State of Ohio Environmental Protection Agency
Division of Air Pollution Control

Cleveland-Akron-Lorain, OH

INTERIM
Eight-Hour Ozone Attainment Demonstration
and
15 Percent Rate of Progress

State Implementation Plan

Prepared by:
The Ohio Environmental Protection Agency
Division of Air Pollution Control

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Acknowledgement

The Ohio EPA, Division of Air Pollution Control would like to express appreciation for the extensive efforts, guidance and expertise provided by the Midwest Regional Planning Organization (Midwest RPO) staff. The significant amount of work in the areas of air quality modeling, model development, model inventory development and processing, data collection, data analysis and overall technical direction were and will continue to be invaluable in the development of this state implementation plan (SIP) and future submittals. The appendices to this document are populated with a multitude of technical products and documents generated by the Midwest RPO. This level of SIP development could not have been accomplished by Ohio EPA without the efforts and expertise of this dedicated group of professionals.

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Section One

Background

This document is the eight-hour ozone state implementation plan (SIP) for the Cleveland-Akron-Lorain, OH, area which includes Ashtabula, Cuyahoga, Geauga, Lake, Lorain, Medina, Portage and Summit counties. The Northeast Ohio Areawide Coordinating Agency (NOACA) is the metropolitan planning organization (MPO) that covers the five counties of Cuyahoga, Geauga, Lake, Lorain and Medina. The Akron Metropolitan Area Transportation Study (AMATS) is the MPO that covers Summit and Portage counties. For air quality efforts, NOACA acts as the designated local agency under § 174 of the federal Clean Air Act and, as such, is the lead organization for its five counties, AMATS two counties and Ashtabula County. Ashtabula County falls within the Cleveland Combined Metropolitan Statistical Area (CMSA) and is included for air quality analyses and plans. All discussions and data presented in this plan apply to all eight counties. Figure 1 shows the eight-county nonattainment area and the monitoring network.

The Clean Air Act Amendments of 1990 (CAAA) define five ozone nonattainment classifications for areas that exceed the National Ambient Air Quality Standard (NAAQS) based on the severity of the ozone levels. They are, in order of increasing severity: marginal, moderate, serious, severe, and extreme. Attainment dates and plan submission requirements depend on the classification designation for each area. To determine the level of the problem, the causes and solution, the state needs to; summarize the air quality data, identify the sources of emissions, identify control strategies, and demonstrate that the control strategies are sufficient to attain the eight-hour ozone standard.

In 1997, the United States Environmental Protection Agency (U.S. EPA) revised the NAAQS for ozone replacing the 1979 one-hour ozone standard with an eight-hour ozone standard set at 0.08 parts per million (ppm). The standard was challenged legally and upheld by the U.S. Supreme Court in February 2001.

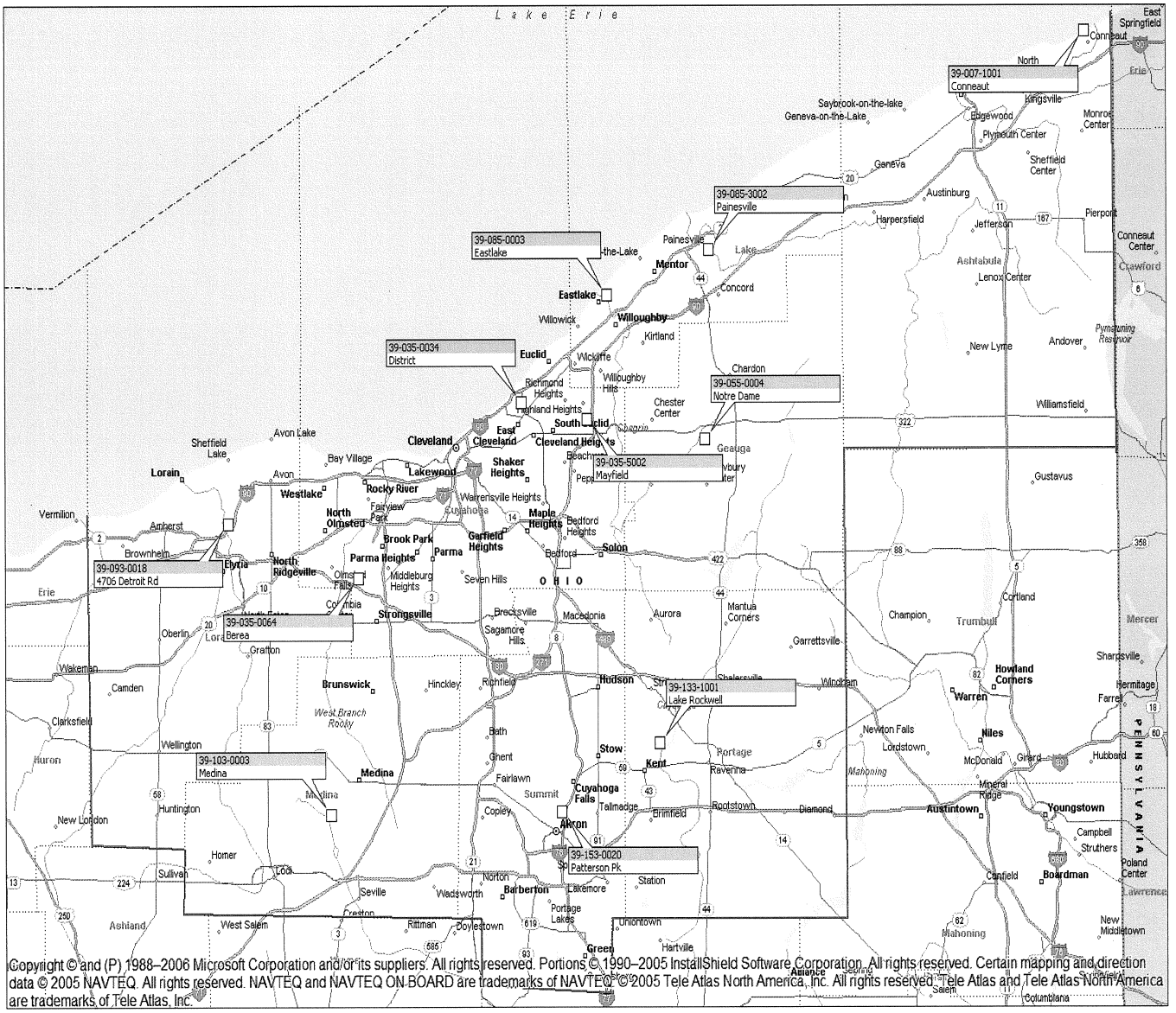
On April 15, 2004, U.S. EPA designated 134 nonattainment areas for the eight-hour ozone standard across the country. The Cleveland-Akron-Lorain, OH area is designated as a moderate ozone nonattainment area under this standard. The CAAA requires states with moderate ozone nonattainment areas to submit a plan by June 15, 2007 detailing how the eight-hour ozone standard will be attained by June 15, 2010. As part of this requirement, the state must also include a 15 percent Rate of Progress (ROP) Plan.

