

**24-Hour PM<sub>2.5</sub>  
Limited Maintenance Plan**

**for the**

**Birmingham  
2006 24-Hour PM<sub>2.5</sub> Maintenance Area**

**2020**

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**PREFACE:**

This document contains Alabama's Limited Maintenance Plan for the Birmingham area for the 2006 24-Hour National Ambient Air Quality Standard for PM<sub>2.5</sub>.

## **EXECUTIVE SUMMARY:**

This document contains Alabama's Limited Maintenance Plan (LMP) demonstration under the federal Clean Air Act Amendments of 1990 for the Birmingham 24-hour PM<sub>2.5</sub> Maintenance Area (BMA) with respect to the 2006 National Ambient Air Quality Standard (NAAQS) for 24-hour fine particle pollution. The BMA consists of two full counties, Jefferson and Shelby Counties, and one partial county, Walker County.

This demonstration is based on the following:

1. Three years of ambient monitoring data from the five PM<sub>2.5</sub> monitors in the BMA. No violations of the 24-hour PM<sub>2.5</sub> standard were shown for 2017-2019 data.
2. The implementation of permanent and enforceable reductions in PM<sub>2.5</sub> and precursor emissions.
3. Compliance with Section 110 and Part D requirements of the Clean Air Act.
4. The limited maintenance plan analysis that supports the conclusion that the area is not likely to violate the 2006 24-hour PM<sub>2.5</sub> NAAQS through the end of the second maintenance planning period.

**Table of Contents**

**1.0 INTRODUCTION ..... 6**

**1.1 Purpose ..... 6**

**1.2 Historical Background ..... 6**

**1.3 What is PM<sub>2.5</sub>? ..... 6**

**1.4 Limited Maintenance Plan Option ..... 7**

**2.0 DISCUSSION OF ATTAINMENT ..... 9**

**2.1 Overview ..... 9**

**2.2 PM<sub>2.5</sub> Monitoring Network ..... 9**

**3.0 LIMITED MAINTENANCE PLAN ..... 9**

**3.1 Attainment Emission Inventory ..... 10**

**3.2 Maintenance Demonstration ..... 11**

**3.3 Control Plan ..... 16**

**3.4 Monitoring Network ..... 17**

**3.5 Verification of Attainment ..... 17**

**3.6 Contingency Plan ..... 17**

**3.7 Fully Approved SIP, Section 110 and Part D Requirements ..... 19**

**3.7.1 Section 110 Implementation Plans ..... 19**

**3.7.2 Part D Plan Requirements for Nonattainment Areas ..... 20**

**3.8 Conformity Determination ..... 20**

**4.0 CONCLUSION ..... 21**

**List of Figures and Tables**

**Figure 1.1 -Map of Area Designated as Nonattainment for 2006 24-hour PM<sub>2.5</sub> NAAQS ..... 8**

**Table 3.1 -2017 Emissions (tons/day) for the Birmingham Maintenance Area ..... 11**

**Table 3.2 -Birmingham Maintenance Area Design Values ..... 13**

**Table 3.3 -Birmingham Maintenance Area 3 Year Averages and 24-Hour Values ..... 14**

**Appendix**

**A. Limited Maintenance Plan Option for Moderate PM<sub>10</sub> Nonattainment Areas ..... 11**

**B. Mobile Source Data (MOVES) ..... 12**

**C. Inventory Data ..... 13**

**D. VMT + LMP Calculations ..... 14**

## **1.0 INTRODUCTION**

### **1.1 Purpose**

This update of the 2006 24-hour PM<sub>2.5</sub> Birmingham Maintenance Plan, as required by 175A of the Clean Air Act, demonstrates that the Birmingham 24-hour PM<sub>2.5</sub> maintenance area continues to demonstrate compliance of the 2006 24-hour PM<sub>2.5</sub> NAAQS.

### **1.2 Historical Background**

On October 8, 2009, the United States Environmental Protection Agency (EPA) designated Jefferson and Shelby Counties and a portion of Walker County as nonattainment for the 2006 24-hour PM<sub>2.5</sub> standard. The nonattainment designation was an action taken by the EPA under Section 107(d) of the Clean Air Act (CAA). The CAA requires that some areas be designated as nonattainment if a monitor is found to be in violation of a NAAQS. The official designations and classifications were printed in the Federal Register on November 13, 2009 (74 FR 58688). This designation became effective on December 14, 2009.

Upon attainment of the 2006 24-hour PM<sub>2.5</sub> NAAQS and in compliance with CAA section 175A(a), on June 17, 2010, the Alabama Department of Environmental Management (ADEM) submitted the final redesignation request and maintenance plan to EPA requesting that the Birmingham 24-hour PM<sub>2.5</sub> nonattainment area be redesignated to attainment of the 2006 24-hour PM<sub>2.5</sub> standard. This request was based on compliant monitoring data from 2007-2009. On January 25, 2013, the Birmingham 24-hour PM<sub>2.5</sub> nonattainment area was redesignated to attainment/maintenance for the 2006 24-hour PM<sub>2.5</sub> NAAQS (78 FR 5306).

Under section 175A(b), 8 years after the redesignation of an area to attainment and after the submittal of the initial 10 year maintenance plan, states are required to submit an additional revision to the SIP providing a plan for maintaining the NAAQS for 10 years after the expiration of the initial 10 year maintenance plan. The State of Alabama is required to submit an updated maintenance plan for the 2006 24-hour PM<sub>2.5</sub> standard in 2021.

