State of Ohio Environmental Protection Agency
Division of Air Pollution Control

Ohio's Recommended Designations for the 2015 Ozone Standard

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The Ohio Environmental Protection Agency
Division of Air Pollution Control

September 2016

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List of Appendices

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Designation Area	Nonattainment Designation Counties for the 1997 Standard	Nonattainment Designation Counties for the 2008 Standard	Ohio EPA Recommended Nonattainment Counties for the 2015 Standard
(1) Canton-Massillon, OH	Stark		
(2) Cincinnati, OH-KY-IN[1]	Butler Clermont Clinton Hamilton Warren	Butler Clermont Clinton Hamilton Warren	Butler Clermont Hamilton Warren
(3) Cleveland-Akron-Lorain, OH[2]	Ashtabula Cuyahoga Geauga Lake Lorain Medina Portage Summit	Ashtabula Cuyahoga Geauga Lake Lorain Medina Portage Summit	Cuyahoga Geauga Lake Lorain Medina Portage Summit
(4) Columbus, OH[3]	Delaware Fairfield Franklin Knox Licking Madison	Delaware Fairfield Franklin Knox Licking Madison	Delaware Fairfield Franklin Licking
(5) Dayton-Springfield, OH	Clark Green Miami Montgomery		
(6) Huntington-Ashland, WV-KY-OH			
(7) Lima, OH	Allen		
(8) Parkersburg-Marietta, WV-OH	Washington		
(9) Steubenville-Weirton, OH-WV	Jefferson		
(10) Toledo, OH	Lucas Wood		
(11) Wheeling, WV-OH	Belmont		
(12) Youngstown-Warren-Sharon, OH-PA	Columbiana Mahoning Trumbull		

[1] Currently attaining the 2008 standard. Redesignation requested April 2016.
[2] Currently attaining the 2008 standard. Redesignation requested July 2016.
[3] Currently attaining the 2008 standard. Redesignation requested June 2016.

Background

On October 1, 2015, U.S. EPA strengthened the 2008 primary and secondary eight-hour ozone standards, lowering both standards to 0.070 parts per million (ppm) (herein expressed as 70 parts per billion (ppb)). U.S. EPA retained their indicators, averaging times and forms as they were under the 2008 ozone standards (80 FR 65292, October 26, 2015).

Under Clean Air Act (CAA) Section 107(d), U.S. EPA is required to make designations after a State submits recommendations. This document is Ohio's recommendations for designations for the 2015 ozone standard. These recommendations are due to U.S. EPA by October 1, 2016 and use the three-most recent years of air quality data available at the time, 2013 to 2015. Ohio EPA will also be using preliminary 2014 to 2016 design values, based upon 2016 data in Ohio that is available through July 23, 2016, to inform our recommendations for nonattainment. Following this recommendation, U.S. EPA intends to notify States (via a "120-day letter") by June 2, 2017 and to finalize designations, after a public comment period, by October 1, 2017.

Based on the air quality data, and the five-factor analysis discussed below, Ohio is recommending designations of unclassifiable/attainment and nonattainment. The remainder of this document discusses the method used for Ohio's recommendations for nonattainment areas and the resulting analysis. Ohio is recommending all other counties in the State be designated as unclassifiable/attainment. U.S. EPA has historically used the "unclassifiable/attainment" category for areas that monitor attainment and for areas that do not have monitors and there is no reason to believe they are not attainment or are contributing to nearby violations.

An Explanation of Ohio EPA's Five-Factor Analysis for Nonattainment Recommendations

U.S. EPA's guidance "Area Designations for the 2015 Ozone National Ambient Air Quality Standards" (February 25, 2016) (herein referred to as "Designation Guidance") states that each area evaluated for nonattainment should be assessed on a case-by-case basis considering the specific facts and circumstances unique to the area. A nonattainment area must include not only the area that is violating the standard but also nearby areas that contribute to the violation. This area of analysis begins with an evaluation of the entire urbanized area, starting with the 2013 Core Based Statistical Area/Combined Statistical Area (CBSA/CSA) that contains the violating monitor(s). Ohio's CBSA/CSA's are shown in Appendix A[4]. Boundary recommendations should be based on an evaluation of the five factors discussed in the Designation Guidance, as well as any other relevant factors or circumstances specific to a particular area.

The five designation factors used to determine nearby areas of influence are:

1. Air quality data,

[4] http://www.census.gov/geo/maps-data/maps/statecbsa.html

2. Emissions and emissions-related data,
3. Meteorology,
4. Geography/topography, and
5. Jurisdictional boundaries.

The analyses methods for each factor are described below and the actual analysis for each nonattainment area is provided in the section entitled "Recommendations for Nonattainment."

Factor 1: Air quality data

The revised standard is 70 ppb. Ohio EPA operates a large network of Federal Reference Method (FRM) ozone monitors, primarily located in urbanized areas and areas with expected maximum concentrations of ozone.

The air quality analysis begins by looking at the design value of each monitoring site. The design value is the 3-year average of the annual fourth-highest daily maximum eight-hour average ozone values for each County based on data for 2013 to 2015. Other air quality analyses that can help determine appropriate boundaries include:

- The amount by which monitored levels exceed the standard may indicate the magnitude of emissions contributing to the exceedance and whether there may be influences from surrounding areas.
- Trends in monitoring values (and design values) in the area.

All air monitoring data is retrieved from the U.S. EPA's Air Quality System (AQS) at https://www.epa.gov/aqs and is presented in ppb in all tables. The three-year averages for monitors that are violating the standard are highlighted with red. Monitoring sites that have less than 75 percent capture in at least one quarter are highlighted with green. Ohio EPA will be using preliminary 2014 to 2016 design values to inform our recommendations for nonattainment. These design values are based upon 2016 data in Ohio that is available through July 23, 2016. AQS data retrieval sheets for the 2013 to 2015 design value are provided in Appendix B. The state and local air monitoring stations (SLAMS) data certification report for calendar year 2015 is provided in Appendix C. SLAMS data certification for 2016 will be completed in early 2017, prior to U.S. EPA's proposal of recommended nonattainment areas. Ohio EPA will be preparing a revised recommendation to U.S. EPA, as appropriate, in the event complete 2016 air quality data show a different designation is more appropriate.

The following table summarizes all the air quality data for Ohio monitors from 2006 to 2016. In some cases, this table will contain more monitor locations than those identified in the nonattainment area analysis because of the historical nature of the data. Monitors included in the nonattainment area analysis include only those operational during the 2013 to 2015 design value period.[5]

[5] Preliminary data for 2016 will also be considered. No new monitors were added in 2016.

Table 1: Ohio's Annual Fourth-Highest Daily Maximum Eight-hour Average Ozone Concentrations and 3-Year Averages (ppb)

Site	County	Year											3-Year Average								
		2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016[6]	'06-'08	'07-'09	'08-'10	'09-'11	'10-'12	'11-'13	'12-'14	'13-'15	'14-'16[6]
39-003-0002	Allen	75	78	67	67								73	70	67	67					
39-003-0009	Allen				69	72	73	79	68	66	64	68		69	70	71	74	73	71	66	66
39-007-1001	Ashtabula	86	92	75	75	83	77	79	70	69	70	72	84	80	77	78	79	75	72	69	70
39-009-0004	Athens		80	69	67	70	71						74	72	68	69	70	71			
39-017-0004	Butler	79	91	71	73	77	78	83	68	70	70	74	80	78	73	76	79	76	73	69	71
39-017-0018	Butler					80	82	84	68	69	70	74			80	81	82	78	73	69	71
39-017-1004	Butler	76	91	79	76								82	82	77	76					
39-017-9991	Butler						79	85	69	69	68	66				79	82	77	74	68	67
39-023-0001	Clark	76	78	75	71	75	77	77	71	65	71	71	76	74	73	74	76	75	71	69	69
39-023-0003	Clark	74	78	75	72	74	77	75	67	64	69	70	75	75	73	74	75	73	68	66	67
39-025-0022	Clermont	77	86	71	69	75	82	91	66	68	70	73	78	75	71	75	82	79	75	68	70
39-027-1002	Clinton	81	82	76	70	76	84	86	64	70	70	69	79	76	74	76	82	78	73	68	69
39-035-0034	Cuyahoga	74	80	81	71	75	81	85	69	71	67	70	78	77	75	75	80	78	75	69	69
39-035-0060	Cuyahoga				43	68	71	73	57	66	63	63		43	55	60	70	67	65	62	64
39-035-0064	Cuyahoga	68	83	72	62	72	66	83	64	59	66	68	74	72	68	66	73	71	68	63	64
39-035-5002	Cuyahoga	81	80	83	69	75	78	87	65	61	72	71	81	77	75	74	80	76	71	66	68
39-041-0002	Delaware	75	80	75	70	74	73	77	70	66	68	67	76	75	73	72	74	73	71	68	67
39-047-9991	Fayette						75	77	64	69	70	62				75	76	72	70	67	67
39-049-0028	Franklin	76	78	69									74	73	69						
39-049-0029	Franklin	82	87	83	73	77	87	82	73	70	71	72	84	81	77	79	82	80	75	71	71
39-049-0037	Franklin	79	79	71	70	72	77	81	70	69	64	66	76	73	71	73	76	76	73	67	66
39-049-0081	Franklin	77	79	66	69	72	71	76	65	68	63	69	74	71	69	70	73	70	69	65	66
39-055-0004	Geauga	70	68	82	68	81	72	82	65	65	73	76	73	72	77	73	78	73	70	67	71
39-057-0006	Greene	79	77	75	71	70	76	77	66	66	71	69	77	74	72	72	74	73	69	67	68
39-061-0006	Hamilton	81	89	86	72	80	88	87	69	70	72	75	85	82	79	80	85	81	75	70	72
39-061-0010	Hamilton	81	86	77	65	79	78	83	64	73	70	73	81	76	73	74	80	75	73	69	72
39-061-0040	Hamilton	78	86	80	74	75	85	82	69	69	71	73	81	80	76	78	80	78	73	69	71
39-081-0017	Jefferson	80	79	73	64	71	70	77	66	67	66	62	77	72	69	68	72	71	70	66	65
39-083-0002	Knox	75	80	74	68	73	79	74	67	66	71	66	76	74	71	73	75	73	69	68	67
39-085-0003	Lake	83	74	78	72	80	81	89	70	75	74	75	78	74	76	77	83	80	78	73	74
39-085-0007	Lake				72	68	68	83	68	62	70	68		72	70	69	73	73	71	66	66
39-085-3002	Lake	75	79	76									76	77	76						
39-087-0006	Lawrence	72	76	82	63								76	73	72	63					
39-087-0011	Lawrence	67	82	74	62	69	61	72	60	64	65	64	74	72	68	64	67	64	65	63	64
39-087-0012	Lawrence					74	68	75	63	62	69	70			74	71	72	68	66	64	67
39-089-0005	Licking	72	78	74	69	74	79	77	65	66	68	67	74	73	72	74	76	73	69	66	67
39-093-0018	Lorain	69	78	75	64	73	72	81	60	67	62	68	74	72	70	69	75	71	69	63	65
39-095-0024	Lucas	75	81	71	65	63	66	83	62	70	63	67	75	72	66	64	70	70	71	65	66
39-095-0027	Lucas	69	75	73	68	64	64	74	68	64	63	65	72	72	68	65	67	68	68	65	64
39-095-0034	Lucas	74	78	73	72	72	74	82	65	65	64	63	75	74	72	72	76	73	70	64	64
39-095-0081	Lucas	74	77										75	77							
39-097-0007	Madison	76	83	71	68	73	79	78	66	69	69	68	76	74	70	73	76	74	71	68	68

[6] Data available through July 23, 2016

Site	County	Year											3-Year Average								
		2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016[6]	'06-'08	'07-'09	'08-'10	'09-'11	'10-'12	'11-'13	'12-'14	'13-'15	'14-'16[6]
39-099-0013	Mahoning	76	78	71	65	71	73	76	63	66	69	54	75	71	69	69	73	70	68	66	63
39-103-0003	Medina	73	69	75	66	70							72	70	70	68	70				
39-103-0004	Medina				62	71	70	74	65	64	63	66		62	66	67	71	69	67	64	64
39-109-0005	Miami	73	73	70	71	70	75	77	70	66	68	68	72	71	70	72	74	74	71	68	67
39-113-0033	Montgomery	71	74										72	74							
39-113-0037	Montgomery			77	73	77	80	79	69	69	70	72	77	75	75	76	78	76	72	69	70
39-121-9991	Noble						64	72	63	65	66	64				64	68	66	66	64	65
39-133-1001	Portage	70	84	69	63	71	69	74	58	61	64	58	74	72	67	67	71	67	64	61	61
39-135-1001	Preble	72	73	68	69	71	74	77	67	65	67	69	71	70	69	71	74	72	69	66	67
39-151-0016	Stark	78	84	77	66	80	81	77	70	65	72	70	79	75	74	75	79	76	70	69	69
39-151-0021	Stark	79	82										80	82							
39-151-0022	Stark		83	76		72	74	73	67	59	68	67	79	79	74	73	73	71	66	64	64
39-151-0023	Stark				63									63	63	63					
39-151-4005	Stark	75	87	77	61	78	76	71	67	61	67	71	79	75	72	71	75	71	66	65	66
39-153-0020	Summit	77	90	80	71	76	76	70	60	58	65	56	82	80	75	74	74	68	62	61	59
39-155-0009	Trumbull	74	80	76	69	73	71	76	62	65			76	75	72	71	73	69	67	63	65
39-155-0011	Trumbull	82	84	77	69	76	78	84	68	65	70	71	81	76	74	74	79	76	72	67	68
39-155-0013	Trumbull										66	70								66	67
39-165-0007	Warren	86	88	82	77	76	82	80	67	71	71	74	85	82	78	78	79	76	72	69	72
39-167-0004	Washington	81	86	78	67	76	71	75	63	63	68	63	81	77	73	71	74	69	67	64	64
39-173-0003	Wood	73	83	70	69	70	73	77	65	63	62	66	75	74	69	70	73	71	68	63	63

CASTNET monitor; data not certified by USEPA

Insufficient data (less than 75 percent capture in at least one quarter)

Violating monitor

Factor 2: Emissions and emissions-related data

The analysis for factor 2 looks at ozone-related emissions of volatile organic compounds (VOCs) and nitrogen oxides (NO_x) from areas nearby to an exceeding monitor to determine their contribution. Emissions data are derived from the 2011 v2 NEI data[7] and 2014 Emissions Inventory System (EIS):

- Emissions data for 2011 and 2014 point sources in Ohio are derived from the state inventory database (i.e., Ohio's EIS database which serves as the basis for the NEI). The EIS contains more accurate emissions data as the state allows for the submission of revised emissions reports which may not be accounted for in the 2011 NEI.
- 2011 emissions data for point sources in Kentucky and Indiana, airport and rail yard related emissions (air/rail), nonpoint, nonroad, onroad and fires were derived from the 2011 v2 NEI data.

Emissions reductions that may occur beyond those in these inventories that are due to permanent and enforceable emissions controls that will be in place in time for attainment are also discussed.

This analysis looks at emissions of identified sources, and their magnitude, of VOC and NO_x. Analyzing the magnitude and spatial extent of emissions can further inform the urban/rural air monitoring analysis. Furthermore, combining these analyses with meteorological analysis can further inform the degree of contribution from nearby areas.

Also included in this analysis are current population and population growth, population density and degree of urbanization along with traffic and commuting patterns. Local trends in population growth and patterns may indicate the probable location and magnitude of emissions sources that contribute to nonattainment. The 2011 NEI includes emissions for smaller stationary area and mobile source emissions. Analyzing population density, degree of urbanization, and transportation arteries may provide an indication of the spatial extent emissions from area and mobile sources. Analyzing traffic and commuting patterns, such as analyzing the number and percent of total commuters in each county commuting to counties with violating monitors and analyzing the total vehicle miles traveled (VMT), may help assess the influence of mobile source emissions in an area.

Data included in factor 2 are also provided by:
https://www.epa.gov/ozone-designations/ozone-designations-guidance-and-data.

This Web site provides access to a wide variety of data resources, including:

- 2011 v2 NEI emissions summaries (excel spreadsheet)
- Vehicle miles traveled (excel spreadsheet)
- County population (excel spreadsheet)

[7] https://www.epa.gov/air-emissions-inventories/2011-national-emissions-inventory-nei-data

County profiles are provided by the Ohio Development Services Agency: https://development.ohio.gov/reports/reports_countytrends_map.htm.

Commuting information is derived from the U.S. Census Bureau http://www.census.gov/hhes/commuting/.

Factor 3: Meteorology

The meteorology review looks at wind data gathered at stations in and near Ohio by the National Weather Service (NWS). Wind roses were derived from the NWS data for winds during the ozone season (April 1 to October 31) for NWS sites near a violating monitor. Wind roses are also derived for those days where there was at least one hour where a violating monitor exceeded 70 ppb. These data may suggest that emissions in some directions relative to the violation may be more prone to contribute than emissions in other directions.

HYPSLIT modeling conducted by U.S. EPA is also used to show back trajectories of the 3-dimensional paths traveled by air parcels to a violating monitor on days with high ozone concentrations (daily maximum 8 hour values that exceed 70 ppb) in 2013 and 2014, based on wind speed and direction. HYSPLIT modeling is provided by U.S. EPA's Ozone Designations mapping tool: https://epa.maps.arcgis.com/apps/webappviewer/index.html?id=6a89e7170dd147b1852ec11ccb3880e8.

Ohio EPA also conducted HYSPLIT modeling for Geauga County monitor 39-055-0004 using the HYSPLIT model available at http://ready.arl.noaa.gov/HYSPLIT_traj.php, as modeling for this monitor was not available in U.S. EPA's Ozone Designations mapping tool. Trajectories were produced on July 15, 2016 using model version January 5, 2016. Three starting heights are plotted – 100m AGL (red), 500m (blue), and 1000m (green) – for the Geauga County ozone monitor for each day that monitor's daily maximum 8-hour average ozone value exceeded 70 ppb from 2013 to July 14, 2016. The lines represent HYSPLIT back-trajectories 24 hours in length starting at 1800 EDT, utilizing NOAA EDAS 40 km data for all meteorological input, including vertical motion.

Factor 4: Geography/topography

The geography and topography analysis looks at physical features that might have an effect on the airshed, and therefore, the distribution of particulate matter over an area. Ohio does not have significant topographic features that significantly influence the regional transport of pollutants within the multi-county study areas.

Factor 5: Jurisdictional boundaries

The analysis of jurisdictional boundaries looks at the planning and organizational structure of an area to determine if the implementation of controls in a potential nonattainment area can be carried out in the cohesive manner.

Recommendations for Nonattainment Areas

Cincinnati, OH-KY-IN

Figure 1: Cincinnati, OH-KY-IN Recommended Nonattainment Area – Ohio Portion Only

Discussion

There are five Ohio counties in the 2008 ozone nonattainment area: Butler, Clermont, Clinton, Hamilton, and Warren Counties. In addition to Ohio counties, Boone, Kenton and Campbell Counties in Kentucky, and partial Dearborn County in Indiana were a part of this 2008 ozone nonattainment area. Ohio EPA recommends designating Hamilton, Butler, Clermont and Warren Counties as nonattainment for the Ohio portion of the Cincinnati area. After considering the five factors, Ohio EPA does not recommend adding any additional contributing Ohio counties to this area.

There is one violating monitor in Campbell County, Kentucky for the 2013 to 2015 design year. There were no violating monitors in Ohio or Indiana for the 2013 to 2015 design year. Preliminary data for the 2014 to 2016 design values, with data available through July 23, 2016, indicates all three Hamilton County monitors (39-061-0006, 39-061-0010 and 39-061-0040), two Butler County monitors (39-017-0004 and 39-017-0018), and the Warren County monitor (39-165-0007) will be in violation of the standard. These counties are part of the Cincinnati-Wilmington-Maysville CSA. This CSA includes the following additional counties: Brown, Clermont and Clinton in Ohio; Boone, Bracken, Gallatin, Grant, Kenton, Mason and Pendleton Counties in Kentucky; and Dearborn, Ohio and Union Counties in Indiana.

Figure 2: Cincinnati-Wilmington-Maysville CSA

Source: U.S. Department of Commerce Economics and Statistics Administrations, U.S. Census Bureau, 2010 Economic Census

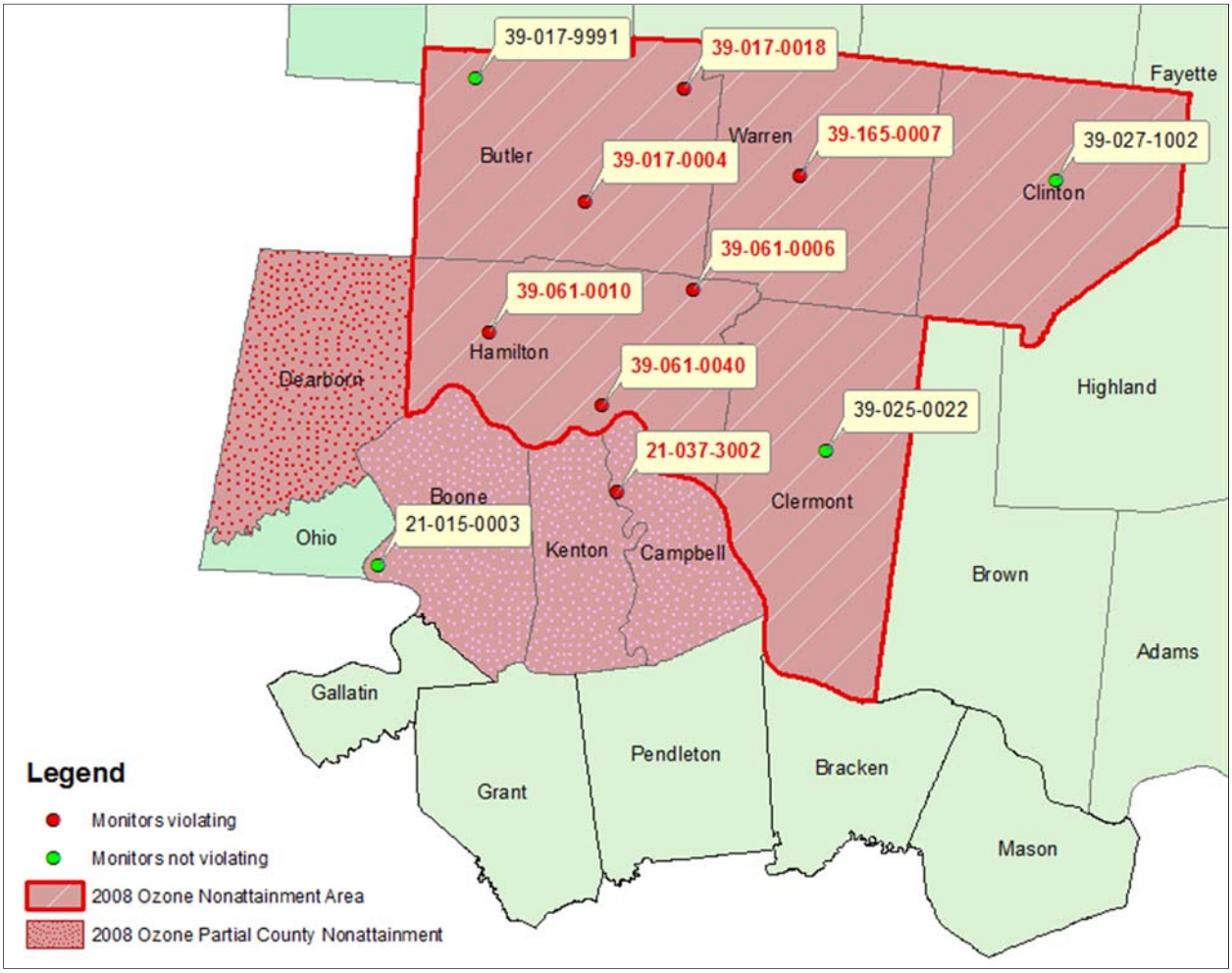
Ohio EPA will not be analyzing any additional counties adjacent to the CSA counties. Counties to the north and east of the CSA will not be analyzed because these counties

historically have been excluded from the nonattainment area or were historically part of a separate nonattainment area (Dayton-Springfield, OH) which is currently not violating either the 2008 or 2015 ozone standards. Additionally, there have been no significant changes to the factors being considered that would warrant analyzing them now.

