

**Summary of Reasons Supporting the Adoption of the Proposed  
Amendments to the Alabama Department of Environmental Management's  
Administrative Code for Division 3 (Air Division)**

Revisions to Chapter 335-3-20 are being proposed to sunset the special gasoline quality requirement in Jefferson and Shelby Counties. Federal standards for the quality of gasoline have largely superseded Alabama's standards.

ADEM regulations in Chapter 335-3-20 and the corresponding federal rules in Alabama's State Implementation Plan (SIP) presently require a Reid Vapor Pressure (RVP) of 7.0 psi for all gasoline sold in Jefferson and Shelby Counties from June 1 through September 15 of each year. This requirement was adopted in 1999, along with low sulfur-in-gasoline requirements, to combat the formation of ground-level ozone in the Birmingham area. The State's low sulfur requirement sunsetted in 2003 after being superseded by the new Federal Tier 2 gasoline sulfur requirements. The federal requirements were more stringent and became effective in 2004. Since then, ADEM has determined that the low sulfur element, rather than the lower RVP, contributed overwhelmingly to the reduction in ozone precursor emissions.

The lower RVP requirement was primarily intended to reduce volatile organic compound (VOC) emissions. At the time of implementation of the requirement, the control of VOC emissions was thought to be an effective strategy for reducing ground-level ozone. As scientific understanding of ozone formation in the Southeast U.S. evolved, it was discovered that nitrogen oxide (NO<sub>x</sub>) emissions played a much larger role in the creation of ground-level ozone than that of VOC emissions. Therefore, ADEM is proposing to rescind the RVP requirement because this special gasoline does very little to improve air quality, and its increased price is an unnecessary burden on consumers.

A detailed index of changes is attached with this summary.

Additional technical analysis supporting this proposed rule change can be found in the technical support document.

## **Demonstration to Provide for the Removal of the 7.0 PSI Reid Vapor Pressure (RVP) Gasoline Requirement in Jefferson and Shelby Counties**

ADEM regulations<sup>1</sup> and the corresponding federal rules in Alabama's State Implementation Plan (SIP) presently require a Reid Vapor Pressure (RVP) of 7.0 psi for all gasoline sold in Jefferson and Shelby Counties from June 1 through September 15 of each year. This requirement was approved by EPA on November 7, 2001 (66 FR 56218). This requirement was adopted, along with low sulfur-in-gasoline requirements, to combat the formation of ground-level ozone in the Birmingham area. The State's low sulfur requirement sunsetted in 2003 after being superseded by new Federal Tier 2 gasoline sulfur requirements beginning in 2004, i.e., the sulfur content requirement for Tier 2 gasoline was tighter than the State's "boutique" gasoline standard. The reductions in ozone precursor emissions from this boutique gasoline overwhelmingly came from the low sulfur element, rather than from the RVP standard.

The lower RVP requirement was primarily intended to reduce volatile organic compound (VOC) emissions. At that time, the control of VOC emissions was thought to be an effective strategy for reducing ground-level ozone. As scientific understanding of ozone formation in the Southeast U.S. evolved, it was discovered that nitrogen oxide (NOx) emissions played a much larger role in the creation of ground-level ozone than that of anthropogenic VOC emissions. This is primarily due to the abundance of biogenic VOC emissions in the region. See Attachment A for discussion of a recent analysis of the relative insensitivity of ground level ozone to reductions in emissions of anthropogenic VOCs in the southeastern U.S.

ADEM is proposing to rescind the RVP requirement for the following reasons:

1. As stated above, the RVP requirement of the boutique fuel does very little toward reducing ozone precursor emissions, and it primarily reduces VOC emissions, which are relatively unimportant in the formation of ozone and fine particles in Birmingham (see Attachment A).
2. The marketing system in the Birmingham area has to keep low RVP and normal RVP supplies segregated in pipelines, in storage and in transport. Refining costs for low RVP fuel are likely greater. These factors lead to an increase in pricing for low RVP gasoline, a burden for consumers in these days of high fuel prices.
3. Significant resources are expended by regulatory agencies and the marketing system to insure compliance with low RVP rules, for negligible air quality benefit.