### **1.3 What is PM<sub>2.5</sub>?**

PM<sub>2.5</sub>, also known as particle pollution or fine particulate, is a complex mixture of extremely small particles and liquid droplets. Particulate matter is made up of a number of components, including nitrates and sulfates, organic chemicals, metals, and soil or dust particles. Fine particles, such as those found in smoke and haze, are 2.5 micrometers in diameter and smaller. These particles can be directly emitted from sources such as forest fires, or they can form when gases emitted from power plants, industries and automobiles react in the air.

The chemical makeup of PM<sub>2.5</sub> in the BMA is similar to that of similar sites across the Southeast. PM<sub>2.5</sub> measurements are separated into several components: ammonium sulfate ((NH<sub>4</sub>)<sub>2</sub>SO<sub>4</sub>), ammonium nitrate (NH<sub>4</sub>NO<sub>3</sub>), organic carbon mass (OC), elemental carbon (EC) and crustal materials, as well as a factor to correct for particles on the filter, characterized as passive mass. NH<sub>4</sub>NO<sub>3</sub> and (NH<sub>4</sub>)<sub>2</sub>SO<sub>4</sub> are secondary pollutants formed in the atmosphere from primary emissions of sulfur dioxide (SO<sub>2</sub>), nitrogen oxides (NO<sub>x</sub>) and ammonia (NH<sub>3</sub>).

OC is a mixture of primary carbon, predominantly from fuel combustion and biomass burning, and secondary carbon, predominantly from biogenic emissions. EC and crustal components (fine soil & metals) are primary pollutants emitted directly into the atmosphere. OC and (NH<sub>4</sub>)<sub>2</sub>SO<sub>4</sub> are the dominant contributors to PM<sub>2.5</sub> mass in the BMA. SO<sub>2</sub> emissions, primarily from utility and industrial point sources, are the primary contributors to SO<sub>4</sub>. SO<sub>4</sub> mass is highest in the summer months, in part due to higher SO<sub>2</sub> emissions in the summer months and in part due to more active secondary photochemical formation under the higher temperatures, relative humidity, and oxidant loading of the summer months.

#### **1.4 Limited Maintenance Plan Option**

Alabama is using the limited maintenance plan option for this revision to the original maintenance plan. The requirements of a limited maintenance plan for PM are explained in the August 9, 2001, memorandum from Lydia Wegman (See Appendix A). This memorandum sets forth new guidance on maintenance plan submissions for certain moderate particulate matter (PM<sub>10</sub>) nonattainment areas seeking redesignation to attainment. Currently, there is no existing limited maintenance plan guidance pertaining specifically to the 2006 24-hour PM<sub>2.5</sub> NAAQS; therefore, EPA advised that the 2001 PM<sub>10</sub> guidance be used. If the area meets the criteria listed in this policy, the State may submit a maintenance plan at the time it is requesting redesignation or updating a current maintenance plan that is more streamlined than would ordinarily be required. This new option is being termed a limited maintenance plan, which allows for a less rigorous maintenance plan than was formerly required in developing attainment/maintenance plans for particulate matter nonattainment areas that have all monitoring sites reporting data that fall below 35µg/m<sup>3</sup> for the 2006 24-hr PM<sub>2.5</sub> NAAQS.

Currently, the BMA is well below the 2006 24-hour PM<sub>2.5</sub> NAAQS. Based on monitoring data from 2017-2019, the BMA currently has a 24-hour PM<sub>2.5</sub> design value of 21 µg/m<sup>3</sup>, which is 60% of the exceedance level of the 2006 24-hour PM<sub>2.5</sub> NAAQS. The design value for the area was determined using the 98<sup>th</sup> percentile three-year average. The highest design value for all the monitoring sites in an area is the accepted design value.

The limited maintenance plan approach requires the development of an attainment emissions inventory, but does not require projected future years emissions inventories as with a typical maintenance plan. The maintenance demonstration is considered to be satisfied if the monitoring data shows that the area is meeting the air quality criteria for a limited maintenance plan as determined in the manner described in this section, and if the area has demonstrated a stable or improving air quality trend. The EPA has determined that the continued applicability of

prevention of significant deterioration requirements, and control measures already contained in the State Implementation Plan (SIP) and federal measures, such as the federal motor vehicle control program and the various transport rules, should provide adequate assurance of maintenance for such areas.

The limited maintenance plan, like a traditional maintenance plan, requires a commitment to continue operation of an appropriate, EPA-approved air quality monitoring network, in accordance with 40 CFR Part 58. This is to verify the attainment status of the area over the maintenance period, especially since there is no cap on the emissions for a limited maintenance plan. A contingency plan is also required to promptly correct any violation of the 2006 24-hour  $PM_{2.5}$  standard that occurs after approval of the limited maintenance plan. The contingency measures do not have to be fully adopted; however the contingency plan is considered to be an enforceable part of the SIP and should ensure that the contingency measures are adopted expeditiously once they are triggered.

The final requirement in a traditional maintenance plan is the establishment of motor vehicle emission budgets for transportation conformity purposes and emission budgets for general conformity purposes. In a limited maintenance plan, the emission budgets are treated as essentially non-constraining for the length of the maintenance period because it is unreasonable to expect that such an area will experience so much growth in that period that a violation of the NAAQS would result. Therefore, the EPA concluded in the guidance that for a limited maintenance area, the emissions need not be capped for the maintenance period and the “budget test” of the transportation and general conformity rules are met. Figure 1.1 demonstrates the BMA designated attainment for the 2006 24-hour  $PM_{2.5}$  NAAQS.



