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Memorandum

Date: 9/6/07

To: Baltimore Regional Transportation Board Interagency Consultation Group

From: MDE/ARMA Planning Program

Subject: PM_{2.5} Precursor Significance Determination for the Baltimore, MD Nonattainment Area

DRAFT

PM_{2.5} Precursor Significance Determination for the Baltimore, MD Nonattainment Area

A. Background on PM Pollutants/Precursors for SIP Planning

EPA's PM_{2.5} implementation rule requires that state air agencies make a determination of the significance of PM_{2.5} pollutants/precursors for SIP planning purposes, including requirements for motor vehicle emission budgets for use in conformity. The known PM pollutants include PM_{2.5} direct as well as the precursors NO_x, SO₂, VOC, and ammonia (NH₃) (see Table 1). PM_{2.5} direct and the precursors NO_x and SO₂ are deemed significant under the EPA guidance. PM₁₀ is required for the base year emission inventory, but does not need to be included in the SIP control strategy. Several precursors are presumed to be insignificant and do not need to be included in the SIP control strategy unless the state or EPA makes a finding of significance. The table below summarizes the federal requirements for each precursor.



Table 1. EPA SIP Requirements for PM Pollutants

	PM _{2.5} Direct	NO _x	SO ₂	VOC	NH ₃	PM ₁₀
Base Year Emission Inventory	√	√	√	√	√	√
SIP Controls	√	√	√	-	-	Not required
Conformity Motor Vehicle Emission Budgets	√	√	-	-	-	Not required

Notes:

"-" = Presumed insignificant as a PM_{2.5} precursor unless State or EPA makes a finding of significance.

B. Summary of Significance Determinations for PM Pollutants

Through consideration of available information (with EPA and surrounding nonattainment states such as Virginia and Washington DC), the MDE has completed significance determinations for each of the PM precursors. The determination was conducted using a two-step process.

Step 1 involved determining whether PM pollutants/precursors are considered significant for SIP planning purposes. Step 2 involved determining whether PM pollutants/precursors identified as significant in Step 1 require Motor Vehicle Emission Budgets (MVEBs) for conformity. The table below summarizes the determination. Sections 3 and 4 provide further information supporting the determinations.

Table 2. Summary of Significance Determinations for SIP Controls and Motor Vehicle Emission Budgets

	PM Direct	NO _x	SO ₂	VOC	NH ₃
Step 1: Determine Significance for SIP Controls	√	√	√	No	No
Step 2: Determine Significance for Establishing Motor Vehicle Emission Budgets for Conformity	√	√	No	No	No

EPA notes that any significance or insignificance finding made prior to EPA's adequacy finding for budgets in a SIP, or EPA's approval of the SIP, should not be viewed as the ultimate determination of the significance of precursor emissions in a given area. State and local agencies may reconsider significance findings based on information and analyses conducted as part of the SIP development process.



C. Step 1: Determine Significance for SIP Controls

The only precursors for which significance determinations are needed for SIP control purposes are VOC and ammonia. EPA requires that PM_{2.5} direct, NO_x, and SO₂ controls be evaluated and included in the SIP. EPA guidance allows states to presume that VOC and ammonia are insignificant unless modeling or other analysis indicates that the precursor should be considered significant. A summary of the rationale for the insignificance determinations for VOC and ammonia is in Table 3 below.

Table 3. Summary of Rationale for Insignificance Determinations for VOC and NH₃ for SIP Controls

Criteria	Pollutant	
	VOC	NH ₃
Are emission controls needed for attainment or maintenance?	No	No
Is there evidence to counter EPA's presumption that the precursor be considered insignificant?	No	No
Will reducing emissions of the precursor have a significant impact on PM _{2.5} concentrations?*	No, based on VISTAS modeling	No, based on VISTAS modeling
Are technology options available to control emissions?	Yes	Varies by source
Is the precursor considered significant for SIP Planning purposes?	No	No

National research is underway to assess the contribution of VOCs to secondary organic aerosol formation. States are following the research and will reconsider the significance determination for VOCs when further technical information becomes available.

