Commonwealth of Pennsylvania
Department of Environmental Protection

Request for a Marginal Classification for the Lancaster County Eight-Hour Ozone Nonattainment Area

June 2004

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Executive Summary

- On April 30, 2004, the U. S. Environmental Protection Agency (EPA) promulgated nonattainment designations and classifications for the eight-hour ozone national ambient air quality standard (NAAQS). 69 Fed. Reg. 23858. These designations and classifications were effective on June 15, 2004.
- Pennsylvania is requesting that EPA reclassify Lancaster County, currently a "moderate" 8-hr ozone nonattainment area, to a "marginal" eight-hour ozone nonattainment area in accordance with Section 181 (a)(4) of the 1990 Amendments of the Clean Air Act (CAA). 42. U.S.C. § 7511(a)(4)
- Lancaster County's 2001-03 8-hr ozone design value is 0.092 ppm. The upper extent of the marginal category listed in Table 1 of Subpart 2 is 0.091 ppm. This value is within 5% of the marginal category, one of the requirements for consideration to have a lower classification assigned to a nonattainment area.
- Lancaster County's 1-hr and 8-hr ozone design values, 2001-03 8-hr exceedances, NOx and VOC emissions and 2000 census populations are not significantly different than other marginal nonattainment areas in the United States.
- Lancaster County's 1-hr and 8-hr ozone design values and 2001-03 8-hr exceedances are comparable to other nonattainment areas in Pennsylvania that have less severe nonattainment classifications.
- HYSPLIT trajectory results and ozone measurements from Pennsylvania's high elevation site on South Mountain indicate significant regional loading and transport on days when Lancaster County's ozone monitor exceeds the 8-hr ozone standard.
- Reclassifying Lancaster County to a marginal 8-hr ozone nonattainment area will not cause a discontinuity in regional nonattainment classifications.
- Results from EPA's NOx-SIP Call modeling suggest Lancaster will reach attainment of the 8-hr ozone standard by 2007; the attainment date assigned to marginal nonattainment areas.

1 Introduction

On April 30, 2004, the EPA promulgated its final nonattainment designations for the 8-hr ozone NAAQS. 69 Fed. Reg. 23858. Seventeen (17) areas in Pennsylvania were designated as 8-hour ozone nonattainment areas. These nonattainment areas include 37 counties in Pennsylvania as well as additional counties in New Jersey and Ohio. The five-county Philadelphia area and Lancaster County were classified as "moderate" nonattainment areas, the highest 8-hour ozone nonattainment classifications in Pennsylvania.

The Commonwealth is formally requesting that the Lancaster County nonattainment area be reclassified as a "marginal" 8-hr ozone nonattainment area. This request is made in accordance with Section 181 (a)(4) of the CAA.

Section 181 (a)(4) of the CAA, 42 U.S.C. § 7411(a)(4), outlines the criteria that the EPA Administrator may consider when adjusting a nonattainment area's initial classification. This section provides that:

> If an area classified under paragraph (1) (Table 1) would have been classified in another category if the design value in the area were 5 percent greater or 5 percent less than the level on which such classification was based, the Administrator may, in the Administrator's discretion, within 90 days after the initial classification, by the procedure required under paragraph (3), adjust the classification to place the area in such other category. In making such adjustment, the Administrator may consider the number of exceedances of the national primary ambient air quality standard for ozone in the area, the level of pollution transport between the area and other affected areas, including both intrastate and interstate transport, and the mix of sources and air pollutants in the area.

The following sections of this submittal will outline several points supporting reclassifying Lancaster County as a marginal 8-hr ozone nonattainment area. These include:

- Lancaster County's 2001-2003 8-hr ozone design value vs. classification cut-offs.
- A comparison of Lancaster County, "marginal" nonattainment areas and other nonattainment areas within Pennsylvania. The comparison addresses:
    - 1-hr and 8-hr design values
    - 8-hr ozone exceedances
    - 1999 NEI NOx and VOC emissions
    - 2000 Census population figures
- An analysis of potential transport into and out of Lancaster County
- An analysis of regional nonattainment designations
- An analysis of EPA's NOx-SIP Call Modeling

2 Lancaster County Classification Analysis

EPA's 8-hr ozone nonattainment classification categories were included in its final rule published on April 30, 2004. (See, 69 FR 23858). Classifications for the 8-hour ozone health-based standards consider both the 1-hour and 8-hr ozone design values. The following table shown below and set forth in EPA's final rule contains a listing of different classification categories based on 8-hr ozone design values.

EPA Classification Table

TABLE 1

CLASSIFICATION FOR 8-HOUR OZONE NAAQS FOR AREAS SUBJECT TO SECTION 51.902(a)

Area class		8-hour design value (ppm ozone)	Maximum Period for Attainment Dates in State Plans (years after effective date of nonattainment designation for 8-hour NAAQS)
Marginal	from	0.085	3
	up to*	0.092	
Moderate	from	0.092	6
	up to*	0.107	
Serious	from	0.107	9
	up to*	0.120	
Severe-15	from	0.120	15
	up to*	0.127	
Severe-17	from	0.127	17
	up to*	0.187	
Extreme	equal to or above	0.187	20

* but not including

To qualify for an adjustment to the initial classification of a nonattainment area, an area must have an 8-hr ozone design value within 5% of the next higher or lower classification category. Lancaster County's 2001-03 8-hr ozone design value, 0.092 ppm, is well within 5% of the marginal classification cutoff. Lancaster County, therefore, should be considered for the lower marginal ozone nonattainment area classification for the 8-hr ozone NAAQS.

3 Lancaster County Comparisons

Several comparisons between Lancaster County, PA and other marginal nonattainment areas in the United States as well as other nonattainment areas in Pennsylvania will be outlined in this section. These include an analysis of 8-hr and 1-hr ozone design values,

8-hr exceedances, 1999 NEI NOx and VOC emission estimates and 2000 census population figures.

3.1 Eight-hour and One-Hour Ozone Design Values

Table 1 lists 8-hr and 1-hr ozone design values for all seven (7) marginal nonattainment areas in the United States and Lancaster County.