Factor 1: Air quality

There are eleven monitors in this area.

Figure 3: Cincinnati, OH-KY-IN Area Air Quality Monitors



In Campbell County, Kentucky, monitor 21-037-3002 is violating the standard based on 2013 to 2015 air quality data. The preliminary 2014 to 2016 design values, with data available through July 23, 2016, indicates all three Hamilton County monitors (39-061-0006, 39-061-0010 and 39-061-0040), two Butler County monitors (39-017-0004 and 39-017-0018), and the Warren County monitor (39-165-0007) will be in violation of the standard. As can be seen from Table 1, air quality trends have declined historically in this area.

Table 2: Annual Fourth-Highest Daily Maximum Eight-hour Average Ozone Concentrations and 3-Year Averages (ppb) for Ohio Monitors

Site	County	Year				Average	
		2013	2014	2015	2016[8]	'13-'15	'14-'16[8]
39-017-0004	Butler	68	70	70	74	69	71
39-017-0018	Butler	68	69	70	74	69	71
39-017-9991	Butler	69	69	68	66	68	67
39-025-0022	Clermont	66	68	70	73	68	70
39-027-1002	Clinton	64	70	70	69	68	69
39-061-0006	Hamilton	69	70	72	75	70	72
39-061-0010	Hamilton	64	73	70	73	69	72
39-061-0040	Hamilton	69	69	71	73	69	71
39-165-0007	Warren	67	71	71	74	69	72

Insufficient data
Violating monitor
Source: U.S. EPA AQS

Table 3: Annual Fourth-Highest Daily Maximum Eight-hour Average Ozone Concentrations and 3-Year Averages (ppb) for Kentucky Monitors

Site	County	Year				Average	
		2013	2014	2015	2016[8]	'13-'15	'14-'16[8]
21-015-0003	Boone	59	62	62	64	61	62
21-037-3002	Campbell	72	71	71	69	71	70

Insufficient data
Violating monitor
Source: U.S. EPA AQS

Factor 2: Emissions and emissions related data

Emission trends

Overall, the most significant emissions in the analysis area emanate from Hamilton County, and then Butler County, Clermont County, Boone County, KY and Dearborn County, IN. Considering all the counties in this analysis area, these four counties account for 73% of NO_x and 56% of VOC emissions.

Warren, Clinton and Brown Counties, and Grant, Kenton and Campbell Counties, KY have lower emissions compared to the higher emitting counties and the majority of their emissions are related to nonpoint sources. Gallatin, Mason and Pendleton Counties, KY also have lower emissions compared to the higher emitting counties but their emissions are related to a presence of both point sources and nonpoint sources.

[8] Data available through July 23, 2016

Ohio and Union Counties, IN, and Bracken County, KY all have very low (insignificant) emissions.

Table 4: Cincinnati, OH-KY-IN Area Emissions (TPY)

Ohio County	NO_x (TPY)							
	2014 Point	2011 Point	2011 Air/Rail	2011 Nonpoint	2011 Nonroad	2011 Onroad	2011 Fires	2011 NO_x Total
Brown	11.10	4.07	0.33	383.53	254.07	1,288.36	2.39	**1,932.75**
Butler	4,065.37	3,884.24	105.31	1,962.75	1,569.52	7,108.70	0.00	**14,630.52**
Clermont	15,114.13	16,028.69	1.15	592.15	833.68	4,374.25	0.00	**21,829.92**
Clinton	0.06	11.51	1.62	475.88	421.59	1,583.19	0.00	**2,493.79**
Hamilton	7,914.21	9,042.38	644.10	3,798.10	3,145.46	19,232.85	0.00	**35,862.89**
Warren	338.80	569.81	1.77	799.42	1,189.90	4,743.52	0.00	**7,304.42**

Kentucky County	NO_x (TPY)						
	2011 Point	2011 Air/Rail	2011 Nonpoint	2011 Nonroad	2011 Onroad	2011 Fires	2011 NO_x Total
Boone	2,828.70	740.49	801.83	682.30	3,455.45	21.32	**8,530.09**
Bracken	3.72	0.00	469.43	72.38	267.93	0.00	**813.46**
Campbell	82.94	0.01	666.79	247.83	1,583.28	0.00	**2,580.85**
Gallatin	609.76	0.00	357.34	42.53	832.85	5.01	**1,847.49**
Grant	12.99	0.01	510.39	96.12	1,590.13	0.28	**2,209.92**
Kenton	99.11	48.06	818.13	521.34	3,449.61	0.00	**4,936.25**
Mason	5,554.50	0.57	521.31	146.65	389.34	0.00	**6,612.37**
Pendleton	949.04	0.18	350.98	77.48	385.47	7.90	**1,771.05**

Indiana County	NO_x (TPY)						
	2011 Point	2011 Air/Rail	2011 Nonpoint	2011 Nonroad	2011 Onroad	2011 Fires	2011 NO_x Total
Dearborn	6,530.64	0.01	296.72	196.33	1,610.93	6.62	**8,641.25**
Ohio	0.00	0.00	76.65	28.77	164.59	2.75	**272.76**
Union	0.00	0.00	190.63	135.37	226.35	0.00	**552.35**

Ohio County	VOC (TPY)							
	2014 Point	2011 Point	2011 Air/Rail	2011 Nonpoint	2011 Nonroad	2011 Onroad	2011 Fires	2011 VOC Total
Brown	14.13	28.21	0.69	4,558.87	111.49	969.87	24.69	**5,693.82**
Butler	1,071.50	1,128.31	18.30	6,081.24	1,076.33	4,556.78	0.00	**12,860.96**
Clermont	226.07	179.65	2.49	5,500.53	719.53	2,654.57	0.00	**9,056.77**
Clinton	2.38	3.86	3.03	3,199.71	308.14	902.79	0.00	**4,417.53**
Hamilton	984.60	1,158.67	59.90	10,759.16	2,734.21	10,490.15	0.00	**25,202.09**
Warren	186.01	268.96	3.81	4,760.18	812.53	2,741.38	0.00	**8,586.86**

Kentucky County	VOC (TPY)						
	2011 Point	2011 Air/Rail	2011 Nonpoint	2011 Nonroad	2011 Onroad	2011 Fires	2011 VOC Total
Boone	867.81	151.22	3,708.82	960.74	1,156.27	210.59	**7,055.45**
Bracken	13.41	0.00	2,604.87	98.86	143.77	0.00	**2,860.91**
Campbell	160.55	0.03	2,658.31	260.64	785.96	0.00	**3,865.49**
Gallatin	87.39	0.00	1,872.80	95.01	230.24	49.75	**2,335.19**
Grant	79.77	0.01	3,246.13	239.93	422.24	2.86	**3,990.94**
Kenton	229.09	3.71	3,289.76	418.90	1,405.33	0.00	**5,346.79**
Mason	311.42	1.33	2,694.03	121.77	194.90	0.00	**3,323.45**
Pendleton	127.20	0.39	3,137.17	44.20	227.50	80.48	**3,616.94**

Indiana County	VOC (TPY)						
	2011 Point	2011 Air/Rail	2011 Nonpoint	2011 Nonroad	2011 Onroad	2011 Fires	2011 VOC Total
Dearborn	1,573.31	0.01	3,500.17	152.55	752.90	144.58	**6,123.52**
Ohio	0.00	0.01	1,571.07	30.63	111.12	46.31	**1,759.14**
Union	0.00	0.01	1,500.88	218.28	127.38	0.00	**1,846.55**

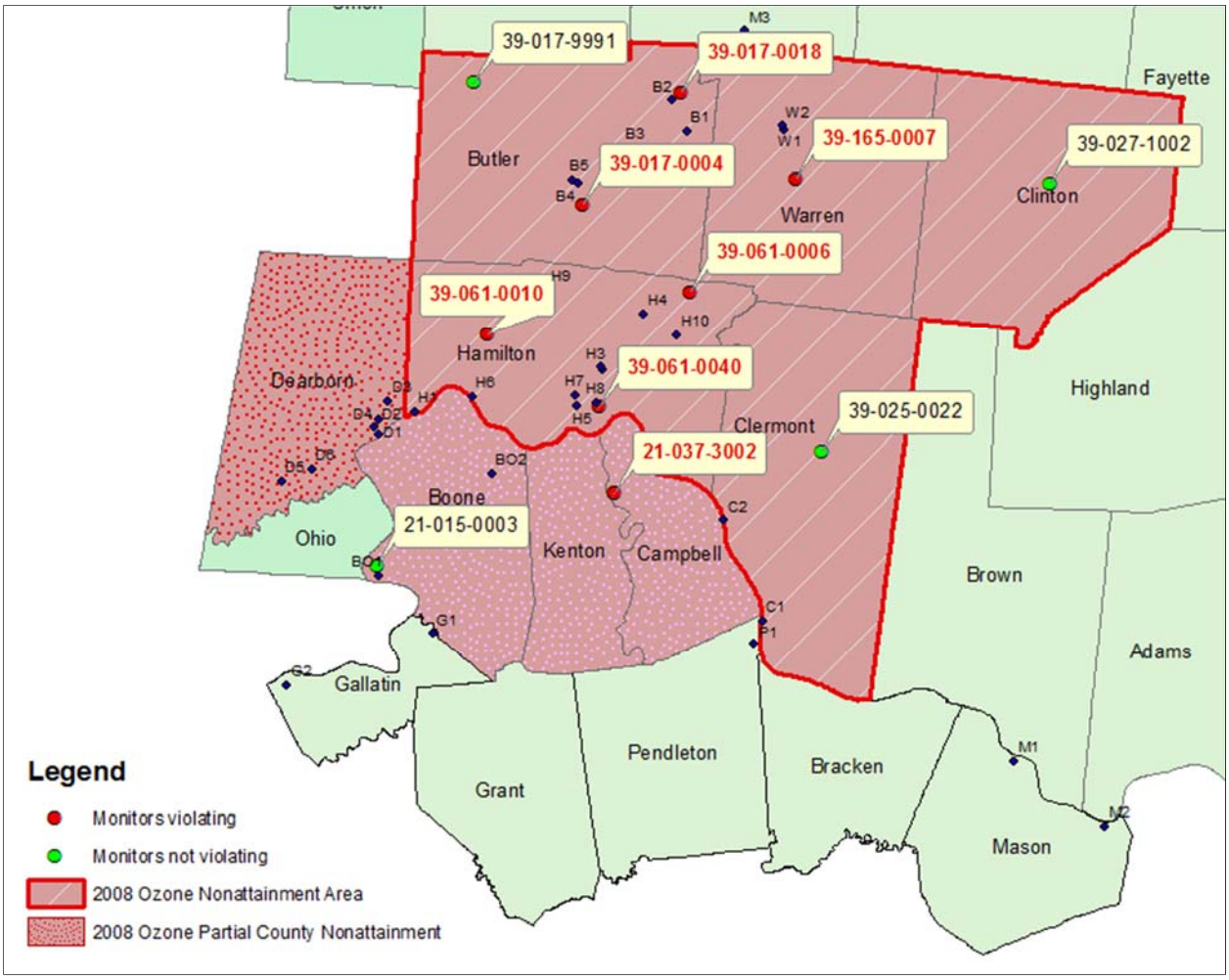
Source: 2011 NEI; 2011 EIS and 2014 EIS

As seen in Table 5 below, the most significant point emissions of NO_x in 2011 were from the three Duke Energy facilities located in Hamilton (Miami Fort) and Clermont (Beckjord and Zimmer) Counties and AEP's Tanners Creek in Dearborn County, IN. Tanners Creek and Miami Fort are located west and southwest of the violating monitors while Beckjord and Zimmer are located east/southeast of the violating monitors. Several of these facilities permanently shut down in 2014 and 2015 as described below.

As can be seen from Figure 4, the larger concentration of the larger point sources reside in Butler, Hamilton, Dearborn (IN), and Boone (KY) Counties.

The following figure[9] and table shows the higher emitting point sources located in the area.

Figure 4: Location of Cincinnati, OH-KY-IN Analysis Area Emissions Point Sources



Source: 2011 NEI

[9] The table can be used to correlate the location of each point source with the letter (first letter of county) and number next to the symbol on the map in the figure.

Table 5: Cincinnati, OH-KY-IN Analysis Area Emissions Point Sources for 2011

State	County	MapID	Facility Name	NO_x (TPY)
OH	Clermont	C1	Duke Energy Ohio, Wm. H. Zimmer Station (1413090154)	8,460
OH	Clermont	C2	Duke Energy Ohio, W.C. Beckjord Station (1413100008)	7,538
OH	Hamilton	H1	Duke Energy Ohio, Miami Fort Station (1431350093)	6,490
IN	Dearborn	D1	INDIANA MICHIGAN POWER CO TANNERS CREEK	5,367
KY	Mason	M1	East KY Power Coop - Spurlock Station	3,605
KY	Boone	BO1	Duke Energy KY East Bend	2,667
OH	Butler	B1	AK Steel Corporation (1409010006)	2,276
KY	Mason	M2	Carmeuse Lime & Stone Inc	1,914
KY	Pendleton	P1	Carmeuse Lime Inc	821
KY	Boone	BO2	Cincinnati/Northern Ken	740
OH	Hamilton	H2	DTE St. Bernard, LLC (1431394148)	737
OH	Hamilton	H3	Emery Oleochemicals LLC (1431074278)	647
IN	Dearborn	D2	MGPI of Indiana	536
OH	Butler	B2	Wausau Paper Towel & Tissue, LLC (1409010043)	426
OH	Hamilton	H4	General Electric Aviation, Evendale Plant (1431150060)	402
OH	Butler	B3	MillerCoors LLC (1409000353)	380
KY	Gallatin	G1	Mississippi Lime Co - Verona Plant	364
OH	Warren	W1	Texas Eastern Transmission - Lebanon (1483060328)	355
OH	Hamilton	H5	GESTSTREET	305
IN	Dearborn	D3	Ardagh Glass Inc	296
OH	Butler	B4	City of Hamilton Department of Public Utilities (1409040243)	214
KY	Gallatin	G2	Gallatin Steel Co	197
OH	Hamilton	H6	INEOS ABS (USA) Corporation (1431010054)	190
OH	Hamilton	H7	QUEENSGATE	181
IN	Dearborn	D4	LAWRENCEBURG PLANT	169
OH	Warren	W2	Lebanon Compressor Station (1483000144)	160
IN	Dearborn	D5	TEXAS GAS TRANSMISSION - DILLSBORO	158
OH	Hamilton	H8	University of Cincinnati (1431070849)	149
OH	Butler	B5	Smart Papers - Hamilton Mill (1409040212)	140

State	County		Facility Name	VOC (TPY)
IN	Dearborn	D2	MGPI of Indiana	961
OH	Butler	B1	AK Steel Corporation (1409010006)	675
IN	Dearborn	D6	AURORA CASKET CO INC	496
OH	Hamilton	H9	Rumpke Sanitary Landfill, Inc. (1431092049)	239
OH	Butler	B3	MillerCoors LLC (1409000353)	173
OH	Hamilton	H10	Steelcraft Mfg. Co. (1431050879)	157
KY	Boone	BO2	Cincinnati/Northern Ken	151
KY	Mason	M1	East KY Power Coop - Spurlock Station	141
IN	Dearborn	D1	INDIANA MICHIGAN POWER CO TANNERS CREEK	97
OH	Hamilton	H1	Duke Energy Ohio, Miami Fort Station (1431350093)	96
KY	Gallatin	G2	Gallatin Steel Co	79
KY	Boone	BO1	Duke Energy KY East Bend	61
OH	Clermont	C1	Duke Energy Ohio, Wm. H. Zimmer Station (1413090154)	55
OH	Warren	W2	Lebanon Compressor Station (1483000144)	54

Source: 2011 NEI

Level of control of emission sources

Permanent and enforceable reductions of VOC and NO_x emissions have contributed to the attainment of the 2008 eight-hour ozone standard and the overall ozone downward trend in ozone. Some of these reductions were due to the application of tighter federal standards on new vehicles and non-road diesel engines while reductions in EGU emissions were due to implementation of CAIR/CSAPR.

With respect to EGUs, changes at several facilities have resulted in reductions in NO_x emissions. Tanner's Creek Generating Station in Dearborn County, IN permanently shut down in May 2015. The Walter C. Beckjord facility in Clermont County permanently shut down in October 2014. Prior to the shutdown, point source NO_x emissions had dropped in Clermont County from 16,028.69 TPY to 15,114.13 TPY (2011 to 2014), partly attributable to the Walter C. Beckjord facility. Walter C. Beckjord's 2011 NO_x emissions represented 7,538 TPY of the 16,028.60 TPY. And lastly, unit 6 (163 megawatts) of the Miami Fort facility in Hamilton County permanently shut down in June 2015. Prior to the shutdown, point source NO_x emissions had dropped in Hamilton County from 9,042.38 TPY to 7,914.21 TPY (2011 to 2014), partly attributable to unit 6 at Miami Fort. Miami Fort's unit 6 2011 NO_x emissions represented 1,673 TPY of the 9,042 TPY.

Urbanization, population and commuting trends

The following table provides a summary of 2010 population and 2011 VMT for each of the counties that are discussed in this section.

Table 6: Cincinnati, OH-KY-IN Analysis Area County Level VMT, Population, Land Area and Population Density

County	2011 VMT	2010 Population	Land Area (Sq. Miles)	Population Density (1,000 per Sq. Miles)
Brown	468,171,663	44,846	492	0.09
BUTLER	3,099,030,997	368,130	467	0.79
Clermont	1,951,343,156	197,363	452	0.44
Clinton	662,416,993	42,040	411	0.10
HAMILTON	9,004,357,566	802,374	407	1.97
WARREN	2,139,774,797	212,693	400	0.53
Boone, KY	1,558,794,112	118,811	415	0.29
Bracken, KY	104,160,119	8,488	203	0.04
CAMPBELL, KY	1,010,009,434	90,336	404	0.22
Gallatin, KY	245,765,593	8,589	99	0.09
Grant, KY	529,145,674	24,662	260	0.09
Kenton, KY	1,720,886,038	159,720	162	0.99
Mason, KY	192,648,412	17490	241	0.07

Pendleton, KY	184,074,537	14,877	281	0.05
Dearborn, IN	690,348,611	50,047	305	0.16
Ohio, IN	71,591,617	6,128	87	0.07
Union, IN	105,444,221	7516	162	0.05
Total for Counties	23,737,963,540	2,174,110	5,248	

Source: U.S. EPA Designations Guidance and Data:
https://www.epa.gov/ozone-designations/ozone-designations-guidance-and-data and
http://www.epa.gov/pmdesignations/2012standards/techinfo.htm#F2

Degree of urbanization and population trends

As seen in Table 6 above, the majority of the population for this analysis area resides in Hamilton County. Greater populations are also noted in Butler and Clermont Counties and Kenton and Boone Counties, KY. As seen in Figure 5 below, the populations in Ohio's counties are expected to grow in the future except for Hamilton County. The populations in all counties located in Kentucky and Indiana that are a part of this analysis area are expected to increase through 2020[10].

The most urbanized areas are within Hamilton County and Butler County. Their population and population densities are significantly higher than other areas indicating that population-related emissions in these areas may be high. This is supported by Table 4 above, which indicates these counties have the highest nonpoint and roadway emissions compared to others. Kenton County, KY and Boone County, KY also have high population densities but their nonpoint and roadway emissions are not comparatively high. Warren and Clermont Counties, and to a lesser extent, Clinton and Brown Counties, also have relatively high nonpoint emissions compared to other counties in this analysis area. Clinton and Brown Counties have very low population densities while Warren and Clermont Counties have mid-range population densities.

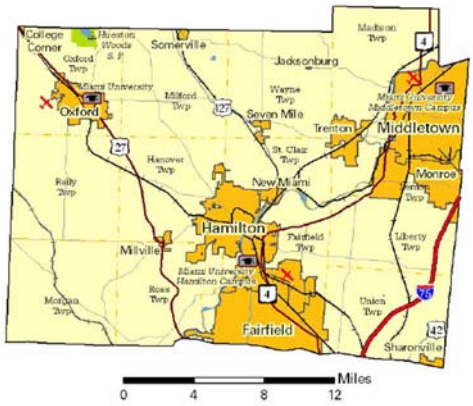
[10] http://ksdc.louisville.edu/index.php/kentucky-demographic-data/projections;
http://www.stats.indiana.edu/pop_proj/

Figure 5: Cincinnati, OH-KY-IN Analysis Area County Profiles

Hamilton County

Hamilton County is 46% forest, 10% cropland, and 41% urban. The greater Cincinnati area is the major urban area. The 2010 population was 802,374 while it grew to 806,631 in 2014. Population is expected to decline in the future to a level of 790,600 by 2020.

