State Implementation Plan

2008 Eight-Hour Ozone National Ambient Air Quality Standard Emissions Inventory & Emissions Statement

The Ohio Environmental Protection Agency
Division of Air Pollution Control
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Acknowledgement

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1 Introduction

The 1990 Clean Air Act Amendments (CAAA) requires the United States Environmental Protection Agency (US EPA) to set National Ambient Air Quality Standard (NAAQS) for pollutants considered harmful to public health and the environment. In 2008, the US EPA established revisions to the primary and secondary National Ambient Air Quality Standards for ozone thereby replacing the 1997 ozone standards. The 2008 NAAQS for Ozone established a primary and secondary 8-hour ozone standard of 0.075 parts per million (ppm) (73 FR 16436).

Ground level ozone is not directly emitted into the air. It is formed as a product of chemical reactions between nitrogen oxides (NO_x) and volatile organic compounds (VOCs), referred to as ozone precursors, in the presence of sunlight. Industrial facilities, motor vehicle exhaust, gasoline vapors and chemical solvents are a few examples of emission sources contributing to these ozone precursors. Ozone is a harmful pollutant at ground level and is of particular concern during the summer months when sunlight and hot weather can form harmful ozone concentrations which can trigger a variety of chest, throat and lung related health problems.

The CAAA defines five ozone nonattainment area classifications based on severity for areas that exceed the NAAQS. The nonattainment area classifications are as follows (in order of increasing severity): marginal, moderate, serious, severe and extreme. The US EPA "Air Quality Designations for the 2008 Ozone NAAQS" rule designated nonattainment and unclassifiable/attainment areas nationwide effective July 2012 (77 FR 30088). These designations were published concurrently with the "Implementation of the 2008 NAAQS for Ozone: Nonattainment Area Classifications Approach, Attainment Deadlines and Revocation of the 1997 Ozone Standards for Transportation Conformity Purposes" rule which established the air quality thresholds for classification categories that are assigned to all areas designated nonattainment for the 2008 Ozone NAAQS according to the ''percent-above-the-standard'' methodology (77 FR 30160).

In Ohio, three nonattainment areas (NAAs) have been designated for the 2008 NAAQS for Ozone including Cincinnati, Cleveland-Akron-Lorain and Columbus. These nonattainment areas, comprised of multiple counties, have each been classified as Marginal nonattainment based on an area design value criteria. The Cincinnati nonattainment area is a multi-state nonattainment area which includes partial nonattainment areas in counties located outside of Ohio in Kentucky and Indiana (77 FR 30088). The nonattainment areas are discussed in further detail in the following section.

Outside of the Marginal nonattainment designation areas, all other counties in the State of Ohio have been designated as unclassifiable/attainment (77 FR 30088). US EPA has historically used the "unclassifiable/attainment" category for areas that either have air quality monitors that demonstrate attainment and for areas that do not have monitors and for which there is no reason to believe they are not in attainment or are contributing to nearby violations.

Attainment dates and State Implementation Plan (SIP) submission requirements are dependent upon area classification designations. Under section 182(a) of the CAAA, Marginal areas have up to 3 years from designation to attain the NAAQS, and are not required to submit an attainment demonstration. When Congress amended the CAA in 1990, it anticipated that nonattainment areas with ozone concentrations close to the NAAQS would likely come into attainment within 3 years of designation without any additional local planning (78 FR 34184).

This SIP submittal is intended to satisfy the requirements for the designated Ohio Marginal nonattainment areas established in the proposed "Implementation of the 2008 NAAQS for Ozone: SIP Requirements" (78 FR 34178) including the emissions inventory and emissions statement requirements. The 2008 emission inventory has been selected as the appropriate inventory for SIP development. The 2008 base year ozone emissions inventory presented in this document is an inventory of the actual reported, estimated or calculated typical summer day and annual VOC and NO_x emissions for Ohio sources. Ohio EPA has prepared an inventory for each nonattainment area including the point, area, onroad and nonroad sectors. Typical summer day emissions were evaluated for summer weekdays in the months of June, July and August.

2 Nonattainment Areas

The US EPA "Air Quality Designations for the 2008 Ozone NAAQS" rule designated three nonattainment areas in Ohio (77 FR 30088). The design value for an individual monitoring site is the three-year average of the annual fourth highest daily maximum eight-hour average ozone concentration. An area meets the standard if, and only if, every monitoring site in the area meets the NAAQS. The designated nonattainment areas in Ohio have each been classified as Marginal nonattainment based on an area design value criteria above the NAAQS of 0.075 ppm. Each of the three nonattainment areas is comprised of a subset of several counties. Figure 1 shows the location of the counties included in each designated nonattainment area discussed below.

2.1 Cincinnati

The Cincinnati nonattainment area is a multi-state nonattainment area which includes partial nonattainment areas in counties located outside of Ohio in Kentucky and Indiana. The Cincinnati nonattainment area includes the following counties: Butler, Clermont, Clinton, Hamilton and Warren Counties in Ohio; portions of Boone, Kenton and Campbell Counties in Kentucky; and portions of Dearborn County in Indiana. The typical summer day emissions inventory and emission statement information presented in this report is only representative of the nonattainment counties located in Ohio. The Ohio-Kentucky-Indiana Regional Council of Governments (OKI) is the designated metropolitan planning organization (MPO) for all of the Cincinnati ozone nonattainment area with the exception of Clinton County, Ohio.

2.2 Cleveland-Akron-Lorain

The Cleveland-Akron-Lorain nonattainment area includes the following counties: Ashtabula, Cuyahoga, Geauga, Lake, Lorain, Medina, Portage and Summit. The Northeast Ohio Areawide Coordinating Agency (NOACA) is the MPO that covers Cuyahoga, Geauga, Lake, Lorain and Medina. The Akron Metropolitan Area Tranportation Study (AMATS) is the MPO that covers Summit and Portage counties.