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<sup>1</sup> ADEM Admin. Code R. 335-3-20-.02(4)

4. The Birmingham area met the 75 ppb 8-hour ozone standard for the 2008-2010 monitoring period. Present trends indicate that the standard will also be met for the 2009-2011 monitoring period. If this ozone standard or a revised ozone standard is violated in the future, ADEM will review all feasible ozone reduction measures at that time. In light of the ineffectiveness of low RVP gasoline as a means to reduce ozone, it is not likely to be considered as a viable ozone reduction strategy.

Upon rescission of Chapter 335-3-20, Control of Fuels, the 7.0 gasoline RVP requirement will be removed from State regulations in its entirety. With the removal of this boutique fuel from State rules, low RVP gasoline will be added to the maintenance plans for the 1997 8-hour ozone and annual fine particle NAAQS and the 2006 daily fine particle NAAQS as a possible contingency measure to be considered if the air quality standards are violated in the future. However, in light of the ineffectiveness of low RVP gasoline as a means to reduce ozone or fine particles, it is not likely to be considered as a viable reduction strategy.

In order to rescind this boutique gasoline requirement, EPA requires ADEM to demonstrate that this SIP revision will not interfere with the attainment or maintenance of the NAAQS or any other applicable requirement of the Clean Air Act (CAA). EPA requires this demonstration under Section 110(l) of the CAA. This demonstration must be made for the 1997 and the 2008 8-hour ozone NAAQS, the 1997 (annual) and 2006 (daily) fine particle NAAQS and the NO<sub>2</sub> NAAQS. In the section to follow, ADEM demonstrates that the rescission of the summertime 7.0 gasoline RVP requirement in the Birmingham area will not interfere with attainment or maintenance of the relevant NAAQS.