Figure 1.1 Maintenance Area Designated as Attainment for 2006 24-hour  $PM_{2.5}$  NAAQS in Alabama



## **2.0 DISCUSSION OF ATTAINMENT**

### **2.1 Overview**

Compliance with the NAAQS for 24-hour PM<sub>2.5</sub> is met if the 98<sup>th</sup> percentile of 24-hour PM<sub>2.5</sub> concentrations in a year, averaged over three years, is less than or equal to the level of the standard of 35 µg/m<sup>3</sup>. The resulting concentration represents a 24-hour PM<sub>2.5</sub> design value. A violation of the 24-hour PM<sub>2.5</sub> NAAQS occurs when the design value exceeds 35 µg/m<sup>3</sup> at any monitor. In other words, a design value higher than 35 µg/m<sup>3</sup> at any monitor will constitute a violation of the 24-hour PM<sub>2.5</sub> NAAQS and could result in the area being designated nonattainment for the 24-hour PM<sub>2.5</sub> standard.

The most recent three years of 24-hour PM<sub>2.5</sub> monitoring data (2017-2019) for the BMA demonstrate compliance with the 2006 24-hour PM<sub>2.5</sub> NAAQS.

### **2.2 PM<sub>2.5</sub> Monitoring Network**

There are currently five PM<sub>2.5</sub> monitoring stations in the BMA installed in accordance with 40 CFR 58. These monitoring stations provide adequate coverage of the entire maintenance area and have been representative of the area of highest concentrations. All monitors remained at their original locations during the period 2017-2019. All monitoring has been submitted and approved by EPA in the annual ADEM and Jefferson County Department of Health's Ambient Air Monitoring Network Plans.

## **3.0 LIMITED MAINTENANCE PLAN**

On October 8, 2009 (74 FR 58688), the EPA designated Jefferson and Shelby counties and a portion of Walker County as a Nonattainment Area (NAA). Upon attainment of the 2006 24-hour PM<sub>2.5</sub> NAAQS and in compliance with CAA section 175A(a), on June 17, 2010, ADEM submitted the final redesignation request and maintenance plan to EPA requesting that the BMA be redesignated to attainment of the 2006 24-hour PM<sub>2.5</sub> standard. This request was based on compliant monitoring data from 2007-2009 demonstrating the Birmingham NAA was shown to have attained compliance with the NAAQS. As a result, the EPA determined on January 25, 2013, that the area had attained the standard (78 FR 5306) and reclassified the BMA as attainment/maintenance for the 2006 PM<sub>2.5</sub> 24-hour NAAQS.

This limited maintenance plan has been developed according to the EPA's September 4, 1992, Calcagni Memo for "Procedures for Processing Requests to Redesignate Areas to Attainment," EPA's August 9, 2001, memo for "Limited Maintenance Plan Option for Moderate PM<sub>10</sub> Nonattainment Areas," applicable provisions of the CAA, additional guidance received from EPA Region 4, and the requirements of Section 175A of the CAA.

This limited maintenance plan addresses the following elements:

- attainment inventory,
- maintenance demonstration,
- control plan,
- monitoring network,
- verification of continued attainment, and
- contingency plan.

### **3.1 Attainment Emission Inventory**

There are four different man-made emission inventory source classifications: point, area, nonroad and on-road sources. Major point sources are stationary source facilities that have the potential to emit greater than 100 tons per year (TPY) of NO<sub>x</sub>, SO<sub>2</sub>, and PM<sub>2.5</sub>. The point source emissions are calculated from data collected annually from the sources. There may be several emission sources for one facility. Emissions data is collected for each point source at a facility and the data is reported to the state or local air agencies.

Area sources are those sources whose emissions are relatively small, but due to the large number of sources, the collective emissions could be significant (i.e., combustion of fuels for heating and structure fires). For area sources, emissions are estimated by multiplying an emission factor by some known indicator of collective activity, such as fuel usage, number of households, or population. These types of emissions are estimated on the county level.

On-road mobile sources are vehicles that travel on local roads, state highways and interstates. Nonroad mobile sources are pieces of equipment that can move but do not use the roadways (i.e., lawn mowers, construction equipment, and railroad locomotives). For on-road as well as nonroad mobile sources, ADEM used the Motor Vehicle Emission Simulator (MOVES3) mobile model to generate emissions. The Birmingham area MPO provided local VMT data as well as the MOVES input files. The MOVES input files that contained default data were updated with default data from the new MOVES3 model. On-road and nonroad MOVES3 runs were conducted for Jefferson, Shelby and Walker counties for 2017. The on-road runs that were conducted for Walker County reflected only the partial area included in the BMA.

All nonroad runs were conducted using MOVES3 default data and local meteorological data that was provided by the Birmingham MPO. All nonroad runs conducted with the MOVES3 model yielded county level emissions data for Jefferson, Shelby and Walker counties. The emissions data for Walker County was apportioned for the partial area in the BMA using the population distribution for the partial area compared to the county as a whole. The ratio was 0.15. See Appendix B for MOVES3 documentation.

Table 3.1 displays the emissions inventory required for a limited maintenance plan. The daily emissions (tons/day) for point, nonpoint and event were derived from annual inventory information obtained from the 2017 National Emissions Inventory (NEI). For Jefferson and Shelby counties the annual emissions data for each pollutant was divided by 365 to obtain daily

emissions for each pollutant. The only point source in the partial Walker County area is the Alabama Power Company’s Plant Gorgas. Annual point source emissions were obtained and divided by 365 to obtain daily emissions. For nonpoint and event emissions for the partial Walker County area, the annual emissions data was apportioned using a relative population distribution ratio. Once apportioned for the partial area, the annual emissions for the area were divided by 365 to obtain daily emissions. Daily emissions were summed across each source category to provide total daily emissions for the BMA. See Appendix C for emissions inventory information.