2.3 Columbus

The Columbus nonattainment area includes the following counties: Delaware, Fairfield, Franklin, Knox, Licking and Madison. The six county Columbus nonattainment area includes two MPOs, the Mid-Ohio Regional Planning Commission (MORPC) and the Licking County Area Tranportation Study (LCATS). MORPC covers Franklin County, Delaware County, Pataskala and Etna Township in Licking County, and Violet and Bloom Townships in Fairfield County. LCATS covers the ramainder of Licking county. Madison County, Delaware County and the remainder of Fairfield County are located outside of the MPO area coverage.

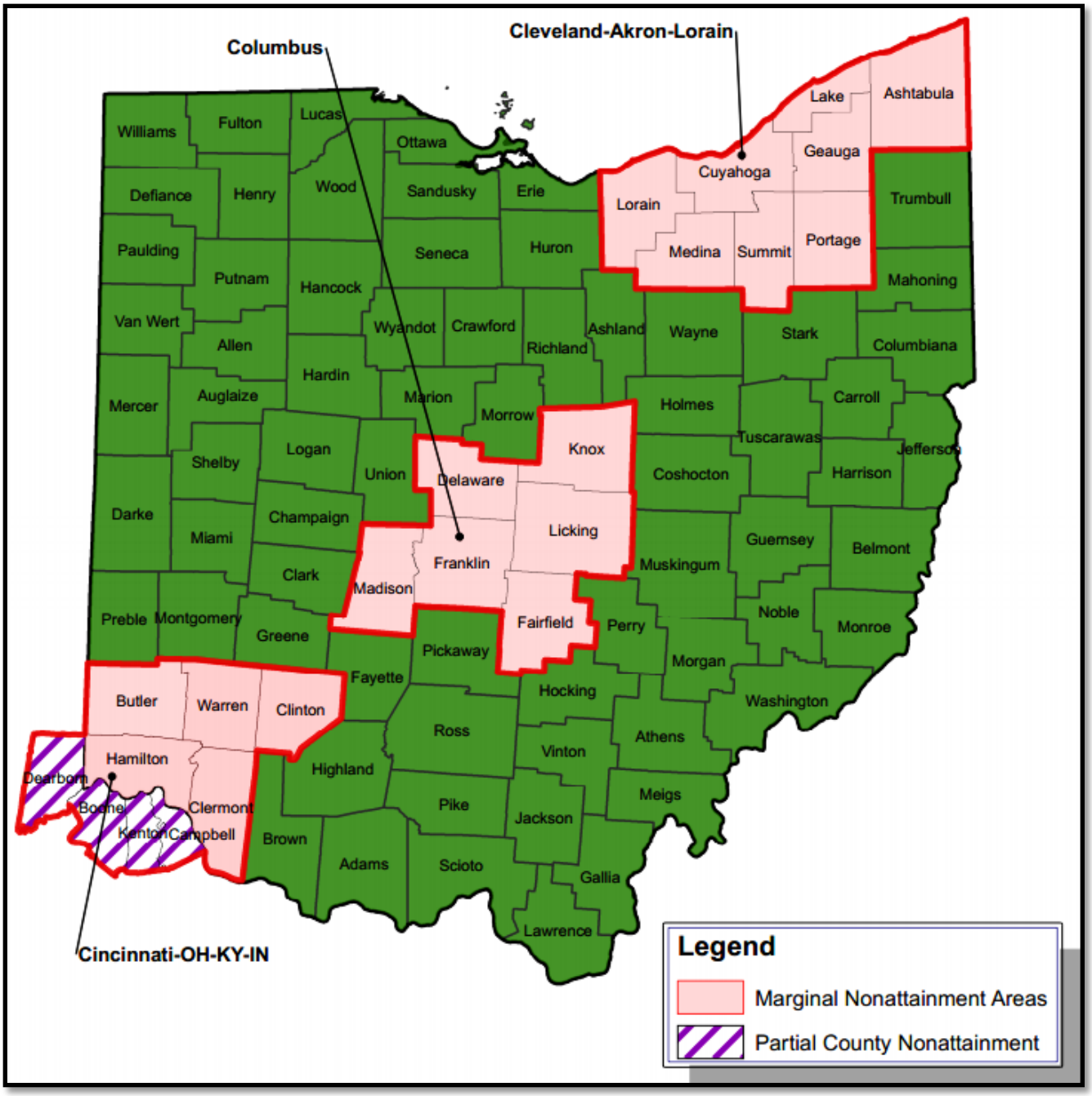

Figure 1. Ohio 2008 Eight-Hour Ozone (0.075 ppm) Nonattainment Areas

3 Emission Inventory Summary

This section presents a summary of the 2008 Base Year Emissions Inventory for Ohio. Marginal nonattainment areas are required to submit an emission inventory summary (EIS) for the nonattainment area within 2 years of nonattainment designation (CAA Section 182(a)(1)). "Emission inventories are critical for the efforts of state, local and federal agencies to attain and maintain the NAAQS that the US EPA has established for criteria pollutants, including ozone. The CAA section 182(a)(3)(A) requires that states submit periodic emission inventories every 3 years after the initial base year inventory for Marginal and above ozone nonattainment areas. The periodic inventory must include emissions of VOC and NO_x for point, area, and mobile sources (onroad and nonroad). On December 4, 2008, the US EPA promulgated the AERR rule (40 CFR 51, subpart A). The AERR requires states to submit comprehensive statewide 3-year cycle emission inventories (2008, 2011, 2014, etc.) regardless of an area's attainment status. The Proposed Implementation Rule US EPA has suggested for states with periodic inventory obligations under 182(a)(3)(A) to rely on their 3-year cycle inventory as described in the AERR to satisfy their 182(a)(3)(A) periodic inventory obligation." (78 FR 34201)

At the time the 2008 emission inventory was evaluated, permitted Ohio facilities classified as Title V were required to file a complete EIS. The EIS includes detailed emissions information as well as data about the egress points where pollutants are released into the air including NO_x and VOCs. Ohio EPA has the authority under Ohio Administrative Code (OAC) rule 3745-15-03 to request and receive this information from regulated entities.