### **Technical Demonstration**

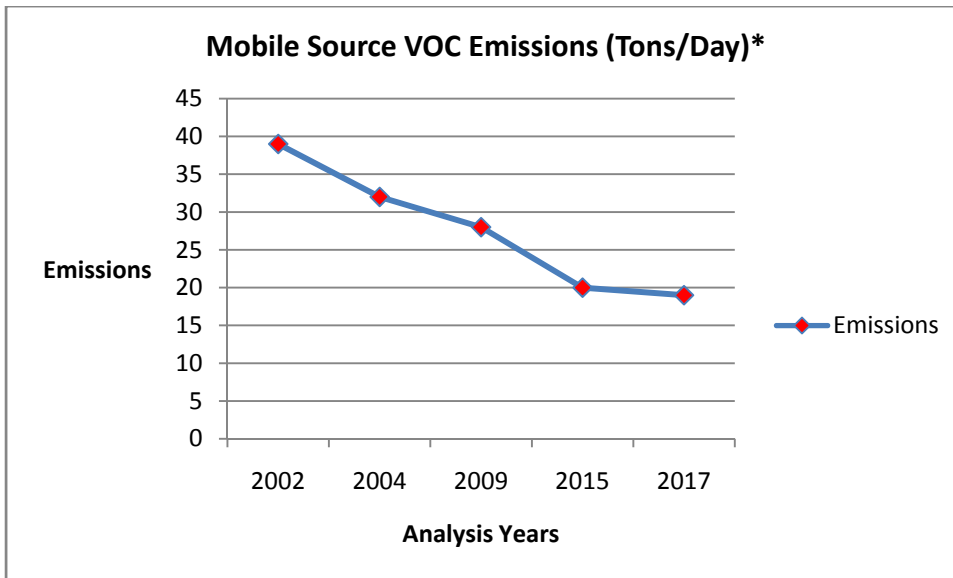
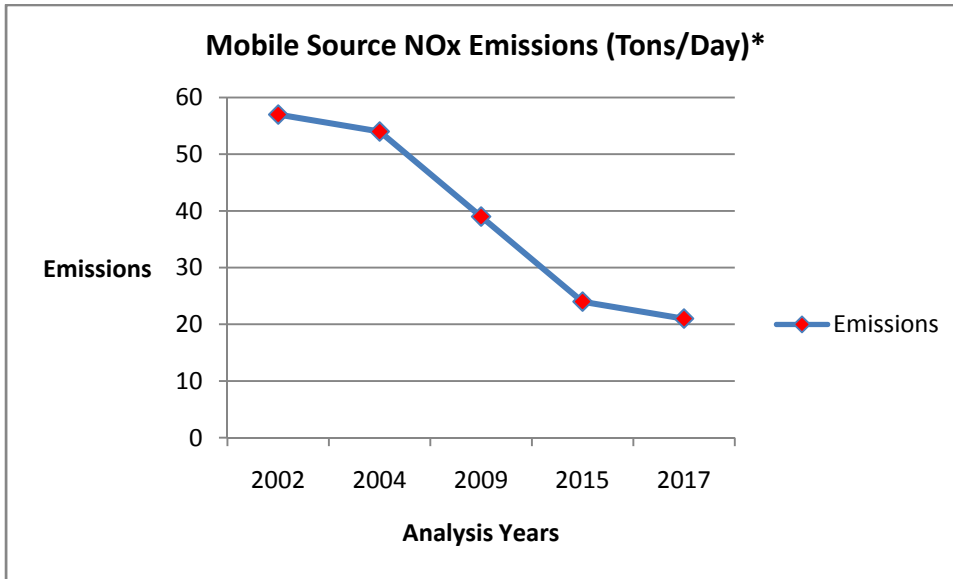
Alabama has already submitted a redesignation request and maintenance plan for 1997 8-hour ozone NAAQS. In an effort to show that the Birmingham area could demonstrate maintenance of the 8-hour ozone standard without taking credit for the use of 7.0 RVP gasoline, higher RVP levels were modeled for this redesignation request. This plan satisfies the non-interference demonstration required by Section 110(l) of the CAA. EPA has already made a technical determination that the Birmingham maintenance area will attain and maintain the 1997 8-hour ozone NAAQS using a higher RVP gasoline than proposed by this SIP revision. The maintenance plan for the 1997 8-hour ozone NAAQS also demonstrates that the use of higher RVP gasoline in the Birmingham area will not interfere with attainment or maintenance of the 2008 8-hour ozone NAAQS.

Below is language from Page 4-4 of the Birmingham 8-hour ozone redesignation package.

*The Reid Vapor Pressure (RVP) for gasoline sold in the area will assume an RVP of 9.0 in all future year inventory projections for the years 2009, 2015 and 2017, in the maintenance demonstration. The SIP requires a lower RVP as a control and it is not*

being removed from the SIP. The maintenance plan is not considering the reductions gained from using the SIP RVP limit in the future year projections because the state is considering a change to the RVP limit to 9.0 psi (the –maximum federal limit for summertime RVP) at a later date. This change could be allowed because the area is able to demonstrate continued maintenance of the 8-hour NAAQS with a RVP of 9.0 psi in the future years.

Below are emissions projections from page 4-7 of the Birmingham 8-hour ozone redesignation package.

