

*Proposed*

**Delaware**

*State Implementation Plan (SIP) Revision*

**Demonstration that Amendments to  
Section 2.0 of 7 DE Admin Code 1142, *Control of NO<sub>x</sub>  
Emissions from Industrial Boilers and Process Heaters at  
Petroleum Refineries* Do not Interfere with Any Applicable  
Requirement of the Clean Air Act**

**Delaware Department of Natural Resources and Environmental Control**



December 7, 2010

## 1. Introduction

In November 2009, Delaware promulgated Section 2.0 of 7 DE Admin Code 1142, Control of NO<sub>x</sub> Emissions from Industrial Boilers and Process Heaters at Petroleum Refineries. In June 2010, Section 2.0 of 1142 was approved by the Environmental Protection Agency (EPA) into Delaware's State Implementation Plan (SIP) (75 FR 31711).

The purpose of Section 2.0 of 7 DE Admin Code 1142 is to reduce nitrogen oxides (NO<sub>x</sub>) emissions from large industrial boilers and process heaters that are located at petroleum refineries. This reduction in NO<sub>x</sub> emissions from the affected units would aid in the attainment and maintenance of any national ambient air quality standard (NAAQS), and any other applicable requirement that is affected by NO<sub>x</sub> emissions. NAAQSs and applicable requirements that are affected by NO<sub>x</sub> emissions are:

- **Ozone NAAQS.** NO<sub>x</sub> emissions impact air quality relative to ozone. This is because ozone is formed through a reaction in the atmosphere between NO<sub>x</sub> and volatile organic compounds (VOC) in the presence of heat and sunlight (i.e., NO<sub>x</sub> and VOC are precursors to the formation of ozone). The air quality in Delaware is designated under Section 107 of the Clean Air Act (CAA) as not meeting the 1997 health based NAAQS of 0.08 ppm for ozone. In addition, the EPA issued a revised 8-hour ozone NAAQS of 0.075 ppm in March 2008, and has proposed to reconsider that revised NAAQS in January of 2010. The air quality in Delaware is anticipated to be designated as non-attainment under the new ozone NAAQS.

Under the 1997 ozone NAAQS the entire state of Delaware is included as part of a Philadelphia based non-attainment area (NAA). Delaware submitted to the EPA an attainment demonstration SIP in July 2007 which demonstrated that the NAA would attain compliance with that NAAQS by 2010. EPA has not yet issued area designations for the 2008 revised NAAQS, and has not yet finalized its reconsideration of the 2008 revised NAAQS.

- **Fine Particulate Matter (PM<sub>2.5</sub>) NAAQS.** NO<sub>x</sub> emissions contribute to the formation of nitrate particulates in the atmosphere, and nitrate particles are PM<sub>2.5</sub> (i.e., they are particles with an aerodynamic diameter of 2.5 microns or less). The air quality in New Castle County Delaware is designated under Section 107 of the CAA as not meeting the 1997 health based NAAQS for PM<sub>2.5</sub>. In addition, the EPA issued a revised PM<sub>2.5</sub> NAAQS in 2006.

Under the 1997 NAAQS New Castle County Delaware is included as part of a Philadelphia based NAA. Delaware submitted to the EPA an attainment demonstration SIP in April 2008 which demonstrated that the NAA would attain compliance with the NAAQS by 2010<sup>1</sup>. Relative to the 2006 PM<sub>2.5</sub> NAAQS, New Castle County Delaware is

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<sup>1</sup> Based on 2007-2009 monitoring data, New Castle County has attained the 1997 NAAQS for the annual and daily standard.

designated as non-attainment for the daily standard, and is included as part of the Philadelphia based NAA. The attainment demonstration SIP is due in December 2012.<sup>2</sup>

- **Visibility.** NO<sub>x</sub> emissions contribute to the formation of PM<sub>2.5</sub>, and PM<sub>2.5</sub> is a visibility impairing pollutant under the federal regional haze program. Visibility impairing emission from Delaware have been determined to “significantly”<sup>3</sup> impact one (1) federal class 1 area, Brigantine National Wildlife Area, in New Jersey.

The State of Delaware submitted to the EPA in September 2009 a Visibility SIP that met the requirements of Part C to Title I of the CAA. This SIP primarily relied upon SO<sub>2</sub> reductions, because sulfate was determined by the Regional Planning Organizations to be the main cause of visibility impairment in Class I areas. However, the SIP also partially relied on reductions in NO<sub>x</sub> emissions to demonstrate that Delaware has met its 2018 visibility related goals.