A typical permitted facility may have multiple source types. For example, a refinery with numerous industrial processes would itself be a point source, the leaks from valves and the switch engine that moves tank cars on the railroad siding would be a nonroad mobile source. A typical permitted facility may also have more than one industrial classification. The refinery in the previous example is in one industrial category while the tank farm is in another. Quantities of emissions may be measured directly (at the stack); they may be calculated from engineering principles (e.g., mass balance); or they may be estimated (e.g., by assuming reasonable emission rates, times, etc.). Emissions can be expressed in terms of annual emissions, seasonal emissions or daily emissions. For the purpose of this submittal, the data presented has been quantified as typical summer day emissions in tons per day.

Ohio EPA prepared a comprehensive emissions inventory including point, area and mobile sources for precursors of ozone (VOCs and NO_x) for base year 2008. The point sources were divided into two categories, electric generating units (EGUs) and non-EGUs. Four basic steps were involved in the preparation of the emission inventory including planning, data collection, data analysis and emission estimation and reporting.

Emission estimates generally followed the methodologies outlined in US EPA's emission inventory preparation guidance document, Volumes I-IV and US EPA's "Reporting Guidance for 1996 Periodic Emissions Inventories and National Emission Trends (NET) Inventories." The Lake Michigan Air Directors Consortium (LADCO) spatially and temporally processed the emissions data in accordance with US EPA guidance: "Guidelines on the Use of Models and Other Analyses for Demonstrating Attainment of Air Quality Goals for Ozone, PM2.5, and Regional Haze", EPA-454/B07-002, April 2007. To ensure the EIS is of the highest quality, Ohio EPA implemented quality assurance (QA) procedures and quality control (QC) checks throughout the inventory development process. Ohio EPA specifically followed the procedures outlined in US EPA's guidance documents pertaining to inventory quality assurance and

believes the inventory to be complete, accurate and of high quality.

In the case of the pollutant ozone, precursor emissions are expressed in terms of typical daily emissions representative of the peak ozone season, or tons per day. LADCO has processed annual emissions data files for the 2008 base year inventory using the Consolidated Community Emissions Processing Tool (CONCEPT) model and calculated daily emissions in a robust, consistent and transparent manner (Appendix A). The information below describes the procedures Ohio EPA used to generate the 2008 base year ozone emissions inventory. A detailed description of the development of the 2008 base year emissions inventory estimates in its entirety is available in Appendix B. More information on the development and results of the 2008 base year emissions inventory is available on the LADCO website at:

http://www.ladco.org/tech/emis/current/index.php

3.1 Point Source Emissions

Emissions from point sources are defined as those whose emissions are usually fairly well characterized, are generally discharged through stacks and which are required to possess an Ohio EPA issued permit. The final point source inventory is divided into two categories: EGUs and non-EGUs. The majority of the point source EGU inventory is comprised of the US EPA Clean Air Markets Division (CAMD) inventory. The non-EGU inventory, and several EGUs not required to submit data to CAMD, are comprised of point source facility data submitted to Ohio EPA. Typical summer day and total annual emissions of NO_x and VOCs for Ohio point sources are presented by county in Tables 1-4. Based on the typical summer day emissions presented in Tables 1 and 2 the EGU NO_x emissions were the second largest emission sector in the Cincinnati NAA. Appendices C and D contain a detailed list of the EGU and non-EGU point sources included in the 2008 base year inventory by facility and unit ID, with their respective VOC and NO_x emissions.

3.1.1 Non-Electric Generating Units

The primary source of data for non-EGU point sources was the facility reported 2008 annual emission data. Ohio Title V facilities are required to submit annual emissions reports through the Ohio EPA web interface, Air Services. Under Title V, major sources are those with the potential to emit 100 tons per year or more of any one regulated pollutant (PM10; nitrogen oxides; sulfur dioxide; carbon monoxide; volatile organic compounds; and lead); 10 tons per year or more of any one hazardous air pollutant (HAP); or 25 tons per year or more of any two or more hazardous air pollutants. The emissions data are reported by the sources annually as part of the inventory process conducted by Ohio EPA and include emissions, process rates, operating schedules, and other relevant facility information. The data are stored in Ohio EPA's internal data management system called STARS2. The data were converted from Air Services into the EIS XML file format via a tool developed by Ohio EPA's contractor, UNICON. The data were submitted to US EPA and LADCO. LADCO used the data to spatially and temporally allocate typical summer daily emissions.

3.1.2 Electric Generating Units

40 CFR Part 75 includes requirements for Ohio EGU units to report emissions and activity data to the US EPA CAMD database. This data is referred to as continuous emission monitoring (CEM) data. For these units, temporal allocation of VOC and NO_x annual emissions to typical

summer day emissions was accomplished utilizing a 3-tier approach. The total annual emissions are based on the emissions reported in the CAMD database. For all other EGU units, the Ohio EPA facility reported 2008 annual emission data was used as described in section 3.1.1 above.

