-AOP-R13	V	
				0429-AOP-R14	V	
				0429-AOP-R15	V	
				0429-AOP-R16	V	
				0429-AOP-R17	A	
				0429-AOP-R18	P	
				0429-AOP-R2	V	
				0429-AOP-R3	V	
				0429-AOP-R4	V	
				0429-AOP-R5	V	
				0429-AOP-R6	V	
				0429-AOP-R7	V	
				0429-AOP-R8	V	
				0429-AOP-R9	V	
24-00057	CORRELL INC	CHARLESTON	337214	0814-AOP-R0	V	

Pollutant	Emission Rate (lb/hr)	NAAQS Standard (µg/m3)	Averaging Time	Highest Concentration (µg/m3)	% of NAAQS
PM10	90.9	150	24-Hour	0.176	0.12%
		80	Annual	1.39	1.74%
SO2	839.8	1300	3-Hour	100.2	7.71%
		365	24-Hour	30.1	8.25%
CO	499.6	10,000	8-Hour	41.9	0.42%
		40,000	1-Hour	115.43	0.29%
NOX	447	100	Annual	0.74	0.74%

Pollutant	Emission Rate (lb/hr)	NAAQS Standard (µg/m3)	Averaging Time	Highest Concentration (µg/m3)	Background	Total	% of NAAQS
PM10	43.7	150	24-Hour	87	36.8	123.8	82.50%
		80	Annual	35.3	5.2	40.5	50.60%
SO2	207.4	1300	3-Hour	585.9	34	619.9	47.70%
		365	24-Hour	170.7	12.8	183.5	50.30%
CO	1290.5	10,000	8-Hour	6156.1	1839	7995.1	80.00%
		40,000	1-Hour	23723.3	2404.8	26128.1	65.30%
NOX	76.2	100	Annual	23	18.4	41.4	41.40%

						Examination of the source type, location, plot plan, land use, emission parameters, and other available information indicate that modeling is not warranted at this time.
				0814-AOP-R1	V	
				0814-AOP-R2	V	
				0814-AOP-R3	V	
				0814-AOP-R4	V	
				0814-AOP-R5	A	
24-00068	SOURCEGAS ARK-WOOLSEY COMP	OZARK	486210	0972-AOP-R0	V	
				0972-AOP-R1	V	
				0972-AOP-R2	V	
				0972-AOP-R3	V	
				0972-AOP-R4	A	

Pollutant	Emission Rate (lb/hr)	NAAQS Standard (µg/m3)	Averaging Time	Highest Concentration (µg/m3)	% of NAAQS
PM10	0.3	150	24-Hour	7.3	4.87%
		80	Annual	0.7	0.88%
SO2	0.3	1300	3-Hour	9.2	0.71%
		365	24-Hour	5.8	1.59%
CO	13.7	10,000	8-Hour	340.7	3.41%
		40,000	1-Hour	396.9	0.99%
NOX	27.6	100	Annual	40.9	40.90%

24-00071	SOURCEGAS ARK-DRAKE COMP	OZARK	486210	1185-AOP-R0	V
				1185-AOP-R1	V
				1185-AOP-R2	V
				1185-AOP-R3	V
				1185-AOP-R4	V
				1185-AOP-R5	V
				1185-AOP-R6	A

Pollutant	Emission Rate (lb/hr)	NAAQS Standard (µg/m3)	Averaging Time	Highest Concentration (µg/m3)	% of NAAQS
CO	111.9	10,000	8-Hour	4763.4	47.63%
		40,000	1-Hour	5927.6	14.82%
NOX	52.9	100	Annual	85.3	85.30%

24-00081	ENABLE GAS TRANS/WALKER	CECIL	486210	1204-AOP-R0	V
				1204-AOP-R1	V
				1204-AOP-R2	V
				1204-AOP-R3	V

Pollutant	Emission Rate (lb/hr)	NAAQS Standard (µg/m3)	Averaging Time	Highest Concentration (µg/m3)	% of NAAQS
PM10	0.0499	150	24-Hour	42.8716	28.58%
NOX	102.2261	100	Annual	28.652	28.65%

24-00083	SPECTRA ENERGY/NOARK COMP.	ALIX	486210	1271-AOP-R0	V
				1271-AOP-R1	V
				1271-AOP-R2	V
				1271-AOP-R3	V
				1271-AOP-R4	V
				1271-AOP-R5	V
				1271-AOP-R6	A

Pollutant	Emission Rate (lb/hr)	NAAQS Standard (µg/m3)	Averaging Time	Highest Concentration (µg/m3)	% of NAAQS
PM10	0.11	150	24-Hour	0.76	0.51%
CO	43.2	10,000	8-Hour	240	2.40%
		40,000	1-Hour	445.3	1.11%
NOX	24.8	100	Annual	65.3	65.30%

24-00086	CROSS TIMBERS HOLDING CO.	FORT SMITH	486210	1934-AOP-R0	V

Pollutant	Emission Rate (lb/hr)	NAAQS Standard (µg/m3)	Averaging Time	Highest Concentration (µg/m3)	% of NAAQS
NOX	59.8	100	Annual	8.9	8.90%

24-00088	ENABLE GAS TRANS/WEBB CITY	CECIL	486210	1285-AOP-R0	V
				1285-AOP-R1	V
				1285-AOP-R2	V

Pollutant	Emission Rate (lb/hr)	NAAQS Standard (µg/m3)	Averaging Time	Highest Concentration (µg/m3)	% of NAAQS
PM10	0.3	150	24-Hour	2.22	1.48%
		80	Annual	0.22	0.28%

				1285-AOP-R3	V
				1285-AOP-R4	V
				1285-AOP-R5	A

SO2	0.3	1300	3-Hour	16.66	1.28%
		365	24-Hour	3.6	0.99%
CO	57.3	10,000	8-Hour	1346.75	13.47%
		40,000	1-Hour	3122.69	7.81%
NOX	66.6	100	Annual	27.21	27.21%

24-00090	SOURCEGAS ARK-DAVIS COMP	ALTUS	486210	1310-AOP-R0	V
				1310-AOP-R1	V
				1310-AOP-R2	V
				1310-AOP-R3	A

Pollutant	Emission Rate (lb/hr)	NAAQS Standard (µg/m3)	Averaging Time	Highest Concentration (µg/m3)	% of NAAQS
CO	4.4	10,000	8-Hour	2432.1	24.32%
		40,000	1-Hour	3027	7.57%
NOX	44.4	100	Annual	37.2	37.20%

24-00092	SEECO/STOCKTON COMPRESSOR STA	OZARK	213112	1362-AOP-R0	V
				1362-AOP-R1	V
				1362-AOP-R2	V
				1362-AOP-R3	V
				1362-AOP-R4	V
				1362-AOP-R5	A

Pollutant	Emission Rate (lb/hr)	NAAQS Standard (µg/m3)	Averaging Time	Highest Concentration (µg/m3)	% of NAAQS
CO	77	10,000	8-Hour	1773	17.73%
		40,000	1-Hour	2357	5.89%

24-00094	SOURCEGAS ARK-SELLS COMPRESS	OZARK	486210	1378-AOP-R0	V
				1378-AOP-R1	V
				1378-AOP-R2	V
				1378-AOP-R3	V
				1378-AOP-R4	A

Pollutant	Emission Rate (lb/hr)	NAAQS Standard (µg/m3)	Averaging Time	Highest Concentration (µg/m3)	% of NAAQS
PM10	0.7	150	24-Hour	37.5	25.00%
CO	77.4	10,000	8-Hour	3591.3	35.91%
		40,000	1-Hour	12258.9	30.65%
NOX	26.5	100	Annual	40	40.00%

24-00104	SOURCEGAS ARK-LONE ELM COMP	OZARK	486210	1450-AOP-R0	V
				1450-AOP-R1	V
				1450-AOP-R2	V
				1450-AOP-R3	V
				1450-AOP-R4	A

Pollutant	Emission Rate (lb/hr)	NAAQS Standard (µg/m3)	Averaging Time	Highest Concentration (µg/m3)	% of NAAQS
PM10	0.3	150	24-Hour	4.62948	3.09%
		80	Annual	0.00977	0.01%
SO2	0.1	1300	3-Hour	0.3023	0.02%
		365	24-Hour	0.13717	0.04%
CO	3	10,000	8-Hour	88.29364	0.88%
		40,000	1-Hour	137.76512	0.34%
NOX	43.5	100	Annual	39.79257	39.79%

25-00028	CHEROKEE LANDFILL/IESI-AR	CHEROKEE VILLAGE	562212	2069-AOP-R0	A

Pollutant	Emission Rate (lb/hr)	NAAQS Standard (µg/m3)	Averaging Time	Highest Concentration (µg/m3)	% of NAAQS
PM10	4.7	150	24-Hour	107.6	71.73%

26-00015	WEYERHAEUSER N R CO	MOUNTAIN PINE		0905-AOP-R0	V
				0905-AOP-R1	V
				0905-AOP-R2	V
				0905-AOP-R3	V
				0905-AOP-R4	V
				0905-AOP-R5	V

Pollutant	Emission Rate (lb/hr)	NAAQS Standard (µg/m3)	Averaging Time	Highest Concentration (µg/m3)	% of NAAQS
PM10	46.4	150	24-Hour	42.4	28.27%
		80	Annual	0.36	0.45%
SO2	9.6	1300	3-Hour	16.07	1.24%
		365	24-Hour	4.81	1.32%
CO	481.3	10,000	8-Hour	612	6.12%
		40,000	1-Hour	916	2.29%
NOX	86.4	100	Annual	3.2	3.20%

26-00022	TRIUMPH FABRICATIONS,LLC-H.S.	HOT SPRINGS	336413	0968-AOP-R0	V
				0968-AOP-R1	V
				0968-AOP-R2	V
				0968-AOP-R3	V
				0968-AOP-R4	V
				0968-AOP-R5	V
				0968-AOP-R6	V
				0968-AOP-R7	A
				0968-AOP-R8	P

Pollutant	Emission Rate (lb/hr)	NAAQS Standard (µg/m3)	Averaging Time	Highest Concentration (µg/m3)	% of NAAQS
PM10	1.7	150	24-Hour	13.256	8.84%

26-00077	TRG-HOT SPRINGS, LLC	HOT SPRINGS	331315	0279-AOP-R0	V
				0279-AOP-R1	V
				0279-AOP-R2	A

Pollutant	Emission Rate (lb/hr)	NAAQS Standard (µg/m3)	Averaging Time	Highest Concentration (µg/m3)	% of NAAQS
PM10	11.9	150	24-Hour	91.67	61.11%

26-00268	TWO D, LLC	HOT SPRINGS	321113	1436-AOP-R0	V
				1436-AOP-R1	V
				1436-AOP-R2	N

Pollutant	Emission Rate (lb/hr)	NAAQS Standard (µg/m3)	Averaging Time	Highest Concentration (µg/m3)	% of NAAQS
PM10	245.1	150	24-Hour	78.87	52.58%
SO2	0.5	80	Annual	0.04	0.05%
		1300	3-Hour	0.36	0.03%
		365	24-Hour	0.169	0.05%
CO	47.8	10,000	8-Hour	26.92	0.27%
		40,000	1-Hour	38.45	0.10%
NOX	2.5	100	Annual	0.2	0.20%

27-00002	WEST FRASER-LEOLA LUMBER MILL	LEOLA	321113	0057-AOP-R0	V
				0057-AOP-R1	V
				0057-AOP-R2	V
				0057-AOP-R3	V
				0057-AOP-R4	V
				0057-AOP-R5	V
				0057-AOP-R6	V
				0057-AOP-R7	A

Pollutant	Emission Rate (lb/hr)	NAAQS Standard (µg/m3)	Averaging Time	Highest Concentration (µg/m3)	% of NAAQS
PM10	22.6	150	24-Hour	114.95	76.63%
CO	502.3	10,000	8-Hour	1190.28	11.90%
		40,000	1-Hour	1841.78	4.60%
NOX	65.8	100	Annual	10.5	10.50%
Pb	0.0004	0.15	Rolling 3-month Period over 3 years (not to be exceeded in any 3 month period)	0.00031	0.21%

27-00008	H.G. TOLER & SON LUMBER CO,INC	LEOLA	321113	0193-AOP-R0	V
				0193-AOP-R1	V
				0193-AOP-R2	V
				0193-AOP-R3	V
				0193-AOP-R4	V
				0193-AOP-R5	V
				0193-AOP-R6	A
				0193-AOP-R7	P

Pollutant	Emission Rate (lb/hr)	NAAQS Standard (µg/m3)	Averaging Time	Highest Concentration (µg/m3)	% of NAAQS
PM10	35.1	150	24-Hour	101.3	67.53%
Pb	0.0012	0.15	Rolling 3-month Period over 3 years (not to be exceeded in any 3 month period)	0.00029	0.19%

27-00039	CENTRIA	SHERIDAN	332321	0757-AOP-R0	V	Examination of the source type, location, plot plan, land use, emission parameters, and other available information indicate that modeling is not warranted at this time.
				0757-AOP-R1	V	
				0757-AOP-R2	V	
				0757-AOP-R3	V	
28-00002	NIDEC MOTOR COMPANY	PARAGOULD	335312	0965-AOP-R0	V	
				0965-AOP-R1	V	
				0965-AOP-R2	V	

				0965-AOP-R3	V	Examination of the source type, location, plot plan, land use, emission parameters, and other available information indicate that modeling is not warranted at this time.
28-00060	PARAGOULD CITY LIGHT & WATER	PARAGOULD	221112	0985-AOP-R0	V	

Pollutant	Emission Rate (lb/hr)	NAAQS Standard (µg/m3)	Averaging Time	Highest Concentration (µg/m3)	% of NAAQS
PM10	5.6	150	24-Hour	2.563	1.71%
		80	Annual	0.041	0.05%
SO2	1.5	1300	3-Hour	1.215	0.09%
		365	24-Hour	0.479	0.13%
CO	52.7	10,000	8-Hour	38.37	0.38%
		40,000	1-Hour	66.82	0.17%
NOX	183.9	100	Annual	6.358	6.36%

28-00077	NORTHEAST ARK REG SOLID WASTE	PARAGOULD	562212	2126-AOP-R0	V	
				2126-AOP-R1	V	

Pollutant	Emission Rate (lb/hr)	NAAQS Standard (µg/m3)	Averaging Time	Highest Concentration (µg/m3)	% of NAAQS
PM10	15.8	150	24-Hour	138.64	92.43%

				2126-AOP-R2	A	
28-00090	KNL HOLDINGS, LLC	PARAGOULD	333318	1584-AOP-R0	V	Examination of the source type, location, plot plan, land use, emission parameters, and other available information indicate that modeling is not warranted at this time.
28-00251	AMERICAN RAILCAR INDUSTRIES	PARAGOULD	336510	1779-AOP-R0	V	
				1779-AOP-R1	V	
				1779-AOP-R2	V	
				1779-AOP-R3	V	
				1779-AOP-R4	V	

Pollutant	Emission Rate (lb/hr)	NAAQS Standard (µg/m3)	Averaging Time	Highest Concentration (µg/m3)	% of NAAQS
PM10	4.4	150	24-Hour	95.5	63.67%

				1779-AOP-R5	A	
				1779-AOP-R6	P	
28-00256	AMERICAN RAILCAR IND-MARMADUKE	MARMADUKE	336510	1830-AOP-R0	V	
				1830-AOP-R1	V	

Pollutant	Emission Rate (lb/hr)	NAAQS Standard (µg/m3)	Averaging Time	Highest Concentration (µg/m3)	% of NAAQS
PM10	8.2	150	24-Hour	89.7	59.80%

				1830-AOP-R10	A	
				1830-AOP-R2	V	
				1830-AOP-R3	V	
				1830-AOP-R4	V	
				1830-AOP-R5	V	
				1830-AOP-R6	V	
				1830-AOP-R7	V	

				1830-AOP-R8	V	
				1830-AOP-R9	V	
29-00016	SOUTHERN BAKERIES, LLC	HOPE	311812	1940-AOP-R0	V	
				1940-AOP-R1	V	Examination of the source type, location, plot plan, land use, emission parameters, and other available information indicate that modeling is not warranted at this time.
				1940-AOP-R2	V	
				1940-AOP-R3	V	
				1940-AOP-R4	A	
29-00090	NEW MILLENNIUM BUILDING,LLC	HOPE	332312	1092-AOP-R0	V	
				1092-AOP-R1	V	

Pollutant	Emission Rate (lb/hr)	NAAQS Standard (µg/m3)	Averaging Time	Highest Concentration (µg/m3)	% of NAAQS
PM10	3.4	150	24-Hour	147.1	98.10%

				1092-AOP-R10	P	
				1092-AOP-R2	V	
				1092-AOP-R3	V	
				1092-AOP-R4	V	
				1092-AOP-R5	V	
				1092-AOP-R6	V	
				1092-AOP-R7	V	
				1092-AOP-R8	V	
				1092-AOP-R9	A	
29-00120	GEORGIA-PACIFIC PANEL PRODUCTS	HOPE	321219	1533-AOP-R0	V	
				1533-AOP-R1	V	
				1533-AOP-R10	V	
				1533-AOP-R11	V*	
				*- for CO and Nox only		
				1533-AOP-R12	V	
				1533-AOP-R13	A**	
				**- for PM10, SO2, and Pb		
				1533-AOP-R2	V	

Pollutant	Emission Rate (lb/hr)	NAAQS Standard (µg/m3)	Averaging Time	Highest Concentration (µg/m3)	% of NAAQS
PM10	73.6	150	24-Hour	56.56391	37.70%
		80	Annual		
SO2	1	1300	3-Hour	0.69832	0.06%
		365	24-Hour		
CO	101.4	10,000	8-Hour	199	19.90%
		40,000	1-Hour	647	16.20%
NOX	106.4	100	Annual	12	12%
Pb	0.02	0.15	Rolling 3-month Period over 3 years (not to be exceeded in any 3 month period)	0.00629	4.20%

				1533-AOP-R3	V	
				1533-AOP-R4	V	
				1533-AOP-R5	V	
				1533-AOP-R6	V	
				1533-AOP-R7	V	
				1533-AOP-R8	V	
				1533-AOP-R9	V	
29-00121	BRENTWOOD INDUSTRIES INC	HOPE	326199	1539-AOP-R0	V	

						Examination of the source type, location, plot plan, land use, emission parameters, and other available information indicate that modeling is not warranted at this time.
				1539-AOP-R1	V	
				1539-AOP-R2	V	
				1539-AOP-R3	V	
29-00142	WEYERHAEUSER-MID SOUTH PROJEC	FULTON		1755-AOP-R0	V	

Pollutant	Emission Rate (lb/hr)	NAAQS Standard (µg/m3)	Averaging Time	Highest Concentration (µg/m3)	% of NAAQS
PM10	149.9	150	24-Hour	66.08	44.05%
		80	Annual	14.37	17.96%
SO2	1471.7	1300	3-Hour	244.31	18.79%
		365	24-Hour	69.53	19.05%
CO	2131.8	10,000	8-Hour	3550	35.50%
		40,000	1-Hour	3584	8.96%
NOX	642.9	100	Annual	16.59	16.59%
Pb	1.79	0.15	Rolling 3-month Period over 3 years (not to be exceeded in any 3 month period)	0.05	33.33%

29-00304	ARKANSAS ELECTRIC CO-OP-CT1	FULTON	221112	1860-AOP-R0	V

Pollutant	Emission Rate (lb/hr)	NAAQS Standard (µg/m3)	Averaging Time	Highest Concentration (µg/m3)	% of NAAQS
PM10	70.9	150	24-Hour	0.79718	0.53%
NOX	172	100	Annual	0.133	0.13%

				1860-AOP-R1	V	
				1860-AOP-R2	V	
				1860-AOP-R3	V	
				1860-AOP-R4	A	
				1860-AOP-R5	P	
				1868-AOP-R0	V	
29-00305	SMI STEEL PRODUCTS	HOPE	332312	1925-AOP-R0	V	Examination of the source type, location, plot plan, land use, emission parameters, and other available information indicate that modeling is not warranted at this time.
29-00506	SW/AMERICAN ELECTRIC POWER CO	FULTON	221112	2123-AOP-R0	V	
				2123-AOP-R1	V	
				2123-AOP-R2	V	
				2123-AOP-R3	V	
				2123-AOP-R4	A	

Pollutant	Emission Rate (lb/hr)	NAAQS Standard (µg/m3)	Averaging Time	Highest Concentration (µg/m3)	% of NAAQS
PM10	171.7	150	24-Hour	19.68	13.12%
		80	Annual	0.49	0.61%
SO2	480.6	1300	3-Hour	10.38	0.80%
		365	24-Hour	4.22	1.16%
CO	933.2	10,000	8-Hour	12.9	0.13%
		40,000	1-Hour	23.7	0.06%
NOX	503.3	100	Annual	0.91	0.91%
Pb	0.106	0.15	Rolling 3-month Period over 3 years (not to be exceeded in any 3 month period)	0.0002	0.13%

30-00008	ACME BRICK-PERLA PLANT	MALVERN	327120	1154-AOP-R0	V
				1154-AOP-R1	V

	Emission Rate	NAAQS Standard		Highest Concentration	

				1154-AOP-R2	V
				1154-AOP-R3	V
				1154-AOP-R4	A

Pollutant	(lb/hr)	(µg/m3)	Averaging Time	(µg/m3)	% of NAAQS
		80	Annual	0	0.00%
SO2	54.1	1300	3-Hour	0	0.00%
		365	24-Hour	48.32449	13.24%

30-00011	ENTERGY ARKANSAS-LK CATHERINE	JONES MILLS	221112	1717-AOP-R0	V
				1717-AOP-R1	V
				1717-AOP-R2	V
				1717-AOP-R3	V
				1717-AOP-R4	V
				1717-AOP-R5	V
				1717-AOP-R6	A

Pollutant	Emission Rate (lb/hr)	NAAQS Standard (µg/m3)	Averaging Time	Highest Concentration (µg/m3)	% of NAAQS
PM10	525.7	150	24-Hour	114.85	76.57%
		80	Annual	34.7	43.38%
SO2	2000	1300	3-Hour	312.3	24.02%
		365	24-Hour	138.8	38.03%
CO	375.7	10,000	8-Hour	211.08	2.11%
		40,000	1-Hour	563.63	1.41%
NOX	4786	100	Annual	47.97	47.97%
VOC	53.8	0.12	1-Hour (ppm)	0	0.00%

30-00015	FLAKEBOARD AMERICA, LLC	MALVERN	321219	0688-AOP-R0	V
				0688-AOP-R1	V
				0688-AOP-R10	A
				0688-AOP-R2	V
				0688-AOP-R3	V
				0688-AOP-R4	V
				0688-AOP-R5	V
				0688-AOP-R6	V
				0688-AOP-R7	V
				0688-AOP-R8	V
				0688-AOP-R9	V

Pollutant	Emission Rate (lb/hr)	NAAQS Standard (µg/m3)	Averaging Time	Highest Concentration (µg/m3)	% of NAAQS
PM10	25.9	150	24-Hour	120.45051	80.30%
		80	Annual	2.80018	3.50%
SO2	3	1300	3-Hour	80.85395	6.22%
		365	24-Hour	37.65784	10.32%
CO	91	10,000	8-Hour	205.37388	2.05%
		40,000	1-Hour	310.26269	0.78%
NOX	67.5	100	Annual	1.62043	1.62%

30-00030	REYNOLDS CONSUMER PRODUCTS,LL	MALVERN	331315	0448-AOP-R0	V
				0448-AOP-R1	V
				0448-AOP-R2	V
				0448-AOP-R3	V
				0448-AOP-R4	V
				0448-AOP-R5	V
				0448-AOP-R6	V
				0448-AOP-R7	V
				0448-AOP-R8	A
				0488-AOP-R2	N
				0488-AOP-R3	N

Pollutant	Emission Rate (lb/hr)	NAAQS Standard (µg/m3)	Averaging Time	Highest Concentration (µg/m3)	% of NAAQS
PM10	14.76	150	24-Hour	108.7	72.47%
		80	Annual	0	0.00%
SO2	N/A	1300	3-Hour	0	0.00%
		365	24-Hour	0	0.00%
CO	N/A	10,000	8-Hour	0	0.00%
		40,000	1-Hour	0	0.00%
NOX	55.5	100	Annual	95	95.00%
Pb	0.03	0.15	Rolling 3-month Period over 3 years (not to be exceeded in any 3 month period)	0.07	46.67%

30-00039	NATURAL GAS PIPELINE #306	MALVERN	486210	1591-AOP-R0	V
				1591-AOP-R1	V
				1591-AOP-R2	V
				1591-AOP-R3	V
				1591-AOP-R4	V
				1591-AOP-R5	V
				1591-AOP-R6	V
				1591-AOP-R7	A
				1591-AOP-R8	P

Pollutant	Emission Rate (lb/hr)	NAAQS Standard (µg/m3)	Averaging Time	Highest Concentration (µg/m3)	% of NAAQS
PM10	13.1	150	24-Hour	4.08	2.72%
CO	265.4	10,000	8-Hour	208.24	2.08%
		40,000	1-Hour	374.08	0.94%
NOX	1126.4	100	Annual	38.6	38.60%

30-00071	PACTIV, LLC MALVERN	MALVERN	326140	0916-AOP-R0	V
				0916-AOP-R1	V
				0916-AOP-R2	V
				0916-AOP-R3	V
				0916-AOP-R4	V
				0916-AOP-R5	V
				0916-AOP-R6	A

Pollutant	Emission Rate (lb/hr)	NAAQS Standard (µg/m3)	Averaging Time	Highest Concentration (µg/m3)	% of NAAQS
PM10	1.5	150	24-Hour	8.261	5.51%

30-00081	ENABLE GAS TRANS/MALVERN	MALVERN	486210	1102-AOP-R0	V
				1102-AOP-R1	V
				1102-AOP-R2	V
				1102-AOP-R3	A
				1102-AOP-R4	P

Pollutant	Emission Rate (lb/hr)	NAAQS Standard (µg/m3)	Averaging Time	Highest Concentration (µg/m3)	% of NAAQS
PM10	4.79	150	24-Hour	3.66	2.44%
CO	50.3	10,000	8-Hour	77.16	0.77%
		40,000	1-Hour	141.53	0.35%
NOX	75.7	100	Annual	15.75	15.75%

30-00084	ANTHONY TIMBERLANDS	MALVERN	321113	1140-AOP-R0	V
				1140-AOP-R1	V
				1140-AOP-R2	V
				1140-AOP-R3	V
				1140-AOP-R4	A
				1140-AOP-R5	P

Pollutant	Emission Rate (lb/hr)	NAAQS Standard (µg/m3)	Averaging Time	Highest Concentration (µg/m3)	% of NAAQS
PM10	25.8	150	24-Hour	90	60.00%
SO2	0	80	Annual	0	0.00%
		1300	3-Hour	0	0.00%
		365	24-Hour	0	0.00%
CO	44.7	10,000	8-Hour	52	0.52%
		40,000	1-Hour	84	0.21%
Pb	0.004	0.15	Rolling 3-month Period over 3 years (not to be exceeded in any 3 month period)	0.0004	0.27%

30-00086	ACME BRICK-OEP PLANT	MALVERN	327120	1343-AOP-R0	V	Examination of the source type, location, plot plan, land use, emission parameters, and other available information indicate that modeling is not warranted at this time.
				1343-AOP-R1	V	
				1343-AOP-R2	V	
				1343-AOP-R3	W	

30-00229	ENTERGY AR,INC/HOT SPRING PLNT	MALVERN	221112	1936-AOP-R0	V
				1936-AOP-R1	V
				1936-AOP-R2	V
				1936-AOP-R3	V
				1936-AOP-R4	V
				1936-AOP-R5	V
				1936-AOP-R6	A

Pollutant	Emission Rate (lb/hr)	NAAQS Standard (µg/m3)	Averaging Time	Highest Concentration (µg/m3)	% of NAAQS
PM10	58.8	150	24-Hour	15.06124	10.04%
		80	Annual	0.18311	0.23%
SO2	27.5	1300	3-Hour	4.714	0.36%
		365	24-Hour	1.985	0.54%
CO	241.4	10,000	8-Hour	64.28	0.64%
		40,000	1-Hour	114.62	0.29%
NOX	94.2	100	Annual	0.844	0.84%
Pb	0.0005042	0.15	Rolling 3-month Period over 3 years (not to be exceeded in any 3 month period)	0	0.00%

30-00337	MAGNET COVE GENERATING STATION	MALVERN	221112	1987-AOP-R0	V
				1987-AOP-R1	V

Pollutant	Emission Rate (lb/hr)	NAAQS Standard (µg/m3)	Averaging Time	Highest Concentration (µg/m3)	% of NAAQS
PM10	80.4	150	24-Hour	3.17	2.11%

				Permit	Status
				1987-AOP-R2	V
				1987-AOP-R3	V
				1987-AOP-R4	V
				1987-AOP-R5	A

Pollutant	Emission Rate	NAAQS Standard	Averaging Time	Highest Concentration	% of NAAQS
		80	Annual	0.09	0.11%
SO2	9.6	1300	3-Hour	1.93	0.15%
		365	24-Hour	0.56	0.15%
CO	180.6	10,000	8-Hour	20.567	0.21%
		40,000	1-Hour	61.26	0.15%
NOX	86.6	100	Annual	0.23	0.23%

				Permit	Status
31-00010	CERTAINTEED GYPSUM MFG., INC	NASHVILLE	327420	0598-AOP-R0	V
				0598-AOP-R1	V
				0598-AOP-R2	V
				0598-AOP-R3	V
				0598-AOP-R4	V
				0598-AOP-R5	V
				0598-AOP-R6	V
				0598-AOP-R7	A

Pollutant	Emission Rate (lb/hr)	NAAQS Standard (µg/m3)	Averaging Time	Highest Concentration (µg/m3)	% of NAAQS
PM10	63.4	150	24-Hour	26.4	17.60%
CO	45.3	10,000	8-Hour	16.3	0.16%
		40,000	1-Hour	52.1	0.13%
NOX	55.3	100	Annual	1.4	1.40%
Pb	0.00133	0.15	Rolling 3-month Period over 3 years (not to be exceeded in any 3 month period)	0.002	1.33%

				Permit	Status
31-00016	WEYERHAEUSER-NR CO.-DIERKS	DIERKS	321113	0023-AOP-R0	V
				0023-AOP-R1	V
				0023-AOP-R10	P
				0023-AOP-R2	V
				0023-AOP-R3	V
				0023-AOP-R4	V
				0023-AOP-R5	V
				0023-AOP-R6	V
				0023-AOP-R7	V
				0023-AOP-R8	V
				0023-AOP-R9	A

Pollutant	Emission Rate (lb/hr)	NAAQS Standard ($\mu g/m^3$)	Averaging Time	Highest Concentration ($\mu g/m^3$)	% of NAAQS
PM_{10}	55.9	50	Annual	8.2	16.40%
		150	24-Hour	45.2	30%
SO_2	12.6	80	Annual	N/A	N/A
		1300	3-Hour	N/A	N/A
		365	24-Hour	N/A	N/A
VOC	365.6	0.12	1-Hour (ppm)	N/A	N/A
CO	313.3	10,000	8-Hour	126.2	1.30%
		40,000	1-Hour	181.9	0.50%
NO_X	99.3	100	Annual	47	47
Pb	0.02	0.15	Rolling 3-month Period over 3 years (not to be exceeded in any 3 month period)	0.002	1.3

				Permit	Status
31-00023	HUSQVARNA FORESTRY PROD.N..A.	NASHVILLE	333991	0349-AOP-R0	V
				0349-AOP-R1	V
				0349-AOP-R2	V
				0349-AOP-R3	V
				0349-AOP-R4	V
				0349-AOP-R5	P

Pollutant	Emission Rate (lb/hr)	NAAQS Standard ($\mu g/m^3$)	Averaging Time	Highest Concentration ($\mu g/m^3$)	% of NAAQS
PM_{10}	0.7	150	24-Hour	38.04	25.40%
SO_2		80	Annual		
		1300	3-Hour		
		365	24-Hour		
CO		10,000	8-Hour	2795	28.00%
		40,000	1-Hour	4643	11.60%
NO_x		100	Annual		
Pb		0.15	Rolling 3-month Period over 3 years (not to be exceeded in any 3 month period)		

				Permit	Status	
31-00107	UPPER SOUTHWEST ARK SW MGMT	NASHVILLE	562212	2241-AOP-R0	A	Examination of the source type, location, plot plan, land use, emission parameters, and other available information indicate that modeling is not warranted at this time.