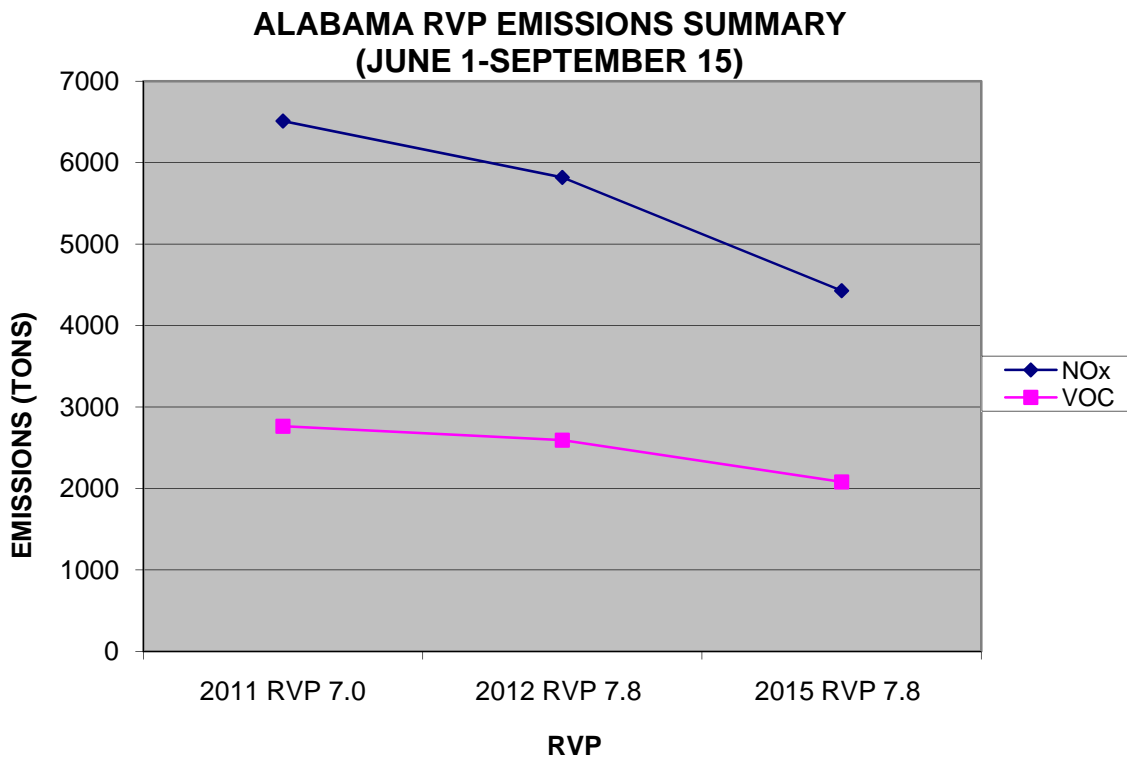


\*Gasoline RVP was modeled at 7.0 psi for CY 2004. For the other three years analyzed in the 2005 8-hour ozone redesignation package, the RVP was assumed to be 9.0 psi.

ADEM utilized the new EPA mobile source model (MOVES) to evaluate the potential effects on emissions of VOC and NO<sub>x</sub> in the Birmingham area (Jefferson and Shelby Counties) resulting from increasing summertime gasoline RVP from 7.0 psi to 7.8 psi and to demonstrate that the mobile source emissions projections in the 1997 8-hour ozone maintenance plan remain accurate. The current 2011 RVP level of 7.0 psi was compared to an increased RVP level of 7.8 psi in the summer of 2012 and 2015. As can be seen in both the table and the graph below, both NO<sub>x</sub> and VOC emissions decreased over the entire period in spite of an increased RVP. This is consistent with the trends in mobile source emissions projections shown in the 1997 8-hour ozone NAAQS maintenance plan.

	<b>2011 7.0 psi RVP (tons)</b>	<b>2012 7.8 psi RVP (tons)</b>	<b>2015 7.8 psi RVP (tons)</b>
<b>NO<sub>x</sub></b>	6511	5819	4429
<b>VOC</b>	2764	2593	2081