Butler County



Butler County is 23% forest, 51% cropland, and 13% urban. Hamilton, Middletown and Fairfield are the major urban areas. The 2010 population was 368,130 while it grew to 374,158 in 2014. Population is expected to continue growing in the future to a level of 390,110 by 2020.

Warren County

Warren County is 29% forest, 56% cropland, and 8% urban. Mason, Lebanon and Springboro are the major urban areas. The 2010 population was 212,693 while it grew to 221,659 in 2014. Population is expected to continue growing in the future to a level of 225,770 by 2020.

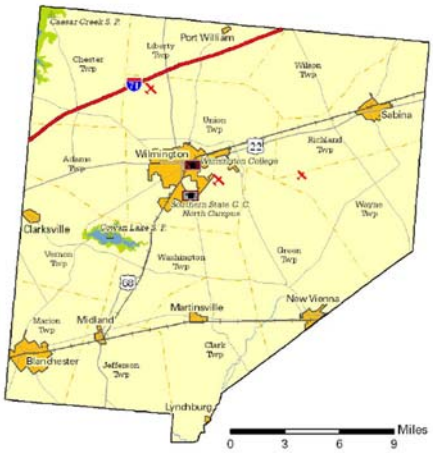
Brown County

Brown County is 36% forest, 45% cropland, and 3% urban. Georgetown and Perry Township are the major urban areas. The 2010 population was 44,846 while it declined to 44,116 in 2014. Population is expected to grow in the future to a level of 45,850 by 2020.

Clermont County

Clermont County is 49% forest, 29% cropland, and 11% urban. Union and Miami townships are the major urban areas. The 2010 population was 197,363 while it grew to 201,560 in 2014. Population is expected to continue growing in the future to a level of 208,330 by 2020.

Clinton County

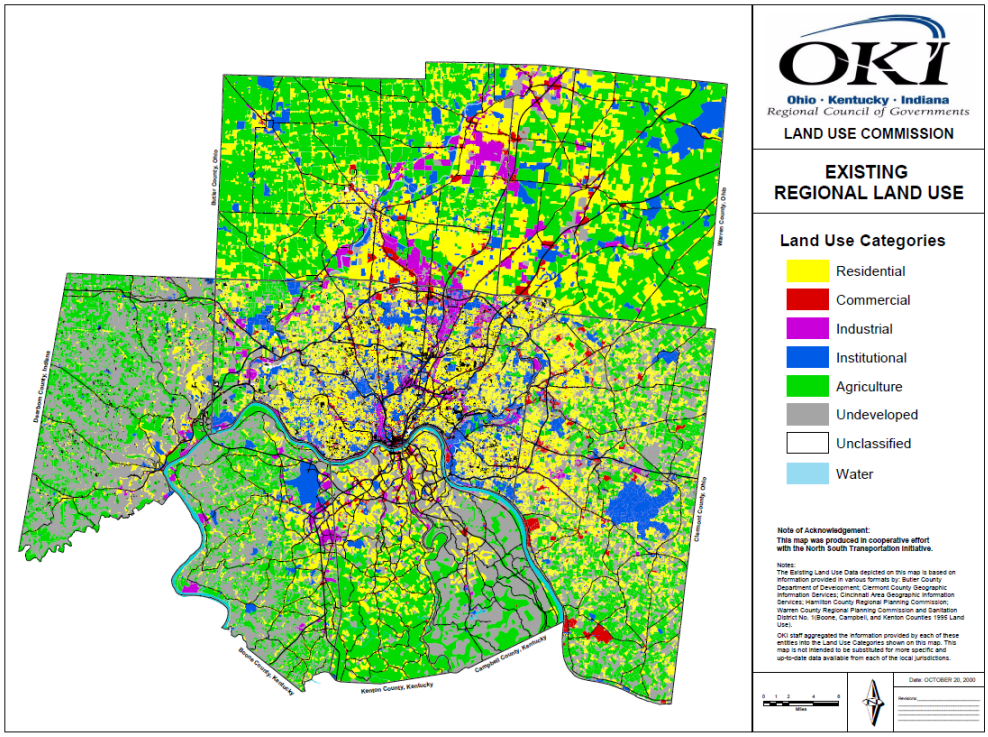


Clinton County is 16% forest, 71% cropland, and 2% urban. Wilmington is the major urban area. The 2010 population was 42,040 while it declined to 41,835 in 2014. Population is expected to grow in the future to a level of 42,100 by 2020.

Source: Ohio Department of Development. Ohio County Profiles: https://development.ohio.gov/reports/reports_countytrends_map.htm

As can be seen from Figure 6 below, for those Indiana and Kentucky counties immediately surrounding the greater Cincinnati area, the majority of those counties are undeveloped or agriculture lands. However, there is a larger urban component concentrated near the Cincinnati area.

Figure 6: Cincinnati, OH-KY-IN Analysis Area Regional Land Use



Source: http://www.oki.org/pdf/LUC/existing_landuse.pdf

Commuting trends

As can be seen in Table 6, the majority of VMT occurs in Hamilton County, and to a lesser extent Butler, Warren, Clermont, Kenton (KY), and Boone (KY) Counties. Table 7 below looks at commuter travel in and out of the county in this analysis area with the violating monitor for the 2013 to 2015 design value, Campbell (KY). Nearly 64% of Campbell County's working residents commute to counties outside of Campbell County. In turn, 46% of Campbell County's workforce commutes from other counties into Campbell County. Of the Campbell County residents that commute to other counties, the greatest percentage commutes north to Hamilton County (33.6%). To a lesser extent, some commute to Kenton County, KY (14.3%), Boone County, KY (8.9%), Clermont County (2.0%), and Butler County (1.7%). Of the non-residents that commute into Campbell County, the most significant percentage comes from Kenton County (16.4%) and then Hamilton County (11.4%). Overall, the most significant commuter travel in and out of Campbell County occurs with Hamilton County and Kenton County, KY.

Preliminary 2016 data indicate Hamilton, Butler and Warren Counties will also have violating monitors for the 2014 to 2016 design value period, so commuter travel in and out of these counties are also provided in Table 7 below. 18.7% of Hamilton County's working residents commute to counties outside of Hamilton County. In turn, nearly 30% of Hamilton County's workforce commutes from other counties into Hamilton County. Of the Hamilton County residents that commute to other counties, the greatest percentage commutes to Butler County (5.9%). To a lesser extent, some commute to Warren County (3.3%), Boone County, KY (2.3%), Kenton County, KY (2.2%), and Clermont County (1.9%). Of the non-residents that commute into Hamilton County, the most significant percentage comes from Butler County (11.2%) and then Clermont County (9.3%) and Warren County (6.2%). Overall, the most significant commuter travel in and out of Hamilton County occurs with Butler, Clermont and Warren Counties.

43% of Butler County's working residents commute to counties outside of Butler County. In turn, 32% of Butler County's workforce commutes from other counties into Butler County. Of the Butler County residents that commute to other counties, the greatest percentage commutes to Hamilton County (28.1%). To a lesser extent, some commute to Warren County (8.6%) and Montgomery County (2.6%). Of the non-residents that commute into Butler County, the most significant percentage comes from Hamilton County (15.3%) and then Warren County (7.7%) and Clermont County (3%). Overall, the most significant commuter travel in and out of Butler County occurs with Hamilton and Warren Counties.

58.9% of Warren County's working residents commute to counties outside of Warren County. In turn, 50.6% of Warren County's workforce commutes from other counties into Warren County. Of the Warren County residents that commute to other counties, the greatest percentage commutes to Hamilton County (26.2%). To a lesser extent, some commute to Montgomery County (13.2%) and Butler (11%). Of the non-residents that commute into Warren County, the most significant percentage comes from Butler County (17.4%) and then Hamilton County (14.8%) and Montgomery County (8.3%).

Overall, the most significant commuter travel in and out of Warren County occurs with Hamilton, Butler and Montgomery Counties.

Amongst all the counties with violating monitors, the most significant commuter travel occurs between Hamilton, Butler, Warren and Clermont counties.

Table 7a: Commuter Travel In and Out of Campbell County

Campbell, KY

Percent of workers that work outside the county - 63.9%

Average commute time in minutes - 23.9

Number of workers 16+ years of age living in Campbell County		44,389	
Commute Out To		Number	Percent
Hamilton County	OH	14,936	33.6%
Kenton County	KY	6,356	14.3%
Boone County	KY	3,948	8.9%
Clermont County	OH	876	2.0%
Butler County	OH	767	1.7%
Warren County	OH	383	0.9%
Pendleton County	KY	138	0.3%
Montgomery County	OH	97	0.2%
Franklin County	OH	94	0.2%
Dearborn County	IN	68	0.2%

Percent is of workers living in county.

Number of workers 16+ years of age working in Campbell County		29,701	
Commute In From		Number	Percent
Kenton County	KY	4,861	16.4%
Hamilton County	OH	3,388	11.4%
Boone County	KY	1,792	6.0%
Pendleton County	KY	987	3.3%
Clermont County	OH	946	3.2%
Bracken County	KY	364	1.2%
Butler County	OH	217	0.7%
Grant County	KY	161	0.5%
Dearborn County	IN	156	0.5%
Mason County	KY	116	0.4%

Percent is of workers working in county.

Table 7b: Commuter Travel In and Out of Hamilton County

Hamilton

Percent of workers that work outside the county - 18.7%

Average commute time in minutes - 22.7

Number of workers 16+ years of age living in Hamilton County	370,463	
Commute Out To	Number	Percent
Butler County	21,941	5.9%
Warren County	12,371	3.3%
Boone County	8,352	2.3%
Kenton County	8,277	2.2%
Clermont County	7,209	1.9%
Campbell County	3,388	0.9%
Dearborn County	1,499	0.4%

Number of workers 16+ years of age working in Hamilton County	427,387	
Commute In From	Number	Percent
Butler County	47,967	11.2%
Clermont County	39,760	9.3%
Warren County	26,429	6.2%
Brown County	3,014	0.7%
Montgomery County	2,780	0.7%
Clinton County	1,299	0.3%
Greene County	866	0.2%

Montgomery County	1,469	0.4%
Franklin County	532	0.1%
Greene County	197	0.1%

Percent is of workers living in county.

Highland County	757	0.2%
Adams County	623	0.1%
Franklin County	605	0.1%

Percent is of workers working in county.

Table 7c: Commuter Travel In and Out of Butler County

Butler

Percent of workers that work outside the county - 43.0%

Average commute time in minutes - 23.5

Number of workers 16+ years of age living in Butler County: 170,916

Commute Out To		Number	Percent
Hamilton County	OH	47,967	28.1%
Warren County	OH	14,618	8.6%
Montgomery County	OH	4,382	2.6%
Clermont County	OH	1,263	0.7%
Boone County	KY	738	0.4%
Greene County	OH	597	0.3%
Kenton County	KY	594	0.3%
Preble County	OH	305	0.2%
Franklin County	OH	261	0.2%
Campbell County	KY	217	0.1%

Percent is of workers living in county.

Number of workers 16+ years of age working in Butler County: 143,692

Commute In From		Number	Percent
Hamilton County	OH	21,941	15.3%
Warren County	OH	11,127	7.7%
Clermont County	OH	4,338	3.0%
Montgomery County	OH	3,703	2.6%
Preble County	OH	2,194	1.5%
Greene County	OH	486	0.3%
Brown County	OH	485	0.3%
Clinton County	OH	293	0.2%
Clark County	OH	187	0.1%
Mahoning County	OH	149	0.1%

Percent is of workers working in county.

Table 7d: Commuter Travel In and Out of Warren County

Warren

Percent of workers that work outside the county - 58.9%

Average commute time in minutes - 24.4

Number of workers 16+ years of age living in Warren County: 100,806

Commute Out To		Number	Percent
Hamilton County	OH	26,429	26.2%
Montgomery County	OH	13,313	13.2%
Butler County	OH	11,127	11.0%
Clermont County	OH	2,073	2.1%

Number of workers 16+ years of age working in Warren County: 83,799

Commute In From		Number	Percent
Butler County	OH	14,618	17.4%
Hamilton County	OH	12,371	14.8%
Montgomery County	OH	6,938	8.3%
Clermont County	OH	4,219	5.0%

Greene County	OH	1,919	1.9%
Clinton County	OH	1,055	1.0%
Kenton County	KY	659	0.7%
Boone County	KY	537	0.5%
Franklin County	OH	318	0.3%
Miami County	OH	169	0.2%

Percent is of workers living in county.

Greene County	OH	1,164	1.4%
Clinton County	OH	1,093	1.3%
Preble County	OH	494	0.6%
Brown County	OH	308	0.4%
Highland County	OH	263	0.3%
Clark County	OH	256	0.3%

Percent is of workers working in county.

Sources: U.S. Census Bureau http://www.census.gov/hhes/commuting/

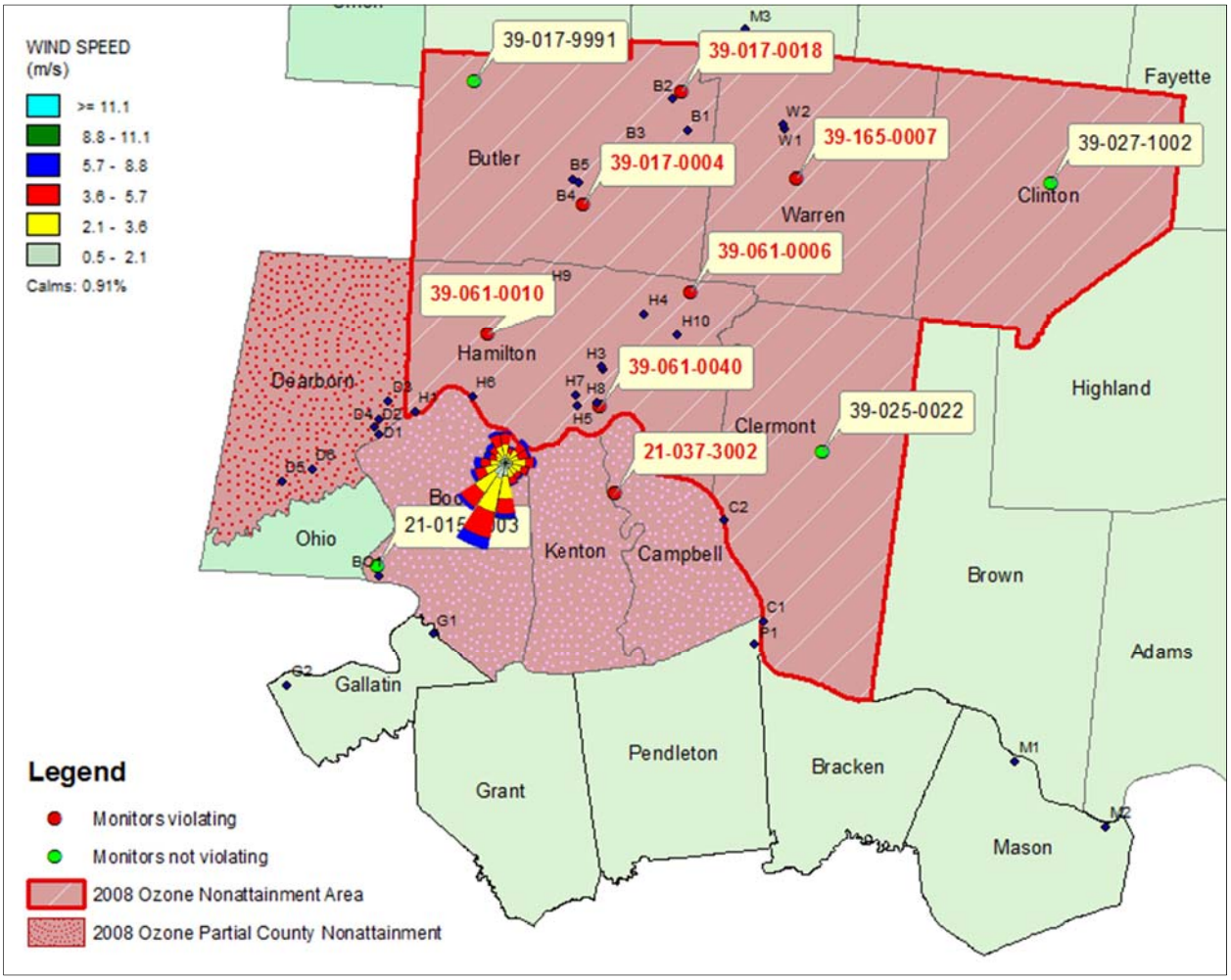
Kentucky Deskbook of Economic Statistics
http://e-archives.ky.gov/pubs/Economic_Dev/2005desk/CommuteTime.pdf

Ohio Department of Development. Ohio County Profiles:
http://development.ohio.gov/reports/reports_countytrends_map.htm

Factor 3: Meteorology

The following wind rose for the ozone season (April 1 to October 31) for 2013 through 2015 for the Cincinnati/Northern Kentucky International Airport represents this area.

Figure 7a: 2013 to 2015 Ozone Season Wind Rose for Cincinnati, OH-KY-IN Analysis Area

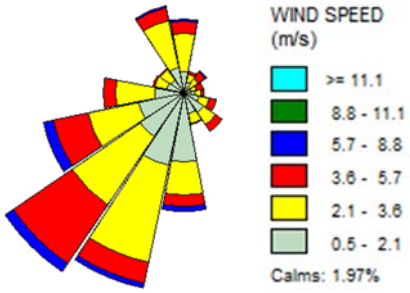


Winds from the south, south-southwest and west-southwest (collectively, the southwest quadrant) are prevalent in this area. This indicates sources of emissions from the southwest quadrant may be contributing to violations at the Hamilton County, Butler County, Warren County and Campbell County (KY) monitors.

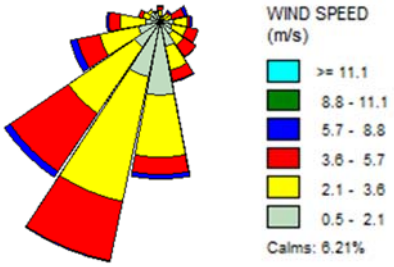
The following wind roses represent a subset of the days in Figure 7. These wind roses for the Cincinnati/Northern Kentucky International Airport represent only days where there was at least one hour where each respective monitor exceeded 70 ppb.

Figure 7b: Wind Roses on Days with at Least One Hour where Violating Monitor Exceeded 70 ppb

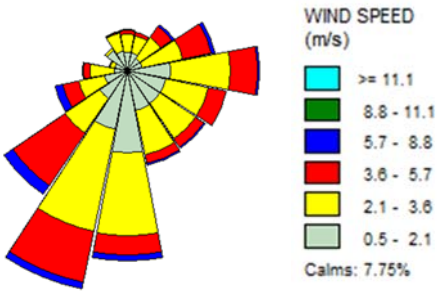
Campbell Co., KY (21-037-3002)
2013-2015



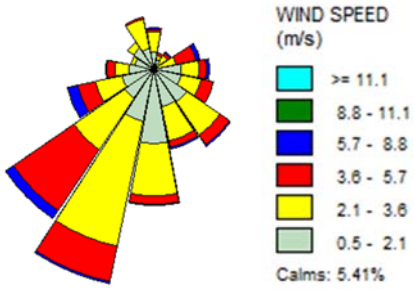
Hamilton Co. (39-061-0006)
2013-July 18, 2016



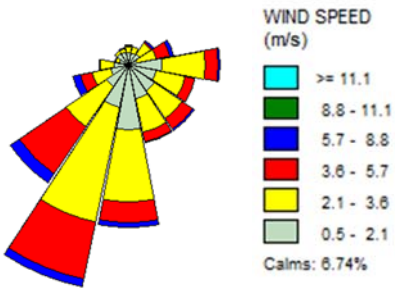
Hamilton Co. (39-061-0010)
2013-July 18, 2016



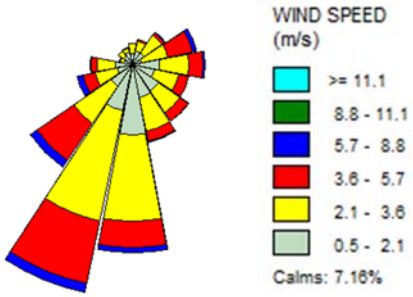
Hamilton Co. (39-061-0040)
2013-July 18, 2016



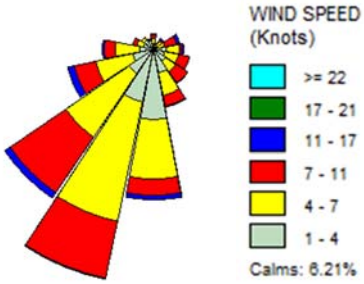
Butler Co. (39-017-0004)
2013-July 18, 2016