- **Nitrogen Dioxide (NO<sub>2</sub>) NAAQS.** NO<sub>x</sub> emissions, by definition, directly impact ambient NO<sub>2</sub> concentrations. The air quality in Delaware is designated under Section 107 of the CAA as meeting the current annual NO<sub>2</sub> NAAQS. In February 2010, the EPA revised the annual NO<sub>2</sub> NAAQS and issued a new hourly NO<sub>2</sub> NAAQS.

EPA has not issued designations of areas under the 2010 revised NAAQS, and State recommendations for designation of areas are due to the EPA in January 2011.

Section 2.0 of 7 DE Admin Code 1142 does not limit emissions of any pollutant other than NO<sub>x</sub>. Section 2.0 covers nine (9) emission units at the Delaware City Refinery, and imposes compliance dates between 2007 and 2012, depending on the particular emission unit.

In 2009 the operations of equipment at the Delaware City Refinery were discontinued, and in 2010 the refinery ownership changed from Premcor Refining Group Inc. to Delaware City Refining Company, LLC (“DCRC”). Two actions related to this change in ownership impact Delaware’s SIP:

- On May 28, 2010, the Delaware Department of Natural Resources and Environmental Control (the Department) reached an enforcement settlement with Premcor. This settlement, among other things, terminated the 2008 FCCU NO<sub>x</sub> Agreement which had required the Premcor fluid catalytic cracking unit CO boiler to meet a 20 parts per million (ppm) NO<sub>x</sub> emission limitation by May 1, 2009.<sup>4</sup>

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<sup>2</sup> Based on 2007-2009 monitoring data, New Castle County has already attained the 2006 PM<sub>2.5</sub> NAAQS.

<sup>3</sup> As a result of the consultation process, the Middle Atlantic and Northeast Visibility Union (MANE-VU) States defined contributions to Class I areas as “significant” if a State contributed at least 2 percent of total sulfate observed on the 20 percent worst visibility days in 2002. Based on the MANE-VU Contribution Assessment and the application of the “≥ 2% SO<sub>2</sub> rule,” emissions from Delaware were determined to contribute to visibility degradation exclusively to the Brigantine Wilderness Class I area (note that NO<sub>x</sub> was not the primary pollutant of concern in this round of Regional Haze SIPs).

<sup>4</sup> 2008 Consent Decree with Premcor Refinery at Delaware City, The FCCU NO<sub>x</sub> Agreement

- On May 31, 2010 the Department and DCRC reached an agreement on DCRC's acquisition, restart and operation of the Delaware City Refinery. One element of that agreement provides that the Department will propose to revise Section 2.0 of 7 DE Admin Code 1142 to provide for a facility-wide NO<sub>x</sub> emission cap compliance alternative.

In a separate regulatory process, Delaware is proposing to revise Section 2.0 of 7 DE Admin Code 1142 to (1) provide for the control of NO<sub>x</sub> from the Fluid Catalytic Cracking Unit CO boiler to the level that was previously required by the 2008 consent agreement, and (2) provide for a facility-wide NO<sub>x</sub> emission cap compliance alternative. The purpose of this SIP revision is to demonstrate that these revisions to Section 2.0 of 7 DE Admin Code 1142 will not interfere with attainment or maintenance of any NAAQS, or any other applicable requirement of the CAA.

Questions or comments regarding this SIP revision should be addressed to Ronald A. Amirikian, Planning Branch Manager, Division of Air Quality, Delaware Department of Natural Resources and Environmental Control, at (302) 739-9402 or [ronald.amirikian@state.de.us](mailto:ronald.amirikian@state.de.us).

## 2. Impact Analysis

Section 2.0 of 7 DE Admin Code 1142 sets emission limits only for the pollutant NO<sub>x</sub>, and only impacts the Delaware City Refinery (i.e., the Delaware City Refinery is the only petroleum refinery within the State of Delaware). This analysis considers the effect the revisions to Section 2.0 of 7 DE Admin Code 1142 have on applicable requirements for which NO<sub>x</sub> emissions are a precursor or pollutant of interest. That is, the pollutants ozone, PM<sub>2.5</sub>, visibility, and NO<sub>2</sub>.