32-00007	WHITE-RODGERS/EMERSON ELECTRIC	BATESVILLE	334512	0261-AOP-R0	V	No criteria pollutants met the significance level for modeling.
				0261-AOP-R1	V	
				0261-AOP-R2	V	
32-00014	ARK LIME-LIME PLANT	BATESVILLE	327410	0045-AOP-R0	V	
				0045-AOP-R1	V	
				0045-AOP-R2	V	
				0045-AOP-R3	V	
				0045-AOP-R4	V	
				0045-AOP-R5	V	
				0045-AOP-R6	A	
				0045-AOP-R7	P	

Pollutant	Emission Rate (lb/hr)	NAAQS Standard (µg/m^3)	Averaging Time	Highest Concentration (µg/m^3)	% of NAAQS
PM_{10}	63.4	150	24-Hour	117.832 + 30*	98.60%
SO_2	137.2	80	Annual	1.614	2.10%
		1300	3-Hour	112.775	8.70%
		365	24-Hour	22.641	6.30%
CO	267	10,000	8-Hour	175.904	1.80%
		40,000	1-Hour	607.16	1.60%
NO_x	321.6	100	Annual	5.077	5.10%
*The North Little Rock 2009 PM_{10} background value of 30 µg/m^3 was added to determine % of NAAQS					

32-00036	FUTUREFUEL CHEMICAL CO	BATESVILLE	325199	1085-AOP-R0	V	
				1085-AOP-R1	V	
				1085-AOP-R10	A	
				1085-AOP-R11	P	
				1085-AOP-R2	V	
				1085-AOP-R3	V	
				1085-AOP-R4	V	
				1085-AOP-R5	V	
				1085-AOP-R6	V	
				1085-AOP-R7	V	
				1085-AOP-R8	V	
				1085-AOP-R9	V	

Pollutant	Emission Rate (lb/hr)	NAAQS Standard (µg/m^3)	Averaging Time	Highest Concentration (µg/m^3)	% of NAAQS
PM_{10}	54.1	150	24-Hour	9.35	6
SO_2	1423.1	80	Annual	11.75	14.7
		1300	3-Hour	265.43	20.4
		365	24-Hour	71.43	19.6
CO	268.8	10,000	8-Hour	41.04	<1
		40,000	1-Hour	128.71	<1
NO_x	189	100	Annual	8.09	8
Pb	0.9	0.15	Rolling 3-Month	0.02**	13.3
		*Emergency generators were not modeled			
**H1H Monthly, 5 years of data					

32-00038	GDX NORTH AMERICA, INC.	BATESVILLE	326291	0315-AOP-R0	V	
				0315-AOP-R1	V	
				0315-AOP-R10	V	
				0315-AOP-R11	V	
				0315-AOP-R2	V	
				0315-AOP-R3	V	
				0315-AOP-R4	V	
				0315-AOP-R5	V	
				0315-AOP-R6	V	
				0315-AOP-R7	V	

Pollutant	**Emission Rate (lb/hr)**	**NAAQS Standard (µg/m^3)**	**Averaging Time**	**Highest Concentration (µg/m^3)**	**% of NAAQS**
VOC*	475	0.12	1-hour (ppm)	0.1157	96.50%
*** Used Scheffe Method**					

				0315-AOP-R8	V
				0315-AOP-R9	V
32-00042	ENTERGY ARKANSAS-INDEPENDENCE	NEWARK	221112	0449-AOP-R0	V
				0449-AOP-R1	V
				0449-AOP-R2	V
				0449-AOP-R3	V
				0449-AOP-R4	V
				0449-AOP-R5	V
				0449-AOP-R6	V
				0449-AOP-R7	V
				0449-AOP-R8	A
				0449-AOP-R9	P

Pollutant	Emission Rate (lb/hr)	NAAQS Standard (μg/m^3)	Averaging Time	Highest Concentration (μg/m^3)	% of NAAQS
PM_{10}	1,392.70	50	Annual	34.63716	69.30%
		150	24-Hour	148.57665	99.10%
SO_2	16,292.20	80	Annual	7.86022	9.90%
		1300	3-Hour	812.3476	62.50%
		365	24-Hour	246.31127	67.50%
VOC	105.4	0.12	1-Hour (ppm)	--	--
CO	6,480.40	10,000	8-Hour	385.49405	3.90%
		40,000	1-Hour	1241.37146	3.10%
NO_x	12,250.60	100	Annual	27.99792	28.00%
Pb	0.7	0.15	Rolling 3-month Period over 3 years (not to be exceeded in any 3 month period)	0.04073	27.20%

33-00013	UNILIN FLOORING, NC, LLC-	MELBOURNE	321918	0559-AOP-R0	V
				0559-AOP-R1	V
				0559-AOP-R2	V
				0559-AOP-R3	V
				0559-AOP-R4	V
				0559-AOP-R5	V
				0559-AOP-R6	V
				0559-AOP-R7	A
				0559-AOP-R8	P

Pollutant	Emission Rate (lb/hr)	NAAQS Standard (μg/m^3)	Averaging Time	Highest Concentration (μg/m^3)	% of NAAQS
PM_{10}	30.844 (33.3)	150	24-Hour	48.24*	32.16%
SO_2	4.65 (4.70)	80	Annual	1.487	1.86%
		1300	3-Hour	65.48	5.04%
		365	24-Hour	29.86	8.18%
CO	26.72 (26.8)	10,000	8-Hour	46.64	0.47%
		40,000	1-Hour	188.41	0.47%
NO_X	40.19 (40.2)	100	Annual	9.14	9.14%
Lead (Pb)	0.004087 -0.01	0.15	Rolling 3-month period over 3 years (not to be	0.002**	1.33%
*Background not added because concentratio n less than 50%. ** 24-hr					

34-00010	NORANDAL USA INC	NEWPORT	331315	0907-AOP-R0	V
				0907-AOP-R1	V
				0907-AOP-R2	V
				0907-AOP-R3	V
				0907-AOP-R4	V
				0907-AOP-R5	A

Pollutant	Emission Rate (lb/hr)	Emission Rate (tpy)	NAAQS Standard (μg/m^3)	Averaging Time	Highest Concentration (μg/m^3)	% of NAAQS
PM10	3.2	6.3	50	Annual	Modeling not necessary <100 tpy	
			150	24-Hour		
SO_2	3.1	3.1	80	Annual	Modeling not necessary <100 tpy	
			1300	3-Hour		
			365	24-Hour		
VOC	3.1	4.2	0.12	1-Hour (ppm)	0.056 ppm	46%
VOC OILS	1156.9	2556.4				
VOC COATINGS	772.7	1172				
VOC total	1932.7	3732.6				
CO	8	26.2	10,000	8-Hour	Modeling not necessary <100 tpy	
			40,000	1-Hour		
NO_x	8.4	35.4	100	Annual	Modeling not necessary <100 tpy	

34-00033	ARK STEEL ASSOCIATES	NEWPORT	331110	0035-AOP-R0	V
				0035-AOP-R1	V
				0035-AOP-R10	V
				0035-AOP-R11	V
				0035-AOP-R12	A
				0035-AOP-R13	P
				0035-AOP-R14	P

Pollutant	Emission Rate (lb/hr)	NAAQS Standard (μg/m^3)	Averaging Time	Highest Concentration (μg/m^3)	% of NAAQS
PM_{10}	15.5	150	24-Hour	87.8	58.53
SO_2	42.1	80	Annual	8.6	10.75
		1300	3-Hour	246	18.92
		365	24-Hour	93	25.48
CO	469.7	10,000	8-Hour	1538	15.38
		40,000	1-Hour	5040	12.6
NO_x	77.4	100	Annual	10.5	10.5
Pb	0.41	0.15	Rolling 3-month Period over 3 years (not to be	0.046 (highest month)	30.6

				0035-AOP-R2	V
				0035-AOP-R3	V
				0035-AOP-R4	V
				0035-AOP-R5	V
				0035-AOP-R6	V
				0035-AOP-R7	V
				0035-AOP-R8	V
				0035-AOP-R9	V

exceeded in any 3 month period)

34-00109	CENTERPOINT ENERGY/DIAZ	DIAZ	486210	1246-AOP-R0	V
				1246-AOP-R1	V

Pollutant	Emission Rate (lb/hr)	NAAQS Standard (μg/m^3)	Averaging Time	Highest Concentration (μg/m^3)	% of NAAQS
NO_x	25.8	100	Annual	20.8	21%
CO	87	10,000	8-Hour	490.3	5%
		40000	1-Hour	700.5	2%

34-00111	ENABLE MISS. RIVER TRANS.	TUCKERMAN	486210	1419-AOP-R0	V
				1419-AOP-R1	V
				1419-AOP-R2	V
				1419-AOP-R3	V
				1419-AOP-R4	A
				1419-AOP-R5	P

Pollutant	Emission Rate (lb/hr)	NAAQS Standard (μg/m^3)	Averaging Time	Highest Modeled Concentration (μg/m^3)	Highest Concentration with Background (μg/m^3)	% of NAAQS
PM_{10}	1.8	50	Annual	0.5	20.5	41.00%
		150	24-Hour	4.7	41.7	27.80%
CO	48.2	10,000	8-Hour	232.5	1950.3	19.50%
		40,000	1-Hour	318.5	3181.5	8.00%
NO_x	281	100	Annual	60.1	76.3	76.30%

* Background – PM10: Annual - 20μg/m^3 , 24-hr - 37μg/m^3 ; CO: 8 hr – 1717.8 μg/m^3, 1 hr 2863.0 μg/m^3; NO_x: Annual – 16.196 μg/m^3

34-00259	DUKE ENERGY,JACKSON FACILITY	NEWPORT		1998-AOP-R0	V

Pollutant	Emission Rate (lb/hr)	NAAQS Standard (μg/m^3)	Averaging Time	Highest Concentration (μg/m^3)	% of NAAQS
PM_{10}	68.50	50	Annual	0.39	1%
		150	24-Hour	4.12	3%
SO_2	14.20	80	Annual	0.22	0%
		1300	3-Hour	7.04	1%
		365	24-Hour	2.42	1%
NO_x	91.4	100	Annual	0.97	100%
VOC	40.20	0.12	1-Hour (ppm)	0.02	17%
CO	277.60	10,000	8-Hour	110.16	1%
		40,000	1-hour	273.37	1%

35-00013	CENTRAL MOLONEY-2400 WEST 6TH	PINE BLUFF	335311	0370-AOP-R0	V
				0370-AOP-R1	V
				0370-AOP-R2	V

Pollutant	**Emission Rate (lb/hr)**	**NAAQS Standard (μg/m^3)**	**Averaging Time**	**Highest Concentration (μg/m^3)**	**% of NAAQS**
VOC	213.2	0.12	1-hour (ppm)	(+0.008ppm)	7%

35-00016	EVERGREEN PACKAGING, ING	PINE BLUFF	322121	0580-AOP-R0	V
				0580-AOP-R1	V
				0580-AOP-R10	V
				0580-AOP-R11	A

Pollutant	Emission Rate (lb/hr)	NAAQS Standard (μg/m^3)	Averaging Time	Highest Concentration (μg/m^3)*	% of NAAQS
PM_{10}	337.6	150	24-Hour	118.3*	78.90%
		80	Annual	31.6*	39.50%
SO_2	1617.3	1300	3-Hour	1,035.3*	79.60%
		365	24-Hour	363.1*	99.50%
CO	1634.6	10,000	8-Hour	2,622.4*	26.20%

0580-AOP-R12	P
0580-AOP-R2	V
0580-AOP-R3	V
0580-AOP-R4	V
0580-AOP-R5	V
0580-AOP-R6	V
0580-AOP-R7	V
0580-AOP-R8	V
0580-AOP-R9	V

[illegible]	[illegible]	40,000	1-Hour	4,440.5*	11.10%
NO_x[1]	1424.2	100	Annual	46.0*	46.00%
Pb	0.40509	0.15	Rolling 3-month Period over 3 years (not to be exceeded in any 3 month period)	0.025**	16.70%

1. All NO_x were assumed to be NO_2.

*Includes background concentrations of 36 $\mu g/m^3$ for PM_{10}, 17 $\mu g/m^3$ for NO_x, 2176 $\mu g/m^3$ for CO 1-hour standard, 1718 $\mu g/m^3$ for CO 8-hour, 65 $\mu g/m^3$ for SO_2 3-hour, 17 $\mu g/m^3$ for SO_2 24-hour, and 5 $\mu g/m^3$ for SO_2 annual standards.

**The highest modeled monthly concentration for the 2005 through 2009 time period was 0.025 $\mu g/m^3$. Therefore, the quarterly average and the 3-month rolling average would not exceed the NAAQS.

35-00017	MONDI BAGS USA, LLC	PINE BLUFF	322121	0385-AOP-R0	V
				0385-AOP-R1	V
				0385-AOP-R2	V
				0385-AOP-R3	V
				0385-AOP-R4	V
				0385-AOP-R5	V
				0385-AOP-R6	V
				0385-AOP-R7	V

Pollutant	Emission Rate (lb/hr)	NAAQS Standard ($\mu g/m^3$)	Averaging Time	Highest Concentration ($\mu g/m^3$)	% of NAAQS
PM_{10}	109.19	150	24-Hour	110 -145	73 -97
		80	Annual	2.3	2.9
SO_2	34	1300	3-Hour	27.52	2.1
		365	24-Hour	13.69	3.8
CO	7,913.70	10,000	8-Hour	2,646	26.5
		40,000	1-Hour	4,643	11.6
NO_x	86.8	100	Annual	9.8	9.8
Pb	0.0243	0.15	Rolling 3-month Period over 3 years (not to be exceeded in any 3 month period)	0.0087*	5.8

				0385-AOP-R8	A	*Modeled 1st High on a monthly basis- no further processing needed since it passes.
				0385-AOP-R9	P	
35-00025	PLANTERS COTTON OIL MILL, INC	PINE BLUFF	311224	1427-AOP-R0	V	
				1427-AOP-R1	V	
				1427-AOP-R10	V	
				1427-AOP-R11	V	
				1427-AOP-R12	V	(see modeling table below)
				1427-AOP-R13	A	
				1427-AOP-R2	V	
				1427-AOP-R3	V	
				1427-AOP-R4	V	
				1427-AOP-R5	V	
				1427-AOP-R6	V	
				1427-AOP-R7	V	
				1427-AOP-R8	V	
				1427-AOP-R9	V	
35-00058	VARCO-PRUDEN BUILDINGS	PINE BLUFF		0721-AOP-R0	V	
				0721-AOP-R1	V	
				0721-AOP-R2	V	
				0721-AOP-R3	V	Examination of the source type, location, plot plan, land use, emission parameters, and other available information indicate that modeling is not warranted at this time.
35-00110	ENTERGY ARKANSAS-WHITE BLUFF	REDFIELD	221112	0263-AOP-R0	V	(see modeling table below)
				0263-AOP-R1	V	
				0263-AOP-R2	V	
				0263-AOP-R3	V	
				0263-AOP-R4	V	
				0263-AOP-R5	V	

1427-AOP-R12:

Pollutant	Emission Rate (lb/hr)	NAAQS Standard (μg/m^3)	Averaging Time	Highest Concentration (μg/m^3)	% of NAAQS
PM_{10}	15.2	150	24-Hour	142.12* -107.12	95 71
Pb	0.000022	0.15	Rolling 3-month Period over 3 years (not to be exceeded in any 3 month period)	0.009**	6

*2012 background for Little Rock has been added.

**1st Monthly High over a 3-year period (2007-2009). Lead did not increase with R12 and the lead modeling info is from the R11 renewal.

0263-AOP-R0 – R5:

Pollutant	Emission Rate (lb/hr)	NAAQS Standard (μg/m^3)	Averaging Time	Highest Concentration (μg/m^3)	% of NAAQS
PM_{10}	1493.3	150	24-Hour	121.7	81.10%
SO_2	20990.1	80	Annual	11.42	14.30%
		1300	3-Hour	426.4	32.80%
		365	24-Hour	128.3	35.20%
CO	6508.8	10,000	8-Hour	1809.5	18.10%
		40,000	1-Hour	3084	7.71%
NO_x	12240.2	100	Annual	33.1	33.10%
Lead	0.5	0.15	3 month rolling	< 0.01	< 6.7%

Background
– PM10 - 47;
SO2 – 39.3,
13.1, 5.2; CO
– 2863,
1717.8; NOx
– 19.2 ug/m3

0263-AOP-R6 V
0263-AOP-R7 V
0263-AOP-R8 A
0263-AOP-R9 P

35-00116 PINE BLUFF ARSENAL PINE BLUFF 928110

1113-AOP-R0 V
1113-AOP-R1 V
1113-AOP-R10 A
1113-AOP-R11 P
1113-AOP-R2 V
1113-AOP-R3 V
1113-AOP-R4 V
1113-AOP-R5 V
1113-AOP-R6 V
1113-AOP-R7 V
1113-AOP-R8 V
1113-AOP-R9 V

Pollutant	Emission Rate (lb/hr)	NAAQS Standard (μg/m^3)	Averaging Time	Highest Concentration (μg/m^3)	% of NAAQS
PM_{10}	104.2	50	Annual	29.41 (includes background)	58.82%
		150	24-Hour	135.25 (includes background)	90.16%
VOC	-------	0.12	1-Hour (ppm)	N/A	N/A
CO	434.5	10,000	8-Hour	1949.32	19.50%
		40,000	1-Hour	6107.5	15.04%
NO_X	483.5	100	Annual	6.31844	6.30%
Lead	1.35	1.5	Quarterly	0.2688	17.92%

35-00117 SOUTHWIND MILLING CO, LLC PINE BLUFF 311212

0533-AOP-R0 V
0533-AOP-R1 V
0533-AOP-R2 V
0533-AOP-R3 V
0533-AOP-R4 V

Examination of the source type, location, plot plan, land use, emission parameters, and other available information indicate that modeling is not warranted at this time.

35-00170 WASTE MGMT ARK-PINE BLUFF PINE BLUFF 562212

1887-AOP-R0 V
1887-AOP-R1 V
1887-AOP-R2 V
1887-AOP-R3 V
1887-AOP-R4 A

Pollutant	Emission Rate (lb/hr)	NAAQS Standard (μg/m^3)	Averaging Time	Highest Concentration (μg/m^3)	% of NAAQS
PM_{10}	27.3	150	24-Hour	147.59036*	98.40%
SO_2	7.9	80	Annual	3.56843	4.46%
		1300	3-Hour	87.89321	6.77%
		365	24-Hour	40.77309	11.18%
VOC	15.4	0.12	1-Hour (ppm)	--	--
CO	24.8	10,000	8-Hour	199.57755	2.00%
		40,000	1-Hour	387.61359	0.97%
NO_x	4.6	100	Annual	2.07782	2.08%
Pb	N/A	0.15	Rolling 3-month Period over 3 years	N/A	N/A
	* Includes background of 38 μg/m^3 (Little Rock 2010).				

35-00213 BERENFIELD CONTAINERS PINE BLUFF 332439

1056-AOP-R0 V
1056-AOP-R1 V
1056-AOP-R2 V
1056-AOP-R3 V
1056-AOP-R4 V

Pollutant	Emission Rate (lb/hr)	NAAQS Standard (μg/m^3)	Averaging Time	Highest Concentration (μg/m^3)	% of NAAQS
PM_{10}	4.2	50	Annual	1.31	2.60%
		150	24-Hour	6.97	4.60%
SO_2	0.3	80	Annual	0.09	0.11%
		1300	3-Hour	2.44	0.20%
		365	24-Hour	1	0.27%
CO	0.6	10,000	8-Hour	3.94	0.04%
		40,000	1-Hour	6.83	0.02%

				1056-AOP-R5	V

NOx	0.6	100	Annual	0.2	0.19%

				1056-AOP-R6	V
				1056-AOP-R7	V
				1056-AOP-R8	A
35-00266	CENTERPOINT ENERGY/SHERRILL	SHERRILL	486210	1245-AOP-R0	V

Pollutant	Emission Rate (lb/hr)	NAAQS Standard (μg/m³)	Averaging Time	Highest Concentration (μg/m³)	% of NAAQS
NOx	201	100	Annual	20.1	20.00%
Ozone**	8.4	0.12 (ppm)	1-Hour	(+0.011 ppm)	9.00%
CO	106	10,000	8-Hour	38.07	0.00%
		40,000	1-Hour	54.39	0.00%

35-00409	PINE BLUFF ENERGY LLC	PINE BLUFF	221112	1822-AOP-R0	V
				1822-AOP-R1	V
				1822-AOP-R2	V
				1822-AOP-R3	V
				1822-AOP-R4	V
				1822-AOP-R5	A

Pollutant	Emission Rate (lb/hr)	NAAQS Standard (μg/m³)	Averaging Time	Highest Concentration (μg/m³)	% of NAAQS
PM_{10}	30.1	50	Annual	0.12992*	0.26%
		150	24-Hour	1.04993*	0.70%
SO_2	117.2	80	Annual	0.4	0.50%
		1300	3-Hour	9.7	0.80%
		365	24-Hour	3.4	1%
CO	169.4	10,000	8-Hour	14.1	0.14%
		40,000	1-Hour	25.7	0.07%
NO_x	411.1	100	Annual	10.96	11%
Pb	0.03208	0.15	Rolling 3-month Period over 3 years (not to be exceeded in any 3 month period)	0.00039**	0.26%
* Does not include background. ** 1 Month high.					

35-01477	Highland Pellets, LLC	Pine Bluff	321113	2341-AOP-R0	P	Reserved
36-00004	ACME BRICK CO-EBP PLANT	CLARKSVILLE	327120	1515-AOP-R0	V	
				1515-AOP-R1	V	
				1515-AOP-R2	V	Examination of the source type, location, plot plan, land use, emission parameters, and other available information indicate that modeling is not warranted at this time.
				1515-AOP-R3	V	
				1515-AOP-R4	A	
36-00005	TRACKER MARINE- KENNER PLANT	KNOXVILLE		1606-AOP-R0	V	
				1606-AOP-R1	V	
				1606-AOP-R2	V	
				1606-AOP-R3	V	
				1606-AOP-R4	V	

Pollutant	Emission Rate (lb/hr)	NAAQS Standard (μg/m³)	Averaging Time	Highest Concentration (μg/m³)	% of NAAQS
PM_{10}	Less than 100 tpy	50	Annual		0%
		150	24-Hour		0%
SO_2	Less than 100 tpy	80	Annual		0%
		1300	3-Hour		0%
		365	24-Hour		0%
NOx	Less than 100 tpy	10,000	8-Hour		0%
		40,000	1-Hour		0%
VOC	139.2	0.12	Annual	0.014	12%
CO	Less than 100 tpy	10,000	8-Hour		0%
		40,000	1-Hour		0%

36-00015	GREENVILLE TUBE COMPANY, LLC	CLARKSVILLE	331210	0161-AOP-R0	V
				0161-AOP-R1	V
				0161-AOP-R2	V
				0161-AOP-R3	V
				0161-AOP-R4	V

Pollutant	Emission Rate (lb/hr)	Modeling Results (µg/m³)	Back-ground Conc. (µg/m³)	Highest Concentration (µg/m³)	NAAQS Standard (µg/m³)	Averaging Time	% of NAAQS
PM_{10}	0.41	6.64	46	52.64	150	24-hour	35.10%
		1.52	23.2	24.72	50	Annual	49.50%

36-00161	SOURCEGAS ARK-BATSON COMP	OAKGROVE	486210	1449-AOP-R0	V
				1449-AOP-R1	V
				1449-AOP-R2	V
				1449-AOP-R3	V
				1449-AOP-R4	V

Pollutant	Emission Rate (lb/hr)	NAAQS Standard (µg/m³)	Averaging Time	Highest Concentration (µg/m³)	% of NAAQS
PM_{10}	0.2	50	Annual	0.09978	
		150	24-Hour	1.66375	
CO	32.784	10,000	8-Hour	446.933	
		40,000	1-Hour	784.44	
NO_x	52.889	100	Annual	33.569	33.50%

36-00181	XTO-ENERGY, MCMILLAN COMP. STA	CLARKSVILLE	486210	1935-AOP-R0	V

Pollutant	Emission Rate (lb/hr)	NAAQS Standard (µg/m³)	Averaging Time	Highest Concentration (µg/m³)	% of NAAQS
PM_{10}	not listed in permit	50	Annual		0%
		150	24-Hour		0%
SO_2	not listed in permit	80	Annual		0%
		1300	3-Hour		0%
		365	24-Hour		0%
NOx	28.2	100	Annual	4	4%
VOC	Modeling NR	0.12	1-Hour (ppm)		0%
CO	38.8	10,000	8-Hour	38.5	0%
		40,000	1-Hour	55	0%

37-00004	ENTERGY ARKANSAS-HARVEY COUCH	STAMPS	221112	1759-AOP-R0	V
				1759-AOP-R1	V
				1759-AOP-R2	V
				1759-AOP-R3	V
				1759-AOP-R4	V
				1759-AOP-R5	V
				1759-AOP-R6	V
				1759-AOP-R7	V

Pollutant	Emission Rate (lb/hr)	NAAQS Standard (µg/m³)	Averaging Time	Highest Concentration (µg/m³)	% of NAAQS
PM_{10}	132.2	50	Annual	24.3	49%
		150	24-Hour	54.38	37%
SO_2	2009.6	80	Annual	19.04	24%
		1300	3-Hour	457.53	36%
		365	24-Hour	170.92	47%
CO	161.3	10,000	8-Hour	18.56	0.20%
		40,000	1-Hour	31.79	0.10%
NO_x	1102.4	100	Annual	11.11	12%
Pb	0.03	0.15	Rolling 3-month Period over 3 years (not to be exceeded in any 3 month period)	0.0002	0.20%

37-00005	BONANZA CREEK ENERGY RESOURCE	STAMPS	211111	1742-AOP-R0	V
				1742-AOP-R1	V
				1742-AOP-R2	V
				1742-AOP-R3	V
				1742-AOP-R4	V

Pollutant	**Emission Rate (lb/hr)**	**NAAQS Standard (µg/m³)**	**Averaging Time**	**Highest Concentration (µg/m³)**	**% of NAAQS**
PM_{10}	No modeling required since less than 100 tpy				
SO_2*	917.1	80	Annual	16.59 (w/o SN-04)	20%
				19.87 (w/o SN-05)	24%
		1,300	3-hour	912.43 (w/o SN-04)	70%**
				490.46 (w/o SN-05)	37%
		365	24-hour	174.3 (w/o SN-04)	47%
				140.17 (w/o SN-05)	38%
NO_x	No modeling required since less than 100 tpy				
CO	39	10,000	8-hour	4902	49%
		40,000	1-hour	7831	19%
VOC	No modeling required since less than 100 tpy				

37-00105	FALCON PRODUCTS	LEWISVILLE	337214	1062-AOP-R0	V	Criteria pollutant emissions were not modeled in this analysis because the emission of these pollutants did not qualify as being a major source.
39-00023	USA COE HUXTABLE PUMPING STAT	MARIANNA	924110	1793-AOP-R0	V	
				1793-AOP-R1	V	
				1793-AOP-R2	A	
				1793-AOP-R3	P	
				1793-AOP-R4	P	

Pollutant	Emission Rate (lb/hr)	NAAQS Standard (µg/m^3)	Averaging Time	Highest Concentration (µg/m^3)	% of NAAQS
PM_{10}	16.7	150	24-Hour	146.6[a]	97.80%
SO_2	1.5	80	Annual	12.8[b]	16.00%
		1300	3-Hour	47.5[c]	3.70%
		365	24-Hour	42.5[d]	11.70%
CO	74.8	10,000	8-Hour	2969.7[e]	29.70%
		40,000	1-Hour	5026.6[f]	12.60%
NO_x	67.3	100	Annual	77.4[g]	77.40%
Pb	N/A	0.15	Rolling 3-month Period over 3 years (not to be exceeded in any 3 month period)	N/A	N/A

a. Includes background concentration of 30 µg/m^3, NLR, 2009.
b. Includes background concentration of 7.9 µg/m^3, Memphis, 2008.
c. Includes background concentration of 28.8 µg/m^3, Memphis, 2008.
d. Includes background concentration of 31.4 µg/m^3, Memphis, 2008.
e. Includes background concentration of 1,603.3 µg/m^3, Memphis, 2008.
f. Includes background concentration of 2,863 µg/m^3, Memphis, 2008.

g. Includes background concentration of 17 µg/m^3, Crittenden County, 2009. Also used 75% factor.

40-00041	ENABLE MISS. RIVER/GLENDALE	GLENDALE	486210	1424-AOP-R0	V
				1424-AOP-R1	V
				1424-AOP-R2	V
				1424-AOP-R3	V
				1424-AOP-R4	V
				1424-AOP-R5	A

Pollutant	Emission Rate (lb/hr)	NAAQS Standard (µg/m^3)	Averaging Time	Highest Concentration (µg/m^3)	% of NAAQS
PM_{10}	1.4	150	24-Hour	3.4	2.3
CO	245.2	10,000	8-Hour	1280.1	12.8
		40,000	1-Hour	1863.1	4.7
NO_x	223.2	100	Annual	49.7	49.7
Pb	N/A	0.15	Rolling 3-month Period over 3 years (not to be exceeded in any 3 month period)	N/A	N/A

41-00001	ASH GROVE CEMENT	FOREMAN	327310	0075-AOP-R0	V
				0075-AOP-R1	V
				0075-AOP-R10	V
				0075-AOP-R11	V
				0075-AOP-R12	V
				0075-AOP-R13	V
				0075-AOP-R14	V
				0075-AOP-R15	V

Pollutant	Emission Rate (lb/hr)	NAAQS Standard (µg/m^3)	Averaging Time	Highest Concentration (µg/m^3)	% of NAAQS
PM_{10}	83.8	150	24-Hour	145.5462[b]	97%
SO_2	618.1	80	Annual	23.6[a]	30%
		1300	3-Hour	882.6 [a]	68%
		365	24-Hour	268.6 [a]	74%
CO	2503.3	10,000	8-Hour	1169.0 [a]	12%
		40,000	1-Hour	4366.8 [a]	11%
NO_x	685.6	100	Annual	51.1 [a]	51%
Pb	0.14	0.15	Rolling 3-month Period over 3 years (not to be exceeded in any 3 month period)	0.00063[c]	0.50%

a. These modeling results were obtained through detailed modeling performed by the facility in Permit # 0075-AOP-R7. There were no increases in emissions from these pollutants.

				0075-AOP-R16	A	b. Modeled result of 97.5462 µg/m³ plus background of 48 µg/m³ (Little Rock 2007). The PM_{10} modeling results were obtained through detailed modeling performed by the facility in Permit 0075-AOP-R13. There were no permitted increases in PM_{10} emissions. c. Modeled as the 1st highest Month, therefore it is impossible for the rolling 3-month average to exceed the NAAQS.
				0075-AOP-R17	P	
				0075-AOP-R2	V	
				0075-AOP-R3	V	
				0075-AOP-R4	V	
				0075-AOP-R5	V	
				0075-AOP-R6	V	
				0075-AOP-R7	V	
				0075-AOP-R8	V	
				0075-AOP-R9	V	
41-00002	DOMTAR A.W. ,LLC	ASHDOWN	322121	0287-AOP-R0	V	(see table below)
				0287-AOP-R1	V	
				0287-AOP-R10	V	
				0287-AOP-R11	V	
				0287-AOP-R12	V	
				0287-AOP-R13	V	
				0287-AOP-R14	V	
				0287-AOP-R15	A	
				0287-AOP-R16	P	

Pollutant	Emission Rate (lb/hr)	NAAQS Standard (µg/m³)	Averaging Time	Highest Concentration (µg/m³)*	% of NAAQS
PM_{10}	472.9	150	24-Hour	125.4 [A]	81.6
		80	Annual	63	78.8
SO_2	3,112.40	1300	3-Hour	1,024	78.8
		365	24-Hour	337	92.3
CO	3,000.80	10,000	8-Hour	216	2.2
		40,000	1-Hour	664	1.7
NO_x	1,902.80	100	Annual	74	74
Pb	0.17	0.15	Rolling 3-month Period over 3 years (not to be exceeded in any 3 month period)	0.014	7.3

[A] Includes Little Rock 2009 background concentration of 38 mg/m³

[B] Includes background for 2010 El Dorado (SO_2) and Little Rock (NO_2)

41-00370	SPECIALTY MINERALS, INC	ASHDOWN	424690	2337-AOP-R0	A	No SOB
42-00056	TYSON POULTRY-RIVER VALLEY	SCRANTON	311613	0792-AOP-R0	V	(see table below)
				0792-AOP-R1	V	
				0792-AOP-R2	V	
				0792-AOP-R3	V	
				0792-AOP-R4	V	
				0792-AOP-R5	V	

Pollutant	Emission Rate (lb/hr)	NAAQS Standard ($\mu g/m^3$)	Averaging Time	Highest Concentration ($\mu g/m^3$)	% of NAAQS
PM_{10}		50	Annual	1.68	3.30%
		150	24-hour	13.9	9.20%
SO_2		80	Annual		0%
		1,300	3-hour		0%
		365	24-hour		0%
NO_X		100	Annual		0%
VOC		0.12	1-hour (ppm)		0%
CO		10,000	8-hour	233.5	2.30%
		40,000	1-hour	304.4	0.70%

42-00064	SPANG & CO-MAGNETICS FERRITE	BOONEVILLE	335314	0899-AOP-R0	V	Examination of the source type, location, plot plan, land use, emission parameters, and other available information indicate that modeling is not warranted at this time.
42-00088	ENABLE GAS TRANS/TRANS-DUNN	MAGAZINE	486210	1209-AOP-R0	V	(see table below)
				1209-AOP-R1	V	
				1209-AOP-R2	V	
				1209-AOP-R3	V	
				1209-AOP-R4	V	
				1209-AOP-R5	A	
				1209-AOP-R6	P	

Pollutant	Emission Rate (lb/hr)	NAAQS Standard ($\mu g/m^3$)	Averaging Time	Highest Concentration ($\mu g/m^3$)	% of NAAQS
PM_{10}	5.8	50	Annual	0.7	1.4
		150	24-Hour	4.06	2.7
SO_2	Less than 100 tpy				
VOC	Less than 100 tpy				
CO	46.1	10,000	8-Hour	24.9	0.30%
		40,000	1-Hour	89.4	0.20%
NO_x	708.6	100	Annual	79.78*	79.78*
		188	1-Hour	na	Na
	*Modeled result of 70.78735 ug/m^3 and background of 8.998 ug/m^3.				