The Tier 1 approach to the temporal allocation of the CEM data was adapted from the methodology presented in 'Temporally Allocating Emission with CEM Data for Chemical Transport and SIP Modeling' (S. Edick, M. Janssen, n.d.). That methodology used CEM data from 2001 through 2003 to temporally allocate 2002 emissions data. For the 2008 inventory presented in this document, 2008 CEM data was used to temporally allocate the 2008 typical summer day emissions. Ohio EPA also deviated from the described methodology by using annual unit emission values from the CEM data rather than integrating the NIF inventory annual unit emission values. A detailed description of the methodology used for the temporal allocation of the CAMD EGU unit emissions is available in Appendix E.

The results of the Tier 1 approach were reviewed and any suspected anomalies or zero values were further analyzed using the Tier 2 approach. The Tier 2 analysis was completed by finding the average NO_x emission rate of each unit for every weekday hour during summer 2008 (June - August). The resulting average hourly weekday NO_x emission rate was multiplied by 24 hours to calculate the typical summer day (ozone season) emission rate in tons per day.

The results of the Tier 2 approach were reviewed and any anomalies or zero values were further analyzed using the Tier 3 approach. In the Tier 3 analysis the total annual EGU unit NO_x emissions were divided by 366 days (2008 was a leap year) to produce a typical day emission assuming each day of the year produced an equivalent NO_x emission in tons per day.

3.2 Area Source Emissions

Area sources (also referred to as nonpoint sources) are usually spread over wide areas with no distinct discharge points or are comprised of a large number of small point sources that are difficult to describe separately and whose emissions are not well characterized (e.g., heating furnaces in individual homes, architectural surface coating, automobile refueling, dry cleaning, etc.). Area emissions are typically estimated by multiplying an emission factor by a known indicator of activity (e.g., population, employment, etc.) for a source classification code (SCC). For the 2008 inventory, States and US EPA formed the Eastern Regional Technical Advisory Committee (ERTAC). The committee defined the inventory categories, emissions factors and sources of activity data and contracted with Transystems to develop draft emissions estimates. County level activity data were provided to all States. When available, 2008 activity data was used to perform calculations of emissions for area sources and Ohio EPA accepted the majority of the estimates. In some cases Ohio developed a more refined methodology, produced more accurate activity data, or applied a necessary point source subtraction to the ERTAC or US EPA estimate. In a number of cases, data was provided from national estimates and allocated to the State and county levels. In a few cases projections from a previous inventory were used. Appendix F contains a list of the area sources included in the 2008 base year inventory by SCC and County, with their respective VOC and NO_x emissions

The area source data were processed in Microsoft Excel and Access applications, converted into the EIS XML file format via US EPA's EIS Bridge Application and provided to US EPA and LADCO. The area source emissions files provided to LADCO were used to create spatial and temporal allocation of emissions and typical summer day estimates using the LADCO

CONCEPT emissions model. The CONCEPT model produced typical summer day emissions estimates which were aggregated for each nonattainment county. Typical summer day and total annual emissions for Ohio area sources are presented in Table 1-4, respectively. The area source VOC emissions were the second largest sector contribution in the Columbus and Cincinnati NAAs.

3.3 Mobile Source Emissions

Mobile sources are divided into two major categories – onroad and nonroad. Onroad mobile sources include cars, trucks, buses and motorcycles used for transportation of goods and passengers on roads and streets. Nonroad mobile sources include other modes of powered transportation such as aircraft, locomotives, ships and motor vehicles not associated with highway vehicles. This classification protocol has been utilized throughout this document.

"For all inventories that are used in developing RFP plans or attainment demonstrations, mobile source emissions should be estimated using the latest emissions models, data and planning assumptions. The latest approved models should be used to estimate emissions from onroad and nonroad sources, in combination with the latest available estimates of [vehicle miles traveled] VMT, vehicle population, and/or equipment activity. States are advised to check the US EPA Web pages for the mobile source models and to consult with the US EPA Office of Transportation and Air Quality and their regional office to determine the versions of models to use for their SIPs for the 2008 ozone NAAQS. Currently, the most recently approved model for estimating onroad emissions in states outside of California is MOVES2010 which initially was approved for use in SIPs on March 2, 2010 (75 FR 9411). The US EPA has subsequently released two minor updates to MOVES2010, MOVES2010a and MOVES2010b that are also approved for use in SIPs" (78 FR 34202). Typical summer day and total annual emissions for Ohio mobile sources are presented in Tables 1-4.

3.3.1 Onroad Mobile Emissions

Onroad mobile source emissions were calculated by running US EPA Motor Vehicle Emission Simulator version 2010b (MOVES2010b). MOVES2010b provides emissions estimates for pollutants including VOCs and NO_x from mobile sources under a wide range of user-defined conditions. Ohio EPA relied on VMT data generated by the Ohio DOT Office of Planning and Programming and Metropolitan Planning Organizations (MPOs). Ohio DOT and MPOs used urban transportation planning methodologies approved by the Federal Highway Administration to generate the necessary VMT estimates. MOVES2010b was run using area-specific input values where available and national average defaults in other cases. The nonattainment areas MPOs provided the nonattainment area county emissions for a typical summer day as shown in Tables 1 and 2. Detailed reports and information on the development of these emission estimates are available from the developing MPO in Appendices G-I. Appendix J contains a list of the 2008 base year inventory onroad emissions by county and road type, with their respective VOC and NO_x emissions.

Based on the estimated typical summer day emission presented in Tables 1 and 2, onroad mobile emissions are the largest contributing sector of NO_x emissions in all three Ohio NAAs. Onroad mobile emissions are also the largest contributing sector of VOC emissions in the Columbus and Cincinnati NAAs and the second largest contributing sector of VOC emissions in the Cleveland-Akron-Lorain NAA based on typical summer day emissions.