### 2.1. Baseline NO<sub>x</sub> emissions from the Delaware City Refinery.

**Ozone.** 2002 is the SIP base year for planning associated with the 1997 0.08 ppm ozone NAAQS. Actual 2002 base year NO<sub>x</sub> emissions from the Delaware City Refinery were 3,555 TPY. For the 2008 revised NAAQS, which is currently being reconsidered, a SIP planning base year has not yet been determined. The most current emission inventory is 2008, and actual 2008 NO<sub>x</sub> emissions from the Delaware City Refinery were 2,525 TPY.

**PM<sub>2.5</sub>.** 2002 is the SIP base year for planning associated with the 2008 PM<sub>2.5</sub> 15 ug/m<sup>3</sup> annual, and the 65 ug/m<sup>3</sup> daily NAAQSs. Base year 2002 NO<sub>x</sub> emissions are identical to those identified under ozone above. For the 2008 revised NAAQS, a SIP planning base year has not yet been determined. The most current emission inventory is 2008, and actual 2008 NO<sub>x</sub> emissions from the Delaware City Refinery were those identified under ozone above.

**Visibility.** 2002 is the SIP base year for planning associated with Delaware's 2008 Visibility SIP. Base year 2002 NO<sub>x</sub> emissions are those identified under ozone above.

**NO<sub>2</sub>**. For the 2010 revised NAAQS, area designation has not yet occurred, and a SIP planning base year has not yet been determined. The most current emission inventory is 2008, and actual 2008 NO<sub>x</sub> emissions from the Delaware City Refinery were those identified under ozone above.

2.2. Projected NO<sub>x</sub> emissions from the Delaware City Refinery under current (i.e., before revision) Section 2.0 of 7 DE Admin Code 1142.

**Ozone**. Delaware's 2007 Ozone SIP demonstrates that compliance with the 1997 0.08ppm ozone NAAQS will be achieved in 2009, based on 2009 projected emission levels. 2002 was the SIP base year, and 2002 base year NO<sub>x</sub> emissions (see 2.1 above) were projected to 2009 by applying factors that account for projected growth and controls. The projection calculations are explained in detail in the 2007 ozone SIP.

The following five (5) emission units received post-2002/Pre-2009 emission controls that were relied upon in the 2007 ozone SIP calculations<sup>5</sup>:

- Boiler 1 (Unit 80-1) – 80% control from 7 DE Admin Code 1142<sup>6</sup>
- Boiler 2 (Unit 80-2) – 80% control from 7 DE Admin Code 1142
- Crude Unit vacuum Heater (Unit 21-H-2) – 60% control from 1142
- Fluid Catalytic Cracking Unit CO Boiler – 86.7% control from 2008 Consent Decree<sup>7</sup>
- Methanol Plant Heater 41-H-1 – 100% control from 2003 shut down

Resultant 2009 attainment year emissions from the Delaware City Refinery (i.e., those after the application of growth, the 41-H-1 shutdown, the control of Units 80-1, 80-2, 21-H-2, and the Cracker CO boiler) were estimated at 2,855 TPY.

**PM<sub>2.5</sub>**. Delaware's 2008 PM<sub>2.5</sub> SIP demonstrates that compliance with the 1997 15 ug/m<sup>3</sup> annual, and the 65 ug/m<sup>3</sup> daily standards will be achieved in 2009, based on 2009 projected emission levels. 2002 was the SIP base year, and 2002 base year NO<sub>x</sub> emissions (see 2.1 above) were projected to 2009 by applying factors that account for projected growth and controls. The projection calculations are those discussed under ozone above.

**Visibility**. Delaware's 2009 Visibility SIP is based on 2018 projected emission levels.

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<sup>5</sup> Note that the Crude Unit Atmospheric Heater (Unit 21-H-701) is regulated by 7 DE Admin Code 1142. 1142 imposes a limit of 0.04 lb/mmbtu, however, this limit was previously imposed in 1996 as a LAER limit pursuant to 7 DE Admin Code 1125. Unit 21-H-701 will remain subject to the 0.04 lb/mmbtu limit independent of 7 DE Admin Code 1142 because it was a NSR derived limitation

<sup>6</sup> 2.0 of 7 DE Admin Code 1142, Control of NO<sub>x</sub> Emissions From Industrial Boilers and Process Heaters at Petroleum Refineries, Effective 2008. Note: this regulation was revised effective 11/11/2009, and the 11/11/2009 revision was approved into the DE SIP at 75 FR 31711 on June 4, 2010.

