

**Final Draft**

**MEASURES TO MEET THE EPA-IDENTIFIED  
SHORTFALLS IN THE DELAWARE PHASE II  
ATTAINMENT DEMONSTRATION FOR THE  
PHILADELPHIA-WILMINGTON-TRENTON  
OZONE NON-ATTAINMENT AREA**

**Prepared For:**  
**The U.S. Environmental Protection Agency**  
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**Delaware Department of Natural Resources & Environmental Control**  
**Division of Air and Waste Management**

*Air Quality Management Section*





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## **A. List of Attachments to SIP Submission**

1. **Attachment 1** -- Marine Engine and Locomotive Engine Standards: Emission Reduction Calculations for Sussex County
2. **Attachment 2** -- On-Road Heavy Duty Diesel Standards: Emission Reduction Break-Out and MOBILE 5b Outputs for Kent, New Castle, and Sussex Counties
3. **Attachment 3** -- Ozone Transport Commission Document: *OTC States' Approach to Achieving Emission Reductions in the Ozone Transport Region from Implementing Model Rules, Ozone Transport Commission*
4. **Attachment 4** -- E. H. Pechan Document: *Control Measure Development Support Analysis of Ozone Transport Commission Model Rules*

## I. Preface

This revision to Delaware's State Implementation Plan (SIP) is based on work that was performed regionally to identify emission control strategies and develop model regulations that will close shortfalls in the attainment demonstrations for several ozone non-attainment areas in the Northeast. The Ozone Transport Commission (OTC) coordinated the regional work. Several Delaware employees participated in the regional work. In addition, the OTC hired a contractor, E.H. Pechan, to analyze the benefits of the model rules. This approach guaranteed that the methods used to calculate emission reductions from the model rules were consistent in all parts of the Ozone Transport Region.

Information specific to the areas within and surrounding the Philadelphia-Wilmington-Trenton ozone non-attainment area, including Delaware, are contained herein. Details of the OTC regional work, and the resulting regional data, are contained in 2 documents attached to the SIP submission for reference. These documents are:

- *OTC States' Approach to Achieving Additional Emission Reductions in the Ozone Transport Region from Implementing Model Rules*, the Ozone Transport Commission, May 18, 2001.
- *Control Measure Development Support Analysis of Ozone Transport Commission Model Rules*, E.H. Pechan, March 31, 2001.

These documents are available on the OTC web site at <http://www.sso.org/otc/> under "Publications".

### 1.1 Organizational and Staff Responsibilities

This SIP revision was developed by the Delaware Department of Natural Resources and Environmental Control (DNREC), Division of Air and Waste Management, Air Quality Management Section under the direction of the following officials and managers:

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## II. Introduction

Delaware has two counties, Kent and New Castle, that are part of the Philadelphia-Wilmington-Trenton non-attainment area with respect to the 1 hour ozone national ambient air quality standard. The Philadelphia-Wilmington-Trenton ozone non-attainment area also contains parts of Maryland, Pennsylvania and New Jersey, and has a total of 14 counties (see Figure 1).