Table 1. Summary of all Marginal Areas in the US

Nonattainment Area	State	Counties/Cities/Parish	2001-03 8-hr DV	2001-03 1-hr DV
Imperial County	CA	Imperial	0.087	0.142
Baton Rouge	LA	Ascension, East Baton Rouge, Iberville, Livingston, West Baton Rouge	0.086	0.131
Beaumont/Port Arthur	TX	Hardin, Jefferson, Orange	*0.091***	*0.129* **
Portland	ME	Androscoggin, Cumberland, Sagadahoc, York	0.090	0.126
Atlanta	GA	Barrow, Bartow, Carroll, Cherokee, Clayton, Cobb, Coweta, De Kalb, Douglas, Fayette, Forsyth, Fulton, Gwinnett, Hall, Henry, Newton, Paulding, Rockdale, Spalding, Walton	0.091	0.125
San Francisco Bay Area	CA	Alameda, Contra Costa, Marin, Napa, San Francisco, San Mateo, Santa Clara, Solano, Sonoma	0.086	0.123
Norfolk-Virginia Beach-Newport News	VA	Chesapeake, Gloucester, Hampton, Isle of Wight, James City, Newport News, Norfolk, Poquoson, Portsmouth, Suffolk, Virginia Beach, Williamsburg, York	0.090	0.121
Lancaster County	**PA**	**Lancaster**	**0.092**	**0.124**

From EPA's online AirData website: http://www.epa.gov/air/data/geosel.html
*** Concentrations from Texas Natural Resource Commission, some monitors not in AIRS: http://www.tnrcc.state.tx.us/air/monops/index.html#ozdata*

While Lancaster County's 8-hr ozone design value is higher than all of the marginal 8-hr ozone nonattainment areas classified by EPA, its 1-hr design value lies in the lower range of the marginal areas; 0.124 ppm vs. the range for marginal areas, 0.121-0.142 ppm. This comparison indicates Lancaster County's 8-hr and 1-hr ozone design values are similar to

other areas in the country that EPA classified as marginal 8-hr ozone nonattainment areas.

3.2 Eight-hr Ozone Exceedances

Table 2 summarizes the number of 8-hr ozone exceedances for all the marginal nonattainment areas in other states and Lancaster County, PA from 2001 through 2003.

Table 2. Eight-hr Ozone Exceedances for Marginal Areas and Lancaster County

Nonattainment Area	State	2001	2002	2003	2001-03	Monitors
Imperial County	CA	27	26	9	62	6
Baton Rouge	LA	23	10	55	88	10
Beaumont/Port Arthur	TX	13	18	23	54	7
Portland	ME	21	35	5	61	6
Atlanta	GA	49	133	27	209	11
San Francisco Bay Area	CA	12	23	16	51	27
Norfolk-Virginia Beach-Newport News	VA	8	38	8	54	3
Lancaster County	**PA**	**15**	**18**	**3**	**36**	**1**

The number of 8-hr ozone exceedances in Lancaster County is comparable with the number of exceedances measured in 2001-2003 in other marginal nonattainment areas.

3.3 1999 National Emissions Inventory NOx and VOC Emission Estimates

Table 3 lists NOx and VOC emission estimates from the 1999 National Emissions Inventory (NEI). NOx and VOC are ozone precursors. Emission estimates from the 1999 NEI indicate that Lancaster County generally has lower emissions than most of the other seven (7) marginal nonattainment areas in other states. The NOx/VOC ratio for Lancaster County is lower than most of the marginal areas listed in Table 3. Additional comparisons for emissions per square mile and emissions per capita are summarized in section 3.5 of this document.

Table 3. NOx and VOC Emission Estimates from the 1999 NEI

Emissions Summary in TPY

Nonattainment Area	State	Total NOx	Total VOC	Total NOx & VOC
Imperial County	CA	17,064.27	15,392.53	32,456.80
Baton Rouge	LA	120,979.77	55,775.65	176,755.42
Beaumont/Port Arthur	TX	76,680.75	44,168.25	120,849.00
Portland	ME	37,310.43	39,835.20	77,145.63
Atlanta	GA	278,504.89	217,351.32	495,856.21
San Francisco Bay Area	CA	246,779.28	265,983.40	512,762.68
Norfolk-Virginia Beach-Newport News	VA	108,256.70	94,620.39	202,877.09
Lancaster County	**PA**	**23,832.16**	**28,133.62**	**51,965.78**

NOx/VOC Ratio

Nonattainment Area	State	NOx/VOC Ratio
Imperial County	CA	1.11
Baton Rouge	LA	2.17
Beaumont/Port Arthur	TX	1.74
Portland	ME	0.94
Atlanta	GA	1.28
San Francisco Bay Area	CA	0.93
Norfolk-Virginia Beach-Newport News	VA	1.14
Lancaster County	**PA**	**0.85**

3.4 2000 Census Figures

Table 4 lists the 2000 Census population figures for the seven (7) marginal ozone nonattainment areas other states and Lancaster County. Most of the marginal nonattainment areas (5 out of 7) have larger populations according to the 2000 census figures. Lancaster County's population falls within the range of figures for the 7 marginal nonattainment areas.

Table 4. Population Information from the 2000 Census

Marginal Nonattainment Areas and Lancaster County

Nonattainment Area	State	Total Population
Imperial County	CA	142,361
Beaumont/Port Arthur	TX	385,090
Portland	ME	591,361
Baton Rouge	LA	636,214
Norfolk-Virginia Beach-Newport News	VA	1,542,144
Atlanta	GA	4,228,492
San Francisco Bay Area	CA	6,783,760
Lancaster County	**PA**	**470,658**

3.5 Emissions per Square Mile and Person

Additional analyses were done for NOx and VOC emissions per square mile and per person. Values for Lancaster County and the seven (7) marginal nonattainment areas in other states were then compared.

Table 5 lists emissions per square mile. All emission values are expressed in tons per year. Emissions per square mile for Lancaster County are within the range of values for the seven (7) marginal nonattainment areas and below their average.

Table 5. Emissions/Square Mile

In Tons per Year

Nonattainment Area	State	Area (miles^2)	NOx (miles^2)	VOC (miles^2)	NOx + VOC (miles^2)
Imperial County	CA	4,175	4.1	3.7	7.8
Baton Rouge	LA	2,205	54.9	25.3	80.2
Beaumont/Port Arthur	TX	2,154	35.6	20.5	56.1
Portland	ME	2,551	14.6	15.6	30.2
Atlanta	GA	6,286	44.3	34.6	78.9
San Francisco Bay Area	CA	6,924	35.6	38.4	74.1
Norfolk-Virginia Beach-Newport News	VA	2,003	54.0	47.2	101.3
Lancaster County	**PA**	**949**	25.1	29.6	54.8

Table 6 lists NOx and VOC emissions per capita for Lancaster County and the seven (7) marginal nonattainment areas in other parts of the country. Lancaster County's emissions

per person lie within the range of the other marginal nonattainment areas and below their average.