<sup>7</sup> Consent Decree with Premcor Refinery at Delaware City, The FCCU NO<sub>x</sub> Agreement.

Section 2.0 of 7 DE Admin Code 1142 provides for compliance dates between 2009 and 2012. In 2012 the requirements of 7 DE Admin Code are fully implemented. As part of Delaware's 2009 Visibility SIP, 2002 NO<sub>x</sub> emissions from the Delaware City Refinery were projected to be 2,761 TPY, and 2,774 TPY, for 2012 and 2018, respectively.

The 1142 related NO<sub>x</sub> controls relied upon in the Visibility SIP were:

- Boiler 1 (Unit 80-1) – 80% control from 7 DE Admin Code 1142
- Boiler 2 (Unit 80-2) – 80% control from 7 DE Admin Code 1142
- Crude Unit vacuum Heater (Unit 21-H-2) – 60% control from 1142
- Fluid Catalytic Cracking Unit CO Boiler – 86.7% control from 2008 Consent Decree
- Methanol Plant Heater 41-H-1 – 100% control from 2003 shut down
- Boilers 80-3 and 80-4 – 100% control from shutdown on or before May 1, 2011.<sup>8</sup>

NO<sub>2</sub>. For the 2010 revised NAAQS, area designation has not yet occurred. The 2002 and 2008 actual NO<sub>x</sub> emissions, and the 2009, 2012 and 2018 projected NO<sub>x</sub> emissions discussed above are used to evaluate the impact that the revisions to Section 2.0 of 7 DE Admin Code 1142 would have on future NO<sub>2</sub> NAAQS planning.

### 2.3. Revision to Section 2.0 of 7 DE Admin Code 1142.

Delaware is revising Section 2.0 of 7 DE Admin Code 1142 to (1) provide for the control of NO<sub>x</sub> emissions from the Fluid Catalytic Cracking Unit CO Boiler (Unit 23-H-3) that was previously required under a 2008 consent decree, and (2) provide for, as an option, compliance with a facility-wide NO<sub>x</sub> cap as an alternative to unit specific NO<sub>x</sub> emission limitations.

The initial facility-wide cap is being established at the level of Premcor's actual 2008 NO<sub>x</sub> emissions (i.e., 2,525 TPY), and will decline in two step decreases, as follows:

- 2,525 tons per year, evaluated over each twelve (12) consecutive month rolling period, for any twelve (12) month rolling period ending on or before January 2014.
- 2,225 tons per year, evaluated over each twelve (12) consecutive month rolling period, commencing with the twelve (12) month rolling period beginning on December 31, 2013 and ending on December 31, 2014.
- 1,650 tons per year, evaluated over each twelve (12) consecutive month rolling period, commencing with the twelve (12) month rolling period beginning on December 31, 2014 and ending on December 31, 2015.

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<sup>8</sup> Note that in the current Delaware SIP Boilers 3 and 4 are not required to shutdown, and the allowable emission rate for Boilers 1, 3 and 4 were finalized at 0.015 lb/mmbtu limit, 24-hour rolling average basis. See also footnote 4.

Under the revised Section 2.0 of 7 DE Admin Code 1142, either all of the unit specific NO<sub>x</sub> emission limitations apply or the facility-wide cap apply at all times (i.e., there is no gap in compliance).

2.4. Impact of Revised 7 DE Admin Code 1142 on ozone, PM<sub>2.5</sub>, visibility and NO<sub>2</sub>, (i.e., the requirements for which NO<sub>x</sub> emissions are a precursor or pollutant of interest).

The addition of emission limits to Section 2.0 of 7 DE Admin Code 1142 applicable to Unit 23-H-3 do not in any way change the emission limits for this unit. That is, the emissions limit for Unit 23-H-3 do not change, but only the vehicle by which these emission limits will be enforced is changing (i.e., it will be enforced through Section 2.0 of 7 DE Admin Code 1142 instead of a consent agreement). In other words, no change is being made that could upset the status quo.

With the revision to 2.0 of 7 DE Admin Code 1142 described in 2.3 above, the Delaware City Refinery may comply by either (1) complying with all of the unit specific emission limitations specified in 7 DE Admin Code 1142, or (2) complying with the applicable facility-wide NO<sub>x</sub> emission cap.