3.3.2 Nonroad Mobile Emissions

Nonroad mobile source emissions were calculated using the Nonroad National Mobile Inventory Mode (NMIM) computer model and CONCEPT. Ohio EPA prepared the inputs to the NMIM model and provided them to LADCO and US EPA. LADCO performed analysis using NMIM to generate emission rates for various off road equipment. LADCO had previously contracted consultants to develop local data used in NMIM 2008 for agricultural equipment, construction equipment, commercial marine, recreational marine, and railroads (Environ, 2004, E.H. Pechan, 2004, and Environ, 2007a, 2007b). The emissions rates were processed in CONCEPT and spatially/temporally allocated in specified grid cells. The NMIM model does not include emission estimates for aircraft, locomotives and commercial marine vessels.

The typical summer day emissions presented in Tables 1 and 2 show nonroad emissions are the largest contributing sector of VOC emissions and the second largest contributing sector of NO_x in the Cleveland-Akron-Lorain NAA. Nonroad emissions are also the second largest contributing sector of NO_x emissions in the Columbus NAA. Appendix K contains a list of the nonroad sources included in the 2008 base year inventory by SCC and county, with their respective VOC and NO_x emissions.

Ohio EPA and LADCO prepared emission estimates for railroad locomotives; commercial, military and civil aircraft; and commercial vessels using state- and county-specific activity factors and US EPA approved emission factors and data. The aircraft, locomotives and commercial marine vessels inventories are also processed in CONCEPT by LADCO. The typical summer day emission inventories for marine, aircraft and rail (MAR) are further described below. Appendix L contains a list of the MAR sources included in the 2008 base year inventory by SCC and County, with their respective VOC and NO_x emissions.

3.3.2.1 Marine

Marine fuel consumption in the LADCO region remained fairly consistent between 2005 and 2008 (EERA et al., 2007). Therefore, the 2008 marine emissions are based on the 2005 LADCO Base M inventory which was developed utilizing data previously prepared by a LADCO contractor (Environ, 2007a). The data was then spatially and temporally allocated using the LADCO CONCEPT model.

3.3.2.2 Aircraft

For inventory year 2008, US EPA contracted with the Eastern Research Group (ERG) and generated a detailed aircraft inventory for the entire nation. Ohio EPA provided the state-specific aircraft emission data (where available) for the 2008 aircraft inventory. The Ohio airport inventory accounted for 724 Airports, including, for the first time, emissions from gliderports, heliports, sea plane bases, STOLports and ultra-light fields. However, airport specific landing/take off (LTO) and engine type information necessary for calculating specific aircraft emissions was only available for the large airports. Therefore, two methods were used to calculate the Ohio aircraft emissions inventory.

The ODOT tracks operations for towered and non-towered airports in Ohio. A landing or a take-off is considered an operation. Two operations make up one landing/take-off (LTO). Where there was specific aircraft model data available emission factors were derived using the Federal Aviation Administration (FAA) Emission Dispersion Modeling System (EDMS). EDMS is a combined emissions and dispersion model for assessing air quality at civilian airports and military air bases. This portion of the aircraft emissions inventory was calculated by multiplying

the number of LTOs per year by the EDMS emission factor. More information on the ODOT tracking operations is available at:

www.dot.state.oh.us/aviation

For the majority of the remaining airports where airport specific LTO and aircraft engine type information was not available, ERG used either regression equations to calculate the LTOs or other documented procedures as explained in the following report:

http://www.epa.gov/ttn/chief/net/2008_nei/aircraft_report_final.pdf

Ohio EPA thoroughly reviewed the 2008 ERG aircraft inventory and it was considered representative for Ohio. Emissions data was temporally and spatially allocated by LADCO using CONCEPT to generate typical summer day emissions.

3.3.2.3 Rail

Rail emissions for the 2008 inventory were developed by ERTAC. Previous inventory development indicates that locomotives are the most important source of NO_X emissions from nonroad engines. Ohio is an important rail center in the nation and ranking second in Midwestern rail activity after the State of Illinois. The objective of developing an inventory through ERTAC was to standardize and improve data quality calculations of railroad locomotives by creating a link-level, spatially and temporally allocated emission inventory.

The calculation of emissions for locomotives is similar to that of on-road mobile sources. Each railroad company operates on certain rail lines. Each company has a set of locomotives each with a different emission factor. Based upon the mix of locomotives a company has, a weighted emission factor for that company can be obtained. The fuel used by each company can then be multiplied by the appropriate emission factor to obtain an emission rate.

The ERTAC Rail group used annual gross ton miles (GTM) and total amount of fuel used for each railroad to calculate a railroad fuel consumption index for each railroad in terms of GTM/gallon fuel. The GTM for a given link was then divided by the average fuel consumption index for all railroads on that link to obtain the fuel consumption for the link. In cases where more than one railroad operated on the link, the resulting average fuel consumption index was the straight average of the number of railroads operating on the link. The fuel use was then multiplied by the emission factor to obtain emissions for the link. Using a GIS, the links were summed to the appropriate counties to obtain county level emissions. Daily emissions were calculated by dividing the annual emissions by 365. More information regarding the ERTAC Rail methodology is available at:

http://www.ertac.us/rail/index.html

Typical summer day emissions were provided by LADCO assuming typical day and typical summer day emissions are equivalent.