**Table 3.1 2017 SO<sub>2</sub>, NO<sub>x</sub>, PM<sub>2.5</sub>, VOC and NH<sub>3</sub> Emissions (tons/day) for the Birmingham Maintenance Area**

<b>Birmingham Maintenance Area</b>	<b>Point Source</b>	<b>Non-Point Source</b>	<b>On-Road Mobile Source</b>	<b>Nonroad Mobile Source</b>	<b>Event</b>	<b>Total</b>
<b>SO<sub>2</sub></b>	49.34	0.45	0.27	0.02	0.11	<b>50.19</b>
<b>NO<sub>x</sub></b>	61.83	9.69	27.96	9.44	0.24	<b>109.16</b>
<b>PM<sub>2.5</sub></b>	8.7	13.72	0.80	1.07	1.05	<b>25.34</b>
<b>VOC</b>	9.18	161.3	12.91	7.75	2.71	<b>193.85</b>
<b>NH<sub>3</sub></b>	0.33	1.54	0.95	0.02	0.19	<b>3.03</b>
<b>Total</b>	<b>129.38</b>	<b>186.7</b>	<b>42.89</b>	<b>18.30</b>	<b>4.3</b>	

\*For the methodology used in apportioning the overall Walker County inventory to the maintenance area inventory, ADEM used a relative population distribution for the partial county area to develop the partial county inventory (the ratio was 0.15).

<b>Plant Gorgas</b>	<b>PM<sub>2.5</sub></b>	<b>SO<sub>2</sub></b>	<b>NO<sub>x</sub></b>	<b>VOC</b>	<b>NH<sub>3</sub></b>
Annual	96.78	1296.13	4111.28	72.69	1.35
Daily	0.27	3.55	11.26	0.20	0.004

\*Alabama Power’s Plant Gorgas in Walker County was permanently retired on April 15, 2019.

### 3.2 Maintenance Demonstration

For this redesignation request to be complete and approvable, the CAA requires that the maintenance plan provide for maintenance of the PM<sub>2.5</sub> NAAQS for at least 10 years following EPA’s approval of the plan. As stated earlier in this document, attainment of the PM<sub>2.5</sub> NAAQS has been demonstrated in the BMA, and this maintenance plan update will demonstrate continued attainment, or “maintenance” of the PM<sub>2.5</sub> NAAQS through the year 2034. For PM<sub>10</sub> NAAs, the EPA developed guidance for a more streamlined maintenance plan approach for those NAAs that were designated ‘moderate’ and that meet certain criteria. This approach was described in the August 9, 2001, guidance memo, “Limited Maintenance Plan Option for Moderate PM<sub>10</sub> Nonattainment Areas.” The EPA developed this guidance for areas that have been meeting the PM<sub>10</sub> NAAQS for 5 years or more, have a ‘moderate’ designation, and have a low risk of future exceedances. This policy was designed to allow both the states and the EPA to timely redesignate areas that are at little risk of PM<sub>10</sub> violations.

The guidance describes how the EPA studied PM<sub>10</sub> NAAs and found that some moderate PM<sub>10</sub> NAA have had a history of low PM<sub>10</sub> design values with very little inter-annual variation. The

EPA explained that the very small amount of variation between the peaks and means in most of the data indicates a very stable relationship that can reasonably be expected to continue in the future absent any significant changes in emissions. Based on this study of data, the EPA believed they could reliably make estimates about the future variability of PM<sub>10</sub> concentrations across the country using a statistical analysis, especially in areas where the amount of emissions is not expected to change.

The EPA identified threshold levels of PM<sub>10</sub> for which the design values of the studied NAAs did not exceed. These threshold levels were below the individual site-specific critical design values (CDV). The CDV is an indicator of the likelihood of future violations of the NAAQS given the current average design value and its variability. The CDV is the highest average design value an area could have before it may experience a future exceedance of the NAAQS with a certain probability. The guidance allows NAAs to follow a LMP if their design values are below the identified threshold level or below the area specific CDV and the area also can demonstrate limited growth in on-road motor vehicle emissions (including fugitive dust) and pass a motor vehicle regional emissions analysis test. In Attachment A of the guidance memo, "Limited Maintenance Plan Option for Moderate PM<sub>10</sub> Nonattainment Areas," the EPA describes that a CDV can be calculated for any site with a minimum of five years of data. And furthermore, the EPA states in Attachment A that since this CDV technique is very general, it can be applied to any pollutant with a minimum of five years of valid data.

ADEM has discussed with EPA Region 4 the applicability of following the LMP pathway for the Birmingham 2006 24-hour PM<sub>2.5</sub> maintenance area. Since the EPA has not performed a comprehensive study of PM<sub>2.5</sub> areas as it has for PM<sub>10</sub>, there is no design value threshold available for PM<sub>2.5</sub>. Determining the BMA CDV is the only option to demonstrate whether the BMA's 24-hour PM<sub>2.5</sub> design value is unlikely to violate the NAAQS in the future along with demonstrating there will be limited future growth in on-road motor vehicles by passing a motor vehicle regional emissions analysis test.

The following demonstrations show that the BMA's 24-hour PM<sub>2.5</sub> design value is below the site-specific CDV and that future growth in the area does not exceed the motor vehicle regional emissions analysis test requirements. The LMP will continue to implement the controls of the attainment plan.