Butler Co. (39-017-0018)
2013-July 18, 2016

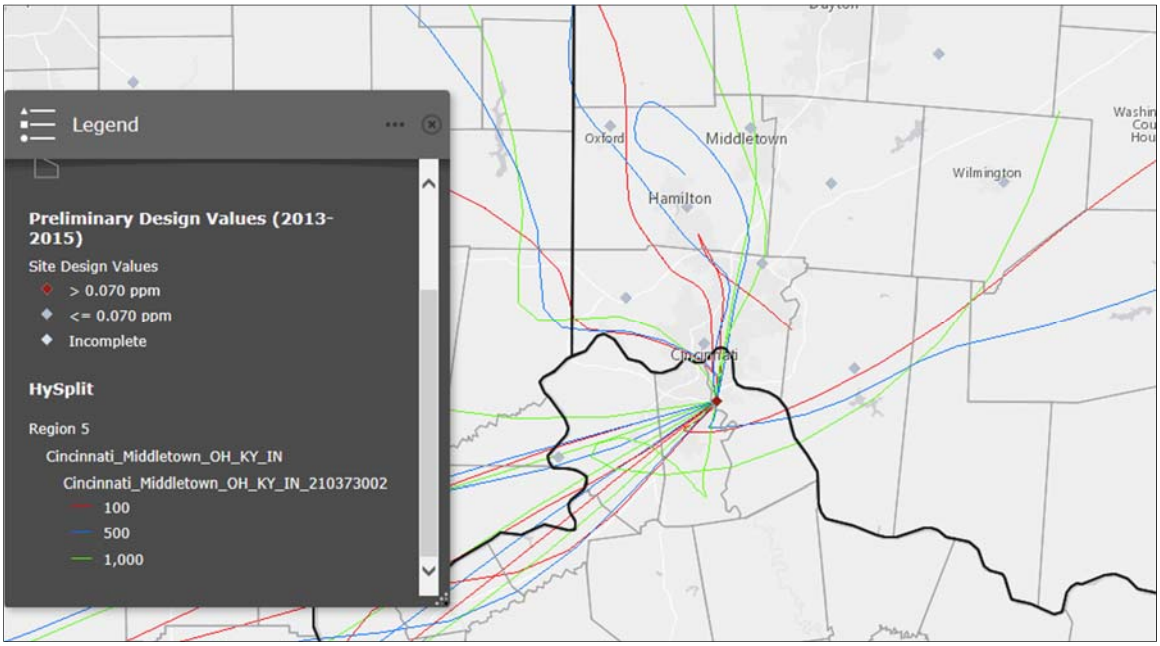


Warren Co. (39-165-0007)
2013-July 18, 2016



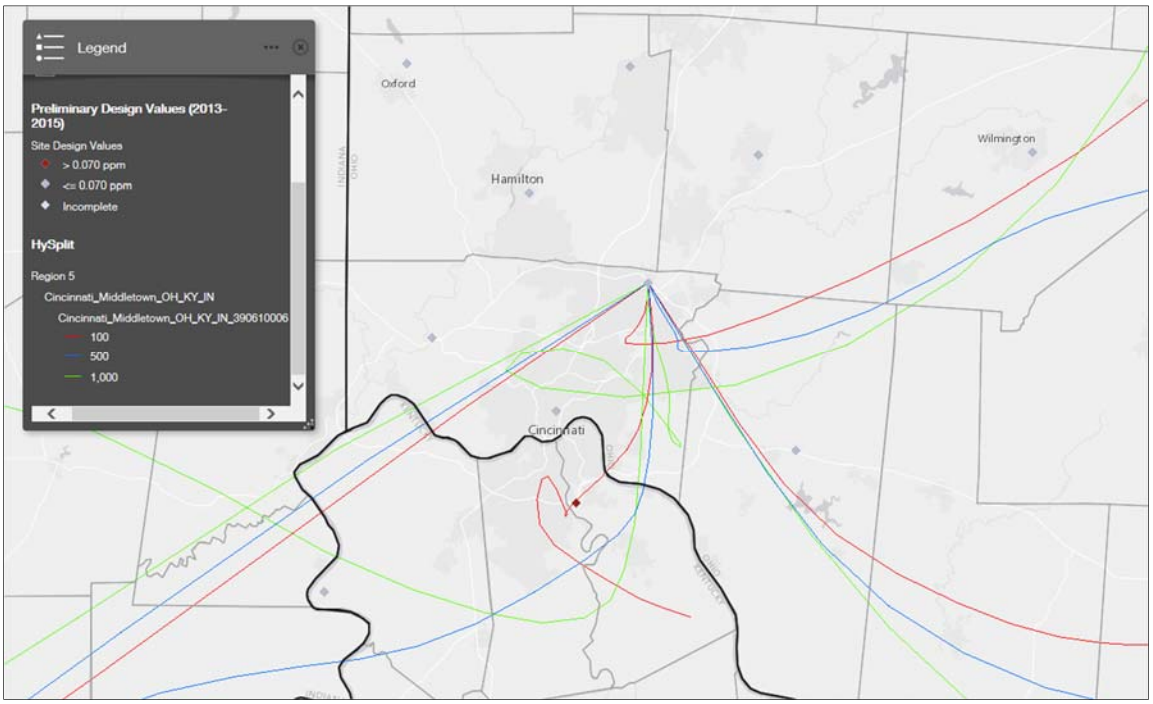
HYSPLIT modeling also shows sources of emissions to the south and southwest of the violating monitors may be contributing to the violations, although some back-trajectories show sources to the north, northwest, east and southeast may also be contributing.

Figure 8a: HYSPLIT modeling for the Cincinnati Analysis Area (Back-Trajectories from Violating Monitor in Campbell County, KY [21-037-3002] on Days in 2013 and 2014 with High Ozone Concentrations)



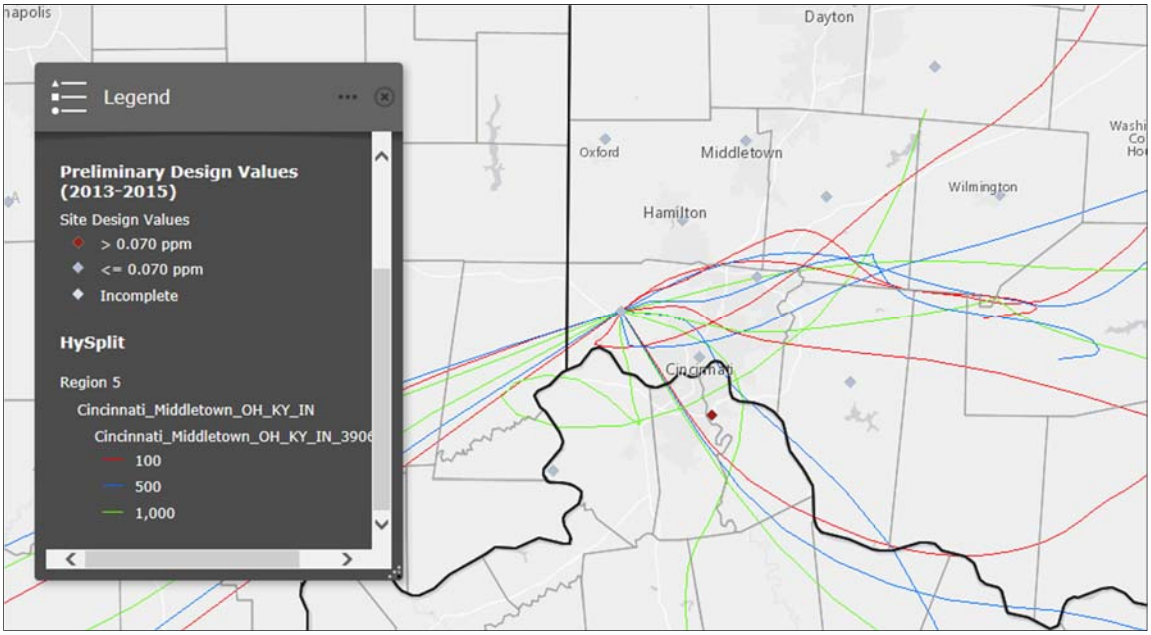
Source: https://epa.maps.arcgis.com/apps/webappviewer/index.html?id=6a89e7170dd147b1852ec11ccb3880e8

Figure 8b: HYSPLIT modeling for the Cincinnati Analysis Area (Back-Trajectories from Violating Monitor in Hamilton County [39-061-0006] on Days in 2013 and 2014 with High Ozone Concentrations)



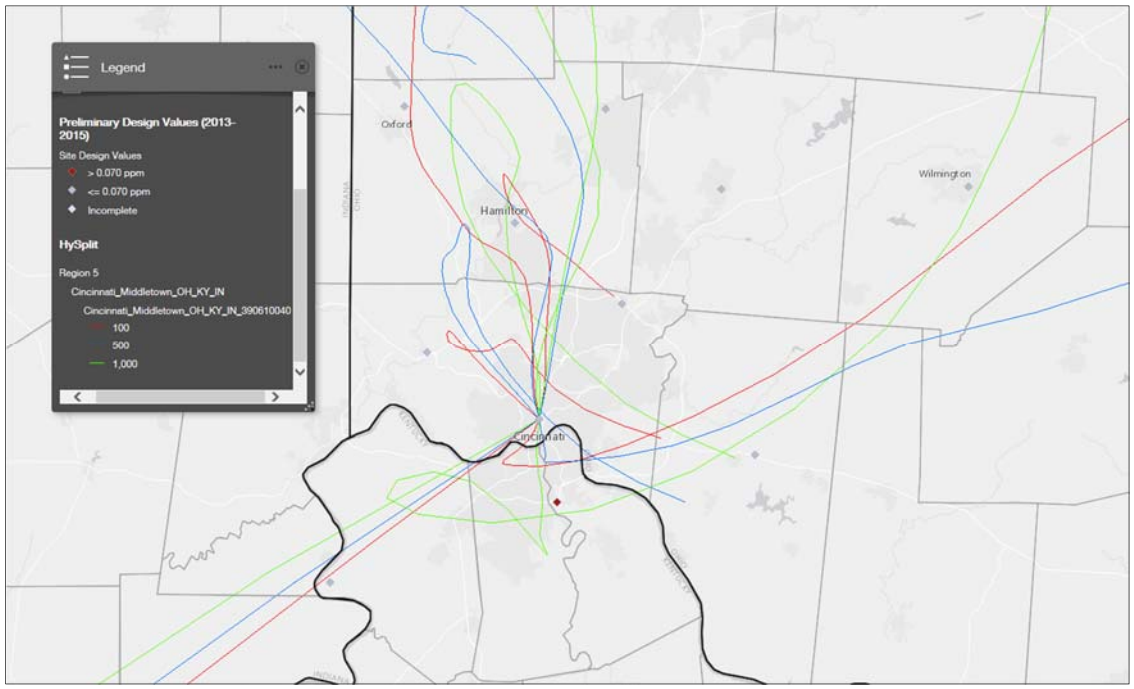
Source: https://epa.maps.arcgis.com/apps/webappviewer/index.html?id=6a89e7170dd147b1852ec11ccb3880e8

Figure 8c: HYSPLIT modeling for the Cincinnati Analysis Area (Back-Trajectories from Violating Monitor in Hamilton County [39-061-0010] on Days in 2013 and 2014 with High Ozone Concentrations)



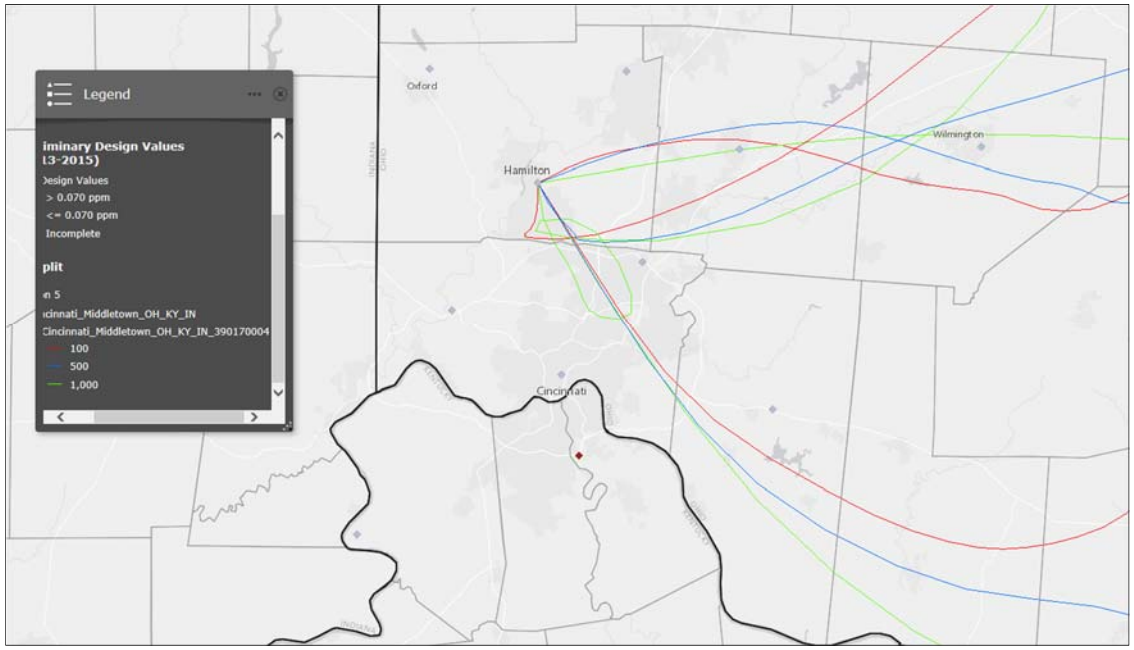
Source: https://epa.maps.arcgis.com/apps/webappviewer/index.html?id=6a89e7170dd147b1852ec11ccb3880e8

Figure 8d: HYSPLIT modeling for the Cincinnati Analysis Area (Back-Trajectories from Violating Monitor in Hamilton County [39-061-0040] on Days in 2013 and 2014 with High Ozone Concentrations)



Source: https://epa.maps.arcgis.com/apps/webappviewer/index.html?id=6a89e7170dd147b1852ec11ccb3880e8

Figure 8e: HYSPLIT modeling for the Cincinnati Analysis Area (Back-Trajectories from Violating Monitor in Butler County [39-017-0004] on Days in 2013 and 2014 with High Ozone Concentrations)

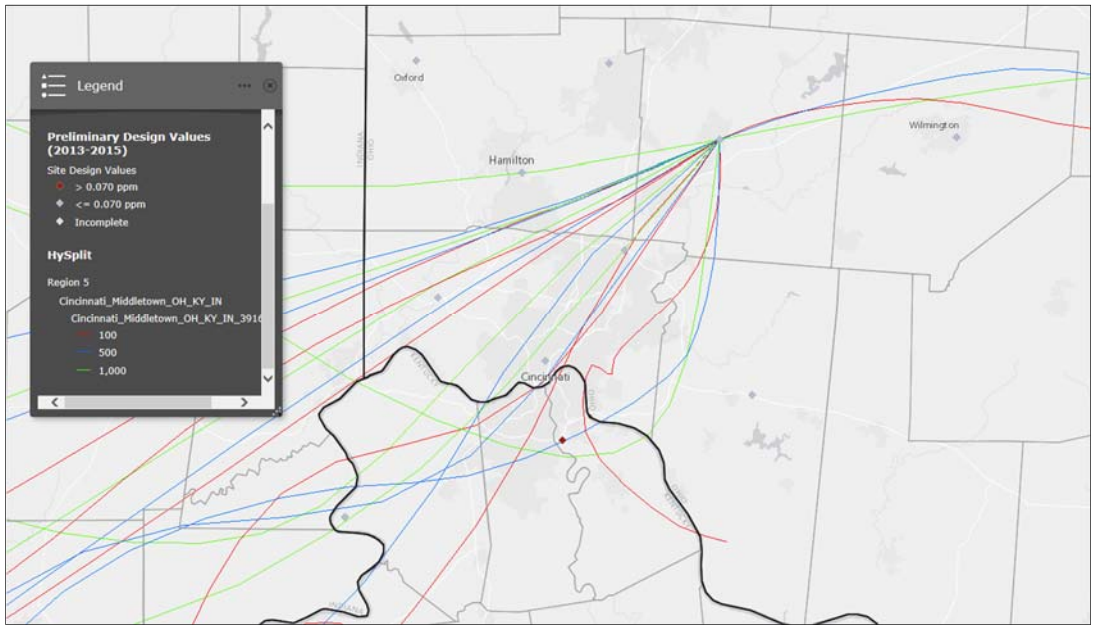


Source: https://epa.maps.arcgis.com/apps/webappviewer/index.html?id=6a89e7170dd147b1852ec11ccb3880e8

Figure 8f: HYSPLIT modeling for the Cincinnati Analysis Area (Back-Trajectories from Violating Monitor in Butler County [39-017-0018] on Days in 2013 and 2014 with High Ozone Concentrations)

Source: https://epa.maps.arcgis.com/apps/webappviewer/index.html?id=6a89e7170dd147b1852ec11ccb3880e8

Figure 8g: HYSPLIT modeling for the Cincinnati Analysis Area (Back-Trajectories from Violating Monitor in Warren County on Days in 2013 and 2014 with High Ozone Concentrations)



Source: https://epa.maps.arcgis.com/apps/webappviewer/index.html?id=6a89e7170dd147b1852ec11ccb3880e8

Factor 4: Geography/topography

This analysis area does not have any geographical or topographical barriers significantly affecting air pollution transport. Therefore, this factor does not play a role in the analysis of this area.

Factor 5: Jurisdictional boundaries

Butler, Clermont, Clinton, Hamilton, Warren, and partial Boone (KY), Campbell (KY), Kenton (KY), Dearborn (IN) Counties were designated as nonattainment counties for the 2008 eight-hour ozone standard as part of the Cincinnati-OH-KY-IN nonattainment area. The same counties were designated as nonattainment under the 1997 ozone standard. This area has been redesignated to attainment for the 1997 ozone standard. Redesignation has been requested for the 2008 ozone standard.

The Cincinnati-Wilmington-Maysville CSA includes Brown, Butler, Clermont, Clinton, Hamilton and Warren Counties in Ohio; Boone, Bracken, Campbell, Gallatin, Grant, Kenton, Mason and Pendleton Counties in Kentucky; and Dearborn, Ohio and Union Counties in Indiana. The principal cities are Cincinnati and Middletown, Ohio.

The Ohio-Kentucky-Indiana regional Council of Governments (OKI) is the planning agency designated as the Metropolitan Planning Organization for the greater Cincinnati area. The OKI region is composed of eight counties in three states: Butler, Clermont, Hamilton and Warren Counties in Ohio; Boone, Campbell and Kenton Counties in Kentucky; and Dearborn County in Indiana. *Please note that the cities of Franklin and Carlisle in Warren County are part of the Miami Valley Regional Planning Commission (MVRPC) planning area.*

Conclusion

Butler, Clermont, Clinton, Hamilton and Warren Counties in Ohio have historically been a part of this nonattainment area. Monitors in Butler, Hamilton and Warren counties will be in violation of the 2015 ozone standard based on preliminary 2014 to 2016 design values, with data available through July 23, 2016. Warren, Clinton and Brown Counties have significantly lower emissions than Hamilton and Butler Counties. Overall, the most significant emissions in the analysis area emanate from Hamilton County, and then Butler County, Clermont County, Boone County, KY and Dearborn County, IN. Considering all the counties in this analysis area, these five counties account for 73% of NO_x and 56% of VOC emissions. Overall, the largest concentration of larger point sources reside in Butler, Hamilton, Dearborn (IN), and Boone (KY) Counties, as can be seen by Figure 4. The most significant point emissions of NO_x in 2011 were from the three Duke Energy facilities located in Hamilton (Miami Fort) and Clermont (Beckjord and Zimmer) Counties and AEP's Tanners Creek in Dearborn County, IN. As noted above, the Walter C. Beckjord facility in Clermont County permanently shut down in October 2014, unit 6 (163 megawatts) of the Miami Fort facility in Hamilton County permanently shut down in June 2015, and Tanner's Creek Generating Station in

Dearborn County, IN permanently shut down in May 2015. All of the operating units at larger Ohio utilities in these counties are fully controlled for NO_x.

Winds roses and HYSPLIT modeling indicate sources from the south, south-southwest and west-southwest (i.e. primarily sources in Hamilton County as well as Dearborn County, IN and Boone County, KY) are likely contributing to the violating monitors. Some back-trajectories also indicate sources in Butler, Warren and Clermont may also be contributing to the violating monitors.

The majority of VMT in the Ohio portion of this area occurs in Hamilton County, and to a lesser extent Butler, Warren, Clermont and Boone (KY) Counties. The most significant commuter travel in the Ohio portion of the area occurs in Hamilton, Butler, Warren and Clermont Counties.

With respect to the remaining Ohio counties in this analysis area, none of the factors support including Clinton County or Brown County. These counties have very low emissions, low populations, low population densities, low VMT and low commuting patterns with the counties with violating monitors.

Ohio EPA is not making any recommendations regarding counties in Indiana or Kentucky. Within Ohio, Ohio EPA recommends Hamilton, Butler, Clermont and Warren Counties be designated nonattainment.

Cleveland-Akron-Lorain, OH

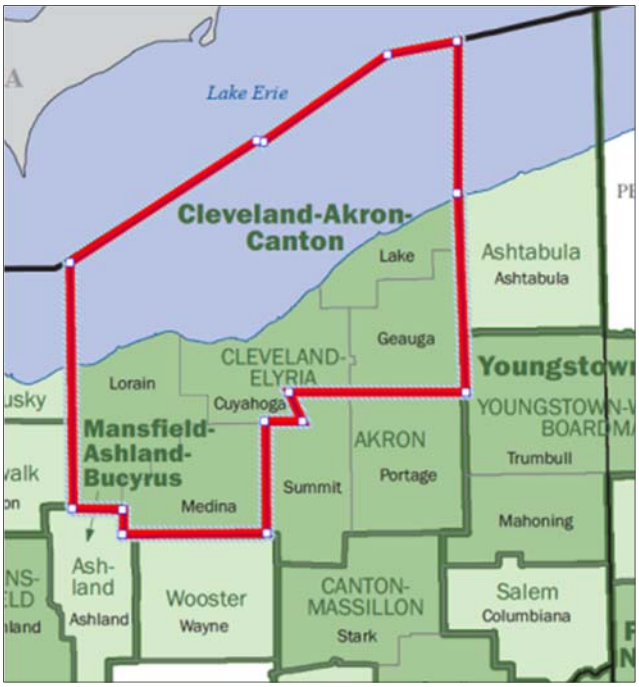
Figure 9: Cleveland-Akron-Lorain, OH Recommended Nonattainment Area

Discussion:

There are eight counties in the 2008 ozone nonattainment area: Ashtabula, Cuyahoga, Geauga, Lake, Lorain, Medina, Portage, and Summit Counties. Ohio EPA recommends designating Cuyahoga, Geauga, Lake, Lorain, Medina, Portage, and Summit Counties as nonattainment. After considering the five factors, Ohio EPA does not recommend including any other contributing counties in this area.

