Tennessee
Area Designations for the
2008 Ozone National Ambient Air Quality Standards

The table below identifies the areas and associated counties or parts of counties in Tennessee that EPA intends to designate as nonattainment for the 2008 ozone national ambient air quality standards (2008 ozone NAAQS). In accordance with section 107(d) of the Clean Air Act, EPA must designate an area (county or part of a county) "nonattainment" if it is violating the 2008 ozone NAAQS or if it is contributing to a violation of the 2008 ozone NAAQS in a nearby area. The technical analyses supporting the boundaries for the individual nonattainment areas are provided below.

Intended Nonattainment Areas in Tennessee

Area	Tennessee's Recommended Nonattainment Counties	EPA's Intended Nonattainment Counties
Knoxville-Sevierville-La Follette, TN	Blount (partial) Cocke (partial) Sevier (partial)	Anderson Blount Cocke (partial) Knox Loudon Sevier
Memphis, TN-MS-AR*	None	Shelby

*Memphis, TN-MS-AR is a multi-state nonattainment area. Table 1 below identifies the counties in the other states that EPA intends to designate as part of the nonattainment area.

EPA intends to designate the remaining counties in Tennessee that are not listed in the table above as "unclassifiable/attainment" for the 2008 ozone NAAQS.

The analysis below provides the basis for intended nonattainment area boundaries. It relies on our analysis of whether and which monitors are violating the 2008 ozone NAAQS, based on certified air quality monitoring data from 2008-2010 and an evaluation of whether nearby areas are contributing to such violations. EPA has evaluated contributions from nearby areas based on a weight of evidence analysis considering the factors identified below. EPA issued guidance on December 4, 2008 that identified these factors as ones EPA would consider in determining nonattainment area boundaries and recommended that states consider these factors in making their designations recommendations to EPA.[1]

1. Air quality data (including the design value calculated for each Federal Reference Method monitor or Federal Equivalent Method (FEM) monitor in the area);
2. Emissions and emissions-related data (including location of sources and population, amount of emissions and emissions controls, and urban growth patterns);
3. Meteorology (weather/transport patterns);
4. Geography and topography (mountain ranges or other basin boundaries);
5. Jurisdictional boundaries (e.g., counties, air districts, existing nonattainment areas, Indian country, metropolitan planning organizations (MPOs))

[1] The December 4, 2008 guidance memorandum "Area Designations for the 2008 Revised Ozone National Ambient Air Quality Standards" refers to 9 factors. In this technical support document we have grouped the emissions-related factors together under the heading of "Emissions and Emissions-Related Data," which results in 5 categories of factors.

Ground-level ozone generally is not emitted directly into the air, but is created by chemical reactions between oxides of nitrogen (NOx) and volatile organic compounds (VOC) in the presence of sunlight. Because NOx and VOC emissions from a broad range of sources over a wide area typically contribute to violations of the ozone standards, EPA believes it is important to consider whether there are contributing emissions from a broad geographic area. Accordingly, EPA chose to examine the 5 factors with respect to the larger of the Combined Statistical Area (CSA) or Core Based Statistical Area (CBSA) associated with the violating monitor(s).[2] All data and information used by EPA in this evaluation are the latest available to EPA and/or provided to EPA by states or tribes.

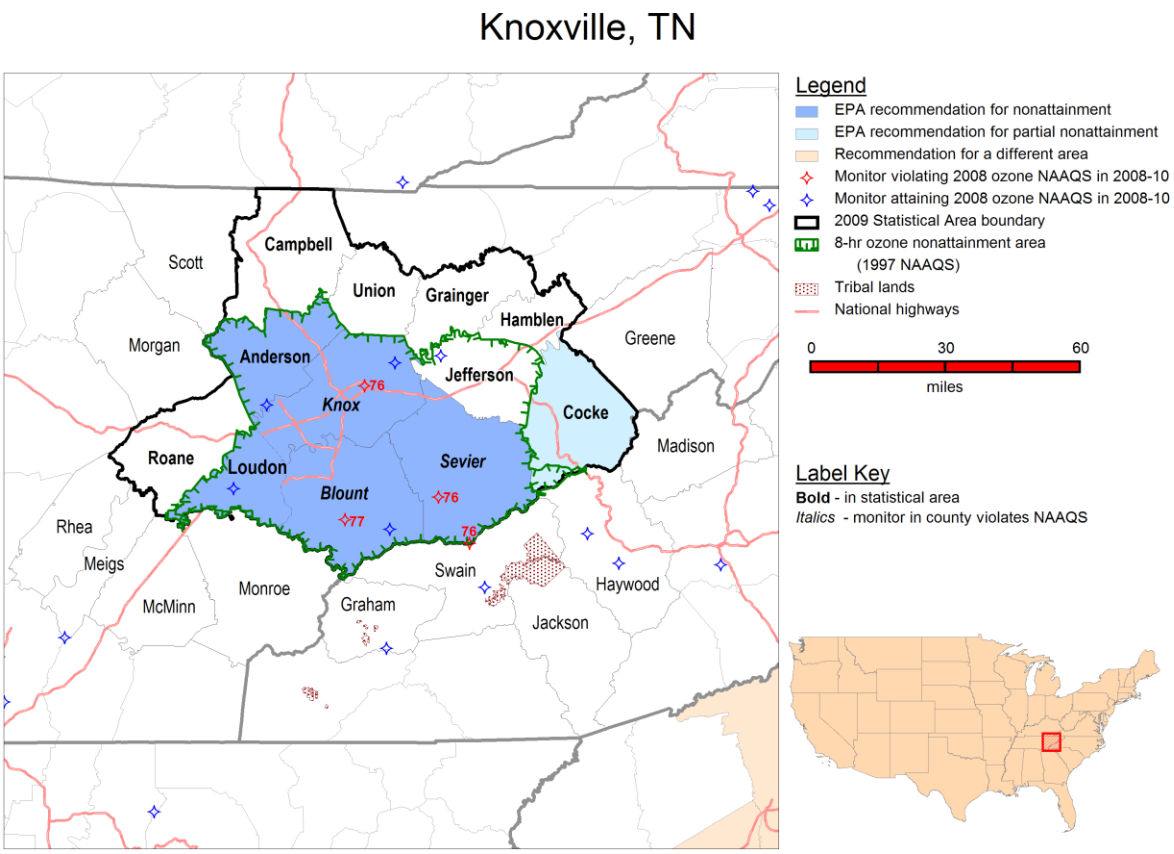
In EPA's designations guidance for the 2008 ozone NAAQS EPA recommended examining CSA/CBSAs because certain factors used to establish CSAs and CBSAs are similar to the factors EPA is using in this technical analysis to determine if a nearby area is contributing to a violation of the 2008 ozone NAAQS. Congress required a similar approach in 1990 for areas classified as serious or above for the 1-hour ozone standard, and EPA used the same basic approach in the designation process for the 1997 ozone NAAQS. Where a violating monitor is not located in a CSA or CBSA, EPA's guidance recommended using the boundary of the county containing the violating monitor as the starting point for considering the nonattainment area's boundary.

[2] Lists of CBSAs and CSAs and their geographic components are provided at www.census.gov/population/www/metroareas/metrodef.html. The lists are periodically updated by the Office of Management and Budget. EPA used the most recent update, based on 2008 population estimates, issued on December 1, 2009 (OMB Bulletin No. 10-02).

Technical Analysis for Knoxville-Sevierville-La Follette

Figure 1 is a map of the Knoxville-Sevierville-La Follette intended nonattainment area. The map also shows locations and design values of air quality monitors, county and other jurisdictional boundaries, the nonattainment area boundary for 1997 ozone NAAQS, and major transportation arteries.

Figure 1. Knoxville-Sevierville-La Follette CSA



For purposes of the 1997 8-hour ozone NAAQS, this area was designated nonattainment. The boundary for the nonattainment area for the 1997 ozone NAAQS included the entire counties of Anderson, Blount, Jefferson, Knox, Loudon, and Sevier in Tennessee, and a portion of Cocke County, Tennessee.

In March 2009, Tennessee recommended that Anderson, Blount, Knox, Loudon, and Sevier Counties in their entireties, and a portion of Cocke County be designated as the "Knoxville" nonattainment area for the 2008 8-hour ozone standard based on air quality data from 2006-2008. In March 2009, Tennessee also recommended that Jefferson County be designated as the "Morristown" nonattainment area, separate from a Knoxville nonattainment area, for the 2008 8-hour ozone standard based on air quality data from 2006-2008. Letter from James H. Fyke, Commissioner, State of Tennessee Department of Environment and Conservation to A. Stanley Meiburg, Acting Regional Administrator, US EPA Region 4 (March 10, 2009) (on file with US EPA Region 4). In November 2011, Tennessee provided an update to their 2009 original recommendation based on preliminary air quality data from 2009-2011. In its updated recommendation, Tennessee recommended that the portions of Blount, Cocke and Sevier Counties that comprise the Tennessee portion of the Great Smoky Mountains National Park be

designated "nonattainment" for the 2008 ozone NAAQS. Letter from Robert J. Martineau Jr, Commissioner, State of Tennessee Department of Environment and Conservation to Gwen Keyes Fleming, Regional Administrator, US EPA Region 4 (Nov. 8, 2011) (on file with US EPA Region 4). The March 2009 and November 2011 recommendations were based on data from FEM monitors sited and operated in accordance with 40 CFR Part 58.

After considering these recommendations and based on EPA's technical analysis described below, EPA intends to designate five entire counties and one partial county in Tennessee (identified in Table 1 below) as "nonattainment" for the 2008 ozone NAAQS as part of the Knoxville-Sevierville-La Follette nonattainment area.

Table 1. State's Recommended and EPA's Intended Designated Nonattainment Counties for Knoxville-Sevierville-La Follette.

Knoxville-Sevierville-La Follette	State-Recommended Nonattainment Counties	EPA Intended Nonattainment Counties
Tennessee	Blount (partial) Cocke (partial) Sevier (partial)	Anderson Blount Cocke (partial) Knox Loudon Sevier

Factor Assessment

Factor 1: Air Quality Data

For this factor, we considered 8-hour ozone design values (in parts per billion (ppb)) for air quality monitors in counties in the Knoxville-Sevierville-La Follette area based on data for the 2008-2010 period (i.e., the 2010 design value, or DV), which are the most recent years with fully-certified air quality data. A monitor's DV is the metric or statistic that indicates whether that monitor attains a specified air quality standard. The 2008 ozone NAAQS are met at a monitor when the annual fourth-highest daily maximum 8-hour average concentration, averaged over 3 years is 75 ppb or less. A DV is only valid if minimum data completeness criteria are met. See 40 CFR part 50 Appendix P. Where several monitors are located in a county (or a designated nonattainment area or maintenance area), the DV for the county or area is determined by the monitor with the highest level.

The 2010 DVs for the ozone NAAQS for counties in the Knoxville-Sevierville-La Follette and nearby surrounding area are shown in Table 2.

Table 2. Air Quality Data.

County*	State Recommended Nonattainment?	2008-2010 Design Value (ppb)
Anderson, TN	No	70
Blount, TN	**Yes (Partial)**	**77**
Cocke, TN	**Yes (Partial)**	**N/A**
Jefferson, TN	No	74
Knox, TN	**No**	**76**
Loudon, TN	No	73

Sevier, TN	**Yes (Partial)**	**76**

*Counties with violating monitors are shown in bold.

Blount, Knox and Sevier Counties show violations of the 2008 ozone NAAQS, therefore these counties are included in the nonattainment area. A county (or partial county) must also be designated nonattainment if it contributes to a violation in a nearby area. Each county without a violating monitor that is located near a county with a violating monitor has been evaluated, as discussed below, based on the five factors and other relevant information to determine whether it contributes to the nearby violation.

Factor 2: Emissions and Emissions-Related Data

EPA evaluated emissions of ozone precursors (NOx and VOC) and other emissions-related data that provide information on areas contributing to violating monitors.

Emissions Data

EPA evaluated county-level emission data for NOx and VOC derived from the 2008 National Emissions Inventory (NEI), version 1.5. This is the most recently available NEI. (See http://www.epa.gov/ttn/chief/net/2008inventory.html) Significant emissions levels in a nearby area indicate the potential for the area to contribute to observed violations. We will also consider any additional information we receive on changes to emissions levels that are not reflected in recent inventories. These changes include emissions reductions due to permanent and enforceable emissions controls that will be in place before final designations are issued and emissions increases due to new sources. The precursor emission source-category percentages used below and throughout the document were derived from emissions data from the 2008 NEI version 1.5 referenced above.

Table 3 shows emissions of NOx and VOC (given in tons per year (tpy)) for violating and nearby counties in the Knoxville-Sevierville-La Follette, TN CSA that we considered for inclusion in the Knoxville-Sevierville-La Follette area.

Table 3. Total 2008 NOx and VOC Emissions.

County*	State Recommended Nonattainment?	NOx (tpy)	VOC (tpy)
Anderson, TN	**No**	**12,475**	**3,569**
Blount, TN	**Yes (Partial)**	**3,593**	**6,749**
Campbell, TN	No	2,964	1,773
Cocke, TN	**Yes (Partial)**	**1,761**	**2,273**
Grainger, TN	No	687	1,216
Hamblen, TN	No	6,612	4,719
Jefferson, TN	No	3,148	3,329
Knox, TN	**No**	**15,169**	**16,182**
Loudon, TN	**No**	**3,751**	**3,340**
Roane, TN	No	10,711	3,006
Sevier, TN	**Yes (Partial)**	**2,602**	**5,399**
Union, TN	No	432	959
	Areawide:	63,905	52,514

*Counties that EPA intends to designate as nonattainment are shown in bold.

Knox County is leading all counties with 24 percent of NOx and 31 percent VOC of the CSA's emissions. Anderson County emitted 19 percent of the CSA's NOx emissions with 77 percent from point sources. It is worth noting that the Bull Run Facility Electric Generating Unit (EGU) in Anderson County generated 1,086 tons of NOx with Selective Catalytic Reduction (SCR) control during the 2008 ozone season. Blount County was the second highest VOC contributor at 6,749 tons, 13 percent of the CSA total. Sevier County had the third highest VOC levels with 5,400 tons, about 10 percent of the CSA total. In addition, 18 percent of all VOC emissions from mobile sources originated from Blount and Sevier Counties.

Population density and degree of urbanization

EPA evaluated the population and vehicle use characteristics and trends of the area as indicators of the probable location and magnitude of non-point source emissions. These include ozone-creating emissions from on-road and off-road vehicles and engines, consumer products, residential fuel combustion, and consumer services. Areas of dense population or commercial development are an indicator of area source and mobile source NOx and VOC emissions that may contribute to ozone formation. Rapid population or vehicle miles travelled (VMT) growth (see below) in a county on the urban perimeter signifies increasing integration with the core urban area, and indicates that it may be appropriate to include the area associated with the area source and mobile source emissions as part of the nonattainment area. Table 4 shows the population, population density, and population growth information for each county in the area.

Table 4. Population and Growth.

County*	State Recommended Nonattainment?	2010 Population	2010 Population Density (1000 pop/sq mi)	Absolute change in population (2000-2010)	Population % change (2000-2010)
Anderson	**No**	**75,129**	**0.22**	**3,897**	**+5%**
Blount	**Yes (Partial)**	**123,010**	**0.22**	**16,793**	**+16%**
Campbell	No	40,716	0.08	853	+2%
Cocke	**Yes (Partial)**	**35,662**	**0.08**	**2,035**	**+6%**
Grainger	**No**	22,657	0.07	1,920	+9%
Hamblen	No	62,544	0.36	4,301	+7%
Jefferson	No	51,407	0.16	6,825	+15%
Knox	**No**	**432,226**	**0.82**	**49,198**	**+13%**
Loudon	**No**	**48,556**	**0.20**	**9,342**	**+24%**
Roane	No	54,181	0.14	2,238	+4%
Sevier	**Yes (Partial)**	**89,889**	**0.15**	**18,190**	**+25%**
Union	No	19,109	0.08	1,250	+7%
	Areawide:	1,055,086	0.23	116,842	12%

*Counties that EPA intends to designate as nonattainment are shown in bold.

Sources: U.S. Census Bureau population estimates for 2010 as of August 4, 2011 (http://factfinder2.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=DEC_10_PL_GCTPL2.STO5&prodType=table)

In terms of population growth, Sevier, Loudon and Blount Counties experienced the largest with 25 percent, 24 percent and 16 percent, respectively. Sevier County has the second highest absolute change in population with 18,190. Most of the urban area is in the center (Sevierville) with sparsely populated communities on the northwest side of the county adjacent to Knoxville. Loudon is mostly rural with

sparsely populated areas along the US Highway 11 corridor. Blount County's population grew 16 percent and is home to 11 percent of the CSA's population making it second to Knox County. Blount County's urban and agriculture development is in the northwestern half of the County. Knox County has highest population density, the largest absolute change in population, and, the largest population in the 12-county CSA. Anderson County has intermittent urbanization in Oak Ridge and Clifton on the southwestern part of the county, adjacent to Knoxville. Jefferson County is mostly rural with the center of the urban density in Jefferson City, and in closer proximity (compared to Knoxville) to the more urbanized area of Morristown in Hamblen County.

Traffic VMT data and commuting patterns

EPA evaluated the total VMT for each county. In combination with the population/population density data and the location of main transportation arteries (see above), this information helps identify the probable location of non-point source emissions. A county with high VMT is generally an integral part of an urban area and indicates the presence of motor vehicle emissions that may contribute to ozone formation that contributes to nonattainment in the area. Rapid population or VMT growth in a county on the urban perimeter signifies increasing integration with the core urban area, and indicates that the associated area source and mobile source emissions may be appropriate to include in the nonattainment area. Table 5 shows the total 2008 VMT for each county.

Table 5. Traffic and VMT Data.

County*	State Recommended Nonattainment?	2008 VMT** (million miles)
Anderson	**No**	**831**
Blount	**Yes (Partial)**	**1,105**
Campbell	No	656
Cocke	**Yes (Partial)**	**455**
Grainger	**No**	232
Hamblen	No	656
Jefferson	No	819
Knox	**No**	**5,304**
Loudon	**No**	**782**
Roane	No	743
Sevier	**Yes (Partial)**	**1,164**
Union	No	134
	Areawide:	12,881

*Counties that EPA intends to designate as nonattainment are shown in bold.
**MOBILE model VMTs are those inputs into the NEI version 1.5.

Knox County leads the CSA with the highest VMT followed by Sevier and Blount counties.

Factor 3: Meteorology (weather/transport patterns)

For this factor, EPA analyzed 30-years of National Weather Service (NWS) wind speed and wind direction data collected at the Knoxville/McGhee Tyson Airport (Station #13891) to help determine transport patterns and source contributions. EPA assessed wind direction and speed for the 2008-2010 "ozone season" (March through October) in the Knoxville-Sevierville-La Follette, TN CSA. The analysis was conducted to better understand the fate and transport of precursor emissions contributing to

ozone formation. EPA's analysis of the NWS data indicate predominate southwest, west-southwest and northern component for the Knoxville-Sevierville-La Follette, TN CSA

Factor 4: Geography/topography (mountain ranges or other air basin boundaries)

The geography/topography analysis evaluates the physical features of the land that might affect the air shed and, therefore, the distribution of ozone over the area.

Regional topography consists of linear ridge and parallel lowland valleys. The Area has predominantly high elevations in the northern regions and lower elevations further south ranging from 700 to 1,500 feet. The Knoxville-Sevierville-La Follette, TN area includes the Tennessee portion of the Great Smoky Mountains National Park (GSMNP). This area consists of densely forested high peaks and valleys. The highest point in the state is at Clingman's Dome with an elevation of 6,643 feet. There are three violating monitors in the Knoxville area that are at the higher elevations and within the GSMNP. These monitors are Look Rock (AQS ID: 47-009-0101, 2008-2010 DV of 77 ppb) in Blount County, Cove Mountain (AQS ID: 47-155-0101, 2008-2010 DV of 76 ppb) in Sevier County, and Clingman's Dome (AQS ID: 47-155-0102, 2008-2010 DV of 76 ppb), also in Sevier County.