42-00108	ENABLE MIDSTREAM/CHISMVILLE	CHISMVILLE	486210	1907-AOP-R0	V	(see table below)

Pollutant	Emission Rate (lb/hr)	NAAQS Standard ($\mu g/m^3$)	Averaging Time	Highest Concentration ($\mu g/m^3$)	% of NAAQS
NO_X	33.3	100	Annual	6.2	6.20%
VOC	not applicable, emissions are < 500 tons per year				
CO	36	10,000	8-hour	9.6	<1%
		40,000	1-hour	21.3	<1%

42-00119	PINE BLUFF SAND & GRAVEL CO	DELAWARE	212319	0174-AOP-R2	V	Examination of the source type, location, plot plan, land use, emission parameters, and other available information indicate that modeling is not warranted at this time.
				1747-AOP-R0	V	

				1747-AOP-R1	V
				1747-AOP-R2	V
				1747-AOP-R3	V
42-00207	ENABLE MIDSTREAM/	BROWNSVILLE	486210	1906-AOP-R0	V

Pollutant	Emission Rate (lb/hr)	NAAQS Standard (μg/m^3)	Averaging Time	Highest Concentration (μg/m^3)	% of NAAQS
NO_X	38.6	100	Annual	39.72	40%
CO	33.9	10,000	8-hour	9.6	<1%
		40,000	1-hour	21.2	<1%
VOC	not applicable, emissions are < 100 tons per year				
Modeling was conducted using Fort Smith five-year Metdata, 2001 – 2005					

				1906-AOP-R1	V
				1906-AOP-R2	V
				1906-AOP-R3	V
42-00212	ARMBRUSTER COMPRESSOR STATIOI	NEW BLAINE	22121	1969-AOP-R0	V

Pollutant	Emission Rate	NAAQS	Averaging Time	Highest Concentration	% of NAAQS
PM10	N/A	50	annual		0
		150	24-hour		0
		80	Annual		0%
		1,300	3-hour		0%
SO2	NA	365	24-hour		0%
NOX	24.8	100	Annual	21.5	22%
VOC	NA	0.12	1-hour (ppm)		0%
		10,000	8-hour		0%
CO	NA	40,000	1-hour		0%

42-00238	ENABLE MIDSTREAM/BROWNSVILLE	BOONEVILLE	486210	2054-AOP-R0	V
				2054-AOP-R1	V

Pollutant	Emission Rate (lb/hr)	NAAQS Standard (μg/m^3)	Averaging Time	Highest Concentration (μg/m^3)	% of NAAQS
NO_X	168.2	100	Annual	7.2	7.20%
CO	*196.7	10,000	8-hour	188.55	1.90%
		40,000	1-hour	279.11	<1%
***Current permit action pound per hour of CO is 45 lb/hr.**					

				2054-AOP-R2	V
43-00093	ENABLE MISS. RIVER/CARLISLE	CARLISLE	486210	1244-AOP-R0	V
				1244-AOP-R1	V
				1244-AOP-R2	V
				1244-AOP-R3	V

Pollutant	Emission Rate (lb/hr)	NAAQS Standard (μg/m^3)	Averaging Time	Highest Concentration (μg/m^3)	% of NAAQS
PM_{10}	1.7	50	Annual	23.31*	47%
		150	24-Hour	45.62*	31%
CO	436.1	10,000	8-Hour	2602.7	26%
		40,000	1-Hour	3483.57	9%
NO_X	344.7	100	Annual	85.58	86%
* PM_{10} highest concentrations include background of 23 μg/m^3 (annual) and 43 μg/m^3 (24-hour)					

				1244-AOP-R4	V
				1244-AOP-R5	A
43-00131	GRACE COMPOSITES, LLC	LONOKE	326122	2141-AOP-R0	A

Pollutant	Emission Rate (lb/hr)	NAAQS Standard	Averaging Time	Highest Concentration	% of NAAQS

		($\mu g/m^3$)		($\mu g/m^3$)	
PM_{10}	3.6	150	24-Hour	112.05	74.70%

43-00202	TENASKA AR. GENERATING STATION	KEO		1959-AOP-R0	V

pollutant	avg. time	total ipact	naaqs	% naaqs
PM	annual	35	50	70
	24-hour	56.2	150	37.5
SO2	annual	9	80	11.3
	24-hour	62	365	17
	3-hour	168	1300	12.9

pollutant	avg period	psd class II increment	Max Predicted Concentration	Percent of Standard	Percent of available increment
PM10	annual	17	0.69	4.1	4.2
	24-hour	30	9.47	31.6	--
SO2	annual	20	0.97	4.9	5.1
	24-hour	91	13.8	15	--
	3-hour	512	98.1	19	--

43-00203	GENPOWER/KEO	KEO		1963-AOP-R0	V

Pollutant	Emission Rate (lb/hr)	NAAQS Standard ($\mu g/m^3$)	Averaging Time	Highest Concentration ($\mu g/m^3$)	% of NAAQS
		80	Annual	0.50	1%
		1,300	3-hour	5.73	0%
SO2	8.7	365	24-hour	2.54	1%
NOX	71.8	100	Annual	11.66	12%
VOC	24.8	0.12	1-hour (ppm)	-	0%
		10,000	8-hour	128.46	1%
CO	127.5	40,000	1-hour	183.52	0%

43-00565	ENGLAND OIL FIELD SERVICES,INC	ENGLAND	333132	2151-AOP-R0	A

reserved

45-00008	FISHING HOLDINGS, LLC	FLIPPIN	336612	0979-AOP-R0	V
				0979-AOP-R1	V
				0979-AOP-R2	V
				0979-AOP-R3	V
				0979-AOP-R4	V
				0979-AOP-R5	V
				0979-AOP-R6	V
				0979-AOP-R7	V
				0979-AOP-R8	V
				0979-AOP-R9	A

Pollutant	Emission Rate (lb/hr)	NAAQS Standard ($\mu g/m^3$)	Averaging Time	Highest Concentration ($\mu g/m^3$)	% of NAAQS
PM_{10}	10	150	24-Hour	113.8 (148.8)*	99%
*Includes Background					

46-00005	COOPER TIRE & RUBBER COMPANY	TEXARKANA	326211	0957-AOP-R0	V
				0957-AOP-R1	V
				0957-AOP-R10	V
				0957-AOP-R11	V
				0957-AOP-R12	A
				0957-AOP-R2	V
				0957-AOP-R3	V

Pollutant	Emission Rate (lb/hr)	NAAQS Standard ($\mu g/m^3$)	Averaging Time	Highest Concentration ($\mu g/m^3$)	% of NAAQS
PM_{10}	21	50	Annual	37.3	74.6
		150	24-Hour	144	96
SO_2	63.3	80	Annual	6.58	8.3
		1300	3-Hour	172.3	13.3
		365	24-Hour	67.55	18.5
NO_x	99.9	100	Annual	2.89	2.89
Pb	0.00835	0.15	Rolling 3-month Period over 3 years (not to be exceeded in any 3 month period)	0.147	98%

Note: For PM_{10} the highest concentration reported includes Shreveport, LA 2008 PM_{10} background concentrations. For Lead compliance with the NAAQS is demonstrated by comparing the highest concentration which is on a 24-hour basis (a short term averaging period) to the 3-month rolling total limit (a long term averaging period). In this

				0957-AOP-R4	V	
				0957-AOP-R5	V	
				0957-AOP-R6	V	
				0957-AOP-R7	V	
				0957-AOP-R8	V	
				0957-AOP-R9	V	
46-00114	SMITH-BLAIR, INC	TEXARKANA	332919	0847-AOP-R0	V	No SOB
46-00133	ENBRIDGE GATHERING (NE TX,LLC)	FOUKE	211111	1002-AOP-R0	V	

Pollutant	Emission Rate (lb/hr)	NAAQS Standard ($\mu g/m^3$)	Averaging Time	Highest Concentration ($\mu g/m^3$)	% of NAAQS
PM10	0.6	50	annual	0.2	0
		150	24-hour	1.9	1
SO2	47.2	80	annual	0.5	1
		365	24-hour	6.6	2
NOx	20.5	100	annual	4.2	4
CO	22.5	10000	8-hour	99.3	1
		40000	1-hour	205	1

46-00150	NATURAL GAS PIPELINE #305	TEXARKANA	486210	1589-AOP-R0	V
				1589-AOP-R1	V
				1589-AOP-R2	V
				1589-AOP-R3	V
				1589-AOP-R4	A

Pollutant	Emission Rate (lb/hr)	NAAQS Standard ($\mu g/m^3$)	Averaging Time	Highest Concentration ($\mu g/m^3$)	% of NAAQS
PM_{10}	11	50	Annual	0.7	1.4
		150	24-Hour	4.06	2.7
SO_2	1.1	80	Annual	0.07	<1
		1300	3-Hour	1.3	<1
		365	24-Hour	0.4	<1
VOC	55.9	0.12	1-Hour (ppm)	0.02	0.16
CO	265.5	10,000	8-Hour	213	2.1
		40,000	1-Hour	458	1.1
NO_x	1102.8	100	Annual	70.62	71

47-00012	KINDER MORGAN OPERATING,LP "C"	BLYTHEVILLE	493190	0232-AOP-R0	V
				0232-AOP-R1	V
				0232-AOP-R2	V
				0232-AOP-R3	V

Pollutant	**Facility Total Emission Rate (lb/hr)**	**NAAQS (ug/m3)**	**Averaging Time**	**Model Prediction (ug/m3)**	**% of NAAQS**
PM/PM_{10}	65.8	50	Annual	10.5	21
		150	24-hour	42	27.9
SO_2	<100 tpy, therefore no modeling performed				
NO_x	615.1	100	Annual	15.2	15.2
CO	4262.6	10000	8-hour	4284	42.3
		40000	1-hour	6121.3	15.3

47-00093	BALL METAL FOOD CONTAINER CORP	BLYTHEVILLE	332431	1339-AOP-R0	V	Examination of the source type, location, plot plan, land use, emission parameters, and other available information indicate that modeling is not warranted at this time.
				1339-AOP-R1	V	
47-00113	ENTERGY ARKANSAS-BLYTHEVILLE	BLYTHEVILLE		0155-AOP-R0	V	(see table below)

Pollutant	Emission Rate (lb/hr)	Maximum Concentration (Fg/m3)/(lb/hr)	Factor (Time Period)	Impacts/unit (Fg/m3)	Primary NAAQS Standard (Fg/m3)
PM/PM10	30	0.592	0.4 24 -hour	7.1	150
			0.1 annual	1.776	50
so2	1153.5	0.593	0.4 24-hour	273.14	365
			0.1 annual	68.3	80
nox	1594.5	0.593	0.1 annual	94.6	100
co	109.8	0.592	1.0 1hour	65	40000
			0.7 8-hour	45.5	10000

47-00115	VISKASE CORP	OSCEOLA	326121	0268-AOP-R0	V	(see table below)
				0268-AOP-R1	V	
				0268-AOP-R2	V	
				0268-AOP-R3	V	
				0268-AOP-R4	V	
				0268-AOP-R5	V	
				0268-AOP-R6	V	
				0268-AOP-R7	A	

Pollutant	Emission Rate (lb/hr)	NAAQS Standard ($\mu g/m^3$)	Averaging Time	Highest Concentration ($\mu g/m^3$)	% of NAAQS
PM_{10}	14	150	24-Hour	86.2*	57.5
SO_2	149.2	80	Annual	12.4	15.5
		1300	3-Hour	465.4	36
		365	24-Hour	276.7*	76
NO_x	67.7	100	Annual	11.74	12
*2010 background values added to modeled high.					

47-00145	BLYTHEVILLE TRANSFER STATION	BLYTHEVILLE	22132	1956-AOP-R0	V	Examination of the source type, location, plot plan, land use, emission parameters, and other available information indicate that modeling is not warranted at this time.
47-00148	CITY OF OSCEOLA COMPOST FAC.	OSCEOLA	325314	1919-AOP-R0	N	No SOB
47-00188	S-R OF ARKANSAS	WILSON	326113	0707-AOP-R0	V	(see table below)

Pollutant	Emission Rate (tpy)	NAAQS Standard ($\mu g/m^3$)	Averaging Time	Highest Concentration ppm	% of NAAQS
VOC	400.5	0.12		0.0127	11

47-00202	NUCOR YAMATO STEEL	BLYTHEVILLE	33111	0883-AOP-R0	V	(see table below)
				0883-AOP-R1	V	
				0883-AOP-R10	A	

Pollutant	NAAQS Standard ($\mu g/m^3$)	Averaging Time	Highest Concentration ($\mu g/m^3$)	% of NAAQS
PM_{10}	50	Annual	21.95	43.90%
	150	24-Hour	92.4	61.60%
	80	Annual	20.1	25.10%

				0883-AOP-R11	P
				0883-AOP-R2	V
				0883-AOP-R3	V
				0883-AOP-R4	V
				0883-AOP-R5	V
				0883-AOP-R6	V
				0883-AOP-R7	V
				0883-AOP-R8	V
				0883-AOP-R9	V

SO_2	1300	3-Hour	124.6	34.10%
	365	24-Hour	274	21%
NO_x	100	Annual	35.4	35.40%
Lead	1.5	Quarter	0.403	26.80%

47-00233	NUCOR STEEL/HICKMAN MILL	BLYTHEVILLE	331110	1139-AOP-R0	V
				1139-AOP-R1	V
				1139-AOP-R10	V
				1139-AOP-R11	V
				1139-AOP-R12	V
				1139-AOP-R13	V
				1139-AOP-R14	V
				1139-AOP-R15	V
				1139-AOP-R16	V
				1139-AOP-R17	V
				1139-AOP-R18	V
				1139-AOP-R19	A
				1139-AOP-R2	V
				1139-AOP-R3	V
				1139-AOP-R4	V
				1139-AOP-R5	V
				1139-AOP-R6	V
				1139-AOP-R7	V
				1139-AOP-R8	V
				1139-AOP-R9	V

Pollutant	NAAQS Standard (µg/m^3)	Averaging Time	Highest Concentration (µg/m^3)	% of NAAQS
pm10	160.5	150	24	106.5

47-00251	MAVERICK TUBE CORP	ARMOREL	331210	1763-AOP-R0	V
				1763-AOP-R1	V
				1763-AOP-R2	V
				1763-AOP-R3	V
				1763-AOP-R4	V
				1763-AOP-R5	V
				1763-AOP-R6	V
				1763-AOP-R7	V
				1763-AOP-R8	V
				1763-AOP-R9	A

Pollutant	Emission Rate (lb/hr)	NAAQS Standard (µg/m^3)	Averaging Time	Highest Concentration (µg/m^3)	% of NAAQS
PM10	250%	150	24-hour	39	26
		80	annual	2	3
SO2	40%	1300	3-hour	83	7
		365	24-hour	47	13
CO	380%	10000	8-hour	113	1
		40000	1-hour	134	0
NOx	570%	100	annual	21	22
Pb	N/A	0	rolling 3-month period over 3 years (not to be exceeded in any 3 month period)	--	--

47-00448	ASSOC.ELEC.CO-OP,INC.AECI/DELL	DELL	221121	1903-AOP-R0	V
				1903-AOP-R1	V

Pollutant	Emission Rate (lb/hr)	NAAQS Standard (µg/m^3)	Averaging Time	Highest Concentration (µg/m^3)	% of NAAQS
PM_{10}	100.9	50	Annual	27.16	55%

				1903-AOP-R2	V
				1903-AOP-R3	V
				1903-AOP-R4	V
				1903-AOP-R5	V
				1903-AOP-R6	V
				1903-AOP-R7	V
				1903-AOP-R8	V
				1903-AOP-R9	A

PM_{10}	[illegible]	150	24-Hour	80.95	54%
CO	230.6	10,000 40,000	8-Hour 1-Hour	186 854	2% 3%
NO_x	132.2	100	Annual	13.5	14%
Pb	0.31	0.15	Rolling 3-month Period over 3 years (not to be exceeded in any 3 month period)	0.04	27%

47-00453	AES CYPRESS, LLC	DELL		1957-AOP-R0	V	No SOB
47-00461	PLUM POINT ENERGY STATION	OSCEOLA	221112	1995-AOP-R0	V	
				1995-AOP-R1	V	
				1995-AOP-R2	V	
				1995-AOP-R3	V	
				1995-AOP-R4	V	
				1995-AOP-R5	V	
				1995-AOP-R6	A	
				1995-AOP-R7	P	
47-00476	BLY'VILLE MUN.WASTE-ENERGY FAC	BLYTHEVILLE		1956-AOP-R1	N	No SOB
47-00493	SKYLINE STEEL, LLC	BLYTHEVILLE	332312	2156-AOP-R0	V	
				2156-AOP-R1	V	
				2156-AOP-R2	A	
				2156-AOP-R3	P	
47-00519	DENSO MANUFACTURING ARKANSAS	OSCEOLA	336211	2048-AOP-R0	V	Examination of the source type, location, plot plan, land use, emission parameters, and other available information indicate that modeling is not warranted at this time.
				2048-AOP-R1	V	
				2048-AOP-R2	V	

Pollutant	Emission Rate (lb/hr)	NAAQS Standard (μg/m³)	Averaging Time	Highest Concentration (μg/m³)	% of NAAQS
PM_{10}	127.8	50 150	Annual 24-Hour	14 2.7	28% 1.80%
SO_2	1070.8	80 1300 365	Annual 3-Hour 24-Hour	3.7 98 22	4.60% 7.60% 6%
CO	1116.3	10,000 40,000	8-Hour 1-Hour	31 84	0.31% 0.21%
NO_x	602	100	Annual	7	7%
Pb	0.17	0.15	Rolling 3-month Period over 3 years (not to be exceeded in any 3 month period)	.00001 1 month average The concentration was too low for the calpost processor.	

Pollutant	Emission Rate (lb/hr)	NAAQS Standard (μg/m³)	Averaging Time	Modeled Concentration (μg/m³)	Background Values NLR 2008 (μg/m³)	Total Highest Concentration (μg/m³)	% of NAAQS
PM_{10}	0.87*	50 150	Annual 24-Hour	18.67 104.58	20 37	38.67 141.58	77.4 94.4

* Includes SN-01, 02 @ 0.0167 lb/hr, SN-05 @ 0.8 lb/hr, & SN-06, 07, 08 @ 0.0111 lb/hr

47-00541	STEELCORR, INC	OSCEOLA	331111	2062-AOP-R0	V	PSD modeling for the facility was performed as part of the permit application.
47-00914	PRECOAT METALS	BLYTHEVILLE	332812	2124-AOP-R0	V	
				2124-AOP-R1	V	
				2124-AOP-R2	A	

Pollutant	Emission Rate (lb/hr)	NAAQS Standard (J.Lg/m3)	Averaging Time	Hig Conce (J.L 1.	hest ntration lm3)	%of NAAQS
PMIO	5.8	150	24-Hour		3*	2.6%
		10,000	8-Hour	178.29*		1.7%
co	69.5	40,000	1-Hour	518.91*		1.2%

47-00991	BIG RIVER STEEL, LLC	OSCEOLA	33111	2305-AOP-R0	V
				2305-AOP-R1	A

Pollutant	Emission Rate (lb/hr)	NAAQS Standard (µg/m^3)	Averaging Time	Highest Concentration (µg/m^3)	% of NAAQS
PM_{10}	5.8	50	Annual	1.33	2.60%
		150	24-Hour	16.41	10.90%
SO_2	N/A	80	Annual		
		1300	3-Hour		
		365	24-Hour		
VOC	N/A	0.12	1-Hour (ppm)		
CO	69.5	10,000	8-Hour	178.29	1.70%
		40,000	1-Hour	518.91	1.20%
NO_x	N/A	100	Annual		
Pb	N/A	0.15	Rolling 3-month Period over 3 years (not to be exceeded in any 3 month period)		

50-00001	PRESCOTT LUMBER MILL	PRESCOTT	321113	0117-AOP-R0	V
				0117-AOP-R1	V
				0117-AOP-R2	V
				0117-AOP-R3	V
				0117-AOP-R4	V
				0117-AOP-R5	V
				0117-AOP-R6	V

Pollutant	**Emission Rate (lb/hr)**	**NAAQS Standard (µg/m^3)**	**Averaging Time**	**Highest Concentration (µg/m^3)**	**% of NAAQS**
PM_{10}	3.43	50	Annual	44*	88
	5.38	150	24-Hour	124*	83
CO	233.2	10,000	8-Hour	205	<0.1
		40,000	1-Hour	253	<0.1
NO_x	43.2	100	Annual	3.34	4
*	Includes Shreveport, LA 2007 PM_{10} background concentration of 64 mg/m^3 (24 hour) and 27 mg/m^3 (Annual)				

50-00058	SPECTRA ENERGY/HOPE COMPRESSC	EMMET	486210	1342-AOP-R0	V
				1342-AOP-R1	V
				1342-AOP-R2	V
				1342-AOP-R3	V
				1342-AOP-R4	V
				1342-AOP-R5	A

Pollutant	Emission Rate (lb/hr)	NAAQS Standard (µg/m^3)	Averaging Time	Highest Concentration (µg/m^3)	% of NAAQS
PM_{10}	3.3	50	Annual	2.35	4.70%
		150	24-Hour	15.846	10.6
SO_2	0.9	80	Annual	2.092	2.60%
		1300	3-Hour	12.29	0.95%
		365	24-Hour	6.941	1.90%
VOC		0.12	1-Hour (ppm)		
CO	44.4	10,000	8-Hour	1221.781	12.20%
		40,000	1-Hour	1490.147	3.70%
NO_x	272.3	100	Annual	60.66*	60.70%
*Consultant modeling result.					

50-00103	NORBORD ARKANSAS,INC	PRESCOTT	321219	1905-AOP-R0	V

Pollutant	Emission Rate (lb/hr)	NAAQS Standard (µg/m3)	Averaging Time	Highest Concentration (µg/m3)	% of NAAQS
PM10	54.5	50	Annual	33	0.66
		150	24-Hour	123	0.82
SO2	6.7	80	Annual	0.07	0

		1300	3-Hour	0.63	0
		365	24-Hour	0.28	0.01
NOx	53.7	100	Annual	0.57	0.01
VOC	39.3	0.12	1-hour (ppm)	0.1071	0.89
CO	53.7	10000	8-hour	3.96	0
		40000	1-hour	12.27	0

52-00013	IP CAMDEN	CAMDEN		0725-AOP-R0	V
				0725-AOP-R1	V
				0725-AOP-R2	V

Pollutant	Model Used	NAAQS Standard (μg/m3)	Averaging Time	Highest Concentration (μg/m3)	% of NAAQS
SO2	BUG 33	1300	3 hour	260.5	0.2
		365	24 hour	46.1	0.126
		80	annual	4.4	0.055

52-00035	ANTHONY TIMBERLANDS, INC.	BEARDEN	321113	0456-AOP-R0	V
				0456-AOP-R1	V
				0456-AOP-R2	V
				0456-AOP-R3	V
				0456-AOP-R4	V
				0456-AOP-R5	V
				0456-AOP-R6	A

Pollutant	Emission Rate (lb/hr)	NAAQS Standard (μg/m3)	Averaging Time	Highest Concentration (μg/m3)	% of NAAQS
PM10	50.1	150	24-Hour	114.9*	76.6
CO	140.9	10000	8-Hour	71	0.8
		40000	1-Hour	109.8	0.3
NOx	32.7	100	Annual	1.6	1.6
Pb	0.00554	0.15	Rolling 3-month	0.00031	0.2
*	Includes Little Rock 2012 background (36 mg/m3)				

52-00055	ARK ELECTRIC COOP-MCCLELLAN	CAMDEN	221112	0181-AOP-R0	V
				0181-AOP-R1	V
				0181-AOP-R2	V
				0181-AOP-R3	V
				0181-AOP-R4	V
				0181-AOP-R5	A

Pollutant	Emission Rate (lb/hr)	NAAQS Standard (μg/m3)	Averaging Time	Highest Concentration (μg/m3)	% of NAAQS
PM10	279.5	150	24-Hour	19.18153	12.80%
SO2	4240.5	80	Annual	35.14319 (2007)	44.00%
		1300	3-Hour	942.31104	72.50%
		365	24-Hour	274.43663	75.20%
CO	1201.2	10000	8-Hour	137.87403	1.40%
		40000	1-Hour	221.49159	0.60%
NOx	874.3	100	Annual	8.34314 (2011)	8.40%
Pb	0.0145	0.15	Rolling 3-month	0.00029	0.20%

52-00247	VICTORY LUMBER	CAMDEN	321113	1862-AOP-R0	V	Pursuant to Act 1302 of the Regular Session of the 89th General Assembly of the State of Arkansas, no dispersion modeling was performed by ADEQ because it was not voluntarily proposed and agreed to by the facility. No other information was submitted by the applicant.
52-00298	MARCONI AEROSPACE DEFENSE SYST	EAST CAMDEN	32592	1865-AOP-R0	V	Examination of the source type, location, plot plan, land use, emission parameters, and other available information indicate that modeling is not warranted at this time

52-00305	POTLATCH CORP.	CAMDEN		1952-AOP-R0	V	Examination of the source type, location, plot plan, land use, emission parameters, and other available information indicate that modeling is not warranted at this time
53-00039	BAY HAWK INDUSTRIES-BIGELOW	BIGELOW		1827-AOP-R0	V	Total criteria pollutant emissions were not modeled, because the rates as estimated in the calculations did not indicate a potential threat to the National Ambient Air Quality Standards (NAAQS)
54-00013	ADM GRAIN RIVER SYSTEM, INC	HELENA	424510	0800-AOP-R0	V	No modeling was performed. Since the previous permit was a PSD permit and significant modeling was performed at that time and the requested modification resulted in a decrease in emissions. *No copy of previous permit on pds*
				0800-AOP-R1	V	
				0800-AOP-R2	V	
54-00017	ENTERGY ARKANSAS-RITCHIE	HELENA	221112	1131-AOP-R0	V	(see table below)
				1131-AOP-R1	V	
				1131-AOP-R2	V	
				1131-AOP-R3	V	
				1131-AOP-R4	V	
54-00019	DELTA OIL MILL	HELENA	311224	1089-AOP-R0	V	No modelling analysis performed

Pollutant	Emission Rate (lb/hr)	NAAQS Standard (µg/m3)	Averaging Time	Highest Conc. (µg/m3)	% of NAAQS
PM10	654.3	150	24-Hour	8.6843	5.78
SO2	10068	80	Annual	15.534	19.41
		1300	3-Hour	483.9991	37.23
		365	24-Hour	166.6187	45.64
CO	1802.9	10000	8-Hour	16.8388	0.16
		40000	1-Hour	29.1785	0.072
NOx	5156.7	100	Annual	6.1695	6.16
Pb	0.0993	0.15	Rolling 3-month	0.00016	0.1

54-00081	HOFFINGER INDUSTRIES	WEST HELENA	326199	1341-AOP-R0	V	All criteria pollutants were modeled using Screen3. All criteria pollutants were less than 50% of the NAAQS, thus no refined modeling was performed
				1341-AOP-R1	V	
54-00110	ENTERPRISE REFINED PRODUCTS CO	HELENA	486210	1598-AOP-R0	V	Examination of the source type, location, plot plan, land use, emission parameters, and other available information indicate that modeling is not warranted at this time
				1598-AOP-R1	V	
				1598-AOP-R2	V	
				1598-AOP-R3	V	
				1598-AOP-R4	V	
				1598-AOP-R5	V	
54-00120	ENABLE GAS TRANS/HELENA	HELENA	486210	1217-AOP-R0	V	
				1217-AOP-R1	V	
				1217-AOP-R2	V	
				1217-AOP-R3	V	
				1217-AOP-R4	V	
				1217-AOP-R5	A	
				1217-AOP-R6	P	

Pollutant	Emission Rate (lb/hr)	NAAQS Standard (µg/m3)	Averaging Time	Highest Concentration (µg/m3)	% of NAAQS
PM10	0.3	50	Annual	0.2	0.004
		150	24-Hour	1.93	0.013
SO2	Modeling was not performed as it is less than 100 tpy				
VOC	Modeling was not performed as it is less than 100 tpy				
CO	90.6	10000	8-Hour	900	0.09
		40000	1-Hour	1204	0.03
NOx	94.5*	100	Annual	40.44	0.4044

54-00130	CYPRESS CHEMICAL COMPANY	HELENA	325311	1492-AOP-R0	V	Examination of the source type, location, plot plan, land use, emission parameters, and other available information indicate that modeling is not warranted at this time. All criteria pollutants are permitted at less than 100 tpy.
				1492-AOP-R1	V	
				1492-AOP-R2	V	
				1492-AOP-R3	V	
				1492-AOP-R4	V	
54-00132	EURAMAX INTERNATIONAL, INC.	HELENA	332812	1581-AOP-R0	V	

Pollutant	Emission Rate (lb/hr)	NAAQS Standard	Averaging Time	Highest Concentration	% of NAAQS

						Lead	0.18	(µg/m3) 1.5	Quarterly	(µg/m3) 1.3	0.87	
55-00017	BEAN LUMBER COMPANY, INC	GLENWOOD	321113	0189-AOP-R0	V	Pollutant	Emission Rate (lb/hr)	NAAQS Standard (µg/m3)	Averaging Time	Highest Concentration (µg/m3)	% of NAAQS	
				0189-AOP-R1	V	PM10	32.7	50	Annual	15.281	30.6	Included background
								150	24-Hour	74.631	49.8	Included background
				0189-AOP-R2	V	SO2	6.7	80	Annual	0.06	0.08	
								1300	3-Hour	2.39	0.19	
				0189-AOP-R3	V			365	24-Hour	0.64	0.18	
						VOC	205	0.12	1-Hour (ppm)	0.0911	76.9	Included background
				0189-AOP-R4	A	CO	55.8	10000	8-Hour	5972.51	59.8	Included background
								40000	1-Hour	7016.61	17.6	
						NOx	55.8	100	Annual	28.71	28.7	Included background
56-00049	BALDWIN PIANO, INC.	TRUMANN	339992	0518-AOP-R0	V	No modelling analysis performed						
				0518-AOP-R1	V							
56-00085	BALDWIN PIANO, INC	TRUMANN	337121	1504-AOP-R0	V	Criteria Pollutants did not exceed the level of significance and were not modeled						
58-00011	BLUE CUBE OPERATIONS LLC	RUSSELLVILLE	333249	0801-AOP-R0	V	Pollutant	Emission Rate (lb/hr)	NAAQS Standard (µg/m3)	Averaging Time	Highest Concentration (µg/m3)	% of NAAQS	
				0801-AOP-R1	V	PM10	2.6	150	24-Hour	134.87	0.899	
				0801-AOP-R2	V							
				0801-AOP-R3	V							
				0801-AOP-R4	V							
				0801-AOP-R5	V							
				0801-AOP-R6	V							
				0801-AOP-R7	V							
				0801-AOP-R8	V							
				0801-AOP-R9	A							
58-00014	WEST FRASER, INC	RUSSELLVILLE	321113	1628-AOP-R0	V	Pollutant	Emission Rate (lb/hr)	NAAQS Standard (µg/m3)	Averaging Time	Highest Concentration (µg/m3)*	% of NAAQS	
				1628-AOP-R1	V	PM10	8.5	50	Annual	40.5	81.1	
								150	24-Hour	109.6	73.1	
				1628-AOP-R10	A		* Little Rock 2008 background concentration – 23 mg/m3 (Annual) 43 mg/m3 (24-hour)					
				1628-AOP-R2	V							
				1628-AOP-R3	V							
				1628-AOP-R4	V							
				1628-AOP-R5	V							
				1628-AOP-R6	V							
				1628-AOP-R7	V							
				1628-AOP-R8	V							

				1628-AOP-R9	V	
58-00030	RUSSELLVILLE STEEL COMPANY	RUSSELLVILLE	332312	1604-AOP-R0	V	Examination of the source type, location, plot plan, land use, emission parameters, and other available information indicate that modeling is not warranted at this time.
				1604-AOP-R1	V	
				1604-AOP-R2	V	
58-00050	RIVERSIDE FURN #5-N PHOENIX	RUSSELLVILLE		0852-AOP-R0	V	
				0852-AOP-R1	V	
				0852-AOP-R2	V	
				0852-AOP-R3	V	

Pollutant	Emission Rate (lb/hr)	NAAQS Standard (µg/m3)	Averaging Time	Highest Concentration (µg/m3)	% of NAAQS
PM10	37.8	50	Annual	36.122	72.25
		150	24-Hour	53.06	35.37

58-00145	SUPERIOR GRAPHITE COMPANY	RUSSELLVILLE	335991	0766-AOP-R0	V	
				0766-AOP-R1	V	
				0766-AOP-R10	A	
				0766-AOP-R2	V	
				0766-AOP-R3	V	
				0766-AOP-R4	V	
				0766-AOP-R5	V	
				0766-AOP-R6	V	
				0766-AOP-R7	V	
				0766-AOP-R8	V	
				0766-AOP-R9	V	

Pollutant	Emission Rate (lb/hr)	NAAQS Standard (µg/m3)	Averaging Time	Highest Concentration (µg/m3)	% of NAAQS**
SO2	54.53*	80	Annual	5.3	6.6
	106.23*	1300	3-Hour	392.2	30.2
	88.87*	365	24-Hour	103.9	28.5
PM10	9.25	150	24-Hour	136.8	91.2
		50	Annual	45.9	91.8

58-00223	CENTERPOINT ENERGY, LLC	LONDON	486210	1218-AOP-R0	V	
				1218-AOP-R1	V	

Pollutant	Emission Rate (lb/hr)	NAAQS Standard (µg/m3)	Averaging Time	Highest Concentration (µg/m3)	% of NAAQS
NOx	37.5	100	Annual	11.22	0
CO	80.5	10000	8-hour	1470	0.15
		40000	1-hour	2100	0.05

58-00224	ENABLE GAS TRANS/PINEY	LONDON	486210	1178-AOP-R0	V	Examination of the source type, location, plot plan, land use, emission parameters, and other available information indicate that modeling is not warranted at this time for VOC and SO2.

						For Nox, PM10, and CO, the permittee elected to install non-selective catalytic control devices rather than provide refined modelling.
				1178-AOP-R1	V	
				1178-AOP-R2	V	
				1178-AOP-R3	V	
				1178-AOP-R4	V	
58-00272	J.W. ALUMINUM CO.	RUSSELLVILLE	331315	1659-AOP-R0	V	
				1659-AOP-R1	V	
				1659-AOP-R2	V	
				1659-AOP-R3	V	
				1659-AOP-R4	V	
				1659-AOP-R5	A	

Pollutant	Emission Rate (lb/hr)	NAAQS Standard (µg/m3)	Averaging Time	Highest Concentration (µg/m3)	% of NAAQS
PM10	12.4	150	24-Hour	59	39
SO2	1.2	80	Annual	4.5	6
		1300	3-Hour	36	3
		365	24-Hour	13	4
CO	17.9	10000	8-Hour	132	1
		40000	1-Hour	307	1
NOx	46.3	100	Annual	40	40
Pb	0.00004	0.15	Rolling 3-month	0.000004 highest	<1

59-00036	ROLLING MEADOWS LANDFILL,INC	HAZEN	562212	1888-AOP-R0	V
				1888-AOP-R1	A

Pollutant	Emission Rate (lb/hr)	NAAQS Standard (µg/m3)	Averaging Time	Highest Concentration (µg/m3)	% of NAAQS
PM10	10.6*	50	Annual	41.102**	0.822
		150	24-Hour	120.977***	0.807

60-00003	3M COLLEGE STATION PLANT	LITTLE ROCK	212325	0039-AOP-R0	V
				0039-AOP-R1	V
				0039-AOP-R10	V
				0039-AOP-R11	A
				0039-AOP-R12	P
				0039-AOP-R2	V
				0039-AOP-R3	V
				0039-AOP-R4	V
				0039-AOP-R5	V
				0039-AOP-R6	V
				0039-AOP-R7	V
				0039-AOP-R8	V
				0039-AOP-R9	V

Pollutant	Emission Rate (lb/hr)	NAAQS Standard (µg/m3)	Averaging Time	Modeled Concentration (µg/m3)	Background Values NLR 2009 (µg/m3)	Total Highest Concentration (µg/m3)	% of NAAQS
PM10	89.04	150	24-Hour	114.09	30	144.09	96.1

Pollutant	Emission Rate (lb/hr)	NAAQS Standard (µg/m3)	Averaging Time	Highest Concentration (µg/m3)	% of NAAQS
CO	73.9	10000	8-Hour	1890	0.18
NOx	48.1	40000	1-Hour	7393	0.18
		100	Annual	48.5	0.48
Pb	0.64	0.15	Calendar quarter	0.76*	50%*

60-00004	POROCEL INDUSTRIES, LLC	LITTLE ROCK	327999	0635-AOP-R0	V	Examination of the source type, location, plot plan, land use, emission parameters, and other available information indicate that modeling is not warranted at this time.
				0635-AOP-R1	V	

60-00058	HALL TANK COMPANY, LLC	NORTH LITTLE ROCK	332420	2016-AOP-R0	V	Pursuant to Act 1302 of the Regular Session of the 89th General Assembly of the State of Arkansas, no dispersion modeling was performed by ADEQ because it was not voluntarily proposed and agreed to by the facility. No other information was submitted by the applicant. Criteria pollutants were not evaluated for impacts on the NAAQS.
				2016-AOP-R1	V	
				2016-AOP-R2	A	
				2016-AR-1	P	
60-00059	ESSICK AIR PRODUCTS	LITTLE ROCK	339999	1520-AOP-R0	V	NA. Total emissions for each criteria pollutant is less than 100 tons per year.
60-00061	ADM-LITTLE ROCK	LITTLE ROCK		0683-AOP-R0	V	
				0683-AOP-R1	V	
				0683-AOP-R2	V	

Pollutant	Emission Rate (lb/hr)	NAAQS Standard (µg/m3)	Averaging Time	Highest Concentration (µg/m3)	% of NAAQS
PM10	11.5	50	Annual	14	0.28
		150	24-hour	56.1	0.37
NOx	70	100	Annual	28.5	0.28
VOC	80	0.12	1-hour (ppm)	0.015	0.13

60-00065	AFCO STEEL, LLC	LITTLE ROCK	332312	1043-AOP-R0	V	
				1043-AOP-R1	V	
				1043-AOP-R2	V	
				1043-AOP-R3	V	
				1043-AOP-R4	V	
				1043-AOP-R5	A	

Pollutant	Emission Rate (lb/hr)	NAAQS Standard (µg/m3)	Averaging Time	Highest Concentration (µg/m3)	% of NAAQS
PM10	10.5	50	Annual	11.354	0.22
		150	24-Hour	72.705	48.47

60-00087	ENTERGY ARKANSAS-LYNCH	NORTH LITTLE ROCK	221112	0019-AOP-R0	V	
				0019-AOP-R1	V	
				0019-AOP-R2	V	
				0019-AOP-R3	V	
				0019-AOP-R4	V	
				0019-AOP-R5	V	
				0019-AOP-R6	V	

Pollutant	Emission Rate (lb/hr)	NAAQS Standard (µg/m3)	Averaging Time	Highest Concentration (µg/m3)	% of NAAQS
PM10	47.1*	50	Annual	5.34*	10.7*
		150	24-Hour	26.19*	17.5*
SO2	1423.3*	80	Annual	25.35*	31.7*
		1300	3-Hour	526.14*	40.5*
		365	24-Hour	171.42*	47.0*
VOC	N/A	0.12	1-Hour (ppm)	N/A	N/A
CO	303.8*	10000	8-Hour	677.10*	6.8*
		40000	1-Hour	1704.41*	4.3*
NOx	1731.1* 86.28**	100	Annual	6.2**	6.2**
Pb	N/A	0.15	Rolling 3-month	N/A	N/A

* Screening emissions and model results based on total potential to emit for all sources.