- Complying with all of the unit specific emission limitations specified in 7 DE Admin Code 1142.

This is the current compliance mechanism in Section 2.0 of 7 DE Admin Code 1142. Therefore, since overall no change is being made to the unit specific emission rates this compliance option would not impact any NAAQS or applicable requirement (i.e., no change is being made that could upset the status quo).

- Complying with the applicable facility-wide NO<sub>x</sub> emission cap. Under this compliance option, emission units will not be subjected to the unit specific emission limitations of Section 2.0 of 7 DE Admin Code 1142, and instead the entire facility will be subject to a facility-wide NO<sub>x</sub> cap.

Compliance with the 7 DE Admin Code 1142 facility-wide caps is required monthly, on a 12-month rolling basis. For standards where compliance is demonstrated on an annual or longer basis, an annual cap is generally consistent with a NAAQS with an annual averaging period.

The NO<sub>2</sub> and PM<sub>2.5</sub> NAAQS both have a standard which is averaged on an “annual” basis. For the NO<sub>2</sub> annual NAAQS, this is the arithmetic average of all of the reported 1-hour values (40 CFR Part 50, Appendix S). For both of the PM<sub>2.5</sub> annual NAAQSs (1997 and 2006), the annual standard design value, which is based upon 3 years of valid annual means, is compared to the NAAQS (40 CFR Part 50 Appendix N). The design value is an average of three annual means over three consecutive years. An annual mean is the average of the average values for each of the four quarters in a calendar year; the average value for each quarter is the average of the daily values for that quarter.

As long as the cap set by 7 DE Admin Code 1142 is lower than a baseline condition (i.e., 7 DE Admin Code 1142 before amendment), a conclusion that the revised Section 2.0 of 7 DE Admin Code 1142 will cause no worsening of air quality is supported.

The table below summarizes the Delaware City Refinery NO<sub>x</sub> emission data presented in 2.1 and 2.2 above.

<b>Year</b>	<b>NO<sub>x</sub> (TPY)</b>
2002 (actual)	3,555
2008 (actual)	2,525
2009 (projected)	2,855
2012 (projected)	2,761
2018 (projected)	2,774

As discussed in 2.3 above, the facility-wide NO<sub>x</sub> cap will start at 2,525 TPY, and decline to 1,650 TPY in 2015. This declining cap option provides for emissions that are lower than the actual and projected emission levels under the current unit specific control option. This indicates that the facility-wide NO<sub>x</sub> emission cap compliance option will not negatively impact the 1997 and 2006 annual PM<sub>2.5</sub> NAAQSs, the 2010 annual NO<sub>2</sub> NAAQS, and visibility related goals

- Complying with the applicable facility-wide NO<sub>x</sub> emission cap – Additional Analysis. For standards where compliance is demonstrated on a more frequent basis, additional analysis is needed. This is because a 12-month rolling total could provide for higher emissions on a seasonal or a daily basis.

The 1997 and 2008 ozone NAAQSs is directly related to the highest concentration averaged over an 8-hour period in any one (calendar) day. The 2010 daily NO<sub>2</sub> NAAQS is determined by comparing the 1-hour primary standard design value, which is the average of three annual 98th percentile values, to the NAAQS (40 CFR Part 50, Appendix S). Likewise, compliance with the 1997 and 2006 24-hour PM<sub>2.5</sub> NAAQSs is determined by comparing the 24-hour standard design value, which is an average the annual 98<sup>th</sup> percentile values for each of three years (40 CFR Part 50 Appendix N).

In addition to the comparison between the actual and projected emissions and the facility-wide cap discussed above, seasonal variations were evaluated. The Department analyzed monthly crude oil throughputs from the crude oil tank farm, which is an indicator of the capacity factor of the refinery. Historical throughput is useful data to analyze because such data supports a conclusion that utilization will not drastically vary by month in the future. Four (4) years, 2005 through 2008, were evaluated (see table below).