There are twelve monitors in this area of which four are in Cuyahoga County. There is one violating monitor in Lake County for the 2013 to 2015 design year. Preliminary data for the 2014 to 2016 design values, with data available through July 23, 2016, indicates the Geauga County monitor 39-055-0004 and Lake County monitor 39-085-0003 will be in violation of the standard. Lake and Geauga Counties are part of the Cleveland-Elyria CBSA which is comprised of Cuyahoga, Geauga, Lake, Lorain, and Medina Counties. Ohio EPA will analyze counties in the Cleveland-Elyria CBSA, along with Ashtabula County which is adjacent to a county with a violating monitor, Portage and Summit Counties which are part of the historical ozone nonattainment areas, and Wayne County which is adjacent to the CBSA and the location of the City of Orrville's Municipal Utility Electric Generation Plant. Ohio EPA will not analyze the remaining counties in the Cleveland-Akron-Canton CSA (Carroll, Erie, Huron, Stark and Tuscarawas) because these additional counties are not part of the historical nonattainment area. Additionally, there have been no significant changes to the factors being considered that would warrant analyzing them now.

Figure 10: Cleveland-Elyria CBSA

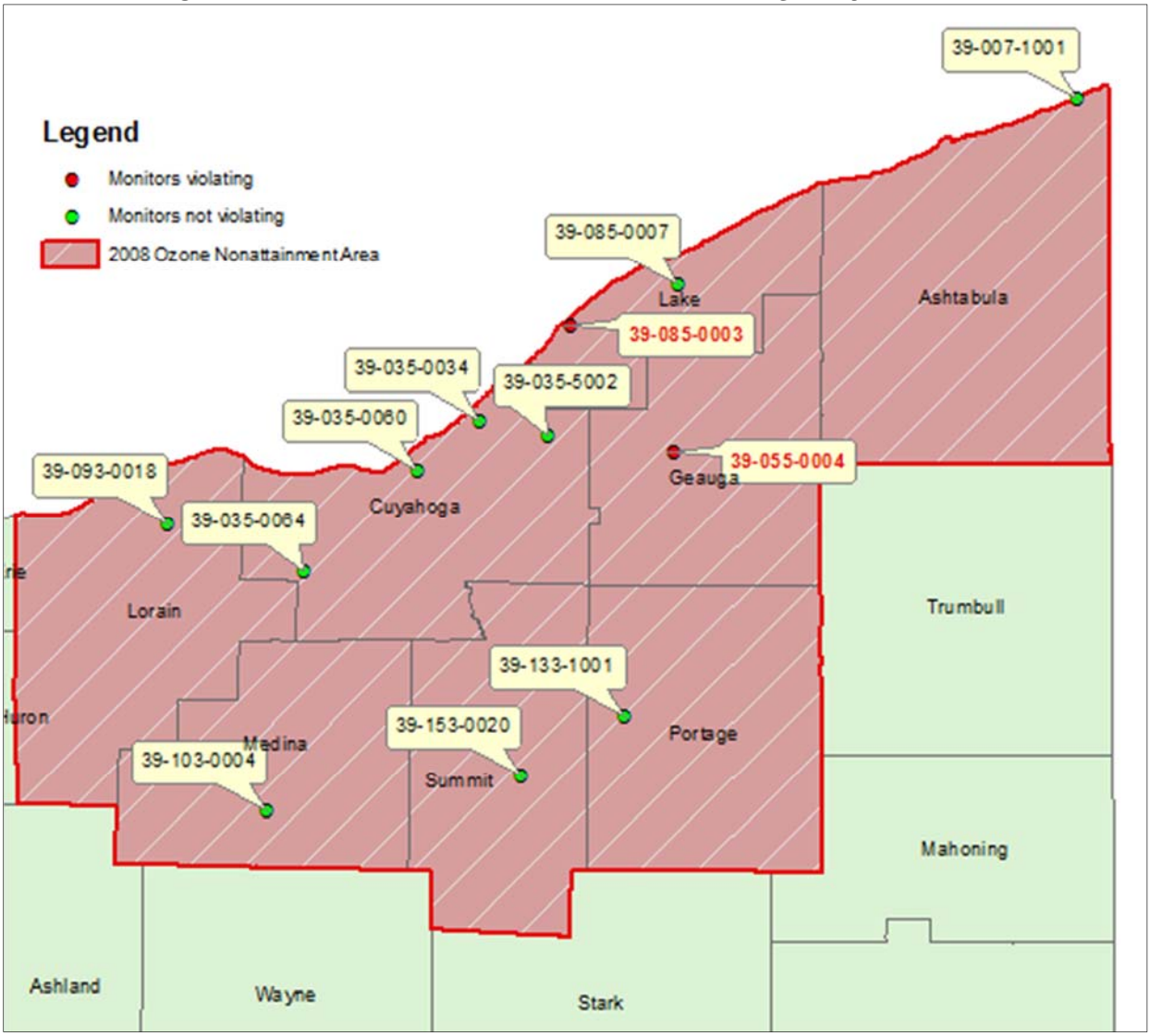


Source: U.S. Department of Commerce Economics and Statistics Administrations, U.S. Census Bureau, 2010 Economic Census

Factor 1: Air quality data

There are twelve monitors in this area.

Figure 11: Cleveland-Akron-Lorain Area Air Quality Monitors



Monitor 39-085-0003 in Lake County is violating the standard based on 2013 to 2015 air quality data. The preliminary 2014 to 2016 design values, with data available through July 23, 2016, indicates the Geauga County monitor 39-055-0004 and Lake County monitor 39-085-0003 will be in violation of the standard. As can be seen from Table 1, air quality trends have declined historically in this area.

Table 8: Annual Fourth-Highest Daily Maximum Eight-hour Average Ozone Concentrations and 3-Year Averages (ppb)

Site	County	Year				Average	
		2013	2014	2015	2016[11]	'13-'15	'14-'16[11]
39-007-1001	Ashtabula	70	69	70	72	69	70
39-035-0034	Cuyahoga	69	71	67	70	69	69
39-035-0060	Cuyahoga	57	66	63	63	62	64
39-035-0064	Cuyahoga	64	59	66	68	63	64
39-035-5002	Cuyahoga	65	61	72	71	66	68
39-055-0004	Geauga	65	65	73	76	67	71
39-085-0003	Lake	70	75	74	75	73	74
39-085-0007	Lake	68	62	70	68	66	66
39-093-0018	Lorain	60	67	62	68	63	65
39-103-0004	Medina	65	64	63	66	64	64
39-133-1001	Portage	58	61	64	58	61	61
39-153-0020	Summit	60	58	65	56	61	59

Insufficient data
Violating monitor
Source: U.S. EPA AQS

Factor 2: Emissions and emissions related data

Emission trends

Overall, the most significant emissions in the analysis area emanate from Cuyahoga County. Considering all the counties in this analysis area, Cuyahoga County accounts for 30% of NO_x and 29% of VOC emissions. With respect to the counties that were a part of the historical nonattainment areas, the most significant emissions come from Cuyahoga, Lorain, Lake and Summit Counties. These counties account for 74% of NO_x and 62% of VOC emissions for all counties in this analysis area. Ashtabula County has higher emissions of VOC but does not have significant emissions of NO_x in comparison to the above counties. Medina, Portage, Geauga and Wayne Counties do not have significant emissions in comparison to the above counties.

[11] Data available through July 23, 2016

Table 9: Cleveland-Akron-Lorain Area Emissions (TPY)

County	NO_x (TPY)							
	2014 Point	2011 Point	2011 Air/Rail	2011 Nonpoint	2011 Nonroad	2011 Onroad	2011 Fires	2011 NO_x Total
Ashtabula	731.27	1,408.22	17.41	1,804.60	933.23	2,750.38	0.00	**6,913.84**
Cuyahoga	3,040.48	3,211.88	1,002.50	6,886.04	6,049.94	17,753.14	1.20	**34,904.70**
Geauga	8.41	8.73	0.49	530.55	520.82	2,017.16	0.00	**3,077.75**
Lake	2,670.38	9,662.58	1.94	1,890.34	1,607.81	4,780.60	0.00	**17,943.27**
Lorain	4,492.56	5,385.41	3.99	2,334.40	1,974.09	5,487.61	0.00	**15,185.50**
Medina	78.27	68.33	6.38	1,053.79	888.34	3,535.96	0.00	**5,552.80**
Portage	118.37	104.10	0.74	1,455.34	813.55	4,153.30	0.00	**6,527.03**
Summit	491.87	586.41	128.41	2,737.11	1,931.13	12,122.09	0.00	**17,505.15**
Wayne	2,116.23	2,827.07	5.68	1,144.56	697.47	3,158.60	0.00	**7,833.38**

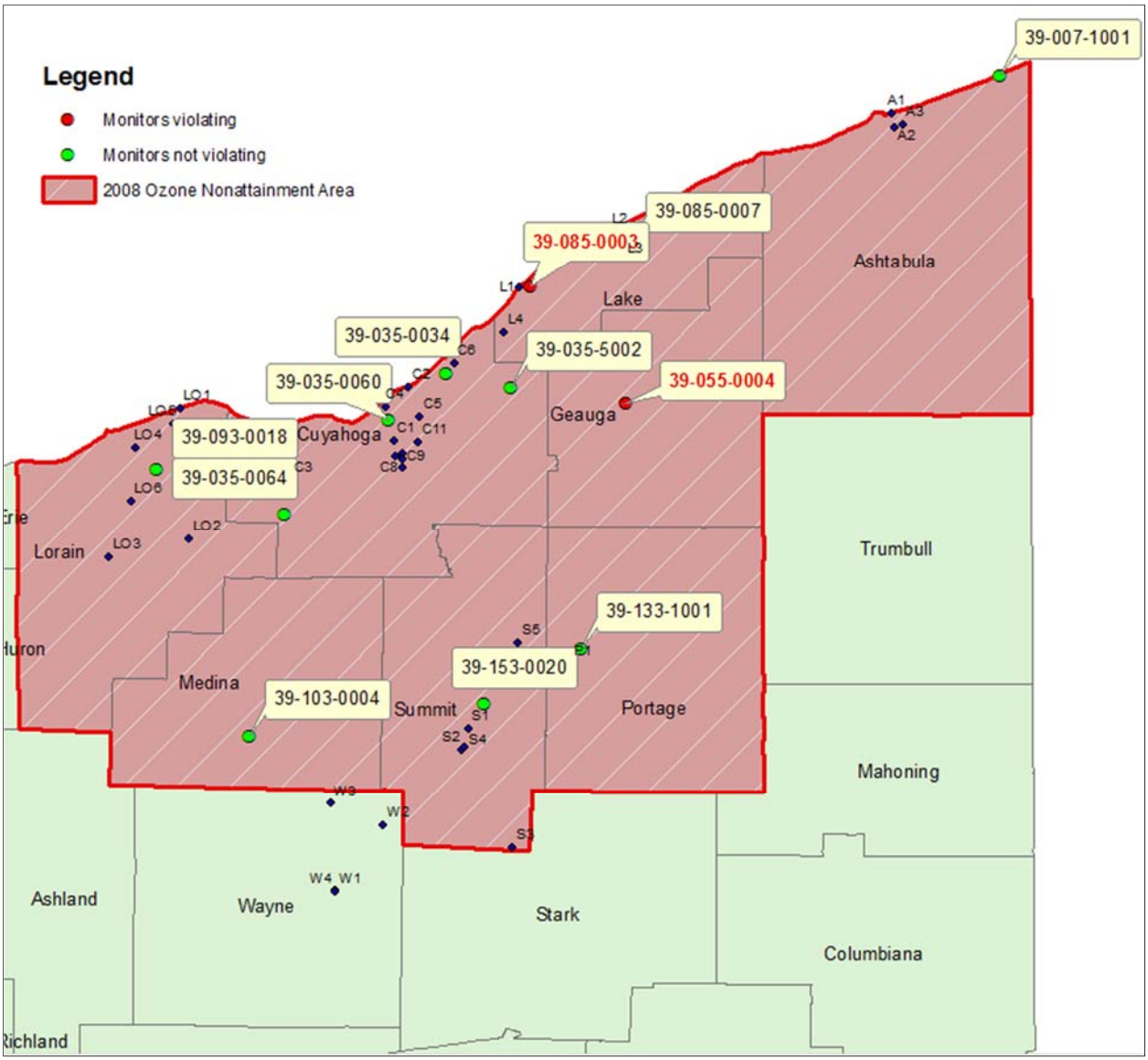
County	VOC (TPY)							
	2014 Point	2011 Point	2011 Air/Rail	2011 Nonpoint	2011 Nonroad	2011 Onroad	2011 Fires	2011 VOC Total
Ashtabula	2,455.88	2,603.61	2.78	7,116.80	2,390.95	1,805.94	0.00	**13,920.08**
Cuyahoga	1,005.35	1,014.93	175.17	15,554.10	8,350.35	11,583.67	12.62	**36,690.84**
Geauga	30.30	13.07	1.05	4,490.77	1,037.21	1,097.72	0.00	**6,639.82**
Lake	306.28	351.09	4.02	4,514.25	2,866.08	2,586.44	0.00	**10,321.88**
Lorain	745.58	948.11	7.52	6,211.75	3,010.40	3,122.82	0.00	**13,300.60**
Medina	187.82	215.12	13.73	4,880.98	1,072.08	1,953.63	0.00	**8,135.55**
Portage	410.23	345.53	1.48	6,260.59	1,464.24	2,090.30	0.00	**10,162.14**
Summit	395.13	451.00	34.25	8,628.16	2,214.63	6,370.27	0.00	**17,698.31**
Wayne	399.29	289.64	10.46	4,983.99	574.84	2,162.05	0.00	**8,020.98**

Source: 2011 NEI; 2011 EIS and 2014 EIS

As can be seen from Figure 12, the larger concentration of the larger point sources reside in Cuyahoga County to the southwest and west of the violating monitors. The largest point source of NO_x in 2011, Cleveland Electric Illuminating Co., Eastlake Plant in Lake County was located in close proximity to the violating monitor in Lake County. This source was permanently shut down in April 2015. Two larger emitting steel plants, Arcelor Mittal and Charter, are located to the southwest and west of the violating monitors. There are also larger concentrations, but to a lesser extent, of larger point sources in Lorain County.

The following figure[12] and table shows the higher emitting point sources located in the area.

Figure 12: Location of Cleveland-Akron-Lorain Analysis Area Emissions Point Sources



Source: 2011 NEI

[12] The table can be used to correlate the location of each point source with the letter (first letter of county) and number next to the symbol on the map in the figure.

Table 10: Cleveland-Akron-Lorain Analysis Area Emissions Point Sources for 2011

County	MapID	Facility Name	NO_x (TPY)
Lake	L1	CLEVELAND ELECTRIC ILLUMINATING CO., EASTLAKE PLANT (0243160009)	8,446
Lorain	LO1	Avon Lake Power Plant (0247030013)	4,659
Wayne	W1	Department of Public Utilities, City of Orrville, Ohio (0285010188)	1,902
Cuyahoga	C1	ArcelorMittal Cleveland Inc. (1318001613)	1,165
Ashtabula	A1	FirstEnergy Generation Corp., Ashtabula Plant (0204010000)	1,148
Cuyahoga	C2	Cleveland Electric Illuminating Co., Lake Shore Plant (1318000245)	771
Wayne	W2	East Ohio Gas - Chippewa Station (0285000366)	654
Cuyahoga	C3	Cleveland-Hopkins Intl	599
Lake	L2	Carmeuse Lime, Inc - Grand River Operations (0243030257)	520
Lake	L3	PAINESVILLE MUNICIPAL ELECTRIC PLANT (0243110008)	509
Summit	S1	City of Akron Steam Generating (1677010757)	254
Cuyahoga	C4	Cleveland Thermal LLC (1318000246)	252
Cuyahoga	C5	The Medical Center Company (1318003059)	204
Wayne	W3	Morton Salt, Inc. (0285020059)	195
Ashtabula	A2	Cristal USA Inc., Ashtabula Complex Plant 2 (0204010193)	193
Lorain	LO2	Ross Incineration Services, Inc. (0247050278)	162
Cuyahoga	C6	COLLINWOOD	159
Cuyahoga	C7	FERRO CORPORATION - CLEVELAND FRIT PLANT (1318170235)	149
Lorain	LO3	Lorain County LFG Power Station (0247100968)	146
Cuyahoga	C8	MARCY	143
Summit	S2	Cargill, Incorporated - Salt Division (Akron, OH) (1677010027)	140
Cuyahoga	C9	Southerly Wastewater Treatment Center (1318172479)	132
Lake	L4	The Lubrizol Corporation - Wickliffe Facility (0243150025)	124
Summit	S3	Akron-Canton Regional	118
Summit	S4	Emerald Performance Materials, LLC (1677010029)	115
Cuyahoga	C10	Charter Steel - Cleveland Inc (1318171623)	111
Lorain	LO4	Lorain Tubular Company LLC (0247080961)	102

County		Facility Name	VOC (TPY)
Ashtabula	A2	Cristal USA Inc., Ashtabula Complex Plant 2 (0204010193)	1,697
Ashtabula	A3	Cristal USA Inc., Ashtabula Complex Plant 1 (0204010200)	733
Lorain	LO5	Ford Motor Company - Ohio Assembly Plant (0247030471)	440
Lorain	LO6	3M Elyria (0247040822)	173
Portage	P1	Smithers-Oasis U.S.A. (1667040037)	168
Cuyahoga	C3	Cleveland-Hopkins Intl	137
Lorain	LO4	Lorain Tubular Company LLC (0247080961)	125
Summit	S5	Morgan Adhesives Company (MACtac) (1677110026)	124
Cuyahoga	C11	North Coast Container Corp. (1318000399)	113
Wayne	W4	The Quality Castings Company (0285010001)	103
Lake	L1	CLEVELAND ELECTRIC ILLUMINATING CO., EASTLAKE PLANT (0243160009)	103
Cuyahoga	C1	ArcelorMittal Cleveland Inc. (1318001613)	94

Source: 2011 NEI

Level of control of emission sources

Permanent and enforceable reductions of VOC and NO_x emissions have contributed to the attainment of the eight-hour ozone standard. Some of these reductions were due to the application of tighter federal standards on new vehicles and non-road diesel engines while reductions in EGU emissions were due to implementation of CAIR/CSAPR.

With respect to EGUs, changes at several facilities have resulted in reductions in NO_x emissions. Cleveland Electric Illuminating Co., Eastlake Plant in Lake County permanently shut down in April 2015. Prior to the shutdown, point source NO_x emissions had dropped significantly in Lake County 9,662.58 TPY to 2,670.38 TPY (2011 to 2014), mostly attributable to decreased emissions from the Eastlake Plant. Cleveland Electric Illuminating Co., Eastlake Plant's 2011 NO_x emissions represented 8,446 TPY of the 9,662.58 TPY. The Cleveland Electric Illuminating Co., Lake Shore facility in Cuyahoga County permanently shut down in April 2015. Prior to the shutdown, point source NO_x emissions had dropped in Cuyahoga County from 3,211.88 TPY to 3,039.65 TPY (2011 to 2014). Cleveland Electric Illuminating Co., Lake Shore facility's 2011 NO_x emissions represented 771 TPY of the 3,211.88 TPY. The First Energy Generation, LLC Ashtabula Plant in Ashtabula County shut down coal fired boilers in April 2015 and December 2015. Prior to the shutdown, point source NO_x emissions in Ashtabula County had dropped from 1,408.22 TPY to 731.27 TPY (2011 to 2014). First Energy Generation, LLC Ashtabula Plant's 2011 NO_x emissions represented 1,148 TPY of the 1,408.22 TPY. These three facilities which shut down in 2015 represented 10,365 TPY of the total 23,262.73 TPY of NOx from point sources in 2011.

Urbanization, population and commuting trends

The following table provides a summary of 2010 population and 2011 VMT for each of the counties that are discussed in this section.

Table 11: Cleveland-Akron-Lorain Analysis Area County Level VMT, Population, Land Area and Population Density

County	2011 VMT	2010 Population	Land Area (Sq. Miles)	Population Density (1,000 per Sq. Miles)
Ashtabula	1,137,086,286	101,497	702	0.14
Cuyahoga	8,534,134,941	1,280,122	458	2.80
GEAUGA	1,045,092,778	93,389	404	0.23
LAKE	2,461,578,196	230,041	228	1.01
Lorain	2,787,828,581	301,356	493	0.61
Medina	1,774,539,943	172,332	422	0.41
Portage	2,128,490,347	161,419	492	0.33
Summit	6,250,389,061	541,781	413	1.31

Wayne	1,192,145,098	114,520	555	0.21
Total for Counties	27,311,285,230	2,998,467	4,167	

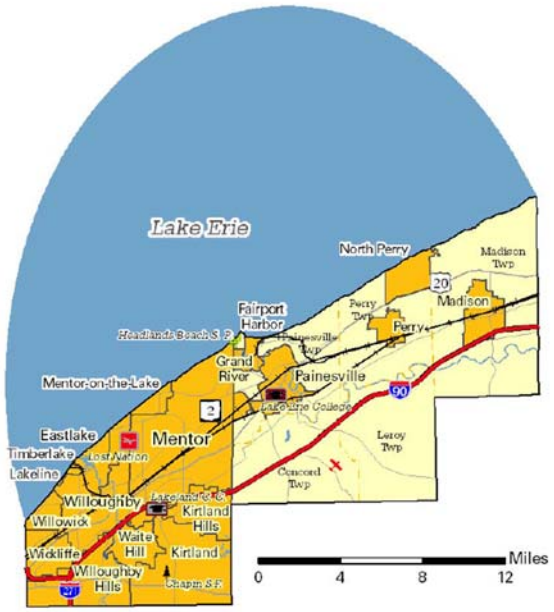
Source: U.S. EPA Designations Guidance and Data:
https://www.epa.gov/ozone-designations/ozone-designations-guidance-and-data and
http://www.epa.gov/pmdesignations/2012standards/techinfo.htm#F2

Degree of urbanization and population trends

As seen in Table 11 above, the majority of the population for this analysis area resides in Cuyahoga County, and to a lesser extent, Summit County. Other more populated counties include Lorain, Lake, Trumbull and Mahoning Counties. Cuyahoga County also has a very high population density; therefore, population-related emissions are expected to be high. Lake and Summit Counties also have higher population densities. This is supported by Table 9 above, which indicates Cuyahoga and Summit Counties have the highest nonpoint and roadway emissions. However, Lake and Lorain Counties do not have comparatively high population related emissions.

Figure 13: Cleveland-Akron-Lorain Analysis Area County Profiles

Lake County



Lake County is 49% forest, 14% cropland, and 32% urban. Mentor is the major urban area. The 2010 population was 230,041 while it declined to 229,230 in 2014. Population is expected to continue declining in the future to a level of 228,600 by 2020.