				0019-AOP-R7	V	** Refined modeling results based on a reduced emission rate to account for facility peaking operations.

60-00090	ENTERGY ARKANSAS-MABELVALE	MABELVALE	221112	1734-AOP-R0	V
				1734-AOP-R1	V
				1734-AOP-R2	V
				1734-AOP-R3	A

Pollutant	Emission Rate (lb/hr)	NAAQS Standard (µg/m3)	Averaging Time	Highest Concentration (µg/m3)	% of NAAQS
PM10	15.2	50	Annual	23.3	46.6
		150	24-Hour	45.9	30.6
SO2	595.2	80	Annual	11.2	14
		1300	3-Hour	615.2	47.3
		365	24-Hour	142	38.9
CO	125.2	10000	8-Hour	80	0.8
		40000	1-Hour	305.1	0.8
NOx	1051.6	100	Annual	19.7	19.7
Pb*	0.04	0.15	Rolling 3-month	0.0185	12.3
*Modeling was performed using a conservative 24-hr analysis					

60-00097	MUSKET CORP/NLR TRANSLOAD SITE	NORTH LITTLE ROCK		1063-AOP-R0	V
				1063-AOP-R1	V
				1063-AOP-R2	V

Pollutant	Emission Rate (lb/hr)	NAAQS Standard (µg/m3)	Averaging Time	Highest Concentration (µg/m3)	% of NAAQS
SO2	42.6	80	Annual	20	0.25
		1300	3-hour	178	0.14
		365	24-hour	79	0.22
VOC	80.6	0.12	1-hour(ppm)	0.02	0.17

60-00107	BLUEGRASS MILTIWALL BAG, LLC	JACKSONVILLE	323112	1039-AOP-R0	V
				1039-AOP-R1	V

Pollutant	Emission Rate (lb/hr)	NAAQS Standard (µg/m3)	Averaging Time	Highest Concentration (µg/m3)	% of NAAQS
PM10	0.7	50	Annual	0.15	0
		150	24-hour	1.69	0.01
SO2	0.5	80	Annual	0.04	0
		1300	3-hour	1.64	0
		365	24-hour	0.56	0
NOx	10.5	100	Annual	4.94	0.05
VOC	346	0.12	1-hour(ppm)	0.012	0.1
CO	4.5	10000	8-hour	45.7	0
		40000	1-hour	90.1	0

60-00110	GEORGIA-PACIFIC HARDBOARD-NLR	NORTH LITTLE ROCK		0248-AOP-R0	V

Pollutant	Emission Rate (lb/hr)	NAAQS Standard (µg/m3)	Averaging Time	Highest Concentration (µg/m3)	% of NAAQS
PM10	84.7	50	Annual	10.017425	0.2
		150	24-hour	134.789104	0.9
SO2	54.6	80	Annual	1.73047	0.02
		1300	3-hour	75.289869	0.06
		365	24-hour	23.432412	0.06
VOC	147.3	0.12	1-hour(ppm)	NA	0
CO	122.2	10000	8-hour	113.691166	0.01
		40000	1-hour	257.62257	0.01

60-00118	FIBER GLASS SYSTEMS, L.P.	LITTLE ROCK	326122	0587-AOP-R0	V	Examination of the source type, location, plot plan, land use, emission parameters, and other available information indicate that modeling is not warranted at this time.
				0587-AOP-R1	V	
				0587-AOP-R2	V	

60-00302	U OF A MEDICAL CENTER	LITTLE ROCK	622110	2125-AOP-R0	V
				2125-AOP-R1	V

Pollutant	Emission Rate (lb/hr)	NAAQS Standard (µg/m3)	Averaging Time	Highest Concentration (µg/m3)	% of NAAQS

				2125-AOP-R2	V	
				2125-AOP-R3	A	
				2125-AOP-R4	P	
60-00438	TWO PINE LANDFILL	JACKSONVILLE	562212	1697-AOP-R0	V	
				1697-AOP-R1	V	
				1697-AOP-R2	V	
				1697-AOP-R3	V	
				1697-AOP-R4	V	
				1697-AOP-R5	V	
				1697-AOP-R6	A	
				1697-AOP-R7	P	
60-00440	JP ENERGY ATT,LLC	NORTH LITTLE ROCK	424710	0590-AOP-R0	V	Pursuant to Act 1302 of the Regular Session of the 89th General Assembly of the State of Arkansas, no dispersion modeling was performed by ADEQ because it was not voluntarily proposed and agreed to by the facility. No other information was submitted by the applicant. Criteria pollutants were not evaluated for impacts on the NAAQS.
				0590-AOP-R1	V	
				0590-AOP-R10	V	
				0590-AOP-R11	V	
				0590-AOP-R12	V	
				0590-AOP-R13	V	
				0590-AOP-R14	V	
				0590-AOP-R15	V	
				0590-AOP-R16	V	
				0590-AOP-R17	A	
				0590-AOP-R18	P	
				0590-AOP-R2	V	
				0590-AOP-R3	V	
				0590-AOP-R4	V	
				0590-AOP-R5	V	
				0590-AOP-R6	V	
				0590-AOP-R7	V	
				0590-AOP-R8	V	

Modeling table for 2125-AOP-R2:

PM10	36.5	50	Annual	13.648	0.273
		150	24-Hour	71.412	0.476
NOx	818.7	100	Annual	27.47	0.275

Modeling table for 1697-AOP-R0:

Pollutant	Emission Rate (lb/hr)	NAAQS Standard (µg/m3)	Averaging Time	Highest Concentration (µg/m3)*	% of NAAQS
PM10	28.81	50	Annual	42.56	85.12
		150	24-Hour	112.58	75.06
SO2	2.2	80	Annual	4.48	5.6
		1300	3-Hour	130.88	10.07
		365	24-Hour	44.75	12.26
CO	56.9	10000	8-Hour	2619.9	26.2
		40000	1-Hour	6028.13	15.07
NOx	23.2	100	Annual	47.24	47.24
	* Includes Background Concentrations				

				0590-AOP-R9	V	
60-00532	UNION PACIFIC RAILROAD-JENKS	NORTH LITTLE ROCK	482111	1713-AOP-R0	V	Examination of the source type, location, plot plan, land use, emission parameters, and other available information indicate that modeling is not warranted at this time.
				1713-AOP-R1	V	
				1713-AOP-R2	V	
60-00565	BFI WASTE SYSTEMS OF ARK,LLC	LITTLE ROCK	562212	1614-AOP-R0	V	Examination of the source type, location, plot plan, land use, emission parameters, and other available information indicate that modeling is not warranted at this time.
				1614-AOP-R1	V	
				1614-AOP-R2	V	
				1614-AOP-R3	A	
60-00617	FALCON JET CORP (DASSAULT)	LITTLE ROCK	336411	1876-AOP-R0	V	(see table below)
				1876-AOP-R1	V	
				1876-AOP-R10	P	
				1876-AOP-R2	V	
				1876-AOP-R3	V	
				1876-AOP-R4	V	
				1876-AOP-R5	V	
				1876-AOP-R6	V	
				1876-AOP-R7	V	
				1876-AOP-R8	V	
				1876-AOP-R9	A	

Pollutant	Emisson Rate (lb/hr)	NAAQS Standard (ug/m^3)	Averaging Time	Highest Concentration*(ug/m^3)	% of NAAQS
PM10	1.6	150	24-Hour	62.3	41.5

60-00621	ROL-LIFT CORP	LITTLE FLOCK		1364-AOP-R0	V	Total criteria pollutant emissions were not modeled, because the rates of total VOC and particulate as estimated in the calculations did not indicate a potential threat to the National Ambient Air Quality Standards (NAAQS).
60-00650	HERITAGE CRYSTAL-CLEAN-LR FAC.	LITTLE ROCK	423930	0915-AOP-R0	V	All criteria pollutants were less than 50% of the NAAQS, thus no refined modeling was performed for these.
60-00683	WHEATLAND TUBE-OMEGA DIV	LITTLE ROCK	33121	1430-AOP-R0	V	Examination of the source type, location, plot plan, land use, emission parameters, and other available information indicate that modeling is not warranted at this time.
				1430-AOP-R1	V	
				1430-AOP-R2	V	
				1430-AOP-R3	V	
				1430-AOP-R4	V	
				1430-AOP-R5	V	
				1430-AOP-R6	V	
				1430-AOP-R7	V	
60-00685	METRO SCRAP METALS	NORTH LITTLE ROCK	331314	0752-AOP-R0	V	Examination of the source type, location, plot plan, land use, emission parameters, and other available information indicate that modeling is not warranted at this time.
				0752-AOP-R1	V	
60-00689	ARKANSAS CHILDREN'S HOSPITAL	LITTLE ROCK	622110	1923-AOP-R0	V	(see table below)
				1923-AOP-R1	V	

Pollutant	Emisson Rate (lb/hr)	NAAQS Standard (ug/m^3)	Averaging Time	Highest Concentration*(u g/m^3)	% of NAAQS
PM10	7	150	24-Hour	98.4	65.6
CO	84	10000	8 -hour	3603.7	
		40000	1-hour	7443.4	
Nox	335.7	100	Annual	89.2	

				1923-AOP-R2	V	* Includes the followmg background concentrations, LIttle Rock. 39 ug/m PMIO• ** Includes the following background concentrations, North Little Rock: 1832 (8-Hour) and 2061 (l-Hour) ug/rrr' CO, and 19.0 Jlg/m3 NOx.
				1923-AOP-R3	V	
				1923-AOP-R4	V	
				1923-AOP-R5	V	
				1923-AOP-R6	V	
				1923-AOP-R7	A	
60-00852	ROCK CITY FURNITURE	NORTH LITTLE ROCK		0969-AOP-R0	V	Criteria pollutant emissions were not modeled in this analysis because the emission of these pollutants did not qualify as being a major source.
				0969-AOP-R1	V	
60-00923	JASON INTERNATIONAL	NORTH LITTLE ROCK	326191	1687-AOP-R0	V	

Pollutant	Emisson Rate (lb/hr)	NAAQS Standard (ug/m^3)	Averaging Time	Highest Concentration*(ug/m^3)	% of NAAQS
PM_{10}	2	50	Annual	31.6886	63.40%
		150	24-Hour	87.97121	58.70%
SO_2	--	80	Annual	N/A	N/A
		1300	3-Hour	N/A	N/A
		365	24-Hour	N/A	N/A
VOC	148.8	0.12	1-Hour (ppm)	N/A	N/A
CO	--	10,000	8-Hour	N/A	N/A
		40,000	1-Hour	N/A	N/A
NO_x	--	100	Annual	N/A	N/A
Pb	--	0.15	Rolling 3-month Period over 3 years (not to be exceeded in any 3 month period)	N/A	N/A

				1687-AOP-R1	V	
				1687-AOP-R2	V	
				1687-AOP-R3	V	
				1687-AOP-R4	V	
				1687-AOP-R5	V	
				1687-AOP-R6	V	
				1687-AOP-R7	A	
60-01071	LITTLE ROCK MUNICIPAL LANDFILL	LITTLE ROCK	562212	1781-AOP-R0	V	Examination of the source type, location, plot plan, land use, emission parameters, and other available infonnation indicate that modeling is not warranted at this time.
				1781-AOP-R1	V	
				1781-AOP-R2	A	

60-01191	PROGRESS RAIL SERVICES CORP	LITTLE ROCK	488210	1601-AOP-R0	V	Examination of the source type, location, plot plan, land use, emission parameters, and other available information indicate that modeling is not warranted at this time.
60-01380	HARRY L. OSWALD GENERATING STA	WRIGHTSVILLE	221112	1842-AOP-R0	V	
				1842-AOP-R1	V	
				1842-AOP-R2	V	
				1842-AOP-R3	V	
				1842-AOP-R4	V	
				1842-AOP-R5	A	
				1842-AOP-R6	P	

Pollutant	Emisson Rate (lb/hr)	NAAQS Standard (ug/m^3)	Averaging Time	Highest Concentration*(ug/m^3)	% of NAAQS
PM_{10}	42	50	Annual	0.15	0.3
		150	24-Hour	1.75	1.2
SO_2	3.8	80	Annual	0.014	1.1
		1300	3-Hour	0.35	0.02
		365	24-Hour	0.158	0.004
CO	612.9	10,000	8-Hour	53.1	0.53
		40,000	1-Hour	77.7	0.2
NO_x	418.1	100	Annual	1.51	1.5

60-04008	NOVUS ARKANSAS, LLC	LITTLE ROCK	311119	2107-AOP-R0	V	No SOB
60-04184	WELSPUN TUBLAR, LLC	LITTLE ROCK	331210	2145-AOP-R0	V	

Pollutant	Emission Rate (lb/hr)	NAAQS Standard (µg/m^3)	Averaging Time	Highest Concentration (µg/m^3)	% of NAAQS
PM_{10}	22.4	50	Annual	11.7	23.40%
		150	24-Hour	103.4	68.90%
SO_2	Less than 100 tpy	80	Annual	-	-
		1300	3-Hour	-	-
		365	24-Hour	-	-
VOC	Less than 100 tpy	0.12	1-Hour (ppm)	-	-
CO	Less than 100 tpy	10,000	8-Hour	-	-
		40,000	1-Hour	-	-
NO_x	Less than 100 tpy	100	Annual	-	-

60-04196	LM WIND POWER BLADES (AR),INC	LITTLE ROCK	333611	2152-AOP-R0	V
				2152-AOP-R1	V
				2152-AOP-R2	V
				2152-AOP-R3	V
				2152-AOP-R4	V
				2152-AOP-R5	V
				2152-AOP-R6	A

Pollutant	Emission Rate (lb/hr)	NAAQS Standard (µg/m^3)	Averaging Time	Highest Concentration (µg/m^3)	% of NAAQS
PM10	7.9	150	24	8.29524	5.50%
SO2	46.2	80	annual	14.84177	18.60%
		1300	3	639.13193	49.20%
		365	24	297.18736	81.50%
CO	17.4	10000	8	170.47044	1.70%
		40000	1	244.58262	0.70%
NOx	29.6	100	annual	5.75637	5.80%
PB	--	0.15	rolling 3-month period over 3 years (not to be exceeded in any 3 month period)	--	--

60-04199	LM WIND POWER BLADES (AR), INC	LITTLE ROCK	326199	2153-AOP-R0	V
				2153-AOP-R1	V
				2153-AOP-R2	V
				2153-AOP-R3	V

Pollutant	Emission Rate (lb/hr)	NAAQS Standard (µg/m^3)	Averaging Time	Highest Concentration (µg/m^3)	% of NAAQS
PM_{10}	8.1	50	Annual	27.91	55.80%
		150	24-hour	77.11	51.40%
SO_2	45	80	Annual	30.62	38.25%
		1,300	3-hour	525.62	40.43%
		365	24-hour	334.02	91.50%
NO_X	154.2	100	Annual	91.32	91.30%
CO	47.7	10,000	8-hour	3123.91	31.24%
		40,000	1-hour	3911.11	9.80%

61-00001	NIELSEN BAINBRIDGE FRAME,INC	POCAHONTAS	339999	0823-AOP-R0	V
				0823-AOP-R1	V

Pollutant	Emission Rate (lb/hr)	NAAQS Standard (µg/m^3)	Averaging Time	Highest Concentration (µg/m^3)	% of NAAQS
PM10	20.1	50	Annual	9.53	19
			24	68.44	45
		80	Annual	2.79	3.5

				0823-AOP-R2	V
				0823-AOP-R3	V
				0823-AOP-R4	V
				0823-AOP-R5	V
				0823-AOP-R6	V
				0823-AOP-R7	V

SO_2	0.3	1300	3	169.76	13
		365	24	27.13	7..5
CO	1	10000	8	95.37	1
		40000	1	228.88	1
NO_x	1.2	100	Annual	5.69	5.7

61-00009	WATERLOO INDUSTRIES	POCAHONTAS		0833-AOP-R0	V
				0833-AOP-R1	V
				0833-AOP-R2	V
				0833-AOP-R3	V
				0833-AOP-R4	V
				0833-AOP-R5	V
				0833-AOP-R6	V
				0833-AOP-R7	V

Pollutant	Emission Rate	NAAQS Standard (µg/m^3)	Averaging Time	Highest Concentration (µg/m^3)	% of NAAQS
VOC	219.2 tpy	0.12	1-hour (ppm)	0.015	13%

61-00031	NATURAL GAS PIPELINE #308	BIGGERS	486210	1587-AOP-R0	V
				1587-AOP-R1	V
				1587-AOP-R2	V
				1587-AOP-R3	V
				1587-AOP-R4	V
				1587-AOP-R5	A

Pollutant	Emission Rate (lb/hr)	NAAQS Standard (µg/m^3)	Averaging Time	Highest Concentration (µg/m^3)	% of NAAQS
PM_{10}	13.7	50	Annual	0.71	1.5
		150	24-Hour	6.2	4.2
SO_2	Less than 100 tpy				
VOC	387.6 tpy	0.12	1-Hour (ppm)	0.03	27
CO	391.9	10,000	8-Hour	316	3.2
		40,000	1-Hour	513	1.3
NO_x	1181	100	Annual	99.828*	99.8

61-00076	ENABLE MISS. RIVER/BIGGERS	BIGGERS	486210	1513-AOP-R0	V
				1513-AOP-R1	V
				1513-AOP-R2	V
				1513-AOP-R3	A
				1513-AOP-R4	V

Pollutant	Emission Rate (lb/hr)	NAAQS Standard (µg/m^3)	Averaging Time	Highest Concentration (µg/m^3)	% of NAAQS
PM_{10}	1.9	50	Annual	0.38998	0.80%
		150	24-Hour	4.06825	2.80%
SO_2	1.1	80	Annual	0.30114	0.40%
		1300	3-Hour	6.86558	0.60%
		365	24-Hour	3.08009	0.90%
VOC	2.9	0.12	1-Hour (ppm)	N/A	N/A
CO	296	10,000	8-Hour	1412.31127	14.20%
		40,000	1-Hour	2028.04226	5.10%
NO_x	297.7	100	Annual	47.64494	47.70%
Pb	N/A	0.15	Rolling 3-month Period over 3 years	N/A	N/A

61-00084	DACO TRAILER CORP	POCAHONTAS	336212	1757-AOP-R0	V	No modelling analysis performed

61-01017	PECO FOODS, INC	POCAHONTAS	311615	2332-AOP-R0	A	Pursuant to Act 1302 of the Regular Session of the 89th General Assembly of the State of Arkansas, no dispersion modeling was performed by ADEQ because it was not voluntarily proposed and agreed to by the facility. No other information was submitted by the applicant.
				2332-AOP-R1	P	
62-00010	ENTERGY ARKANSAS-MOSES	FORREST CITY	221112	0097-AOP-R0	V	
				0097-AOP-R1	V	
				0097-AOP-R2	V	
				0097-AOP-R3	V	
				0097-AOP-R4	V	

Pollutant	Emission Rate (lb/hr)	NAAQS Standard (µg/m3)	Averaging Time	Highest Concentration (µg/m3)	% of NAAQS
PM10	118.5	150	24-Hour	32.424	21.61
SO2	2110.2	80	Annual	18.586	23.23
		1300	3-Hour	484.306	37.25
		365	24-Hour	149.819	41.04
CO	169.4	10000	8-Hour	27.722	0.27
		40000	1-Hour	46.732	0.11
NOx	1167.4	100	Annual	10.281	10.28

63-00010	ALMATIS, INC.	BAUXITE	331313	1527-AOP-R0	V
				1527-AOP-R1	V
				1527-AOP-R10	V
				1527-AOP-R11	V
				1527-AOP-R12	V
				1527-AOP-R13	V
				1527-AOP-R14	V
				1527-AOP-R15	A
				1527-AOP-R2	V
				1527-AOP-R3	V
				1527-AOP-R4	V
				1527-AOP-R5	V
				1527-AOP-R6	V
				1527-AOP-R7	V
				1527-AOP-R8	V
				1527-AOP-R9	V

Pollutant	Emission Rate (lb/hr)	NAAQS Standard (µg/m3)	Averaging Time	Highest Concentration (µg/m3)	% of NAAQS
PM10	206.4 is now	150	24-Hour	146.8 (110.8+36)	97.8
SO2	8.6	80	Annual	3.6	4.5
		1300	3-Hour	38.4	3
		365	24-Hour	20.6	5.7
CO	73.1	10000	8-Hour	147.6	1.5
		40000	1-Hour	254.4	0.7
NOx	152.8	100	Annual	12.6	12.6

63-00011	ST-GOBAIN CERAMICS & PLASTICS	BRYANT	327992	0034-AOP-R0	V
				0034-AOP-R1	V
				0034-AOP-R2	A
				0034-AOP-R3	P

Pollutant	Emission Rate (lb/hr)	NAAQS Standard (µg/m3)	Averaging Time	Background Concentration (µg/m3)	Modeled Concentration (µg/m3)		% of NAAQS
PM10	36.3	150	24-Hour	38	81.931	119.93	79.95
SO2	48.5	80	Annual	5	7.441	12.44	15.55
		1300	3-Hour	21	155.5451	176.545	13.58
		365	24-Hour	14	59.5921	73.592	20.16
CO	42.9	10000	8-Hour	4241	555.591	4796.59	47.96
		40000	1-Hour	2995	318.551	3313.55	8.28
NOx	76.6	100	Annual	22	1.554	23.554	23.55

63-00029	WABASH ALLOYS	BENTON		0139-AOP-R0	V
				0139-AOP-R1	N

Pollutant	Emission Rate (lb/hr)	NAAQS Standard (µg/m3)	Averaging Time	Highest Concentration (µg/m3)	% of NAAQS
PM10	48.1	50	Annual	7.3	15.00%

		150	24-Hour	116.6	78.00%
SO2	32.1	80	Annual	0.5	1.00%
		1300	3-Hour	23	2.00%
		365	24-Hour	9.9	3.00%
NOx	20.2	100	Annual	0.6	1.00%
VOC	26.3	0.12	1-hour (ppm)		0.00%
CO	7.9	10000	8-hour	4.7	0.00%
		40000	1-hour	6.8	0.00%

63-00155	BFI WASTE SYSTEMS OF AR, LLC	BAUXITE	562212	1855-AOP-R0	V
				1855-AOP-R1	V
				1855-AOP-R2	V
				1855-AOP-R3	V
				1855-AOP-R4	V
				1855-AOP-R5	A

Pollutant	Emission Rate (lb/hr)	NAAQS Standard (µg/m3)	Averaging Time	Modeled Concentration (µg/m3)	Background Values NLR 2008 (µg/m3)	Total Highest Concentration (µg/m3)	% of NAAQS
PM10	21.37*	150	24-Hour	8.81	37	45.81	30.5
CO	23.59**	10000	8-Hour	187.5	1717.8	1905.3	19.1
		40000	1-Hour	571.2	2863	3434.2	8.6

* Includes SN-02 @ 20.3 lb/hr (17.3 lb/hr unpaved + 0.36 lb/hr paved + 2.64 lb/hr unpaved perimeter) + SN-03 @ 1.07 lb/hr
** SN-02 Flare

63-00164	COORS TEK-AR OPERATIONS	BENTON	327110	1672-AOP-R0	V

No modelling analysis performed

64-00049	MANSFIELD, A DIV./ WEST FRASER	MANSFIELD	321113	1386-AOP-R0	V
				1386-AOP-R1	V
				1386-AOP-R2	V
				1386-AOP-R3	V
				1386-AOP-R4	V
				1386-AOP-R5	V
				1386-AOP-R6	A

Pollutant	Emission Rate (lb/hr)	NAAQS Standard (µg/m3)	Averaging Time	Highest Concentration (µg/m3)	% of NAAQS
PM10	24.6	150	24-Hour	138.2a	0.922
Pb	0.02	0.15	Rolling 3-month Period over 3 years (not to be exceeded in any 3 month period)	0.009b	0.06

a. Includes the background concentration of 36 µg/m3 (2009, Little Rock).
b. Monthly average used in lieu of quarterly average.

66-00026	DIXIE CONSUMER PRODUCTS, LLC	FORT SMITH	322219	0309-AOP-R0	V

No modelling analysis performed

66-00030	GREENWOOD FIXTURE DIV-KRAFT	GREENWOOD		1309-AOP-R0	V	Total criteria pollutant emissions were not modeled, because the rates of total VOC and particulate as estimated in the calculations did not indicate a potential threat to the National Ambient Air Quality Standards (NAAQS).
				1309-AOP-R1	V	
66-00041	BALDOR ELECTRIC COMPANY	FORT SMITH	335312	0966-AOP-R0	V	(see table below)
				0966-AOP-R3	V	
				0996-AOP-R1	V	
				0996-AOP-R10	V	
				0996-AOP-R11	V	
				0996-AOP-R12	V	
				0996-AOP-R13	V	
				0996-AOP-R14	V	
				0996-AOP-R15	V	
				0996-AOP-R16	V	
				0996-AOP-R17	V	
				0996-AOP-R18	V	
				0996-AOP-R19	V	
				0996-AOP-R2	V	
				0996-AOP-R20	A	
				0996-AOP-R21	P	
				0996-AOP-R3	V	
				0996-AOP-R4	V	
				0996-AOP-R5	V	
				0996-AOP-R6	V	
				0996-AOP-R7	V	
				0996-AOP-R8	V	
				0996-AOP-R9	V	
66-00048	WHIRLPOOL CORPORATION	FORT SMITH	335222	0796-AOP-R0	V	Examination of the source type, location, plot plan, land use, emission parameters, and other available information indicate that modeling is not warranted at this time.
				0796-AOP-R1	V	

Pollutant	Emission Rate (lb/hr)	NAAQS Standard (µg/m3)	Averaging Time	6th Highest Concentration* (µg/m3)	% of NAAQS
PM10	3.3	150	24-Hour	114.88*	0.766
* Includes a background of 36 µg/m3					

				0796-AOP-R2	V
66-00050	TRANE US, INC	FORT SMITH	333415	1155-AOP-R0	V
				1155-AOP-R1	V

No modelling analysis performed

66-00063	COSCO, INC.	FORT SMITH		0973-AOP-R0	V
				0973-AOP-R1	V

Pollutant	Emission Rate (lb/hr)	NAAQS Standard (µg/m3)	Averaging Time	6th Highest Concentration* (µg/m3)	% of NAAQS
PM10	Low Emission Limit - No Modeling Required	50	Annual		0
		150	24-hour		0
VOC	750 tpy	0.12	1-hour (ppm)	0.016	0.13

66-00081	ACME BRICK COMPANY	FORT SMITH	327120	0713-AOP-R0	V
				0713-AOP-R1	V
				0713-AOP-R2	V
				0713-AOP-R3	V

Pollutant	Emission Rate (lb/hr)	NAAQS Standard (µg/m3)	Averaging Time	Highest Concentration (µg/m3)	% of NAAQS
PM10	18.7	50	Annual	6.7	13.4
		150	24-Hour	51.05	34
SO2	21.4	80	Annual	7.7	9
		1300	3-Hour	134	10
		365	24-Hour	58	15
VOC	8.5	0.12	1-Hour (ppm)	-	-
CO	31.7	10000	8-Hour	168.9	1
		40000	1-Hour	358	0.9
NOx	9.5	100	Annual	3.46	3.4

66-00150	RIVERSIDE FURN #2 3 6 & 7	FORT SMITH	337122	1160-AOP-R0	V
				1160-AOP-R1	V
				1160-AOP-R2	V
				1160-AOP-R3	V

Pollutant	Emission Rate (lb/hr)	NAAQS Standard ($\mu g/m^3$)	Averaging Time	Highest Concentration ($\mu g/m^3$)	% of NAAQS
PM_{10}	28.56	150	24-Hour	65.19	43.46%
SO_2		80	Annual		
		1300	3-Hour		
		365	24-Hour		
CO		10,000	8-Hour		
		40,000	1-Hour		
NO_x		100	Annual		
Pb		0.15	Rolling 3-month		

66-00219	SAINT GOBAIN CERAMICS/PLASTICS	FORT SMITH	327992	0492-AOP-R0	V
				0492-AOP-R1	V
				0492-AOP-R10	A
				0492-AOP-R2	V
				0492-AOP-R3	V
				0492-AOP-R4	V
				0492-AOP-R5	V
				0492-AOP-R6	V
				0492-AOP-R7	V
				0492-AOP-R8	V
				0492-AOP-R9	V

Pollutant	Emission Rate (lb/hr)	NAAQS Standard ($\mu g/m^3$)	Averaging Time	Highest Concentration ($\mu g/m^3$)	% of NAAQS
PM_{10}	61.7	150	24-Hour	93.64	97.00%
SO_2	55.7	80	Annual	8.54	10.67%
	55.7	1300	3-Hour	331.96	25.53%
	55.7	365	24-Hour	87.23	23.89%
CO	23.4	10,000	8-Hour	4825.74	48.25%
	23.4	40,000	1-Hour	3107.21	7.76%
NO_x	108.4	100	Annual	24.76	24.76%
Pb		0.15	Rolling 3-month		

66-00226	FT SMITH, CITY OF	FORT SMITH	921110	1791-AOP-R0	V
				1791-AOP-R1	A

Pollutant	Emission Rate (lb/hr)	NAAQS Standard ($\mu g/m^3$)	Averaging Time	Highest Concentration ($\mu g/m^3$)	% of NAAQS
PM_{10}	20.82	150	24-Hour	133.39	89.00%
SO_2		80	Annual		
		1300	3-Hour		
		365	24-Hour		
CO	24.71	10,000	8-Hour	1794.1	17.90%
	27.71	40,000	1-Hour	3132.2	7.80%
NO_x		100	Annual		
Pb		0.15	Rolling 3-month		

66-00274	GERDAU MACSTEEL	FORT SMITH	331110	0693-AOP-R0	V
				0693-AOP-R1	V

Pollutant	Emission Rate (lb/hr)	NAAQS Standard ($\mu g/m^3$)	Averaging Time	Highest Concentration ($\mu g/m^3$)	% of NAAQS

				0693-AOP-R10	A
				0693-AOP-R2	V
				0693-AOP-R3	V
				0693-AOP-R4	V
				0693-AOP-R5	V
				0693-AOP-R6	V
				0693-AOP-R7	V
				0693-AOP-R8	V
				0693-AOP-R9	V

PM_{10}	38.9	150	24-Hour	37.6	25.3.%
SO_2	109.2	80	Annual	9.5	11.90%
	109.2	1300	3-Hour	191.9	14.80%
	109.2	365	24-Hour	89.2	24.40%
CO	469	10,000	8-Hour	711	7.10%
	469	40,000	1-Hour	1140	2.90%
NO_x	137.7	100	Annual	16.3	16.30%
Pb	0.3	0.15	Rolling 3-month	0.06	40%

66-00294	OWENS CORNING COMPOSITE MAT.	FORT SMITH	313230	0747-AOP-R0	V
				0747-AOP-R1	V
				0747-AOP-R2	V
				0747-AOP-R3	V
				0747-AOP-R4	A

Pollutant	Emission Rate (lb/hr)	NAAQS Standard ($\mu g/m^3$)	Averaging Time	Highest Concentration ($\mu g/m^3$)	% of NAAQS
PM_{10}	10.9	150	24-Hour	141.79456	94.60%
SO_2	1.2	80	Annual	0.07756	0.10%
	1.2	1300	3-Hour	3.96813	0.30%
	1.2	365	24-Hour	1.00493	0.30%
CO	52.3	10,000	8-Hour	111.22127	1.10%
	52.3	40,000	1-Hour	263.90512	0.70%
NO_x	12.7	100	Annual	0.80372	0.80%
Pb		0.15	Rolling 3-month		

66-00352	QUALSERV SOLUTIONS, LLC	FORT SMITH	337127	1366-AOP-R0	V	Examination of the source type, location, plot plan, land use, emission parameters, and other available information indicate that modeling is not warranted at this time
				1366-AOP-R1	V	
				1366-AOP-R2	V	
				1366-AOP-R3	V	
				1366-AOP-R4	V	
				1366-AOP-R5	V	
				1366-AOP-R6	V	
				1366-AOP-R7	A	
66-00496	FEDERAL COACH, LLC	FORT SMITH	336211	1421-AOP-R0	V	Examination of the source type, location, plot plan, land use, emission parameters, and other available information indicate that modeling is not warranted at this time
				1421-AOP-R1	V	
				1421-AOP-R2	V	
66-00507	HICKORY SPRINGS MFG CO.	FORT SMITH	326150	1456-AOP-R0	V	

66-00640	CENTERPOINT ENERGY/HOBBS	LAVACA	486210	1203-AOP-R1	V	Examination of the source type, location, plot plan, land use, emission parameters, and other available information indicate that modeling is not warranted at this time
				1203-AOP-R2	V	
				1203-AOP-R3	V	
				1203-AOP-R4	V	
				1203-AOP-R5	V	
66-00701	HUNTINGTON FOAM CORP.	FORT SMITH	326140	2041-AOP-R0	V	

Pollutant	Emission Rate (lb/hr)	NAAQS Standard (µg/m³)	Averaging Time	Highest Concentration (µg/m³)	% of NAAQS
PM_{10}	0.2	150	24-Hour	0.7937	0.53%
SO_2	0.2	80	Annual	0.0586	0.07%
	0.2	1300	3-Hour	1.525	0.12%
	0.2	365	24-Hour	0.7937	0.22%
CO	1.8	10,000	8-Hour	11.316	0.11%
	1.8	40,000	1-Hour	18.088	0.05%
NO_x	2	100	Annual	0.58626	0.59%
Pb		0.15	Rolling 3-month		

66-01533	W & W FIBERGLASS TANK, LLC	FORT SMITH	326199	2143-AOP-R0	V
				2143-AOP-R1	V
				2143-AOP-R2	A

Pollutant	Emission Rate (lb/hr)	NAAQS Standard (µg/m³)	Averaging Time	Highest Concentration (µg/m³)	% of NAAQS
PM_{10}	3	150	24-Hour	25.28	42.20%
SO_2		80	Annual		
		1300	3-Hour		
		365	24-Hour		
CO		10,000	8-Hour		
		40,000	1-Hour		
NO_x		100	Annual		
Pb		0.15	Rolling 3-month		