The NAAQS are air quality standards for pollutants that pose public health risks. The Cleveland-Akron-Lorain, OH area exceeds the eight-hour ozone NAAQS. High levels of ozone can harm the respiratory system and cause breathing problems, throat irritation, coughing, chest pains, and greater susceptibility to respiratory infection. Ozone is generally not directly emitted to the atmosphere, but is formed in the atmosphere by a

chemical reaction between volatile organic compounds (VOC), oxides of nitrogen (NOx) and carbon monoxide (CO) in the presence of sunlight. Because CO is only marginally reactive on producing ozone, the CO component of the 2002 base year inventory does not figure into the attainment demonstration. Therefore, only VOC and NOx components of the 2002 base year inventory are included.

Consequently, in order to reduce eight-hour ozone concentrations, the CAAA requires specific amounts of reductions in VOC and NOx emissions over a period of years until the eight-hour ozone standard is met. The first increment in this reduction process is the requirement to reduce VOC emissions by 15 percent by June 15, 2009.

Figure 1: The Cleveland-Akron-Lorain eight-hour ozone nonattainment area monitoring network



Section Two

Ambient Air Quality Data

In accordance with the CAAA, three complete years of ozone monitoring data are required to demonstrate attainment at a monitoring site. The eight-hour primary and secondary ozone ambient air quality standards are met at an ambient air quality monitoring site when the three-year average of the annual fourth-highest daily maximum eight-hour average ozone concentration is less than or equal to 0.08 ppm. When this occurs, the area is said to be in attainment. Three significant digits must be carried in the computations. Because the third decimal digit, in ppm, is rounded, 0.084 ppm is the largest concentration that is less than or equal to 0.08 ppm. Therefore, for the purposes of this plan, the eight-hour ozone standard is considered to be 0.085 ppm. Values below 0.085 ppm meet the standard, values equal to or greater than 0.085 ppm exceed the standard. These data handling procedures are applied on an individual basis at each monitor in the area. An area is in compliance with the eight-hour ozone NAAQS if, and only if, every monitoring site in the area meets the NAAQS. An individual site's 3-year average of the annual fourth highest daily maximum eight-hour average ozone concentration is also called the site's design value. The air quality design value for the area is the highest design value among all sites in the area. [*Source: "U.S. EPA-454/R-98-017, "Guideline on Data Handling Conventions for the eight-hour Ozone National Ambient Air Quality Standard" December 1998*]

Table 1 shows the Cleveland-Akron-Lorain, OH area monitoring data for 2004 – 2006. This data was retrieved from the U.S. EPA Air Quality System (AQS) database. The AQS contains ambient air pollution data collected by U.S. EPA, state, local and tribal air pollution control agencies from thousands of monitoring stations. Data from the AQS is used to assess air quality, assist in attainment/nonattainment designations, evaluate state implementation plans for nonattainment areas, perform modeling for permit review analysis, and manage other air quality management functions.

The AQS database is updated monthly by states and local environmental agencies that operate the monitoring stations. States provide the monitoring data to U.S. EPA as required by the CAAA. See Appendix A for the AQS database reports used for Table 1.

Table 1: Monitoring Data for Cleveland-Akron-Lorain, OH area 2004 –2006
Data source: U.S. EPA Air Quality System (AQS)
http://www.epa.gov/ttn/airs/airsaqs/index.htm

Data is certified

SITE ID	COUNTY	ADDRESS	YEAR	%OBS	1st 8-HR	2nd 8-HR	3rd 8-HR	4th 8-HR	2004-2006 AVERAGE
39-007-1001	Ashtabula	770 Lake Rd.	2004	100	.088	.088	.085	.081	
39-007-1001	Ashtabula	770 Lake Rd.	2005	99	.104	.095	.094	.093	
39-007-1001	Ashtabula	770 Lake Rd.	2006	99	.099	.099	.090	.096	0.086
39-035-0034	Cuyahoga	891 E. 152 St.	2004	87	.064	.062	.062	.057	
39-035-0034	Cuyahoga	891 E. 152 St.	2005	98	.098	.077	.077	.075	
39-035-0034	Cuyahoga	891 E. 152 St.	2006	97	.079	.077	.077	.074	0.068
39-035-0064	Cuyahoga	390 Fair St.	2004	93	.067	.065	.065	.063	
39-035-0064	Cuyahoga	390 Fair St.	2005	97	.087	.084	.079	.079	
39-035-0064	Cuyahoga	390 Fair St.	2006	100	.072	.071	.071	.068	.0.070
39-035-5002	Cuyahoga	6116 Wilson	2004	93	.086	.079	.079	.078	
39-035-5002	Cuyahoga	6116 Wilson	2005	97	.087	.081	.079	.078	
39-035-5002	Cuyahoga	6116 Wilson	2006	98	.090	.085	.083	.081	0.077
39-055-0004	Geauga	13000 Auburn	2004	99	.087	.084	.076	.075	
39-055-0004	Geauga	13000 Auburn	2005	95	.091	.090	.089	.088	
39-055-0004	Geauga	13000 Auburn	2006	100	.076	.072	.071	.070	0.086
39-085-0003	Lake	36010 Lakeshore	2004	100	.082	.080	.080	.079	
39-085-0003	Lake	36010 Lakeshore	2005	97	.118	.104	.099	.097	
39-085-0003	Lake	36010 Lakeshore	2006	98	.088	.084	.083	.083	0.080
39-085-3002	Lake	71 E. High	2004	96	.079	.076	.076	.076	
39-085-3002	Lake	71 E. High	2005	99	.104	.096	.090	.089	
39-085-3002	Lake	71 E. High	2006	100	.080	.076	.075	.075	0.074
39-093-0017	Lorain	601 Broad	2004	99	.083	.079	.074	.074	
39-093-0018	Lorain	4706 Detroit Rd.	2005	100	.099	.087	.085	.081	
39-093-0018	Lorain	4706 Detroit Rd.	2006	99	.077	.072	.069	.069	0.080
39-103-0003	Medina	6364 Deerview	2004	97	.085	.082	.077	.077	
39-103-0003	Medina	6364 Deerview	2005	99	.101	.094	.093	.090	
39-103-0003	Medina	6364 Deerview	2006	98	.076	.075	.074	.073	0.081
39-133-1001	Portage	1570 Ravenna	2004	100	.086	.084	.082	.081	
39-133-1001	Portage	1570 Ravenna	2005	100	.107	.093	.092	.092	
39-133-1001	Portage	1570 Ravenna	2006	99	.080	.079	.074	.070	0.081
39-153-0020	Summit	800 Patterson Ave.	2004	100	.087	.087	.080	.077	
39-153-0020	Summit	800 Patterson Ave.	2005	100	.096	.089	.089	.089	
39-153-0020	Summit	800 Patterson Ave.	2006	100	.082	.080	.077	.077	0.081
								Highest Average	**0.086 ppm**