### **Design Value**

As described above in Section 2.0, the local design value for the BMA is based on averaging 3 consecutive years of monitoring data. The chart below shows design values beginning with the 2013-2015 design value through the 2017-2019 design value. The average of these five design values was 22.2 µg/m<sup>3</sup>. To qualify for a LMP the average design value must be below the CDV as discussed below.

**Table 3.2 Birmingham Maintenance Area Design Values**

<b>Year</b>	2013-2015	2014-2016	2015-2017	2016-2018	2017-2019
<b>Design Value</b>	23	23	22	22	21

**Critical Design Value**

As described above, the EPA has developed the CDV as an indication of the ‘likelihood of future violations of the NAAQS given the current average design value and its variability’ and applies it to areas that have a minimum of five years of valid data. The process for developing a CDV is outlined in Attachment A of the EPA guidance titled “Limited Maintenance Plan Option for Moderate PM<sub>10</sub> Nonattainment Areas.”

The equation to calculate a CDV is as followed:

$$CDV = NAAQS / (1 + t_c * CV)$$

Where:

CDV = Critical Design Value

NAAQS = National Ambient Air Quality Standard

t<sub>c</sub> = Critical t-value corresponding to a probability of exceeding the NAAQS in the future and the degree of freedom in the estimate to the coefficient of variation.

CV = Coefficient of variation (CV) of the annual design value, calculated as the ratio of the standard deviation and average design values in the past.

A minimum of at least 50 percent daily data collection is required for calculating the annual average. ADEM’s data includes the years 2013 through 2019, which represents five 3-year periods of design values, beginning with the 2013-2015 design value and ending with the 2017-2019 design value. This meets the five-year minimum required years of available data. The design value for each three-year period was calculated by averaging the three annual average values for the periods. Table 3.3 provides the 3-year period, the annual average value for those years, and the design value for each period.

**Table 3.3 Birmingham Maintenance Area 3 Year Averages and 24-Hour Values**

	3 Year Averages					24-Hour Values						
	2017 - 2019	2016 - 2018	2015 - 2017	2014 - 2016	2013 - 2015	2019	2018	2017	2016	2015	2014	2013
<b>Leeds</b>	18	18	17	18	20	15.3	21.6	15.6	15.7	19.9	22	19
<b>McAdory</b>	18	17	18	17	20	16	17.5	19.6	14.4	18.5	21.5	19.6
<b>N BHM</b>	21	21	22	23	23	21.3	21.4	21.7	20.2	22.8	25.9	20.3
<b>Wylam</b>	17	18	18	18	20	16.1	17	19.1	16.8	18.6	21.5	20.6
<b>W BHM</b>	21	22	22	22		19.1	22.2	21.2	21.4	23.6	22	

The CV is calculated as the standard deviation of the five design values divided by the mean of the five design values. The critical t-value was derived by assuming a one-tailed distribution with a tolerable risk factor of 10 percent probability of a NAAQS violation, which matches the method used by EPA to demonstrate a CDV.

The parameter values used for the calculations are as follows:

NAAQS	= 35 $\mu\text{g}/\text{m}^3$
$t_c$	= 1.533
Standard deviation of design values (2013-2019)	= 0.75 $\mu\text{g}/\text{m}^3$
Mean of design values (2013-2019)	= 22.2 $\mu\text{g}/\text{m}^3$
Coefficient of Variation [CV= StDev/Mean]	= 0.034
CDV = [NAAQS/(1+ $t_c$ *CV)]	= 33.3 $\mu\text{g}/\text{m}^3$

### Regional Motor Vehicle Analysis

To qualify for the LMP option, an area must expect only limited growth in on-road motor vehicle  $\text{PM}_{2.5}$  emissions. This is accomplished by demonstrating that the regional motor vehicle growth value is below the margin of safety (MOS) for the area. When adjusted for future on-road mobile emissions, the BMA passes a motor vehicle regional emissions analysis test with design values of 22.87  $\mu\text{g}/\text{m}^3$  or less for the 24-hour analysis.

The equation used to determine eligibility of the BMA for the LMP is based on the U.S. EPA guidance titled “Limited Maintenance Plan Option for Moderate  $\text{PM}_{10}$  Nonattainment Areas.” The regional motor vehicle analysis equation set forth in this guidance is:

$$DV + (VMT_{pi} * DV_{mv}) \leq MOS$$

Where:

DV = 5-year PM<sub>2.5</sub> average annual design value (Five 3-year averages spanning 2013-2019), (µg/m<sup>3</sup>)

VMT<sub>pi</sub> = Projected % increase in VMT (2017-2034)

DV<sub>mv</sub> = Product of the design value and the fraction of the inventory represented by on-road mobile sources in the attainment year (µg/m<sup>3</sup>)

MOS = Margin of safety for PM<sub>2.5</sub> 24-hour standard

ADEM has assumed the attainment year to be 2019, the year the most recent BMA PM<sub>2.5</sub> monitoring data was prepared. The chart below represents projected future design values that are based on projected mobile source growth and three different pollutant scenarios. These scenarios include:

1. All precursor and direct PM<sub>2.5</sub> emissions,
2. Original maintenance plan precursors and direct PM<sub>2.5</sub>
3. Only direct PM<sub>2.5</sub> and SO<sub>2</sub> emissions.

All three scenarios produce future projected design values based on projected mobile source growth below the MOS.

