

**Proposed Revision to  
Delaware's 2008 State Implementation Plan  
For Attainment of the PM<sub>2.5</sub> Annual  
National Ambient Air Quality Standard - Attainment  
Demonstration**



**October 2011**

## Section 1. Introduction

In April, 2008 Delaware submitted to the EPA its “*State Implementation Plan for Attainment of the PM<sub>2.5</sub> Annual National Ambient Air Quality Standard - Attainment Demonstration*” (the “2008 PM<sub>2.5</sub> SIP”).<sup>1</sup> The 2008 PM<sub>2.5</sub> SIP set out to accomplish four primary goals:

- Demonstrate that with all existing and proposed controls, all of Delaware’s PM<sub>2.5</sub> monitors will show attainment in 2009.
- Demonstrate that the entire Philadelphia-Wilmington, PA-NJ-DE non-attainment area will attain the annual PM<sub>2.5</sub> NAAQS in 2009.
- Establish Delaware’s 2009 mobile source budgets for transportation conformity determinations under Regulation No. 1132, Transportation Conformity.
- Treat emission reduction credits (ERCs) banked under 7 DE Admin. Code 1134, Emissions Banking and Trading Program, as “emitted.” As such, the future use of these credits is consistent with, and will not interfere with any calculation or provision of this SIP.

This SIP revision is related to the PM<sub>2.5</sub> and NO<sub>x</sub> on-road mobile source budgets that were established in the 2008 PM<sub>2.5</sub> SIP. Those SIP budgets were established using EPA’s MOBILE6.2 model.<sup>2</sup> However, effective March 2012<sup>3</sup> a new on-road mobile emissions model – Motor Vehicle Emissions Simulator (MOVES) – is required to be used in all planning and transportation conformity determinations.

The purpose of this SIP revision is to 1) replace the on-road mobile emissions budget in the 2008 PM<sub>2.5</sub> SIP with a budget that is based on the MOVES model, 2) demonstrate that the MOVES based mobile source budget is consistent with attainment of the PM<sub>2.5</sub> NAAQS by 2010, and 3) demonstrate that the contingency requirements of the Clean Air Act (CAA) are met. No other changes or revisions to the 2008 PM<sub>2.5</sub> SIP are proposed.

Note that this SIP revision impacts only PM<sub>2.5</sub> and NO<sub>x</sub> emissions and calculations. While sulfur dioxide (SO<sub>2</sub>) is a pollutant of concern relative to PM<sub>2.5</sub> it is not a pollutant of concern for mobile budgets, and therefore no SO<sub>2</sub> changes are proposed as part of this SIP revision. The treatment of SO<sub>2</sub> emissions in the 2008 PM<sub>2.5</sub> SIP is unchanged.

Questions or comments regarding this SIP revision should be addressed to Phil Wheeler, M.S. Project Leader for Transportation Conformity, Planning Branch, Division of Air Quality, Delaware Department of Natural Resources and Environmental Control, at [philip.wheeler@state.de.us](mailto:philip.wheeler@state.de.us).

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<sup>1</sup> [http://www.awm.delaware.gov/Info/Regs/Documents/DE\\_PM25\\_SIP\\_AD\\_fnl.pdf](http://www.awm.delaware.gov/Info/Regs/Documents/DE_PM25_SIP_AD_fnl.pdf)

<sup>2</sup> Details of the MOBILE6 budget calculations are included in Section 8.2 of the 2008 PM<sub>2.5</sub> SIP.

<sup>3</sup> EPA has proposed to extend this date by one year; to March 2013.

## Section 2. Revised On-Road Mobile Source Budgets

This SIP revision establishes on-road mobile emissions budget for New Castle County for PM<sub>2.5</sub> and NO<sub>x</sub>. When approved by the EPA, all subsequent PM<sub>2.5</sub> conformity analyses will test future on-road mobile emissions calculated for transportation plans in New Castle County with this new budget.