Table 6. Emissions/Population

In Tons per Year

Nonattainment Area	State	Population	NOx Per Capita	VOC Per Capita	NOx + VOC Per Capita
Imperial County	CA	142,361	0.120	0.108	0.228
Baton Rouge	LA	636,214	0.190	0.088	0.278
Beaumont/Port Arthur	TX	385,090	0.199	0.115	0.314
Portland	ME	591,361	0.063	0.067	0.130
Atlanta	GA	4,228,492	0.066	0.051	0.117
San Francisco Bay Area	CA	6,783,760	0.036	0.039	0.076
Norfolk-Virginia Beach-Newport News	VA	1,542,144	0.070	0.061	0.132
Lancaster County	**PA**	**470,658**	**0.051**	**0.060**	**0.110**

3.6 Eight-Hour Ozone Nonattainment Areas in Pennsylvania

Table 7 contains a breakdown of Pennsylvania's seventeen (17) 8-hr ozone nonattainment areas listed in EPA's final nonattainmen designations published in the Federal Register on April 30, 2004. The five-county Philadelphia area and Lancaster County were classified as "moderate" nonattainment areas. The remainder of the nonattainment areas in Pennsylvania was classified as "basic" nonattainment areas under Subpart I. Lancaster County was designated nonattainment and classified as a "moderate" nonattainment area under Subpart 2 because its 1-hr ozone design value was greater than 0.120 ppm. EPA classified four (4) areas as "basic" nonattainment areas in other states, which had higher 8-hr ozone design values than Lancaster County. .

Table 8 lists 8-hr ozone exceedances measured in Pennsylvania's nonattainment areas from 2001 through 2003. There are fewer 8-hr ozone exceedances measured in Lancaster County than several nonattainment areas in other states with the lower "basic" nonattainment classification.

Table 7. Pennsylvania Eight-Hour Ozone Nonattainment Designations

April 30, 2004

Nonattainment Area Name	Counties	2001-03 8-hr DV	2001-03 1-hr DV	Classification	Attainment Date
Philadelphia-Wilmington, Atlantic City	Bucks Chester Delaware, Montgomery Philadelphia	0.106	0.133	Moderate	June 2010
Lancaster	Lancaster	0.092	0.124	Moderate	June 2010
Pittsburgh-Beaver Valley, PA	Allegheny Armstrong Beaver Butler Fayette Washington Westmoreland	0.094	0.120	Basic	June 2009
Youngstown-Warren-Sharon	Mercer	0.094	0.117	Basic	June 2009
Franklin Co	Franklin	0.093	0.114	Basic	June 2009
Erie	Erie	0.092	0.110	Basic	June 2009
Reading	Berks	0.091	0.116	Basic	June 2009
Allentown-Bethlehem-Easton	Carbon Lehigh Northampton	0.091	0.114	Basic	June 2009
Clearfield and Indiana	Clearfield Indiana	0.090	0.106	Basic	June 2009
York	Adams York	0.089	0.114	Basic	June 2009
Greene Co	Green	0.089	0.107	Basic	June 2009
Harrisburg-Lebanon-Carlisle	Cumberland Dauphin Lebanon Perry	0.088	0.111	Basic	June 2009
State College	Centre	0.088	0.109	Basic	June 2009
Johnstown	Cambria	0.087	0.106	Basic	June 2009
Scranton-Wilkes-Barre	Lackawanna Luzerne Monroe Wyoming	0.086	0.108	Basic	June 2009
Tioga Co	Tioga	0.086	0.102	Basic	June 2009
Altoona	Blair	0.085	0.107	Basic	June 2009

Table 8. Eight-hr Ozone Exceedances Pennsylvania Nonattainment Areas

Nonattainment Area	2001	2002	2003	2001-03	Monitors
Philadelphia- Wilmington, Atlantic City**	111	135	34	280	9
Lancaster	15	18	3	36	1
Pittsburgh-Beaver Valley, PA	105	206	54	365	15
Youngstown-Warren-Sharon	15	20	6	41	1
Franklin Co	15	27	3	45	1
Erie	4	17	4	25	1
Reading	15	24	4	43	2
Allentown-Bethlehem-Easton	34	41	11	86	3
Clearfield and Indiana	8	13	4	25	1
York	15	19	5	39	2
Greene Co	12	9	3	24	1
Harrisburg-Lebanon-Carlisle	29	31	7	67	3
State College	6	20	7	33	2
Johnstown	5	6	2	13	1
Scranton-Wilkes-Barre	22	35	9	66	4
Tioga Co	3	8	3	14	1
Altoona	3	9	3	15	1

**Five-County Philadelphia area only: Bucks, Chester, Delaware, Montgomery, and Philadelphia counties

4 Transport Analysis

An analysis of ozone transport into and out of the Lancaster County area was conducted using NOAA's HYSPLIT trajectory model. Trajectories were analyzed for each of the 8-hr exceedances measured at the Lancaster monitor from 2001-2003, thirty-six (36) days in all. This provided information on region transport and gauged the effects of transport on Lancaster County and how emissions transported from Lancaster County may affect other nearby nonattainment areas.

4.1 Regional Transport Analysis

Regional transport into and out of Lancaster County was gauged using HYSPLIT trajectories and ozone concentrations from surrounding counties in Pennsylvania and Maryland. Pennsylvania's high elevation site on South Mountain (Methodist Hill, elevation ~1900ft) provided addition information regarding regional ozone transport into southcentral Pennsylvania on days when 8-hr ozone concentrations were ≥ 0.085 ppm.

HYSPLIT back trajectories were calculated for each 8-hr ozone exceedances at the Lancaster monitor from 2001-03. Back trajectories were run at 500 meters, 1000 meters

and 1500 meters to gauge transport through the lower troposphere. Back trajectories from the Lancaster monitor fell into four basic categories; westerly transport from western PA/Ohio/West Virginia, southerly transport from the Baltimore-Washington area, regional recirculation and northerly transport from New York/Ontario/Quebec. Some episodes had combinations of these categories. Trajectories for all thirty-six (36) days are included in Appendix 1.

The vast majority of Lancaster's exceedances days were characterized by westerly transport. Transport out of the Baltimore-Washington area was the next most common followed by recirculation and northerly transport. Table 9 lists the frequency of these different transport regimes.

Table 9. Lancaster County Transport Regime Summary

Category	Westerly	Baltimore-Washington	Recirculation	Northerly
Exclusively	23	2	1	2
Primary	2	5	1	0
Secondary	3	2	2	1

Overnight 1-hr and 8-hr ozone concentrations at Pennsylvania's Methodist Hill monitor on South Mountain are summarized in Table 10 for these different transport regimes. Generally, overnight ozone concentrations tend to be higher under westerly and northerly transport regimes. Overnight concentrations are a significant portion, over 85% on average, of the 8-hr ozone standard. This suggests that there was significant regional loading and transport on days when ozone concentrations exceeded the 8-hr ozone standard at the Lancaster monitoring site.