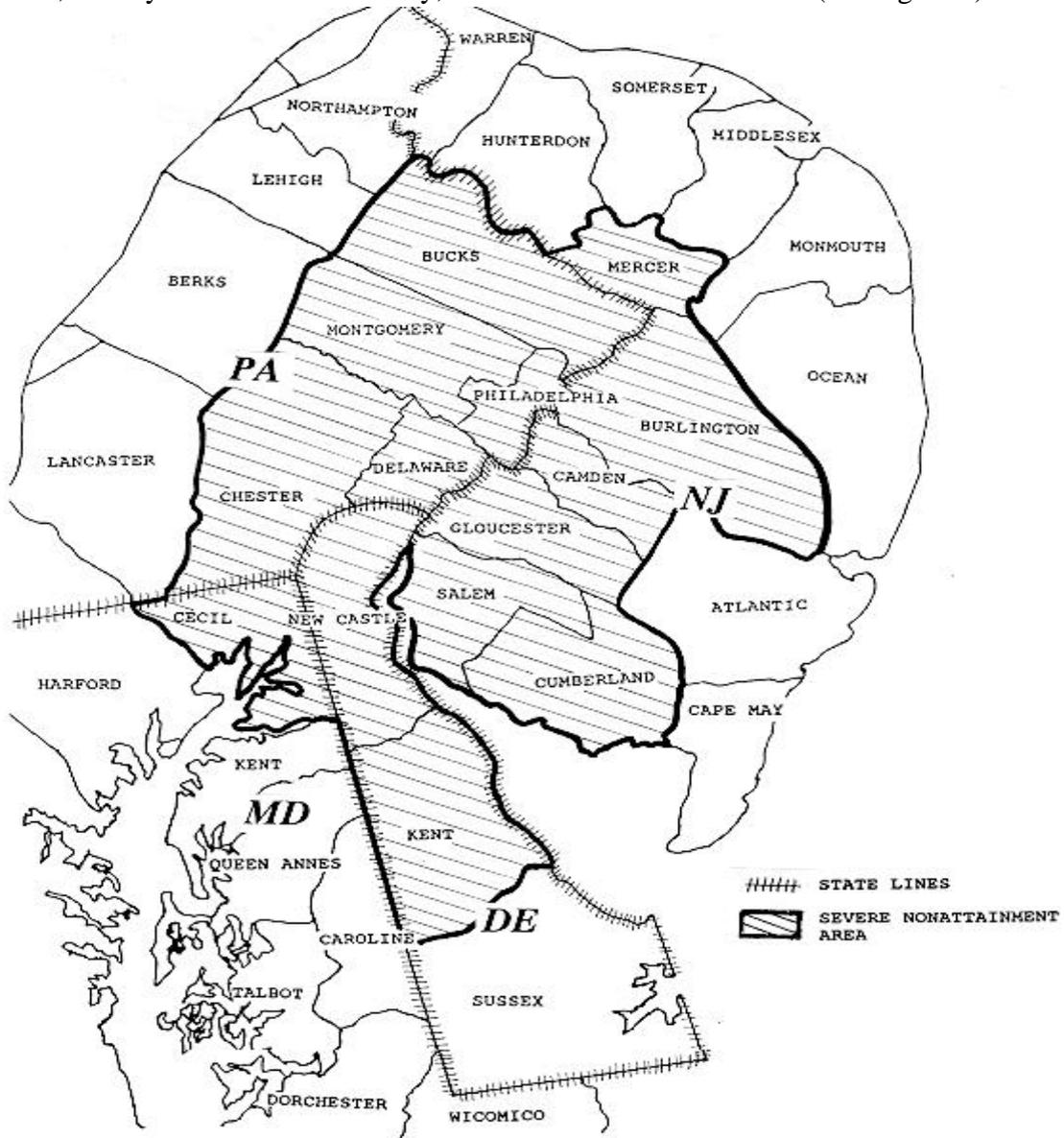


Figure 1 - Philadelphia-Wilmington-Trenton Severe Ozone Non-Attainment Area

The Philadelphia-Wilmington-Trenton non-attainment area is classified as a “severe” non-attainment area with respect to the degree of 1-hour ozone non-attainment. Under the Clean Air Act Amendments of 1990, this severe non-attainment area is required to reach attainment by 2005. In order to demonstrate that the non-attainment area is on track for reaching attainment by 2005, states in the non-attainment area were required to submit attainment demonstrations to the United States Environmental Protection Agency (EPA). These attainment demonstrations were required to show, through atmospheric photochemical computer modeling, that the current and planned pollution reduction measures will bring the non-attainment area into attainment by the end of the 2005 ozone season.

## **2.1 Attainment Demonstrations**

In spite of many attempts, the states in the Philadelphia-Wilmington-Trenton non-attainment area have had great difficulty in demonstrating attainment through modeling. In May, 1998, Delaware submitted to EPA a document entitled *The Delaware Phase II Attainment Demonstration for the Philadelphia-Wilmington-Trenton Ozone Non-Attainment Area*. This document contained the results of extensive atmospheric photochemical modeling for the non-attainment area. Although one modeled episode in that attainment demonstration predicted attainment for Delaware’s portion of the non-attainment area, it did not predict attainment for the entire area, as mandated by the Clean Air Act. The modeling contained current and planned reductions within the non-attainment area, plus reductions in transported nitrogen oxide (NO<sub>x</sub>) emissions as a result of the regional NO<sub>x</sub> SIP Call.<sup>1</sup> Even with the reductions in regional NO<sub>x</sub> transport, the non-attainment area could not fully demonstrate attainment. Because of this problem, EPA cannot approve the attainment demonstrations for the non-attainment area without the inclusion of additional reductions.

In order to facilitate the production of acceptable attainment demonstrations, and at the same time further reduce the problem of pollution transport, EPA agreed to extend the deadline for submission of acceptable attainment demonstrations if the states would do two things. First, the states in the Ozone Transport Region, comprising most of the Northeastern and Mid-Atlantic U.S., must work together to develop a set of common pollution reductions measures. Second, the states in the non-attainment area must revise their attainment demonstrations by including the reductions from the regional measures plus any state-specific measures needed to close an emission reduction shortfall as defined by EPA.