3.4 Emission Inventory Quality Assurance

Standardized procedures were utilized for emissions calculations. Emission estimates generally followed the methodologies outlined in US EPA's emission inventory preparation guidance document, Volumes I-IV and US EPA's "Reporting Guidance for 1996 Periodic Emissions Inventories and National Emission Trends (NET) Inventories." LADCO spatially and temporally

processed the emissions data in accordance with US EPA guidance:" Guidelines on the Use of Models and Other Analyses for Demonstrating Attainment of Air Quality Goals for Ozone, PM2.5, and Regional Haze", EPA-454/B07-002, April 2007.

Starting with the 2008 inventory year, US EPA made significant changes with their repository system, National Emissions Inventory (NEI). The new NEI system allows only quality assured data to be entered. The Ohio EPA submitted XML files were quality assured in US EPA's QA environment and a number of corrections were needed to satisfy US EPA's QA checks. US EPA performs format and content checks on State files prior to accepting the files. Corrections were made to Ohio's data to meet US EPA's strict reporting requirements and data files were submitted to US EPA by the deadline. A complex Java application was developed to convert Ohio data form STARS2 into US EPA's NEI XML files. The State relies on this program to meet future reporting requirements and any minor change with NEI requires a significant State investment to modify the program to satisfy the change.

The same quality assured data was also submitted to LADCO for emissions processing through CONCEPT. There was an exception for the Electric Generating Units (EGUs). The EGU inventory is submitted by facilities to US EPA and it is compiled in US EPA's Acid Rain Program application. The EGU inventory is based on an analysis performed by Ohio EPA on facility reported emissions as measured by continuous emissions monitors. In conclusion, the final point source inventory is a hybrid of the federal EGU inventory and the state provided non-EGU units. Throughout the development of the 2008 base year emissions inventory technical reviews and accuracy checks were performed.

Table 1. 2008 VOC Typical Summer Day Emissions

This table includes VOC emissions estimates developed for a typical summer day in tons per day from all sectors in Ohio counties designated nonattainment under the 2008 NAAQS for Ozone.

	2008 LADCO TYPICAL SUMMER DAY EMISSIONS FROM NON ATTAINMENT COUNTY SECTORS						
	VOC (tpd)						
NAA County/Area	**NON-EGU**	**EGU**	**AREA**	**ONROAD**	**NONROAD**	**MAR**	**TOTAL VOC**
Ashtabula	12.41	0.00	2.74	3.67	15.03	0.22	34.07
Cuyahoga	2.44	0.00	42.59	41.99	54.35	0.41	141.78
Geauga	0.00	0.00	4.53	4.15	5.45	0.00	14.13
Lake	0.82	0.02	8.95	9.22	19.62	0.14	38.77
Lorain	2.21	0.18	8.76	11.71	20.08	0.21	43.15
Medina	0.61	0.00	6.22	7.86	5.88	0.05	20.62
Portage	0.70	0.00	4.50	6.72	8.64	0.11	20.67
Summit	0.78	0.00	18.52	21.23	13.35	0.10	53.98
Cleveland-Akron-Lorain NAA	19.97	0.20	96.81	106.55	142.40	1.24	367.17
Delaware	0.43	0.00	5.35	8.74	6.04	0.11	20.67
Fairfield	0.26	0.00	4.95	5.12	2.40	0.01	12.74
Franklin	1.67	0.00	35.49	94.25	22.53	0.22	154.16
Knox	0.00	0.00	3.01	1.76	1.72	0.00	6.49
Licking	0.30	0.00	6.86	10.03	3.85	0.01	21.05
Madison	0.07	0.00	2.12	3.51	1.52	0.02	7.24
Columbus NAA	2.73	0.00	57.78	123.41	38.06	0.37	222.35
Butler	2.87	0.03	11.61	10.32	6.66	0.13	31.62
Clermont	0.09	0.51	6.63	6.88	4.42	0.02	18.55
Clinton	0.00	0.00	2.33	2.51	1.73	0.00	6.57
Hamilton	1.91	0.27	28.14	30.30	16.86	0.26	77.74
Warren	0.89	0.00	5.54	7.78	4.92	0.01	19.14
Cincinnati NAA*	5.76	0.81	54.25	57.79	34.59	0.42	153.62

Notes:

tpd tons per day
NAA nonattainment
* Cincinnati NAA does not include emissions from partial non-attainment counties located outside of Ohio

Table 2. 2008 NO_x Typical Summer Day Emissions

This table includes NO_x emissions estimates developed for a typical summer day in tons per day from all sectors in Ohio counties designated nonattainment under the 2008 NAAQS for Ozone.

	2008 LADCO TYPICAL SUMMER DAY EMISSIONS FROM NON ATTAINMENT COUNTY SECTORS						
	NO_X (tpd)						
NAA County/Area	**NON-EGU**	**EGU**	**AREA**	**ONROAD**	**NONROAD**	**MAR**	**TOTAL NO_X**
Ashtabula	0.70	5.63	0.35	7.93	4.25	4.70	23.56
Cuyahoga	8.74	5.41	5.14	78.39	29.41	8.27	135.36
Geauga	0.00	0.00	0.75	8.14	2.61	0.00	11.50
Lake	2.05	32.74	1.18	19.01	7.66	2.94	65.58
Lorain	2.31	21.69	0.94	21.31	9.44	4.48	60.17
Medina	0.29	0.00	0.90	21.84	4.18	1.05	28.26
Portage	0.27	0.00	0.86	13.16	3.93	2.14	20.36
Summit	1.95	0.00	2.59	39.90	9.38	2.08	55.90
Cleveland-Akron-Lorain NAA	16.31	65.47	12.71	209.68	70.86	25.66	400.69
Delaware	0.05	0.00	0.63	19.00	6.01	2.12	27.81
Fairfield	4.21	0.00	0.51	11.52	3.86	0.12	20.22
Franklin	1.67	0.00	3.78	168.46	22.93	3.99	200.83
Knox	0.10	0.00	0.24	3.94	1.95	0.03	6.26
Licking	1.52	0.00	0.62	20.84	3.67	0.17	26.82
Madison	0.01	0.00	0.24	7.96	2.30	0.36	10.87
Columbus NAA	7.56	0.00	6.02	231.72	40.72	6.79	292.81
Butler	12.53	3.17	0.99	18.76	7.47	2.51	45.43
Clermont	0.17	65.54	0.76	12.50	3.95	0.87	83.79
Clinton	0.00	0.00	0.36	5.50	2.00	0.10	7.96
Hamilton	7.83	30.64	4.19	55.08	15.25	5.53	118.52
Warren	3.80	0.00	0.87	14.14	5.67	0.28	24.76
Cincinnati NAA*	24.33	99.35	7.17	105.98	34.34	9.29	280.46