Figure 2 shows a topographical map of Knoxville and the National Park. These two monitors are located at a significantly higher elevation than the Knox County monitors. High elevation ozone sites often measure elevated ozone levels overnight due to regional transport of tropospheric ozone formed during the daytime. The regional transport mechanisms that cause these events are related to downward transport by vertical mixing that concentrates the tropospheric ozone or by horizontal transport from surrounding areas (Eliasson et al, 2003). The long duration of these nocturnal events can also be attributed to a lack of local Nitric Oxide (NO) emissions which act to titrate the ozone and reduce the ambient ozone concentration as occurs in urban areas overnight (Eliasson et al, 2003) [3].

Figure 3 compares the hourly distribution of daily maximum hourly ozone values over 65 ppb for four sites: Look Rock, two urban Knox County Sites, and Blue Ridge Parkway, another high elevation site in North Carolina in the GSMNP that is further removed from urban areas. The Knoxville sites show a typical urban pattern of ozone events in the afternoon (approximately 12:00 pm to 6:00 pm). The Blue Ridge Parkway site is impacted primarily by regional transport and shows a typical high elevation site pattern of ozone events overnight (approximately 9:00 pm to 3:00 am). This site is not in the Knoxville Sevierville-La Follette CBSA and is only included as an example of another high elevation site. The Look Rock site shows a combination of these two signals, indicating that the site is impacted by both downwind afternoon ozone formation from Knoxville and high elevation ozone transport. In some cases, these two processes could be affecting the Look Rock monitor simultaneously.

Figure 4 shows the frequency of ozone hourly values greater than 75 ppb by wind direction and time of day for the Look Rock site. This figure illustrates two distinct groups of high ozone events: afternoon ozone from the south to southeast (Knoxville) and overnight ozone from the north to northwest (regional transport). The Cove Mountain site in Sevier County shows a similar pattern as the Look Rock, although with a slightly less pronounced urban signal.

[3] Ingegärd Eliasson, Sofia Thorsson, Yvonne Andersson-Sköld, Summer nocturnal ozone maxima in Göteborg, Sweden, Atmospheric Environment, Volume 37, Issue 19, June 2003, Pages 2615-2627.

As a result of these analyses, EPA has preliminarily concluded that both downwind urban ozone formation from Knoxville Knox County and high elevation regional transport of ozone contribute to the NAAQS violations at the Look Rock and Cove Mountain monitors.

Figure 2. Topographical map of Knoxville and the Great Smoky Mountains National Park

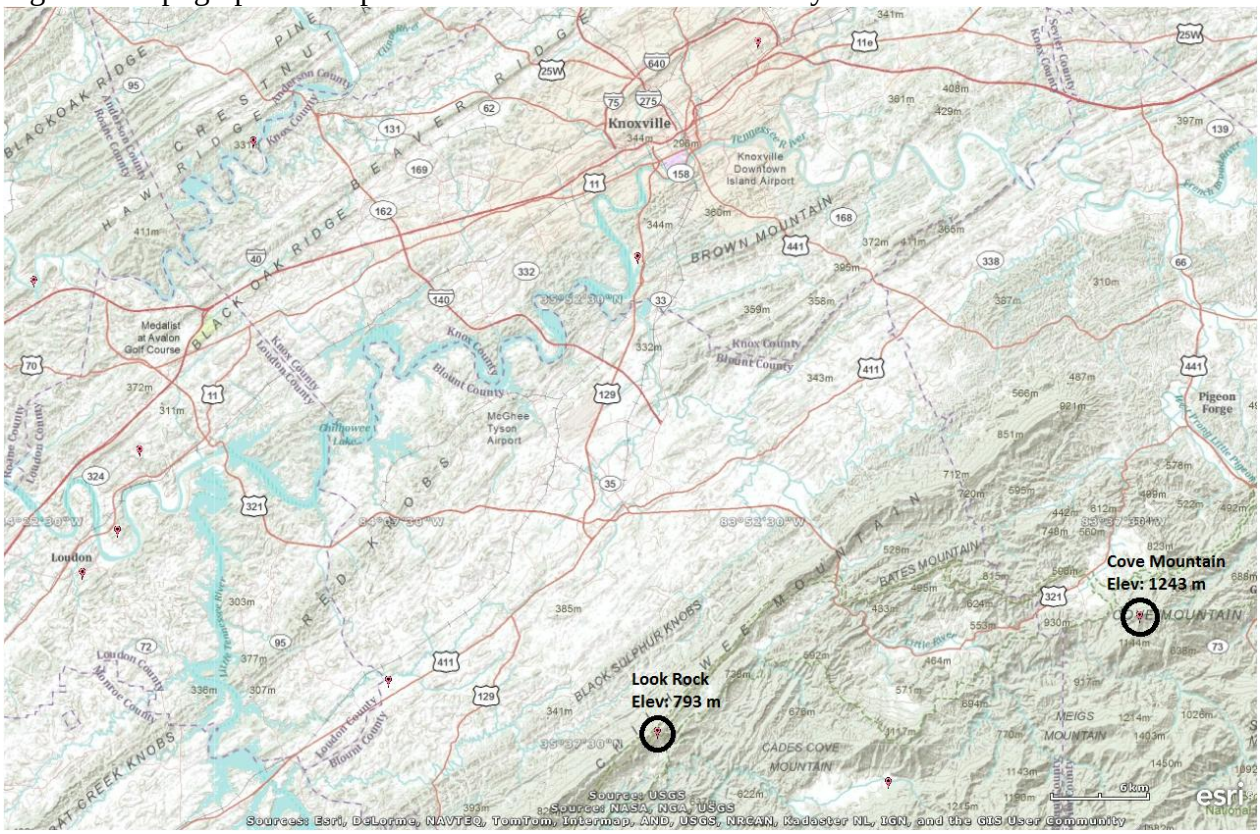


Figure 3. 2007-2010 Count of Daily Max Values > 65 ppb

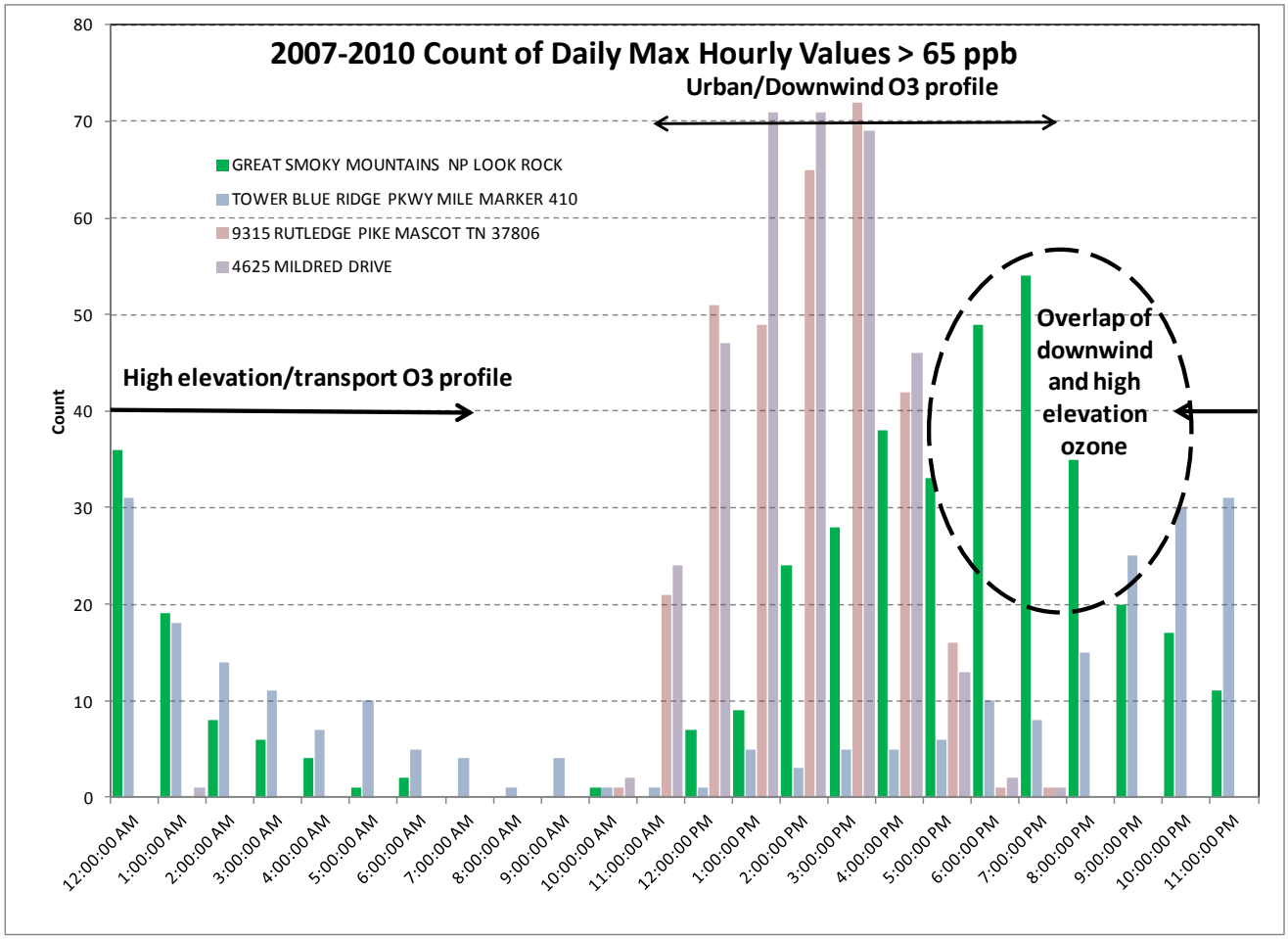
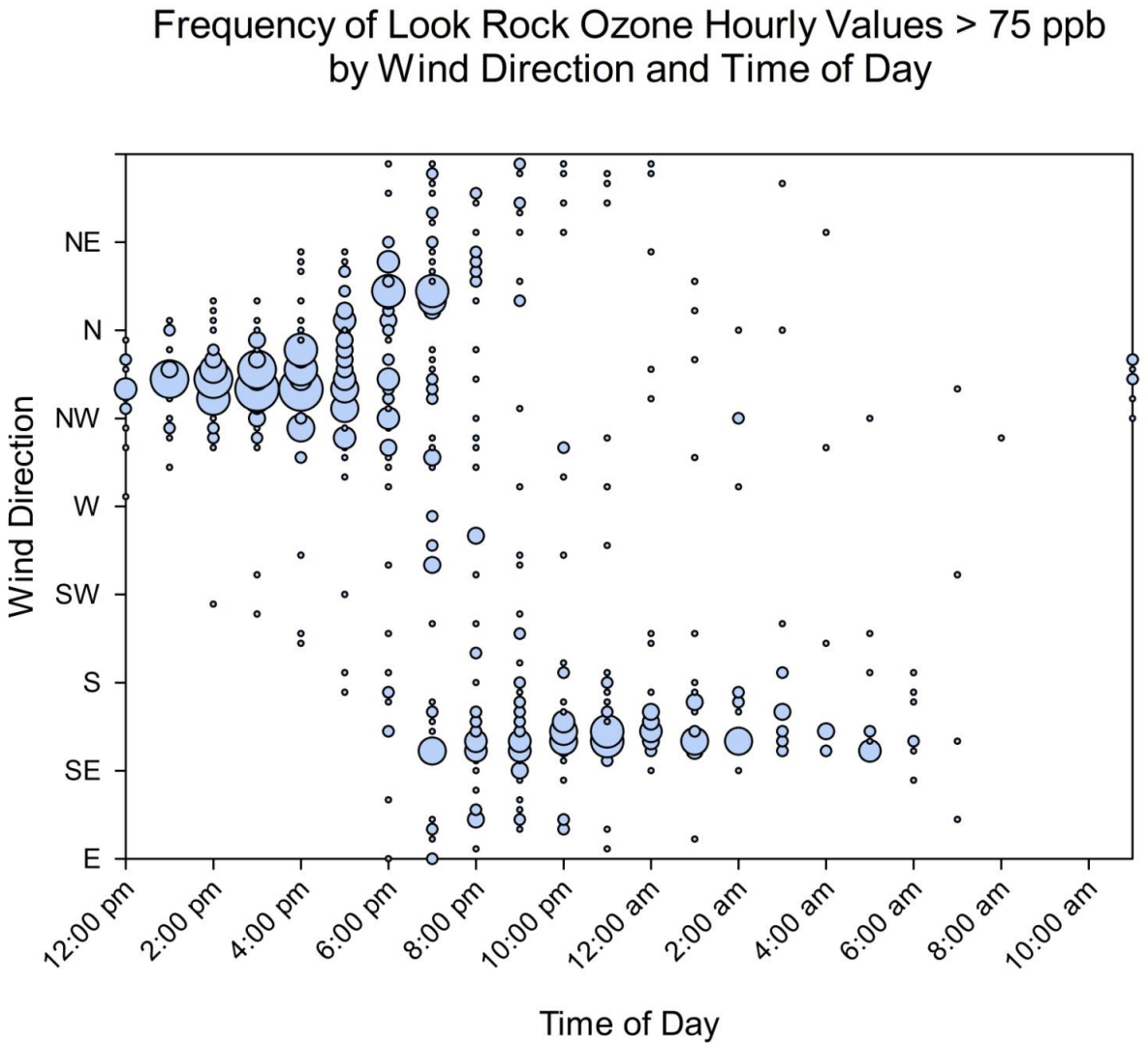


Figure 4. Frequency of Look Rock Ozone Hourly Values >75 ppb



Factor 5: Jurisdictional boundaries

Once we identified the general areas we anticipate recommending as nonattainment areas, we then considered existing jurisdictional boundaries for the purposes of providing a clearly defined legal boundary and to help identify the areas appropriate for carrying out the air quality planning and enforcement functions for nonattainment areas. Examples of jurisdictional boundaries include existing/prior nonattainment area boundaries for ozone or other urban-scale pollutants, county lines, air district boundaries, township boundaries, area covered by a MPOs, state lines, areas of Indian Country, and urban growth boundary. Where existing jurisdictional boundaries were not adequate or appropriate to describe the nonattainment area, other clearly defined and permanent landmarks or geographic coordinates were considered.

The Knoxville-Sevierville-La Follette area has previously established nonattainment boundaries associated with the both the 1-hour ozone and 1997 8-hour ozone NAAQS. The Knoxville-Sevierville-La Follette nonattainment boundary for the 1-hour ozone NAAQS included Knox County, Tennessee in its entirety. Whereas the Knoxville-Sevierville-La Follette nonattainment boundary for the 1997 8-hour

ozone NAAQS included Anderson, Blount, Jefferson, Knox, Loudon, and Sevier Counties in Tennessee in their entireties, and a portion of Cocke County, Tennessee.

The Knoxville-Sevierville-La Follette CSA is composed of two MPOs, the Knoxville Regional Transportation Planning Organization (TPO) and Lakeway Area Metropolitan Transportation Planning Organization (MTPO). The Knoxville TPO includes Loudon, Blount, Knox and Sevier Counties. The Lakeway MTPO includes Jefferson and Hamblen Counties.

Jefferson County had a violating monitor based on air quality data used for the 2004 designation for the 1997 ozone NAAQS. It was included within the nonattainment area boundary based on the violation, not based on a determination that emissions from the county were contributing to a violation in a nearby area violating the standard. Current monitor reading shows Jefferson as attaining. In addition, a portion of Jefferson County (Jefferson City) falls under the Lakeway MTPO.

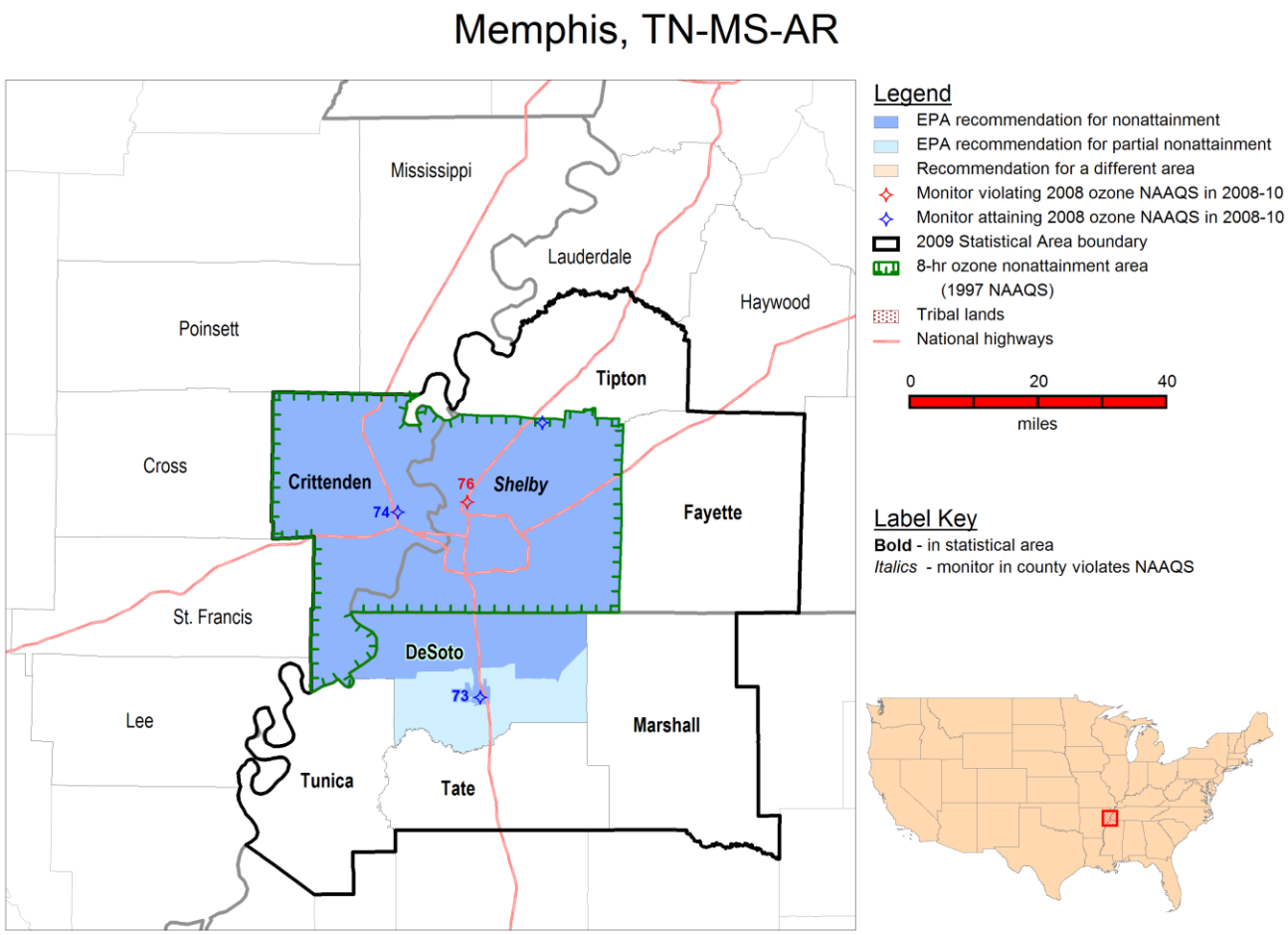
Conclusion

Based on the assessment of factors described above, EPA has preliminarily concluded that the following counties should be included as part of the Knoxville-Sevierville-La Follette nonattainment area because they are either violating the 2008 ozone NAAQS or contributing to a violation in a nearby area: Anderson, Blount, Knox, Loudon and Sevier Counties, in their entireties. A portion of Cocke County is brought in since it comprises the GSMNP. All of these counties are included in the Knoxville nonattainment area for the 1997 ozone NAAQS. The air quality monitors in Blount, Knox and Sevier Counties indicate violations of the 2008 ozone NAAQS based on 2010 DVs, therefore these counties are preliminarily included in the nonattainment area. Anderson and Loudon Counties, in their entireties, and a portion of Cocke County in Tennessee are nearby counties that do not have a violating monitor, but EPA has preliminarily concluded that these counties contribute to the ozone concentrations in violation of the 2008 ozone NAAQS through emissions from point sources and non-point sources (e.g., vehicles and other small area sources). Knox County, Tennessee has among the highest NOx and VOC emissions in the area. Anderson County ranked relatively high for large NOx emissions, contributing 19 percent of the CSA's total NOx. Given the prevalent wind (southwest, west-southwest and northern), Anderson County, which is adjacent to Knox County, is contributing to the violating monitor to Knox County and therefore is being brought in for contribution. While SCR controls were installed at the plant, there has been a steady increase in NOx emission levels since 2006.