	<b>Crude Tank Farm Throughput (%)</b>			
	<b>2005</b>	<b>2006</b>	<b>2007</b>	<b>2008</b>
<b>January</b>	8.4	7.6	8.7	10.2
<b>February</b>	7.6	8.0	6.7	8.3
<b>March</b>	6.9	8.1	8.2	9.8
<b>April</b>	8.2	8.5	8.2	8.3
<b>May</b>	9.4	8.7	8.7	7.8
<b>June</b>	9.1	8.4	8.6	9.4
<b>July</b>	9.4	8.6	9.0	10.0
<b>August</b>	8.8	8.8	8.8	10.0
<b>September</b>	9.5	8.5	7.8	10.0
<b>October</b>	8.4	8.5	8.7	10.1
<b>November</b>	6.7	8.2	8.2	3.9*
<b>December</b>	7.7	8.3	8.4	2.2*

*\*Note: November and December of 2008 are determined to be not representative of normal operations. The refinery was running as significantly reduced rates during these months because the crude unit had its turnaround in November 2008 and the Coker was down. Because of this 2008 was not evaluated further.*

Based on 2005, 2006 and 2007 crude tank farm throughput, the Department concludes there is a slight bias high during the ozone season months. However, given the monthly deviation is slight (36-month average percent is 8.3, and the standard deviation from the average is 0.7), and given that the facility-wide NO<sub>x</sub> caps are less than the recent actual and projected emissions, the Department concludes that refinery operations in the future will be essentially uniform throughout the year, and the 12-month rolling caps are consistent with NAAQS and other applicable requirements.

In addition to crude oil throughputs from the crude oil tank farm, the Department has also analyzed the variability of daily emissions from the Delaware City Refinery. This was done by analyzing actual historical NO<sub>x</sub> emissions for the refinery units that are covered by 7 DE Admin Code 1139, "Nitrogen Oxides (NO<sub>x</sub>) Budget Trading Program." The NO<sub>x</sub> emissions from units subject to 7 DE Admin Code 1139 are monitored by continuous emission monitoring systems (CEMS). Historical NO<sub>x</sub> emissions data for these units were obtained from EPA's Clean Air Market's Division (CAMD) at <http://camddataandmaps.epa.gov/gdm> for calendar years 2005 through 2007.

Analysis of Daily Average NO<sub>x</sub> Emissions: The daily average NO<sub>x</sub> emissions for all units reporting to CAMD, in TPD, for CY2005, 2006, and 2007, by month, are as follows:

	<b>Daily Average NO<sub>x</sub> Emissions (TPD)</b>		
	<b>2005</b>	<b>2006</b>	<b>2007</b>
<b>January</b>	8.6	5.7	7.3
<b>February</b>	8.7	8.4	7.4
<b>March</b>	8.1	8.3	6.8
<b>April</b>	8.2	8.0	6.7
<b>May</b>	8.3	8.3	6.2
<b>June</b>	8.8	7.9	6.8
<b>July</b>	7.7	6.2	7.1
<b>August</b>	7.0	5.7	7.6
<b>September</b>	7.5	6.3	6.7
<b>October</b>	6.0	8.2	7.2
<b>November</b>	5.0	7.9	7.2
<b>December</b>	6.2	6.1	7.5
Stdev	1.2	1.1	0.4
Average	7.5	7.2	7.0

The daily average NO<sub>x</sub> emissions for each month between January 2005 and December 2007 is within one (1) standard deviation of the annual average daily NO<sub>x</sub> emissions for each month for all three (3) years, except for June 2005 (which is 1.03 standard deviations from the average). This indicates there is little variation in daily NO<sub>x</sub> emissions from month to month, and that operations under a 12-month rolling total facility-wide NO<sub>x</sub> cap will not result in high daily NO<sub>x</sub> emissions during times of bad air quality, and would not negatively impact applicable requirements.

Analysis of Highest Single Day NO<sub>x</sub> Emissions: The highest single day's NO<sub>x</sub> emissions for all units reporting to CAMD, in TPD, for calendar years 2005, 2006, and 2007, by month, are as follows:

	<b>Highest Single Day NO<sub>x</sub> Emissions (TPD)</b>		
	<b>2005</b>	<b>2006</b>	<b>2007</b>
<b>January</b>	11.0	7.5	8.8
<b>February</b>	9.8	9.4	9.1
<b>March</b>	10.5	9.5	8.2
<b>April</b>	9.4	11.4	13.0
<b>May</b>	10.8	9.4	7.2
<b>June</b>	11.1	9.1	7.9
<b>July</b>	9.6	7.8	8.6