- 2.1 EPA's MOVES model was used to quantify PM<sub>2.5</sub> and NO<sub>x</sub> emission from on-road mobile sources. These emissions are shown in Table 2-1 below. The associated 2012 MOVES input and output files are included in Appendix A of this SIP revision.

Table 2-1 On-Road Mobile Emission Budget (Tons per Year (tpy))

County	Emissions Budget	
	NO <sub>x</sub>	PM <sub>2.5</sub>
New Castle	6,273	199

- 2.2 This SIP revision establishes the emission levels identified in Table 2-1 as the on-road mobile emissions budget for New Castle County for PM<sub>2.5</sub> and NO<sub>x</sub>.

## Section 3. Demonstration that 2009 MOVES based On-Road Mobile Source Emissions are Consistent with Attainment of the PM<sub>2.5</sub> NAAQS by 2010

Delaware demonstrated attainment of the annual PM<sub>2.5</sub> NAAQS in its 2008 PM<sub>2.5</sub> SIP by showing that Projected 2009 Emissions (i.e., the 2009 emission levels after the implementation of all state and federal control requirements) were less than the Attainment Targets (i.e., the emission levels needed for attainment based on modeling). This same methodology is used below to demonstrate that the MOVES based mobile budgets presented in Section 2 above are consistent with attainment of the PM<sub>2.5</sub> NAAQS.

- 3.1 Community Multi-scale Air Quality Model (CMAQ) modeling was conducted in the 2008 PM<sub>2.5</sub> SIP to demonstrate that Delaware and the entire Philadelphia based non-attainment area would attain the PM<sub>2.5</sub> NAAQS in 2010<sup>4</sup>. CMAQ modeling demonstrated that the Delaware emission levels shown in Table 3-1 are the levels that are necessary for, and consistent with attainment of the annual PM<sub>2.5</sub> NAAQS. These emission levels reflect the level of emissions needed for attainment, and are therefore referred to as the "2009 Attainment Target."<sup>5,6</sup>

<sup>4</sup> A detailed discussion of the CMAQ modeling and modeling results can be found in Section 6 of the 2008 PM<sub>2.5</sub> SIP.

<sup>5</sup> Although New Castle County is the only nonattainment county, emission levels of all three counties are used in the attainment demonstration. This is discussed in Sections 3 and 4 of this SIP revision.

<sup>6</sup> A detailed discussion of the emission inventories associated with the Attainment Target can be found in Section 5 of the 2008 PM<sub>2.5</sub> SIP.

Table 3-1 2009 Attainment Target (tpy)

County	NOx	PM <sub>2.5</sub>
Kent	8,554	1,185
<b>New Castle</b>	<b>23,048</b>	<b>3,249</b>
Sussex	18,001	3,581
Statewide Total	49,603	8,015

- 3.2 Attainment year (i.e., 2009) emission levels were projected in the 2008 PM<sub>2.5</sub> SIP based on final and enforceable State and Federal emission control requirements.<sup>7</sup> These projected 2009 emission levels, which are referred to as the “*Delaware Projected 2009 Emissions*,” are shown in Table 3-2.

Table 3-2 Delaware Projected 2009 Emissions (tpy)

County	NOx	PM <sub>2.5</sub>
Kent	7,799	989
<b>New Castle</b>	<b>21,807</b>	<b>3,015</b>
Sussex	11,591	2,571
Statewide Total	41,197	6,575

- 3.4 Table 3-3 compares the 2009 mobile emissions calculated using MOBILE6 and MOVES. The associated 2009 MOBILE6 and MOVES input and output files are included in Appendix B of this SIP revision.