Technical Analysis for Memphis, TN-MS-AR

Figure 1 is a map of the Memphis, TN-MS-AR intended nonattainment area. The map provides other relevant information including the locations and design values of air quality monitors, county and other jurisdictional boundaries, relevant statistical area boundaries, the nonattainment area boundary for 1997 ozone NAAQS, and major transportation arteries.

Figure 1. TN-MS-AR Nonattainment Area



For purposes of the 1997 8-hour ozone NAAQS, portions of this area were designated nonattainment. The boundary for the nonattainment area for the 1997 ozone NAAQS included the entire counties of Crittenden County, Arkansas, and Shelby County, Tennessee.

In March 2009, Tennessee recommended that Shelby County be designated "nonattainment" for the 2008 8-hour ozone standard based on air quality data from 2006-2008. Letter from James H. Fyke, Commissioner, State of Tennessee Department of Environment and Conservation to A. Stanley Meiburg, Acting Regional Administrator, US EPA Region 4 (March 10, 2009) (on file with US EPA Region 4). Tennessee provided an update to its original recommendation in November 2011 based on preliminary 2009-2011 air quality data. In Tennessee's updated recommendation, the state did not provide a specific update to its 2009 recommendation for the Memphis TN-MS-AR but stated that all

other counties (with the exception of those recommended for Knoxville) should be designated unclassifiable/attainment. Letter from Robert J. Martineau Jr, Commissioner, State of Tennessee Department of Environment and Conservation to Gwendolyn Keyes Fleming, Regional Administrator, US EPA Region 4 (November 8, 2011) (on file with US EPA Region 4).

Also, in March 2009, Mississippi recommended that DeSoto County, Mississippi be designated as a nonattainment area separate from the Memphis nonattainment area for the 2008 ozone NAAQS based on air quality data from 2006-2008. Mississippi provided an update to the original recommendation in October 2011 based on air quality data from 2008-2010, and preliminary data from 2009-2011. In its updated recommendation, Mississippi recommended that all counties in the State be designated attainment for the 2008 ozone NAAQS. Letter from Haley Barbour, Governor of the State of Mississippi to A. Stanley Meiburg, Acting Regional Administrator, US EPA Region 4 (March 3, 2009) and Gwendolyn Keyes Fleming, Regional Administrator US EPA Region 4 (October 27, 2011) (on file with US EPA Region 4). Additionally, in March 2009, Arkansas recommended that Crittenden County, Arkansas be designated nonattainment based on 2006-2008 air quality data. Arkansas did not update its 2009 ozone recommendation. These data are from FEM monitors sited and operated in accordance with 40 CFR Part 58. Letter from Mike Beebe, Governor of the State of Arkansas to Lawrence E. Starfield, Acting Regional Administrator, US EPA Region 6 (March 10, 2009) (on file with US EPA Region 6).

After considering these recommendations and based on EPA's technical analysis described below, EPA intends to designate one county in Arkansas, one county (partial) in Mississippi, and one county in Tennessee (identified in Table 1 below) as nonattainment for the 2008 ozone NAAQS as part of the Memphis, TN-MS-AR multi-state nonattainment area.

Table 1. State's Recommended and EPA's Intended Designated Nonattainment Counties for Memphis, TN-MS-AR.

Memphis, TN-MS-AR	State-Recommended Nonattainment Counties	EPA Intended Nonattainment Counties
Arkansas	Crittenden	Crittenden
Mississippi	None	DeSoto (partial)
Tennessee	None	Shelby

Factor Assessment

Factor 1: Air Quality Data

For this factor, we considered 8-hour ozone design values (in parts per billion (ppb)) for air quality monitors in counties in the Memphis, TN-MS-AR area based on data for the 2008-2010 period (i.e., the 2010 design value, or DV), which are the most recent years with fully-certified air quality data. A monitor's DV is the metric or statistic that indicates whether that monitor attains a specified air quality standard. The 2008 ozone NAAQS are met at a monitor when the annual fourth-highest daily maximum 8-hour average concentration, averaged over 3 years is 75 ppb or less. A DV is only valid if minimum data completeness criteria are met. See 40 CFR part 50 Appendix P. Where several monitors are located in a county (or a designated nonattainment area or maintenance area), the DV for the county or area is determined by the monitor with the highest level.

The 2010 DVs for the ozone NAAQS for counties in the Memphis and nearby surrounding area are shown in Table 2.

Table 2. Air Quality Data[4].

County	State Recommended Nonattainment?	2008-2010 Design Value (ppb)
Crittenden, AR	Yes	74
DeSoto, MS	No	73
Shelby, TN	**No**	**76**

Shelby County, Tennessee shows a violation of the 2008 ozone NAAQS, therefore this county is included in the nonattainment area. A county (or partial county) must also be designated nonattainment if it contributes to a violation in a nearby area. Each county without a violating monitor that is located near a county with a violating monitor has been evaluated, as discussed below, based on the five factors and other relevant information to determine whether it contributes to the nearby violation.

Factor 2: Emissions and Emissions-Related Data

EPA evaluated emissions of ozone precursors (NOx and VOC) and other emissions-related data that provide information on areas contributing to violating monitors.

Emissions Data

EPA evaluated county-level emission data for NOx and VOC derived from the 2008 National Emissions Inventory (NEI), version 1.5. This is the most recently available NEI. (See http://www.epa.gov/ttn/chief/net/2008inventory.html) Significant emissions levels in a nearby area indicate the potential for the area to contribute to observed violations. We will also consider any additional information we receive on changes to emissions levels that are not reflected in recent inventories. These changes include emissions reductions due to permanent and enforceable emissions controls that will be in place before final designations are issued and emissions increases due to new sources. The precursor emission source-category percentages used below and throughout the document were derived from emissions data from the 2008 NEI version 1.5 referenced above.

Table 3 shows emissions of NOx and VOC (given in tons per year (tpy)) for violating and nearby counties that we considered for inclusion in the Memphis, TN-MS-AR area.

[4] Only counties in the Memphis CBSA that have ozone monitors are included in this table.

Table 3. Total 2008 NOx and VOC Emissions.

County	State Recommended Nonattainment	NO_x (tpy)	VOC (tpy)
Crittenden, AR	**Yes**	**4,047**	**3,805**
DeSoto, MS	**No**	**5,080**	**5,222**
Fayette, TN	No	2,385	1,406
Marshall, MS	No	1,769	1,527
Shelby, TN	**No**	**39,519**	**27,929**
Tate, MS	No	3,102	1,392
Tipton, TN	No	2,119	2,251
Tunica, MS	No	1,598	1,096
	Areawide:	59,619	44,628

*Counties that EPA intends to designate as nonattainment are shown in bold.

Shelby County contributes about 66 percent of the NOx and 63 percent of the VOC precursor emissions in the CBSA. Shelby makes up 23 percent of the entire CBSA NOx emissions and 22 percent of the area's VOC emissions. Of the county's 39,519 NOx emissions, 35 percent are from point and mobile emissions and 20 percent from area source emissions. The County's 27, 929 VOC emissions include 36 percent mobile sources and 32 percent area sources.

DeSoto County contributes about 9 percent NOx and 12 percent VOC precursor emissions in the CBSA. The County's 5,080 NOx emissions are mostly comprised of 45 percent area sources, 35 percent mobile sources. DeSoto County's total VOC emissions include 44 percent area sources and 34 percent mobile sources.

Crittenden County contributes less than 10 percent of the precursor CBSA emissions. Of the County's total NOx emissions listed in Table 1, 45 percent are from mobile sources and 34 percent from area sources. The County's total VOC emissions include 35 percent from area sources and 31 percent from mobile sources. Only 5 percent of the County's NOx emissions are from point sources. Both Crittenden and DeSoto Counties represent less than 1 percent of the entire area's NOx and VOC point source emissions

Fayette and Tipton Counties in Tennessee and Marshall, Tate, and Tunica counties in Mississippi all contribute 5 percent or less NOx and VOC precursor emissions in the CBSA.

Together, Crittenden, DeSoto and Shelby Counties account for 82 percent of the NOx emissions and 83 percent of the VOC emissions for the 8-county area. The emissions from Fayette and Tipton Counties in Tennessee and Marshall, Tate and Tunica Counties in Mississippi are not thought to contribute to the violations of the 2008 ozone NAAQS that have been observed by monitors in Shelby County, Tennessee and Crittenden County, Arkansas.

Population density and degree of urbanization

EPA evaluated the population and vehicle use characteristics and trends of the area as indicators of the probable location and magnitude of non-point source emissions. These include ozone-creating emissions from on-road and off-road vehicles and engines, consumer products, residential fuel combustion, and consumer services. Areas of dense population or commercial development are an indicator of area source and mobile source NOx and VOC emissions that may contribute to ozone formation. Rapid population or VMT growth (see below) in a county on the urban perimeter signifies increasing integration with the core urban area, and indicates that it may be appropriate to include the area associated with the area source and mobile source emissions as part of the nonattainment area. Table 4 shows the population, population density, and population growth information for each county in the area.

Table 4. Population and Growth.

County	State Recommended Nonattainment?	2010 Population	2010 Population Density (1000 pop/sq mi)	Absolute change in population (2000-2010)	Population % change (2000-2010)
Crittenden, AR	**Yes**	**50,902**	**0.08**	**(75)**	**<1%**
DeSoto, MS	**No**	**161,252**	**0.32**	**52,584**	**+48%**
Fayette, TN	No	38,413	0.05	9,313	+32%
Marshall, MS	No	37,144	0.05	2,093	+6%
Shelby, TN	**No**	**927,644**	**1.18**	**29,393**	**+3%**
Tate, MS	No	28,886	0.07	3,444	+14%
Tipton, TN	No	61,081	0.13	9,545	+19%
Tunica, MS	No	10,778	0.02	1,557	+17%
	Areawide:	1,316,100	0.28	107,854	+9%

*Counties that EPA intends to designate as nonattainment are shown in bold.
Sources: U.S. Census Bureau population estimates for 2010 as of August 4, 2011 (http://factfinder2.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=DEC_10_PL_GCTPL2.STO5&prodType=table)

Shelby County, Tennessee is densely populated containing 70 percent of the CBSA population. From 2000-2010, the County only had 3 percent growth in population. Fayette and Tipton County in Tennessee had moderate growth from 2000-2010 but are sparsely populated.

DeSoto County, Mississippi is moderately populated in the northern portion of the county and mostly rural in the remaining portion of the County. DeSoto County contains 12 percent of the CBSA population, but experienced 48 percent growth from 2000-2010. Tate, Tunica and Marshall Counties in Mississippi all make up 3 percent or less of the CBSA population and are sparsely populated.

Crittenden County, Arkansas had less than 1 percent population growth from 2000-2010 and contains only 4 percent of the CBSA population. The County is mostly rural with little urbanization.

The attachment to this document contains Figure 2, Memphis Area Ozone and Ozone Precursor Monitoring Network, and Figure 3, Population Density Change Percentage Between 2000 and 2010

Census for Memphis Ozone and Ozone Precursor Monitoring Network, which present graphical information on population density and growth for the Memphis area.

Traffic VMT data and commuting patterns

EPA evaluated the total VMT for each county in the Memphis CBSA. In combination with the population/population density data and the location of main transportation arteries (see above), this information helps identify the probable location of non-point source emissions. A county with high VMT is generally an integral part of an urban area and indicates the presence of motor vehicle emissions that may contribute to ozone formation that contributes to nonattainment in the area. Rapid population or VMT growth in a county on the urban perimeter signifies increasing integration with the core urban area, and indicates that the associated area source and mobile source emissions may be appropriate to include in the nonattainment area. Table 5 shows total 2008 VMT for each county.

Table 5. Traffic and VMT Data.

County	State Recommended Nonattainment?	2008 VMT** (million miles)
Crittenden, AR	**Yes**	**903**
DeSoto, MS	**No**	**1,629**
Fayette, TN	No	573
Marshall, MS	No	725
Shelby, TN	**No**	**8,789**
Tate, MS	No	376
Tipton, TN	No	401
Tunica, MS	No	337
Areawide:		13,733

*Counties that EPA intends to designate as nonattainment are shown in bold.
**MOBILE model VMTs are those inputs into the NEI version 1.5.

Shelby County is the only county in the Memphis CBSA violating the 2008 ozone NAAQS with 2008-2010 air quality data and is considered the core CBSA county, with 64 percent of the VMT in the Memphis CBSA; Approximately 35 percent of Shelby County's NOx emissions and 34 percent VOC emissions are from mobile sources.

DeSoto County has the second highest VMT in the Memphis CBSA (12% of the total Memphis CBSA). Additionally, DeSoto County has a 48 percent growth in population from 2000-2010 with approximately 35 and 34 percent of the County's NOx and VOC emissions (respectively) deriving from mobile sources.

Crittenden County, has less than 10 percent of the CBSA VMT (third highest in the Memphis CBSA). From 2000-2010, Crittenden County had less than 1 percent population growth with 45 percent and 31 percent of the County's NOx and VOC emissions(respectively) deriving from mobile sources.

The remaining counties in the Memphis CBSA all have low total population and population growth with little urbanization and low precursor emission contribution suggesting negligible contribution of population-based emissions.

Factor 3: Meteorology (weather/transport patterns)

For this factor, EPA analyzed 30-years of National Weather Service (NWS) wind speed and wind direction data collected at the Memphis International Airport (NWS Station 13893) to help determine transport patterns and source contributions. EPA assessed wind direction and speed for the 2008-2010 "ozone season" (March through October) in the Memphis CBSA as well as on days when area ozone monitors exceeded the 2008 ozone NAAQS. Additionally, EPA evaluated wind back trajectories (which are an analysis of meteorological patterns) specifically on days when the current ozone design value monitor in Shelby County (Frayser monitor) exceeded the 2008 NAAQS. These analyses were conducted to better understand the fate and transport of precursor emissions contributing to ozone formation.

EPA's analysis of the NWS data indicate predominate south and south-southwest component for the Memphis CBSA. However, an examination on days when monitors in DeSoto County (Hernando) exceeded the 2008 ozone NAAQS suggested a northerly component. Additionally, on days when monitors in Shelby County exceeded the 2008 NAAQS, the data indicated a southerly wind component.

Figure 2, Memphis Area Ozone and Ozone Precursor Monitoring Network, and Figure 4 present graphical information on 24-hour back trajectories for exceedances in 2008-2010 at the Frayser monitor, locations of major stationary sources, and locations of ambient monitors with their design values. An examination of the meteorological data indicates that, for the 2008-2010 days with ozone concentrations above 75 ppb at the Memphis 2008-2010 Design Value site (Frayser monitor), the wind back trajectories primarily go back through Shelby County, TN (on 10 out of 10 days) and DeSoto County, MS (on 7 out of 10 days), with back trajectories going back through Crittenden County, AR on only 1 out of 10 days. As mentioned in Factor 1, the Shelby County monitor is the only monitor in the Memphis CBSA with a 2008-2010 violation of the 2008 ozone NAAQS.

Since the 2008-2010 data is only for three years and has only 10 exceedance days, we evaluated more years to better understand the meteorological transport conditions that exist during ozone exceedances. Normally when we are developing a conceptual model understanding of what yields ozone exceedances in an area we will evaluate 5 to 10 years worth of meteorological data. Therefore we decided to evaluate all days that had ozone exceedances at the Design Value monitor (Frayser) for the 2006-2010 period. The 2006 and 2007 years had more meteorology that was conducive for ozone formation than the years of 2008, 2009, and 2010. Figure 5 in the attachment to this document includes 72-hour back trajectories for 2006-2010 ozone exceedances at the Frayser monitor using the National Oceanic and Atmospheric Administration Hybrid Single Particle Lagrangian Integrated Trajectory Model (NOAA HYSPLIT). To further understand the meteorological transport conditions within the regional area around Memphis, we also evaluated24-hour back trajectories for the 2006-2010 time-periods using the NOAA HYSPLIT model. The results of these back trajectories are included in the attachment to this document as Figure 6 with a further zoom in view in Figure 7.

Evaluation of Figures 6 and 7 further supports our previous conclusions based on the 2008-2010 back trajectories when the Memphis area Frayser monitor has ozone exceedances. The 2006-2010 data further supports that most of the centerlines of the back trajectories passes through Shelby County TN, and many of the back trajectory centerlines pass through DeSoto county in northern Mississippi with smaller percentage passing through Crittenden County, Arkansas.

EPA's meteorological assessment of the area monitors ozone exceedances and specifically the wind back trajectory analysis at the Frayser monitor indicate that Shelby County is likely an emission

contributor to exceedances of the 2008 NAAQS at the Frayser monitor. Furthermore, the assessment also suggests that DeSoto and Crittenden Counties should be considered for potential inclusion in the intended Memphis nonattainment area.

Factor 4: Geography/topography (mountain ranges or other air basin boundaries)

The geography/topography analysis evaluates the physical features of the land that might affect the airshed and, therefore, the distribution of ozone over the area.

The Memphis area does not have any geographical or topographical barriers limiting air pollution transport within its air shed. Therefore, this factor did not play a significant role in this evaluation.

Factor 5: Jurisdictional boundaries

Once we identified the general areas we anticipated we would recommend for nonattainment, we then considered existing jurisdictional boundaries for the purposes of providing a clearly defined legal boundary and to help identify the areas appropriate for carrying out the air quality planning and enforcement functions for nonattainment areas. Examples of jurisdictional boundaries include existing/prior nonattainment area boundaries for ozone or other urban-scale pollutants, county lines, air district boundaries, township boundaries, area covered by an MPO, state lines, Reservation boundaries, and urban growth boundaries. Where existing jurisdictional boundaries were not adequate or appropriate to describe the nonattainment area, other clearly defined and permanent landmarks or geographic coordinates were considered.

The Memphis Area MPO is comprised of two study areas; the Memphis Urban Area MPO and the West Memphis MPO. Both organizations are considered multi-jurisdictional agencies responsible for the implementation and coordination of urban transportation planning and establishing transportation conformity infrastructure within their respective boundaries. The Memphis Urban jurisdiction is comprised of all of Shelby County, Tennessee, the western four miles of Fayette County, Tennessee and the northern twelve miles of DeSoto County. The portion of the Memphis Urban MPO in DeSoto County captures the more urbanized portion of the county that has experience continuous growth as well as the ozone air quality monitor. The West Memphis jurisdiction is comprised of the current and potential future urbanized portion of Crittenden County (including the ozone air quality monitor) with the following legal description:

> That area west from the Mississippi River along the southern right of way line of County Road 18 (Miller Road and Caldwell Road) to the western right of way line of County Road 205 (Hinkley Road); then north along said right of way line and continuing north to the intersection of the southern right of way line of the St. Louis-Southwestern Railroad; then in a southwesterly direction along said right of way line to the intersection of eastern right of way line of State Highway 147; then north along said right of way to the intersection of the southern right of way line of State Highway 131; then west along said right of way line to the western right of way line of County Road 51(Eubank Road); then north along said right of way line to U.S. 70; then continuing north along the western right of way line of County Road 25 (Katie Goodhope) to the northern right of way line of County Road 12 (Buck Lake Road); then east along said northern right of way line to State Road 306; then continuing east along the northern right of way line of State Road 306 to the western right of way line of County Road 165; then north along said right of way line to the northern right of way line of County Road 168; then northeasterly along said

right of way line to the intersection of the northern right of way of County Road 172; then east along said right of way line to the intersection of the western right of way line of County Road 5; then north along said right of way line to the intersection of the northern right of way line of James Mill Road; then east along said northern right of way line to the Mississippi River being the eastern boundary of the study area.