Emissions are total emissions from June 1 through September 15



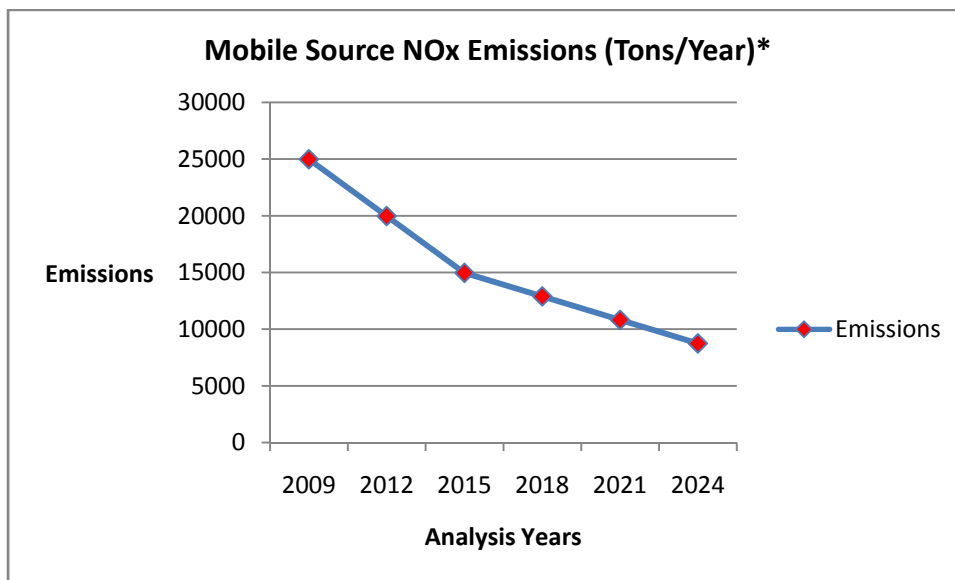
As previously stated, the Birmingham area met the 2008 75 ppb 8-hour ozone standard for the 2008-2010 monitoring period. Present trends indicate that the standard will also be met for the 2009-2011 monitoring period. The maintenance plan for the 1997 8-hour ozone NAAQS, along with the analysis discussed in the previous paragraph, demonstrate that attainment of the 2008 ozone standard can be maintained with the higher RVP

gasoline. Even if this ozone standard or a revised ozone standard is violated in the future, ADEM will review all feasible ozone reduction measures at that time. In light of the ineffectiveness of low RVP gasoline as a means to reduce ozone, it is not likely to be considered as a viable ozone reduction strategy.

Alabama has also submitted to EPA a redesignation request and maintenance plan for the 1997 (annual) fine particle (PM<sub>2.5</sub>) NAAQS. This maintenance plan also demonstrated that attainment of the annual PM<sub>2.5</sub> NAAQS could be maintained with a higher RVP gasoline. Below is language from Page 4-3 of the Birmingham annual PM<sub>2.5</sub> redesignation package. Please note that this plan does not address VOC emissions because VOC is not considered a precursor for fine particle formation in Birmingham.

*For Fuel Formulation, RVP adjustments were made for May-September, with the default RVP being used for all other months. The Reid Vapor Pressure (RVP) for gasoline sold in Jefferson and Shelby Counties will assume an RVP of 7.8 during the summer months of June, July, August and September in all future year inventory projections for the years 2012, 2015, 2018, 2021 and 2024, in the maintenance demonstration. The SIP requires a lower RVP as a control during summer months, and it is not being removed from the SIP at this time. The maintenance plan is not considering the reductions gained from using the SIP RVP limit in the future year projections because the State may consider rescinding the SIP RVP limit at a later date. The maximum federal limit for summertime RVP in specified ozone nonattainment/maintenance areas is 7.8 psi.*

Below are emissions projections from page 4-8 of the Birmingham annual PM<sub>2.5</sub> redesignation package.