A comprehensive list of the site's design values during the 2004-2006 time period is in Appendix A. The area's design value has trended downward as emissions have declined due to such factors as cleaner automobiles and fuels both regionally and locally, and improvements in both mobile sources and point sources, such as electrical generating units (EGUs).

Section Three

Emissions Inventory

Due to the length of this section, below is a summary of its subsections.

- Background
- Mobile source emission estimations and budgets
- 15 percent ROP plan
- Growth and control

Background

U.S. EPA's guidance requires the submittal of a comprehensive inventory of ozone precursor emissions (VOC and NO_x) representative of the currently identified base year, 2002 which meets the criteria set under the Phase I Eight-Hour Ozone Implementation Rule. Ohio also must demonstrate that the improvement in air quality between the year that violations occurred and the year that attainment is forecast based on permanent and enforceable emission reductions.

While a non-insignificant component of ozone and its precursors are transported into this region from outside areas this information does provide some indication of the impact from Ohio sources near the nonattainment area (Appendix E). The emissions are decreasing substantially in response to regional and national programs affecting many EGUs such as the Acid Rain program and the NO_x SIP Call. Other sectors of the inventory also impact ozone formation, but large regional sources such as EGUs have a substantial impact on the formation of ozone due to their high NOx emissions.

Ohio EPA prepared a comprehensive inventory for the Cleveland-Akron-Lorain, OH area including area, mobile, and point sources for precursors of ozone (VOCs and NO_x) for base year 2002. The information below describes the procedures Ohio EPA used to generate the 2002 base inventories. These inventories were provided to the Midwest RPO and have been processed to develop summer day emissions for use in the air quality analyses.

- Area sources were taken from the Ohio 2002 periodic inventory submitted to U.S. EPA. These projections were made from the U.S. Department of Commerce Bureau of Economic Analysis (BEA) growth factors, with some updated local information.

- Mobile source emissions were calculated from MOBILE6.2 produced emission factors by MPOs and the Ohio Department of Transportation (ODOT).

- Point source information was compiled from Ohio EPA's 2002 annual emissions inventory database and the 2002 U.S. EPA Air Markets acid rain database[1].

- Biogenic emissions are not included in these summaries, but were included in the ambient air quality modeling.

- Non-road emissions were generated using U.S. EPA's National Mobile Inventory Model (NMIM) 2002 application. To address concerns about the accuracy of some of the categories in U.S. EPA's non-road emissions model, Midwest RPO contracted with two companies to review the base data and make recommendations. One of the contractors also estimated emissions for three non-road categories not included in U.S. EPA's non-road model. Emissions were estimated for aircraft, commercial marine vessels and railroads. Recreational motorboat population and spatial surrogates (used to assign emissions to each county) were significantly updated. The populations for the construction equipment category were reviewed and updated based upon surveys completed in the Midwest and the temporal allocation for agricultural sources also was updated.

On-Road Emission Estimations

NOACA and AMATS in coordination with Ohio DOT utilize regional travel demand forecast models to simulate traffic in the area and to forecast traffic flows for given growth expectations. The models are primarily used as a long range planning tool to evaluate the transportation system including determination of locations where additional travel capacity may be needed and to determine the infrastructure requirements necessary to meet that need. They are also used as a tool for air quality purposes to estimate the total emissions of pollution caused by vehicles in the area. The travel demand forecasting models are used to predict the total daily vehicle miles traveled (VMT) and a U.S. EPA computer program called MOBILE6.2 is used to calculate emissions per mile. The product of these is the total amount of pollution emitted by the on-road vehicles for the particular analyzed area. In areas outside the regional travel demand model, traffic counts and statewide traffic growth rates are used for the VMT estimates.

MOBILE6.2 Overview

Broadly described, MOBILE6.2 is used to generate "emission factors", which are the average emissions per mile (grams/mile) for ozone precursors, NO_x and VOC. The MOBILE6.2 model includes a number of variables that affect the emission factors. These variables have national default values, some of which require modification to reasonably reflect local conditions. Some of these variables are discussed here. The vehicle fleet (vehicles on the road) age and

[1] http://www.epa.gov/airmarkets/acidrain

the vehicle type have a major effect on the emission factors. The vehicle types are traveling on facility types (MOBILE6.2 facility types are Freeway, Arterial, Local and Ramp) and the vehicle speeds also affect the emission factor values. Meteorological conditions such as air temperature and humidity have a significant affect on emission factors. Emission factors produced by MOBILE6.2 can also include the effect of emission reduction strategies such as vehicle inspection and maintenance programs, regulation of fuels, etc. MOBILE6.2 inputs are estimated using the best available data. These inputs are reviewed and agreed to by U.S. EPA and transportation agencies in a formal interagency consultation process.

There are a number of ways emission factors from MOBILE6.2 can be used with the travel demand model information. Each have their own advantages and disadvantages. One of the simplest methods is to input extensive vehicle fleet, area-specific speed and facility type information MOBILE6.2 to generate a single emission factor that represents the average for all vehicles and facility types in the modeled area. This method only requires multiplying this emission factor by the total VMT of the analyzed area to get the total emissions for the area.

Another method is to create multi-dimensional emission factor "look-up" tables that describe the emission factors by speed, temperature, and facility type. This requires more extensive processing, but the resulting total emissions of this method are more sensitive to even minor changes in the roadway system. Tables of emission factors are created using MOBILE6.2 for each facility type, temperature, and speed given the vehicle fleet on that facility. Then, the travel model provides information on each segment of road (or "link") regarding traffic volumes and facility type which is then "looked-up" in the appropriate emission factor table. It should be noted that speed is estimated as a post process to the travel demand model. Speeds are not taken directly from the travel demand model. Total emissions are calculated by multiplying link VMT by their appropriate emission factor. Both NOACA and AMATS use this method; however, the post process utilized by AMATS uses hour of day. It should be noted that each year analyzed will have different emission factors, volumes, speeds and roadway networks.