Memphis, TN-MS-AR Area has previously established nonattainment boundaries associated with both the 1-hour ozone and 1997 8-hour ozone NAAQS. The Memphis nonattainment boundary for the 1-hour ozone NAAQS included Shelby County, Tennessee in its entirety. Whereas the Memphis nonattainment boundary for the 1997 8-hour ozone NAAQS included Crittenden County, Arkansas and Shelby County, Tennessee in their entireties. Tennessee has recommended a different boundary for the 2008 ozone NAAQS for their portion of this Area. Arkansas recommended the same as the previous boundary for their portion of this Area. In addition, there is current infrastructure for meeting the transportation conformity requirements in Shelby County and the urbanized portions of DeSoto County and Crittenden County since both the Memphis Urban area and West Memphis MPO are currently implementing these requirements for the 1997 8-hour ozone standard.

Even though, DeSoto and Crittenden Counties do not have violating monitors for the 2008 ozone NAAQS based on air quality data from 2008-2010, our analysis suggest that both are likely contributing to the violation in Shelby County due to potential population-based emissions from mobile sources (VMT) and area source, meteorology and population growth.

Conclusion

Based on the assessment of the factors described above, EPA has preliminarily concluded that the following counties should be included as part of the intended Memphis nonattainment area because they are either violating the 2008 ozone NAAQS or contributing to a violation in a nearby area: Crittenden County, Arkansas, and Shelby County, Tennessee in their entireties, and the portion of DeSoto County that is included in the Memphis MPO boundary. Two of these counties (i.e., Crittenden County, Arkansas and Shelby County, Tennessee) are included in the Memphis nonattainment area for the 1997 ozone NAAQS. One of the air quality monitors in Shelby County indicates violation of the 2008 ozone NAAQS based on 2010 DVs, therefore this county is preliminarily included in the nonattainment area. Crittenden County, Arkansas, and DeSoto County, Mississippi are nearby counties that do not have monitors indicating a violation of the standard based on 2010 DVs. However, EPA has preliminarily concluded that these counties (or portions thereof) contribute to the ozone concentrations in violation of the 2008 ozone NAAQS through population-based emissions from mobile and area sources (e.g., vehicles and other small area sources) and county VMT.

Source category emissions data indicate that mobile sources and area sources are the primary contributors to ozone formation in the Memphis CBSA. Thus, population-based emissions such as total population or population growth, and precursor emission transport would indicate a county with contribution in the Memphis Area.

Shelby County, Tennessee dominates the CBSA in terms of urbanization, precursor emission contribution and transport which indicate population-based emission (mobile and area sources) contribution to its own violating monitor. Although the County population growth was less than 5 percent from 2000-2010, it is densely populated with 70 percent of the CBSA population and five times DeSoto County's population. Shelby County makes up over 60 percent of the Area's NOx and VOC

emissions. The County's has over 30 percent of the County's NOx and VOC emission coming from mobile sources and point sources. Meteorological analysis also indicates that Shelby County is contributing to its own violation as well as other monitors in the Memphis CBSA.

The population in DeSoto County, Mississippi has grown steadily from 2000-2010 (particularly the northern portion) with a 48 percent increase, even though it only makes up 12 percent of the total population in the CBSA. The County also has the CBSA's second highest VMT. More than 30 percent of the County's NOx and VOC emissions are from mobile sources and over 40 percent from area sources. In addition, meteorology suggests that DeSoto County is likely contributing to the violation in Shelby County due to potential southerly transport of mobile and area emissions.

Crittenden County, Arkansas makes up less than 5 percent of the CBSA population with less than a 1 percent population growth from 2000-2010. Crittenden County is mostly rural with the least urbanization compared to Shelby and DeSoto Counties. The County contributes less than 10 percent of the CBSA NOx and VOC precursor emissions. However, Crittenden County has over 40 percent of its NOx emission deriving from area sources which is considered a primary contributor to the formation of ozone in the Memphis area. EPA is proposing to include all of Crittenden County in the 2008 ozone Memphis nonattainment area because the county was included in its entirety in the 1997 ozone Memphis nonattainment area and because Arkansas recommended inclusion of the county in its entirety.

The remaining Tennessee (Tipton, Fayette) and Mississippi (Marshal, Tate, and Tunica) counties all have low population and urbanization, and precursor emission contribution and transport suggesting negligible contribution to the violating county. With the exception of those counties that comprise the Memphis, TN-MS-AR 1997 8-hour ozone boundary and the portion of DeSoto County, Mississippi discussed in this TSD for inclusion, EPA preliminarily concludes that the remainder of the counties in the CBSA do not contribute to the violations at the monitors in the CBSA and therefore are not being considered as part of the nonattainment area.

ATTACHMENTS

Figure 2. Memphis Ozone and Ozone Precursor Monitoring Network, with Population Density.

Figure 3. Population Density Change Percentage Between 2000 and 2010 Census for Memphis Ozone and Ozone Precursor Monitoring Network.

Figure 4. Overlay of 24-hour HYSPLIT back trajectories of all 75 ppb exceedances at the Frayser monitor for the 2008-2010 period.

Figure 5. NOAA HYSPLIT MODEL 72-Hour Back Trajectory Frayser Exceedances (2006-10).

Figure 6. NOAA HYSPLIT MODEL 24-Hour Back Trajectory Frayser Exceedances (2006-10).

Figure 7. NOAA HYSPLIT MODEL 24-Hour Back Trajectory Frayser Exceedances (2006-10) - Zoom View.

Figure 2. Memphis Ozone and Ozone Precursor Monitoring Network, with Population Density

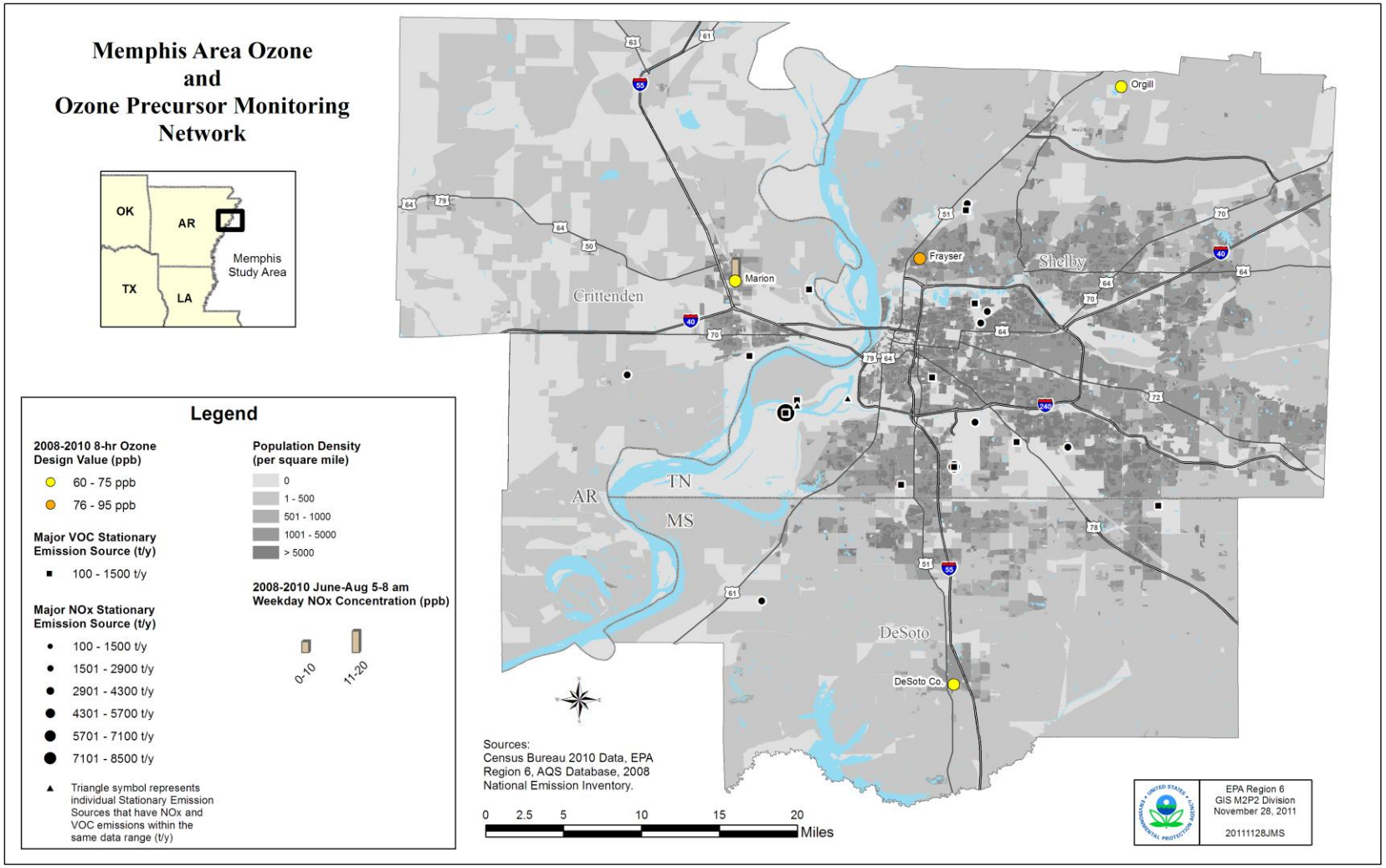


Figure 3. Population Density Change Percentage Between 2000 and 2010 Census for Memphis Ozone and Ozone Precursor Monitoring Network

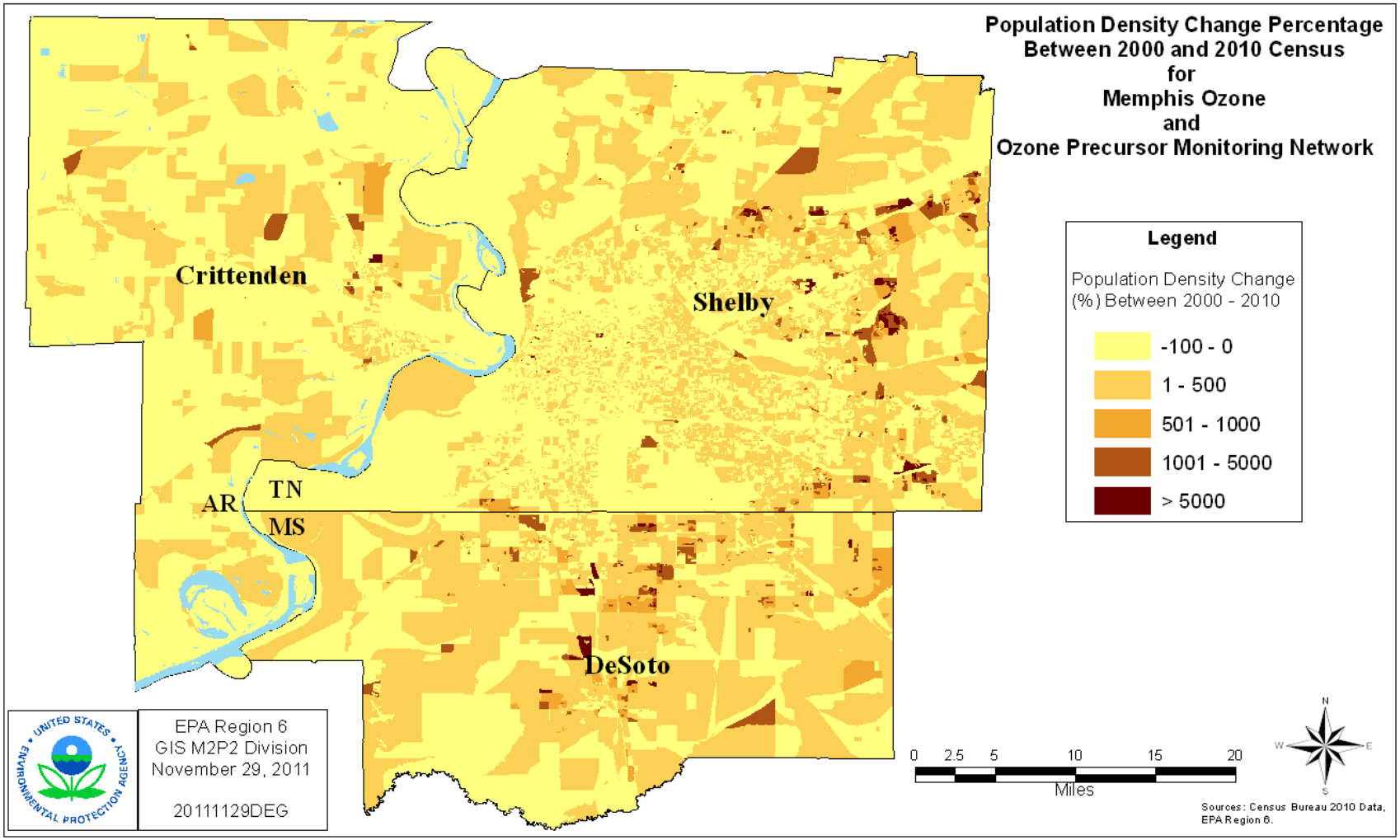


Figure 4 - Overlay of 24-hour HYSPLIT back trajectories of all 75 ppb exceedances at the Frayser monitor for the 2008-2010 period.

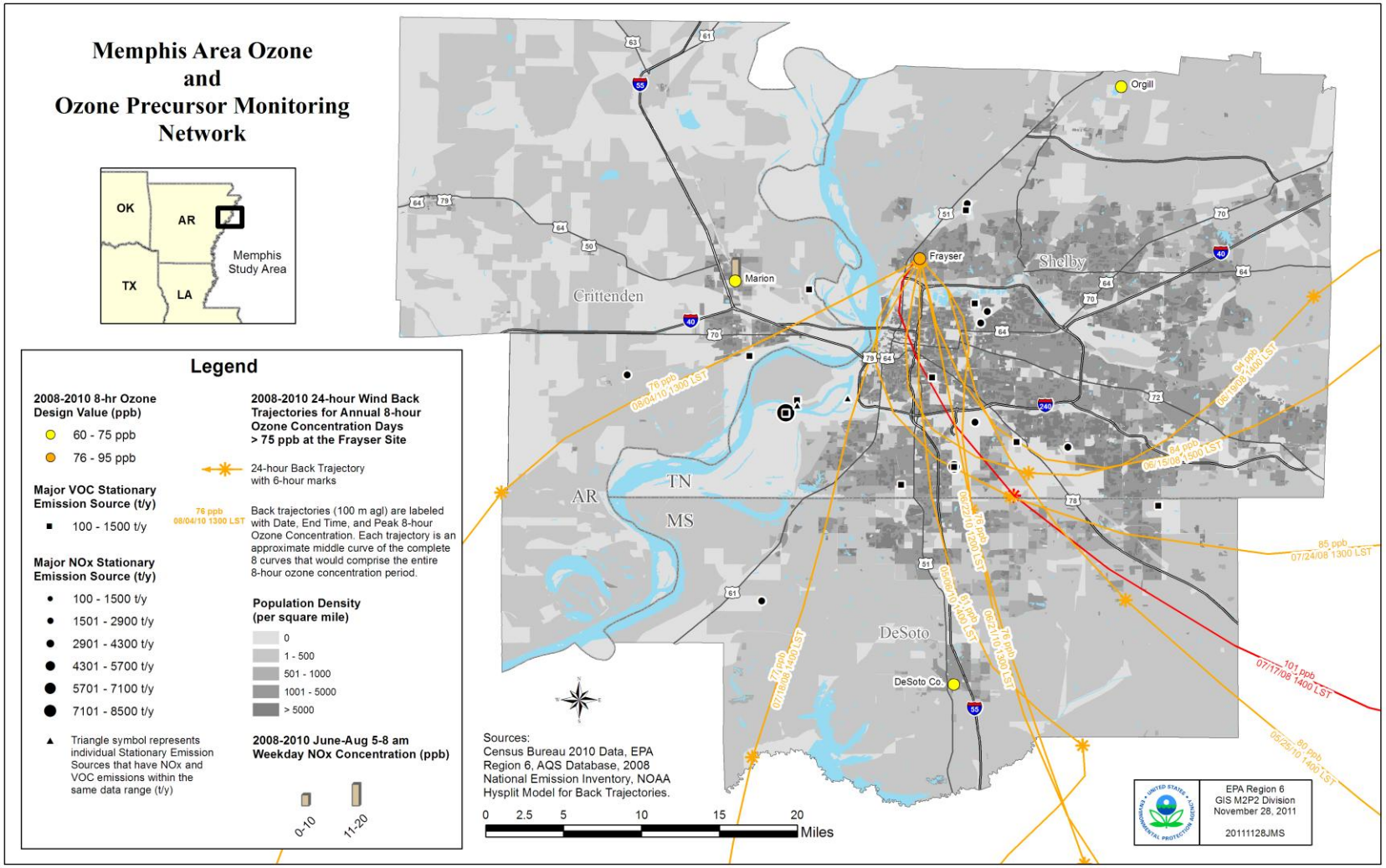


Figure 5. NOAA HYSPLIT MODEL 72-Hour Back Trajectory Frayser Exceedances (2006-10)

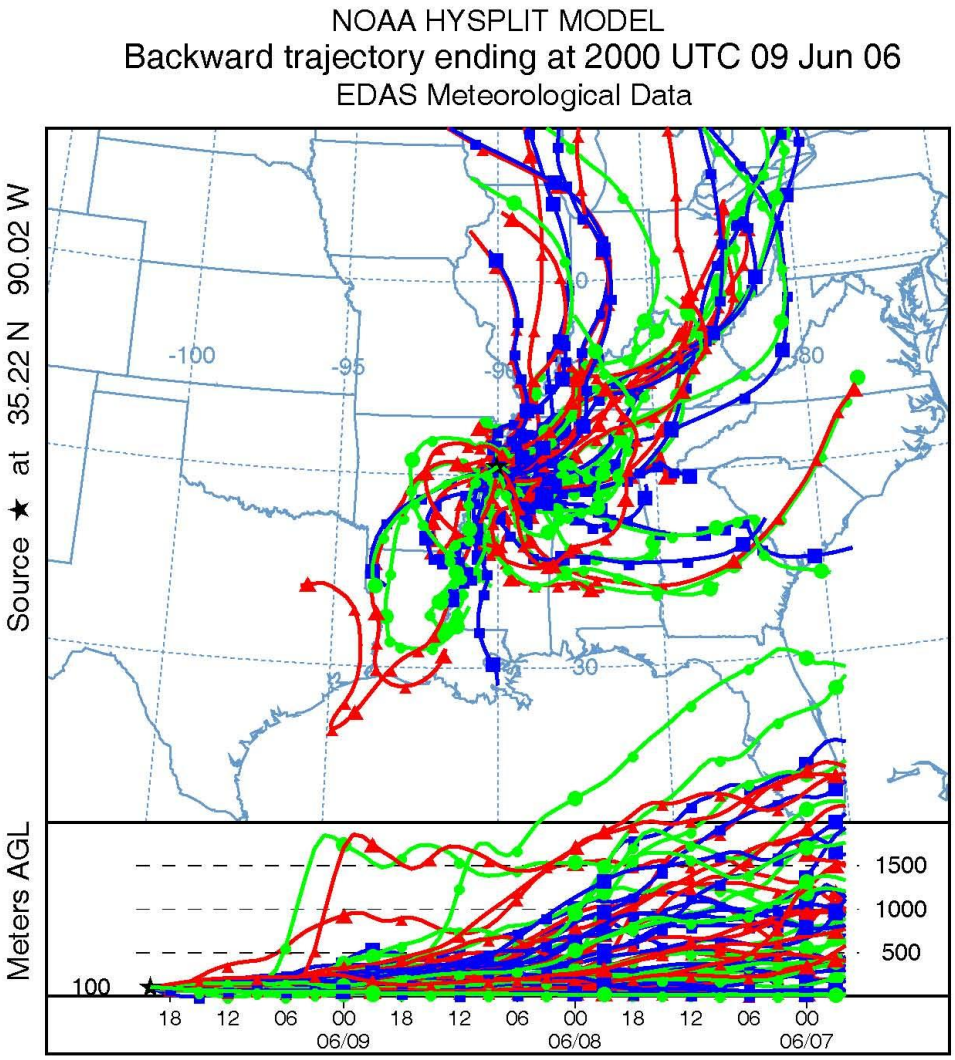


Figure 6. NOAA HYSPLIT MODEL 24-Hour Back Trajectory Frayser Exceedances (2006-10)