67-00296	HUSQVARNA FORESTRY PRODUCTS	DE QUEEN	333991	1753-AOP-R0	V
				1753-AOP-R1	V

Pollutant	Emission Rate (lb/hr)	NAAQS Standard (µg/m³)	Averaging Time	Highest Concentration (µg/m³)	% of NAAQS
PM_{10}		150	24-Hour		
SO_2		80	Annual		
		1300	3-Hour		
		365	24-Hour		
CO	464.4	10,000	8-Hour	6287	63.00%
		40,000	1-Hour	8981	22.00%
NO_x		100	Annual		
Pb		0.15	Rolling 3-month		

68-00234	BIGGS HARDWARE & AUTO SUPPLY	WIRTH	441310	2077-AOP-R0	N
70-00012	GREAT LAKES CHEMICAL/CENTRAL	EL DORADO	325998	1077-AOP-R0	V
				1077-AOP-R1	A

Pollutant	Emission Rate (lb/hr)	NAAQS Standard (µg/m³)	Averaging Time	Highest Concentration (µg/m³)	% of NAAQS
PM_{10}	136.4	150	24-Hour	148.6	99.10%
SO_2	129.1	80	Annual	26.91	33.64%
	129.1	1300	3-Hour	198.11	15.24%
	129.1	365	24-Hour	123.68	33.89%
CO	146	10,000	8-Hour	593.65	5.94%
	146	40,000	1-Hour	1308.18	3.27%
NO_x	163.2	100	Annual	42.1	42.10%
Pb		0.15	Rolling 3-month		

70-00013	WEST FRASER ,INC/HUTTIG MILL	HUTTIG	321113	0118-AOP-R0	V
				0118-AOP-R1	V
				0118-AOP-R2	V
				0118-AOP-R3	V

Pollutant	Emission Rate (lb/hr)	NAAQS Standard (µg/m³)	Averaging Time	Highest Concentration (µg/m³)	% of NAAQS
PM_{10}	72.7	150	24-Hour	29.92	6.60%
SO_2	3.8	80	Annual	0.44	0.01%
	3.8	1300	3-Hour	5.61	0.00%
	3.8	365	24-Hour	2.72	0.01%
CO	84.2	10,000	8-Hour	112.46	1.10%

	84.2	40,000	1-Hour	137.05	0.35%
NO_x	34.9	100	Annual	4.53	4.50%
Pb		0.15	Rolling 3-month		

				0118-AOP-R4	V	
				0118-AOP-R5	V	
				0118-AOP-R6	V	
				0118-AOP-R7	A	
70-00014	D & D PROPERTIES	EL DORADO	325180	0906-AOP-R0	V	Examination of the source type, location, plot plan, land use, emission parameters, and other available information indicate that modeling is not warranted at this time
				0906-AOP-R1	V	
				0906-AOP-R2	V	
70-00016	LION OIL COMPANY	EL DORADO	324110	0868-AOP-R0	V	
				0868-AOP-R1	V	
				0868-AOP-R10	P	
				0868-AOP-R2	V	
				0868-AOP-R3	V	
				0868-AOP-R4	V	
				0868-AOP-R5	V	
				0868-AOP-R6	V	
				0868-AOP-R7	V	
				0868-AOP-R8	V	
				0868-AOP-R9	A	

Pollutant	Emission Rate (lb/hr)	NAAQS Standard (µg/m^3)	Averaging Time	Highest Concentration (µg/m^3)	% of NAAQS
PM_{10}		150	24-Hour	60.6	
SO_2		80	Annual	16	20.00%
		1300	3-Hour	88.9	24.00%
		365	24-Hour	252	19.00%
CO		10,000	8-Hour	14295	35.00%
		40,000	1-Hour	6821	68.00%
NO_x		100	Annual	17.6	
Pb		0.15	Rolling 3-month		

70-00032	UNION COUNTY LUMBER CO	EL DORADO	321113	0703-AOP-R0	V	Examination of the source type, location, plot plan, land use, emission parameters, and other available information indicate that modeling is not warranted at this time
				0703-AOP-R1	V	
				0703-AOP-R2	V	
				0703-AOP-R3	V	
				0703-AOP-R4	V	
				0703-AOP-R5	V	
				2348-AOP-R0	A	
70-00036	COOPER-STANDARD AUTOMOTIVE,INC	EL DORADO	326291	0818-AOP-R0	V	

				0818-AOP-R1	V	Examination of the source type, location, plot plan, land use, emission parameters, and other available information indicate that modeling is not warranted at this time
				0818-AOP-R2	V	
				0818-AOP-R3	V	
				0818-AOP-R4	V	
				0818-AOP-R5	V	
				0818-AOP-R6	V	
				0818-AOP-R7	V	
70-00037	GREAT LAKES SOUTH	EL DORADO	325998	0873-AOP-R0	V	
				0873-AOP-R1	V	
				0873-AOP-R2	V	
				0873-AOP-R3	V	
				0873-AOP-R4	V	
				0873-AOP-R5	V	
				0873-AOP-R6	V	
				0873-AOP-R7	A	
				0873-AOP-R8	P	
				0873-AOP-R9	P	

Pollutant	Emission Rate (lb/hr)	NAAQS Standard (µg/m³)	Averaging Time	Highest Concentration (µg/m³)	% of NAAQS
PM_{10}		150	24-Hour		
SO_2		80	Annual		
		1300	3-Hour		
		365	24-Hour		
CO	141.8	10,000	8-Hour	4956.9	49.50%
	141.8	40,000	1-Hour	15775.4	39.50%
NO_x	54.3	100	Annual	7.9	7.90%
Pb		0.15	Rolling 3-month		

70-00039	MARTIN OPERATING PARTNERSHIP	SMACKOVER	324191	1227-AOP-R0	V
				1227-AOP-R1	A

Pollutant	Emission Rate (lb/hr)	NAAQS Standard (µg/m³)	Averaging Time	Highest Concentration (µg/m³)	% of NAAQS
PM_{10}	3.8	150	24-Hour	69.6337	46.00%
SO_2	9	80	Annual	9.13	11.00%
	9	1300	3-Hour	100.27	8.00%
	9	365	24-Hour	57.82	16.00%
CO	26.7	10,000	8-Hour	154.71	2.00%
	26.7	40,000	1-Hour	178.54	0.00%
NO_x	33.4	100	Annual	45.03	45.00%
Pb		0.15	Rolling 3-month		

70-00040	EL DORADO CHEMICAL COMPANY	EL DORADO	325311	0573-AOP-R0	V
				0573-AOP-R1	V
				0573-AOP-R10	V
				0573-AOP-R11	V
				0573-AOP-R12	V
				0573-AOP-R13	V
				0573-AOP-R14	V
				0573-AOP-R15	V
				0573-AOP-R16	A
				0573-AOP-R17	P
				0573-AOP-R2	V
				0573-AOP-R3	V

Pollutant	Emission Rate (lb/hr)	NAAQS Standard (µg/m³)	Averaging Time	Highest Concentration (µg/m³)	% of NAAQS
PM_{10}	172	150	24-Hour	136.49246	91.00%
SO_2	92.2	80	Annual	13.29965	16.63%
	92.2	1300	3-Hour	555.91071	42.77%
	92.2	365	24-Hour	129.21823	35.41%
CO	24	10,000	8-Hour	36.3551	0.37%
	24	40,000	1-Hour	89.89168	0.23%
NO_x	592.3	100	Annual	12.34876	12.35%
Pb		0.15	Rolling 3-month		

				0573-AOP-R4	V
				0573-AOP-R5	V
				0573-AOP-R6	V
				0573-AOP-R7	V
				0573-AOP-R8	V
				0573-AOP-R9	V
70-00098	CLEAN HARBORS EL DORADO, LLC	EL DORADO	562211	1009-AOP-R0	V
				1009-AOP-R1	V
				1009-AOP-R10	V
				1009-AOP-R11	V
				1009-AOP-R12	A
				1009-AOP-R13	P
				1009-AOP-R2	V
				1009-AOP-R3	V
				1009-AOP-R4	V
				1009-AOP-R5	V
				1009-AOP-R6	V
				1009-AOP-R7	V
				1009-AOP-R8	V
				1009-AOP-R9	V

Pollutant	Emission Rate (lb/hr)	NAAQS Standard (μg/m^3)	Averaging Time	Highest Concentration (μg/m^3)	% of NAAQS
PM_{10}	15.98	150	24-Hour	57.56	63.00%
SO_2		80	Annual		
		1300	3-Hour		
		365	24-Hour		
CO	53.19	10,000	8-Hour	16.49	16.00%
	53.19	40,000	1-Hour	24.99	5.50%
NO_x	181	100	Annual	3.07	23.00%
Pb	0.07315	0.15	Rolling 3-month	0.00937	6%

70-00101	GREAT LAKES WEST	MAGNOLIA	325998	0286-AOP-R0	V
				0286-AOP-R1	V
				0286-AOP-R10	A
				0286-AOP-R2	V
				0286-AOP-R3	V
				0286-AOP-R4	V
				0286-AOP-R5	V
				0286-AOP-R6	V
				0286-AOP-R7	V
				0286-AOP-R8	V
				0286-AOP-R9	V

Pollutant	Emission Rate (lb/hr)	NAAQS Standard (μg/m^3)	Averaging Time	Highest Concentration (μg/m^3)	% of NAAQS
PM_{10}	19.7	150	24-Hour	62.25	41.50%
SO_2	1987	80	Annual	28.68	35.85%
	1987	1300	3-Hour	575.86	44.30%
	1987	365	24-Hour	195.63	53.60%
CO	82.1	10,000	8-Hour	309.89	3.10%
	82.1	40,000	1-Hour	569.25	1.42%
NO_x	82.2	100	Annual	28.73	28.73%
Pb		0.15	Rolling 3-month		

70-00364	UNION COUNTY RECYCLING & DISP.	EL DORADO	562212	1854-AOP-R0	V
				1854-AOP-R1	A

Pollutant	Emission Rate (lb/hr)	NAAQS Standard (μg/m^3)	Averaging Time	Highest Concentration (μg/m^3)	% of NAAQS
PM_{10}	10.2	150	24-Hour	66.7836	44.52%
SO_2	1	80	Annual	0.20475	0.26%
	1	1300	3-Hour	6.60471	0.51%
	1	365	24-Hour	2.08542	0.57%
CO	3	10,000	8-Hour	25.57573	0.26%
	3	40,000	1-Hour	200.41039	0.50%
NO_x	2.6	100	Annual	3.37581	3.38%
Pb		0.15	Rolling 3-month		

70-00400	ENTERPRISE REFINED PRODUCTS CO	EL DORADO	486910	1611-AOP-R0	V	Examination of the source type, location, plot plan, land use, emission parameters, and other available information indicate that modeling is not warranted at this time
				1611-AOP-R1	V	
				1611-AOP-R2	V	
				1611-AOP-R3	V	
				1611-AOP-R4	V	
				1611-AOP-R5	V	
				1611-AOP-R6	A	
70-00473	ANTHONY FOREST PRODUCTS-URBAN	URBANA	321113	1681-AOP-R0	V	
				1681-AOP-R1	V	
				1681-AOP-R10	V	
				1681-AOP-R11	V	
				1681-AOP-R12	A	
				1681-AOP-R13	P	
				1681-AOP-R2	V	
				1681-AOP-R3	V	
				1681-AOP-R4	V	
				1681-AOP-R5	V	
				1681-AOP-R6	V	
				1681-AOP-R7	V	
				1681-AOP-R8	V	
				1681-AOP-R9	V	
70-00480	DEL-TIN FIBER L.L.C.	EL DORADO	321219	1714-AOP-R0	V	
				1714-AOP-R1	V	
				1714-AOP-R2	V	
				1714-AOP-R3	V	
				1714-AOP-R4	V	
				1714-AOP-R5	V	
				1714-AOP-R6	V	
				1714-AOP-R7	V	
				1714-AOP-R8	V	
				1714-AOP-R9	A	
70-00543	UNION POWER STATION	EL DORADO	221112	1861-AOP-R0	V	
				1861-AOP-R1	V	
				1861-AOP-R2	V	
				1861-AOP-R3	V	

70-00473 ANTHONY FOREST PRODUCTS-URBAN:

Pollutant	Emission Rate (lb/hr)	NAAQS Standard (μg/m³)	Averaging Time	Highest Concentration (μg/m³)	% of NAAQS
PM_{10}	19.2	150	24-Hour	123.6	82.40%
SO_2		80	Annual		
		1300	3-Hour		
		365	24-Hour		
CO	45	10,000	8-Hour	356	3.40%
	45	40,000	1-Hour	616	1.50%
NO_x	25.6	100	Annual	14.7	14.70%
Pb		0.15	Rolling 3-month		

70-00480 DEL-TIN FIBER L.L.C.:

Pollutant	Emission Rate (lb/hr)	NAAQS Standard (μg/m³)	Averaging Time	Highest Concentration (μg/m³)	% of NAAQS
PM_{10}	50.5	150	24-Hour	121.2	81.00%
SO_2		80	Annual		
		1300	3-Hour		
		365	24-Hour		
CO		10,000	8-Hour		
		40,000	1-Hour		
NO_x		100	Annual		
Pb		0.15	Rolling 3-month		

70-00543 UNION POWER STATION:

Pollutant	Emission Rate (lb/hr)	NAAQS Standard (μg/m³)	Averaging Time	Highest Concentration (μg/m³)	% of NAAQS
PM_{10}	175.6	150	24-Hour		0.52%
SO_2	24	80	Annual		0.14%
	24	1300	3-Hour		0.21%
	24	365	24-Hour		0.20%

				1861-AOP-R4	V

Pollutant	Emission Rate (lb/hr)	NAAQS Standard ($\mu g/m^3$)	Averaging Time	Highest Concentration ($\mu g/m^3$)	% of NAAQS
CO	378.4	10,000	8-Hour		0.36%
	378.4	40,000	1-Hour		0.17%
NO_x	270.4	100	Annual		1.19%
Pb	0.016	0.15	Rolling 3-month	0.00062	0%

				1861-AOP-R5	V
				1861-AOP-R6	V
				1861-AOP-R7	A
71-00315	DESOTO GATHERING/CPF-2	CLEVELAND	213112	2204-AOP-R0	A
				2204-AOP-R1	P

Pollutant	Emission Rate (lb/hr)	NAAQS Standard ($\mu g/m^3$)	Averaging Time	Highest Concentration ($\mu g/m^3$)	% of NAAQS
PM_{10}	3.5	150	24-Hour	3.43	2.30%
SO_2	1.9	80	Annual	0.33	0.40%
	1.9	1300	3-Hour	13.1	1.00%
	1.9	365	24-Hour	3.42	0.90%
CO	43.7	10,000	8-Hour	66.98	0.70%
	43.7	40,000	1-Hour	150.93	0.40%
NO_x	55.7	100	Annual	7.73	7.70%
Pb		0.15	Rolling 3-month		

71-00380	DESOTO GATHERING/COVE CREEK 4	SOUTHSIDE	486210	2247-AOP-R0	A

Pollutant	Emission Rate (lb/hr)	NAAQS Standard ($\mu g/m^3$)	Averaging Time	Highest Concentration ($\mu g/m^3$)	% of NAAQS
PM_{10}	3.6	150	24-Hour	1.91	1.27%
SO_2		80	Annual		
		1300	3-Hour		
		365	24-Hour		
CO	47.8	10,000	8-Hour	75.55	0.76%
	47.8	40,000	1-Hour	152.76	
NO_x	52.6	100	Annual	5.14	5.14%
Pb		0.15	Rolling 3-month		

71-00396	DESOTO GATHERING/GRAVEL HILL 4	SCOTLAND	486210	2252-AOP-R0	A

Pollutant	Emission Rate (lb/hr)	NAAQS Standard ($\mu g/m^3$)	Averaging Time	Highest Concentration ($\mu g/m^3$)	% of NAAQS
PM_{10}	3.4	150	24-Hour	5	4.00%
SO_2		80	Annual		
		1300	3-Hour		
		365	24-Hour		
CO	44.4	10,000	8-Hour	174.9	2.00%
	44.4	40,000	1-Hour	197.7	0.50%
NO_x	51.6	100	Annual	6.7	7.00%
Pb		0.15	Rolling 3-month		

72-00048	BALL METAL FOOD CONTAINER, LLC	SPRINGDALE	332431	0782-AOP-R0	V	Examination of the source type, location, plot plan, land use, emission parameters, and other available information indicate that modeling is not warranted at this time
				0782-AOP-R1	V	
				0782-AOP-R2	V	
				0782-AOP-R3	V	
				0782-AOP-R4	V	
				0782-AOP-R5	V	
				0782-AOP-R6	V	
				0782-AOP-R7	A	
				0782-AOP-R8	P	

72-00054	AMERICAN TUBING ARKANSAS,LLC	SPRINGDALE	332999	2001-AOP-R0	V	Examination of the source type, location, plot plan, land use, emission parameters, and other available information indicate that modeling is not warranted at this time
				2001-AOP-R1	V	
				2001-AOP-R2	V	
				2001-AOP-R3	V	
				2001-AOP-R4	V	
72-00144	ECO-VISTA, LLC	SPRINGDALE	562212	1884-AOP-R0	V	
				1884-AOP-R1	V	
				1884-AOP-R2	V	
				1884-AOP-R3	V	
				1884-AOP-R4	V	
				1884-AOP-R5	A	

Pollutant	Emission Rate (lb/hr)	NAAQS Standard (µg/m^3)	Averaging Time	Highest Concentration (µg/m^3)	% of NAAQS
PM_{10}	32.5	150	24-Hour	131.98	88.00%
SO_2	18	80	Annual	2.95	3.70%
	18	1300	3-Hour	74.76	5.80%
	18	365	24-Hour	41.54	11.40%
CO	57.3	10,000	8-Hour	182.26	1.80%
	57.3	40,000	1-Hour	321.92	0.80%
NO_x	23.2	100	Annual	4.02	4.02%
Pb		0.15	Rolling 3-month		

72-00205	KAWNEER COMPANY, INC	SPRINGDALE	332321	0904-AOP-R0	V
				0904-AOP-R1	V
				0904-AOP-R2	V
				0904-AOP-R3	V
				0904-AOP-R4	V
				0904-AOP-R5	V
				0904-AOP-R6	V
				0904-AOP-R7	V
				0904-AOP-R8	A
				0904-AOP-R9	P

Pollutant	Emission Rate (lb/hr)	NAAQS Standard (µg/m^3)	Averaging Time	Highest Concentration (µg/m^3)	% of NAAQS
PM_{10}	1.5	150	24-Hour	0.02352	<1%
SO_2		80	Annual		
		1300	3-Hour		
		365	24-Hour		
CO		10,000	8-Hour		
		40,000	1-Hour		
NO_x		100	Annual		
Pb		0.15	Rolling 3-month		

72-00270	SUPERIOR INDUSTRIES INTERNAT'L	FAYETTEVILLE	331524	1302-AOP-R0	V
				1302-AOP-R1	V
				1302-AOP-R10	V
				1302-AOP-R11	V
				1302-AOP-R12	V
				1302-AOP-R13	V
				1302-AOP-R14	V
				1302-AOP-R15	V
				1302-AOP-R16	V
				1302-AOP-R17	V
				1302-AOP-R18	V
				1302-AOP-R19	V
				1302-AOP-R2	V

Pollutant	Emission Rate (lb/hr)	NAAQS Standard (µg/m^3)	Averaging Time	Highest Concentration (µg/m^3)	% of NAAQS
PM_{10}	8.98	150	24-Hour	109.8	73.20%
SO_2		80	Annual		
		1300	3-Hour		
		365	24-Hour		
CO		10,000	8-Hour		
		40,000	1-Hour		
NO_x		100	Annual		
Pb		0.15	Rolling 3-month		

				1302-AOP-R20	V	
				1302-AOP-R21	V	
				1302-AOP-R22	V	
				1302-AOP-R23	V	
				1302-AOP-R24	V	
				1302-AOP-R3	V	
				1302-AOP-R4	V	
				1302-AOP-R5	V	
				1302-AOP-R6	V	
				1302-AOP-R7	V	
				1302-AOP-R8	V	
				1302-AOP-R9	V	
				1302-AR-2	A	
72-00320	JV MANUFACTURING	SPRINGDALE	333995	1668-AOP-R0	V	Examination of the source type, location, plot plan, land use, emission parameters, and other available information indicate that modeling is not warranted at this time
				1668-AOP-R1	V	
72-00695	HARRY D.MATTISON POWER PLANT	TONTITOWN	221112	2009-AOP-R0	V	(see table below)
				2009-AOP-R1	V	
				2114-AOP-R0	V	
				2114-AOP-R1	V	
				2114-AOP-R2	V	
				2114-AOP-R3	V	
				2114-AOP-R4	V	
				2114-AOP-R5	A	
73-00006	ARMSTRONG HARDWOOD FLOORING	KENSETT		0869-AOP-R0	V	(see table below)
				0869-AOP-R1	V	
				0869-AOP-R2	V	
				0869-AOP-R3	V	
				0869-AOP-R4	V	
				0869-AOP-R5	V	

Pollutant	Emission Rate (lb/hr)	NAAQS Standard (μg/m^3)	Averaging Time	Highest Concentration (μg/m^3)	% of NAAQS
PM_{10}	60	150	24-Hour	51	34.00%
SO_2		80	Annual	5.8	7.00%
		1300	3-Hour	Natural Gas	0.00%
		365	24-Hour	13.4	3.70%
CO	4998	10,000	8-Hour	3240	32.00%
		40,000	1-Hour	4606	12.00%
NO_x	1908	100	Annual	35	35.00%
Pb		0.15	Rolling 3-month		

Pollutant	Emission Rate (lb/hr)	NAAQS Standard (μg/m^3)	Averaging Time	Highest Concentration (μg/m^3)	% of NAAQS
PM_{10}	34.2	150	24-Hour	29.45	19.63%
SO_2		80	Annual		
		1300	3-Hour		
		365	24-Hour		
CO	55.1	10,000	8-Hour	88.17	0.88%
	55.1	40,000	1-Hour	158.73	0.40%
NO_x		100	Annual		
Pb		0.15	Rolling 3-month		

73-00104	NATURAL GAS PIPELINE #307	SEARCY	486210	0715-AOP-R0	V	
				0715-AOP-R1	V	
				0715-AOP-R2	V	
				0715-AOP-R3	V	
				0715-AOP-R4	V	
				0715-AOP-R5	V	
				0715-AOP-R6	A	
73-00110	BRYCE COMPANY, LLC	SEARCY	323111	0763-AOP-R0	V	Examination of the source type, location, plot plan, land use, emission parameters, and other available information indicate that modeling is not warranted at this time
				0763-AOP-R1	V	
				0763-AOP-R10	V	
				0763-AOP-R11	V	
				0763-AOP-R12	V	
				0763-AOP-R13	V	
				0763-AOP-R14	A	
				0763-AOP-R2	V	
				0763-AOP-R3	V	
				0763-AOP-R4	V	
				0763-AOP-R5	V	
				0763-AOP-R6	V	
				0763-AOP-R7	V	
				0763-AOP-R8	V	
				0763-AOP-R9	V	
73-00123	TETCO-BALD KNOB	BALD KNOB	486210	1340-AOP-R0	V	
				1340-AOP-R1	V	
				1340-AOP-R2	V	
				1340-AOP-R3	A	
				1340-AOP-R4	P	
73-00127	ENABLE MISS. RIVER//W.POINT	WEST POINT	486210	1432-AOP-R0	V	
				1432-AOP-R1	V	
				1432-AOP-R2	V	
				1432-AOP-R3	V	
				1432-AOP-R4	A	
				1432-AOP-R5	V	

73-00104 NATURAL GAS PIPELINE #307:

Pollutant	Emission Rate (lb/hr)	NAAQS Standard (µg/m^3)	Averaging Time	Highest Concentration (µg/m^3)	% of NAAQS
PM_{10}	13.8	150	24-Hour	10.3	26.90%
SO_2	<100	80	Annual		
	<100	1300	3-Hour		
	<100	365	24-Hour		
CO	145.5	10,000	8-Hour	827.7	8.30%
	145.5	40,000	1-Hour	2087.4	5.20%
NO_x	1727.6	100	Annual	98.16	98.20%
Pb		0.15	Rolling 3-month		

73-00123 TETCO-BALD KNOB:

Pollutant	Emission Rate (lb/hr)	NAAQS Standard (µg/m^3)	Averaging Time	Highest Concentration (µg/m^3)	% of NAAQS
PM_{10}	3.3	150	24-Hour	1.936	3.87%
SO_2	0.9	80	Annual	0.654	0.82%
	0.9	1300	3-Hour	9.061	0.70%
	0.9	365	24-Hour	5.988	1.64%
CO	45.1	10,000	8-Hour	463.39	4.63%
	45.1	40,000	1-Hour	617.24	1.54%
NO_x	274.7	100	Annual	70.99	71.00%
Pb		0.15	Rolling 3-month		

73-00127 ENABLE MISS. RIVER//W.POINT:

Pollutant	Emission Rate (lb/hr)	NAAQS Standard (µg/m^3)	Averaging Time	Highest Concentration (µg/m^3)	% of NAAQS
PM_{10}	1.3	150	24-Hour	45.115	30.10%
SO_2		80	Annual		
		1300	3-Hour		
		365	24-Hour		
CO	417.2	10,000	8-Hour	1427.25	14.30%
	417.2	40,000	1-Hour	2461.33	6.20%
NO_x	238.6	100	Annual	39.91	40.00%
Pb		0.15	Rolling 3-month		

73-00150	MAYTAG MANUFACTURING, LLC	SEARCY	335224	1152-AOP-R0	V	Examination of the source type, location, plot plan, land use, emission parameters, and other available information indicate that modeling is not warranted at this time
				1152-AOP-R1	V	

73-00177	CON-WAY MANUFACTURING, INC.	SEARCY	336212	1534-AOP-R0	V
				1534-AOP-R1	V
				1534-AOP-R2	V

Pollutant	Emission Rate (lb/hr)	NAAQS Standard (µg/m³)	Averaging Time	Highest Concentration (µg/m³)	% of NAAQS
PM_{10}	1.7	150	24-Hour	48.4607	32.30%
SO_2		80	Annual		
		1300	3-Hour		
		365	24-Hour		
CO		10,000	8-Hour		
		40,000	1-Hour		
NO_x		100	Annual		
Pb		0.15	Rolling 3-month		

73-00787	BHP BILLITON PETRO/HARMONY	SEARCY	486210	2292-AOP-R0	A

Pollutant	Emission Rate (lb/hr)	NAAQS Standard (µg/m³)	Averaging Time	Highest Concentration (µg/m³)	% of NAAQS
PM_{10}	2.4	150	24-Hour	4.58	3.05%
SO_2		80	Annual		
		1300	3-Hour		
		365	24-Hour		
CO		10,000	8-Hour		
		40,000	1-Hour		
NO_x		100	Annual		
Pb		0.15	Rolling 3-month		

73-00987	DESOTO GATHERING/TIGER CPF-1	JUDSONIA	486210	2202-AOP-R0	V
				2202-AOP-R1	A

Pollutant	Emission Rate (lb/hr)	NAAQS Standard (µg/m³)	Averaging Time	Highest Concentration (µg/m³)	% of NAAQS
PM_{10}	3.5	150	24-Hour	54.9	36.60%
SO_2		80	Annual		
		1300	3-Hour		
		365	24-Hour		
CO	43.7	10,000	8-Hour	93.3	0.90%
	43.7	40,000	1-Hour	235.7	0.60%
NO_x	55.7	100	Annual	7.5	7.50%
Pb		0.15	Rolling 3-month		

73-00988	LIDE INDUSTRIES, LLC	SEARCY	326199	2164-AOP-R0	V	Examination of the source type, location, plot plan, land use, emission parameters, and other available information indicate that modeling is not warranted at this time

73-01044	TEXAS GAS/BALD KNOB COMP. STA.	BALD KNOB	486210	2190-AOP-R0	V

Pollutant	Emission Rate (lb/hr)	NAAQS Standard (µg/m³)	Averaging Time	Highest Concentration (µg/m³)	% of NAAQS
PM_{10}	1.7	150	24-Hour	48.4607	32.30%
SO_2		80	Annual		
		1300	3-Hour		
		365	24-Hour		
CO		10,000	8-Hour		
		40,000	1-Hour		
NO_x		100	Annual		
Pb		0.15	Rolling 3-month		

73-01081	DESOTO GATHERING/MAKO CPF-1	PANGBURN	486210	2236-AOP-R0	A

Pollutant	Emission Rate (lb/hr)	NAAQS Standard	Averaging Time	Highest Concentration	% of NAAQS

				2236-AOP-R1	P

Pollutant	Emission Rate (lb/hr)	NAAQS Standard ($\mu g/m^3$)	Averaging Time	Highest Concentration ($\mu g/m^3$)	% of NAAQS
PM_{10}	3.1	150	24-Hour	8	5.40%
SO_2		80	Annual		
		1300	3-Hour		
		365	24-Hour		
CO	38.3	10,000	8-Hour	132.6	1.40%
	38.3	40,000	1-Hour	221.6	0.60%
NO_x	50.3	100	Annual	6.8	6.80%
Pb		0.15	Rolling 3-month		

73-01084	FAYETTEVILLE EXPRESS PIPELINE	RUSSELL	486210	2205-AOP-R0	V
				2205-AOP-R1	V
				2205-AOP-R2	V
				2205-AOP-R3	V
				2205-AOP-R4	A

Pollutant	Emission Rate (lb/hr)	NAAQS Standard ($\mu g/m^3$)	Averaging Time	Highest Concentration ($\mu g/m^3$)	% of NAAQS
PM_{10}	1.1	150	24-Hour	41.72	27.80%
SO_2	1.1	80	Annual	5.53	6.92%
	1.1	1300	3-Hour	26.43	2.10%
	1.1	365	24-Hour	45.01	12.34%
CO	38.6	10,000	8-Hour	2981	29.81%
	38.6	40,000	1-Hour	3969	10.00%
NO_x	5838	100	Annual	25.9	25.90%
Pb		0.15	Rolling 3-month		0%

74-00024	ARK ELECTRIC COOP-CARL BAILEY	AUGUSTA	221112	0154-AOP-R0	V
				0154-AOP-R1	V
				0154-AOP-R2	V
				0154-AOP-R3	V
				0154-AOP-R4	A
				0154-AOP-R5	P

Pollutant	Emission Rate (lb/hr)	NAAQS Standard ($\mu g/m^3$)	Averaging Time	Highest Concentration ($\mu g/m^3$)	% of NAAQS
PM_{10}	261	150	24-Hour	18.42	38.00%
SO_2	3250	80	Annual	28.2	35.00%
	887	1300	3-Hour	525.12	40.00%
		365	24-Hour	229.37	6.00%
CO	54	10,000	8-Hour	6.96	0.00%
		40,000	1-Hour	9.94	0.00%
NO_x	887	100	Annual	7.7	8.00%
Pb	0.2	0.15	Rolling 3-month	0.003	0.20%

75-00009	DELTIC TIMBER CORPORATION	OLA	321113	0592-AOP-R0	V
				0592-AOP-R1	V
				0592-AOP-R10	A
				0592-AOP-R11	P
				0592-AOP-R2	V
				0592-AOP-R3	V
				0592-AOP-R4	V
				0592-AOP-R5	V
				0592-AOP-R6	V
				0592-AOP-R7	V
				0592-AOP-R8	V
				0592-AOP-R9	V

Pollutant	Emission Rate (lb/hr)	NAAQS Standard ($\mu g/m^3$)	Averaging Time	Highest Concentration ($\mu g/m^3$)	% of NAAQS
PM_{10}	17.4	150	24-Hour	46.7	93.40%
SO_2		80	Annual		
		1300	3-Hour		
		365	24-Hour		
CO	65.8	10,000	8-Hour	662	6.60%
	65.8	40,000	1-Hour	1315	3.30%
NO_x		100	Annual		
Pb		0.15	Rolling 3-month		

75-00046	OZARK RIDGE LANDFILL, INC	DANVILLE	562212	2034-AOP-R0	V
				2034-AOP-R1	V
				2034-AOP-R2	V
				2034-AOP-R3	A

Pollutant	Emission Rate (lb/hr)	NAAQS Standard ($\mu g/m^3$)	Averaging Time	Highest Concentration ($\mu g/m^3$)	% of NAAQS
PM_{10}	13.1	150	24-Hour	12.12	24.00%
SO_2	0.1	80	Annual	5.62	7.00%
	0.1	1300	3-Hour	40.07	3.00%
	0.1	365	24-Hour	21.32	6.00%
CO	1.6	10,000	8-Hour	736.82	7.00%
	1.6	40,000	1-Hour	986.95	2.00%
NO_x	0.4	100	Annual	28.51	3.00%
Pb		0.15	Rolling 3-month		

Appendix H

Infrastructure SIP Transport Elements Technical Support Document

Infrastructure SIP Transport Elements Technical Support Document

INTRODUCTION

Under Clean Air Act (CAA) section 110(a)(1) and 110(a)(2), each state is required to submit a State Implementation Plan (SIP), referred to as an "infrastructure SIP," that provides for the implementation, maintenance, and enforcement of a revised primary or secondary National Ambient Air Quality Standards (NAAQS). In addition to implementing, maintaining, and enforcing the NAAQS within the state, each state must also address interstate pollution transport pursuant to Section 110(a)(2)(D)(i)(I) and (II) of the Clean Air Act (CAA) which states:

> *Each such plan shall –*
> *(D) contain adequate provisions –*
> *(i) prohibiting, consistent with the provisions of this subchapter, any source or other type of emissions activity within the State from emitting any air pollutant in amounts which will –*
> *(I) contribute significantly to nonattainment in, or interfere with maintenance by, any other State with respect to any such national primary or secondary ambient air quality standard, or*
> *(II) interfere with measures required to be included in the applicable implementation plan for any other State under part C of this subchapter to prevent significant deterioration of air quality or to protect visibility.*

In support of Arkansas's infrastructure SIP, which contains adequate provisions to ensure that Arkansas does not significantly contribute to NAAQS nonattainment or interfere with NAAQS maintenance in any other state, this document summarizes an air quality modeling study conducted for the Arkansas Department of Environmental Quality[1]. This air quality modeling summary further demonstrates that Arkansas does not contribute significantly to NAAQS nonattainment or interfere with maintenance of the NAAQS in any other state. The modeling analysis is attached.

MODELING METHODOLOGY

This modeling study used the Community Multiscale Air Quality (CMAQ) Model to evaluate concentrations of ozone, fine particulate matter ($PM_{2.5}$), nitrogen dioxide (NO_2) and sulfur dioxide (SO_2) at three levels of resolution: a 36-km resolution outer grid encompassing the continental United States (the CONUS grid), a 12-km intermediate resolution grid over the south-central portion of the United States, and a high-resolution 4-km inner grid encompassing the entire state of Arkansas and the adjacent portions of all of the surrounding states (Figure 1).