Parameters	24-Hour
MOS (µg/m <sup>3</sup> )	22.87
DV (µg/m <sup>3</sup> )	22.2
VMT <sub>pi</sub> (2017-2034)	0.12
% of the 2017 EI from on-road mobile sources	10.5%
DV <sub>mv</sub> (µg/m <sup>3</sup> )	*2.33, **3.22, ***0.30
Calculated [DV + (VMT <sub>pi</sub> * DV <sub>mv</sub> )] (µg/m <sup>3</sup> )	*22.48, **22.59, ***22.24

\* All precursor and direct PM<sub>2.5</sub> emissions included

\*\* Original Maintenance Plan precursors and direct PM<sub>2.5</sub> emissions included

\*\*\* Only direct PM<sub>2.5</sub> and SO<sub>2</sub> emissions included

Based on these analyses, the local design value indicates the Birmingham Maintenance Area is unlikely to exceed the NAAQS and there will be limited future motor vehicle growth in the area. Since the average design value is below the CDV, and the regional motor vehicle analysis values are below the MOS, the BMA qualifies for the LMP option. These analyses follow the pathway established in the “Limited Maintenance Plan Option for Moderate PM<sub>10</sub> Nonattainment Areas” memo.

For any VMT or LMP calculation information, see Appendix D.

### 3.3 Control Plan

ADEM has implemented programs that will remain enforceable and are hereby submitted as the plan to ensure that maintenance of the 24-hour PM<sub>2.5</sub> standard will continue. Sources are prohibited from reducing emission controls ('anti-backsliding') following the redesignation of the area unless such a change is first approved by the EPA as a revision to the Alabama SIP that is consistent with Section 110(l) of the Clean Air Act. The following regulatory programs will remain in place in the Birmingham NAA:

- Federal Tier IV Motor Vehicle Emissions Standards
- Federal On-road Diesel Engine Standards
- Federal Non-road Diesel Engine Standards
- Federal Marine Engine Requirements
- Federal Locomotive Requirements
- The Federal New Source Performance Standards under Section 111 (42 U.S.C.7411)
- The Federal National Emissions Standards for Hazardous Air Pollutants (NESHAP) under Section 112 (42 U.S.C 7412)
- The Federal NO<sub>x</sub> SIP Call
- The Federal Cross State Air Pollution Rule (CSAPR)
- The Local Jefferson and Shelby County Burn Ban
- Local voluntary on and off-road diesel retrofit projects have been initiated in the maintenance area. These projects utilize diesel emission control equipment as well as locomotive idle reduction equipment to lessen the particulate emissions from these engines. The reductions are not officially quantified and credit was not taken for these reductions.
- Installation of LNB on Units 1-4 at TVA's Colbert Plant in 2006 and SCR on Unit 5 in 2004. LNB and SCR were added as a result of the NOXSIP Call. Colbert Units 1-5 shutdown in 2016.
- Installation of LNB on Units 6 & 7 at Alabama Power's Gorgas Plant in 2003 and SCR on Unit 10 in 2002. Also, the installation of FGD on Units 8-10 in 2007. LNB and SCR were added as a result of the NOXSIP Call. The FGD was added in anticipation of CAIR. Installation of a Baghouse with Electrostatic Precipitator was added in 2016 as a result of the CSAPR to Gorgas units 8-10. Gorgas units 6 and 7 shutdown in 2015. Alabama Power's Plant Gorgas in Walker County was permanently retired on April 15, 2019.
- Installation of SCR on Units 3 & 4 at Alabama Power's Miller Plant in 2003 with a Consent Decree requiring year round operation beginning in 2008. Also, the installation of SCR on Units 1 & 2 in 2005. All 4 SCRs were added as a result of the NOXSIP Call. Year-round operation of all SCRs was planned in anticipation of the annual NO<sub>x</sub> CAIR rule. The consent decree further required year-round operation of the SCRs on Units 3 and 4. The consent decree requirements have been incorporated into the facility's Title V permit and are enforceable.
- Installation of SCR on Unit 5 at Alabama Power's Gaston Plant in 2006 was added as a result of the NOXSIP Call and in anticipation of CAIR. Installation of a Baghouse with Electrostatic Precipitator was added in 2016 as a result of the CSAPR.
- Installation of Low NO<sub>x</sub> Burner Technology for Cell Burners (LNCB) with over-fire air (OFA) on Unit 1 at Alabama Power's Greene County in 2003. In 2014, the OFA was retired, and just the LNCB is being utilized. Also, the installation of OFA on the LNCB on Unit 2 in



2004. LNCB and OFA were added as a result of the NOXSIP Call. In 2013, the OFA was retired on Unit 2, and just the LNCB is being utilized.

### **3.4 Monitoring Network**

To verify the attainment status of the area over the maintenance period, the limited maintenance plan should contain provisions for continued operation of an appropriate, EPA-approved air quality monitoring network. This is particularly important for areas using a limited maintenance plan because there will be no cap on emissions. ADEM commits to continue operating all required PM<sub>2.5</sub> monitors in the BMA in accordance with 40 CFR Part 58. Any monitor shutdowns or relocations will only be made with the approval of the EPA. In 2011, the Jefferson County Department of Health discontinued the operation of four PM monitors located in Jefferson County, and ADEM also discontinued the operation of one monitor during the 2011 year located in Walker County. In 2015, ADEM discontinued the operation of one monitor located in Shelby County. These shutdowns were all approved by the EPA and were reflected in the appropriate annual monitoring network plans. No other plans are currently under way to discontinue operation, relocation or otherwise affect the integrity of the existing ambient monitoring network for PM<sub>2.5</sub>. The existing monitoring network is operated consistent with all requirements under 40 CFR Part 58.