Some of the assumptions built into MOBILE6.2 are: older vehicles have much higher emission factors than newer vehicles, diesel vehicles have much higher NO_x emission factors and lower VOC emission factors than gasoline vehicles, and higher average speeds have lower emission factors except for diesel vehicles which have higher NO_x at higher speeds.

Best Available Data

Ohio EPA provides Ohio DOT with the most current vehicle age distribution data, temperature data, and fuel properties. Ohio DOT uses this data for generating emission factors for AMATS and Ashtabula County. NOACA generates its own

emission factors using the same inputs. Likewise, the most current transportation planning data available from NOACA and AMATS is used for the emissions estimates.

Analysis Years

Analysis years in this submittal include 2002, 2009, and 2018. The travel demand model presents the transportation system conditions for each of these years. Model runs for each future analysis year contain the road network NOACA and AMATS expect to exist at the beginning of that year with corresponding socioeconomic forecasts for that year.

Local Road VMT

Most local roads such as subdivision streets are not explicitly modeled in a travel demand model. Local road VMT is included by using traffic loaded on zonal centroid connectors. In addition, some local road traffic is captured as intra-zonal trips which travel demand models usually do not assign to roadway segments. Ohio DOT post process includes these trips as local road VMT.

Please note: MOBILE6.2 modeling runs were not performed for this interim submittal, but will be included with the final attainment demonstration submitted in December 2007. The on-road emissions inventory methodology discussion above is included for informational purposes and completeness.

Mobile Source Emission Inventory and Budgets

Table 2 contains the results of the emissions analysis for the Cleveland-Akron-Lorain, OH area.

Table 2: Combined VOC and NO_x Emission Estimations for On-Road Mobile Sources for the Cleveland-Akron-Lorain area in tons per day (tpd)

Data source: Midwest Regional Planning Organization (Midwest RPO) and can be viewed at: http://www.Midwest RPO.org/tech/emis/basek/BaseK_Reports.htm.

	2002	2009
VOC (tpd)	135.14	79.68
NOx (tpd)	229.24	138.35

Motor Vehicle Emission Budget

*Please note: Ohio EPA is requesting that U.S. EPA not approve the mobile vehicle emissions budgets contained in this interim submittal.

The MVEB is the total of all motor vehicle emissions identified in the SIP that an area can produce and still achieve the SIP's purpose of demonstrating attainment or maintenance of the air quality standards. The development of the MVEB is based upon the emissions inventory in the SIP. Motor vehicle emissions inventories are based upon the number of vehicles in the region, vehicle age, the rate of fleet turnover to newer and cleaner vehicles, seasonal temperatures in the area and other factors. The MVEB acts as a ceiling on transportation plan and transportation improvement program emissions. Table 3 contains the motor vehicle emissions budgets for the Cleveland-Akron-Lorain area.

Table 3: Mobile Vehicle Emissions Budget for the Cleveland-Akron-Lorain, OH area (tpd)

	2009
VOC (tons/day)	79.68
NO_x (tons/day)	138.35

This budget is the emission estimate calculated for 2009. The emission estimates are derived from the most recent travel demand model and MOBILE6.2.

All methodologies, latest planning assumptions were determined through the interagency consultation process described in the Transportation Conformity Memorandums of Understanding (MOU) for NOACA and AMATS.

Ohio DOT performed emission projections for the AMATS area and Ashtabula County while NOACA performed its own projections, both using the following approaches.

- Mobile source emission projections are based on the U.S. EPA MOBILE6.2 model. All projections were made in accordance with "Procedures for Preparing Emissions Projections" U.S. EPA-45/4-91-019.

- Emissions inventories are required to be projected to future dates to assess the influence growth and future controls will have. Midwest RPO has developed growth and control files for point, area, and non-road categories. These files were used to develop the future year emissions estimates used in this document. This was done so the inventories used for the attainment demonstration are consistent with modeling performed in the future.

The detailed inventory information for the NOACA, AMATS and Ashtabula County areas for 2002, 2009 and 2018 is in Appendix B. Emission trends are an important gauge for continued compliance with the ozone standard. Therefore, Ohio EPA performed an initial comparison of the inventories for the base year and maintenance years. Mobile source emission inventories are described in Appendix B. In addition to the Midwest RPO estimates, point source emissions were projected based upon the statewide EGU NO_x budgets from the Ohio NO_x rule.

15 Percent Rate of Progress Plan

The nonattainment plan provisions in the 1990 CAAA require states in nonattainment areas to submit to U.S. EPA a current inventory of actual emissions from all sources of relevant pollutants. This inventory is to be used as the basis for determining required emissions reductions. U.S. EPA has chosen calendar year 2002 as the time frame for this current emissions inventory which is called the 2002 Base Year Eight-Hour Ozone SIP Emissions Inventory (hereafter referred to as the 2002 base year inventory). Ohio's draft 2002 base year inventory is being submitted to U.S. EPA as part of this package.

The 15 percent reduction in VOC emissions is based on the 2002 base year inventory which is an inventory of 2002 actual VOC, NOx and CO emissions from sources in the Cleveland-Akron-Lorain, OH area. The amount of VOC emissions reduction that the area must achieve to meet the 15 percent requirement is determined from 2002 base year emissions levels after accounting for any growth in emissions between the base year 2002 and the projected year 2009. In effect, the plan to implement control measures by 2009 will not only reduce 2002 emission levels by 15 percent, but will also reduce emissions that will be produced as a result of economic growth. The plan must show that expected emissions reductions from federal and state control measures to be implemented by 2009 are enough to meet the required 15 percent reduction net of growth.

The Cleveland-Akron-Lorain, OH area implemented state rules identified in the 1994 15 percent ROP demonstration as part of the one-time CAAA requirements. These measures include the region's Motor Vehicle Inspection and Maintenance (I/M) Program (E-Check), Stage II vapor recovery from gasoline nozzles, enforcement cases, the original architectural coatings and removal of the 100 ton per year cut-off for VOC Reasonable Available Control Technology (RACT) requirements in the rural portion of the nonattainment area (including Stage I Vapor Recovery). While the March 14, 1994, 15 percent ROP plan submittal was not explicitly approved, these rules were assumed to be in place as part of the maintenance plan approved as part of the one-hour redesignation on May 7, 1996. Since U.S. EPA did not specifically approve the March 14, 1994 submittal, Ohio EPA has included the plan in this submittal (Appendix C) and is requesting that it be approved at this time.