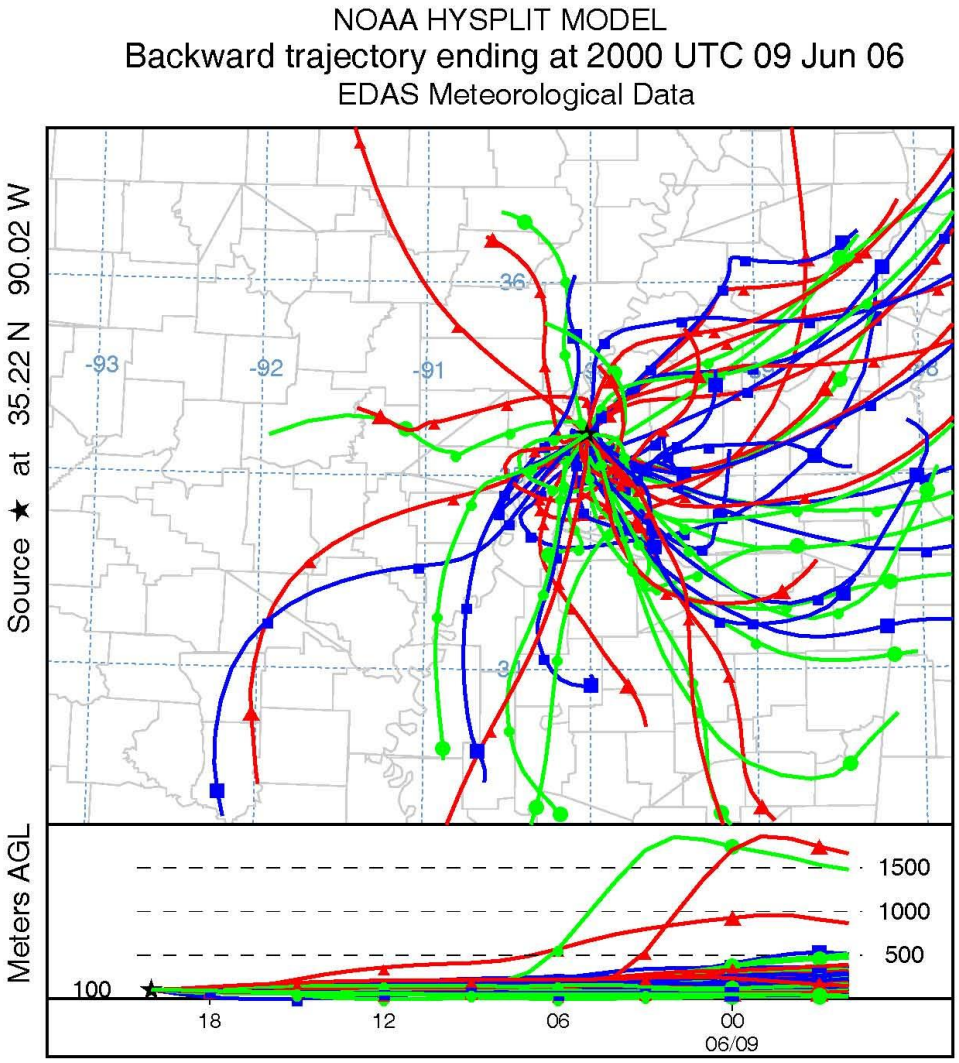
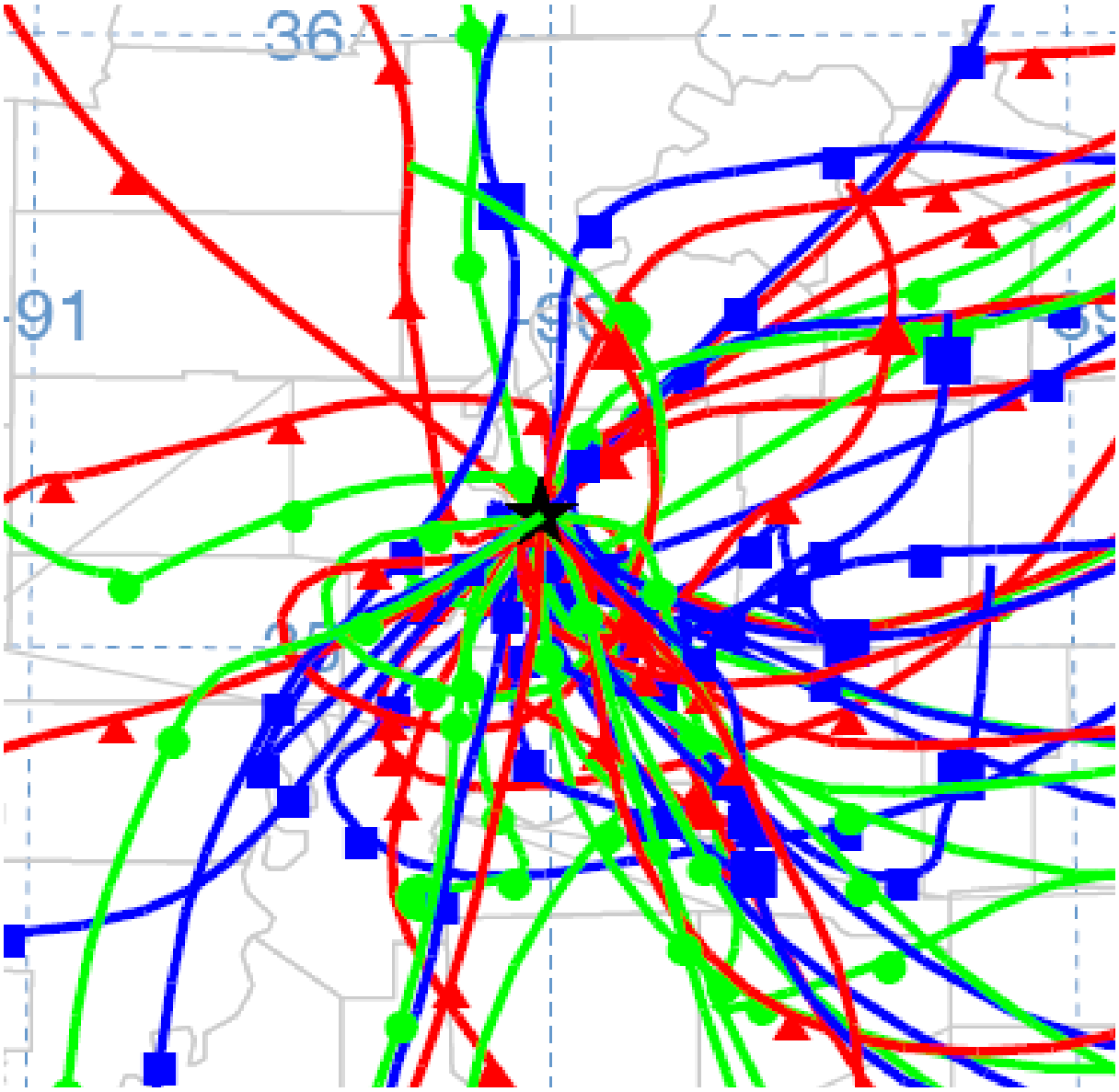


Figure 7. NOAA HYSPLIT MODEL 24-Hour Back Trajectory Frayser Exceedances (2006-10) - Zoom View



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Illinois-Indiana-Wisconsin
Supplement
Area Designations for the 2008
Ozone National Ambient Air Quality Standards

On December 9, 2011, EPA sent letters to Governor Pat Quinn of Illinois, Governor Mitchell E. Daniels, Jr. of Indiana, and Governor Scott Walker of Wisconsin, providing that EPA intended to designate as "unclassifiable/attainment" all parts of the States of Illinois, Indiana, and Wisconsin not otherwise noted in those letters and accompanying enclosures as intended nonattainment areas for the 2008 8-hour ozone National Ambient Air Quality Standards (2008 8-hour ozone NAAQS or standards).[1] All counties in the Chicago-Naperville-Michigan City, Illinois-Indiana-Wisconsin (IL-IN-WI) Combined Statistical Area (CSA) were identified in these letters as intended unclassifiable/attainment areas.

Based on new information submitted by the State of Illinois just prior to issuance of those letters, EPA is now revising its intended designation for many of the counties in the Chicago-Naperville-Michigan City, IL-IN-WI CSA. In a letter dated December 7, 2011, the State of Illinois submitted a letter stating that it had submitted certified ozone air quality data for 2011. That information was not submitted in sufficient time for EPA to consider it in the analyses provided in the December 9, 2011 letters. The newly submitted data, when considered in conjunction with data from the previous two years (2009 and 2010) indicate that a monitor (the Zion monitor) located in Lake County, Illinois is violating the 2008 8-hour ozone NAAQS. Based on that new information, EPA recently completed an analysis (provided below) to determine the area it intends to designate as nonattainment based on the violation of the 2008 8-hour ozone standard at the Zion monitor. The intended nonattainment designation for the counties identified in this Technical Support Document (TSD) replaces the intended designation of unclassifiable/attainment for these counties provided in the December 9, 2011 letters and enclosures. This document does not change or modify the intended designations

[1] The primary 8-hour ozone standard, set to protect human health, was revised on March 27, 2008 (73 FR 16436) from 0.08 parts per million to 0.075 parts per million (ppm) (75 parts per billion (ppb)). The secondary ozone standard, set to protect human welfare and the environment, was revised to be consistent with the primary standard in all respects.

identified in the December 9, 2011 letters and enclosures for any other counties in the States.

The table below identifies the counties or parts of counties in Illinois, Indiana, and Wisconsin that EPA intends to designate as nonattainment as part of the Chicago-Naperville, IL-IN-WI nonattainment area for the 2008 8-hour ozone NAAQS. In accordance with section 107(d) of the Clean Air Act (CAA), EPA must designate an area as "nonattainment" if it is violating the 2008 8-hour ozone NAAQS or if it contributes to a violation of the 2008 8-hour ozone NAAQS in a nearby area. The technical analyses supporting the boundaries for this nonattainment area are provided below.

Table 1. Intended Chicago-Naperville, IL-IN-WI Nonattainment Area for the 2008 Ozone NAAQS

State	State Recommended Nonattainment Counties	EPA's Intended Nonattainment Counties†
Illinois	Cook DuPage Kane Lake McHenry Will Kendall – Partial Oswego Township Grundy – Partial Aux Sable Township Goose Lake Township	Cook DuPage Kane Lake McHenry Will Kendall – Partial Oswego Township Grundy – Partial Aux Sable Township Goose Lake Township
Indiana	Lake	Lake Porter Jasper
Wisconsin	None	Kenosha

† Nonattainment for both primary and secondary 2008 8-hour ozone standards.

The analysis below provides the technical and qualitative bases for the intended boundaries of the Chicago-Naperville, IL-IN-WI ozone nonattainment area under the 2008 8-hour ozone NAAQS. It relies on our analysis of whether and which monitors are recording violations of the 2008 8-hour ozone NAAQS, based on state-certified air quality monitoring data from 2009-2011 for the State of Illinois and from 2008-2010 for ozone monitors in Indiana and Wisconsin and on an evaluation of whether nearby areas are contributing to such violations. EPA has evaluated contributions from nearby areas (counties within the Chicago-Naperville-Michigan City, IL-IN-WI CSA) based on a weight-of-evidence analysis considering the factors identified below. EPA issued guidance on December 4, 2008 that identified these

factors as ones EPA would consider in determining nonattainment area boundaries, and recommended that states consider these factors in making their designation recommendations to EPA.[2]

1. Air quality data, including the ozone design value[3] calculated for each Federal Reference Method (FRM) or Federal Equivalent Method (FEM) monitor in the area;

2. Emissions and emissions-related data, including locations of sources, population, amounts of emissions and emission controls, and growth patterns;

3. Meteorology (weather/pollutant transport patterns);

4. Geography and topography (mountain ranges and other air basin boundaries affecting ozone levels and ozone precursor transport); and,

5. Jurisdictional boundaries, e.g. counties, air districts, existing ozone nonattainment areas, Indian country, Metropolitan Planning Organizations (MPOs) and their covered areas.

Ground-level ozone is generally not emitted directly into the air, but is created by chemical reactions involving Nitrogen Oxides (NOx) and Volatile Organic Compounds (VOC) in the presence of sunlight.[4] Because NOx and VOC emissions from a broad range of sources over a wide area typically contribute to violations of the ozone standards, EPA believes it is important to consider whether there are contributing emissions from a broad geographic area. Accordingly, EPA chose to examine the five factors with respect to the counties in the larger of the CSA or Core Based Statistical Area (CBSA) associated with the

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[2] The December 4, 2008 guidance memorandum, "Area Designations for the 2008 Revised Ozone National Ambient Air Quality Standards," refers to 9 factors. In this technical support document, we have grouped the emissions-related factors together under the heading of "Emissions-Related Data," which results in 5 main categories of factors used to evaluate potential nonattainment area boundaries.

[3] Average of the annual fourth-highest daily maximum 8-hour ozone concentrations during a three-year period with complete data that the state has quality assured/quality controlled and certified. In evaluating the attainment status of an area, EPA generally considers complete ozone data for the most recent three-year period.

[4] Peak ozone concentrations generally occur downwind of source areas on relatively sunny days with high temperatures and relatively low wind speeds.

violating monitor(s).[5] All data and information used by EPA in this evaluation are the latest available to EPA and/or provided to EPA by states or tribes.

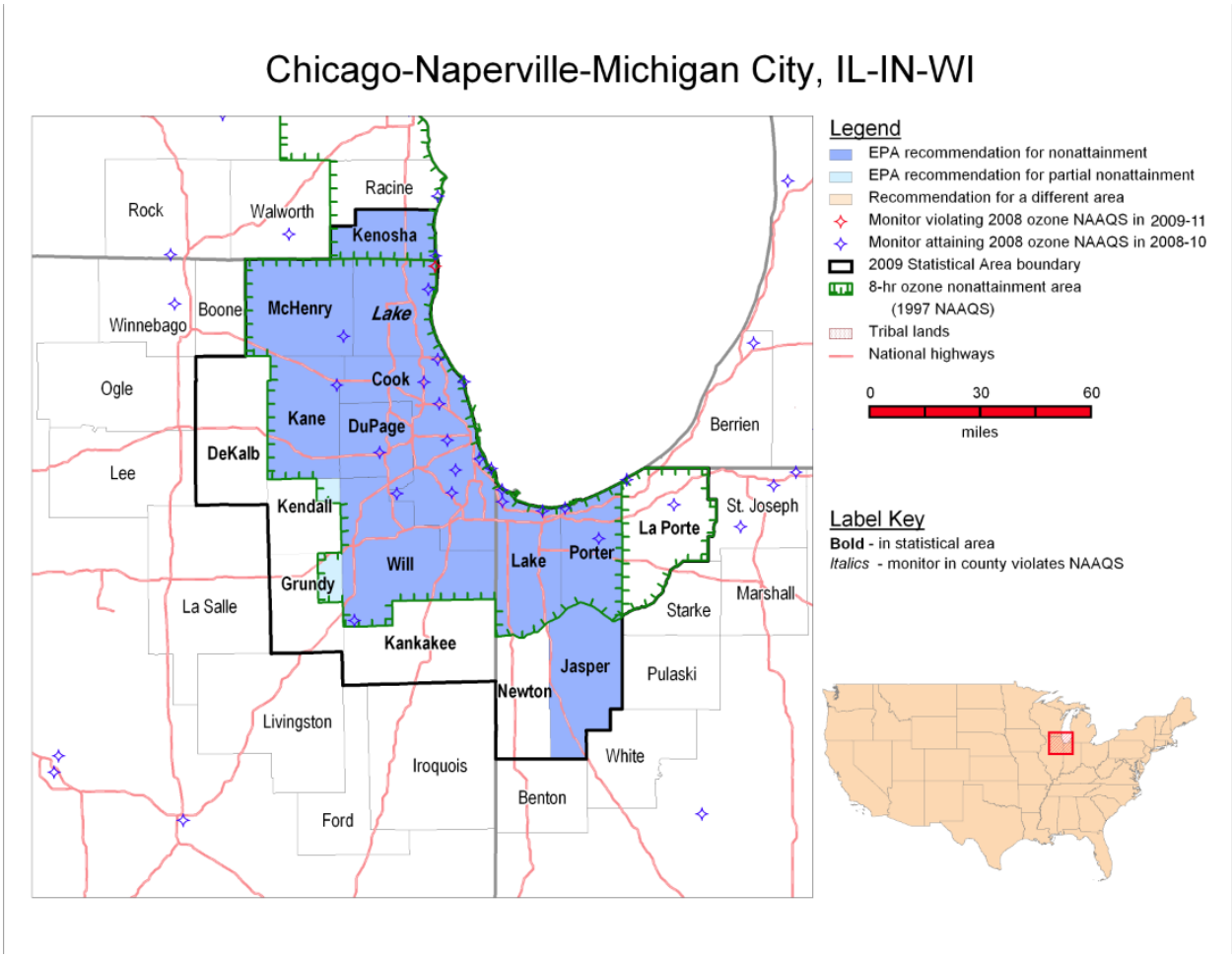
In EPA's designations guidance for the 2008 ozone NAAQS, EPA recommended examining CSA/CBSAs because certain factors used to establish CSAs and CBSAs are similar to the factors EPA is using in this technical analysis to determine if a nearby area is contributing to a violation of the 2008 8-hour ozone NAAQS. Congress required a similar approach in 1990 for areas classified as serious and above for the 1-hour ozone standard and EPA used the same approach in the designation process for the 1997 ozone NAAQS. Where a violating monitor is not located in a CSA or CBSA, EPA's September 4, 2008 guidance recommends using the boundary of the county containing the violating monitor as the starting point for considering the nonattainment area's boundary.

Technical Analysis for the Chicago-Naperville-Michigan City, IL-IN-WI CSA

Figure 1 is a map of the intended Chicago-Naperville, IL-IN-WI ozone nonattainment area. The map provides other relevant information, including the locations of ozone monitors, county and other jurisdictional boundaries, Chicago-Naperville-Michigan City, IL-IN-WI CSA boundary, and major transportation arteries.

Figure 1. Chicago-Naperville, IL-IN-WI Area

[5] Lists of the CBSAs and CSAs and their geographic components are provided at www.census.gov/population/www/metroareas/metrodef.html. The lists are periodically updated by the Office of Management and Budget. EPA used the most recent update, based on 2008 population estimates, issued on December 1, 2009 (OMB Bulletin No. 10-02).



For purposes of the 1997 ozone NAAQS, as noted in Figure 1, portions of this area were designated nonattainment as parts of the Chicago-Gary-Lake County, IL-IN and Milwaukee-Racine, WI ozone nonattainment areas. The boundary of the Chicago-Gary-Lake County, IL-IN ozone nonattainment area for the 1997 ozone NAAQS included the entire counties of Cook, DuPage, Kane, Lake, McHenry, and Will in Illinois and Lake and Porter in Indiana. This nonattainment area also included parts of Kendall (Oswego Township) and Grundy (Aux Sable and Goose Lake Townships) in Illinois. Kenosha County in Wisconsin was designated as nonattainment, but was included in the Milwaukee-Racine, Wisconsin ozone nonattainment area for the 1997 ozone NAAQS. Although Kenosha County was designated as part of the Milwaukee-Racine, WI ozone nonattainment area, the Chiwaukee Prairie monitoring site in Kenosha County was used as the ozone design value site for both the Chicago-Gary-Lake County, IL-IN ozone nonattainment area and the Milwaukee-Racine, WI ozone nonattainment area for both the 1997 8-hour ozone standard and the 1-hour ozone standard.

La Porte County, Indiana was designated as a separate nonattainment area for the 1997 ozone NAAQS. All other counties in the Chicago-Naperville-Michigan City, IL-IN-WI CSA were designated as attainment/unclassifiable for the 1997 ozone NAAQS.