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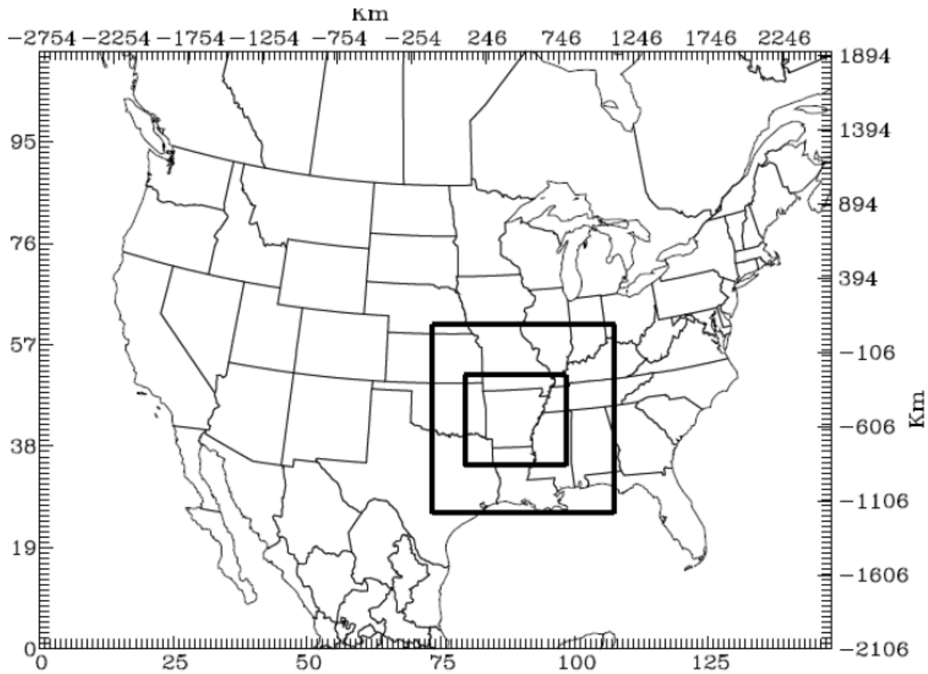
[1] ICF. 2014. "Criteria Pollutant Modeling Analysis for Arkansas". Prepared by ICF International, San Rafael, California (14-003)

Figure 1: CMAQ modeling study domain



The modeling analysis included two base year simulation periods (2005 and 2008), as well as one future year assessment (2015). Input emissions were based on the input inventory data: monthly emissions for the on-road and non-road sectors, and annual emissions for other sectors for criteria pollutants. To evaluate model performance, the CMAQ modeling results were compared with observed data, using a variety of graphical and statistical analysis products and focused on the 12- and 4-km resolution grids. Bias and error plots were used to graphically display statistical measures of model performance and to identify any spatial patterns or trends in the model performance statistics. Concentration time-series scatter plots comparing simulated and observed values at selected monitoring sites were used to determine whether the timing and magnitude of the simulated values match the observations.

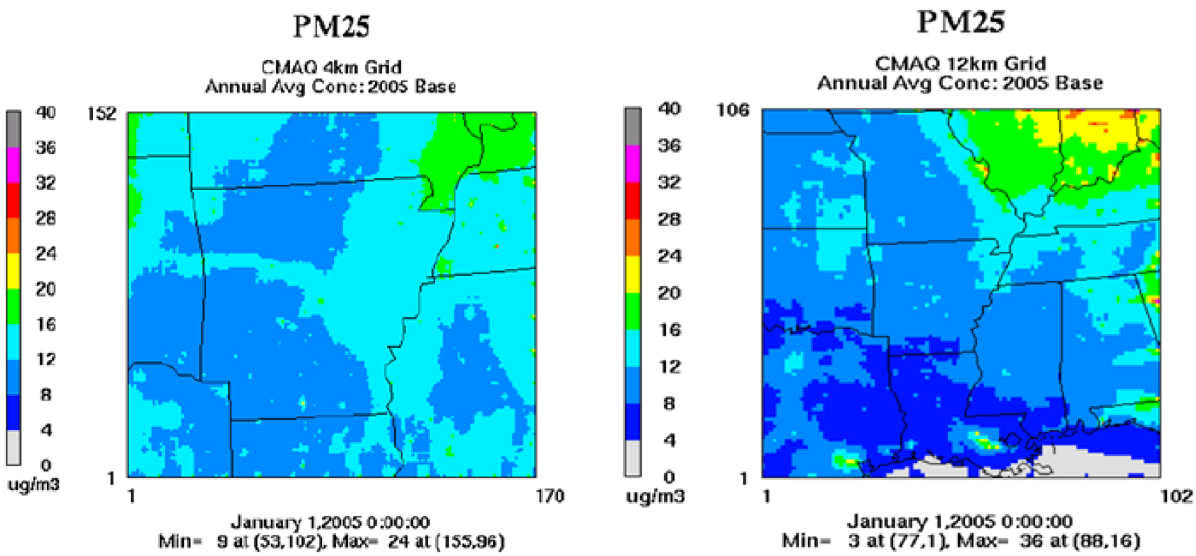
RESULTS

While a complete report of the analyses is provided, this summary of the results focuses on $PM_{2.5}$, NO_2 and SO_2 within the 4-km grid resolution, which includes a high resolution analysis of Arkansas and the adjacent portions of the surrounding states.

$PM_{2.5}$

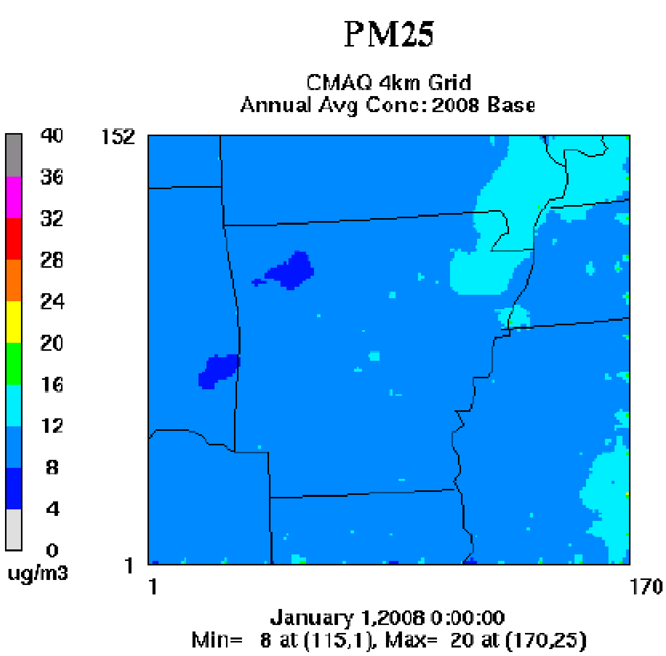
For the 2005 simulation, $PM_{2.5}$ concentrations in the 4-km grid are calculated as an annual average. Modeled concentrations are highest in a broad area over northeastern Oklahoma and eastern Kansas, as well as over southeastern Missouri northward into southern Illinois and southern Indiana; both of these areas of higher concentrations are better visualized at the 12-km grid resolution (Figure 2).

Figure 2: 4-km and 12-km resolution of 2005 simulated $PM_{2.5}$ concentration as an annual average ($\mu g/m^3$)



For the 2008 $PM_{2.5}$ simulation, concentrations in the 4-km grid are lower than in 2005 with the same areas of higher concentrations (Figure 3).

Figure 3: 4-km resolution of 2008 simulated $PM_{2.5}$ concentration as an annual average ($\mu g/m^3$)



For the 2005/2015 differences (Figure 4) and the 2008/2015 differences (Figure 5) at the 4-km resolution of simulated $PM_{2.5}$ concentrations, the plots show a regional decrease in concentrations.

Figure 4: 4-km resolution 2005/2015 differences for simulated $PM_{2.5}$ (annual average $\mu g/m^3$)

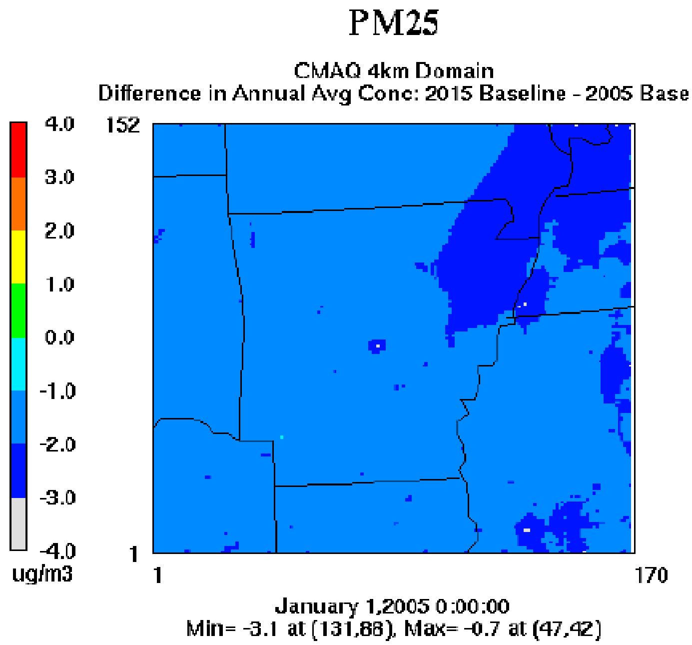
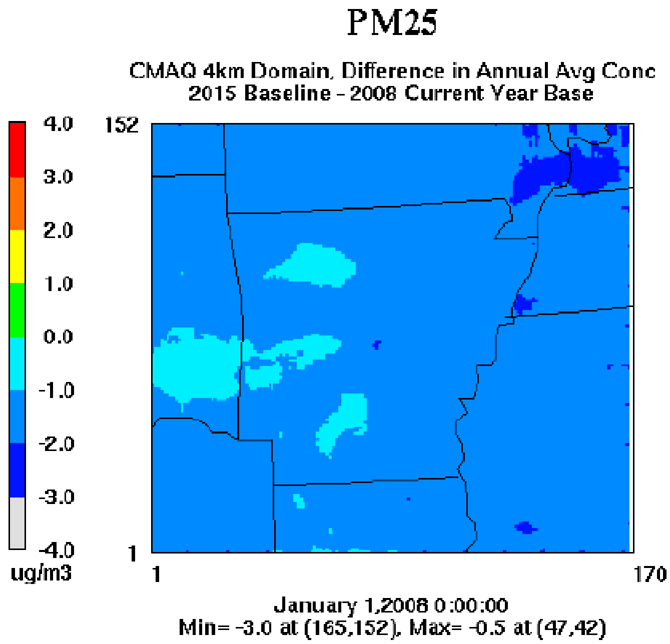


Figure 5: 4-km resolution 2008/2015 differences for simulated $PM_{2.5}$ (annual average $\mu g/m^3$)

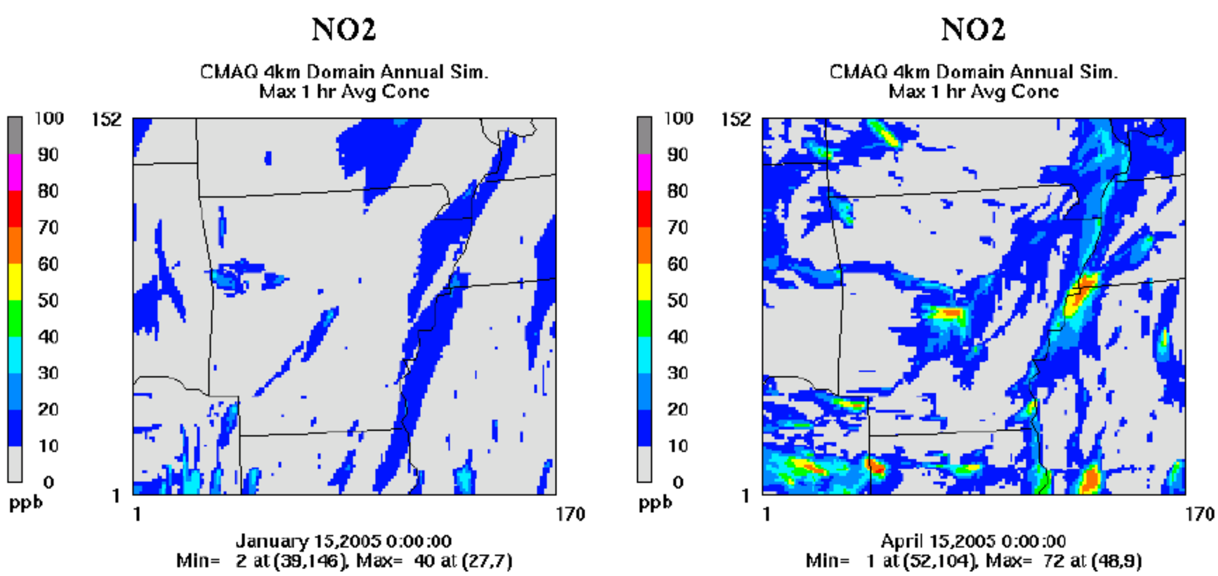


NO_2

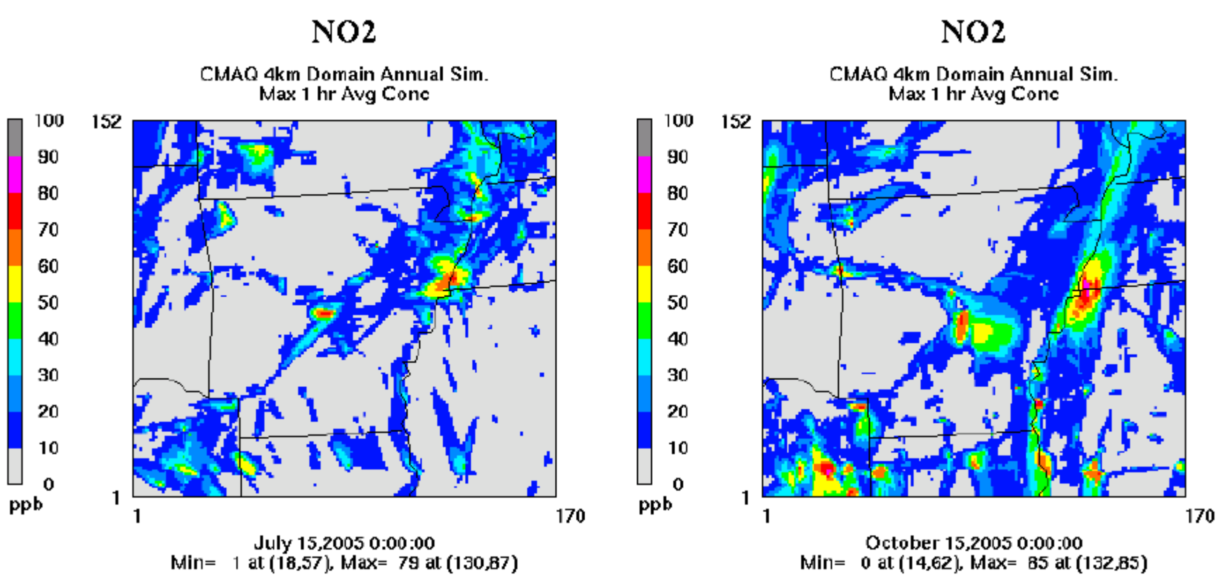
For the 2005 simulation, NO_2 concentrations in the 4-km grid are calculated as a daily maximum 1-hour and depicted quarterly (Figure 6). Concentrations are highest around Memphis, Tennessee, northeast Texas, eastern Mississippi and Little Rock, Arkansas. No simulated concentrations exceed the 1-hour standard of 100 ppb, and the highest concentration is 85 ppb.

Figure 6: 4-km resolution of 2005 simulated NO_2 1-hour concentration (ppb)

January 15/April 15



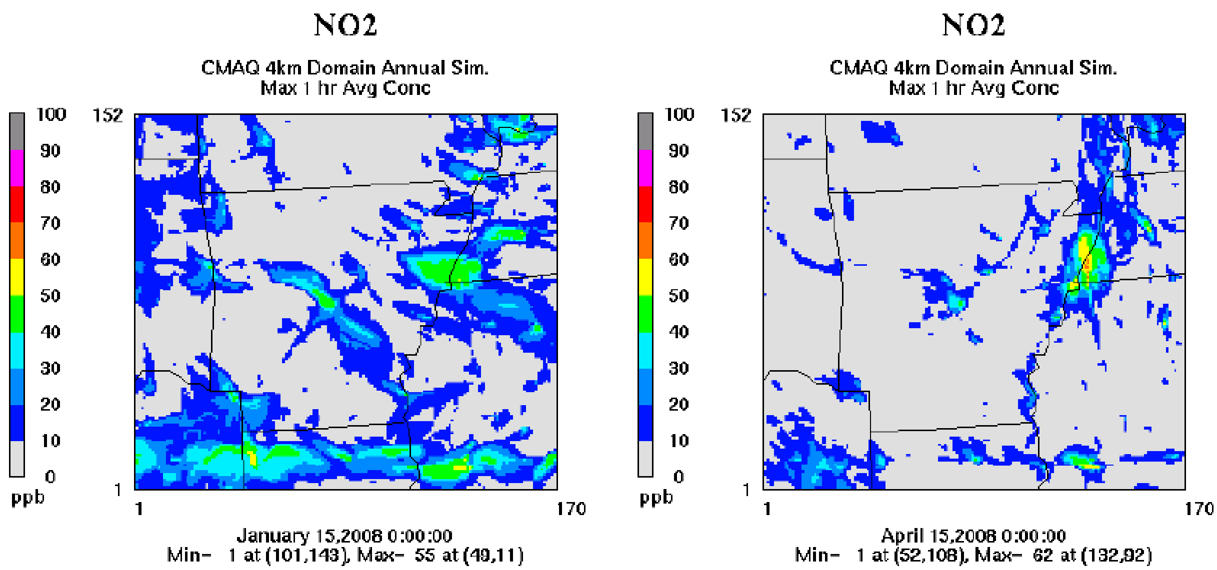
July 15/October 15



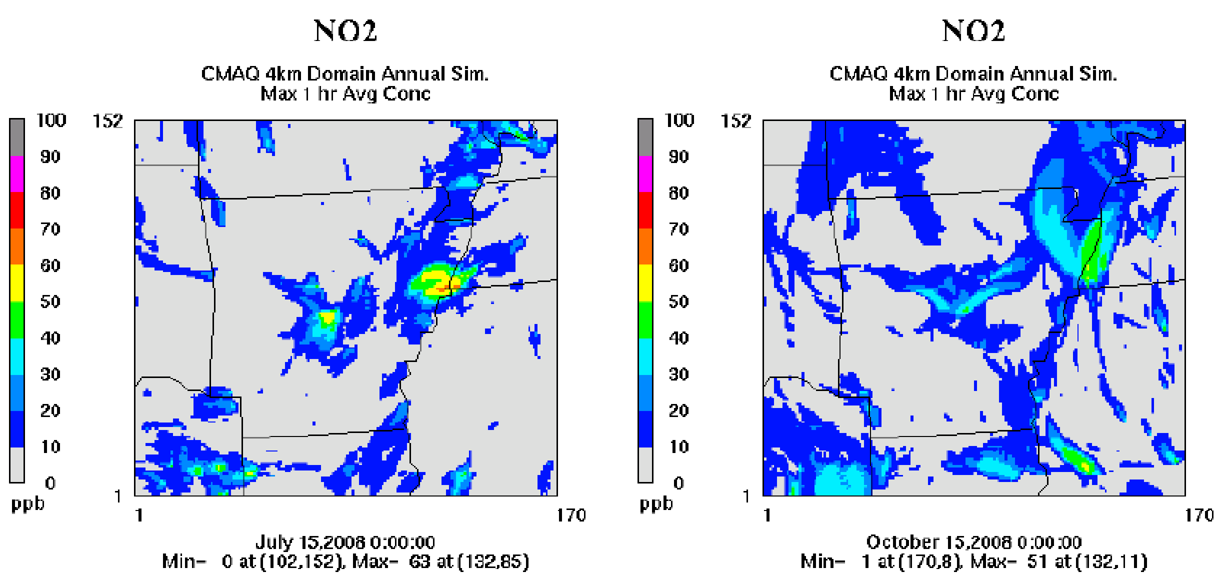
For the 2008 simulation, NO_2 concentrations in the 4-km grid are calculated as a daily maximum 1-hour average and depicted quarterly (Figure 7). Concentrations are generally decreased from 2005 and the highest concentration of 63 ppb is around Memphis, Tennessee.

Figure 7: 4-km resolution of 2008 simulated NO_2 1-hour concentration (ppb)

January 15/April 15



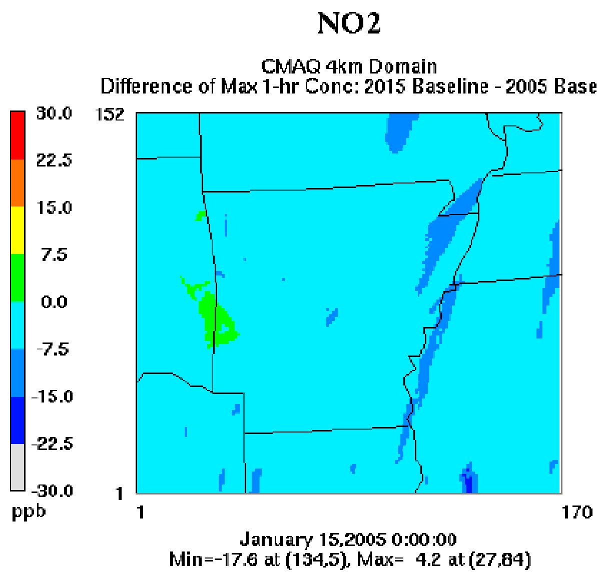
July 15/October 15

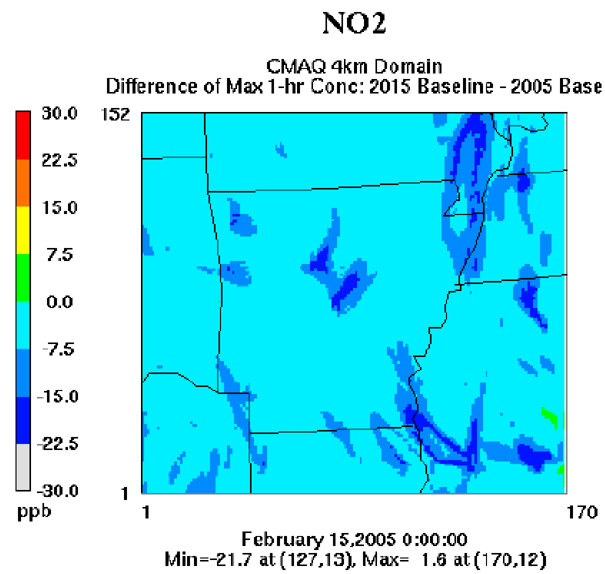


The 2005/2015 differences (Figure 8) and the 2008/2015 differences (Figure 9) at the 4-km resolution of simulated NO_2 1-hour concentrations are presented monthly. For NO_2, areas of both increase and decrease are realized although the decreases are far greater than the increases and all simulated concentrations remain below the 1-hour standard of 100 ppb. Furthermore, the 2008/2015 concentrations are lower than the 2005/2015 concentrations.

Figure 8: 4-km resolution of simulated 2005/2015 differences for 1-hour NO_2 (ppb)

January/February





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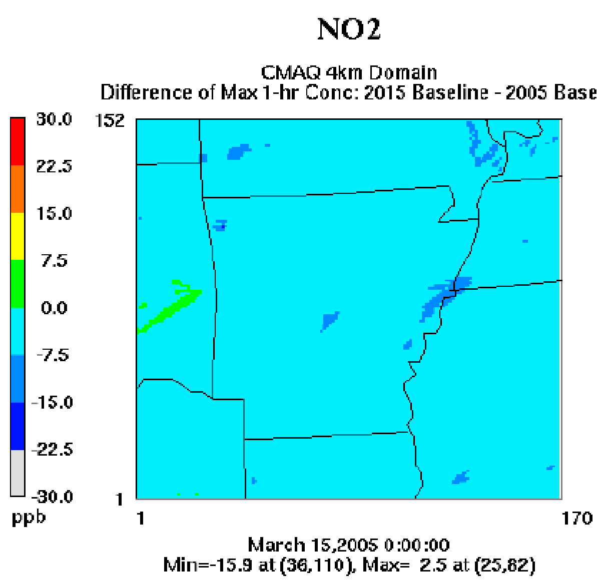
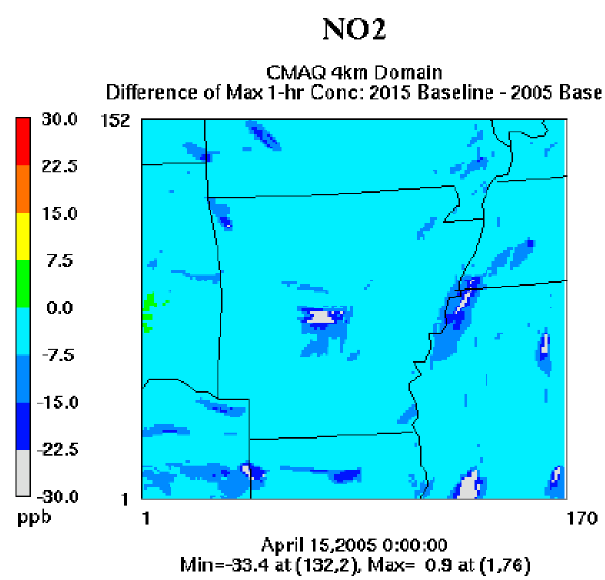
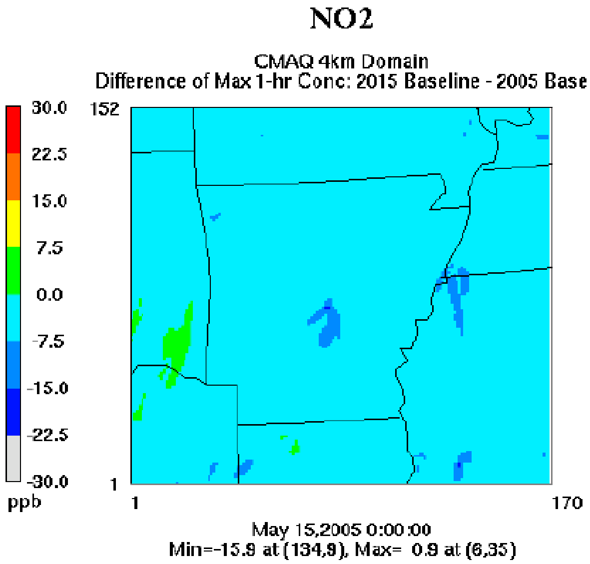
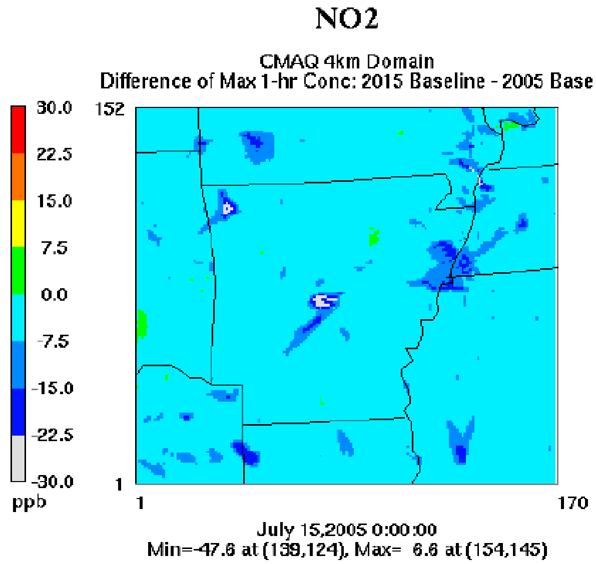


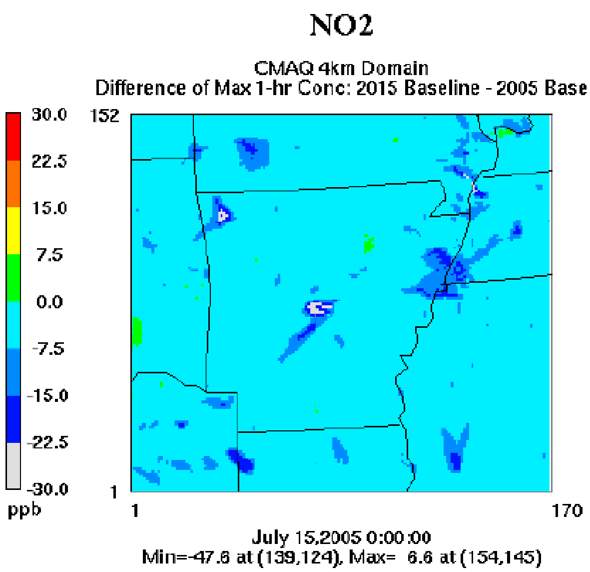


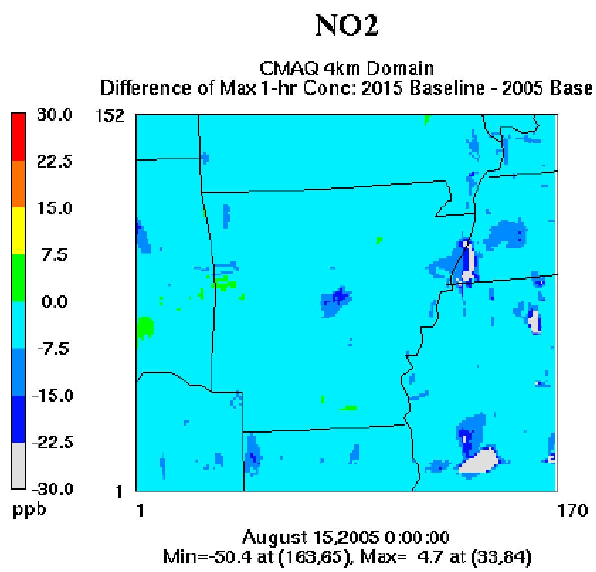
May/June





July/August





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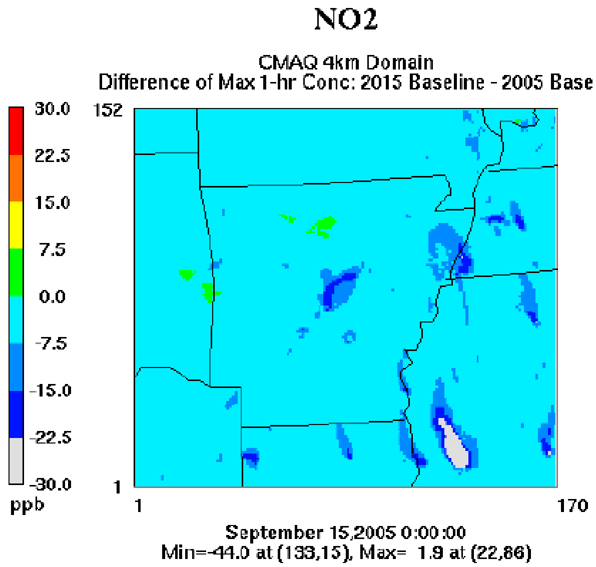

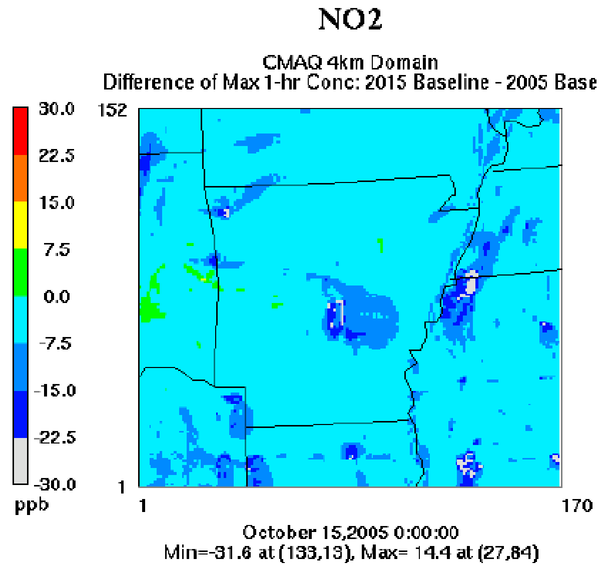

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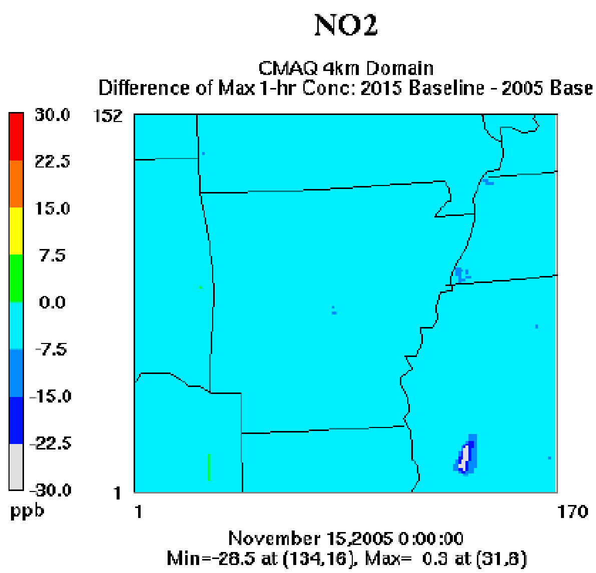


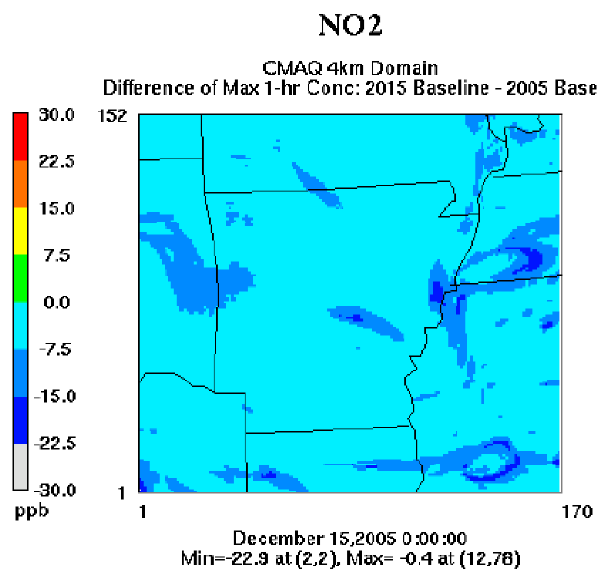
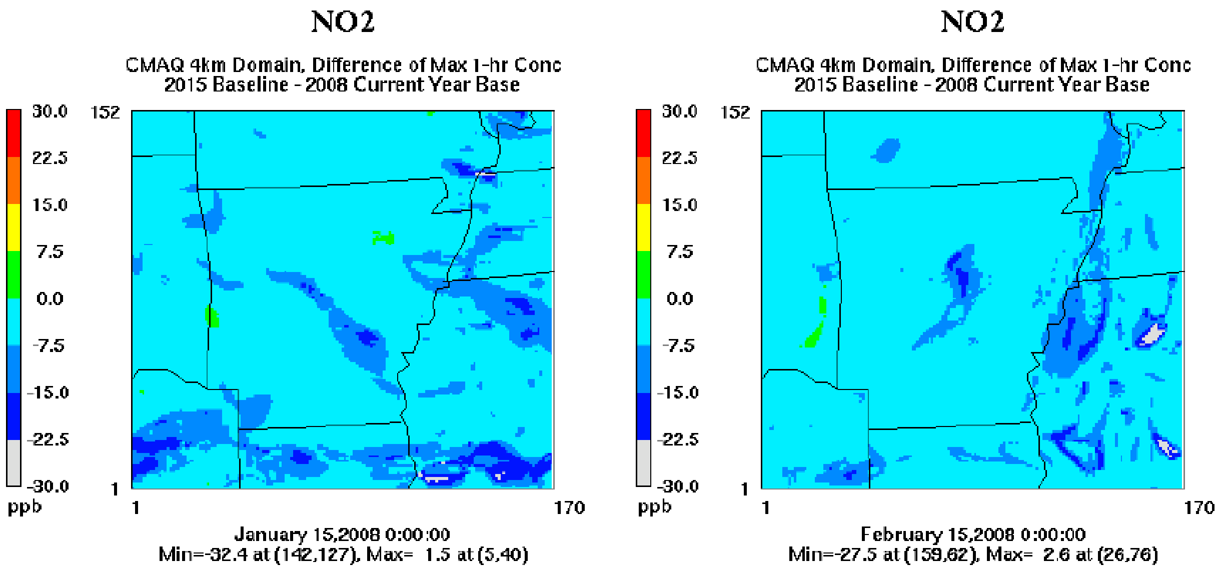