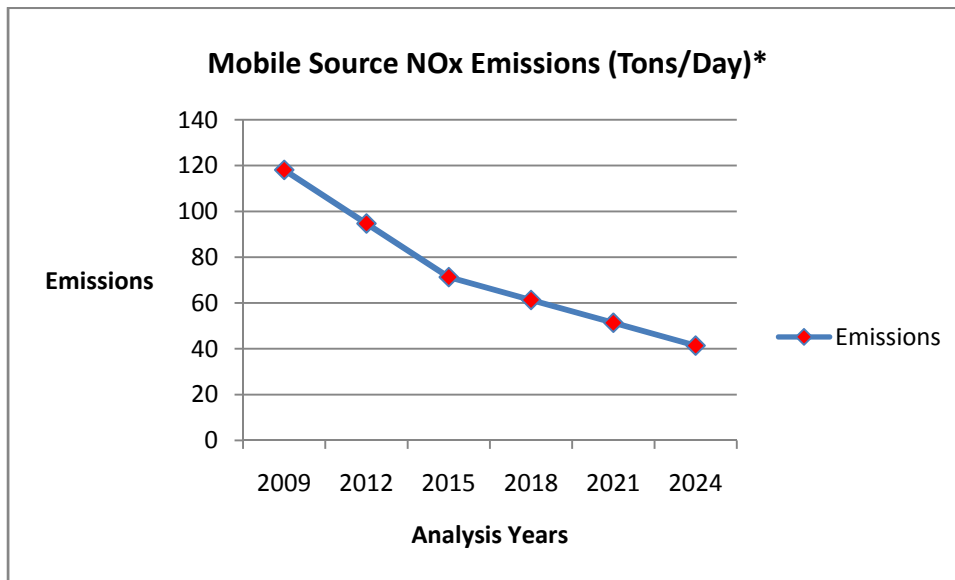


\*Gasoline RVP was modeled at 7.0 psi for CY 2009. For the other five years analyzed in the 2011 Annual PM<sub>2.5</sub> redesignation package, the RVP was assumed to be 7.8 psi.

Alabama has also submitted to EPA a redesignation request and maintenance plan for the 2006 (daily) PM<sub>2.5</sub> NAAQS. This maintenance plan demonstrated that attainment of the daily PM<sub>2.5</sub> NAAQS could be maintained with a higher RVP gasoline. Below is a quote from Page 4-3 of the Birmingham 24-hour PM<sub>2.5</sub> redesignation package. Please note that this plan does not address VOC emissions because VOC is not considered a precursor for fine particle formation in Birmingham.

*For Fuel Formulation, RVP adjustments were made for May-September, with the default RVP being used for all other months. The Reid Vapor Pressure (RVP) for gasoline sold in Jefferson and Shelby Counties will assume an RVP of 7.8 during summer months in all future year inventory projections for the years 2012, 2015, 2018, 2021 and 2024, in the maintenance demonstration. The SIP requires a lower RVP as a control during summer months, and it is not being removed from the SIP at this time. The maintenance plan is not considering the reductions gained from using the SIP RVP limit in the future year projections because the state is considering rescinding the SIP RVP limit at a later date. The maximum federal limit for summertime RVP in specified ozone nonattainment/maintenance areas is 7.8 psi.*

In the narrative for the 24-hour PM<sub>2.5</sub> redesignation request, it was stated that a 7.8 psi RVP was assumed for all years after 2009. This was an oversight, as the RVP was actually modeled at 9.0 psi, which is reflected in the chart below.



\*Gasoline RVP was modeled at 7.0 psi for CY 2009. For the other five years analyzed in the 2010 24-hour PM<sub>2.5</sub> redesignation package, the RVP was assumed to be 9.0 psi.

## **Additional Mobile Source MOVES Analysis**

An analysis examining an increased RVP from 7.0 psi to 7.8 psi in 2012 indicated that summertime emissions of NOx and VOC would be expected to increase by about 25 tons and 60 tons, respectively, in 2012 solely due to the RVP increase. The results of this modeling are shown in the table below. Supporting modeling files are available upon request.

	<b>2012 7.0 psi RVP (tons)</b>	<b>2012 7.8 psi RVP (tons)</b>	<b>Increase Due only to RVP Change (tons)</b>
<b>NOx</b>	5794	5819	25
<b>VOC</b>	2533	2593	60

Emissions are total emissions from June 1 through September 15

Looking solely at mobile source emissions in 2012, going from 7.0 to 7.8 psi RVP, the MOVES model predicts increases of NOx and VOC by 25 and 60 tons, respectively, from June 1 to September 15. This represents 25/5794 or 0.4% of the mobile source NOx emissions for this time period and 60/2533 or 2% of the VOC emissions. Looking at total anthropogenic emissions during the June 1 through September 15 period, the increase is 25/20,000 or approximately 0.1% of NOx emissions and 60/13,000 or approximately 0.5% of VOC emissions. By contrast, each and every year, mobile source emissions are declining due to fleet turnover. The MOVES model estimates that the reductions from 2011 to 2012, just during the June 1 to September 15 time period, are 667 and 110 tons of NOx and VOC, respectively.