Notes:

tpd tons per day

NAA nonattainment area

* Cincinnati NAA does not include emissions from partial non-attainment counties located outside of Ohio

Table 3. 2008 VOC Total Annual Emissions

This table includes VOC emissions estimates developed for a typical summer day in tons per day from all sectors in Ohio counties designated nonattainment under the 2008 NAAQS for Ozone.

	2008 LADCO TOTAL ANNUAL EMISSIONS FROM NON ATTAINMENT COUNTY SECTORS						
	VOC (tpy)						
NAA County/Area	**NON-EGU**	**EGU**	**AREA**	**ONROAD**	**NONROAD**	**MAR**	**TOTAL VOC**
Ashtabula	4470.93	0.20	1343.60	1327.34	2704.97	70.51	9917.55
Cuyahoga	873.80	0.17	16798.79	13544.41	11062.21	138.18	42417.56
Geauga	0.00	0.00	1721.91	891.38	1339.58	0.03	3952.90
Lake	290.41	4.79	3462.76	2130.40	3406.21	48.09	9342.66
Lorain	752.12	51.69	3445.68	2759.07	3681.89	72.74	10763.19
Medina	215.67	0.00	2401.78	1793.48	1389.98	17.94	5818.85
Portage	253.12	0.00	1784.73	1835.85	1800.31	40.51	5714.52
Summit	279.96	0.00	7292.82	5420.09	3055.54	37.48	16085.89
Cleveland-Akron-Lorain NAA	7136.01	56.85	38252.07	29702.02	28440.69	425.48	104013.12
Delaware	142.44	0.00	2084.80	1369.67	1346.76	40.45	4984.12
Fairfield	92.04	0.00	1931.29	1324.74	572.66	1.96	3922.69
Franklin	598.93	0.00	14157.34	12668.64	5410.72	81.02	32916.65
Knox	0.00	0.00	1278.75	577.20	372.10	0.35	2228.40
Licking	108.95	0.00	2645.67	1833.66	853.92	2.34	5444.54
Madison	24.02	0.00	805.07	803.65	345.70	7.26	1985.70
Columbus NAA	966.38	0.00	22902.92	18577.56	8901.86	133.38	51482.10
Butler	1018.67	5.69	4527.08	2689.85	1605.05	48.43	9894.77
Clermont	32.44	168.12	2575.10	1699.44	1005.48	5.18	5485.76
Clinton	0.00	0.00	993.27	559.80	381.95	1.33	1936.35
Hamilton	671.93	98.30	11064.69	9001.36	4063.79	91.42	24991.49
Warren	292.79	0.00	2178.41	1403.74	1133.26	4.81	5013.01
Cincinnati NAA*	2015.83	272.11	21338.55	15354.19	8189.53	151.17	47321.38

Notes:

tpy tons per year

NAA nonattainment area

* Cincinnati NAA does not include emissions from partial non-attainment counties located outside of Ohio

Table 4. 2008 NO_x Total Annual Emissions

This table includes NO_x emissions estimates developed for a typical summer day in tons per day from all sectors in Ohio counties designated nonattainment under the 2008 NAAQS for Ozone.

	2008 LADCO TOTAL ANNUAL EMISSIONS FROM NON ATTAINMENT COUNTY SECTORS						
	NO_X (tpy)						
NAA County/Area	**NON-EGU**	**EGU**	**AREA**	**ONROAD**	**NONROAD**	**MAR**	**TOTAL NO_X**
Ashtabula	258.95	1463.15	306.68	3788.98	1055.91	1513.24	8386.91
Cuyahoga	3106.53	1674.57	4438.42	31729.66	8136.17	2747.63	51832.98
Geauga	0.00	0.00	384.30	2346.92	759.51	0.88	3491.61
Lake	722.68	10425.10	805.18	5442.55	1870.59	999.07	20265.17
Lorain	817.83	5577.70	745.02	6523.05	2503.32	1513.69	17680.61
Medina	100.33	0.00	539.28	5460.96	1292.43	380.91	7773.91
Portage	87.24	0.00	510.12	5709.05	1182.19	773.11	8261.71
Summit	674.73	0.00	1919.64	13277.01	2947.01	754.03	19572.42
Cleveland-Akron-Lorain NAA	5768.29	19140.52	9648.64	74278.18	19747.13	8682.56	137265.32
Delaware	19.03	0.00	395.05	3490.70	1872.05	767.70	6544.53
Fairfield	1526.01	0.00	335.34	2842.30	1190.18	41.71	5935.54
Franklin	582.10	0.00	3225.28	26113.38	7306.02	1443.55	38670.33
Knox	35.05	0.00	168.31	1266.97	565.91	9.36	2045.60
Licking	542.86	0.00	411.61	4752.48	1104.17	63.26	6874.38
Madison	4.99	0.00	128.74	2644.50	635.85	130.91	3544.99
Columbus NAA	2710.04	0.00	4664.33	41110.33	12674.18	2456.49	63615.37
Butler	4108.89	838.17	703.08	6070.45	2343.53	909.45	14973.57
Clermont	61.78	24110.39	450.23	4124.55	1215.80	232.43	30195.18
Clinton	0.00	0.00	196.32	1700.00	551.97	36.12	2484.41
Hamilton	2803.80	12376.78	2909.18	21335.17	4835.11	1828.87	46088.91
Warren	1077.03	0.00	493.53	3905.97	1786.32	101.02	7363.87
Cincinnati NAA*	8051.50	37325.34	4752.34	37136.14	10732.73	3107.89	101105.94