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<sup>1</sup> The NO<sub>x</sub> SIP Call was a requirement issued by EPA as a final rule through Federal Register Notice 63 FR 57397, entitled, *Finding of Significant Contribution and Rulemaking for Certain States in the Ozone Transport Assessment Group Region for Purposes of Reducing Regional Transport of Ozone*, September 24, 1998. Nineteen states plus the District of Columbia were required to comply with an EPA-derived NO<sub>x</sub> emissions budget in order to reduce transport of NO<sub>x</sub> to downwind ozone non-attainment areas. For details, see the SIP submission entitled, *Delaware Plan for Meeting the Nitrogen Oxide (NO<sub>x</sub>) Budget Requirements Contained in the EPA NO<sub>x</sub> SIP Call*, Delaware Department of Natural Resources and Environmental Control (DNREC), November 2000.

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## **2.2 Attainment Shortfalls**

In a series of Federal Register notices on December 16, 1999, EPA issued proposed rules to accomplish the above goals. The notices include the quantification of the attainment shortfalls for the applicable non-attainment areas. The Federal Register Notice pertaining to Delaware is 64 FR 70443. In this notice, EPA identifies the emission reduction shortfall for the Philadelphia-Wilmington-Trenton non-attainment area, and instructs Delaware to work with the other states to eliminate this shortfall. In 64 FR 70443, EPA determined that the Philadelphia-Wilmington-Trenton non-attainment area is short of its attainment emission level target by amounts equal to 4.5 percent of the 1990 baseline emission inventory for volatile organic compounds (VOC) and 0.3 percent of the 1990 baseline emission inventory for nitrogen oxides (NOx). The EPA-derived additional reductions that equate to these percentages are contained in Table 1.

**Table 1  
Additional Reductions of VOC and NOx For Philadelphia-Wilmington-Trenton  
Non-Attainment Area**

<b>VOC Reductions (tons/day)</b>	<b>NOx Reductions (tons/day)</b>
62	3

## **III. Ozone Transport Region Model Rules**

In order to produce new pollution control measures to close the attainment shortfall, the states in the Philadelphia-Wilmington-Trenton non-attainment area cooperated with other states in the Ozone Transport Region to develop six model rules. The Ozone Transport Commission coordinated model rule development. The model rules will be adopted and implemented by each state in the non-attainment area.

### **3.1 Reductions in the Non-Attainment Area**

The six model rules and the expected reductions for the Philadelphia-Wilmington-Trenton non-attainment area are listed in Table 2.

**Table 2  
Reductions from Model Rules for the Philadelphia-Wilmington-Trenton  
Non-Attainment Area**

Model Rule	Reduction Benefit by 2005 (tons/day)	
	VOC	NOx
NOx Model Rule	N/A	6
Consumer Products	9	N/A
Portable Fuel Containers	5	N/A
Architect. & Indust. Maintenance (AIM) Coatings	19	N/A
Mobile Equipment Refinishing	6	N/A
Solvent Cleaning Operations	20	N/A
<b>Total</b>	<b>59</b>	<b>6</b>

The Delaware-specific versions of the model rules will be submitted to EPA as separate SIP revisions, and will be incorporated into the Regulations Governing the Control of Air Pollution. Table 3 contains the regulation numbers and titles, and the expected reductions for Kent and New Castle Counties. Table 4 contains the expected reductions from the model rules for the counties of the other states in the Philadelphia-Wilmington-Trenton non-attainment area.

**Table 3  
Delaware Regulations and Their Expected Reductions for Kent & New Castle Counties**

Regulation Number and Title	Expected Benefit by 2005 (tons/day)			
	Kent		New Castle	
	VOC	NOx	VOC	NOx
Reg. 42, Sect. 1 – Control of NOx Emiss. From Indust. Boilers	N/A	0.00	N/A	0.36
Reg. 41, Sect. 2 – Consumer Products	0.17	N/A	0.68	N/A
Reg. 41, Sect. 3 – Portable Fuel Containers	0.09	N/A	0.43	N/A
Reg. 41, Sect. 1 – Architectural & Industrial Maintenance Coatings	0.38	N/A	1.46	N/A
Reg. 24, Sect. 11 (amended) – Mobile Equip. Repair & Refinish.	0.07	N/A	0.29	N/A
Reg. 24, Sect. 33 (amended) – Solvent Cleaning & Drying	0.48	N/A	0.91	N/A
<b>County Totals</b>	<b>1.19</b>	<b>0.00</b>	<b>3.77</b>	<b>0.36</b>