In addition, the Phase I Eight-Hour Ozone Implementation Rule identifies a separate 15 percent VOC and/or NOx reduction requirement as part of a state's rate of progress demonstration toward achieving the eight-hour ozone standard.

In order to produce a 15 percent ROP plan, adjustments must be made to the 2002 base year inventory following U.S. EPA guidelines, and 2009 projected level of emissions must be calculated from the adjusted base year inventory. As a first step in calculating the adjusted base year inventory and 2009 projected level for the 15 percent ROP plan, the result's of Ohio's draft 2002 base year inventory for the moderate eight-hour ozone nonattainment area are provided below.

The 2002 base year inventory is categorized into EGU point, Non-EGU, Point Title V <100 tpd, Area, Non-road and On-road. VOC, NOx and CO are the ozone precursor emissions reported for each category in the 2002 base year inventory. Because CO is only marginally reactive on producing ozone, the CO component of the 2002 base year inventory does not figure into the 15 percent ROP plan. Therefore, only VOC and NOx components of the 2002 base year inventory are included in this plan. The results of Ohio's 2002 base year inventory are summarized in Table 4 through 13 for VOC and NOx emissions from each of this area's eight counties. The values in all of the tables are reported in tons per summer day (tpd). The peak ozone season for Ohio is defined as June 1 through August 31.

The data sources for all values are provided by the Midwest RPO and can be viewed at: http://www.Midwest RPO.org/tech/emis/basek/BaseK_Reports.htm.

The following tables include the sector categories of: Electrical Generating Unit (EGU-Point), Non-Electrical Generating Unit (Non-EGU), Title V Point <100 tpd, Non-road Mobile (includes Marine, Aircraft, and Rail (MAR)), Area, On-road Mobile (On-road).

Table 4: Ashtabula County (tpd)

Ashtabula County

VOC	2002	2009
EGU	10.69	7.18
Non-EGU	0.77	0.8
Point <100 tpd	0.75	0.7
Non-Road	8.99	8.03
Area	0.51	0.6
On-Road	5.86	3.85
TOTAL	27.57	21.16

NOx	2002	2009
EGU	0.08	0.05
Non-EGU	5.5	5.61
Point <100 tpd	0.3	0.03
Non-Road	5.13	4.48
Area	3.31	3.41
On-Road	12.22	6.04
TOTAL	26.54	19.62

Table 5: Cuyahoga County (tpd)

Cuyahoga County

VOC	2002	2009
EGU	0.06	0.12
Non-EGU	2.13	2.59
Point <100 tpd	3.01	3.33
Non-Road	25.61	16.35
Area	46.9	48.14
On-Road	59.52	32.86
TOTAL	137.2	103.39

NOx	2002	2009
EGU	5.13	4.82
Non-EGU	5.63	5.86
Point <100 tpd	1.5	1.64
Non-Road	40.28	30.8
Area	5.9	6.98
On-Road	91.45	57.25
TOTAL	149.9	107.35

Table 6: Geauga County (tpd)

Geauga County

VOC	2002	2009
EGU	0	0
Non-EGU	0	0
Point <100 tpd	0.06	0.07
Non-Road	3.85	2.8
Area	8.26	8.87
On-Road	4.3	2.34
TOTAL	16.47	14.08

NOx	2002	2009
EGU	0	0
Non-EGU	0	0
Point <100 tpd	0.01	0.01
Non-Road	2.07	1.56
Area	0.44	0.52
On-Road	9.22	3.86
TOTAL	11.74	5.95

Table 7: Lake County (tpd)

Lake County

VOC	2002	2009
EGU	0.31	0.31
Non-EGU	0.18	0.21
Point <100 tpd	0.89	0.91
Non-Road	8.17	5.53
Area	9.01	9.39
On-Road	9.32	6.44
TOTAL	27.88	22.79

NOx	2002	2009
EGU	71.16	28.43
Non-EGU	1.2	1.08
Point <100 tpd	0.21	0.21
Non-Road	8.27	6.7
Area	0.97	1.15
On-Road	15.51	11.48
TOTAL	97.32	49.05

Table 8: Lorain County (tpd)

Lorain County

VOC	2002	2009
EGU	0.33	0.21
Non-EGU	2.11	2.19
Point <100 tpd	0.55	0.61
Non-Road	8.1	5.49
Area	11.96	13.04
On-Road	12.7	7.42
TOTAL	35.75	28.96

NOx	2002	2009
EGU	56.94	6.73
Non-EGU	1.74	1.78
Point <100 tpd	0.66	0.69
Non-Road	13.6	10.63
Area	0.64	0.77
On-Road	20.77	12.51
TOTAL	94.35	33.11

Table 9: Medina County (tpd)

Medina County

VOC	2002	2009
EGU	0	0
Non-EGU	0.2	0.22
Point <100 tpd	0.71	0.81
Non-Road	3.6	2.78
Area	6.18	6.63
On-Road	7.89	4.83
TOTAL	18.58	15.27

NOx	2002	2009
EGU	0	0
Non-EGU	0.08	0.09
Point <100 tpd	0.45	0.45
Non-Road	4.02	2.93
Area	0.76	0.89
On-Road	17.12	8.48
TOTAL	22.43	12.84

Table 10: Portage County (tpd)

Portage County

VOC	2002	2009
EGU	0	0
Non-EGU	0.61	0.83
Point <100 tpd	0.56	0.52
Non-Road	4.32	3.81
Area	6.45	6.71
On-Road	8.76	5.28
TOTAL	20.7	17.15

NOx	2002	2009
EGU	0	0
Non-EGU	0	0
Point <100 tpd	0.27	0.28
Non-Road	5.68	3.97
Area	0.77	0.9
On-Road	19.01	9.35
TOTAL	25.73	14.5

Table 11: Summit County (tpd)

Summit County

VOC	2002	2009
EGU	0	0
Non-EGU	1.13	1.13
Point <100 tpd	0.54	0.52
Non-Road	9.24	6.2
Area	18.61	19.3
On-Road	26.79	16.66
TOTAL	**56.31**	**43.81**

NOx	2002	2009
EGU	0	0
Non-EGU	3.64	2.54
Point <100 tpd	0.04	0.04
Non-Road	11.53	8.16
Area	2.37	2.81
On-Road	43.94	29.38
TOTAL	**61.52**	**42.93**