Figure 9: 4-km resolution of simulated 2008/2015 differences for 1-hour NO_2 (ppb)

January/February



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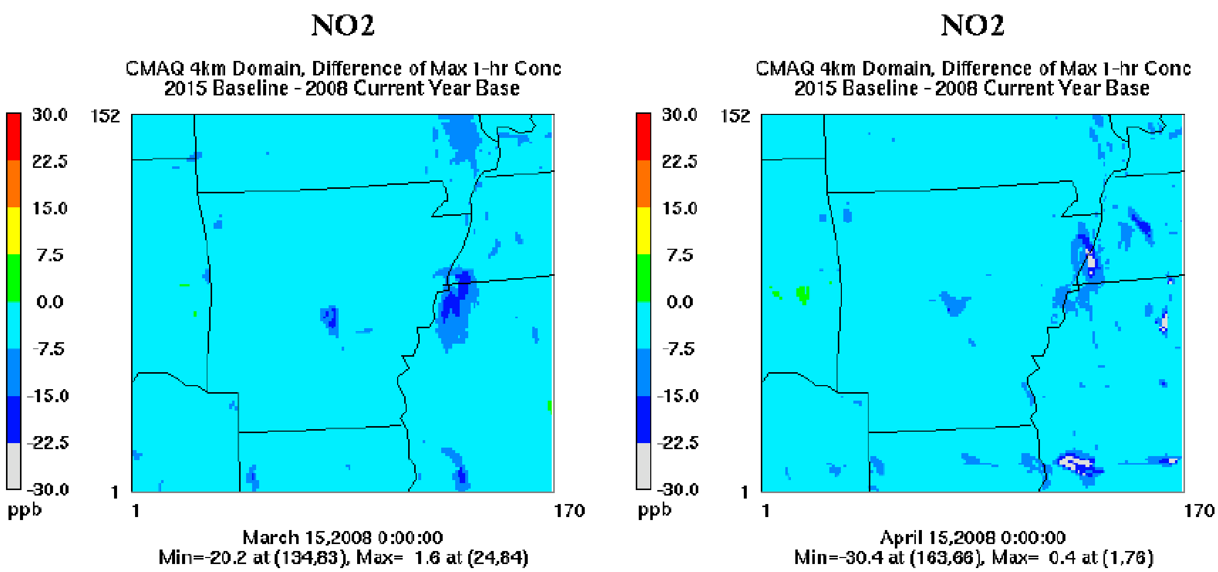
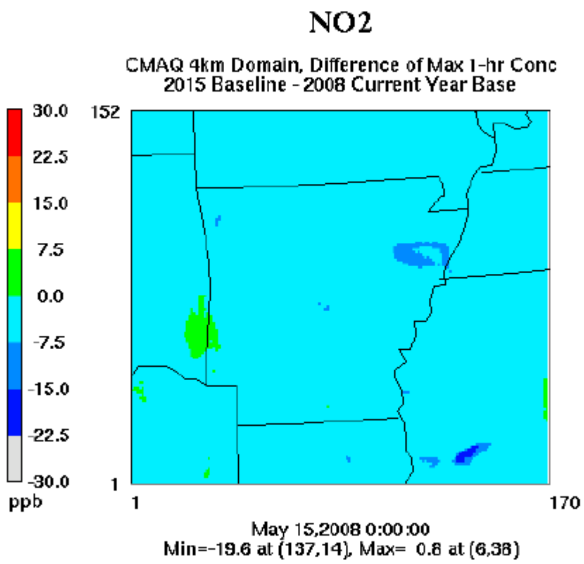
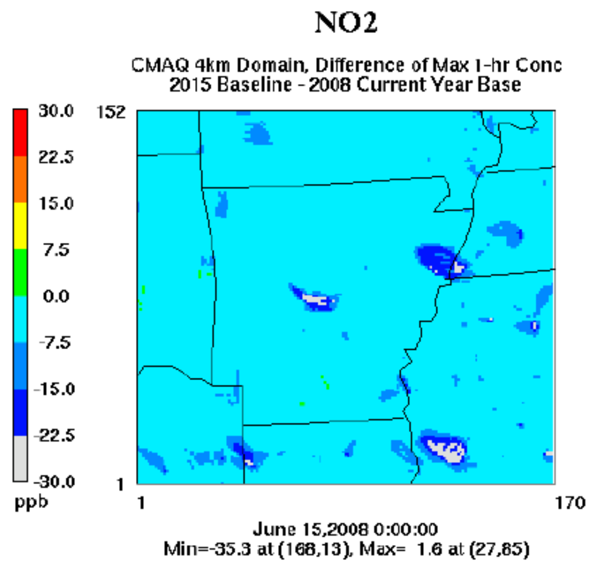
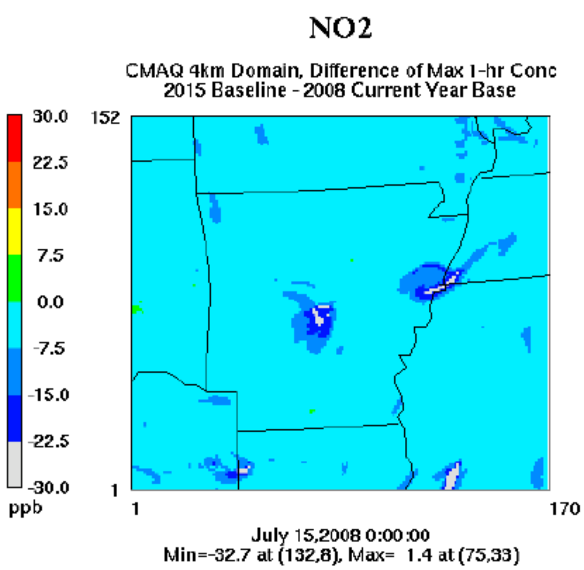


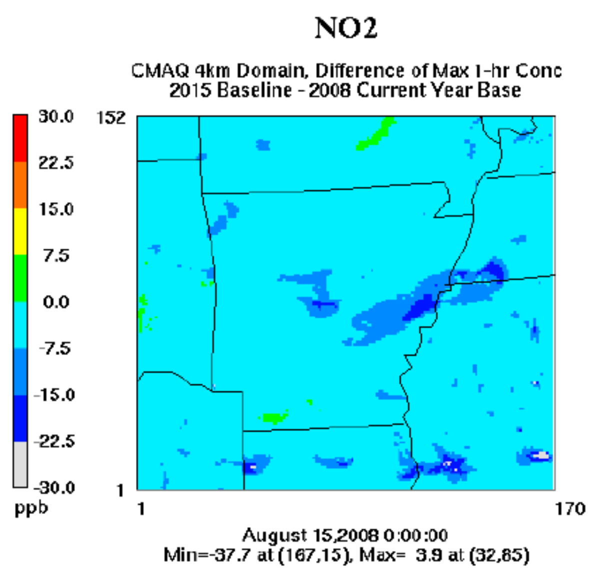
May/June





July/August





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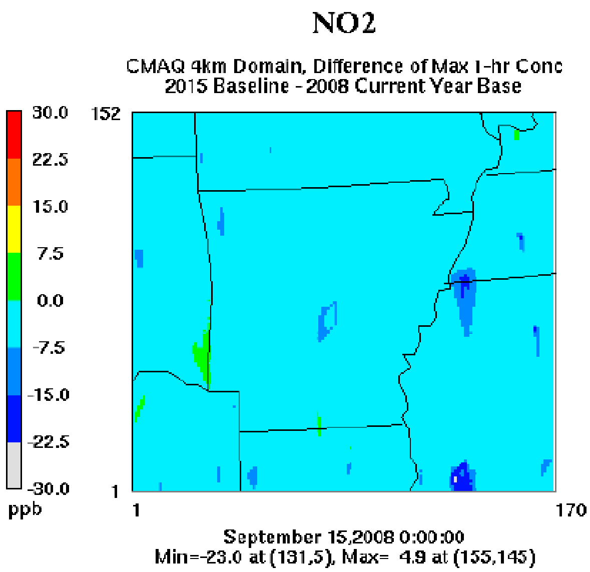
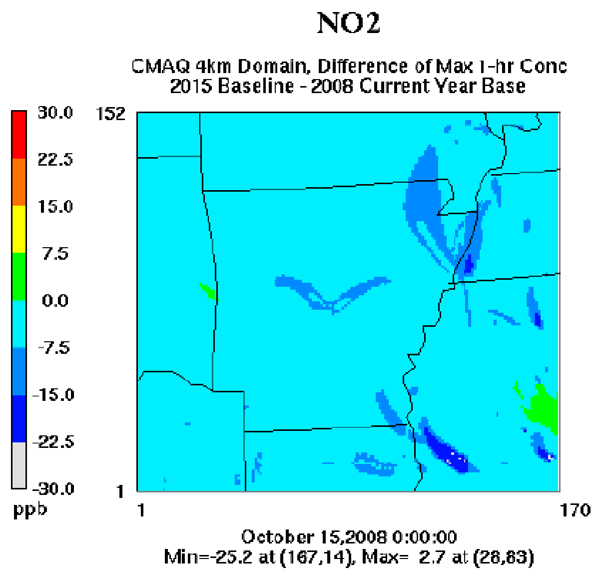
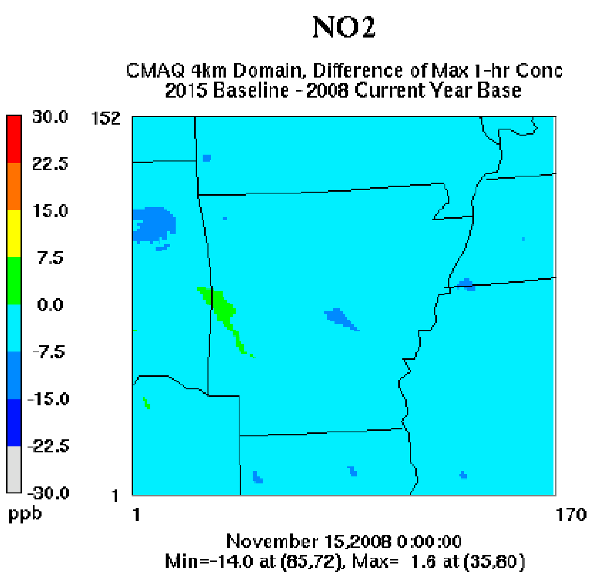
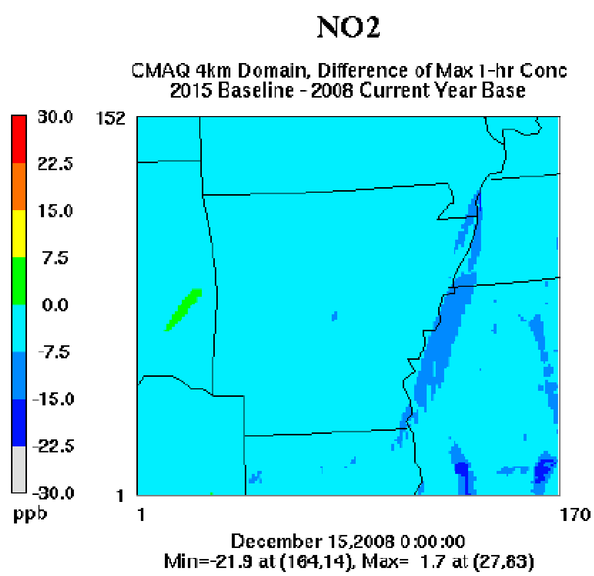




November/December



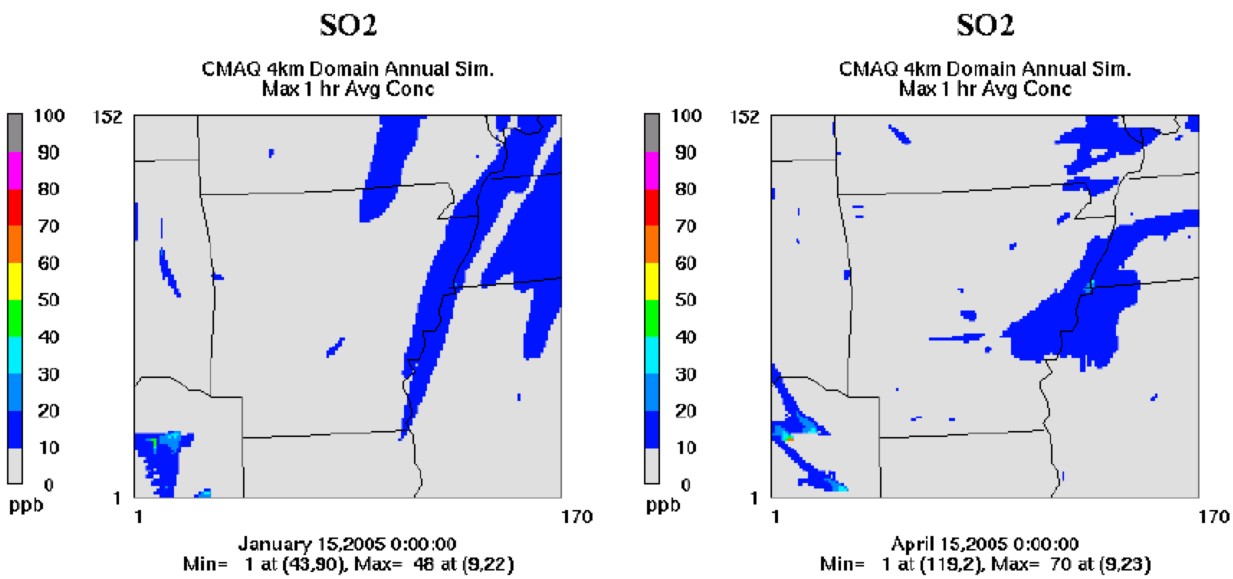


SO_2

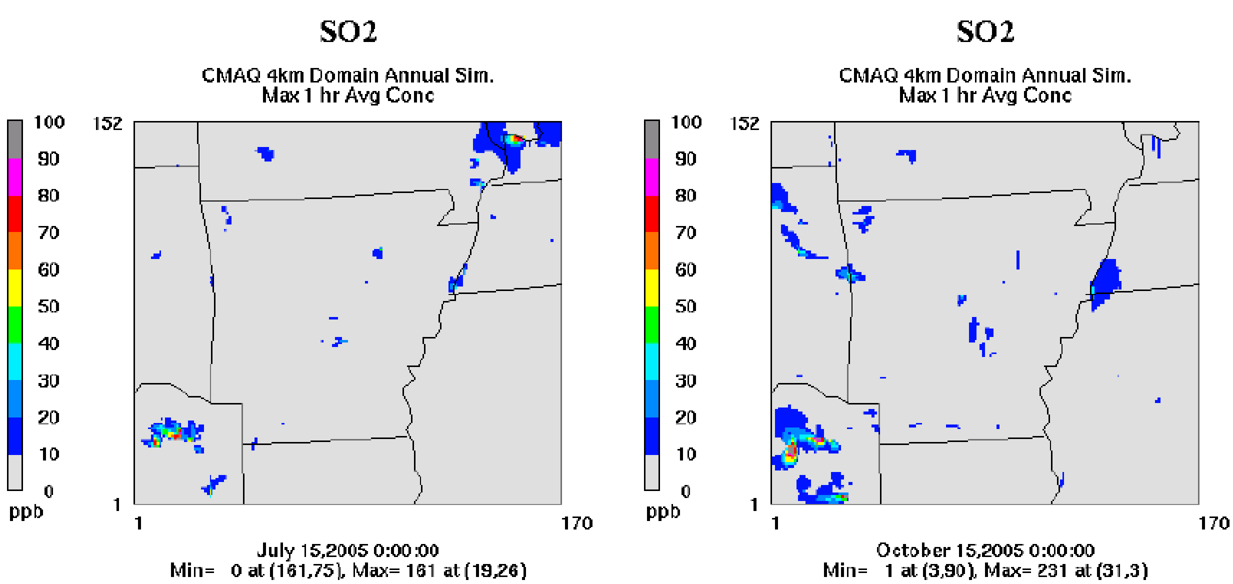
For the 2005 simulation, SO_2 concentrations in the 4-km grid are calculated as a daily maximum 1-hour and depicted quarterly (Figure 10). Concentrations are generally low with the highest concentrations in northeastern Texas and southern Illinois, beyond the potential transport distance of 50 km from Arkansas.

Figure 10: 4-km resolution of simulated 2005 concentrations for 1-hour SO_2 (ppb)

January 15/April 15



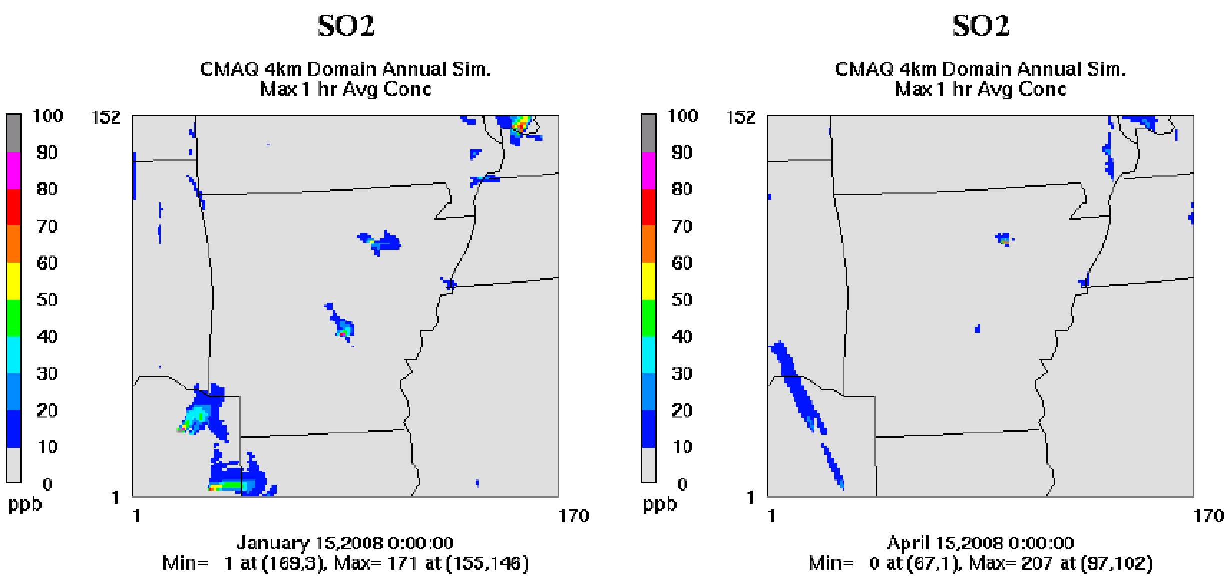
July 15/October 15



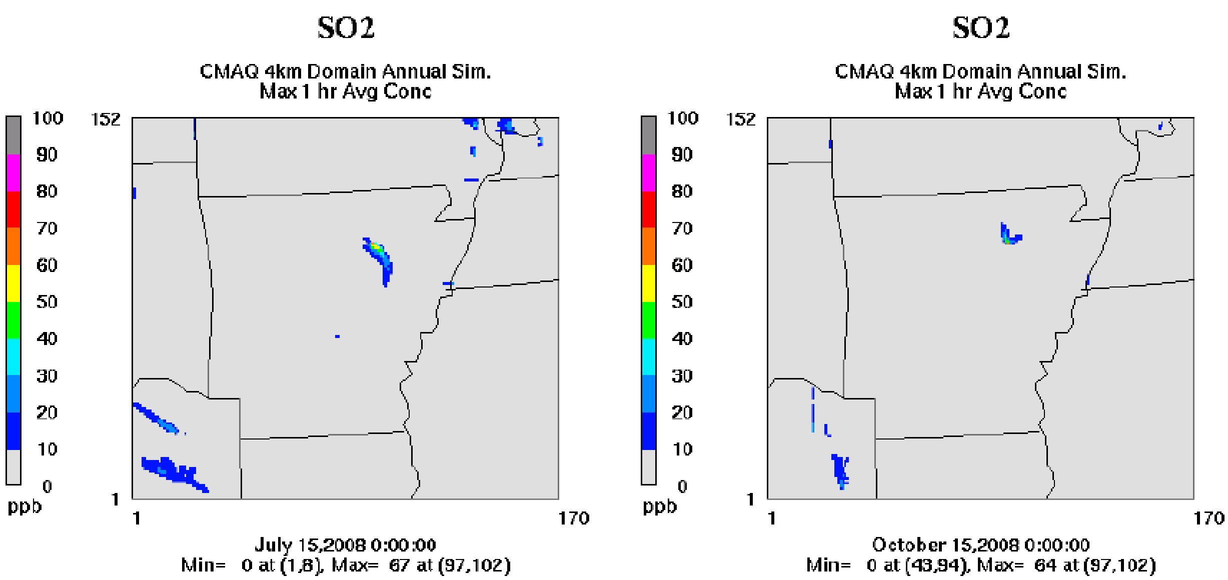
For the 2008 simulation, SO_2 concentrations in the 4-km grid are calculated as a daily maximum 1-hour and depicted quarterly (Figure 11). Like 2005, concentrations are generally low with the highest concentrations in northeastern Texas, southern Illinois and north-central Arkansas.

Figure 11: 4-km resolution of simulated 2008 concentrations for 1-hour SO_2 (ppb)

January 15/April 15



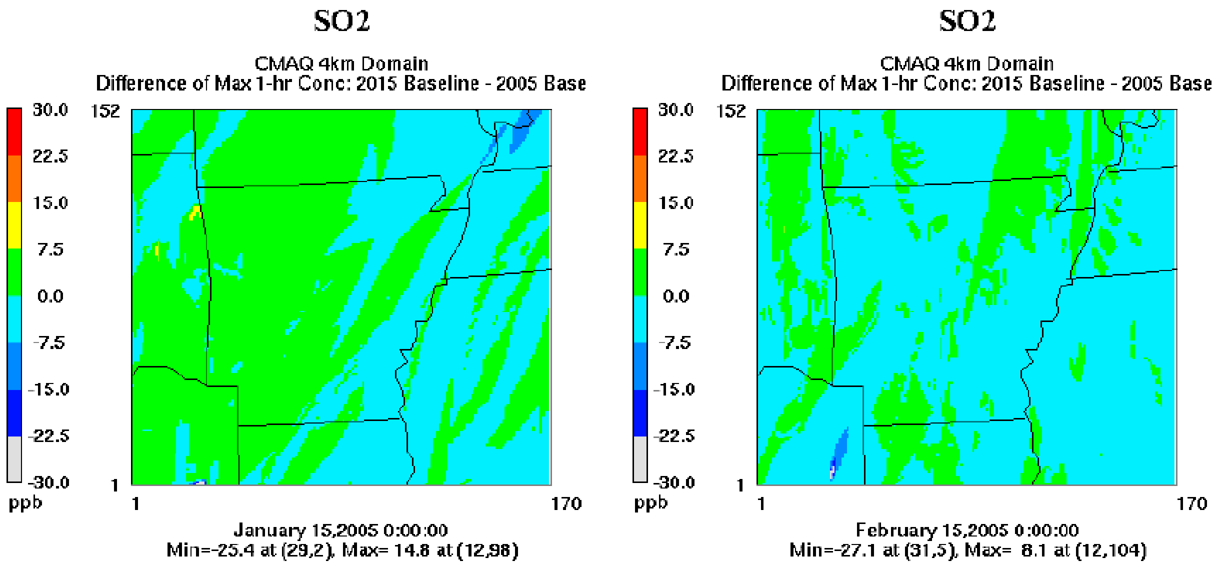
July 15/October 15



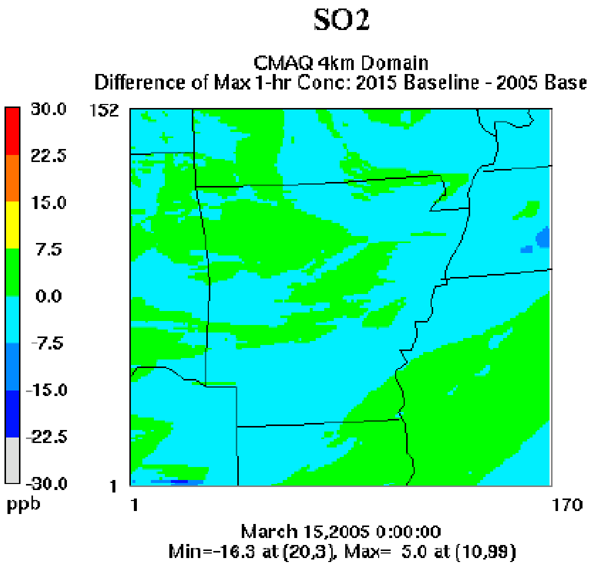
The 2005/2015 differences (Figure 12) and the 2008/2015 differences (Figure 13) at the 4-km resolution of simulated SO_2 1-hour concentrations are presented monthly. For SO_2, areas of both increase and decrease are realized although the decreases tend to be greater than the increases Furthermore, the 2008/2015 concentrations are lower than the 2005/2015 concentrations.

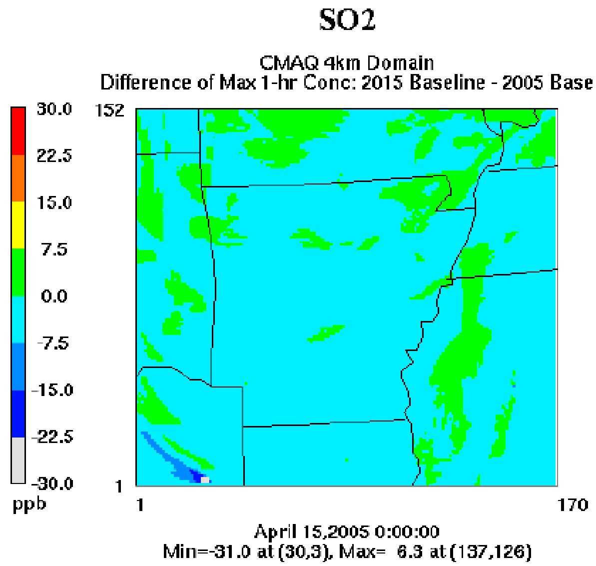
Figure 12: 4-km resolution of simulated 2005/2015 differences for 1-hour SO_2 (ppb)

January/February

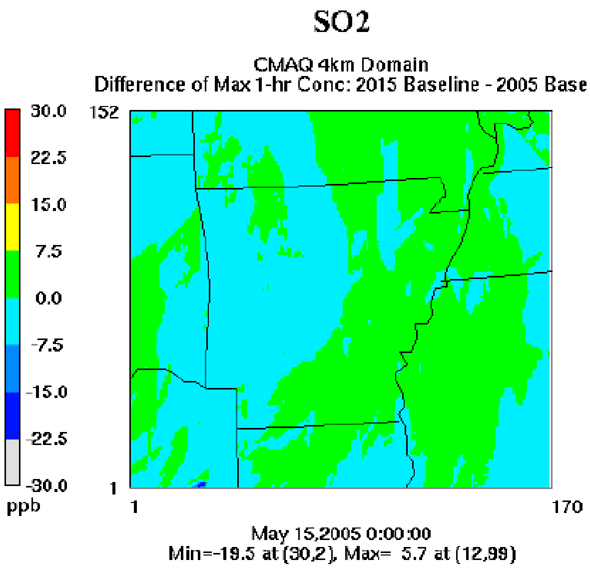


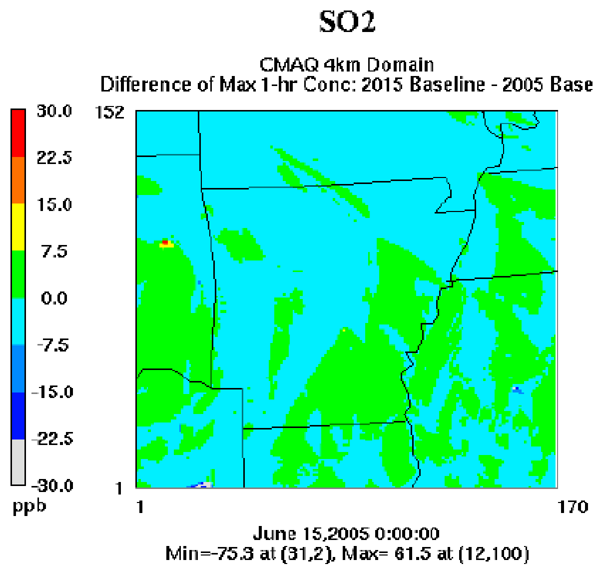
March/April



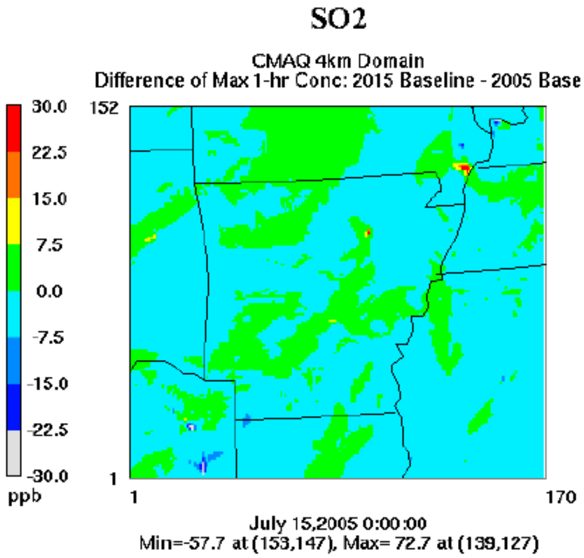


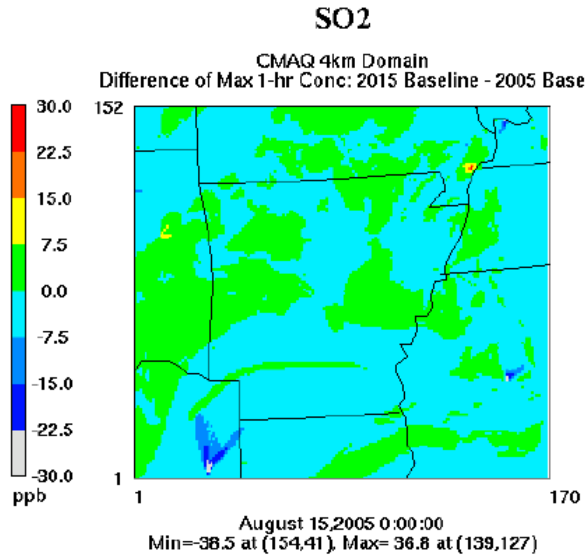
May/June



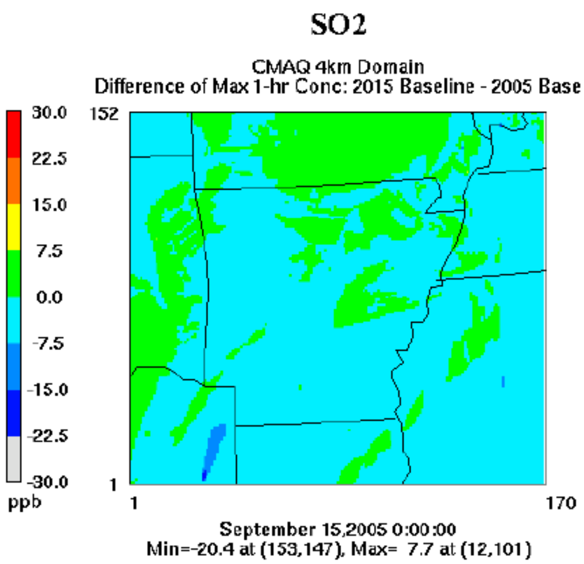


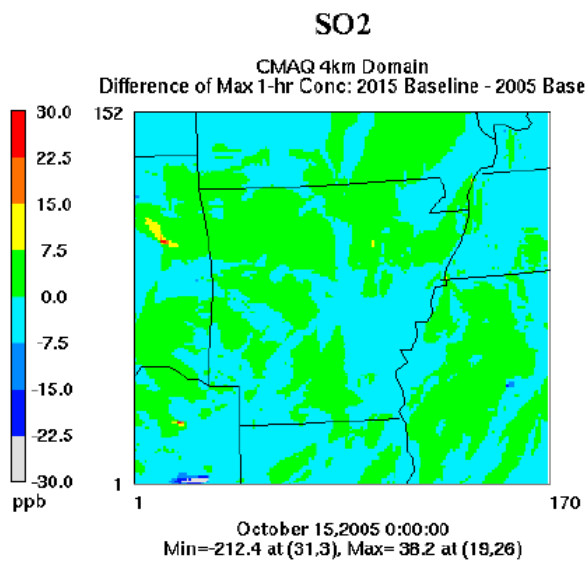
July/August





September/October





November/December

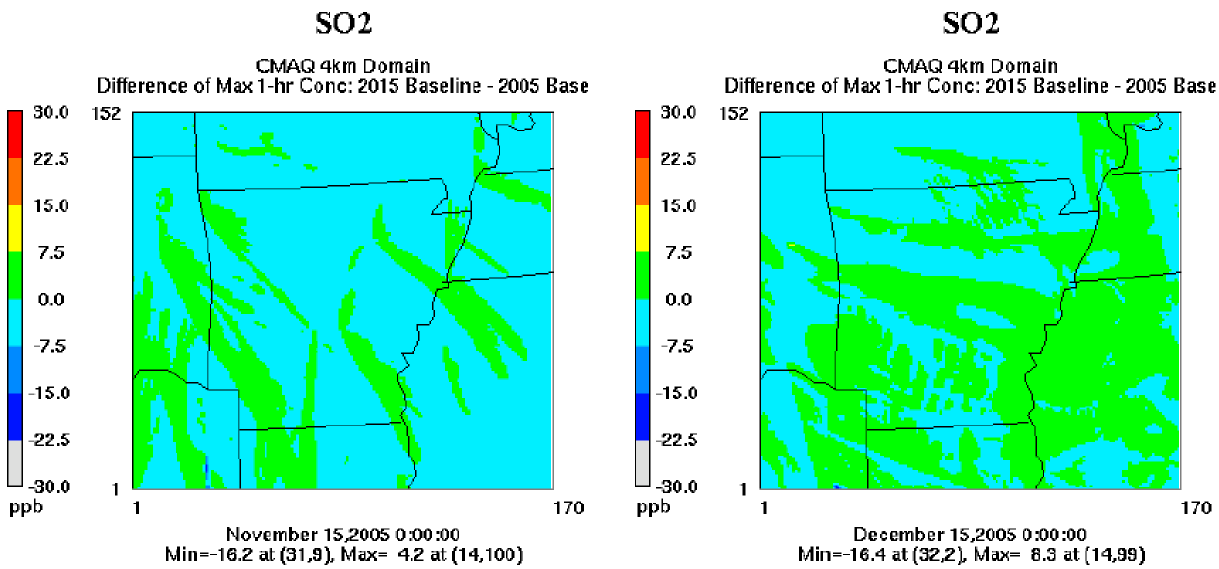
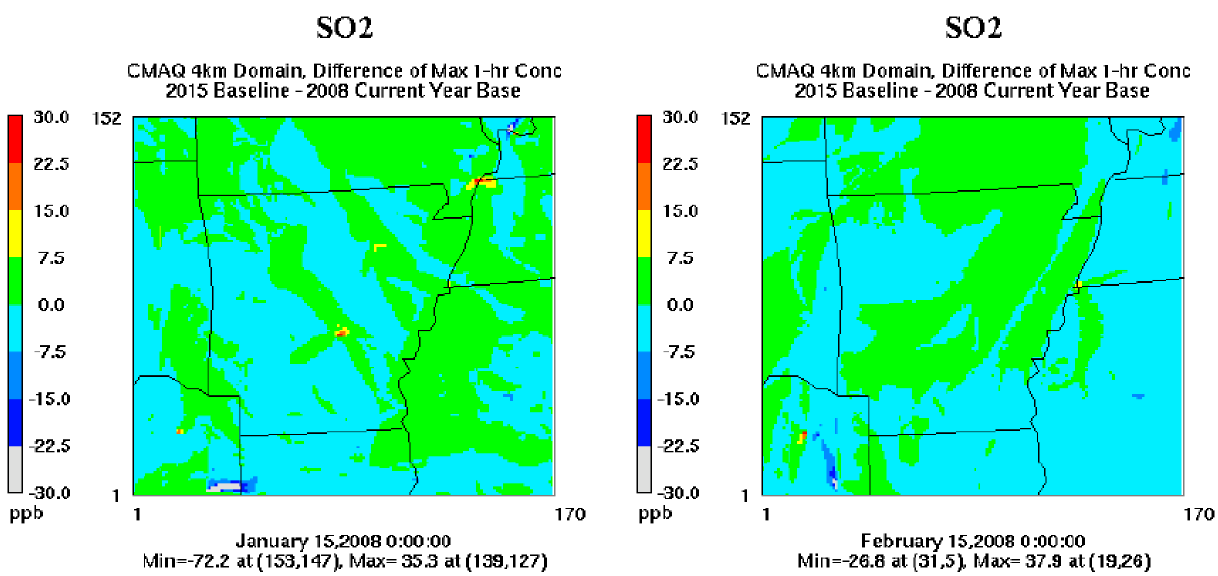
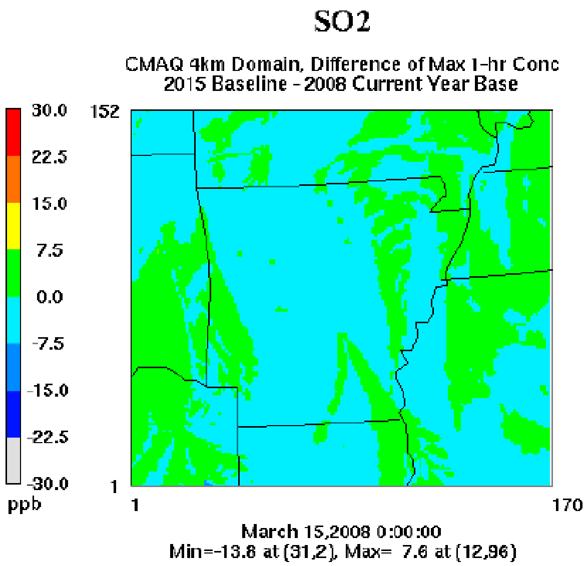