**Table 4  
Model Rule Benefits for Counties of Other States in the Philadelphia-Wilmington-Trenton  
Non-Attainment Area**

State	County	Model Rule Benefits for 2005 (tons/day)						
		Total NOx (NOx Model Rule)	Consumer Products (VOC)	Portable Fuel Containers (VOC)	AIM Coatings (VOC)	Mobile Equipment Refinishing (VOC)	Solvent Cleaning Operations (VOC)	Total VOC
MD	Cecil	0.00	0.11	0.06	0.24	0.00	0.00	0.42
NJ	Burlington	0.29	0.60	0.33	1.29	0.46	0.20	2.88
	Camden	0.07	0.72	0.38	1.56	0.56	0.24	3.47
	Cumberland	0.80	0.20	0.09	0.44	0.16	0.07	0.95
	Gloucester	0.01	0.35	0.19	0.75	0.27	0.12	1.68
	Mercer	1.05	0.47	0.27	1.02	0.36	0.16	2.29
	Salem	1.02	0.09	0.05	0.20	0.07	0.03	0.45
PA	Bucks	0.00	0.83	0.56	1.79	0.64	2.78	6.60
	Chester	0.46	0.59	0.39	1.26	0.45	1.97	4.66
	Delaware	0.89	0.78	0.45	1.69	0.60	2.63	6.16
	Montgomery	0.30	1.02	0.78	2.19	0.78	3.42	8.19
	Philadelphia	0.59	2.11	0.93	4.54	1.62	7.07	16.28

Note: Totals may not equal the sum of the individual benefits due to rounding.

### 3.2 Reductions in Counties Outside of Non-Attainment Area

In order to produce further benefit for the Philadelphia-Wilmington-Trenton non-attainment area, the states decided to also apply the six new regulations to 19 counties outside the non-attainment area. The outside counties being credited to the non-attainment area fall within 100 kilometers of the non-attainment area. The creditable range of 100 kilometers is in accordance with EPA guidelines. The outside counties and their VOC reduction are listed in Table 5.

**Table 5  
VOC Reductions (Tons/Day) From Counties Within 100 KM of  
Non-Attainment Area**

Delaware		Maryland		New Jersey		Pennsylvania	
County	VOC	County	VOC	County	VOC	County	VOC
Sussex	1.6	Caroline	0.3	Atlantic	1.7	Adams	0.9
		Dorchester	0.4	Cape May	0.7	Berks	3.9
		Kent	0.2			Cumberland	2.3
		Queen Annes	0.4			Dauphin	2.8
		Talbot	0.4			Lancaster	5.1
		Wicomico	0.9			Lebanon	1.3
						Lehigh	3.3
						Northampton	2.9
						Schuykill	1.7
						York	4.1
<b>Total</b>	<b>1.6</b>	<b>Total</b>	<b>2.6</b>	<b>Total</b>	<b>2.4</b>	<b>Total</b>	<b>28.3</b>

Extending the VOC rules to the counties outside the non-attainment area but within 100 kilometers of the non-attainment area adds about 35 tons/day of VOC reductions to the 59 tons/day of VOC reductions from within the non-attainment area. This gives a total of 94 tons/day of VOC reductions that can be applied to the attainment shortfall for the Philadelphia-Wilmington-Trenton non-attainment area. An additional benefit of 1 ton/day of NOx reduction is picked up by applying the NOx Model Rule to sources outside of the non-attainment area but within 100 kilometers. The total VOC and NOx benefits from the non-attainment area plus the counties within 100 kilometers are compared to the EPA-derived shortfalls in Table 6.

**Table 6  
Total Model Rule Benefits Versus EPA-Derived Shortfalls  
for Philadelphia-Wilmington-Trenton Non-Attainment Area (Tons/Day)**

Pollutants	EPA-Derived Shortfalls	Benefits: Non-Attainment Area Plus 100 Kilometers
VOC	62	94
NOx	3	7

As can be seen from Table 6, the model rules achieve more VOC and NOx reductions than necessary to close the attainment shortfall.

## IV. Delaware-Specific Reductions

In addition to the benefits from the regional model rules, Delaware is identifying emission reduction benefits from the implementation of three federal rules that were not available when the original modeling for the attainment demonstration was conducted. As indicated in EPA's Federal Register Notice 64 FR 70443, the benefits from these measures were not included in the May 1998 submission of the *Delaware Phase II Attainment Demonstration for the Philadelphia-Wilmington-Trenton Ozone Non-Attainment Area*. The three federal rules and their benefits are listed in Table 7.