Table 12: Cleveland-Akron-Lorain, OH Nonattainment Area Total VOC and NOx Emissions (tpd)

TOTAL VOC	2002	2009
EGU	11.39	7.82
Non-EGU	7.13	7.97
Point <100 tpd	7.06	7.47
Non-Road	72.18	50.99
Area	107.88	112.68
On-Road	135.14	79.68
TOTAL	**340.78**	**266.61**

TOTAL NOx	2002	2009
EGU	133.31	40.03
Non-EGU	17.79	16.96
Point <100 tpd	3.17	3.35
Non-Road	90.58	69.23
Area	15.16	17.43
On-Road	229.24	138.35
TOTAL	**489.25**	**285.35**

Table 13: Cleveland-Akron-Lorain, OH Area 2002 and 2009 Total VOC and NOx Emissions Comparison tons per summer day (tpd)

	2002	2009	Projected Decrease
VOC	340.78	266.61	74.17
NOx	489.25	285.35	203.9

Growth and Control

2009 Projected Level of VOC Emissions

The 2009 projected level of VOC emissions is the maximum amount of anthropogenic (human-caused) VOC emissions allowed in 2009 under the ROP requirement. In Ohio, this is the maximum amount of anthropogenic VOC emissions that are allowed in the Cleveland-Akron-Lorain, OH area in 2009. Ohio calculates its 2009 Projected Level to be 266.61 tpd of VOC emissions.

2009 Growth Factors and the 2009 Current Control Projection Inventory

In order to determine the total amount of VOC emissions reductions required by 1996, future emissions levels must be estimated. For this purpose, 2009 growth factors are developed for the various source categories of emissions based on economic indicators. The 2002 baseline emissions are multiplied by these growth factors, and the resulting inventory is called the 2009 Current Control Projection Inventory (CCPI). The 2009 CCPI is an estimation of the amount of VOC emissions that will occur in 2009 if no new emission control measures are implemented between 2002 and 2009.

The difference between the 2009 CCPI and the 2009 projected level of emissions is the total amount of emissions that the state must plan to reduce in order to meet the 15 percent VOC reduction requirement. This section contains a discussion of how the total VOC emissions reduction requirement is determined.

The 2009 CCPI of VOC's for the Cleveland-Akron-Lorain, OH area is summarized in Table 14 below. Also included for comparison purposes in this table is the 2002 baseline inventory.

Table 14: Summary of 2009 CCPI VOC Emissions for the Cleveland-Akron-Lorain, OH Eight-Hour Ozone Nonattainment Area (tpd)

	2002	2009
EGU	11.39	7.82
Non-EGU	7.13	7.97
Point <100 tpd	7.06	7.47
Non-road	72.18	50.99
Area	107.88	112.68
On-road	135.14	79.68

The EGU Point, Non-EGU, Non-Road source portions of the 2009 Current Control Projection Inventory are essentially created by multiplying 2002 baseline emissions values by the appropriate growth factors. The on-road mobile source emissions are projected by multiplying emission factors generated using the MOBILE6.2 software by projected 2009 vehicle miles traveled (VMT).

Section Four

Clean Air Act Requirements

As required by Section 172 of the 1990 CAAA Amendments and subsequent federal rulemakings, in the mid-1990's Ohio promulgated rules requiring Reasonably Available Control Technology (RACT) for emissions of VOCs from stationary sources. There were no specific rules required by the CAAA such as RACT for existing sources beyond statewide rules. Statewide RACT rules have been applied to all new sources locating in Ohio since that time. The Ohio rules are found in Ohio Administrative Code (OAC) Chapter 3745-21. (Appendix G)

U.S. EPA's NO_x SIP Call required 22 states to pass rules that would result in significant emission reductions from large EGUs, industrial boilers, and cement kilns in the eastern United States. Ohio passed this rule in 2001. Beginning in 2004, this rule accounts for a reduction of approximately 31 percent of all NO_x emissions state-wide compared to previous uncontrolled years. The other 21 states also have adopted these rules.

Controls for EGUs formally commenced May 31, 2004. Emissions covered by this program have been generally trending downward since 1998 with larger reductions occurring in 2002 and 2003. Data taken from U.S. EPA Clean Air Markets Web site, quantifies the gradual NO_x reductions that have occurred in Ohio as a result of Title IV of the 1990 CAAA Amendments and the beginning of the NO_x SIP Call Rule. Ohio developed the NO_x Budget Trading Program rules in OAC Chapter 3745-14 in response to the SIP Call. OAC chapter 3745-14 regulated EGUs and certain non-EGUs under a cap and trade program based on an 85 percent reduction of NOx emissions from EGUs and a 60 percent reduction of NO_x emissions from non-EGUs, compared to historical levels. This cap will stay in place through 2008, at which time the U.S. EPA Clean Air Interstate Rule (CAIR) program will supersede it.

U.S. EPA's rule to control nitrogen oxides from specific source categories (Code of Federal Regulations (CFR) Section 40 Parts 51, 72, 75 and 96, published on October 17, 1998 and referred to as the NO_x SIP Call) has significantly reduced emissions from large EGUs, industrial boilers, and cement kilns. Ohio's NO_x Budget Trading Program Rule was approved on May 25, 2004 (OAC Chapter 3745-14). It is expected that this downward trend will continue as the above programs continue and some form of the CAIR is implemented.

On April 21, 2004, U.S. EPA published Phase II of the NO_x SIP Call that establishes a budget for large (greater than 1 ton per day emissions) stationary internal combustion engines. Ohio EPA's proposed rule OAC 3745-14-12 addresses stationary internal combustion engines, all used in natural gas pipeline transmissions. An 82 percent NO_x reduction from 1995 levels is anticipated. Completion of the compliance plan is expected by May 1, 2006 and the compliance demonstration will begin May 1, 2007. The 2007 controlled NO_x emissions will be 599 tons per day.

The requirements under the 15 percent ROP revisions and subsequent one-hour maintenance plan are still being implemented.

Tier II Emission Standards for Vehicles and Gasoline Sulfur Standards

In February 2000, U.S. EPA finalized a federal rule to significantly reduce emissions from cars and light trucks, including sport utility vehicles (SUVs). Under this proposal, automakers will be required to sell cleaner cars, and refineries will be required to make cleaner, lower sulfur gasoline. This rule will apply nationwide. The federal rules will phase in between 2004 and 2009. U.S. EPA has estimated that NO_x emission reductions will be approximately 77 percent for passenger cars, 86 percent for smaller SUVs, light trucks, and minivans, and 65 to 95 percent reductions for larger SUVs, vans, and heavier trucks. VOC emission reductions will be approximately 12 percent for passenger cars, 18 percent for smaller SUVs, light trucks, and minivans, and 15 percent for larger SUVs, vans, and heavier trucks.