Geauga County

Geauga County is 60% forest, 21% cropland, and 11% urban. Bainbridge and Chester townships are the major urban areas. The 2010 population was 93,389 while it grew to 94,295 in 2014. Population is expected to slightly decline in the future to a level of 93,510 by 2020.

Ashtabula County

Ashtabula County is 39% forest, 32% cropland, and 7% urban. Ashtabula and Conneaut are the major urban areas. The 2010 population was 101,497 while it declined to 99,175 in 2014. Population is expected to grow in the future to a level of 101,230 by 2020.

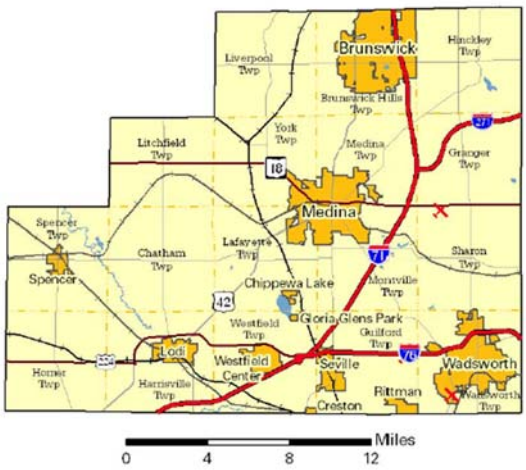
Cuyahoga County

Cuyahoga County is 31% forest and 67% urban. Cleveland is the major urban area. The 2010 population was 1,280,122 while it declined to 1,259,828 in 2014. Population is expected to continue declining in the future to a level of 1,209,550 by 2020.

Lorain County

Lorain County is 23% forest, 38% cropland, and 27% urban. Lorain and Elyria are the major urban areas. The 2010 population was 301,356 while it grew to 304,216 in 2014. Population is expected to continue growing in the future to a level of 310,230 by 2020.

Medina County



Medina County is 35% forest, 38% cropland, and 14% urban. Brunswick and Medina are the major urban areas. The 2010 population was 172,332 while it grew to 176,029 in 2014. Population is expected to continue growing in the future to a level of 184,670 by 2020.

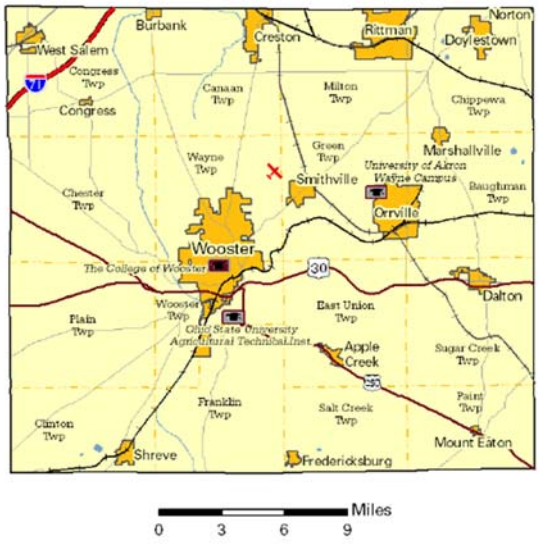
Portage County

Portage County is 46% forest, 23% cropland, and 13% urban. Kent is the major urban area. The 2010 population was 161,419 while it slightly grew to 161,882 in 2014. Population is expected to slightly decline in the future to a level of 161,410 by 2020.

Summit County

Summit County is 41% forest, 5% cropland, and 47% urban. Akron is the major urban area. The 2010 population was 541,781 while it increased slightly to 541,943 in 2014. Population is expected to decline in the future to a level of 534,150 by 2020.

Wayne County



Wayne County is 23% forest, 60% cropland, and 5% urban. Wooster is the major urban area. The 2010 population was 114,520 while it grew to 115,537 in 2014. Population is expected to slightly decline in the future to a level of 114,390 by 2020.

Source: Ohio Department of Development. Ohio County Profiles: http://development.ohio.gov/reports/reports_countytrends_map.htm

Commuting trends

As can be seen in Table 11, the majority of VMT occurs in Cuyahoga County and then Summit County, and then to a lesser extent Lorain, Lake, and Portage Counties. Table 12 below looks at commuter travel in and out of the county, Lake, in this analysis area with the nonattainment monitor based on 2013 to 2015 air quality data. 40.8% of Lake County's working residents commute to counties outside of Lake County. In turn, over 24% of Lake County's workforce commutes from other counties into Lake County. Of the Lake County residents that commute to other counties, the greatest percentage commutes southwest to Cuyahoga County (33.9%), south to Geauga County (2.6%), and east to Ashtabula County (1.3%). To a lesser extent, some commute to Summit, Portage and Lorain Counties (1.7% combined). Of the non-residents that commute into Lake County, the majority comes from Cuyahoga County (13.3%) and Geauga County (5.6%). Overall, the most significant commuter travel in and out of these counties occurs between Lake, Cuyahoga, and Geauga Counties.

Preliminary 2016 data indicate Geauga County will also have a violating monitor for the 2014 to 2016 design value period, so commuter travel in and out of Geauga county is also provided in Table 12 below. 57.2% of Geauga County's working residents commute to counties outside of Geauga County. In turn, 44.1% of Geauga County's workforce commutes from other counties into Geauga County. Of the Geauga County residents that commute to other counties, the greatest percentage commutes to Cuyahoga County (36.8%). To a lesser extent, some commute to Lake County (3%). Of the non-residents that commute into Geauga County, the most significant percentage comes from Trumbull County (10.9%) and then Lake County (8.7%) and Cuyahoga County (8.2%). Overall, the most significant commuter travel in and out of Geauga County occurs with Cuyahoga, Lake and Trumbull Counties.

Table 12a: Commuter Travel In and Out of Lake County

Lake		
	Percent of workers that work outside the county -	40.8%
	Average commute time in minutes -	23.3

Number of workers 16+ years of age living in Lake County		**114,028**
Commute Out To	Number	Percent
Cuyahoga Co. OH	38,706	33.9%
Geauga Co. OH	2,922	2.6%
Ashtabula Co. OH	1,495	1.3%
Summit Co. OH	1,204	1.1%
Portage Co. OH	341	0.3%
Lorain Co. OH	295	0.3%

Number of workers 16+ years of age working in Lake County		**93,192**
Commute In From	Number	Percent
Cuyahoga Co. OH	12,422	13.3%
Geauga Co. OH	5,194	5.6%
Ashtabula Co. OH	4,792	5.1%
Summit Co. OH	1,161	1.2%
Portage Co. OH	433	0.5%
Lorain Co. OH	427	0.5%

Stark Co. OH	111	0.1%
Franklin Co. OH	99	0.1%
Trumbull Co. OH	94	0.1%
Wood Co. OH	64	0.1%

Percent is of workers living in county.

Medina Co. OH	230	0.2%
Trumbull Co. OH	209	0.2%
Stark Co. OH	122	0.1%
Wayne Co. OH	59	0.1%

Percent is of workers working in county.

Table 12b: Commuter Travel In and Out of Geauga County

Geauga

Percent of workers that work outside the county - 57.2%

Average commute time in minutes - 27.6

Number of workers 16+ years of age living in Geauga County		**44,076**	
Commute Out To		Number	Percent
Cuyahoga County	OH	16,230	36.8%
Lake County	OH	5,194	3.0%
Summit County	OH	1,019	0.6%
Portage County	OH	884	0.5%
Ashtabula County	OH	336	0.2%
Trumbull County	OH	316	0.2%
Stark County	OH	184	0.1%
Lorain County	OH	114	0.1%
Allegheny County	PA	114	0.1%
Mahoning County	OH	67	0.0%

Percent is of workers living in county.

Number of workers 16+ years of age working in Geauga County		**33,743**	
Commute In From		Number	Percent
Trumbull County	OH	3,687	10.9%
Lake County	OH	2,922	8.7%
Cuyahoga County	OH	2,778	8.2%
Portage County	OH	2,279	6.8%
Ashtabula County	OH	1,863	5.5%
Summit County	OH	861	2.6%
Mahoning County	OH	170	0.5%
Lorain County	OH	86	0.3%
Medina County	OH	84	0.2%
Stark County	OH	80	0.2%

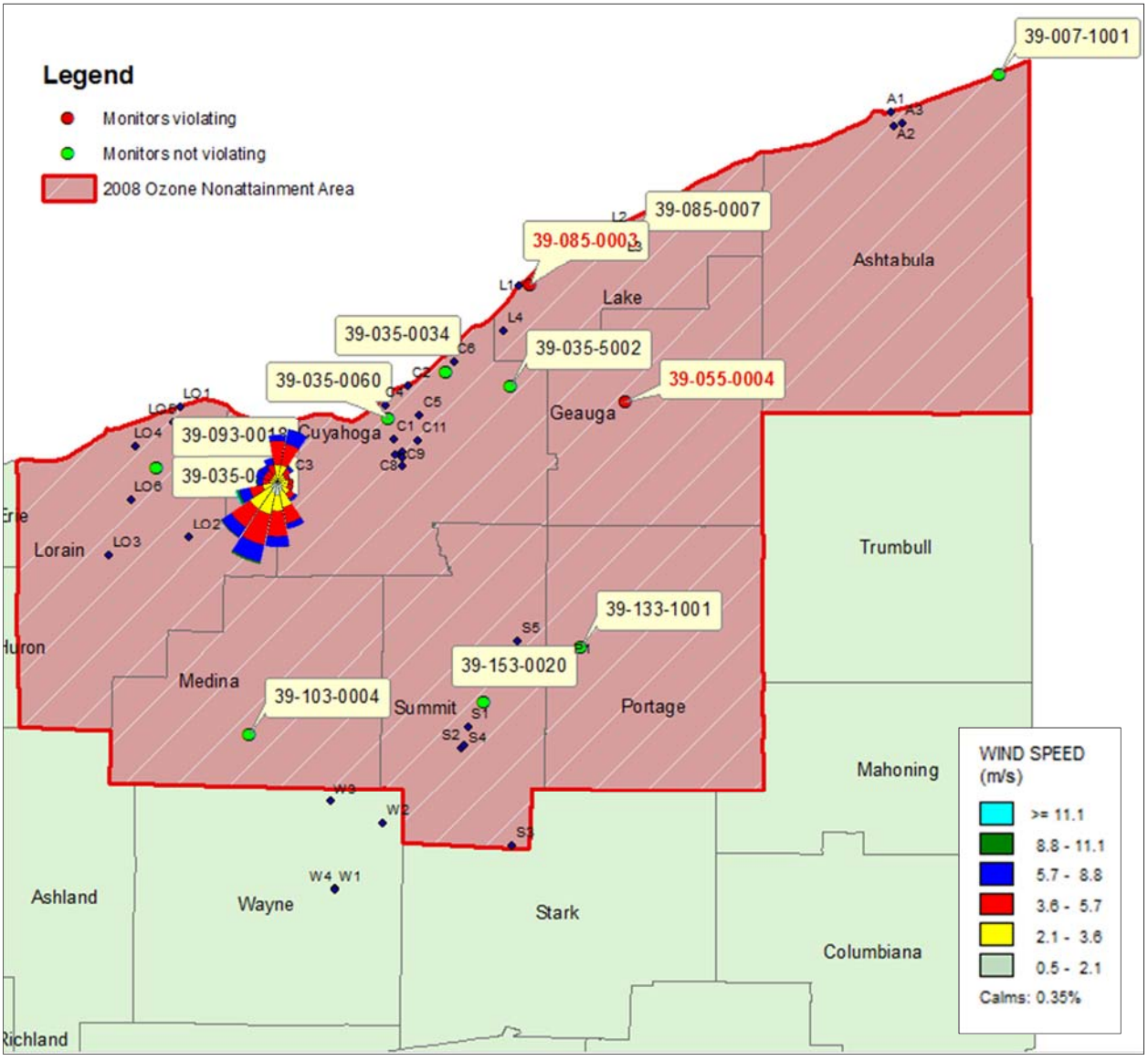
Percent is of workers working in county.

Source: U.S. Census Bureau http://www.census.gov/hhes/commuting/ and Ohio Department of Development. Ohio County Profiles: http://development.ohio.gov/reports/reports_countytrends_map.htm

Factor 3: Meteorology

The following wind rose for the ozone season (April 1 to October 31) for 2013 through 2015 for the Cleveland Hopkins International Airport represents this area.

Figure 14a: 2013 to 2015 Ozone Season Wind Rose for Cleveland-Akron-Lorain Analysis Area

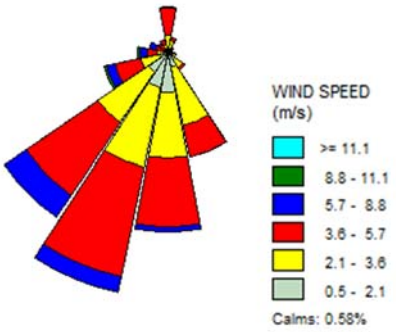


Winds from the south-southwest and west-southwest and north-northeast are prevalent in this analysis area. However, lake effect winds can produce more of a variety of wind direction frequencies near the lake and especially near the nonattainment monitors located near the lake.

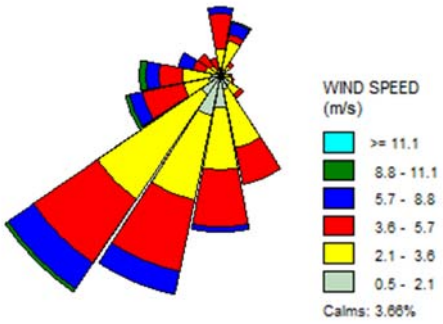
The following wind roses represent a subset of the days in Figure 14. These wind roses for the Cleveland Hopkins International Airport represent only days where there was at least one hour where the violating monitor exceeded 70 ppb. This wind rose demonstrates the lake effect winds are less important on those days with elevated ozone concentrations.

Figure 14b: Wind Roses on Days with at Least One Hour where Violating Monitor Exceeded 70 ppb

Lake County
(39-085-0003)
2013-July 18, 2016

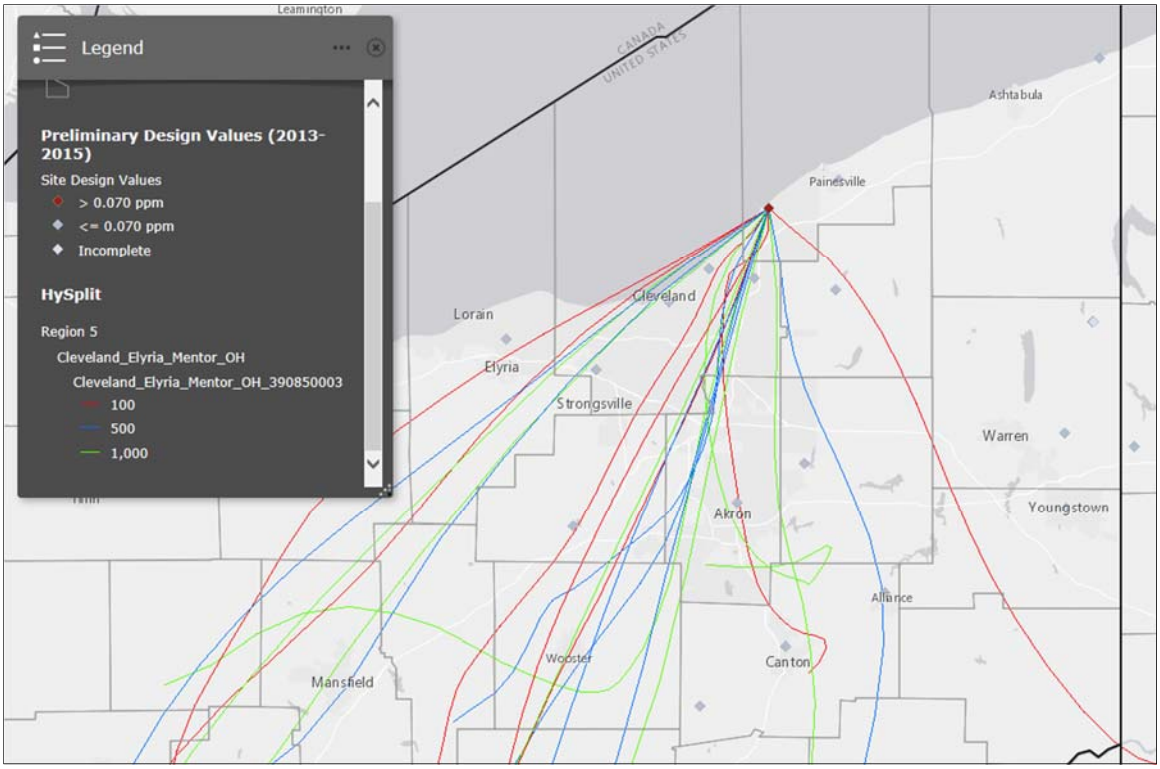


Geauga Co.
(39-055-0004)
2013-July 18, 2016



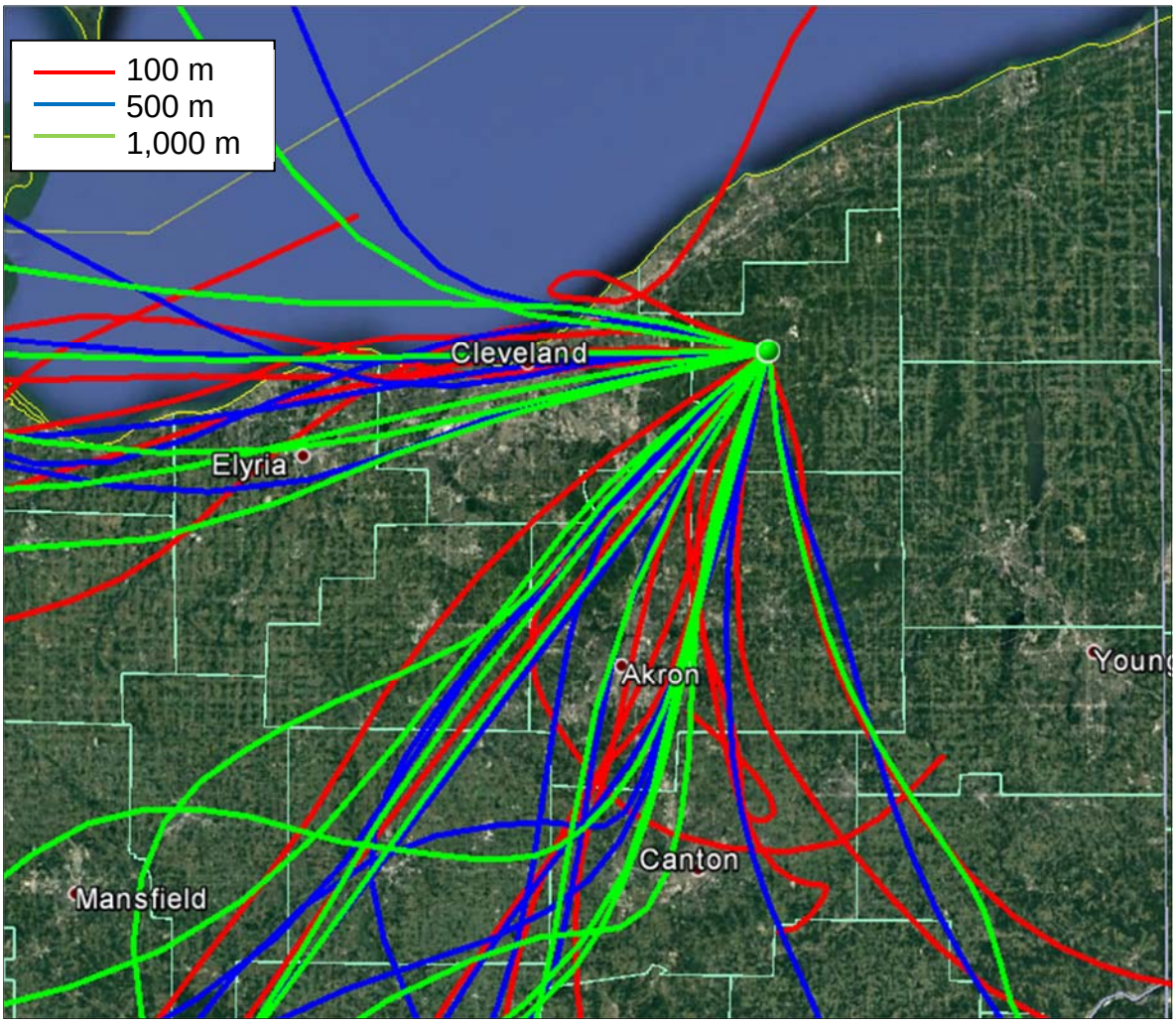
HYSPLIT modeling also shows sources of emissions to the south, southwest and west of the violating monitors may be contributing to the violation, although some back-trajectories show sources to the southeast may also be contributing.

Figure 15a: HYSPLIT modeling for the Cleveland-Akron-Lorain Analysis Area (Back-Trajectories from Violating Monitor in Lake County [39-085-0003] on Days in 2013 and 2014 with High Ozone Concentrations)



Source: https://epa.maps.arcgis.com/apps/webappviewer/index.html?id=6a89e7170dd147b1852ec11ccb3880e8

Figure 15b: HYSPLIT modeling for the Cleveland-Akron-Lorain Analysis Area (Back-Trajectories from Violating Monitor in Geauga County [39-055-0004] on Days in 2013 to July 14, 2016 with High Ozone Concentrations)



Source: http://ready.arl.noaa.gov/HYSPLIT_traj.php

Factor 4: Geography/topography

This analysis area does not have any geographical or topographical barriers significantly affecting air pollution transport. Therefore, this factor does not play a role in the analysis of this area.

Factor 5: Jurisdictional boundaries

Ashtabula, Cuyahoga, Geauga, Lake, Lorain, Medina, Portage, and Summit Counties were designated as nonattainment counties for the 2008 ozone standard as part of the Cleveland-Akron-Lorain nonattainment area. The same counties were designated as nonattainment under the 1997 ozone standard. These areas have been redesignated to

attainment for the 1997 ozone standard. Redesignation has been requested for the 2008 ozone standard.