In March 2009, the Illinois Environmental Protection Agency (IEPA) recommended that Cook, DuPage, Kane, Lake, McHenry, Kendall (Oswego Township only), Grundy (Aux Sable and Goose Lake Townships only), and Will Counties be designated as nonattainment for the 2008 8-hour ozone NAAQS based on air quality data for 2006-2008. Illinois recommended that all other Illinois counties in the Chicago-Naperville-Michigan City, IL-IN-WI CSA be designated as attainment for the 2008 ozone NAAQS. On December 7, 2011, the Illinois Environmental Protection Agency submitted confirmation that the State had certified air quality data for 2011. The State did not provide a revised ozone nonattainment area recommendation in conjunction with these new data.

In March 2009, Indiana recommended that Lake County be designated as nonattainment for the 2008 8-hour ozone NAAQS based on a monitored violation of NAAQS in this county during 2006-2008, and that Porter, La Porte, Jasper, and Newton Counties be designated as attainment for the 2008 ozone NAAQS based on a lack of monitored violations of the 2008 ozone NAAQS in these counties during 2006-2008.

In March 2009, Wisconsin recommended that Kenosha County be designated as attainment for the 2008 ozone NAAQS despite the fact that violations of the 2008 8-hour ozone NAAQS were monitored in this county during 2006-2008.[6]

After considering these recommendations and the new certified air quality data submitted by the State of Illinois, and based

[6] Letter from Douglas P. Scott, Director, Illinois Environmental Protection Agency, to Bharat Mathur, Acting Regional Administrator, U.S. Environmental Protection Agency, Region 5, regarding Illinois' recommended ozone nonattainment boundaries (March 9, 2009); Letter from Thomas W. Easterly, Commissioner, Indiana Department of Environmental Management, to Bharat Mathur, Acting Regional Administrator, U.S. Environmental Protection Agency, Region 5, regarding: Recommendations Concerning Air Quality Designations for the 2008 Revised 8-Hour Ozone National Ambient Air Quality Standard (March 11, 2009); and, Letter from Governor Jim Doyle, State of Wisconsin, to Lisa Jackson, Administrator, U.S. Environmental Protection Agency, regarding: Designation of 8-Hour Ozone Nonattainment Areas in Wisconsin (March 12, 2009).

on EPA's technical analysis described below, EPA intends to designate the counties in Illinois, Indiana, and Wisconsin, and the partial counties in Illinois identified in Table 1 as "nonattainment" for the 2008 8-hour ozone NAAQS as part of the Chicago-Naperville, IL-IN-WI nonattainment area. We intend to designate all other portions of the Chicago-Naperville-Michigan City, IL-IN-WI CSA as unclassifiable/attainment for the 2008 8-hour ozone NAAQS.

Factor Assessment

Factor 1: Air Quality Data

For this factor, we considered 8-hour ozone design values (in ppm) for air quality monitors in counties in the Chicago-Naperville-Michigan City, IL-IN-WI CSA. We used the most recent three-years of certified air quality data, and, thus, considered ozone data for the 2008-2010 period for Indiana and Wisconsin and for the 2009-2011 period for Illinois. We also provide the ozone design values for counties in Illinois based on air quality data for 2008-2010 to provide a complete view of the ozone air quality in this area for this three-year period.

A monitor's ozone design value is the metric or statistic that indicates whether that monitor attained the ozone air quality standard. The 2008 8-hour ozone NAAQS are met at a monitor when the annual fourth-highest daily maximum 8-hour ozone concentrations, averaged over three years is 0.075 ppm or less. A design value is valid only if minimum data completeness requirements are met. See 40 CFR part 50 Appendix P. Where several monitors are located in a county (or a designated nonattainment area or maintenance area), the design value for the county, or area, is determined by the monitor with the highest individual design value.

Note: Monitors that are eligible for providing design value data generally include State and Local Air Monitoring Stations (SLAMS) that are sited in accordance with 40 CFR part 58 Appendix D (Section 4.10) and operating with a FRM or FEM monitor that meets the requirements of 40 CFR part 58 Appendix A. All data from a Special Purpose Monitor (SPM) using an FRM or FEM monitor which has operated for more than 24 months is eligible for comparison to the NAAQS unless the monitoring agency demonstrates that the data came from a particular period during which the requirements of 40 CFR part 58 Appendix A (quality assurance requirements) or Appendix E (probe and monitoring path siting criteria) were not met.

The 2008-2010 and 2009-2011 ozone design values for monitors and counties in the Chicago-Naperville-Michigan City, IL-IN-WI CSA are given in Table 2.

Table 2. Ozone Air Quality Data for the Chicago-Naperville-Michigan City, IL-IN-WI CSA

State/County	**Site Number**	**2008-2010 8-Hour Ozone Design Value (ppm)**	**2009-2011 8-Hour Ozone Design Value (ppm)**
Illinois:			
Cook	170317002	0.063	0.069
Cook	170310032	0.068	0.072
Cook	170310064	0.064	0.068
Cook	170310076	0.067	0.069
Cook	170314002	0.065	0.069
Cook	170311601	0.070	0.069
Cook	170314007	0.059	0.062
Cook	170314201	0.068	0.072
Cook	170310001	0.069	0.071
Cook	170311003	0.066	0.067
DuPage	170436001	0.060	0.063
Kane	170890005	0.066	0.069
Lake	170971007	0.074	**0.076†**
McHenry	171110001	0.065	0.067
Will	171971011	0.062	0.063
Indiana:			
Lake	180892008	0.067	NA
Lake	180890030	0.064	NA
Lake	180890022	0.061	NA
Porter	181270026	0.062	NA
Porter	181270024	0.067	NA
La Porte	180910010	0.065	NA
La Porte	180910005	0.065	NA
Wisconsin:			
Kenosha	550590019	0.074	NA

† Monitored violation of the 2008 8-hour ozone NAAQS.

Lake County (the Zion monitor) in Illinois shows a violation of the 2008 8-hour ozone NAAQS and confirms that at least one ozone monitor in the Chicago-Naperville-Michigan City, IL-IN-WI CSA violates this NAAQS. This supports the inclusion of Lake County, Illinois in the intended ozone nonattainment area. A county (or partial county) must also be designated nonattainment if it contributes to a violation in a nearby area. Each county without a violating monitor that is located near a county with a violating monitor has been evaluated based on the weight-of-evidence of the five factors to determine whether it may have contributed to the nearby violation.

It should be noted that historically the Chiwaukee Prairie monitoring site in Kenosha County, Wisconsin has been the high downwind monitoring site for the Chicago region. The Chiwaukee Prairie ozone design value was used to establish the classification for the Chicago-Gary-Lake County, IL-IN ozone nonattainment area under both the 1997 8-hour ozone standard and the 1-hour ozone standard. In addition, monitoring data from this monitoring site were historically used by the States of Illinois, Indiana, and Wisconsin in conjunction with modeled ozone concentrations to demonstrate that emission reductions in the Chicago area were sufficient to attain the 1-hour ozone standard and the 1997 8-hour ozone standard.

These considerations led us to further consider the peak ozone concentrations at the Chiwaukee Prairie site relative to those for the Zion, Illinois site.

Figure 2 considers the relationship between daily peak 1-hour ozone concentrations for the Chiwaukee Prairie and Zion monitoring sites for the 2000-2011 period.

Figure 2. Correlation Between Daily Peak 1-Hour Ozone Concentrations at Chiwaukee Prairie (Wisconsin) and Zion (Illinois) Monitoring Sites (2000-2011)

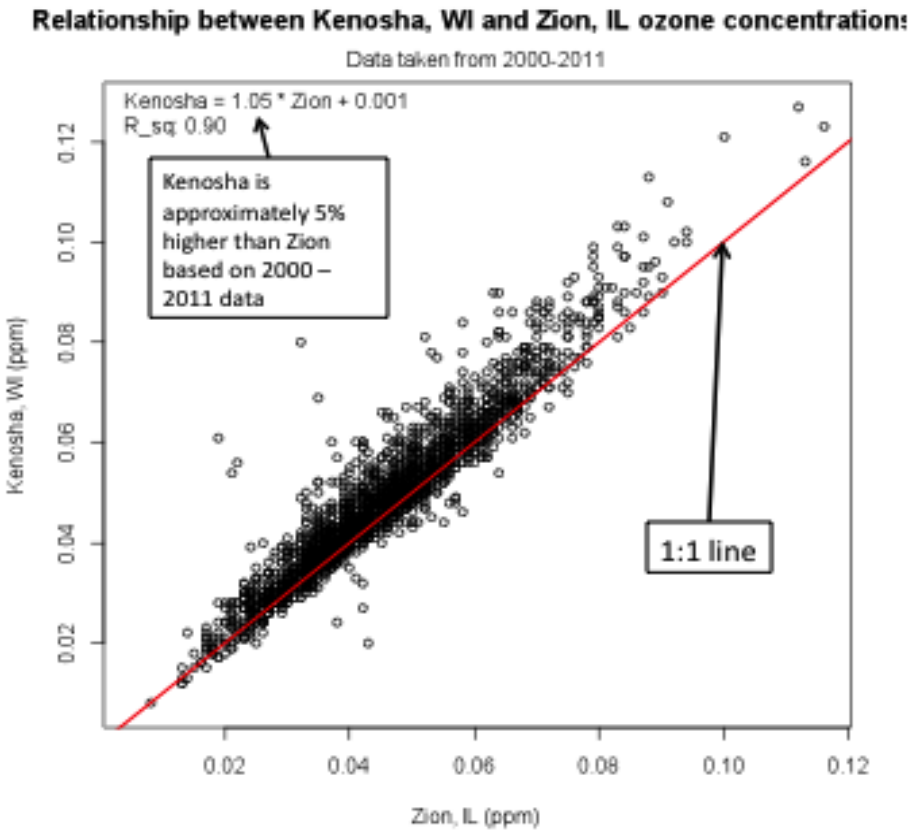


Figure 3 shows the comparison between 3-year ozone design values for the Chiwaukee Prairie and Zion monitoring sites for the 2000-2011 period (note that the 2001 ozone monitoring data for Chiwaukee Prairie have been quality assured, but have not been certified by the State of Wisconsin).

Figure 3. Three-Year 8-Hour Ozone Design Values for Chiwaukee Prairie (Wisconsin) and Zion (Illinois) Monitoring Sites (2000-2011)

The data displayed in Figures 2 and 3 demonstrate both the strong correlation between the peak ozone concentrations at the Chiwaukee Prairie and Zion monitoring sites and the fact that the peak ozone concentrations at the Chiwaukee Prairie monitoring site generally exceed those at the Zion monitoring site. The two monitoring sites are approximately six miles apart, with the Chiwaukee Prairie monitoring site located very near the Illinois-Wisconsin border. The proximity of the two monitoring sites and the above data comparisons strongly suggest that it is likely that the Chiwaukee Prairie monitoring site will be determined to be violating the 2008 8-hour ozone NAAQS once certified data are submitted later this year. Preliminary data for the site suggest that the site may well be violating this ozone standard.

Factor 2: Emissions and Emissions-Related Data

EPA evaluated emissions for ozone precursors (VOC and NOx) and other emissions-related data that provide information on area contributions to the ozone standard violation.

Emissions Data

EPA evaluated county-level emission data for NOx and VOC derived from the 2008 National Emissions Inventory (NEI), version 1.5. These are the most recently available NEI emissions data. (See http://www.epa.gov/ttn/chief/net/2008inventory.html) Significant emission levels in a nearby area indicate the potential for the area to contribute to the observed ozone standard violation.

Table 3 shows the 2008 emissions of VOC and NOx (tons per year (tpy)) for all counties in the Chicago-Naperville-Michigan City, IL-IN-WI CSA. This table also indicates which of the counties were recommended to be nonattainment for the 2008 ozone NAAQS by their respective states.

Table 3. Total 2008 VOC and NOx Emissions (tons/year) in the Chicago-Naperville-Michigan City, IL-IN-WI CSA

State/County	State Recommended Nonattainment?	VOC Emissions (tpy)	NOx Emissions (tpy)
Illinois:			
Cook	Yes	129,466	143,372
DeKalb	No	4,395	4,637
DuPage	Yes	30,508	30,412
Grundy	Yes (partial)	3,291	4,577
Kane	Yes	13,893	15,161
Kankakee	No	5,179	6,941
Kendall	Yes (partial)	3,970	4,642
Lake	Yes	19,978	24,549
McHenry	Yes	9,012	9,138
Will	Yes	19,255	39,878
Illinois Totals		**235,347**	**283,307**
Indiana:			
Jasper	No	2,845	19,788
Lake	Yes	21,266	46,808
La Porte	No	5,555	8,875
Newton	No	1,913	841
Porter	No	8,100	27,055
Indiana Totals		**39,679**	**103,367**
Wisconsin:			
Kenosha	No	5,370	6,788
Total CSA Emissions		**283,996**	**393,462**

Emissions Observations by State

Illinois:

From the Illinois emissions in Table 3, it can be seen that comparatively high emissions originate in the following counties: Cook, DuPage, Kane, Lake, McHenry, and Will. Emissions from these counties, in 2008, account for 94.4 percent of the total Illinois VOC emissions and 92.7 percent of the total Illinois NOx emissions for the Illinois portion of the Chicago-Naperville-Michigan City, IL-IN-WI CSA. These same counties account for 78.3 percent of the total VOC emissions and 66.7 percent of the total NOx emissions for the entire Chicago-Naperville-Michigan City, IL-IN-WI CSA.

Indiana:

From the Indiana emissions data in Table 3, it can be seen that comparatively high VOC emissions originate in Lake and Porter Counties, and comparatively high NOx emissions originate in Jasper, Lake, and Porter Counties. These counties account for 74.0 percent of the total VOC emissions and 90.6 percent of the total NOx emissions for the Indiana portion of the Chicago-Naperville-Michigan City, IL-IN-WI CSA. These same counties account for 10.3 percent of the total VOC emissions and 23.8 percent of the total NOx emissions for the entire Chicago-Naperville-Michigan City, IL-IN-WI CSA.

Wisconsin:

The VOC and NOx emissions in Kenosha County are comparatively small; they are comparable to the emissions from the low-emissions counties in the Illinois and Indiana portions of the Chicago-Naperville-Michigan City, IL-IN-WI CSA.

Population, Population Density, and Degree of Urbanization

EPA evaluated the county-specific populations, population trends, and vehicle use characteristics for the Chicago-Naperville-Michigan City, IL-IN-WI CSA as indicators of the probable location and magnitude of non-point source emissions. These include ozone-creating emissions from on-road and off-road vehicles and engines, consumer products, residential fuel combustion, and consumer services. Areas of dense population or commercial development are an indicator of area source and mobile source NOx and VOC emissions that may contribute to violating ozone monitors. Rapid population growth in a county on the urban perimeter signifies increasing integration with the urban core area, and indicates that it may be appropriate to

include this county in the ozone nonattainment area, particularly if this county already has moderate or higher VOC and/or NOx emissions. Table 4 shows the 2010 population, population density, and population growth information for each county in the Chicago-Naperville-Michigan City, IL-IN-WI CSA

Table 4. Population and Population Growth in the Chicago-Naperville-Michigan City, IL-IN-WI CSA

State/County	State Recommended Nonattainment?	2010 Population	2010 Population Density (1,000 per square mile)	Change in Population (2000-2010)	Population Percent Change (2000-2010)
Illinois:					
Cook	Yes	5,194,675	5.43	-182,417	-3
DeKalb	No	105,160	0.17	15,839	18
DuPage	Yes	916,924	2.73	10,269	1
Grundy	Yes (partial)	50,063	0.12	12,388	33
Kane	Yes	515,269	0.98	107,749	26
Kankakee	No	113,449	0.17	9,573	9
Kendall	Yes (partial)	114,736	0.36	59,529	108
Lake	Yes	703,462	1.50	55,288	9
McHenry	Yes	308,760	0.51	46,890	18
Will	Yes	677,560	0.80	169,531	33
Indiana:					
Jasper	No	33,478	0.06	3,296	11
Lake	Yes	496,005	0.99	11,516	2
La Porte	No	111,467	0.18	1,309	1
Newton	No	14,244	0.04	-298	-2
Porter	No	164,343	0.39	17,188	12
Wisconsin:					
Kenosha	No	166,426	0.60	16,352	11

Sources: U.S. Census Bureau population estimates for 2010 as of August 4, 2011. (http://factfinder2.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=DEC_10_PL_GCTPL2.ST05&prodType=table) and U.S. Census Bureau GIS files for the county boundaries.

Population Observations By State

Illinois:

For Illinois, the population data show that Cook, DuPage, Kane, Lake, McHenry, and Will Counties have comparatively large populations and population densities and, therefore, are more urbanized than the other Illinois counties in this CSA. This

indicates that the population-related VOC and NOx emissions in these counties are relatively high. In addition, the population change levels for 2000-2010 in Kane, Kendall, Lake, McHenry, and Will Counties significantly exceed those of other Illinois counties in the CSA, suggesting that these "fast growing" counties are becoming increasingly urbanized and integrated with the urban core of the Chicago-Naperville-Michigan City, IL-IN-WI CSA. This further indicates that the population-related emission contributions from these counties are increasing compared to those from other counties in the Chicago-Naperville-Michigan City, IL-IN-WI CSA.

The population densities of DeKalb, Grundy, and Kankakee Counties are relatively small compared to those of other counties in the Chicago-Naperville-Michigan City, IL-IN-WI CSA, indicating that the population-related VOC and NOx emissions in these counties contribute significantly less to high ozone concentrations in this CSA.

Indiana:

In the Indiana portion of the Chicago-Naperville-Michigan City, IL-IN-WI CSA, the populations and population densities of Lake, Porter, and La Porte Counties are significantly larger than those of Jasper and Newton Counties. This indicates that population-related VOC and NOx emissions in Jasper and Newton Counties contribute less to high ozone concentrations in this CSA.

The population and population density of La Porte County are comparable to those DeKalb and Kankakee Counties in Illinois, indicating that the population-related VOC and NOx emissions in this county contribute significantly less to high ozone concentrations in this CSA.

Finally, it is concluded that the population-related emissions of Lake and Porter Counties are more significant, from an ozone formation standpoint, than those of other counties in the Indiana portion of the Chicago-Naperville-Michigan City, IL-IN-WI CSA, indicating that population-related VOC and NOx emissions in these counties do contribute significantly to high ozone concentrations in this CSA.

Wisconsin:

Kenosha County has a moderately low 2010 population compared to those of higher populated counties in the Chicago-Naperville-

Michigan City, IL-IN-WI CSA. However, the population density of Kenosha County is relatively high, showing that this county is significantly urbanized and that population-related VOC and NOx emissions in this county can significantly contribute to high downwind ozone concentrations.

Traffic and Commuting Patterns

EPA evaluated the total VMT for each county in the Chicago-Naperville-Michigan City, IL-IN-WI CSA. In combination with the population/population density data and the location of main transportation arteries (see the above area map), this information helps identify the probable location of non-point source emissions. A county with high VMT is generally an integral part of the urban area and indicates the presence of relatively high motor vehicle (on-road mobile source) emissions that may significantly contribute to ozone formation and transport in the urban area. This implies that this county should be included in the ozone nonattainment area, particularly if the VOC and/or NOx emissions in this county are a significant portion of the total emissions in the area (in the CSA/CBSA).

Table 5 shows the traffic levels, total 2008 VMT, in each county in the Chicago-Naperville-Michigan City, IL-IN-WI CSA.

Table 5. Traffic Levels in the Chicago-Naperville-Michigan City, IL-IN-WI CSA

State/County	State Recommended Nonattainment?	2008 VMT (million miles)*
Illinois:		
Cook	Yes	32,755
DeKalb	No	883
DuPage	Yes	8,443
Grundy	Yes (partial)	678
Kane	Yes	3,628
Kankakee	No	945
Kendall	Yes (partial)	769
Lake	Yes	5,638
McHenry	Yes	2,169
Will	Yes	5,713
Indiana:		
Jasper	No	732
Lake	Yes	4,915
La Porte	No	936
Newton	No	219
Porter	No	1,640
Wisconsin:		
Kenosha	No	1,354

***** Mobile source VMT are those input into the NEI version 1.6 used to compute the mobile source portion of the NEI emissions summarized above in Table 3.