Heavy-Duty Diesel Engines

In July 2000, U.S. EPA issued a final rule for Highway Heavy Duty Engines, a program which includes ultra low sulfur diesel fuel standards. This rule applies to heavy-duty gasoline and diesel trucks and buses. It is anticipated that this rule will result in significant reductions in NO_x from diesel trucks and buses, a large sector of the mobile sources NO_x inventory.

Clean Air Non-road Diesel Rule

In May 2004, U.S. EPA issued the Clean Air Non-road Diesel Rule. This rule applies to diesel engines used in industries such as construction, agriculture, and mining. It also contains a cleaner fuel standard similar to the highway diesel program. The new standards will cut emissions from non-road diesel engines by more than 90 percent. Non-road diesel equipment, as described in this rule, currently accounts for 47 percent of diesel particulate matter (PM) and 25 percent of NO_x from mobile sources nationwide. Sulfur levels will be reduced in non-road diesel fuel by 99 percent from current levels, from approximately 3,000 ppm now to 15 ppm in 2010. New engine standards take effect, based on engine horsepower, starting in 2008. Together, these rules will substantially reduce local and regional sources of ozone precursors.

New Source Review

Ohio has a long standing and fully implemented New Source Review (NSR) program. This is addressed in OAC Chapter 3745-31. The chapter includes provisions for the Prevention of Significant Deterioration (PSD) permitting program in OAC 3745-31-01 to 3745-31-20. Ohio's PSD program was conditionally approved on October 10, 2001 (66 FR 51570) and received final approval on January 22, 2003 (68FR 2909) by U.S. EPA as part of the SIP.

Any facility that is not listed in the 2002 emission inventory, or for the closing of which credit was taken in demonstrating attainment, will not be allowed to construct, reopen, modify, or reconstruct without meeting all applicable permit rule requirement. The review process will be identical to that used for new sources.

Section Five

Control Strategies

Ohio EPA and the Midwest RPO have been evaluating regional air quality and the impact of alternative emission reduction scenarios through the use of photochemical grid models, most notably, the Comprehensive Air Model with Extensions (CAMx), over the past several years. The CAMx model was used to evaluate future air quality assuming growth and control consistent with Pechan reports dated, 2004 and 2005 (Appendix D) and also incorporating on-the-books controls such as CAIR, the Federal Motor Vehicle I Program, the Maximum Achievable Control Technology (MACT) standards and enforcement settlements for large utilities and petroleum refineries across the Midwest.

Ohio EPA has evaluated several control options which would reduce ozone precursors in the Cleveland-Akron-Lorain area. Many of these options have been collectively identified as the "Midwest RPO White Papers", which are located at: http://MidwestRPO.org/Regional_Air_Quality.html. Several control options are currently being considered for adoption provided the supplemental 2005 based air quality analyses indicate that additional controls are warranted. The current strategy includes the previously mentioned NO_x and VOC RACT, CAIR and other state and federal requirements. These controls result in significant emission reductions. In addition, the programs identified below have been adopted or will be adopted by the 2009 ozone season and result in improvements to air quality. After review of these options, the following control programs were incorporated as part the control strategy included in the attainment demonstration.

Portable Fuel Containers:
This rule is an effective state rule to control VOCs statewide through the improved design of portable fuel containers (gas cans) and has a compliance date of July 1, 2007. U.S. EPA approved this revision into the SIP on March 30, 2007.

Architectural and Industrial Maintenance (AIM) Coatings:
This rule has been adopted by the State of Ohio to control VOCs statewide through the revised formulation of AIM coatings and is being submitted as part of this package. Compliance is January 1, 2009. (Appendix G)

Consumer and Commercial Products:
This rule has been adopted by the State of Ohio to control VOCs statewide through the revised formulation of various consumer products such as hair sprays and deodorants and is being submitted as part of this package. This rule has compliance dates of March 15, 2008 and January 1, 2009. (Appendix G)

Weight of Evidence

The modeling analysis developed in support of this package resulted in predicted future year design values within the window identified by U.S. EPA as needing corroboratory evidence that the area should or should not be expected to attain the NAAQS by the attainment date. This additional evidence has been termed 'weight of evidence' (WOE) and utilizes ambient air quality data, ambient air quality trends, emissions trends, meteorologically adjusted ambient air quality trends and other data that would indicate the future air quality that should be expected for the Cleveland-Akron-Lorain area.

Appendix F is a composite of WOE analyses performed by the Midwest RPO on behalf of the member states, including Ohio. While the analyses are not conclusive, the data generally indicate an expected continual improvement in air quality. Ambient air quality trends, emissions trends and statistical analyses utilizing meteorological weighting can provide additional insight into expected future air quality. An extremely powerful piece of evidence is the current design value for the period 2004-2006 which indicates only one monitor in the region not currently attaining the ambient standard and that monitor is at 86 ppb for that period. An "Overview of Regional Planning Activities" presentation by LADCO providing regional emissions tables, ozone trends and other related information is also located in Appendix F.

Section Six

Attainment Demonstration

Ohio EPA, as part of the Midwest RPO, participated in the development of emissions inventories, meteorological data bases, photochemical model development and control strategy development to address the regional eight-hour ozone nonattainment areas. The Cleveland-Akron-Lorain nonattainment area is the only CAAA Subpart 2 moderate ozone nonattainment area in Ohio; thus, it has an attainment date of June 15, 2010, which is six years after its designation. This dictated that the modeling demonstration be performed for the 2009 ozone season with the planned control strategies and growth assumptions consistent with the expectations for that year.

Emissions Inventory:
As part of the state plan, all potential sources of VOC and NOx have to be identified and emissions quantified. This is accomplished through the development of an emissions inventory. These inventories are developed by states on a periodic basis. While the initial 2002 inventory developed for this area coincided with the air quality designations, a 2005/2009 inventory is being developed and will be the basis for the inventory used in a subsequent air quality analysis. This plan submittal includes the official submittal of this 2002 inventory being used as the basis for the interim air quality analysis (Appendix B). Note: additional modeling utilizing the most recent inventory for 2005 is being developed and will be submitted in a subsequent submittal. This submittal includes the documentation of methodologies used to develop the 2005 inventory. In order to demonstrate that a plan will be sufficient to attain the air quality standard by June 15, 2010, a demonstration that control strategies in place by the 2009 ozone season is necessary. Therefore, a projected 2009 emissions inventory is also necessary.