The Cleveland-Elyria CBSA is comprised of Cuyahoga, Geauga, Lake, Lorain, and Medina Counties. The Cleveland-Akron-Canton CSA includes the Cleveland-Elyria CBSA, the Canton-Massillon CBSA (Carroll and Stark Counties), and Ashtabula, Erie, Huron, Portage, Sandusky and Tuscarawas Counties.

The Northeast Ohio Areawide Coordinating Agency (NOACA) is the planning agency designated as the Metropolitan Planning Organization (MPO) for the greater Cleveland area. The NOACA region is composed of five counties: Cuyahoga, Geauga, Lake, Lorain and Medina.

The Akron Metropolitan Area Transportation Study (AMATS) is the planning agency designated as the MPO for the Akron area. The AMATS region is composed of two counties: Summit and Portage.

Conclusion

Ashtabula, Cuyahoga, Geauga, Lake, Lorain, Medina, Portage, and Summit Counties have historically been a part of this nonattainment area. Monitor 39-085-0003 in Lake County is violating the 2015 ozone standard based on 2013 to 2015 air quality data. Monitors in Lake and Geauga counties will be in violation of the standard based on preliminary 2014 to 2016 design values, with data available through July 23, 2016.

The largest point source of NO_x in 2011 in the analysis area is in Lake County in close proximity to the only violating monitor in Lake County. This source was permanently shut down in April 2015. Cuyahoga County has the highest emissions, followed by Lake, Summit and Lorain Counties. Considering all the counties in this analysis area, these four counties account for 74% of NO_x and 62% of VOC emissions, although the majority of emissions in Summit County are from onroad sources. Overall, the largest concentration of larger point sources reside in Cuyahoga and Lorain Counties, as can be seen by Figure 12. Wind roses and HYSPLIT modeling indicate transport is more likely from all counties to the south, southwest and west of the violating monitors. Cuyahoga County has the highest population and VMT, followed by Summit County then Lake and Lorain Counties.

Medina and Portage Counties have monitors attaining the revised standard for the 2013-2015 period with no violations so far for the 2014-2016 design value period. However, they both have moderate emissions, population and VMT. Medina County accounts for 5% of NO_x and 7% of VOC 2011 emissions of all counties in this analysis area, mostly from onroad sources. Portage County accounts for 6% of NO_x and 8% of VOC 2011 emissions of all counties in this analysis area, mostly from onroad sources. Medina and Portage Counties both also have relatively moderate populations, VMT and commuting, which implies that these counties are generally urbanized and relatively integrated with Cleveland metropolitan area. Portage County has moderate commuting

with the counties with violating monitors, and Medina County has moderate commuting with Cuyahoga County, which does not have violating monitors but is likely itself a contributing source. Wind roses and HYSPLIT modeling indicate these collective emissions may be contributing to the violating monitors.

Ashtabula County has a monitor (39-007-1001) which is attaining the revised standard for the 2013-2015 period, and also for the 2014-2016 period based on preliminary data available through July 23, 2016. Ashtabula County accounts for 6% of NO_x and 11% of VOC 2011 emissions of all counties in this analysis area. NO_x emissions have since decreased due to the shutdown of coal fired boilers at First Energy Generation, LLC Ashtabula Plant in April 2015 and December 2015. Based on the wind roses and HYSPLIT modeling, it is unlikely emissions from sources in Ashtabula County are contributing to the violating monitors. Ashtabula County has the lowest population and VMT in this analysis area. While there is some commuting between Ashtabula County and the counties with the violating monitors, the violating monitors are more likely impacted by emissions and commuter travel from Cuyahoga County. Ohio EPA does not believe this factor alone warrants including Ashtabula County in the nonattainment designations.

Wayne County accounts for 7% of NO_x and 6% of VOC emissions of all counties in this analysis area. The majority of Wayne County's emissions are from nonpoint and roadway emissions. Wayne County is significantly south of the violating monitors. Sources in Wayne County would more likely impact the monitors in Medina or Summit Counties, both of which are well below the standard at 64 and 61 ppb, respectively. Wayne County does have a moderate population and VMT, but population is declining and there is negligible commuting between Wayne County and the counties with violating monitors. Ohio EPA believes these factors do not warrant including Warren County in the nonattainment designations.

Ohio EPA recommends Cuyahoga, Geauga, Lake, Lorain, Medina, Portage, and Summit Counties be designated nonattainment.

Columbus, OH

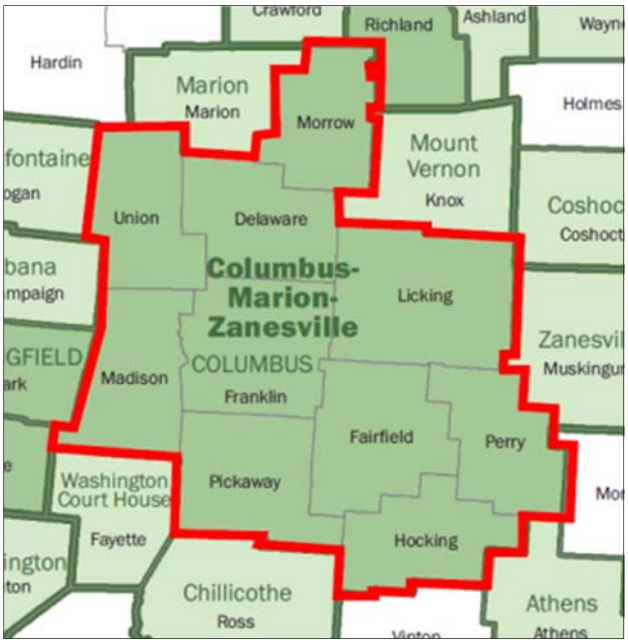
Figure 16: Columbus, OH Recommended Nonattainment Area

Discussion

There are six counties in this 2008 ozone nonattainment area, Delaware, Fairfield, Franklin, Knox, Licking, and Madison Counties. Ohio EPA recommends designating Delaware, Fairfield, Franklin and Licking Counties as nonattainment for the Columbus area. After considering the five factors, Ohio EPA does not recommend adding any contributing counties to this area.

There is one violating monitor in Franklin County. Franklin County is part of the Columbus, OH CSBA which is comprised of Delaware, Fairfield, Franklin, Hocking, Licking, Madison, Morrow, Perry, Pickaway, and Union Counties. Ohio EPA will analyze counties in the Columbus CBSA, along with Knox County which is part of the historical ozone nonattainment areas. Ohio EPA will not analyze the remaining counties in the Columbus-Marion-Zanesville CSA (Fayette, Guernsey, Logan, Marion, Muskingum, and Ross) because the violating monitor is very close to the standard at 71 ppb, and these additional counties are not part of the historical nonattainment area. Additionally, there have been no significant changes to the factors being considered that would warrant analyzing them now.

Figure 17: Columbus CSBA

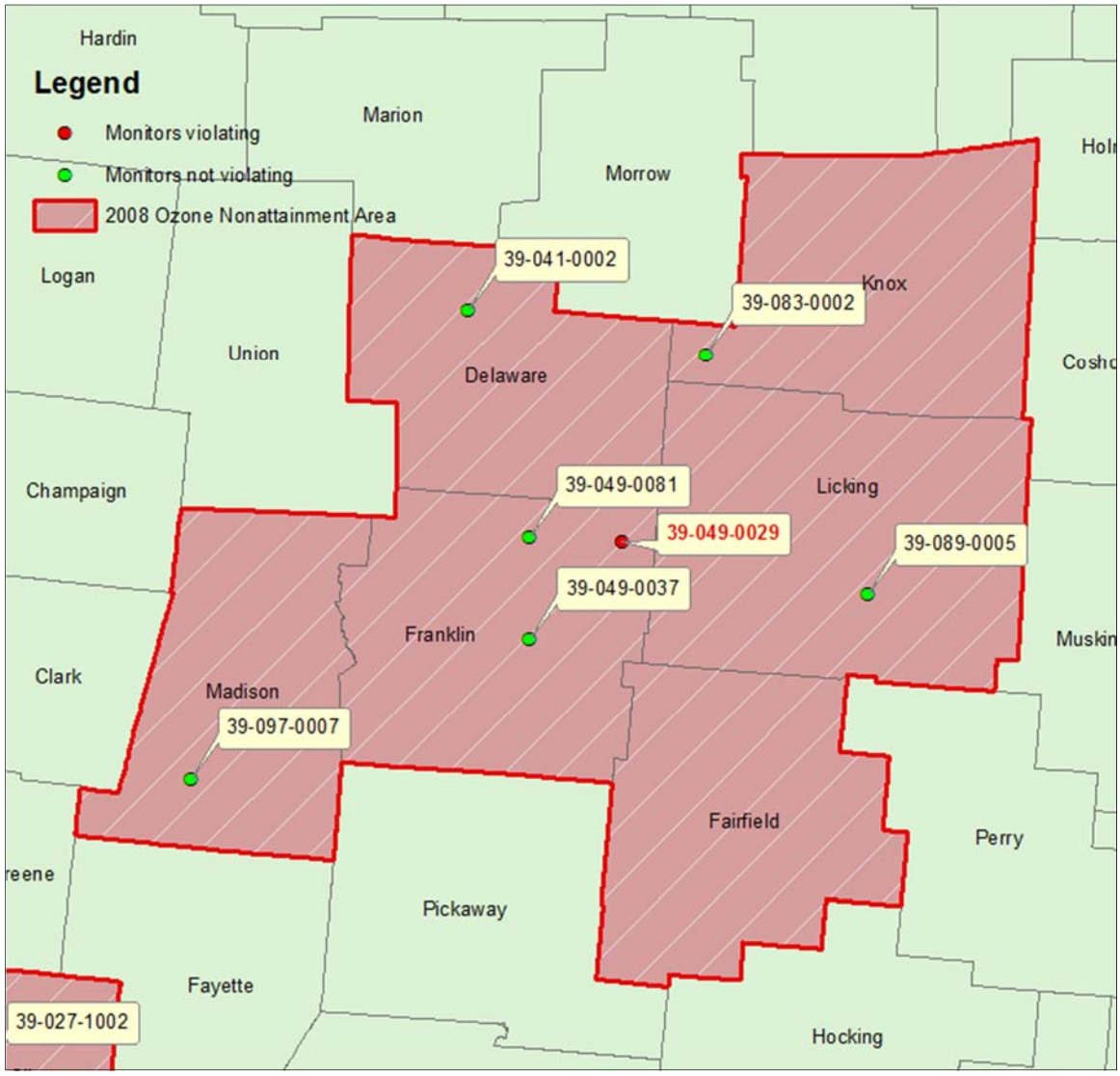


Source: U.S. Department of Commerce Economics and Statistics Administrations, U.S. Census Bureau, 2010 Economic Census

Factor 1: Air quality data

There are seven monitors in this area.

Figure 18: Columbus Analysis Area Air Quality Monitors



Franklin County monitor 39-049-0029 is violating the standard based on 2013 to 2015 air quality data. The preliminary 2014-2016 design values, with data available through July 23, 2016 indicates the Franklin County monitor 39-049-0029 will also be in violation of the standard for this time period. As can be seen from Table 1, air quality trends have declined historically in this area.

Table 13: Annual Fourth-Highest Daily Maximum Eight-hour Average Ozone Concentrations and 3-Year Averages (ppb)

Site	County	Year				Average	
		2013	2014	2015	2016[13]	'13-'15	'15-'16[13]
39-041-0002	Delaware	70	66	68	67	68	67
39-049-0029	Franklin	73	70	71	72	71	71
39-049-0037	Franklin	70	69	64	66	67	66
39-049-0081	Franklin	65	68	63	69	65	66
39-083-0002	Knox	67	66	71	66	68	67
39-089-0005	Licking	65	66	68	67	66	67
39-097-0007	Madison	66	69	69	68	68	68

Insufficient data
Violating monitor

Source: U.S. EPA AQS

Factor 2: Emissions and emissions related data

Emission trends

Overall, the most significant emissions in the analysis area emanate from Franklin County. Considering all the counties in this analysis area, Franklin County accounts for 50% of NO_x and 33% of VOC emissions. The most significant emissions come from Franklin, Delaware, Fairfield and Licking Counties, which together account for 70% of NO_x and 60% of VOC emissions of all counties in this analysis area. The majority of emissions in this analysis area are related to nonpoint and onroad sources.

Delaware, Hocking, Licking, Perry, Pickaway and Union Counties have low emissions compared to Franklin county and the majority of their emissions are related to nonpoint sources. Fairfield, Knox, Madison and Morrow Counties also have lower emissions compared to Franklin County but their emissions are related to a presence of both point sources and nonpoint sources.

Table 14: Columbus Analysis Area Emissions (TPY)

County	NO_x (TPY)							
	2014 Point	2011 Point	2011 Air/Rail	2011 Nonpoint	2011 Nonroad	2011 Onroad	2011 Fires	2011 NO_x Total
Delaware	25.46	49.11	2.00	1,386.03	1,304.61	3,877.06	0.00	**6,618.81**
Fairfield	1,468.60	1,703.93	1.53	660.80	828.81	3,209.00	0.01	**6,404.08**
Franklin	536.36	649.28	904.64	4,687.95	4,852.18	25,779.73	4.82	**36,878.60**
Hocking	200.29	170.90	0.01	172.67	75.52	995.07	5.98	**1,420.15**
Knox	43.62	74.82	1.09	486.67	406.58	1,446.83	1.19	**2,417.18**
Licking	343.35	517.33	1.02	805.50	768.52	4,861.55	0.00	**6,953.92**

[13] Data available through July 23, 2016

Madison	3.02	4.16	1.45	595.22	491.90	1,895.87	0.00	**2,988.60**
Morrow	13.52	3.66	0.81	403.53	246.55	1,569.48	0.00	**2,224.03**
Perry	64.55	567.06	0.16	268.64	133.85	870.58	0.00	**1,840.29**
Pickaway	182.00	466.43	1.29	1,058.80	522.01	1,695.75	2.39	**3,746.67**
Union	61.79	54.78	1.23	651.01	701.34	1,369.64	3.58	**2,781.58**

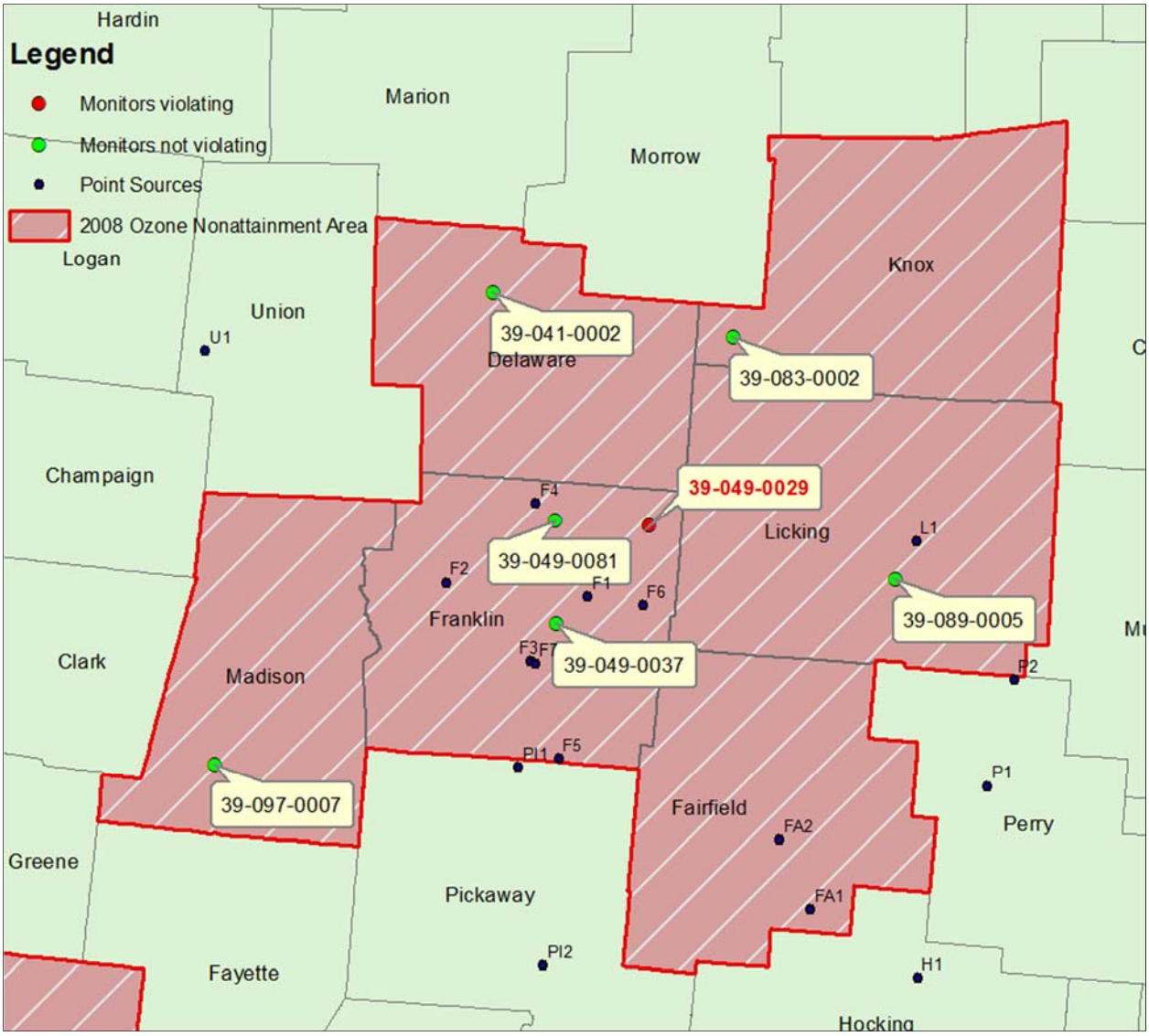
County	**VOC (TPY)**							
	2014 Point	**2011 Point**	**2011 Air/Rail**	**2011 Nonpoint**	**2011 Nonroad**	**2011 Onroad**	**2011 Fires**	**2011 VOC Total**
Delaware	131.36	123.48	3.93	4,142.52	1,020.87	2,126.01	0.00	**7,416.81**
Fairfield	215.27	189.48	3.37	5,563.26	388.80	2,270.88	0.12	**8,415.91**
Franklin	817.50	1,122.62	154.29	13,601.29	3,675.75	15,607.82	50.68	**34,212.45**
Hocking	4.50	2.60	0.01	7,702.74	317.71	648.35	83.80	**8,755.21**
Knox	67.90	71.40	2.33	5,102.62	284.97	1,072.24	12.34	**6,545.90**
Licking	252.09	155.95	2.23	7,509.45	642.68	3,022.58	0.00	**11,332.89**
Madison	53.18	23.24	3.73	3,113.13	254.79	935.21	0.00	**4,330.10**
Morrow	14.58	0.20	1.77	3,238.13	229.71	844.07	0.00	**4,313.88**
Perry	67.01	93.30	0.36	5,882.08	81.24	680.81	0.00	**6,737.79**
Pickaway	187.53	315.03	3.10	3,848.41	266.05	1,101.27	24.97	**5,558.83**
Union	1,132.17	596.16	3.41	3,116.38	324.69	737.23	37.14	**4,815.01**

Source: 2011 NEI; 2011 EIS and 2014 EIS

As can be seen from Figure 19, the larger concentration of the larger point sources reside in Franklin County. As seen in Table 15 below, the most significant point emissions of NO_x in 2011 was from the Crawford Compressor Station and Anchor Hocking in Fairfield County. These facilities are located to the south-southeast of the violating monitor. The most significant point emissions of VOC in 2011 was from the Honda Marysville Auto Plant in Union County, located to the west-northwest of the violating monitor.

The following figure[14] and table shows the higher emitting point sources located in the area.

Figure 19: Location of Columbus Analysis Area Emissions Point Sources



Source: 2011 NEI

[14] The table can be used to correlate the location of each point source with the letter (first letter of county) and number next to the symbol on the map in the figure.

Table 15: Columbus Analysis Area Emissions Point Sources for 2011 (TPY)

County	MapID	Facility Name	NO_x
Fairfield	FA1	CRAWFORD COMPRESSOR STATION (0123000137)	871
Fairfield	FA2	Anchor Hocking, LLC (0123010078)	770
Perry	P1	Texas Eastern Transmission LP - Somerset (0664000100)	444
Franklin	F1	Port Columbus Intl	401
Licking	L1	Owens Corning Insulating Systems, LLC (0145020185)	245
Pickaway	P2	Picway Power Plant (0165000006)	211
Franklin	F2	BUCKEYEYARD	205
Hocking	H1	GE Logan Lighting Plant (0637010000)	164
Franklin	F3	PARSONSYARD	156
Pickaway	P3	DuPont-Circleville (0165010004)	154
Franklin	F4	ANHEUSER-BUSCH COLUMBUS BREWERY (0125040554)	141
Franklin	F5	Rickenbacker Internatio	138
Perry	P1	Waste Management of Ohio (Suburban South Recycling) (0664000056)	109

County		Facility Name	VOC
Union	U1	Honda of America Mfg., Inc., Marysville Auto Plant (0180010193)	527
Franklin	F6	Ball Container LLC (0125040914)	296
Pickaway	P3	DuPont-Circleville (0165010004)	270
Franklin	F7	Columbus Steel Castings (0125040020)	197
Franklin	F4	ANHEUSER-BUSCH COLUMBUS BREWERY (0125040554)	81
Franklin	F1	Port Columbus Intl	74
Licking	L1	Owens Corning Insulating Systems, LLC (0145020185)	63

Source: 2011 NEI

Level of control of emission sources

Permanent and enforceable reductions of VOC and NO_x emissions have contributed to the attainment of the eight-hour ozone standard. Some of these reductions were due to the application of tighter federal standards on new vehicles and non-road diesel engines.

With respect to EGUs, changes at a single facility have resulted in reductions in NO_x emissions potentially impacting the nonattainment area. The Picway Power Plant in Pickaway County officially and permanently shutdown in May of 2015. The coal-fired boiler did not operate in 2014. While not located in the previous nonattainment area, the Picway Power Plant is located approximately 1.25 kilometers from the southern border of Franklin County. Prior to the shutdown, NO_x emissions had dropped from 466.43 TPY to 182.00 TPY (2011 to 2014). Picway Power Plant's 2011 NO_x emissions represented 211 TPY of the 466.43 TPY.