VMT Observations By State

Illinois:

For Illinois, the VMT data show that VMT levels in Cook County are significantly higher than those for other counties in the Chicago-Naperville-Michigan City, IL-IN-WI CSA. The VMT levels for DuPage, Kane, Lake, McHenry, and Will Counties are comparatively higher than those of the other Illinois counties in the Chicago-Naperville-Michigan City, IL-IN-WI CSA and, cumulatively, are a significant portion of the total VMT for the Chicago-Naperville-Michigan City, IL-IN-WI CSA.

Indiana:

For Indiana, the VMT data show that VMT levels in Lake and Porter Counties are comparatively higher than those of the other Indiana counties in the Chicago-Naperville-Michigan City, IL-IN-WI CSA, and, cumulatively, are a significant portion of the total VMT for the Chicago-Naperville-Michigan City, IL-IN-WI CSA.

Wisconsin:

The VMT level in Kenosha County is similar to the VMT level in Porter County, Indiana. This indicates that the ozone impact of mobile source emissions in Kenosha County should be similar to that of Porter County.

Factor 3: Meteorology (Weather/Transport Patterns)

EPA evaluated available meteorological data to help determine how meteorological conditions, particularly transport conditions, affect the fate and transport of ozone and ozone precursors contributing to ozone formation in the Chicago-Naperville-Michigan City, IL-IN-WI CSA. The data available for this evaluation were presented by the States of Illinois and Wisconsin as part of their March 2009 ozone designation recommendation submittals. Indiana conducted no meteorological analyses to assess the impacts of transported ozone and ozone precursors for monitors outside of Indiana, and presented minimal discussions on pollutant transport for ozone monitors inside of Indiana.

In Illinois' March 9, 2009 ozone designation recommendation submittal, the IEPA notes that the predominant wind direction across the State is from south/southwest, with an average wind speed of approximately 11 miles per hour. The State notes that ozone monitors in the Chicago area that exceed the 2008 8-hour ozone standard based on 2006-2008 data show strong evidence of regional (i.e., longer-range) contributions to high ozone levels. The State also presents a pollution wind rose (direction percent frequency) for days in 2006-2008 with peak 8-hour ozone concentrations exceeding 75 ppb, with wind data collected at the Alsip monitoring site (Cook County). These data show that, on high ozone days, the wind blew from the south through southwest. Some high ozone day winds were also recorded with winds from east-northeast through south-southeast and west-southwest through west. Virtually no high ozone day wind directions were recorded for wind directions for west-northwest through northeast.

In Wisconsin's March 12, 2009 ozone designation recommendation submittal technical support document, the Wisconsin Department of Natural Resources (WDNR) summarized the wind directions for days (2006-2008) when 1-hour ozone concentrations at the Chiwaukee Prairie monitoring site in Kenosha County exceeded 75 ppb. This analysis indicated that, on 57.9 percent of these high ozone days winds were from the southeast through south, which is where the Chicago-Gary-Lake County, IL-IN ozone nonattainment area for the 1997 8-hour ozone standard is located. On 15.8 percent of the high ozone days, winds were from the southwest, indicating that emissions in Walworth County contributed to the high ozone concentrations in Kenosha County.

Factor 4: Geography/Topography (Mountain Ranges or Other Air Basin Boundaries)

The geography/topography analysis evaluates the physical features of the land that might affect the air-shed, and, therefore, the distribution of ozone over the area.

The Chicago-Naperville-Michigan City, IL-IN-WI CSA does not have any geographical or topographical barriers significantly limiting air pollution transport within its air-shed. Therefore, this factor did not play a significant role in this evaluation.

Factor 5: Jurisdictional Boundaries

Once we identified the general area that we anticipated we would recommend as nonattainment for the 2008 8-hour ozone NAAQS, we then considered existing jurisdictional boundaries for purposes of providing a clearly defined legal boundary and to help identify the area appropriate for carrying out the air quality planning and enforcement functions for an ozone nonattainment area. Examples of jurisdictional boundaries include existing or prior nonattainment boundaries, air district boundaries, township boundaries, areas covered by metropolitan planning organizations, state lines, and Reservation boundaries. Where existing jurisdictional boundaries are not adequate or appropriate to describe the nonattainment area, other clearly defined and permanent landmarks or geographic coordinates may be considered.

The Chicago-Naperville-Michigan City, IL-IN-WI CSA has previously established ozone nonattainment boundaries associated with both the 1-hour and 8-hour ozone NAAQS. The Chicago nonattainment boundary for the 1-hour ozone NAAQS included Cook, DuPage, Kane, Lake, McHenry, and Will Counties and Lake and Porter Counties in Indiana in their entireties and partial counties for Grundy (Aux Sable and Goose Lake Townships) and Kendall (Oswego Township) Counties in Illinois. Kenosha County, Wisconsin was part of the Milwaukee 1-hour ozone nonattainment area. All of these areas were designated as nonattainment for the 1997 8-hour ozone NAAQS.

Illinois has recommended that the same full and partial counties in Illinois be included as part of the Chicago nonattainment area for the 2008 8-hour ozone NAAQS. Indiana has recommended that only Lake County be designated as nonattainment for the 2008 ozone NAAQS. Finally, Wisconsin has recommended that Kenosha County be designated as attainment for the 2008 8-hour ozone NAAQS.

Conclusion

Illinois:

Based on the assessment of factors described above, EPA intends to include the following Illinois counties and partial counties in the Chicago-Naperville, IL-IN-WI ozone nonattainment area: Cook, DuPage, Kane, Lake, McHenry, and Will Counties in their entirety; and, Oswego Township in Kendall County, and Aux Sable and Goose Lake Townships in Grundy County. Based on the levels of VOC and NOx emissions, and other emissions-related data, including population and VMT levels, it is concluded that Cook,

DuPage, Kane, Lake, McHenry, and Will Counties are significant sources of emissions that contribute to the high ozone levels at the Zion monitor. Based on the State of Illinois' recommendation and on historical nonattainment boundary considerations, we also intend to include Oswego Township in Kendall County and Aux Sable and Goose Lake Townships in Grundy County as part of the Chicago-Naperville, IL-IN-WI ozone nonattainment area for the 2008 8-hour ozone standard.

Based on our analysis of the factors above, especially considering the emissions-related factors, we intend to designate the remaining Illinois counties, including the remaining portions of Kendall and Grundy Counties, in the Chicago-Naperville-Michigan City, IL-IN-WI CSA as attainment for the 2008 8-hour ozone NAAQS.

Indiana:

Based on the assessment of factors described above, EPA intends to include Lake, Jasper, and Porter Counties in the Chicago-Naperville, IL-IN-WI nonattainment area for the 2008 8-hour ozone NAAQS. This is based on the high emissions in these counties that contribute to high ozone concentrations at the Zion monitor. Meteorology on high ozone days in Chicago area favor the transport of ozone and ozone precursor emissions from these counties to the Zion monitor and other downwind portions of the Chicago area.

The low emissions and emissions-related population and VMT data of Newton County favor the exclusion of this county from the nonattainment area. It is concluded that emissions from this county do not significantly contribute to the high ozone concentrations at the Zion monitor.

The VOC and NOx emissions of La Porte County are significantly lower than those of Lake and Porter Counties and those of recommended nonattainment counties in Illinois. In addition, it is recognized that historically La Porte County has been designated as a separate nonattainment area for the 1997 8-hour ozone standard. Based collectively on these factors, we intend to not include La Porte County in the Chicago-Naperville, IL-IN-WI ozone nonattainment area for the 2008 8-hour ozone NAAQS.

Wisconsin:

Kenosha County presents a more unique situation for this designation analysis. The VOC and NOx emissions in Kenosha

County are relatively low and similar to those for counties recommended for exclusion from the intended ozone nonattainment area. In addition, it is noted that Illinois' and Wisconsin's wind direction analyses for high ozone days indicate that Kenosha County emissions are probably downwind of the violating Zion, Illinois monitor on high ozone days. These conclusions would support the exclusion of Kenosha County from the intended ozone nonattainment area.

Nonetheless, it is also recognized that the Chiwaukee Prairie monitoring site in Kenosha County has historically been the high downwind ozone monitoring site for the Chicago region. Chiwaukee Prairie ozone design values were used to establish the classification for the Chicago-Gary-Lake County, IL-IN ozone nonattainment area under both the 1997 8-hour ozone standard and the 1-hour ozone standard.

Based on the above considerations, at this time we are notifying the State of Wisconsin that we intend to include Kenosha in the Chicago-Naperville, IL-IN-WI ozone nonattainment area for the 2008 8-hour ozone standard. If the State of Wisconsin submits certified data for 2009-2011 showing that Kenosha County is actually attaining the 2008 8-hour ozone standard, EPA's conclusion regarding the designation for Kenosha County should be revisited.

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Ohio
Area Designations for the
2008 Ozone National Ambient Air Quality Standards

SUMMARY

The table below identifies the areas and associated counties in Ohio that EPA intends to designate as nonattainment for the 2008 ozone National Ambient Air Quality Standards (NAAQS).[1] In accordance with section 107(d) of the CAA, EPA must designate an area (county or part of a county) as "nonattainment" if it is violating the 2008 ozone NAAQS or if it is contributing to a violation of the 2008 ozone NAAQS in a nearby area. The technical analyses supporting the boundaries for the nonattainment areas are provided below.

Table 1. Intended Ozone Nonattainment Areas in Ohio

Area	Ohio Recommended Nonattainment Counties	EPA's Intended Nonattainment Counties
Nonattainment Areas †		
Cincinnati-Middletown-Wilmington, OH-KY-IN ‡	Butler Clermont Clinton Hamilton Warren	Butler Clermont Clinton Hamilton Warren
Cleveland-Akron-Lorain, OH	Ashtabula Cuyahoga Geauga Lake Lorain Medina Portage Summit	Ashtabula Cuyahoga Geauga Lake Lorain Medina Portage Summit
Columbus, OH	Delaware Fairfield Franklin Knox Licking Madison	Delaware Fairfield Franklin Knox Licking Madison

[1] The primary 8-hour hour ozone standard, set to protect human health, was revised on March 27, 2008 (73 FR 16436) from 0.08 parts per million (ppm) to 0.075 ppm. The secondary ozone standard, set to protect human welfare and the environment, was revised to be consistent with the primary ozone standard in all respects.

† Nonattainment for both primary and secondary 2008 8-hour ozone standards.

‡ Cincinnati-Middletown-Wilmington, OH-KY-IN is a multi-state nonattainment area. Table 2 below identifies the counties in Ohio and in other states that EPA intends to designate as part of the nonattainment area.

EPA intends to designate the remaining counties in Ohio that are not listed in Table 1 above as "unclassifiable/attainment" for the 2008 ozone NAAQS.

The analysis below provides the basis for the intended nonattainment area boundaries. It relies on our analysis of whether and which monitors are recording violations of the 2008 ozone NAAQS, based on certified air quality monitoring data from 2008-2010 and on an evaluation of whether nearby areas are contributing to such violations. EPA has evaluated contributions from nearby areas based on a weight-of-evidence analysis considering the factors identified below. EPA issued guidance on December 4, 2008 that identified these factors as ones EPA would consider in determining nonattainment area boundaries, and recommended that states consider these factors in making their designation recommendations to EPA.[2]

1. Air quality data (including the ozone design value calculated for each Federal Reference Method (FRM) or Federal Equivalent Method (FEM) monitor in the area);

2. Emissions and emissions-related data (including location of sources, population, amount of emissions and emission controls, and growth patterns);

3. Meteorology (weather/transport patterns);

4. Geography and topography (mountain ranges and other basin boundaries affecting ozone levels and ozone precursor transport); and,

5. Jurisdictional boundaries (e.g. counties, air districts, existing ozone nonattainment areas, Indian country,

[2] The December 4, 2008 guidance memorandum, "Area Designations for the 2008 Revised Ozone National Ambient Air Quality Standards," refers to 9 factors. In this technical support document, we have grouped the emissions-related factors together under the heading of "Emissions-Related Data," which results in 5 categories of factors.

Metropolitan Planning Organization (MPOs) and their covered area).

Ground-level ozone is generally not emitted directly into the air, but is created by chemical reactions involving Nitrogen Oxides (NOx) and Volatile Organic Compounds (VOC) in the presence of sunlight.[3] Because NOx and VOC emissions from a broad range of sources over a wide area typically contribute to violations of the ozone standards, EPA believes it is important to consider whether there are contributing emissions from a broad geographic area. Accordingly, EPA chose to examine the 5 factors with respect to the larger of the Combined Statistical Area (CSA) or Core Based Statistical Area (CBSA) associated with the violating monitor(s).[4] All data and information used by EPA in this evaluation are the latest available to EPA and/or provided to EPA by states or tribes.

In EPA's designations guidance for the 2008 ozone NAAQS, EPA recommended examining CSA/CBSAs because certain factors used to establish CSAs and CBSAs are similar to the factors EPA is using in this technical analysis to determine if a nearby area is contributing to a violation of the 2008 ozone NAAQS. Congress required a similar approach in 1990 for areas classified as serious and above for the 1-hour ozone standard and EPA used the same approach in the designation process for the 1997 ozone NAAQS. Where a violating monitor is not located in a CSA or CBSA, EPA's September 4, 2008 guidance recommends using the boundary of the county containing the violating monitor as the starting point for considering the nonattainment area's boundary.

Technical Analysis for Cincinnati-Middletown-Wilmington, OH-KY-IN

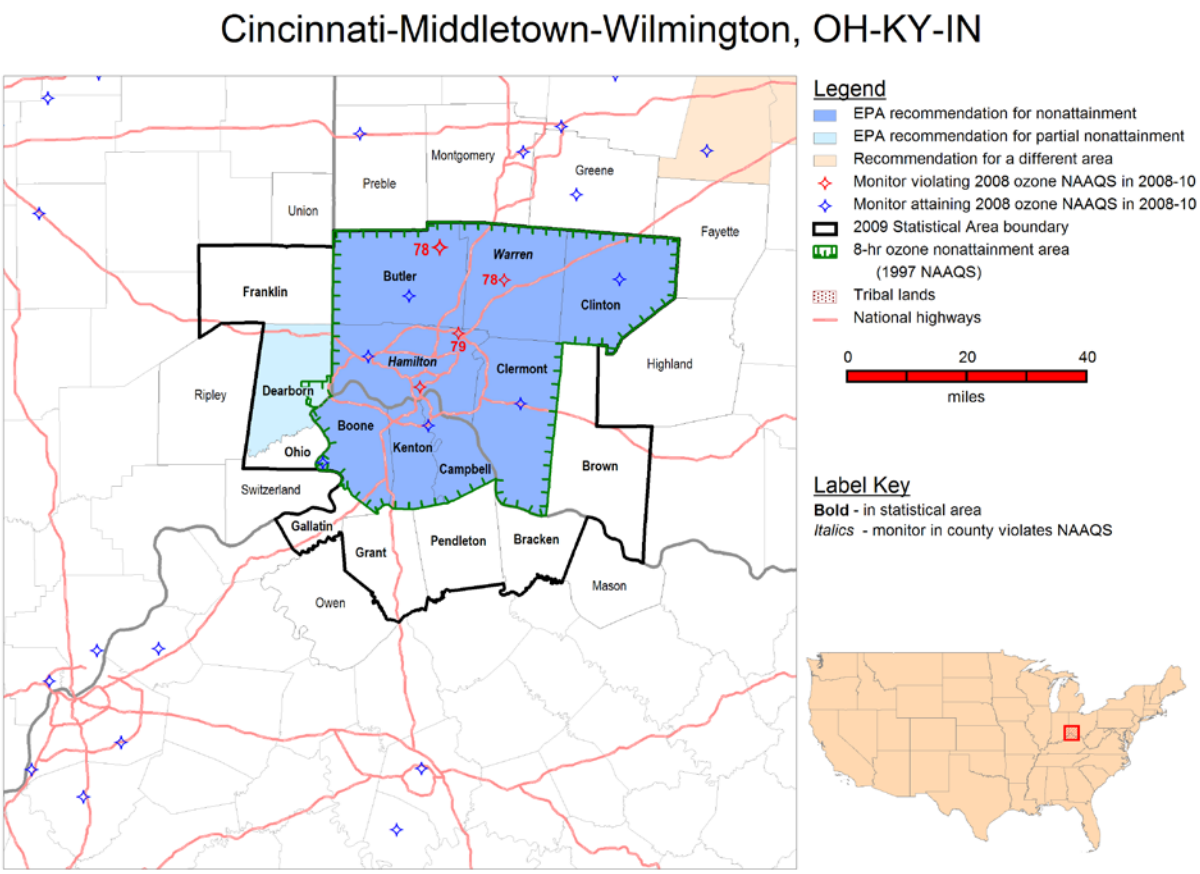
Figure 1 is a map of the Cincinnati-Middletown-Wilmington, OH-KY-IN intended nonattainment area. The map provides other relevant information, including the locations and ozone design values (violating monitors only) of air quality monitors, county and other jurisdictional boundaries, existing maintenance boundary for the 1997 ozone NAAQS, Cincinnati-Middletown-

[3] Peak ozone concentrations generally occur downwind of source areas on relatively sunny days with high temperatures and relatively low wind speeds.

[4] Lists of CBSAs and CSAs and their geographic components are provided at www.census.gov/population/www/metroareas/metrodef.html. The lists are periodically updated by the Office of Management and Budget. EPA used the most recent update, based on 2008 population estimates, issued on December 1, 2009 (OMB Bulletin No. 10-02).

Wilmington, OH-KY-IN CSA boundary, and major transportation arteries.

Figure 1. Cincinnati-Middletown-Wilmington, OH-KY-IN Area



For purposes of the 1997 ozone NAAQS, as noted in Figure 1, portions of this area were designated nonattainment and subsequently redesignated to attainment (maintenance). The boundary for the nonattainment area for the 1997 ozone NAAQS included the entire counties of Butler, Clermont, Clinton, Hamilton, and Warren in Ohio and Boone, Campbell, and Kenton in Kentucky and part of Dearborn County (Lawrenceburg Township) in Indiana.

In March 2009, Ohio recommended that Butler, Clermont, Clinton, Hamilton, and Warren Counties be designated as “nonattainment” for the 2008 ozone NAAQS based on air quality data from 2006-2008. In March 2009, Kentucky recommended that Boone, Campbell, and Kenton Counties be designated as nonattainment for the 2008 ozone NAAQS based on air quality data from 2006-2008.

Additionally, Indiana, in March 2009, recommended that each county in the Indiana portion of the Cincinnati-Middletown-Wilmington, OH-KY-IN CSA be designated as "attainment" for the 2008 ozone NAAQS. In October 2011, Kentucky submitted an update to their 2009 recommendation, and revised their recommendation to "attainment" designations for each county in the State.[5]

The ozone data reflected in Figure 1 and summarized below are from FEM monitors sited and operated in accordance with 40 CFR part 58.

After considering these recommendations and based on EPA's technical analysis described below, EPA intends to designate the counties in Ohio and Kentucky and the partial county in Indiana identified in Table 2 below as "nonattainment" for the 2008 ozone NAAQS as part of the Cincinnati-Middletown-Wilmington, OH-KY-IN nonattainment area.

Table 2. EPA's Intended Nonattainment Counties for the Cincinnati-Middletown-Wilmington, OH-KY-IN Ozone Nonattainment Area

Cincinnati-Middletown-Wilmington, OH-KY-IN	State-Recommended Nonattainment Counties	EPA Intended Nonattainment Counties
Indiana	None	Dearborn-Partial
Kentucky	None	Boone Campbell Kenton
Ohio	Butler Clermont Clinton Hamilton Warren	Butler Clermont Clinton Hamilton Warren

Factor Assessment

Factor 1: Air Quality Data

[5] Letters from Leonard K, Peters, Kentucky Energy and Environmental Cabinet Secretary to A. Stanley Meiburg and Gwendolyn Keyes Fleming regarding the initial and updated nonattainment boundary recommendations for the 2008 8-hour ozone standard for Kentucky(October 13, 2011 and March 12, 2009, respectively); Letter from Chris Korleski, Director, State of Ohio Environmental Protection Agency, to Lynn Buhl, Regional Administrator, U.S. Environmental Protection Agency, Region 5, regarding initial nonattainment boundary recommendations for Ohio for the 2008 ozone NAAQS (March 9, 2009); Letter from Thomas W. Easterly, Commissioner, Indiana Department of Environmental Management, to Bharat Mathur, Deputy Regional Administrator, U.S. Environmental Protection Agency, Region 5, regarding the initial nonattainment boundary recommendations for the 2008 ozone NAAQS for Indiana.