Emissions Processing:
Ohio's base year inventory is supplied to both U.S. EPA and the Midwest RPO in the form of tons per year emissions calculations for each source sector. In addition to being processed to generate estimates of future year emissions, the data must be processed to generate estimates of hourly emission rates for use in the photochemical. In addition, the subspecies of VOC and NOx are also generated for each emission type to better represent the actual compounds (and their photochemical reactivity). To accomplish this, temporal and species 'profiles' are utilized to apportion the emission correctly for typical weekday, Saturday and Sunday patterns. These profiles are incorporated into the emissions modeling system (EMS) and the CONsolidated Community Emissions Processing Tool (CONCEPT) emissions processing tools used to generate the hourly emission rates for use in the photochemical grid models used to estimate air quality.

The EMS 2004 is utilized to provide temporal profiles and speciation profiles to the various emission sources. This is a necessary step to generate hourly emissions information which is consistent with the daily, weekly and monthly variation in the operation of specific source types as well as provide more precise reactivity information to the photochemical grid model from state data which are annual average, generic (i.e.

VOC) emissions totals. A summary of the emissions processing is contained in Appendix E.

To forecast future growth and control in the development of 2009 emission inventories, contractor assistance (E.H. Pechan 2004, 2005, in Appendix D) was used to generate growth and control values for application to each industrial source type. On-road emission forecasts were based on travel demand information provided by the MPO or Ohio DOT and were subsequently processed through the MOBILE6.2 emissions model. Non-road estimates were based on NMIM model estimates.

Meteorological Data:
Meteorological data sets were developed for the year 2002 (subsequent analysis will be based on the 2005 meteorological year) and were processed using the MM5 meteorological processor consistent with the approach detailed LADCO & Midwest RPO report dated 2005, contained in Appendix E.

Air Quality Model:
The Comprehensive Air Model with Extensions (CAMx) is an advanced photochemical grid model which can cover a large geographic are with multiple vertical layers and horizontal grid resolution from less than a kilometer to several kilometers. The model allows for various treatments of the chemical processes that convert precursor chemicals into ozone. The specific protocol under which the CAMx modeling was performed for this demonstration is contained in the Midwest Regional Planning Organization Modeling Protocol (2005) contained in Appendix E.

Performance Evaluation:
A model performance study was conducted to assess the ability of the model to replicate actual air quality. Even though the model is applied in a relative sense instead of an absolute sense, a model performance evaluation is necessary to determine if the model is operating properly and is providing the right answers for the right reasons. The summary of the evaluation is contained in Appendix E.

Air Quality Modeling Results:
Round 4 modeling results using the Base K 2002 inventory and grown 2009 emission inventories, produced by the Midwest RPO (Appendix E), evaluated several control strategies, including those which simulated 'beyond CAIR' utility programs as well as the simulation of several industrial and area source control options identified in what have been labeled 'the Midwest RPO White Papers'. These reports evaluated a series of candidate control options and identified various levels of control. The expected emission reductions and cost effectiveness of each of the options was then calculated.

While no scenario exactly matches the current package of control options being adopted for the Cleveland-Akron-Lorain area, Scenario 3a, "All-Min" (Appendix E), most closely reflects this level of control. The Midwest RPO contracted with MACTEC to evaluate several candidate control measures for consideration by states in evaluating potential control strategies to achieve attainment. These control options were evaluated

at levels that have been demonstrated to be achievable in existing state plans and were also evaluated for more extreme levels of potential reductions. The Midwest RPO also performed several control strategy photochemical model runs to evaluate the potential air quality benefits of packages of these control options. "All Min" represents a control strategy analysis which assumed the set of potential control strategies was being implemented at the lesser level of control in the study area. The projected future 2009 design value at the worst case monitor in the nonattainment area is 87.7 ppb at the Geauga County monitor. As will be discussed n the weight of evidence section, this monitor is actually monitoring attainment based on 2004-2006 air quality data (77 ppb) and the highest design value in the area is 86 ppb. Subsequent modeling based on 2005 inventories and design values should also corroborate that the control strategies that Ohio EPA has identified are being implemented.

Section Seven

Contingency Measures

Contingency measures to be considered will be selected from a comprehensive list of measures deemed appropriate and effective at the time the selection is made. The selection of measures will be based on cost-effectiveness, emission reduction potential, economic and social considerations or other factors that Ohio EPA deems appropriate. Ohio EPA will solicit input from all interested and affected persons in the maintenance area prior to selecting appropriate contingency measures. Because it is not possible at this time to determine what control measure will be appropriate at an unspecified time in the future, the list of contingency measures outlined below is not comprehensive.

1) Lower Reid vapor pressure gasoline program.

2) Tighten VOC RACT on existing sources covered by U.S. EPA Control Technique Guidelines issued in response to the 1990 CAAA.

3) Apply RACT to smaller existing sources.

4) Alternative fuel (e.g. LP and CNG) and diesel retrofit programs for fleet vehicle operations.

5) Require VOC or NO_x emission offsets for new and modified major sources.

6) Require VOC or NO_x emission offsets for new and modified minor sources.

7) Increase the ratio of emission offsets required for new sources.

8) Require VOC or NO_x controls on new minor sources (less than 100 tons).

No contingency measure shall be implemented without providing the opportunity for full public participation during which the relative costs and benefits of individual measures, at the time they are under consideration, can be fully evaluated. The following is a list of VOC and NO_x sources potentially subject to future controls.

NO_x RACT

- EGUs
- asphalt batching plants
- industrial/commercial and institutional boilers
- process heaters
- internal combustion engines
- combustion turbines
- other sources greater than 100 tons per year

VOC RACT

- stage I gasoline dispensing facilities (including pressure valves)
- automobile refinishing shops
- cold cleaner degreasers
- flexible package printing
- wood panel coating
- industrial solvent cleaning
- offset lithography
- industrial surface coating
- other sources greater than 50 tons per year

Section Eight

Public Participation

Ohio published notification for a public hearing and solicitation for public comment concerning the draft 2002 base year emissions inventory, eight-hour ozone attainment demonstration and the 15 percent rate of progress plan in the widely distributed county publications on June 18, 2007.

The public hearing to receive comments on this request will be held on July 24, 2007 at the Ohio EPA Northeast District Office, 2110 E. Aurora Road, located at Twinsburg, Ohio. The public comment period will close on July 24, 2007. Comments received during the public comment period will be included with the final package. Appendix I will include a copy of the public notice, certifications of publication, and the transcript from the public hearing.

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