* VISTAS VOC and NH₃ point source screening model results show little reduction in visibility impairment when controlling these precursor emissions.



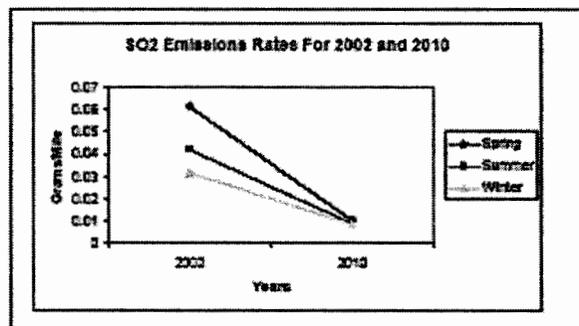
D. Step 2: Determine Significance for Establishing Motor Vehicle Emission Budgets for Conformity

Based on EPA's transportation conformity regulation, a state air agency and/or EPA finding of significance or insignificance (a "significance finding") for a PM_{2.5} precursor will be based on criteria similar to the general criteria for insignificance of motor vehicle emissions in § 93.109(k) of the conformity rule. Specifically, the following criteria should be considered in making significance or insignificance findings for PM_{2.5} precursors:

- The contribution of on-road emissions of the precursor to the total 2002 baseline SIP inventory for that precursor;
- the current state of air quality for the area (handled under Step 1);
- the results of speciation monitoring for the area (handled under Step 1);
- the likelihood that future motor vehicle control measures will be implemented for a given precursor; and
- projections of future on-road emissions of the precursor.

The precursor that EPA guidance indicates may be significant for mobile source purposes, and which the states believe is insignificant, is SO₂. EPA requires that PM direct and NO_x motor vehicle emission budgets be included in the SIP. Under Step 1, states determined that VOC and ammonia are not significant precursors for SIP planning purposes; therefore motor vehicle emission budgets are not required for these precursors.

SO₂ is a significant precursor for SIP planning purposes, but a motor vehicle emission budget for SO₂ is not required for the following reasons. First, based on 2002 base year and 2009 projected year inventories modeled by VISTAS/MANE-VU, SO₂ emissions from on-road sources represent less than 2 percent of the total overall SO₂ emission inventory for the region and are not a significant source of total overall SO₂ precursor emissions in the region. Second, federal requirements for sale of low-sulfur fuel are expected to substantially reduce SO₂ emissions from on-road sources by 2009.¹ As shown by the chart below, preliminary estimates using EPA's MOBILE6.2 model indicate that SO₂ emission rates are expected to decline by 75 to 80 percent between 2002 and 2009. A summary of the rationale for the significance determinations for SO₂, VOC, and ammonia is listed below.



¹ According to EPA, gasoline sulfur levels have declined by 90 percent since the base year and diesel sulfur levels by 97 percent (EPA Press Release February 28, 2001).



Table 4. Summary of Rationale for Insignificance Determinations for SO₂, Ammonia, and VOC for Motor Vehicle Emission Budget Purposes

Criteria	Pollutant		
	SO ₂	VOC	NH ₃
Step 1			
Are controls required for SIP Planning Purposes?	Yes	No	No
	↓	↓	↓
Outcome	Proceed to Step 2	Not Significant for SIP Planning or Conformity	



	Pollutant
Step 2	SO ₂
Are on-road emissions of the precursor a significant source of total PM _{2.5} precursor emissions?	No*
Are there existing ozone season motor vehicle emission budgets for the precursor?	No
Are there potential disbenefits of controlling on-road sources?	No
Are there controls in-place that will substantially mitigate future on-road emissions of the precursor?	Yes**
Is the precursor considered significant for establishing a motor vehicle emission budget?	No

* SO₂ emissions from on-road sources represent <2 percent of the overall total SO₂ inventory for the region.

** Requirements for sale of low-sulfur fuel is expected to substantially reduce SO₂ emissions from on-road sources by 2009.