Urbanization, population and commuting trends

The following table provides a summary of 2010 population and 2011 vehicle miles traveled (VMT) for each of the counties that are discussed in this section.

Table 16: Columbus Analysis Area County Level VMT, Population, Land Area and Population Density

County	2011 VMT	2010 Population	Land Area (Sq. Miles)	Population Density (1,000 per Sq. Miles)
Delaware	1,977,677,063	174,214	442	0.39
Fairfield	1,318,678,726	146,156	505	0.29
FRANKLIN	11,407,805,978	1,163,414	540	2.15
Hocking	386,096,227	29,380	423	0.07
Knox	529,386,511	60,921	527	0.12
Licking	2,022,815,763	166,492	687	0.24
Madison	769,115,156	43,435	465	0.09
Morrow	616,933,408	34,827	406	0.09
Perry	307,782,918	36,058	409	0.09
Pickaway	660,023,424	55,698	502	0.11
Union	706,190,710	52,300	437	0.12
Total for Counties	20,702,505,885	1,962,895	5,343	

Source: U.S. EPA Designations Guidance and Data: https://www.epa.gov/ozone-designations/ozone-designations-guidance-and-data and http://www.epa.gov/pmdesignations/2012standards/techinfo.htm#F2

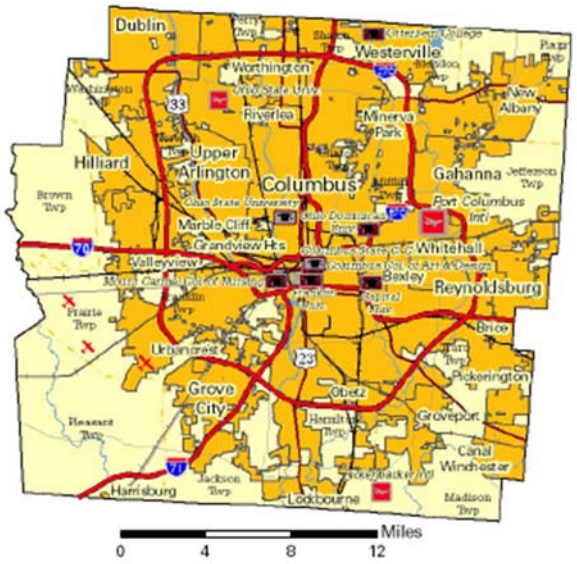
Degree of urbanization and population trends

As seen in Table 16 above, the majority of the population for this analysis area resides in Franklin County, and to a lesser extent Licking, Delaware and Fairfield Counties. As seen in Figure 20 below, the population in each of the counties in this analysis area is expected to grow except Pickaway and Union Counties.

The most urbanized area is Columbus, located in Franklin County. Franklin County's population and population density is significantly higher than other areas indicating that population-related emissions in this areas may be high. This is supported by Table 14 above, which indicates Franklin County has the highest nonpoint and roadway emissions compared to the others.

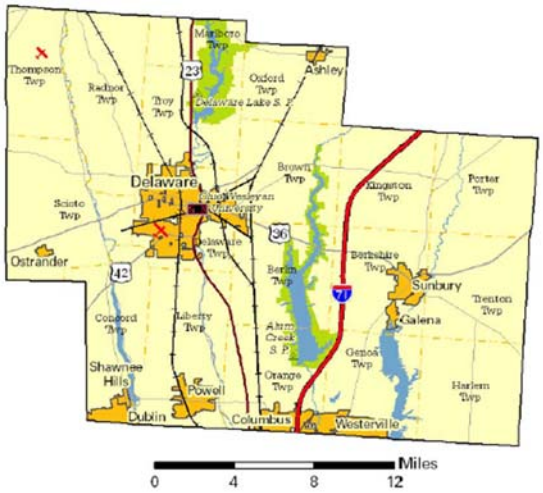
Figure 20: Columbus Analysis Area County Profiles

Franklin County



Franklin County is 14% forest, 23% cropland, and 61% urban. Columbus (the location of the violating monitor) is the major urban area. The 2010 population was 1,163,414 while it grew to 1,231,393 in 2014. Population is expected to continue growing in the future to a level of 1,237,960 by 2020.

Delaware County



Delaware County is 26% forest, 53% cropland, and 17% urban. Delaware city is the major urban area. The 2010 population was 174,214 while it grew to 189,113 in 2014. Population is expected to continue growing in the future to a level of 210,630 by 2020.

Fairfield County

Fairfield County is 24% forest, 63% cropland, and 8% urban. Lancaster and Pickerington are the major urban areas. The 2010 population was 146,156 while it grew to 150,381 in 2014. Population is expected to continue to grow in the future to a level of 165,850 by 2020.

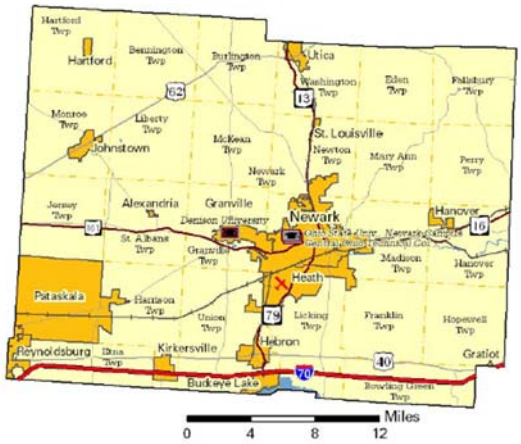
Hocking County

Hocking County is 85% forest, 4% cropland, and only 1% urban. Logan is the major urban area. The 2010 population was 29,380 while it declined slightly to 28,725 in 2014. Population is expected to grow slightly in the future to a level of 29,480 by 2020.

Knox County

Knox County is 39% forest, 44% cropland, and 4% urban. Mount Vernon is the largest major urban area. The 2010 population was 60,921 while it grew slightly to 61,167 in 2014. Population is expected to continue to grow in the future to a level of 64,960 by 2020.

Licking County



Licking County is 34% forest, 39% cropland, and 11% urban. Newark and Pataskala are the major urban areas. The 2010 population was 166,492 while it grew to 169,390 in 2014. Population is expected to increase in the future to a level of 180,860 by 2020.

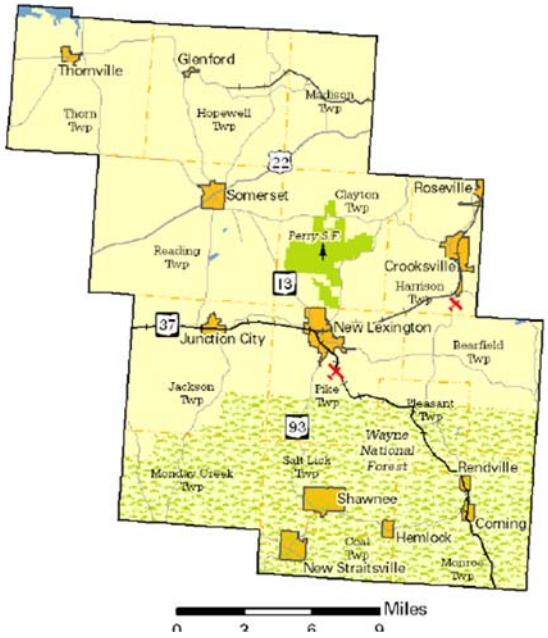
Madison County

Madison County is 5% forest, 81% cropland, and 6% urban. London and West Jefferson are the major urban areas. The 2010 population was 43,435 while it increased slightly to 43,918 in 2014. Population is expected to continue to grow in the future to a level of 45,670 by 2020.

Morrow County

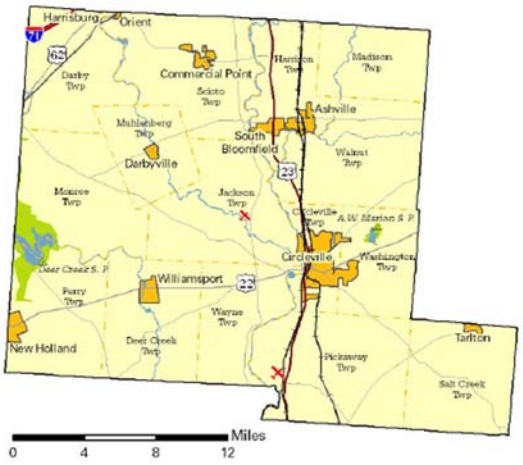
Morrow County is 28% forest, 65% cropland, and 3% urban. Mount Gilead is the largest major urban area. The 2010 population was 34,827 while it increased to 35,152 in 2014. Population is expected to continue to grow in the future to a level of 37,380 by 2020.

Perry County



Perry County is 71% forest, 22% cropland, and 1% urban. New Lexington is the largest major urban area. The 2010 population was 36,058 while it declined to 35,812 in 2014. Population is expected to continue to grow in the future to a level of 37,610 by 2020.

Pickaway County



Pickaway County is 10% forest, 82% cropland, and 3% urban. Circleville is the largest major urban area. The 2010 population was 55,698 while it declined to 56,876 in 2014. Population is expected to continue to decline in the future to a level of 58,010 by 2020.

Union County

Source: Ohio Department of Development. Ohio County Profiles: http://development.ohio.gov/reports/reports_countytrends_map.htm

Commuting trends

As can be seen in Table 16, the majority of VMT occurs in Franklin and Licking Counties, and to a lesser extent Delaware and Fairfield Counties. Only 10% of Franklin County's working residents commute to counties outside of Franklin County. In turn,

just over 24% of Franklin County's workforce commutes from other counties into Franklin County. Of the Franklin County residents that commute to other counties, the majority commute north to Delaware and Union Counties (5.6%). To a lesser extent, some commute to counties to the east, and even to a lesser extent the west and south. Of the non-residents that commute into Franklin County, a significant portion also commutes from Delaware County to the north (over 6%). However, over twice as many workers are commuting into Franklin County from the north than are commuting out to the north. Over 8% of Franklin County non-resident workers also commute in from counties to the east (Fairfield and Licking Counties). There are fewer non-residents commuting in from the south and west.

Table 17: Commuter Travel In and Out of Franklin County

Franklin

Percent of workers that work outside the county -	10.1%
Average commute time in minutes -	21.5

Number of workers 16+ years of age living in Franklin County		**576,846**
Commute Out To	Number	Percent
Delaware Co. OH	25,577	4.4%
Union Co. OH	6,699	1.2%
Licking Co. OH	5,082	0.9%
Fairfield Co. OH	4,639	0.8%
Madison Co. OH	3,201	0.6%
Pickaway Co. OH	1,999	0.3%
Ross Co. OH	741	0.1%
Hamilton Co. OH	605	0.1%
Montgomery Co. OH	544	0.1%
Clark Co. OH	522	0.1%

Percent is of workers living in county.

Number of workers 16+ years of age working in Franklin County		**684,068**
Commute In From	Number	Percent
Delaware Co. OH	45,886	6.7%
Fairfield Co. OH	30,114	4.4%
Licking Co. OH	28,330	4.1%
Pickaway Co. OH	11,472	1.7%
Union Co. OH	7,909	1.2%
Madison Co. OH	7,682	1.1%
Knox Co. OH	3,417	0.5%
Morrow Co. OH	3,146	0.5%
Hocking Co. OH	2,196	0.3%
Muskingum Co. OH	2,164	0.3%

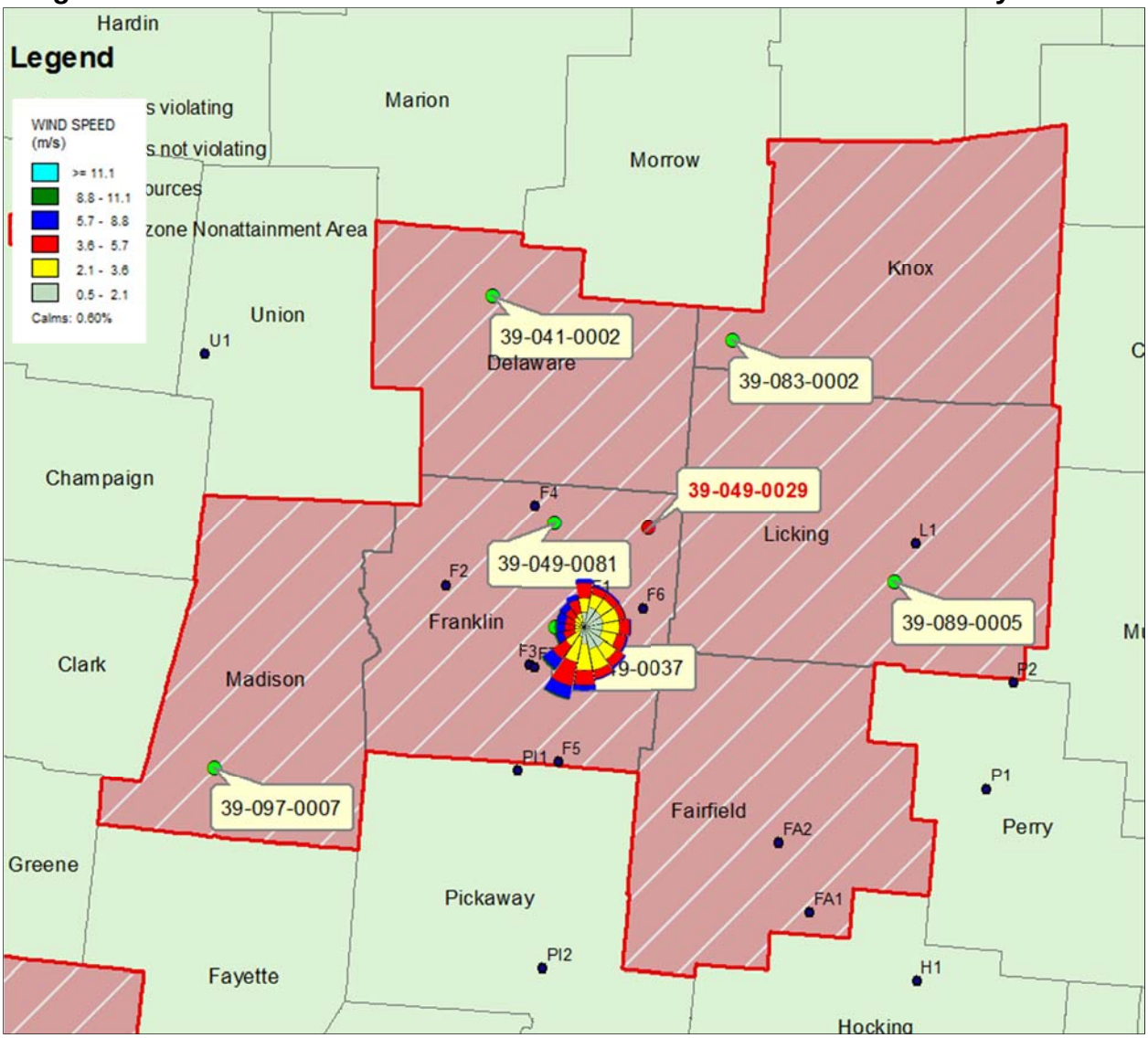
Percent is of workers working in county.

Source: U.S. Census Bureau http://www.census.gov/hhes/commuting/ and Ohio Department of Development. Ohio County Profiles: http://development.ohio.gov/reports/reports_countytrends_map.htm

Factor 3: Meteorology

The following wind rose for the ozone season (April 1 to October 31) for 2013 through 2015 for the Port Columbus International Airport represents this area.

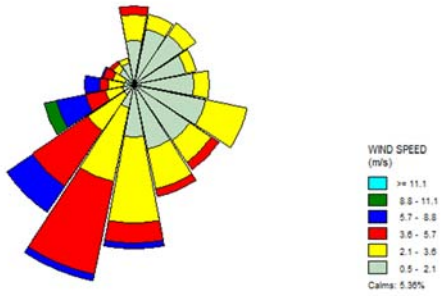
Figure 21: 2013 to 2015 Ozone Season Wind Rose for Columbus Analysis Area



Winds from the south-southwest and southwest are prevalent near the violating monitor in Franklin County. This indicates sources of emissions from the southwest quadrant may be contributing to violations at the Franklin County monitor.

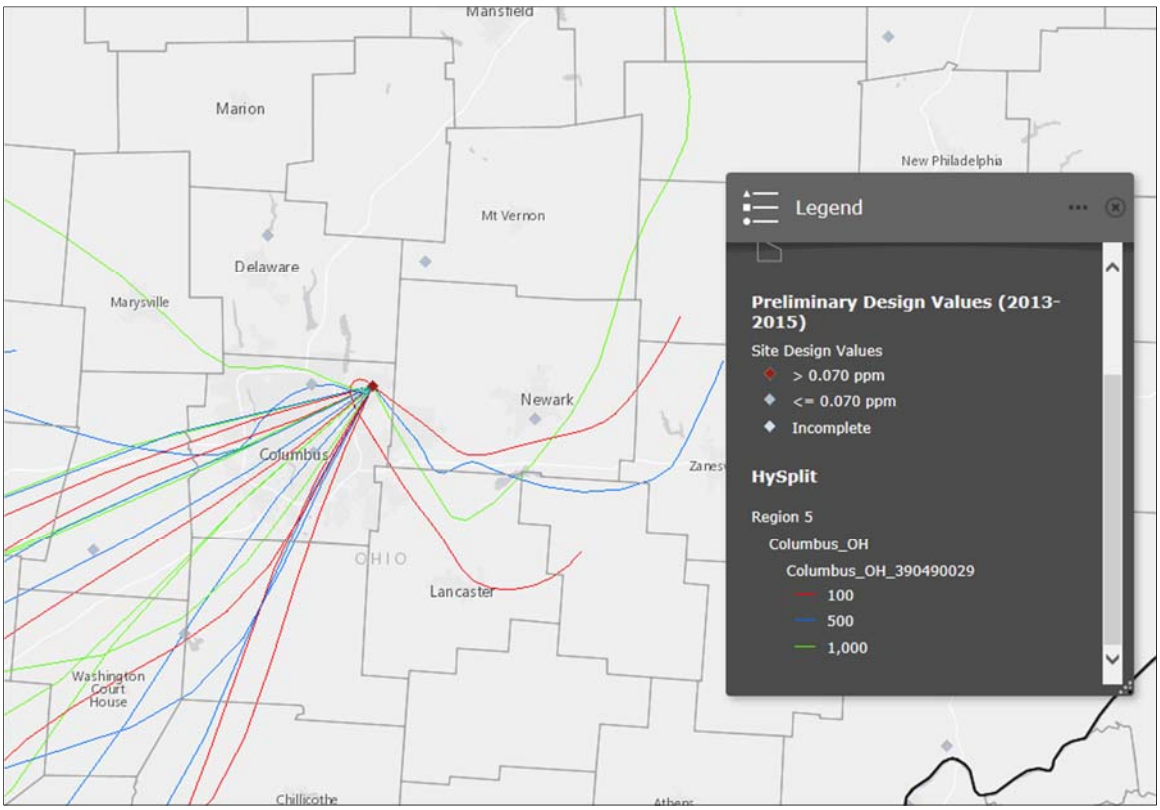
The following wind rose represents a subset of the days in Figure 14. This wind rose for the Port Columbus International Airport represents only days where there was at least one hour where the violating monitor exceeded 70 ppb.

Figure 14b: Wind Rose on Days in 2013 to July 18, 2016 with at Least One Hour where the Franklin County Monitor (39-049-0029) Exceeded 70 ppb



HYSPLIT modeling also shows sources of emissions to the south-southwest and west-southwest of the violating monitor may be contributing to the violation, although some back-trajectories show sources to the east, southeast and west-northwest may also be contributing.

Figure 22: HYSPLIT modeling for the Columbus Analysis Area (Back-Trajectories from Violating Monitor on Days in 2013 and 2014 with High Ozone Concentrations)



Source: https://epa.maps.arcgis.com/apps/webappviewer/index.html?id=6a89e7170dd147b1852ec11ccb3880e8

Factor 4: Geography/topography

This analysis area does not have any geographical or topographical barriers significantly affecting air pollution transport. Therefore, this factor does not play a role in the analysis of this area.

Factor 5: Jurisdictional boundaries

Delaware, Fairfield, Franklin, Licking, Knox and Madison Counties were designated as nonattainment counties for the 2008 ozone standard as part of the Columbus nonattainment area. The same counties were designated as nonattainment under the 1997 ozone standard. These areas have been redesignated to attainment for the 1997 ozone standard. Redesignation has been requested for the 2008 ozone standard.

The Columbus, OH CSBA includes Delaware, Fairfield, Franklin, Hocking, Licking, Madison, Morrow, Perry, Pickaway, and Union Counties. The Columbus-Marion-Zanesville CSA includes the Columbus CSBA along with Fayette, Guernsey, Knox, Logan, Marion, Muskingum, and Ross Counties.

The Mid-Ohio Regional Planning Commission (MORPC) is the planning agency designated as the MPO for the greater Columbus area. The MORPC region is composed of two Counties: Delaware and Franklin and portions of Fairfield and Licking Counties.

The Licking County Area Transportation Study (LCATS) is the planning agency designated as the MPO for Licking County.

Conclusion

Delaware, Fairfield, Franklin, Licking, Knox and Madison Counties have historically been a part of this nonattainment area. Franklin County has the highest emissions (50% of NO_x and 33% of VOC emissions in the analysis area) and largest amount of larger point sources. Compared with other nonattainment areas in Ohio, the point source emissions in this analysis are relatively minor. All other counties in this analysis area have significantly lower and similar (to each other) emissions, with Delaware, Fairfield and Licking Counties having slightly higher emissions than the remaining counties. Collectively, Delaware, Franklin and Licking Counties account for 27% of NO_x and 27% of VOC emissions. Franklin County has the highest VMT and second highest population of any county in any of the Ohio nonattainment analysis areas. Delaware, Fairfield and Licking Counties have higher population, VMT and commuter travel with Franklin County then other counties in the analysis area, which implies that these counties are generally urbanized and relatively integrated with the Columbus metropolitan area such that the collective emissions may be contributing to the violating monitor.

With respect to the remaining Ohio counties in this analysis area, none of the factors support including Hocking, Knox, Madison, Morrow, Perry, Pickaway or Union Counties. These counties have significantly lower emissions, lower populations, lower population densities, lower VMT and lower commuting patterns with Franklin County.

Ohio EPA recommends Delaware, Fairfield, Franklin and Licking Counties be designated nonattainment.