Table 3-3 2009 MOBILE6, MOVES and *Increase* due to MOVES (tpy)

County	2009 Mobile6		2009 MOVES		MOVES <i>Increase</i>	
	NOx	PM <sub>2.5</sub>	NOx	PM <sub>2.5</sub>	NOx	PM <sub>2.5</sub>
Kent	1,922	32	3,488	109	1,566	77
<b>New Castle</b>	<b>4,904</b>	<b>87</b>	<b>8,448</b>	<b>257</b>	<b>3,544</b>	<b>170</b>
Sussex	2,707	41	4,764	147	2,057	106
Totals	9,533	160	16,700	513	7,167	353

- 3.5 Adding the “MOVES *Increase*” emissions from Table 3-3 to the “*Delaware Projected 2009 Emissions*” from Table 3-2 yields a projected Delaware 2009 Emission level that reflects the use of the MOVES model instead of the MOBILE6 model. This revised emissions projection is shown in Table 3-4, and is referred to as the “*Revised Delaware Projected 2009 Emissions*.”

<sup>7</sup> A detailed discussion of Delaware’s projected 2009 emission levels can be found in Section 4 of the 2008 PM<sub>2.5</sub> SIP.

Table 3-4 Revised Delaware Projected 2009 Emissions (tpy)

County	NOx	PM <sub>2.5</sub>
Kent	9,365	1,066
<b>New Castle</b>	<b>25,351</b>	<b>3,185</b>
Sussex	13,648	2,677
Statewide Total	48,364	6,928

3.5 The “Revised Delaware Projected 2009 Emissions” (i.e., Table 3-4) are demonstrated to be consistent with attainment if they are equal to or lower than the “2009 Attainment Target” (i.e., Table 3-1). The “Revised Delaware Projected 2009 emissions” are compared to the “Attainment Target” in Table 3-5 below.

Table 3-5 Shortfall and Surplus by County and Statewide (tpy)

County	Attainment Target		Revised Delaware Projected 2009 Emissions		Surplus/Shortfall	
	NOx	PM <sub>2.5</sub>	NOx	PM <sub>2.5</sub>	NOx	PM <sub>2.5</sub>
Kent	8,554	1,185	9,365	1,066	-811	119
<b>New Castle</b>	<b>23,048</b>	<b>3,249</b>	<b>25,351</b>	<b>3,185</b>	<b>-2,303</b>	<b>64</b>
Sussex	18,001	3,581	13,648	2,677	4,353	904
<b>Statewide</b>	<b>49,603</b>	<b>8,015</b>	<b>48,364</b>	<b>6,928</b>	<b>1,239</b>	<b>1,087</b>

This comparison shows that there is a 64 tpy PM<sub>2.5</sub> surplus in New Castle County, and a 2,303 tpy NOx shortfall for New Castle County. This demonstrates that, relative to direct PM<sub>2.5</sub>, the MOVES based mobile budgets are consistent with attainment. These results also indicate that NOx requires further analysis.

3.6 Because of the regional nature of secondarily-formed sulfate and nitrate, and the broad modeling domain of the CMAQ modeling, which included all of Delaware, emission reductions from Kent and Sussex counties will contribute to attainment within New Castle County and the Philadelphia based non-attainment area. Kent and Sussex counties are within the State of Delaware, contiguous to New Castle County, and are less than 200 kilometers away. EPA’s PM<sub>2.5</sub> Implementation Rule specifically provides for the consideration of in-state NO<sub>x</sub> and SO<sub>2</sub> reductions in their SIPs from sources up to 200 kilometers away from the non-attainment area boundaries.<sup>8</sup>

Consistent with this EPA rule, emissions from Kent and Sussex Counties were analyzed. Using the same methodology as above, statewide emissions are calculated and presented in Table 3-5. These results indicate that while there is a 2009 NOx shortfall of 2,303 tpy in New Castle County, there is a statewide NOx surplus of 1,239 tpy. The analysis

<sup>8</sup> PM<sub>2.5</sub> Implementation Rule, April 25, 2007 (72 FR 20586 at 20636)

demonstrates that the 2009 MOVES based emission shown in Table 3-3 do not impair Delaware’s ability to meet its SIP emissions targets or meeting EPA’s National Ambient Air Quality Standards for particulate matter.<sup>9</sup>

#### **Section 4. Demonstration that the Contingency Measure Requirements of the CAA are Met**

Contingency measures are additional control measures to be implemented in the event that an area fails to either meet “reasonable further progress” or attain the standards by its attainment date. The quantity of emission reductions needed to satisfy contingency requirements is an amount equal to one year’s worth of required reductions.