### **3.5 Verification of Attainment**

Verification of continued attainment is monitored through operation of the ambient fine particulate matter monitor network and the maintenance of updating the area's emissions inventory. The current five ambient PM<sub>2.5</sub> monitors that are operating in the 24-hour PM<sub>2.5</sub> nonattainment area will continue to operate unless a change(s) is approved by EPA. No plans are underway to discontinue operation, relocate, or otherwise affect the integrity of the ambient monitoring network. Any change would only be made if it is consistent with 40 CFR Part 58. The Air Emissions Reporting Requirements (AERR) were promulgated by EPA in December 2008 with amendments being finalized on February 19, 2015. The final amendments reduced the reporting burden for state and local agencies, improved consistency and clarity with other rules and better reflected current inventory technologies and practices. For the purposes of verifying continued attainment based upon the emissions inventory, the three main components of the inventory, point, area and mobile, will be updated on different schedules. The major point sources of air pollution will continue to submit data on their emissions on an annual basis per 40 CFR 51, Subpart Q. For the area source and mobile source portions of the inventory, these emissions will continue to be quantified on a three-year cycle. The last completed triennial inventory was 2017.

### **3.6 Contingency Plan**

#### *3.6.1*

Section 175A(d) of the Clean Air Act Amendments requires the inclusion of contingency provisions that would be implemented by the state to correct any future violation of the NAAQS in areas that had been redesignated as an attainment area. Alabama commits to adopt, within 18

months of certification of a violation of the 2006 24-hour PM<sub>2.5</sub> standard, one or more control measure(s) (contingency measures) as needed to re-attain the standard.

The State of Alabama will use actual ambient monitoring data as the indicator or trigger to determine when these contingency measures would be implemented. In accordance with 40 CFR 58, ambient fine particulate matter monitoring data that indicates a future violation of the 2006 24-hour PM<sub>2.5</sub> NAAQS will begin the process to implement these contingency measures. Also, in the event that the 98<sup>th</sup> percentile of 24-hour PM<sub>2.5</sub> concentrations in a year at any individual monitor in the maintenance area records a reading of 36 µg/m<sup>3</sup> or higher, the state will evaluate existing control measures to determine whether any further emission reduction measures should be implemented at that time.

Several factors will be considered in determining the need for additional control measures in the event of a future year violation of the 2006 24-hour PM<sub>2.5</sub> standard. Depending on when such future year violation occurs, additional local and regional emissions reductions may still be on the way from various regulatory programs. If a future year violation occurs, ADEM will consider the air quality impact of these various regulatory programs in determining the need for additional local reductions in emissions of direct PM<sub>2.5</sub> and/or SO<sub>2</sub>.

### *3.6.2 Contingency Measures*

PM<sub>2.5</sub> particles originate from a variety of stationary and mobile sources and may be directly emitted or formed in the atmosphere by transformation of gaseous emissions. Primary PM<sub>2.5</sub> particles are emitted directly from their sources. Precursor emissions for PM<sub>2.5</sub> undergo chemical reactions involving SO<sub>2</sub>, NO<sub>x</sub>, VOCs and NH<sub>3</sub> which cause the formation of secondary PM<sub>2.5</sub>.

- *NO<sub>x</sub> RACT*

The Acid Rain program, the NO<sub>x</sub> SIP Call, the Clean Air Interstate Rule (CAIR), the Cross State Air Pollution Rule, and the 24-hour PM<sub>2.5</sub> Birmingham Attainment demonstration succeeded in requiring controls that meet RACT (Reasonably Available Control Technology), and in some instances, BACT (Best Available Control Technology) for large sources of NO<sub>x</sub>. The State would commit to investigate other smaller point sources of lower thresholds for specific controls. Rules would be implemented if further reductions in NO<sub>x</sub> were deemed appropriate based on the effectiveness of the reductions to bring the area back into attainment and the cost effectiveness of the control measures. Any measures deemed appropriate would be adopted within 18 months of the determination of a violation.

- *VOC RACT*

ADEM Admin. Code Chapter 335-3-6 incorporates regulations based on documents issued by EPA known as Control Technique Guidelines or CTGs. The State would commit to investigate any CTG categories issued by EPA post 1990, for possible adoption. The State will determine if there are any new point source categories covered

by a CTG that are applicable in the Birmingham maintenance area. A comparison would be made to any corresponding New Source Performance Standards (NSPS) to determine if the NSPS is more stringent than the CTG and if the particular source category is already covered by the NSPS. Rules would be implemented if further reductions in VOCs were deemed appropriate based on the effectiveness of the reductions to bring the area back into attainment and the cost effectiveness of the control measures. Any measures deemed appropriate would be adopted within 18 months of the determination of a violation.

A timeline for the development of PM<sub>2.5</sub>, NO<sub>x</sub>, SO<sub>2</sub>, NH<sub>3</sub> and/or VOC regulations follows:

1. Identify potential stationary sources for reductions	3 months
2. Identify applicable RACT	3 months
3. Initiate a stakeholder process	3 months
4. Draft SIP regulations	3 months
5. Initiate rulemaking process (including public comment period, hearing, Commission adoption and final submission to EPA)	6 months
Completion no later than:	18 months

- *Prioritization of Funding for Diesel Emissions Reduction Projects in the BMA*

In the event that monitoring data in the maintenance area indicates a violation of the 2006 24-hour PM<sub>2.5</sub> NAAQS, ADEM will prioritize diesel retrofit and replacement projects in the BMA for funding from the existing state clean diesel program.