New Source Review (NSR) rules classify an increase in NOx emissions of less than 40 tons per year from existing major stationary sources as insignificant. Further, this increase could occur at an unlimited number of individual facilities in the area. The emissions from these individual sources would be more concentrated and have a higher ambient impact than the slight estimated increase in NOx emissions in 2012 created by the removal of our RVP rule. Again, the estimated increase in NOx emissions in 2012 due to the removal of the RVP rule is 25 tons/year. These NOx emissions would be spread out over the entire nonattainment area, which would significantly lessen their concentration and the ambient impact.

As previously stated, as scientific understanding of ozone formation in the Southeast U.S. evolved, it was discovered that nitrogen oxide (NOx) emissions played a much larger role in the creation of ground-level ozone than that of anthropogenic VOC emissions. This is primarily due to the abundance of biogenic VOC emissions in the region. See Attachment A for discussion of a recent analysis of the relative insensitivity of ground level ozone to reductions in emissions of anthropogenic VOCs in the southeastern U.S. The estimated increase in VOC emissions of 60 tons in 2012 due to the removal of the RVP rule is not expected to have a significant impact on ozone concentrations. Also, VOCs are not considered to be a precursor to PM<sub>2.5</sub> formation in the Birmingham area.

It is our conclusion that the 7.0 psi gasoline RVP requirement has minimal impact on lowering ozone and fine particle concentrations in the Birmingham area. Because of this, no credit was taken for the 7.0 psi RVP requirement in the maintenance plans submitted by the State for the Birmingham 1997 8-hour ozone redesignation request, the Birmingham 24-hour PM<sub>2.5</sub> redesignation request, or the Birmingham annual PM<sub>2.5</sub> redesignation request. Thus, the State has already demonstrated that attainment and maintenance of the 1997 8-hour ozone NAAQS, the daily PM<sub>2.5</sub> NAAQS and the annual PM<sub>2.5</sub> NAAQS will not be significantly affected by rescission of the 7.0 psi gasoline RVP requirement in Jefferson and Shelby Counties. Revised modeling with the MOVES model demonstrates that the mobile source emissions projections in the maintenance plan for the 1997 8-hour ozone NAAQS remain valid and also serves to demonstrate that attainment of the 2008 8-hour ozone NAAQS can be maintained with the higher RVP gasoline. Finally, the increase in NO<sub>x</sub> emissions projected to occur in 2012 is expected to have an insignificant impact on NO<sub>2</sub> concentrations in the area.

# Attachment A

## NO<sub>x</sub>/VOC Ozone Sensitivity Analysis

Over the last 20 years, scientific understanding of ozone formation in the Southeastern US has continued to evolve through analyses and modeling performed in support of State Implementation Plan development. One of the findings that has evolved from these efforts is the relative insensitivity of ground level ozone to reductions in anthropogenic VOC emissions in the southeastern US. This is due in large part to the abundance of VOC emissions from natural sources (forests, etc.). As part of the ASIP and SEMAP projects, Georgia Tech performed modeling sensitivity analyses to examine the impact of NO<sub>x</sub> and VOC emissions reductions on 8-hour ozone concentrations. The modeling was performed using a June 1-July 10, 2002, summer episode with a 12 km modeling domain and 2009 on the way (OTW) Base D Emissions.

In this analysis, point source NO<sub>x</sub> emissions in Alabama and surface NO<sub>x</sub> emissions in Jefferson and Shelby counties were reduced by 30%. This resulted in about a 4 ppb reduction in 8-hour ozone concentrations in Birmingham (see graph). When VISTAS region anthropogenic VOCs were collectively reduced by 30%, this resulted in a slight increase (dis-benefit) in ozone in Birmingham (see graph).

This analysis shows that NO<sub>x</sub> controls are effective in reducing ozone concentrations in Birmingham while VOC controls, even over a broad region, are ineffective in reducing ozone concentrations in Birmingham.