Table 10. Average Overnight Ozone Concentrations at Methodist Hill

In parts per million (ppm)

	Westerly	Baltimore-Washington	Recirculation	Northerly
1-hr Peak	0.082	0.075	0.074	0.082
8-hr Peak	0.074	0.069	0.067	0.075

4.2 Regional Ozone Analysis

Ozone concentrations for monitors in the counties surrounding Lancaster County were surveyed on exceedances days to determine regional peak concentrations. Figure 1 shows the locations of the regional ozone monitors used in this analysis and Pennsylvania's high elevation site (Methodist Hill). Results from this analysis are summarized in Table 11. Most of the region's peak concentrations occurred outside Lancaster County for the thirty-six (36) exceedances days that were examined. Peak 8-hr ozone concentrations typically occurred at one of the Maryland monitors or at Pennsylvania's New Garden monitor. These monitors typically record downwind concentrations from the Baltimore/Washington region. This result indicates peak 8-hr ozone concentrations are generally occurring downwind of Baltimore/Washington area and not in Lancaster County.

Figure 1. Regional Ozone Monitors

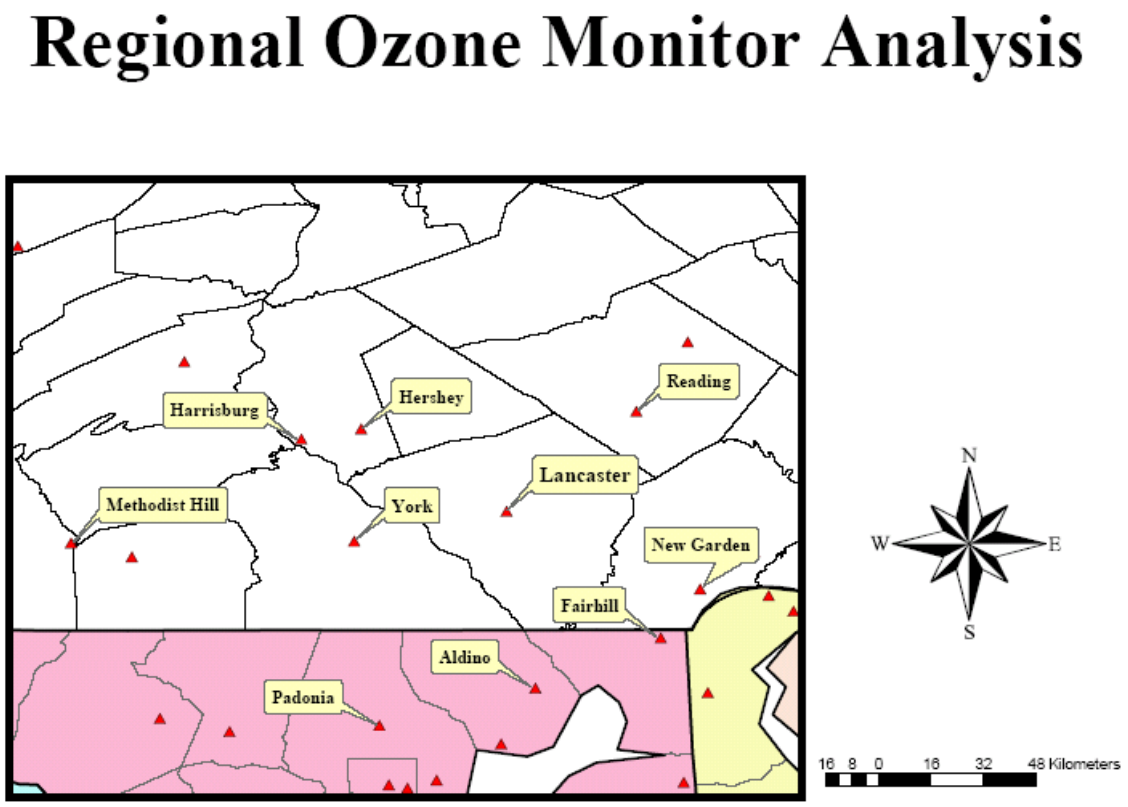


Table 11. Regional Eight-hr Peak Ozone Analysis

Percent of Peak Ozone Occurrences For Days When
Lancaster County's 8-hr Ozone Concentrations ≥ 0.085 ppm

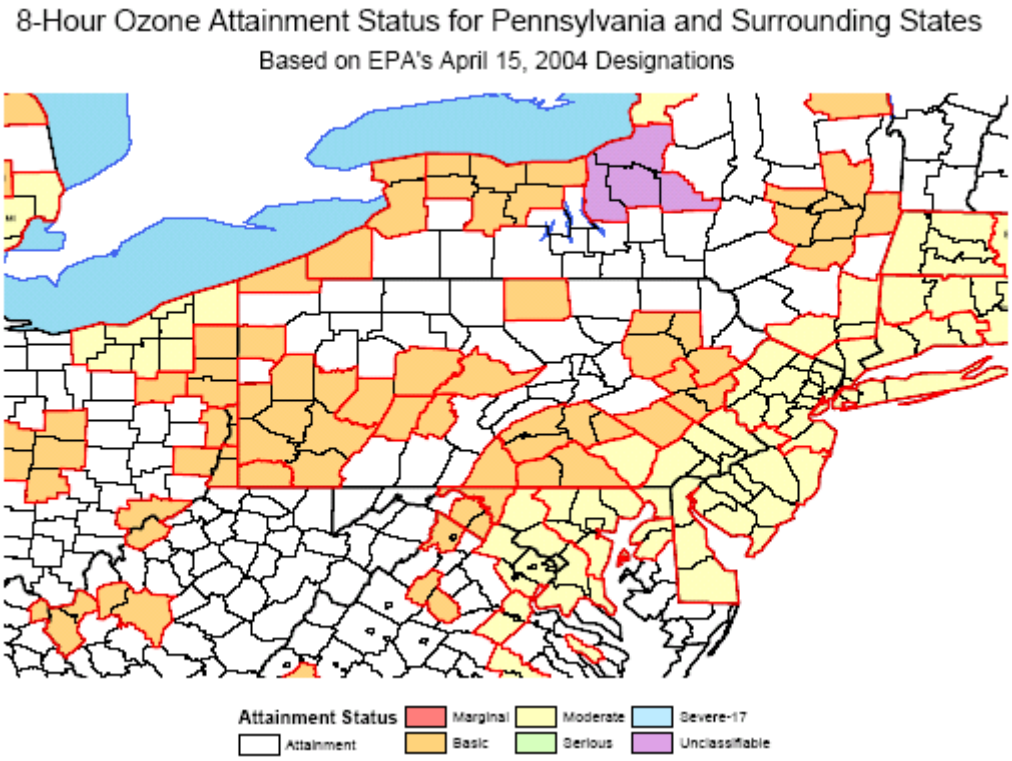
Lancaster County	Maryland	New Garden	Southcentral Pennsylvania
9.7%	36.1%	26.4%	27.8%

5 Regional Classification Analysis

Figure 1 shows nonattainment classifications in the Mid-Atlantic region promulgated by EPA on April 30, 2004. Lancaster County borders the Philadelphia and Baltimore 8-hr nonattainment areas on the east and the south. Both of these areas are classified as "moderate" 8-hr ozone nonattainment areas. Reclassifying Lancaster County to a "marginal" nonattainment area will remedy inconsistencies in the 8-hr ozone designation and classification process. This change will provide some gradation between more severely classified areas to the east and south and the lower basic designations along the Appalachian front.