Other control measures not included in the above list will be considered if new control programs are deemed more effective for this area.

### **3.7 Fully Approved SIP, Section 110 and Part D Requirements**

#### **3.7.1 Section 110 Implementation Plans**

The annual PM<sub>2.5</sub> attainment demonstration was submitted by ADEM to EPA in May 2009. Thus, Criterion 2 has been met.

The general elements required in a SIP are listed in §110(a). These elements include procedures for air quality monitoring and modeling; criteria for establishing stationary source controls, monitoring and reporting; implementation of permitting programs under Part C (Prevention of Significant Deterioration or PSD) and Part D (New Source Review or NSR); and provisions for public involvement. Alabama has a fully approved SIP under the authority of §110. On

September 23, 2009, ADEM submitted a letter to EPA certifying that Alabama's existing SIP meets all Section 110(a)(2) provisions of the Clean Air Act that address the requirements for the 2006 24-hour PM<sub>2.5</sub> NAAQS. This, in addition to the discussion in Section 3.7.2, meets Criterion 4.

### **3.7.2 Part D Plan Requirements for Nonattainment Areas**

#### **3.7.2(a) Nonattainment Areas in General**

Section 172(c) – In June of 2010, ADEM submitted to EPA the “Redesignation Request and Maintenance Demonstration for the Birmingham, Alabama, 2006 24-Hour PM<sub>2.5</sub> Nonattainment Area”. This request demonstrates attainment of the 2006 24-Hour PM<sub>2.5</sub> NAAQS based on implementation of a combination of federal measures including CAIR, other regional controls, mobile source controls and local controls on industrial sources of direct PM<sub>2.5</sub>.

Section 176(c) - The concept of transportation conformity was introduced in the Clean Air Act of 1977, but the requirements became substantially more rigorous in the Amendments of 1990. The CAA and the Safe, Accountable, Flexible, Efficient Transportation Equity Act – A Legacy for Users (SAFETEA-LU) define the framework for effective integration of transportation and air quality planning. Thus, ADEM has met the requirement of Section 172(c).

Transportation conformity is a process by which it is determined that on-road mobile (highway) source emissions evaluated from the Transportation Improvement Program (TIP) and/or Long Range Transportation Plan (LRTP) will not adversely impact air quality in a determined area of nonattainment. Federal funding and approval are given to transportation activities that are consistent with air quality goals.

The State has developed a SIP for the purposes of addressing conformity. This SIP delineates the interagency consultative process between the Metropolitan Planning Organization (MPO), the Environmental Protection Agency (EPA), the Federal Highway Administration (FHWA), the Federal Transit Authority (FTA), State and local transportation and air quality agencies, as well as, the public participation process for stakeholders and citizens in the BMA. The Alabama Conformity SIP under the PM<sub>2.5</sub> NAAQS was approved on March 26, 2009 (74 FR 13170), with an effective date of May 26, 2009.

### **3.8 Conformity Determination**

The transportation and general conformity rules apply to nonattainment areas and maintenance areas operating under maintenance plans. Transportation conformity determinations are required in nonattainment and maintenance areas whenever the State Transportation Improvement Program is revised or a metropolitan planning organization revises their Long Range

Transportation Plan. General conformity determinations are required whenever there is a federal action, other than transportation-related, within a nonattainment or maintenance area that will increase emissions above a de minimis level. In a traditional maintenance plan, emission budgets are established explicitly for transportation conformity by means of motor vehicle emission budgets and implicitly for general conformity where the estimated emissions in the SIP that reflect the federal action being considered becomes the emission budget that must be met. Emissions budgets in limited maintenance plan areas may be treated as non-constraining for the length of the maintenance period because it is unreasonable to expect that such an area will experience so much growth in that period that a violation of the 2006 24-hour PM<sub>2.5</sub> NAAQS would result. For general conformity determinations, this means that emission estimates for federal actions, other than transportation related, would no longer need to be compared to the SIP since the limited maintenance plan would be considered to satisfy the required budget test.

For transportation conformity determinations, it would be unreasonable to expect the area to experience so much growth in vehicle emissions during the limited maintenance plan period that a violation of the 2006 24-hour PM<sub>2.5</sub> NAAQS would occur. As a result, federal actions requiring transportation conformity determinations under the transportation conformity rule are considered to satisfy the budget test without the need for a regional emissions analysis. Therefore, motor vehicle emission budgets are not established in a limited maintenance plan.

Approval of the limited maintenance plan does not relieve transportation partners of the other transportation conformity requirements. Transportation plan revisions and transportation improvement program conformity determinations must satisfy all other applicable requirements of the transportation conformity rule and hot-spot requirements must be satisfied for transportation projects (40 CFR 93.109(e)).

The PM<sub>2.5</sub> maintenance period is through 2034 for the Birmingham 2006 24-hour PM<sub>2.5</sub> maintenance area.

## **4.0 CONCLUSION**

ADEM proposes that the Birmingham 2006 24-hour PM<sub>2.5</sub> maintenance area meets the requirements for a limited maintenance plan. The BMA is currently 60% of the 35 µg/m<sup>3</sup> exceedance level for the 2006 24-hour PM<sub>2.5</sub> standard, with a design value of 21 µg/m<sup>3</sup>. An attainment inventory for 2017-2019 has been provided, as well as contingency measures in the event that the BMA should violate the standard in the future. Finally, ADEM has committed to continue operating PM monitors in the Birmingham maintenance area in accordance with 40 CFR Part 58.

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