<b>August</b>	8.5	7.1	8.9
<b>September</b>	9.4	8.1	8.1
<b>October</b>	11.3	10.2	8.9
<b>November</b>	6.5	10.0	9.0
<b>December</b>	8.3	7.2	8.6
Stdev	1.4	1.3	1.4
Average	9.7	8.9	8.8

Delaware's air quality is generally worst in the hot summer months of June, July and August. The highest single day NO<sub>x</sub> emission from the Delaware City Refinery were generally outside of this period. In all three (3) of the years analyzed the highest daily NO<sub>x</sub> emissions occurred during months where air quality is generally good in Delaware (i.e., October for 2005, and April for 2006 and 2007). In addition, only in three (3) months out of the thirty-six (36) months (i.e., October 2005, April 2006, and April 2007) analyzed did the highest single day NO<sub>x</sub> emission exceed the highest single day annual average plus one (1) standard deviation. This indicates that operations under a 12-month rolling total facility-wide NO<sub>x</sub> cap will not provide for high emissions on bad air quality days, and will not negatively impact applicable requirements.

Analysis of the Number of Days that NO<sub>x</sub> Emissions exceed Annual Average plus 1 standard deviation: The table below shows the number of days where daily NO<sub>x</sub> emission were greater than the annual average emissions plus one (1) standard deviation.

	<b>Number of Days NO<sub>x</sub> Emissions Were Greater Than Annual Average Plus 1 Standard Deviation</b>		
	2005	2006	2007
<b>January</b>	4	4	9
<b>February</b>	4	5	5
<b>March</b>	2	8	2
<b>April</b>	4	2	3
<b>May</b>	4	5	4
<b>June</b>	6	5	4
<b>July</b>	5	2	5
<b>August</b>	4	7	3
<b>September</b>	6	8	4
<b>October</b>	5	3	4
<b>November</b>	5	5	4
<b>December</b>	3	6	4

Out of these three (3) years, the maximum number of days that the daily NO<sub>x</sub> emissions exceed the mean/average plus one (1) standard deviation was only 9 (January 2007). On only seven (7) out of these thirty-six (36) months did the daily NO<sub>x</sub> emissions exceed one (1) standard deviation more than 5 times. And, the number of times the daily NO<sub>x</sub> emissions exceeded one (1) standard deviation is constant from month to month.

The above analysis indicates that relative to the 1997 ozone NAAQS, the planning assumptions used in the 2007 attainment demonstration SIP would not be undermined by the revisions to Section 2.0 of 7 DE Admin Code 1142. This is because refinery operations do not vary significantly from month to month, and actual emissions levels do not vary significantly over an ozone season or do not vary significantly on a daily basis within the months of the ozone season. Relative to the 2008 ozone NAAQS, planning is now underway but base year and attainment years have not yet been set. Preservation of the status quo air quality will prevent interference with Delaware's obligations to develop timely attainment demonstrations, and no interference with the ozone NAAQS (i.e., no change is being made that would upset the status quo).

Relative to the daily standard of the 2006 PM<sub>2.5</sub> NAAQS (which sets a lower threshold than the 1997 daily NAAQS and would address the daily standard under the 1997 NAAQS for which New Castle County is in attainment), the above analysis also indicates that the planning assumptions used in the 2008 attainment demonstration SIP would not be undermined by the revisions to Section 2.0 of 7 DE Admin Code 1142 (i.e., a 12-month rolling cap is consistent with attainment because refinery utilization and emissions do not vary significantly from month to month or from day to day).

Relative to the NO<sub>2</sub> NAAQS, area designations have not yet occurred. Because refinery operations do not vary significantly from month to month, and actual emissions levels do not vary significantly over the year, preservation of the status quo air quality will prevent interference with Delaware's obligations to develop timely attainment demonstrations, and no interference with the NO<sub>2</sub> NAAQS (i.e., no change is being made that would upset the status quo).

### **3. Conclusion**

Delaware concludes that the revisions to Section 2.0 of 7 DE Admin Code 1142 to 1) include the NO<sub>x</sub> control requirement for the Fluid Catalytic Cracking Unit CO boiler that were previously provided for in a 2008 consent agreement and 2) provide for a facility-wide NO<sub>x</sub> cap compliance alternative will not interfere with attainment or maintenance of any NAAQS or any other applicable requirement of the CAA