EPA's newly promulgated classifications also show some inconsistency. Most of the moderate nonattainment areas in the Mid-Atlantic region with the exception of Lancaster County lie within the I-95 corridor. Reclassifying Lancaster County to a marginal area will remove this inconsistency.

Figure 2. Region Nonattainment Classifications



6 NOx-SIP Call Modeling

Results from EPA's NOx-SIP call modeling were examined to determine their effects on Lancaster County, PA. The NOx-SIP Call is a NOx emission control program based on work done by the Ozone Transport Assessment Group (OTAG). Numerous states including Pennsylvania agreed to impose NOx controls on large stationary sources under their jurisdiction. This program was effective in states within the Ozone Transport Region in May 2003 and the other NOx SIP Call states by May 31 of this year (2004).

Model results for the NOx-SIP Call are posted online. Pennsylvania downloaded model files and extracted model results for the Lancaster County monitor. An examination of possible attainment was conducted following Section 3 of EPA's "Draft Guidance on the use of Models and Other Analysis in Attainment Demonstrations for the 8-Hour Ozone NAAQS" (May 1999). We had some difficulty extracting some of the model days and were unable to use 3 days in our RRF calculation. Extracted model results for Lancaster County and corresponding 8-hr ozone concentrations are included in Appendix 2.

Lancaster County's estimated design value after the implementation of the NOx SIP Call is below the 8-hr ozone NAAQS. This result is based on the RRF calculated from EPA's

NOx-SIP Call modeling. The RRF is multiplied by Lancaster County's 2001-03 8-hr ozone design value and then compared to the 8-hr ozone NAAQS:

Lancaster County's 2001-03 8-hr ozone design value:

0.092 ppm

Lancaster County's RRF from EPA's NOx-SIP Call Modeling:

0.871

Calculation:

(RRF) × (2001-03 8-hr ozone design value)

(0.871) × (0.092 ppm) = 0.080 ppm

8-hr ozone NAAQS = 0.085 ppm

This result suggests the recently implemented NOx-SIP Call emission reductions will bring Lancaster County into attainment with the 8-hr ozone NAAQS. The model attainment year is 2007, which is the proposed attainment date for all "marginal" nonattainment classifications.

7 Summary

The Commonwealth of Pennsylvania is formally requesting that the Lancaster County nonattainment area be reclassified as a "marginal" 8-hr ozone nonattainment area. This request is made in accordance with Section 181 (a)(4) of the CAA. Pennsylvania's position for adjusting the initial classification Lancaster County from moderate to marginal 8-hr ozone nonattainment is supported by the following:

- Lancaster County's 2001-2003 8-hr ozone design value is 0.092 ppm. The upper extent of the marginal category listed in Table 1 of Subpart 2 is 0.091 ppm. This value is within 5% of the marginal category, one of the requirements for consideration to have a lower classification assigned to a nonattainment area.
- Lancaster County's 1-hr and 8-hr ozone design values, 2001-2003 8-hr exceedances, NOx and VOC emissions and 2000 census populations are not significantly different than other marginal 8-hr ozone nonattainment areas in the United States.
- Lancaster County's 1-hr and 8-hr ozone design values and 2001-2003 8-hr exceedances are comparable to other nonattainment areas in Pennsylvania that have less severe nonattainment classifications.

- HYSPLIT trajectory results and ozone measurements from Pennsylvania's high elevation site on South Mountain indicate significant regional loading and transport on days when Lancaster County's ozone monitor exceeds the 8-hr ozone standard.
- Reclassifying Lancaster County to a "marginal" nonattainment area will remedy inconsistencies in "marginal" nonattainment classifications.
- Results from EPA's NOx-SIP Call modeling project that Lancaster will reach attainment by 2007; the attainment date assigned to marginal nonattainment areas.

8 Citations and Acknowledgements

NOAA HYSPLIT:

Citation

Draxler, R.R. and Rolph, G.D., 2003. HYSPLIT (HYbrid Single-Particle Lagrangian Integrated Trajectory) Model access via NOAA ARL READY Website (http://www.arl.noaa.gov/ready/hysplit4.html). NOAA Air Resources Laboratory, Silver Spring, MD.

Rolph, G.D., 2003. Real-time Environmental Applications and Display sYstem (READY) Website (http://www.arl.noaa.gov/ready/hysplit4.html). NOAA Air Resources Laboratory, Silver Spring, MD.

Acknowledgment

The authors gratefully acknowledge the NOAA Air Resources Laboratory (ARL) for the provision of the HYSPLIT transport and dispersion model and/or READY website (http://www.arl.noaa.gov/ready.html) used in this publication.

EPA NOx SIP Call Model Results:

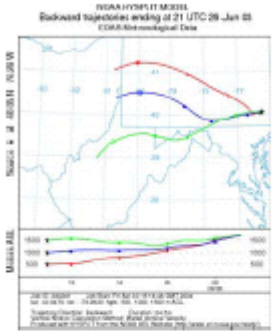
ftp://ftp.epa.gov/modelingcenter/NOx_SIPcall/.

Appendix 1.