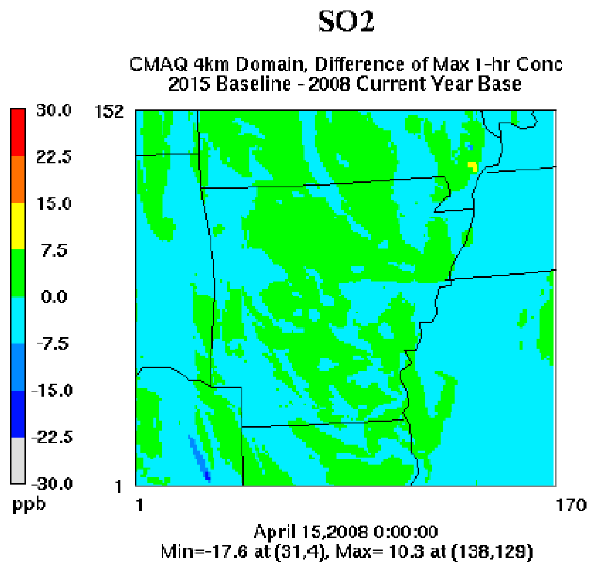
Figure 13: 4-km resolution of simulated 2005/2015 differences for 1-hour SO_2 (ppb)

January/February



March/April





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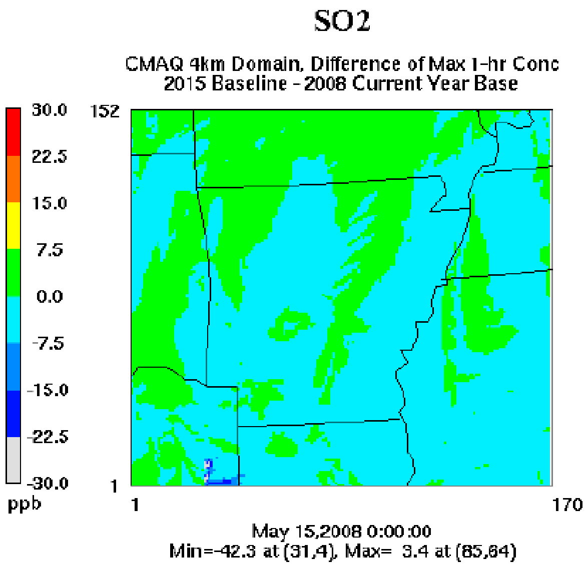

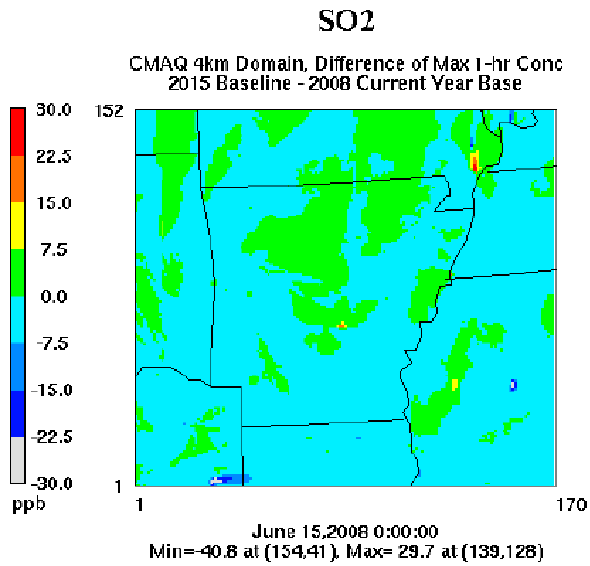

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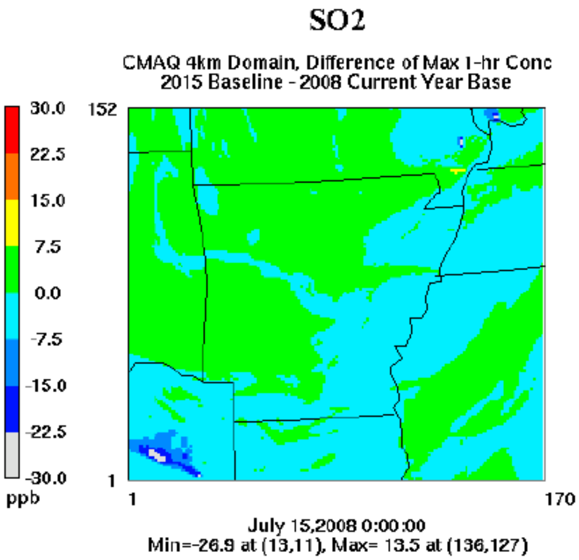

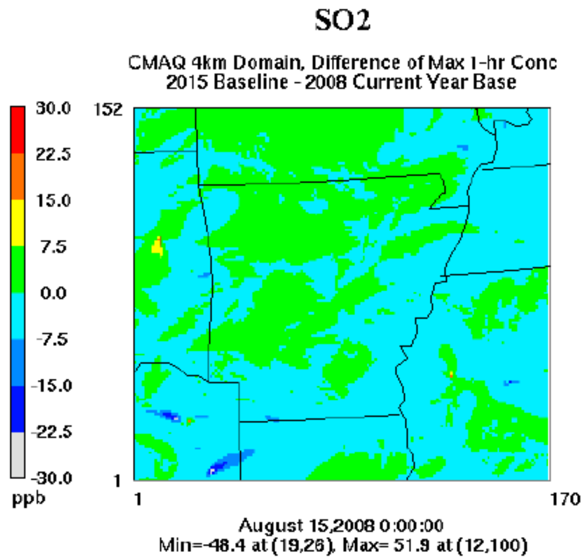

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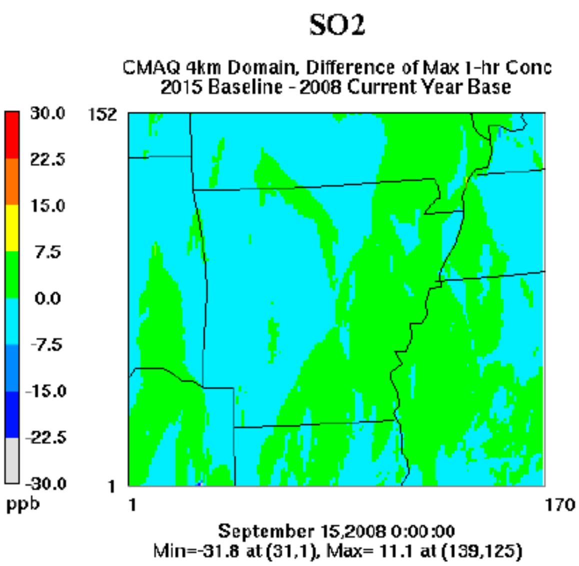
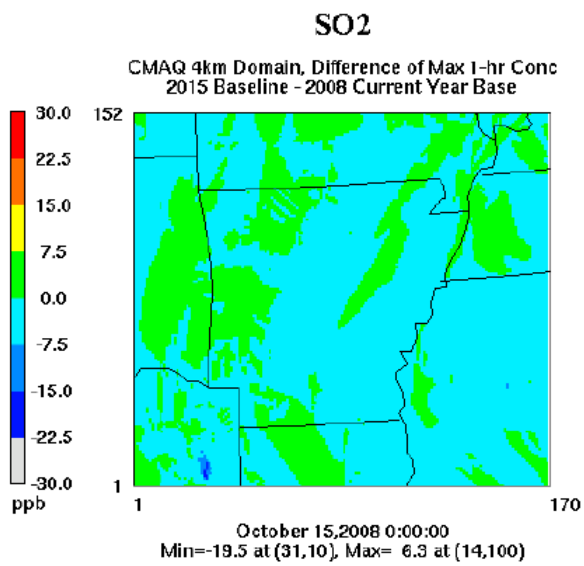
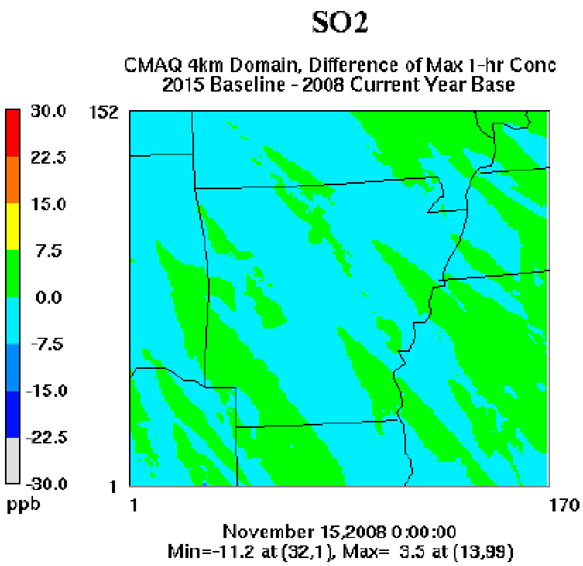
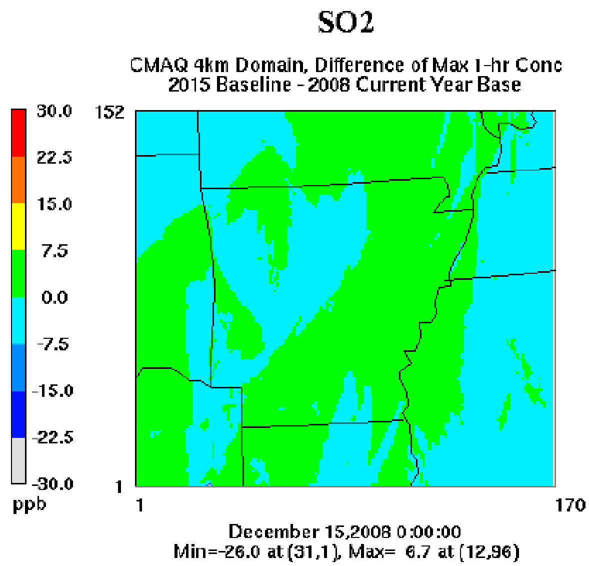




November/December





CONCLUSIONS

As illustrated in the high-resolution CMAQ 4-km inner grid encompassing the entire state of Arkansas and the adjacent portions of all of the surrounding states, this study demonstrates that Arkansas does not significantly contribute to any NAAQS nonattainment or interfere with any NAAQS maintenance in any other state for $PM_{2.5}$, NO_2 and SO_2. For $PM_{2.5}$, base year/future year differences decreased and are below the NAAQS annual standard of 12 $\mu g/m^3$. For the 1-hour NO_2 NAAQS of 100 ppb, all areas in and adjacent to Arkansas are below the standard. For SO_2, any areas identified in this study in Arkansas that are above the standard of 75 ppb are not close enough to an adjacent state to significantly contribute nonattainment or interfere with maintenance in any adjacent state. For example, the FutureFuel Chemical Company, which is the source of the depicted "plume" visible in the 4-km July 2008 simulation panel of Figure 11 is 85 km from Missouri and 125 km from Tennessee, which is beyond the transport distance for SO_2. Other SO_2 higher values occur in and around southern Illinois, which is beyond the potential for Arkansas' emissions to be the contributing sources.

Appendix I

NAAQS Evaluation Requirements Threshold
Technical Support Document

NAAQS Evaluation Requirements Threshold Technical Support Document

Introduction

Pursuant to Ark. Code Ann. § 8-4-318, the Arkansas Department of Environmental Quality (ADEQ or Department) included pollutant-specific national ambient air quality standard (NAAQS) evaluation requirements in the NAAQS state implementation plan (SIP) for non-PSD (Minor NSR) permitting actions under the authority in SIP-approved Reg. 19.402 and Reg. 19.405. The Department determined that it was necessary to require NAAQS evaluations for Minor NSR permitting involving construction of stationary sources with relatively large proposed emissions of PM_{10}, SO_2, and NOx and minor NSR permitting involving modification of stationary sources with relatively large proposed net emission increases of PM_{10}, SO_2, and NOx. As such, the Department selected a threshold of 100 tpy above which to require modeling or source-oriented monitoring Minor NSR permitting actions for PM_{10}, SO_2, and NOx. This threshold was selected based on the definition of major source.

Although this threshold for NAAQS evaluation requirements was set at the 100 tpy level based on the definition of major source, the Department found it prudent to evaluate modeling to support this threshold. The Department contracted with ICF International, LLC (ICF) to model the potential impacts of emission increases equal to 100 tpy for PM_{10}, SO_2, and NOx. ICF's full report, which includes a modeling demonstration in support of the 100 tpy threshold, has been included with this technical support document and the results are summarized below.

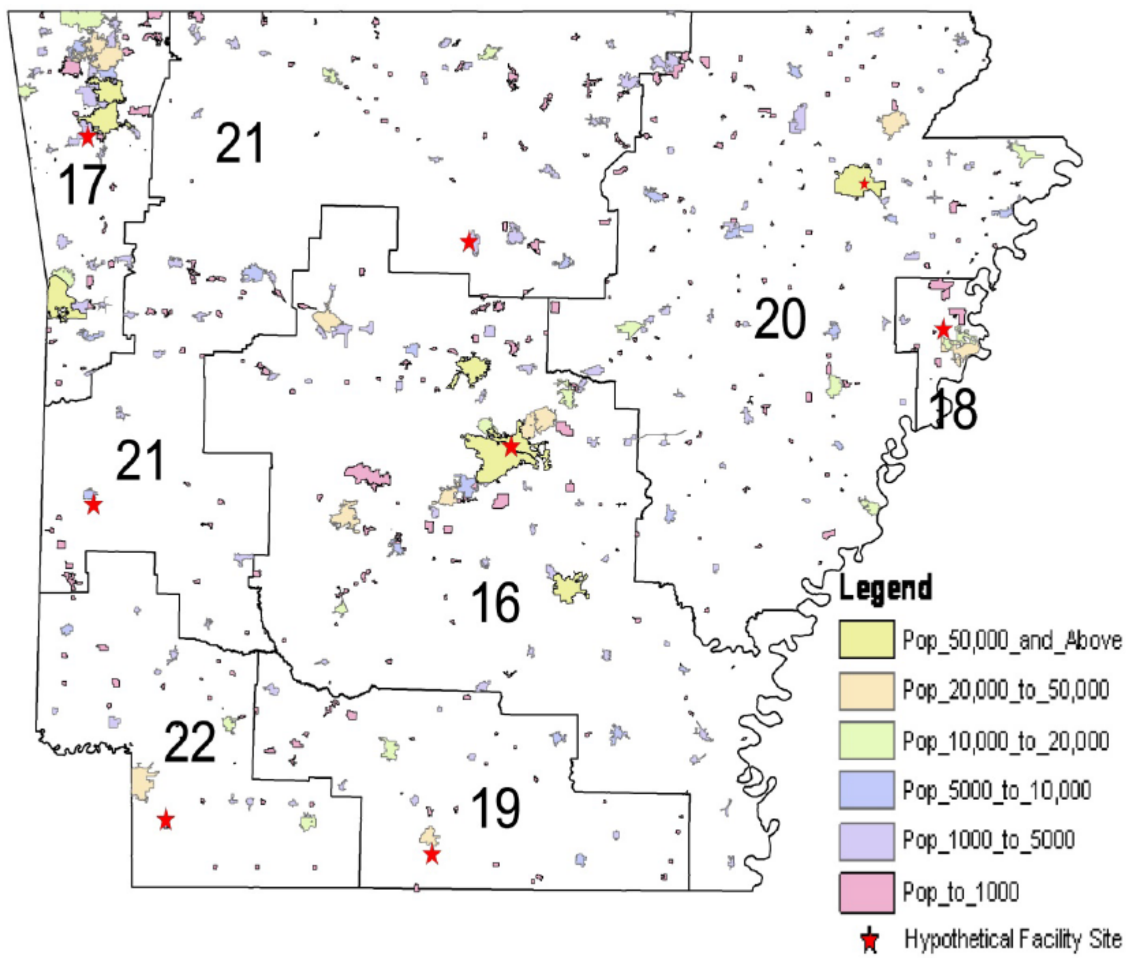
Modeling Analysis Summary

ICF conducted a combined AERMOD/Community Multiscale Air Quality (CMAQ) analysis, using CMAQ modeling for the 2008 base year and the 2018/2015 future year from the Arkansas statewide modeling effort[1], to assess potential nearfield impacts from new or existing sources with emission increases of 100 tpy of PM_{10}, SO_2, and NOx. For each pollutant, AERMOD was applied at eight locations in Arkansas to cover each air quality control region (AQCR) and provide coverage across distinct geographical areas. These locations are identified in Figure 1. For this analysis, two sets of stack parameters, based on the 90^{th} and 50^{th} (median) percentile stack parameters for the top 10 Arkansas emission sources with emissions less than 100 tpy, were used to evaluate hypothetical 100 tpy PM_{10}, SO_2, and NOx sources. These parameters are listed in Table 1 below. A

[1] ICF (2014). "Criteria Pollutant Modeling Analysis for Arkansas." Prepared for the Arkansas Department of Environmental Quality, North Little Rock, Arkansas (14-003).

list of the top 10 Arkansas emission sources with emissions less than 100 tpy for each of the three pollutants and their stack characteristics have been included with this technical support document.

Figure 1. Hypothetical Minor Point Source Facility Locations



Arkansas' Air Quality Control Regions (AQCR) and hypothetical minor point source facility locations (AQCR 16, Pulaski County; AQCR 17, Washington County; AQCR 18, Crittenden County; AQCR 19, Union County; AQCR 20, Craighead County; AQCR 21, Van Buren and Polk Counties; AQCR 22, Miller County) in relation to human population density.

Table 1. 50th and 90th Percentile Stack Parameters

Pollutant	Percentile	Stack Height (ft)	Diameter (ft)	Temperature (°F)	Exit Velocity (ft/s)
NO_x	90th	128.5	9.9	876.5	52.47
	50th	73	4	500	41
SO_2	90th	119.4	12.3	590	87.96
	50th	74.5	4.25	367.5	66.6
PM_{10}	90th	129.5	18.01	455	90.3
	50th	80	6.75	206.5	50.61

The maximum and average AERMOD-derived impacts over all locations were calculated for the 1-hour NO_2 NAAQS, the annual NO_2 NAAQS, the 1-hour SO_2 NAAQS, and the 24-hour PM_{10} NAAQS. The daily maximum AERMOD-derived impacts were added to simulated CMAQ-derived concentrations for each day and 2015 future design values (FDVs) were determined based upon the form of the standard. The annual NO_2 NAAQS was not included in this analysis because the impacts for the 1-hour NO_2 NAAQS are expected to be larger than for the annual averaging period. ICF also performed sensitivity tests examining the effects of variable stack parameters and terrain.

Modeling Results Summary

NO_2

The worst-case near-field impacts of a 100 tpy emission increase of NO_x for the 1-hour NO_2 NAAQS for the 50th percentile and 90th percentile stack parameters are small and FDVs calculated at monitoring sites including the worst-case impacts are nowhere near the 100 ppb level of the 1-hour NO_2 NAAQS. These results are presented in Tables 2 and 3.

Table 2. Estimated Future-Year 1-Hour NO_2 Design values (ppb) for Monitoring Sites within Arkansas Considering Worst-Case Near-Field Impacts: 50th Percentile Stack Parameters

Site/Location	County	Base-Year 1-Hr NO_2 Design Values (ppb)	2015 Baseline FDV (ppb)	AERMOD + Background FDV (ppb)	Difference in FDV (ppb)
North Little Rock (Pike Ave)	Pulaski	43.7	29.9	32.2	2.3
Marion	Crittenden	48.3	38.6	41.5	2.9

Table 2. Estimated Future-Year 1-Hour NO_2 Design values (ppb) for Monitoring Sites within Arkansas Considering Worst-Case Near-Field Impacts: 90th Percentile Stack Parameters

Site/Location	County	Base-Year 1-Hr NO_2 Design Values (ppb)	2015 Baseline FDV (ppb)	AERMOD + Background FDV (ppb)	Difference in FDV (ppb)
North Little Rock (Pike Ave)	Pulaski	43.7	29.9	30.3	2.3
Marion	Crittenden	48.3	38.6	39.0	2.9

SO_2

The worst-case near-field impacts of a 100 tpy emission increase of SO_2 for the 1-hour SO_2 NAAQS for the 50th percentile represents between a 15 and 22 % increase in future design value at each monitoring location. This increase is much smaller for the 90th percentile stack characteristics, approximately 3 – 4 % of the 1-hour SO_2 NAAQS. The worst-case impact future design values for hypothetical sources under both the 90th percentile and 50th percentile stack characteristics scenarios were well under the 1-hour SO_2 NAAQS of 75 ppb. These results are presented in Tables 4 and 5.

Table 4. Estimated Future-Year 1-Hour SO_2 Design values (ppb) for Monitoring Sites within Arkansas Considering Worst-Case Near-Field Impacts: 50th Percentile Stack Parameters

Site/Location	County	Base-Year 1-Hr SO_2 Design Values (ppb)	2015 Baseline FDV (ppb)	AERMOD + Background FDV (ppb)	Difference in FDV (ppb)
North Little Rock (Pike Ave)	Pulaski	12.3	9.3	20	11.6
El Dorado	Union	26.0	23.2	39.6	16.4

Table 5. Estimated Future-Year 1-Hour SO_2 Design values (ppb) for Monitoring Sites within Arkansas Considering Worst-Case Near-Field Impacts: 90th Percentile Stack Parameters

Site/Location	County	Base-Year 1-Hr SO_2 Design Values (ppb)	2015 Baseline FDV (ppb)	AERMOD + Background FDV (ppb)	Difference in FDV (ppb)
North Little Rock (Pike Ave)	Pulaski	12.3	9.3	12.0	2.7
El Dorado	Union	26.0	23.2	26.3	3.1

PM_{10}

The worst-case near-field impacts of a 100 tpy emission increase of PM_{10} for the 24-hour PM_{10} NAAQS for the 50th percentile and 90th percentile stack parameters are small, and FDVs calculated at monitoring sites including the worst-case impacts are nowhere near the 150 µg/m^3 level of the 24-hour PM_{10} NAAQS. For the 90th percentile stack characteristics, the addition of a 100 tpy source made no impact on the FDV. These results are presented in Tables 6 and 7.

Table 6. Estimated Future-Year 24-Hour PM_{10} Design values (ppb) for Monitoring Sites within Arkansas Considering Worst-Case Near-Field Impacts: 50th Percentile Stack Parameters

Site/Location	County	Base-Year 24-Hr PM_{10} Design Values (µg/m^3)	2015 Baseline FDV (µg/m^3)	AERMOD + Background FDV (µg/m^3)	Difference in FDV (µg/m^3)
North Little Rock (Pike Ave)	Pulaski	41.0	34.6	35.6	1

Table 7. Estimated Future-Year 24-Hour PM_{10} Design values (ppb) for Monitoring Sites within Arkansas Considering Worst-Case Near-Field Impacts: 90th Percentile Stack Parameters

Site/Location	County	Base-Year 24-Hr PM_{10} Design Values (µg/m^3)	2015 Baseline FDV (µg/m^3)	AERMOD + Background FDV (µg/m^3)	Difference in FDV (µg/m^3)
North Little Rock (Pike Ave)	Pulaski	41.0	34.6	34.6	0

Sensitivity Analysis

In addition to the 90th and 50th percentile values, ICF also ran a sensitivity analysis using the 10th percentile stack characteristics and examined the effects of adjusting those 10th percentile characteristics by 50 % and the effect of using flat terrain. The 10th percentile stack characteristics for each pollutant are listed in Table 8. Although it is unlikely that any facility emitting 100 tpy would have all stack characteristics falling at or below the 10th percentile, the 10th percentile stack characteristics results are useful in identifying which stack characteristics have the most significant effect on modeled concentrations.

Table 8. 10th Percentile Stack Parameters

Pollutant	Percentile	Stack Height (ft)	Diameter (ft)	Temperature (°F)	Exit Velocity (ft/s)
NO_x	10th	42.30	1.29	194.00	30.85
SO_2	10th	57.50	1.84	174.00	23.84
PM_{10}	10th	31.82	2.58	119.45	16.39

In order to test the sensitivity of the model to variations in individual stack parameters, ICF ran sensitivity tests in which a single stack characteristic corresponding to the 10th percentile stack characteristic values was increased by 50 %. Another sensitivity test was run with the 10th percentile stack characteristics and flat terrain. The results are summarized in tables 9 – 11. Concentrations greater than the corresponding NAAQS are highlighted in bold.

Table 9. AERMOD-Derived 8th High Daily Maximum 1-Hour NO_2 Concentrations for Varying Stack Parameters: Modified 10th Percentile Stack Parameters and Flat Terrain

Scenario	8th High Daily Maximum 1-Hour NO_2 Concentration (ppb)							
	AQCR 16 (Pulaski)	AQCR 17 (Washington)	AQCR 18 (Crittenden)	AQCR 19 (Union)	AQCR 20 (Craighead)	AQCR 21 (Van Buren)	AQCR 21 (Polk)	AQCR 22 (Miller)
10th %ile	**129.1**	**105.8**	94.8	**124.5**	**105.8**	**121.4**	**128.6**	**123.3**
10th %ile +Stack Height	94.7	56.7	57.6	69.4	63.1	**122.5**	97.5	65.3
10th %ile +Stack Diameter	91.8	88.6	76.4	**109.1**	90.2	**101.0**	**108.9**	99.3
10th %ile +Temp-erature	90.6	87.2	77.2	**106.4**	87.6	**100.7**	**108.5**	95.6
10th %ile +Exit Velocity	**108.8**	95.1	85.3	**117.1**	98.6	**116.0**	**119.2**	**109.0**
Flat Terrain	87.9	**105.7**	97.0	**124.5**	**105.8**	**120.2**	**128.8**	**124.7**

Table 10. AERMOD-Derived 4th High Daily Maximum 1-Hour SO_2 Concentrations for Varying Stack Parameters: Modified 10th Percentile Stack Parameters and Flat Terrain.

Scenario	4th High Daily Maximum 1-Hour SO_2 Concentration (ppb)							
	AQCR 16 (Pulaski)	AQCR 17 (Washington)	AQCR 18 (Crittenden)	AQCR 19 (Union)	AQCR 20 (Craighead)	AQCR 21 (Van Buren)	AQCR 21 (Polk)	AQCR 22 (Miller)
10th %ile	**75.7**	52.8	58.0	64.6	58.4	**109.9**	**122.4**	65.3
10th %ile +Stack Height	38.2	58.5	32.3	37.1	33.5	36.6	**105.8**	32.9
10th %ile +Stack Diameter	53.3	54.3	43.4	54.1	47.9	61.5	**90.6**	53.4
10th %ile +Temp-erature	50.1	51.0	38.2	49.8	43.4	46.4	**90.5**	48.8
10th %ile +Exit Velocity	55.5	57.9	46.0	56.1	49.8	69.2	**99.6**	55.1
Flat Terrain	66.8	53.7	58.2	64.8	59.1	64.1	64.6	65.8

Table 11. AERMOD-Derived 2nd High 24-Hour PM_{10} Concentrations for Varying Stack Parameters: Modified 10th Percentile Stack Parameters and Flat Terrain.

Scenario	2nd High 24-Hour PM_{10} Concentration ($\mu g/m^3$)							
	AQCR 16 (Pulaski)	AQCR 17 (Washington)	AQCR 18 (Crittenden)	AQCR 19 (Union)	AQCR 20 (Craighead)	AQCR 21 (Van Buren)	AQCR 21 (Polk)	AQCR 22 (Miller)
10th %ile	**255.1**	**304.1**	**358.7**	**321.5**	**393.0**	**323.8**	**269.4**	**336.4**
10th %ile +Stack Height	95.6	127.1	124.1	**210.4**	141.8	**160.7**	**194.7**	141.2
10th %ile +Stack Diameter	**208.5**	**287.6**	**338.1**	**306.3**	**330.8**	**263.6**	**247.4**	**300.0**
10th %ile +Temp-erature	**156.7**	**238.3**	**218.1**	**241.4**	**240.4**	**223.8**	**228.6**	**223.1**

10^{th} %ile +Exit Velocity	**197.5**	**257.4**	**287.5**	**306.0**	**292.8**	**282.6**	**252.1**	**285.3**
Flat Terrain	**268.8**	**337.8**	**358.7**	**321.5**	**395.4**	**307.7**	**270.8**	**339.5**

Among the four stack parameter characteristics, the modeled concentrations were most sensitive to stack height for PM_{10}, SO_2, and NOx. On average over all areas, a 50 % increase in stack height above the 10^{th} percentile resulted in a 33 % reduction in NO_2, a 37 % reduction in SO_2, and a 53 % reduction in PM_{10}. Modeled concentrations were somewhat sensitive to a 50 % increase in temperature (19 %, 29 %, and 30 % reduction for NO_2, SO_2, and PM_{10}, respectively). Modeled concentrations for NO_2 and SO_2 are least sensitive to exit velocity and modeled concentrations of PM_{10} are least sensitive to stack diameter. The effect of using flat terrain rather than local terrain from the hypothetical locations was variable.

Although the sensitivity analysis using the 10^{th} percentile stack characteristics results are useful in identifying which stack characteristics have the most significant effect on modeled concentrations, it is unlikely that any facility emitting 100 tpy would have all stack characteristics falling at or below the 10^{th} percentile. The average stack characteristics for facilities on the PM_{10}, SO_2, and NOx lists of the top 10 plants with emissions up to 100 tpy fall between the 50^{th} and 90^{th} percentile. No facilities on the top ten lists of emitters under 100 tpy had more than two stack characteristic that fall at or below the 10th percentile stack characteristic for that pollutant. One facility on the top 10 NOx sources list has two stack parameters that fall below the 10^{th} percentile mark; however, that facilities emissions (53.39 tpy NO_x) are nowhere near the 100 tpy threshold examined in this analysis. Only one facility with a single characteristic falling below the 10th percentile for NOx emitted more than 90 tpy. One facility on the top 10 PM_{10} sources list has two stack parameters that fall below the 10^{th} percentile mark; however, that facilities emissions are only 76.32 tpy PM_{10}. No facilities on the SO_2 top ten sources list had more than one stack characteristic that fell at or below the 10^{th} percentile mark. Of those facilities that had one stack characteristic at or below the 10^{th} percentile mark, no facility emitted more than 66 tpy SO_2.

Conclusion

Based on the results of this analysis, the Department finds that setting NAAQS evaluation requirements for Minor NSR permitting actions at the 100 tpy threshold for PM_{10}, SO_2, and NOx, based on the definition of major source, is supported by the modeling data. The Department will continue to evaluate ambient concentrations of NAAQS pollutants in the State and regional scale modeling updates to evaluate whether the modeling thresholds included in this SIP submittal continue to be appropriate and protective of the NAAQS. This analysis also informs the Department about which stack characteristics are most influential in determining the potential impact of emission increases for PM_{10}, SO_2, and NOx. If the Department determines that it is necessary and appropriate to revise or create new NAAQS evaluation requirements for Minor NSR permitting, the Department may expand on this modeling to identify appropriate thresholds for modeling requirements. Any revisions to Minor NSR NAAQS evaluation requirements would be made through a NAAQS SIP revision, as required under Ark. Code Ann. § 8-4-318.