Notes:

tpy tons per year

NAA nonattainment area

* Cincinnati NAA does not include emissions from partial non-attainment counties located outside of Ohio

4 Source Emission Statement

Marginal areas are required to submit an emissions statement under Section 182(a)(3)(B) of the CAA (78 FR 34202). The emission statement must: ‘‘. . . require that the owner or operator of each stationary source of oxides of nitrogen or volatile organic compounds provide the state with a statement, in such form as the Administrator may prescribe (or an equivalent alternative developed by the state), for classes or categories of sources, showing the actual emissions of oxides of nitrogen and volatile organic compounds from that source. The first such statement shall be submitted within 3 years after the date of the enactment of the CAA Amendments of 1990. Subsequent statements shall be submitted at least every year thereafter. The statement shall contain a certification that the information contained in the statement is accurate to the best knowledge of the individual certifying the statement” (78 FR 34202). The US EPA has proposed that this SIP submittal of the emissions statement program be due 2 years after the effective date of designations (78 FR 34203).

In July 1992, US EPA published a guidance memorandum on source emission statements titled, ‘Guidance on the Implementation of an Emission Statement Program.’ Further guidance was provided to clarify the source emission statement requirements were applicable to all areas designated nonattainment for the 1997 ozone NAAQS and classified as Marginal or higher under subpart 2, part D, title I of the CAAA. The Proposed Implementation Rule similarly applies the memorandum ‘‘Emission Statement Requirements Under 8-hour Ozone NAAQS Implementation,’’ dated March 14, 2006, to all areas designated nonattainment for the 2008 ozone NAAQS and classified as Marginal or higher under subpart 2 (78 FR 34202).

All of the Ohio 2008 Ozone NAAQS nonattainment areas have an emissions statement program in place due to historic nonattainment designations for an earlier ozone NAAQS. The Proposed Implementation Rule indicates that “if an area has a previously approved emission statement rule in force for the 1997 ozone NAAQS or the 1-hour ozone NAAQS that covers all portions of the nonattainment area for the 2008 ozone NAAQS, such rule should be sufficient for purposes of the emissions statement requirement for the 2008 ozone NAAQS. The state should review the existing rule to ensure it is adequate and, if it is, may rely on it to meet the emission statement requirement for the 2008 ozone NAAQS” (78 FR 34203).

Ohio EPA has the authority under OAC Chapter 3745-24 to request NO_x and VOC Emission Statements, which applies to any facility located in a county that is out of attainment for the NAAQS for ozone and emits greater than or equal to 25 tons per year of VOC or NO_x during the reporting year. In general, facilities subject to this requirement must submit actual emissions data for NO_x and VOC. OAC Chapter 3745-24 is available at:

http://www.epa.ohio.gov/dapc/regs/3745_24.aspx.

Ohio’s current emission statement program was approved by US EPA into Ohio’s SIP on September 27, 2007 (72 FR 54844).

5 Projected Emissions Modeling

US EPA provided 2015 design value estimates for hypothetical 8-hour ozone nonattainment areas for the 2008 Ozone NAAQS. The projected 2015 design values were presented as supporting material for the rules to implement the 8-hour Ozone NAAQS. The projections were developed using measured 2008-2010 design value information from the Cross State Air Pollution Rule (CSAPR) final rule modeling. The original CSAPR modeling made projections for 2014 using a base year of 2005 (a 9-year projection). The percentage change of ozone over the modeled 9 year period was apportioned to develop estimates for the projected change in ozone between the measured 2008-2010 period and the 2015 Marginal attainment demonstration year. The results of this analysis are presented in Table 5. The highest design value for each nonattainment area based on actual measured data is presented for the 2008-2010 period. The highest projected values for the year 2015 are also presented for each of the three Ohio designated NAAs. All three Ohio areas are projected to attain the 2008 Ozone NAAQS by the year 2015. The spreadsheets and methodology for these projections are included in Appendix M (US EPA, 2012).

Table 5. US EPA Projected 2015 Ozone Design Values

This table shows the projected ozone design values in the three Ohio 2008 NAAQS nonattainment areas. All three nonattainment areas are projected to be in attainment by 2015.

State	2008 Ozone NAAQS Nonattainment Area Name	Area Classification	Highest Measured 2008-2010 Ozone Design Value	Highest Projected 2015 Ozone Design Value	Projected to Attain by 2015?
Ohio	Cincinnati-Hamilton, OH-KY-IN	Marginal	79	74	Yes
Ohio	Cleveland-Akron-Lorain, OH	Marginal	77	72.2	Yes
Ohio	Columbus, OH	Marginal	77	71.3	Yes

Adapted from "Spreadsheet estimates 2015 design values for hypothetical 8-hour ozone nonattainment areas for the 75 ppb NAAQS for the purpose of estimating the number of marginal nonattainment areas that are expected to attain the NAAQS by their attainment date (2015)" EPA-HQ-OAR-2010-0885-0011

6 References

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