Lancaster Trajectory Analysis

- June 26, 2003
- 8-hr Ozone Value: 0.121 ppm
- LNS Met Summary:

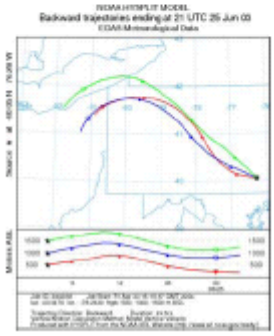
Max Temp:	91° F
Min Temp:	61° F
Precipitation:	0.00"



Lancaster Trajectory Analysis

- June 25, 2003
- 8-hr Ozone Value: 0.109 ppm
- LNS Met Summary:

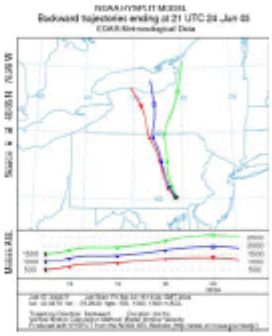
Max Temp:	90° F
Min Temp:	60° F
Precipitation:	0.00"



Lancaster Trajectory Analysis

- June 24, 2003
- 8-hr Ozone Value: 0.088 ppm
- LNS Met Summary:

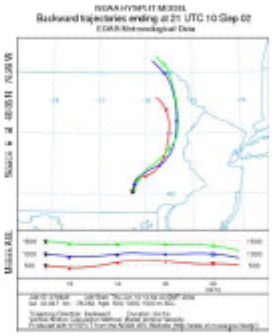
Max Temp:	87° F
Min Temp:	57° F
Precipitation:	0.00"



Lancaster Trajectory Analysis

- September 10, 2002
- 8-hr Ozone Value: 0.091 ppm
- LNS Met Summary:

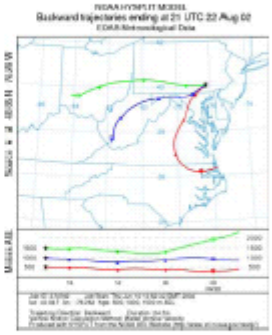
Max Temp:	97° F
Min Temp:	67° F
Precipitation:	0.00"



Lancaster Trajectory Analysis

- August 22, 2002
- 8-hr Ozone Value: 0.085 ppm
- LNS Met Summary:

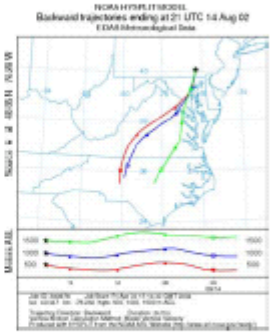
Max Temp:	93° F
Min Temp:	67° F
Precipitation:	0.03”



Lancaster Trajectory Analysis

- August 14, 2002
- 8-hr Ozone Value: 0.104 ppm
- LNS Met Summary:

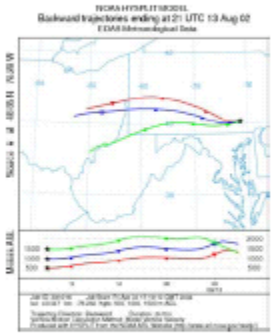
Max Temp:	100° F
Min Temp:	71° F
Precipitation:	0.00”



Lancaster Trajectory Analysis

- August 13, 2002
- 8-hr Ozone Value: 0.094 ppm
- LNS Met Summary:

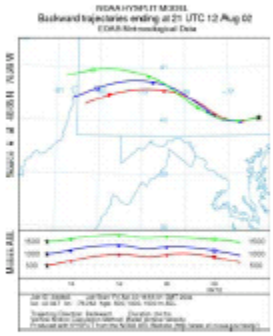
Max Temp:	99° F
Min Temp:	69° F
Precipitation:	0.00”



Lancaster Trajectory Analysis

- August 12, 2002
- 8-hr Ozone Value: 0.118 ppm
- LNS Met Summary:

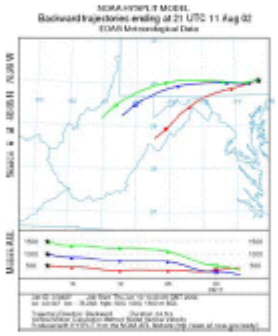
Max Temp:	97° F
Min Temp:	67° F
Precipitation:	0.00”



Lancaster Trajectory Analysis

- August 11, 2002
- 8-hr Ozone Value: 0.085 ppm
- LNS Met Summary:

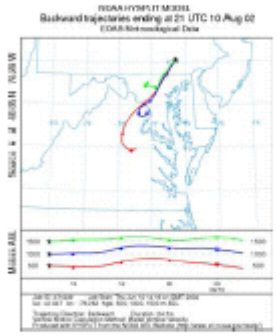
Max Temp:	94° F
Min Temp:	61° F
Precipitation:	0.00"



Lancaster Trajectory Analysis

- August 10, 2002
- 8-hr Ozone Value: 0.090 ppm
- LNS Met Summary:

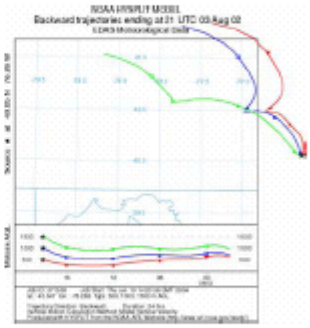
Max Temp:	90° F
Min Temp:	57° F
Precipitation:	0.00"



Lancaster Trajectory Analysis

- August 3, 2002
- 8-hr Ozone Value: 0.085 ppm
- LNS Met Summary:

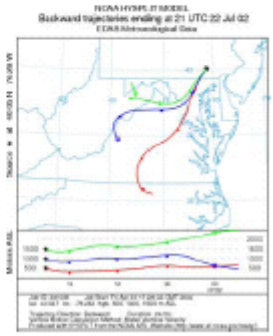
Max Temp:	95° F
Min Temp:	72° F
Precipitation:	0.95"



Lancaster Trajectory Analysis

- July 22, 2002
- 8-hr Ozone Value: 0.096 ppm
- LNS Met Summary:

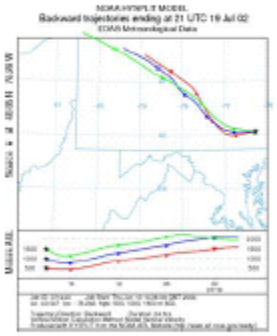
Max Temp:	94° F
Min Temp:	67° F
Precipitation:	0.00"



Lancaster Trajectory Analysis

- July 19, 2002
- 8-hr Ozone Value: 0.087 ppm
- LNS Met Summary:

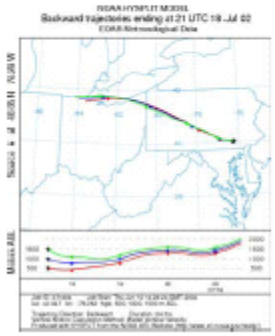
Max Temp:	92° F
Min Temp:	72° F
Precipitation:	0.02"



Lancaster Trajectory Analysis

- July 18, 2002
- 8-hr Ozone Value: 0.091 ppm
- LNS Met Summary:

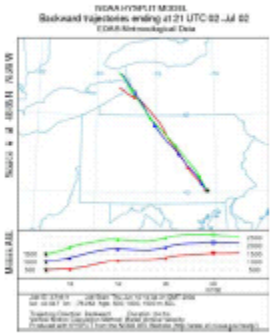
Max Temp:	92° F
Min Temp:	71° F
Precipitation:	0.00"



Lancaster Trajectory Analysis

- July 2, 2002
- 8-hr Ozone Value: 0.093 ppm
- LNS Met Summary:

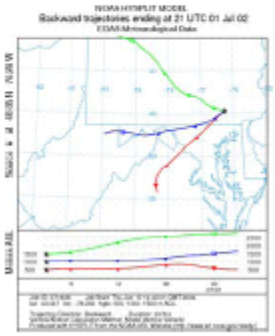
Max Temp:	94° F
Min Temp:	68° F
Precipitation:	0.00"



Lancaster Trajectory Analysis

- July 1, 2002
- 8-hr Ozone Value: 0.087 ppm
- LNS Met Summary:

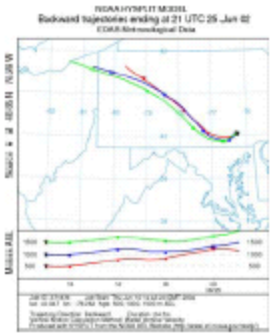
Max Temp:	90° F
Min Temp:	64° F
Precipitation:	0.00"



Lancaster Trajectory Analysis

- June 25, 2002
- 8-hr Ozone Value: 0.092 ppm
- LNS Met Summary:

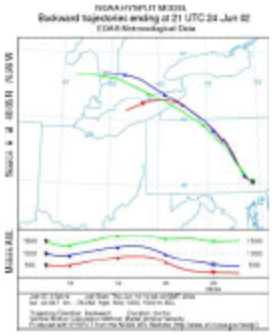
Max Temp:	91° F
Min Temp:	69° F
Precipitation:	0.00”



Lancaster Trajectory Analysis

- June 24, 2002
- 8-hr Ozone Value: 0.097 ppm
- LNS Met Summary:

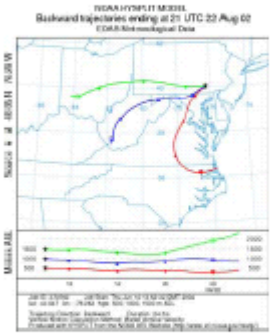
Max Temp:	91° F
Min Temp:	66° F
Precipitation:	0.05”



Lancaster Trajectory Analysis

- June 22, 2002
- 8-hr Ozone Value: 0.090 ppm
- LNS Met Summary:

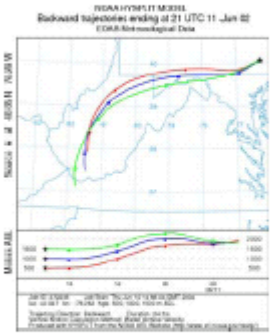
Max Temp:	86° F
Min Temp:	58° F
Precipitation:	0.00"



Lancaster Trajectory Analysis

- June 11, 2002
- 8-hr Ozone Value: 0.089 ppm
- LNS Met Summary:

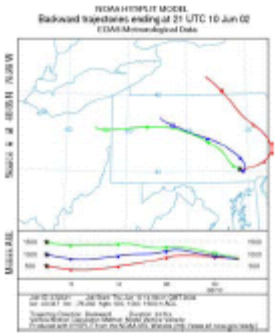
Max Temp:	92° F
Min Temp:	63° F
Precipitation:	0.00"



Lancaster Trajectory Analysis

- June 10, 2002
- 8-hr Ozone Value: 0.092 ppm
- LNS Met Summary:

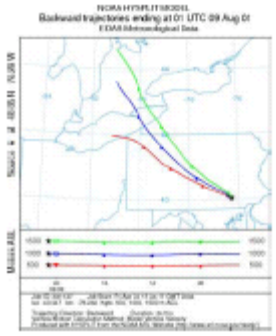
Max Temp:	85° F
Min Temp:	61° F
Precipitation:	0.00"



Lancaster Trajectory Analysis

- August 9, 2001
- 8-hr Ozone Value: 0.105 ppm
- LNS Met Summary:

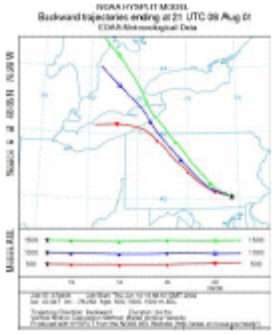
Max Temp:	98° F
Min Temp:	69° F
Precipitation:	0.00"



Lancaster Trajectory Analysis

- August 8, 2001
- 8-hr Ozone Value: 0.088 ppm
- LNS Met Summary:

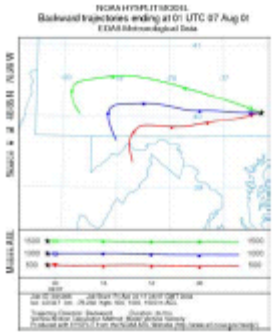
Max Temp:	98° F
Min Temp:	74° F
Precipitation:	0.00"



Lancaster Trajectory Analysis

- August 7, 2001
- 8-hr Ozone Value: 0.102 ppm
- LNS Met Summary:

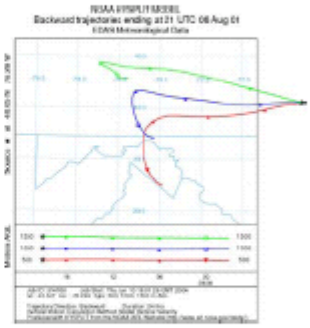
Max Temp:	96° F
Min Temp:	71° F
Precipitation:	0.00"



Lancaster Trajectory Analysis

- August 6, 2001
- 8-hr Ozone Value: 0.090 ppm
- LNS Met Summary:

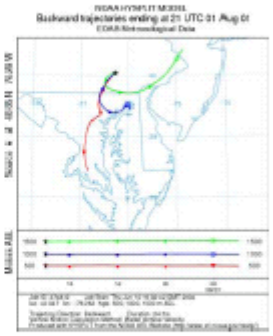
Max Temp:	90° F
Min Temp:	69° F
Precipitation:	0.00”



Lancaster Trajectory Analysis

- August 1, 2001
- 8-hr Ozone Value: 0.086 ppm
- LNS Met Summary:

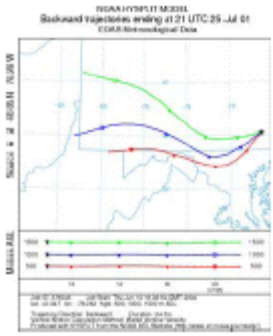
Max Temp:	87° F
Min Temp:	59° F
Precipitation:	0.00”



Lancaster Trajectory Analysis

- July 25, 2001
- 8-hr Ozone Value: 0.085 ppm
- LNS Met Summary:

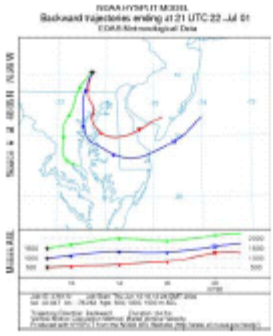
Max Temp:	96° F
Min Temp:	74° F
Precipitation:	0.00"



Lancaster Trajectory Analysis

- July 22, 2001
- 8-hr Ozone Value: 0.086 ppm
- LNS Met Summary:

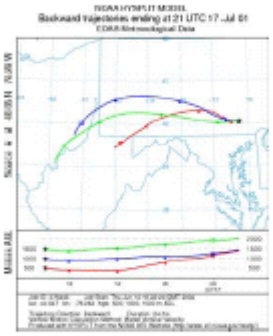
Max Temp:	86° F
Min Temp:	58° F
Precipitation:	0.00"



Lancaster Trajectory Analysis

- July 17, 2001
- 8-hr Ozone Value: 0.090 ppm
- LNS Met Summary:

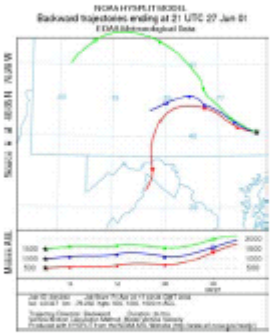
Max Temp:	85° F
Min Temp:	65° F
Precipitation:	0.00”



Lancaster Trajectory Analysis

- June 27, 2001
- 8-hr Ozone Value: 0.097 ppm
- LNS Met Summary:

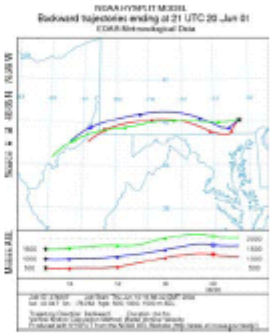
Max Temp:	96° F
Min Temp:	71° F
Precipitation:	0.00”



Lancaster Trajectory Analysis

- June 20, 2001
- 8-hr Ozone Value: 0.086 ppm
- LNS Met Summary:

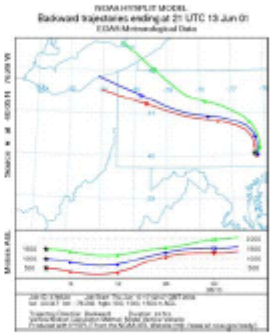
Max Temp:	91° F
Min Temp:	64° F
Precipitation:	0.50"



Lancaster Trajectory Analysis

- June 13, 2001
- 8-hr Ozone Value: 0.086 ppm
- LNS Met Summary:

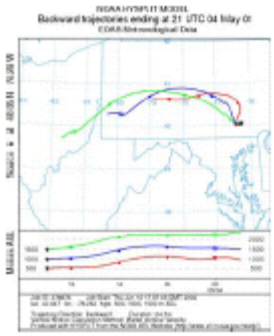
Max Temp:	88° F
Min Temp:	64° F
Precipitation:	0.00"



Lancaster Trajectory Analysis

- May 4, 2001
- 8-hr Ozone Value: 0.096 ppm
- LNS Met Summary:

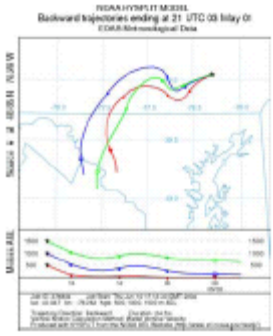
Max Temp:	89° F
Min Temp:	57° F
Precipitation:	0.00"



Lancaster Trajectory Analysis

- May 3, 2001
- 8-hr Ozone Value: 0.094 ppm
- LNS Met Summary:

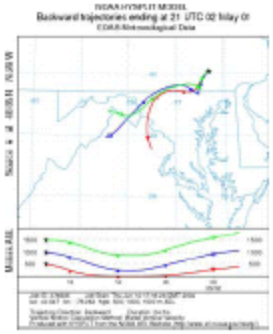
Max Temp:	88° F
Min Temp:	54° F
Precipitation:	0.00"



Lancaster Trajectory Analysis

- May 2, 2001
- 8-hr Ozone Value: 0.094 ppm
- LNS Met Summary:

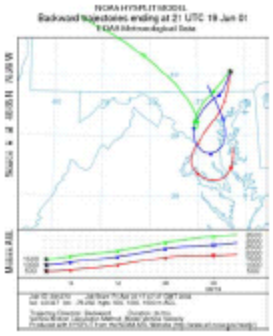
Max Temp:	88° F
Min Temp:	49° F
Precipitation:	0.00"



Lancaster Trajectory Analysis

- June 19, 2001
- 8-hr Ozone Value: 0.101 ppm
- LNS Met Summary:

Max Temp:	96° F
Min Temp:	71° F
Precipitation:	0.00"



Appendix 2

NOx SIP Call Results for Lancaster County

Data from: ftp://ftp.epa.gov/modelingcenter/NOx_SIPcall/

In Parts per Billion (ppb)

Date	Revised_2007_base	Revised_2007_budget	Revised_9596_base	Lancaster 8-hr
7/4/88	78.01	71.15		78
7/5/88	79.57	76.57	86.58	86
7/6/88	102.42	97.20	108.29	111
7/7/88	114.95	109.17	120.39	108
7/8/88	110.22	99.84	112.72	101
7/9/88	91.92	88.03	95.07	85
7/10/88	92.37	87.41	94.86	102
7/11/88	105.12	94.61	107.59	92
7/16/91	86.60	81.77	89.24	84
7/17/91	74.40	67.88	82.61	93
7/18/91	80.89	71.16	83.99	95
7/19/91		66.02	78.11	94
7/20/91	104.58	91.71	109.02	107
7/21/91	93.67	81.23	97.96	91
7/22/93		45.57	48.35	43
7/23/93		53.60	56.54	53
7/24/93		70.50	80.01	84
7/25/93		81.61	93.00	92
7/26/93		45.35	46.28	49
7/27/93	66.72		68.66	74
7/28/93	76.58	70.58	78.90	93
7/29/93		70.92	78.41	61
7/10/95		70.29	81.64	76
7/11/95			84.66	70
7/12/95		81.34	89.43	96
7/13/95		77.14	95.37	100
7/14/95		78.74	98.71	99
7/15/95		84.58	92.93	103
7/16/95		79.82	90.92	75
7/17/95		103.53	125.60	79
7/18/95		77.35	90.70	74

Rate Reduction Factor (RRF) Calculation for Lancaster, PA

** Followed EPA Draft Guidance on the use of models and other analyses in attainment demonstrations for the 8-hour ozone NAAQS, Example 3.2, page 39-41.

Lancaster, PA	
RRF	0.871
2001-03 8-hr DV	0.092
Result	**0.080**