**Table 7**  
**Delaware Emission Reduction Benefits from Implementation of Three Federal Rules**  
**(Tons/Day)**

Federal Rule	Kent		New Castle		Sussex	
	VOC	NOx	VOC	NOx	VOC	NOx
Marine Engine Standards	0.02	0.00	2.02	- 0.11	0.18	- 0.01
Locomotive Engine Standards	0.00	0.14	0.00	0.63	0.00	0.15
On-Road Heavy Duty Diesel Standards	0.00	0.02	0.00	0.05	0.00	0.02
<b>Total</b>	<b>0.02</b>	<b>0.16</b>	<b>2.02</b>	<b>0.57</b>	<b>0.18</b>	<b>0.16</b>

Note: Negative numbers in Table 7 indicate NOx increases.

The reductions in Kent and New Castle Counties from these three federal measures were included in Delaware's 2005 Rate-of-Progress Plan but not in Delaware's Attainment Demonstration. Therefore, they are being applied to the attainment shortfall. The emission reduction calculations for marine engines and locomotives in Kent and New Castle Counties are contained in Section IV of the *Delaware 2005 Rate-of-Progress Plan for Kent and New Castle Counties*, December 2000. Because that rate-of-progress plan does not cover Sussex County, the emission reduction calculations for marine engines and locomotives in Sussex County are being submitted as *Attachment 1* to this SIP submission. Emission Reductions for on-road heavy-duty diesel engines in Kent and New Castle Counties were included in the total calculation for on-road mobile emission controls in the *Delaware 2005 Rate-of Progress Plan for Kent and New Castle Counties*, but were not broken out as a line item. Therefore, MOBILE 5a model runs and emission reduction break-outs for on-road heavy-duty diesel standards in Kent and New Castle Counties, as well as those for Sussex County, are being submitted as *Attachment 2* to this SIP submission.

## V. Summary of Reductions

Table 8 shows the new total benefits for the non-attainment area when the Delaware-specific reductions from the three federal rules are added to the reductions from the OTC model rules.

**Table 8  
Total Reductions Applied to Non-Attainment Area Shortfall**

Pollutant	Reductions (tons/day)		
	OTC Model Rules in NAA + 100 KM	3 Federal Rules in Delaware	Total Reductions in NAA + 100 KM
VOC	94	2	96
NO <sub>x</sub>	7	1	8

The analysis contained in this document has shown that the implementation of the OTC model rules in the Philadelphia-Wilmington-Trenton non-attainment area and 19 counties within 100 kilometers of the non-attainment area will result in ample emission reductions to close the EPA-identified attainment shortfall. The inclusion of additional emission reductions in Kent, New Castle and Sussex Counties from the implementation of three federal rules not previously counted toward attainment further increases the total amount of benefits that can be counted towards attainment for the Philadelphia-Wilmington-Trenton non-attainment area. The emission reduction efforts described in this document are significant, and are intended to enhance the chances of attaining the 1-hour ozone standard by 2005.

## VI. Mid-Course Review

In order to check our progress toward attaining the 1-hour ozone standard by 2005, Delaware plans to conduct an analysis prior to that date. This analysis, termed the mid-course review, will follow EPA guidelines and will show that either 1) the adopted control measures are sufficient to reach attainment by 2005, or 2) additional control measures will be needed for attainment. Delaware previously committed to the mid-course review in its January 2000 SIP submission, *Addendum to the Delaware Phase II Attainment Demonstration for the Philadelphia-Wilmington-Trenton Ozone Non-Attainment Area*. Delaware is herein reiterating its previous commitment, and is also committing to submit the mid-course review to EPA no later than December 31, 2004.



## **ATTACHMENT 1**

Marine Engine and Locomotive Engine Standards:  
Emission Reduction Calculations for Sussex County

(Available by Request)





## **ATTACHMENT 2**

On-Road Heavy Duty Diesel Standards:

Emission Reduction Break-Out and MOBILE 5b Outputs for Kent, New Castle,  
and Sussex Counties

(Available by Request)





**ATTACHMENT 3**

Ozone Transport Commission Document:

***OTC States' Approach to Achieving Emission Reductions in the Ozone  
Transport Region from Implementing Model Rules***

(Available by Request)

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**ATTACHMENT 4**

E. H. Pechan Document:

*Control Measure Development Support Analysis of  
Ozone Transport Commission Model Rules*

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