Delaware demonstrated that the contingency requirements of the CAA were met in Section 9 of its 2008 PM<sub>2.5</sub> SIP by showing that the Delaware control measures have reduced NO<sub>x</sub> and primary PM<sub>2.5</sub> by more than is necessary to attain compliance with the PM<sub>2.5</sub> NAAQS. This same methodology is used below to demonstrate that the “*Revised Delaware Projected 2009 Emissions*” in Table 3-4 are low enough to satisfy contingency requirements.

4.1 Quantification of the contingency requirement is discussed in detail in Section 9.1 of the 2008 PM<sub>2.5</sub> SIP. The contingency requirement for NO<sub>x</sub> and PM<sub>2.5</sub> is presented in Table 9-3 of the 2008 PM<sub>2.5</sub> SIP, and shown below in Table 4-1.

Table 4-1 Contingency Requirement (tpy)

County	NO <sub>x</sub>	PM <sub>2.5</sub>
New Castle	1,100	26

4.2 Demonstration that contingency requirement is met is shown if the “*Revised Delaware Projected 2009 Emissions*” shown in Table 3-4 are lower than the “*Attainment Target*” shown in Table 3-1 by at least the amount of the amount of the contingency requirement shown in Table 4-1. Table 3-5 shows this calculation.

Table 3-5 shows that a 64 tpy reduction of PM<sub>2.5</sub> emissions are above and beyond that necessary for attainment. Since 64 tpy is greater than the contingency requirement of 26 tpy PM<sub>2.5</sub>, the contingency requirement is demonstrated relative to the pollutant primary PM<sub>2.5</sub>. Table 3-5 also indicates that NO<sub>x</sub> requires further analysis.

4.3 Because of the regional nature of secondarily-formed sulfate and nitrate, and the broad modeling domain of the CMAQ modeling, which included all of Delaware, emission reductions from Kent and Sussex counties will contribute to attainment within New Castle County and the Philadelphia based non-attainment area. Kent and Sussex counties are within the State of Delaware, contiguous to New Castle County, and are less than 200 kilometers away. EPA’s PM<sub>2.5</sub> Implementation Rule specifically provides for the

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<sup>9</sup> Note that this is similar to the approach used in the 2008 PM<sub>2.5</sub> SIP to address SO<sub>2</sub> emissions. See Section 5 (page 65) of the 2008 PM<sub>2.5</sub> SIP.

consideration of in-state NO<sub>x</sub> and SO<sub>2</sub> reductions in their SIPs from sources up to 200 kilometers away from the non-attainment area boundaries.

Consistent with this EPA rule, emissions from Kent and Sussex Counties were analyzed. Using the same methodology as above, statewide emissions are calculated and presented in Table 3-5. This indicates that while there is a 2009 NO<sub>x</sub> shortfall of 2,303 tpy in New Castle County, there is a statewide NO<sub>x</sub> surplus of 1,239 tpy. Since 1,239 tpy is greater than the contingency requirement of 1,100 tpy NO<sub>x</sub>, the contingency requirement is demonstrated as met relative to the pollutant NO<sub>x</sub>.

## **Section 5. Summary**

The analysis in Section 3 and Section 4 above demonstrates that 2009 MOVES based emission levels in table 3-3 are consistent with attainment and the contingency requirements of the CAA. This SIP revision is anticipated to be approved by the EPA in 2012. Because the 2012 based mobile budgets established in Section 2 of this SIP revision are less than the 2009 MOVES based emission levels shown in Table 3-3, Section 3 and Section 4 above also demonstrate that mobile budgets established in Section 2 are consistent with attainment and contingency requirements of the CAA.

Appendix A. 2012 MOVES input and output files

Appendix B. 2009 MOVES and 2009 MOBILE6 Input and Output Files