For this factor, we considered 8-hour ozone design values (in ppm) for air quality monitors in counties in the Cincinnati-Middleton-Wilmington, OH-KY-IN CSA based on data for the 2008-2010 period, which are the most recent years with fully-certified air quality data. A monitor's design value is the metric or statistic that indicates whether that monitor attains a specified air quality standard. The 2008 ozone NAAQS are met at a monitor when the annual fourth-highest daily maximum 8-hour ozone concentrations, averaged over 3 years is 0.075 ppm or less. A design values is valid only if minimum data completeness requirements are met. See 40 CFR part 50 Appendix P. Where several monitors are located in a county (or a designated nonattainment area or maintenance area), the design value for the county or area is determined by the monitor with the highest individual design value.

Note: Monitors that are eligible for providing design value data generally include State and Local Air Monitoring Stations (SLAMS) that are sited in accordance with 40 CFR Part 58, Appendix D (Section 4.1) and operating with a Federal Reference Method (FRM) or Federal Equivalent Method (FEM) monitor that meets the requirements of 40 CFR Part 58, Appendix A. All data from a Special Purpose Monitor (SPM) using an FRM or FEM which has operated for more than 24 months is eligible for comparison to the NAAQS unless the monitoring agency demonstrates that the data came from a particular period during which the requirements of Appendix A (quality assurance requirements) or Appendix E (probe and monitoring path siting criteria) were not met.

The 2008-2010 ozone design values for monitors and counties in the Cincinnati-Middletown-Wilmington, OH-KY-IN CSA are shown in Table 3.

Table 3. Ozone Air Quality Data for the Cincinnati-Middletown-Wilmington, OH-KY-IN CSA

State/County	Site Number	2008-2010 8-hour Ozone Design Values (ppm)
Ohio:		
Butler	390170018	**0.078†**
Butler	390170004	0.073
Clermont	390250022	0.071
Clinton	390271002	0.074
Hamilton	390610040	**0.076†**
Hamilton	390610010	0.073

Hamilton	390610006	**0.079†**
Warren	391650007	**0.078†**
Kentucky:		
Boone	210150003	0.065
Campbell	210373002	0.072

† Monitored violation of the 2008 ozone NAAQS.

Butler, Hamilton, and Warren Counties in Ohio show violations of the 2008 ozone NAAQS. Therefore, these counties are included in the intended ozone nonattainment area. A county (or partial county) must also be designated nonattainment if it contributes to a violation in a nearby area. Each county without a violating monitor that is located near a county with a violating monitor has been evaluated based on the weight-of-evidence of the five factors and other relevant information to determine whether it contributes to the nearby violation.

Please note that the state of Ohio, in its March 9, 2009 area designation recommendations and accompanying technical support documentation, based its recommendations on 2006-2008 ozone data. Since these data no longer cover the most recent 3-year period with quality-assured, state-certified data and have been supplanted by the more current 2008-2010 ozone data, we are not reviewing the older ozone data covered by the state of Ohio.

Factor 2: Emissions and Emissions-Related Data

EPA evaluated emissions for ozone precursors (VOC and NOx) and other emissions-related data that provide information on area contributions to ozone standard violations.

Emissions Data

EPA evaluated county-level emission data for NOx and VOC derived from the 2008 National Emissions Inventory (NEI), version 1.5. These are the most recently available NEI emissions data. (See http://www.epa.gov/ttn/chief/net/2008inventory.html) Significant emission levels in a nearby area indicate the potential for the area to contribute to the observed ozone standard violation.

Table 4 shows the 2008 emissions of VOC and NOx (tons per year (tpy)) for all counties in the Cincinnati-Middletown-Wilmington, OH-KY-IN CSA. This table also indicates which of the counties were recommended to be nonattainment for the 2008 ozone NAAQS by their respective states.

Table 4. Total 2008 VOC and NOx Emissions (tons/year) in the Cincinnati-Middletown-Wilmington, OH-KY-IN CSA

State/County	State Recommended Nonattainment?	VOC Emissions (tpy)	NOx Emissions (tpy)
Indiana:			
Dearborn	No	3,572	11,637
Franklin	No	1,097	862
Ohio	No	210	259
Kentucky:			
Boone	No	4,332	8,848
Bracken	No	361	760
Campbell	No	2,260	2,697
Gallatin	No	671	1,634
Grant	No	1,148	1,623
Kenton	No	3,901	4,095
Pendleton	No	608	1,394
Ohio:			
Brown	No	1,720	1,430
Butler	Yes	10,813	12,600
Clermont	Yes	5,809	28,461
Clinton	Yes	2,618	2,941
Hamilton	Yes	26,816	38,664
Warren	Yes	5,618	6,027
CSA Total		71,554	123,933

Emissions Observations By State

Ohio:

From the Ohio emissions data in Table 4, it can be seen that comparatively high 2008 VOC and NOx emissions in the vicinity of the violating counties originate in the following counties: Butler, Clermont, Hamilton, and Warren. Emissions from these counties in 2008 account for 68.6 percent of the VOC emissions and 69.2 percent of the NOx emissions for the entire Cincinnati-Middletown-Wilmington, OH-KY-IN CSA.

The VOC and NOx emissions from Brown and Clinton Counties, Ohio are significantly smaller than those originating in the higher emitting counties elsewhere in the Cincinnati-Middletown-Wilmington, OH-KY-IN CSA. This supports the exclusion of Brown County from the recommended ozone nonattainment area for the 2008 8-hour ozone NAAQS, but not the exclusion of Clinton County based on consideration of jurisdictional boundaries (see the discussion of Factor 5 below).

Indiana:

From the Indiana emissions data in Table 4, it can be seen that comparatively high 2008 VOC and NOx emissions in the vicinity of the violating counties originate from Dearborn County. Emissions from this county in 2008 account for 5.0 percent of the VOC emissions and 9.4 percent of the NOx emissions for the entire Cincinnati-Middletown-Wilmington, OH-KY-IN CSA. The majority of these emissions come from the American Electric Power (AEP) - Tanner's Creek Generating Station located in the Lawrenceburg Township, adjacent to the recommended nonattainment area.

The VOC and NOx emissions from Franklin and Ohio Counties in Indiana are comparatively smaller than those originating in the higher emitting counties elsewhere in the Cincinnati-Middletown-Wilmington, OH-KY-IN CSA. This supports the exclusion of these counties from the recommended ozone nonattainment area for the 2008 8-hour ozone NAAQS.

Kentucky:

Based on the 2008 NEI, 62 percent of Boone County's NOx emissions are from point sources, and 21 percent of Boone County's NOx emissions from mobile sources. Less than 5 percent of Campbell County's NOx emissions are from point sources, and 57 percent of Campbell County's NOX emissions are from mobile sources. Kenton County also has less than 5 percent of its NOx emission from point sources, but 63 percent of Kenton County's NOX emissions are from mobile sources. Boone County has 29 percent of its VOC emission coming from area sources and 23 percent of its VOC emissions from mobile sources. Campbell County has 35 percent of its VOC emissions coming from area sources and 43 percent of VOC emissions from mobile sources. Kenton County has 38 percent of its VOC emission coming from area sources and 41 percent of its VOC emissions from mobile sources.

The VOC and NOx emissions from Bracken, Gallatin, Grant, and Pendleton Counties, Kentucky are considerably less than those originating in the higher emitting counties elsewhere in the Cincinnati-Middletown-Wilmington, OH-KY-IN CSA. This would support the exclusion of these counties from the recommended ozone nonattainment area for the 2008 8-hour ozone NAAQS.

Population, Population Density, and Degree of Urbanization

EPA evaluated the population and vehicle use characteristics and population trends of the area as indicators of the probable

location and magnitude of non-point source emissions. These include ozone-creating emissions from on-road and off-road vehicles and engines, consumer products, residential fuel combustion, and consumer services. Areas of dense population or commercial development are an indicator of area source and mobile source NOx and VOC emissions that may contribute to violating ozone monitors. Rapid population or Vehicle Miles Traveled (VMT) growth in a county on the urban perimeter signifies increasing integration with the urban core area, and indicates that it may be appropriate to include this county in the ozone nonattainment area, particularly if this county already has moderate or higher VOC and/or NOx emissions. Table 5 shows the 2010 population, population density, and population growth information for each county in the Cincinnati-Middletown-Wilmington, OH-KY-IN CSA.

Table 5. Population and Population Growth in the Cincinnati-Middletown-Wilmington, OH-KY-IN CSA

State/County	State Recommended Nonattainment	2010 Population	2010 Population Density (1,000 per square mile)	Change in Population (2000-2010)	Population Percent Change (2000-2010)
Indiana:					
Dearborn	No	50,047	0.16	3,702	+8
Franklin	No	23,087	0.06	866	+4
Ohio	No	6,128	0.07	492	+9
Kentucky:					
Boone	No	118,811	0.46	31,811	+37
Bracken	No	8,488	0.04	211	+3
Campbell	No	90,336	0.57	1,680	+2
Gallatin	No	8,589	0.08	705	+9
Grant	No	24,662	0.09	2,115	+9
Kenton	No	159,720	0.97	8,032	+5
Pendleton	No	14,877	0.05	389	+3
Ohio:					
Brown	No	44,846	0.09	2,263	+5
Butler	Yes	368,130	0.78	34,447	+10
Clermont	Yes	197,363	0.43	18,733	+10
Clinton	Yes	42,040	0.10	1,378	+3
Hamilton	Yes	802,374	1.94	-41,916	-5
Warren	Yes	212,693	0.52	52,006	+32
Area-wide		2,172,191	0.45	116,914	+6

Sources: U.S. Census Bureau population estimates for 2010 as of August 4, 2011. (http://factfinder2.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=DEC_10_PL_GCTPL2.ST05&prodType=table)

Population Observations By State

Ohio:

For Ohio, the population data show that Butler, Clermont, Hamilton, and Warren Counties have comparatively large populations and population densities and are densely populated. This implies that the population-related VOC and NOx emissions in these counties are relatively high. In addition, the population change percentages in Butler, Clermont, and Warren Counties between 2000 and 2010 exceed the population change percentage for the entire Cincinnati-Middletown-Wilmington, OH-KY-IN area, implying that the population-related emission contributions from these counties are increasing compared to those from other counties in the Cincinnati-Middletown-Wilmington, OH-KY-IN area.

Indiana:

The populations of the Indiana counties in the Cincinnati-Middletown-Wilmington, OH-KY-IN CSA are smaller than those of the Ohio counties and larger Kentucky counties in this CSA, but Dearborn County has a moderate population implying moderate population-related VOC and NOx emissions. In addition, the population change percentage change from 2000 to 2010 in Dearborn County is greater than the population change percentage for the entire Cincinnati-Middletown-Wilmington, OH-KY-IN CSA, implying that the population-related emission contribution from this county may be increasing relative to those from other counties in the Cincinnati-Middletown-Wilmington, OH-KY-IN area. Ohio County, Indiana also has a greater population change percentage as well, but the lower population in this county causes this change to be less significant.

Kentucky:

For Kentucky, Boone, Campbell, and Kenton Counties have relatively high populations and population densities when compared to the rest of the CSA. Bracken, Gallatin, Grant and Pendleton Counties are smaller when compared to the counties included in the non-attainment recommendation. Boone County at 37 percent growth and Warren County at 32 percent growth had the highest percentage of population growth for any of the counties in the Cincinnati-Middletown-Wilmington CSA. Other counties in this CSA did not have as large of a population percentage change, with their growth rates ranging from a 2 to 10 percent

increase. Hamilton County population decreased by 5 percent from 2000-2010.

Traffic and Commuting Patterns

EPA evaluated the total VMT for each county in the Cincinnati-Middletown-Wilmington, OH-KY-IN CSA. In combination with the population/population density data and the location of main transportation arteries (see above area map), this information helps identify the probable location of non-point source emissions. A county with high VMT is generally an integral part of an urban area and indicates the presence of relatively high motor vehicle emissions that may significantly contribute to ozone formation and transport that contributes to nonattainment in the urban area. Rapid population or VMT growth in a county on the urban perimeter signifies increasing integration with the core urban area, and suggests that this county should be included in the ozone nonattainment area, particularly if the VOC and/or NOx emissions in this county are a significant portion of the total emissions in the nonattainment area.

Table 6 shows the traffic levels, total 2008 VMT, in each county in the Cincinnati-Middletown-Wilmington, OH-KY-IN CSA.

Table 6. Traffic Levels in the Cincinnati-Middletown-Wilmington, OH-KY-IN CSA

State/County	State Recommended Nonattainment	2008 VMT* (million miles)
Indiana:		
Dearborn	No	904
Franklin	No	316
Ohio	No	63
Kentucky:		
Boone	No	1,095
Bracken	No	89
Campbell	No	1,005
Gallatin	No	278
Grant	No	432
Kenton	No	1,669
Pendleton	No	182
Ohio:		
Brown	No	413
Butler	Yes	2,469
Clermont	Yes	1,464
Clinton	Yes	655
Hamilton	Yes	7,391
Warren	Yes	1,640

Area-wide	20,063

* MOBILE model VMT are those input into the NEI version 1.5 use to compute the mobile source portion of the NEI emissions summarized above in Table 4.

VMT Observations By State

Ohio:

For Ohio, the VMT data show that VMT levels in Butler, Clermont, Hamilton, and Warren Counties are comparatively higher than those in Brown and Clinton Counties and, accumulatively, are a significant portion of the total VMT for the Cincinnati-Middletown-Wilmington, OH-KY-IN CSA.

Indiana:

For Indiana, the data show that VMT level in Dearborn County is a comparatively high portion of the total VMT for the Cincinnati-Middletown-Wilmington, OH-KY-IN CSA.

Kentucky:

The VMT data show that VMT levels in Boone, Campbell, and Kenton Counties are larger than those in Bracken, Gallatin, Grant, and Pendleton Counties and, accumulatively, are a large portion of the total VMT for the Cincinnati-Middletown-Wilmington, OH-KY-IN CSA.

Additional Emissions-Related Data Discussed in Ohio's March 9, 2009 Designation Recommendation Submittal

The State of Ohio, through the Ohio Environmental Protection Agency (OEPA), has provided a detailed discussion of the county-specific VOC and NOx emissions, populations, and traffic and commuting patterns for the Ohio counties in the Cincinnati-Middletown-Wilmington, OH-KY-IN CSA. These data support our conclusions discussed above, but also allow us to further refine our decisions for Factor 2 for the Ohio portion of the CSA. This is particularly true for growth in county populations and traffic levels and the inter-county impact of commuter traffic.

With regard to emissions, Ohio clearly shows that both VOC and NOx daily emissions in Brown County are considerably lower than many other counties in the Cincinnati-Middletown-Wilmington, OH-KY-IN CSA. This confirms our conclusions that Brown County

emissions are relatively low and would not support inclusion of this county in the ozone nonattainment area.

Ohio has projected county-populations through 2030. These population projections show that populations in Clinton and Brown Counties will remain comparatively low through 2030. Whereas, the populations of Butler, Clermont, Hamilton, and Warren Counties will either significantly increase or will remain relatively high through 2030.

Estimated daily VMT in Brown County are shown to be largely unchanged beginning in 2001 through 2007, and daily VMT in Hamilton County are estimated to be similarly unchanged between 1990 and 2007. In contrast, daily VMT levels have shown significant growth trends in Butler, Clinton, Clermont, and Warren Counties between 1990 and 2007.

The State of Ohio notes that the vast majority of workers traveling out of county from Butler, Warren, and Clermont Counties commute to Hamilton County. This conclusion is supported by tabulated inter-county commuter numbers and percentages in Ohio' March 9, 2009 submittal. It is also noted that approximately 15 percent of the Hamilton County workers commute outside of the county, with the majority traveling to Butler County, with significant numbers of commuters also traveling from Hamilton County to Warren and Clermont Counties. The commuter numbers for Brown County show a much smaller number commuters traveling to or from other counties in the Cincinnati-Middletown-Wilmington, OH-KY-IN CSA.

Considering all of the information provided by the State of Ohio supports the conclusion that there is strong urban integration of Butler, Clermont, Hamilton, and Warren Counties. In contrast, Clinton and Brown Counties are not significantly integrated with the Cincinnati urban area. This favors the exclusion of Brown County from the Cincinnati-Middletown-Wilmington, OH-KY-IN ozone nonattainment area for the 2008 ozone NAAQS. Clinton County, however, cannot be excluded from the ozone nonattainment area due to jurisdictional boundary considerations, as discussed for Factor 5 below.

Factor 3: Meteorology (Weather/Transport Patterns)

EPA evaluated available meteorological data to help determine how meteorological conditions, particularly transport conditions, affect the fate and transport of ozone and ozone precursors contributing to ozone formation in the Cincinnati-

Middletown-Wilmington, OH-KY-IN CSA. The wind direction percentages show that there is no “preferred” wind direction during the summertime. Transport winds can and do blow from all directions into the counties with the recorded violations of the 2008 ozone NAAQS. There is, however, an indication that winds from south-southwest and west-southwest (collectively, the southwest quadrant) may be more prevalent than winds from other wind directions during the summertime in all three ozone standard violation counties.

Factor 4: Geography/Topography (Mountain Ranges or Other Air Basin Boundaries)

The geography/topography analysis evaluates the physical features of the land that might affect the airshed and, therefore, the distribution of ozone over the area.

The Cincinnati-Middletown-Wilmington, OH-KY-IN CSA does not have any geographical or topographical barriers significantly limiting air pollution transport within its air shed. Therefore, this factor did not play a significant role in this evaluation.

Factor 5: Jurisdictional Boundaries

Once we identified the general area that we anticipated we would recommend as nonattainment for the 2008 ozone NAAQS, we then considered existing jurisdictional boundaries for the purposes of providing a clearly defined legal boundary and to help identify the area appropriate for carrying out the air quality planning and enforcement functions for an ozone nonattainment area. Examples of jurisdictional boundaries include existing/prior nonattainment boundaries for ozone or other urban-scale pollutants, county boundaries, air district boundaries, township boundaries, areas covered by metropolitan planning organizations, state lines, and Reservation boundaries. Where existing jurisdictional boundaries are not adequate or appropriate to describe the nonattainment area, other clearly defined and permanent landmarks or geographic coordinates may be considered.

The Cincinnati-Middletown-Wilmington, OH-KY-IN area has previously established nonattainment boundaries associated with the both the 1-hour ozone and 1997 8-hour ozone NAAQS. The Cincinnati nonattainment boundary for the 1-hour ozone NAAQS included Boone, Campbell and Kenton Counties in their entireties in Kentucky; Butler, Clermont, Hamilton and Warren Counties in

their entireties in Ohio. Whereas the Cincinnati nonattainment boundary for the 1997 8-hour ozone NAAQS included Boone, Campbell and Kenton Counties in their entireties in Kentucky, Butler, Clermont, Clinton, Hamilton and Warren Counties in their entireties in Ohio, and a portion of Dearborn County (Lawrenceburg Township) in Indiana. Kentucky and Indiana have recommended a different nonattainment boundary for the 2008 ozone NAAQS for their portion of this area. Ohio recommended the same boundary as the 1997 ozone NAAQS nonattainment boundary for their portion of this area. With the exception of those counties (and partial county) that comprise the 1997 8-hour ozone boundary for this area, we believe that the remainder of the counties in the CSA do not contribute to the violations at the monitors in this area and, therefore, are not necessary for consideration as part of the nonattainment area.

Conclusion

Ohio:

Based on the assessment of factors described above, EPA has preliminarily concluded that the following Ohio counties should be included in the Cincinnati-Middletown-Wilmington, OH-KY-IN ozone nonattainment area because they are either violating the 2008 ozone NAAQS or contributing to a violation of the 2008 ozone NAAQS within this preliminary nonattainment area: Butler; Clermont; Clinton; Hamilton; and, Warren.

Table 8a summarizes which factors, discussed above, support the inclusion of each Ohio county in the intended nonattainment area for the 2008 ozone NAAQS. Note that Table 8a covers all Ohio counties in the Cincinnati-Middletown-Wilmington, OH-KY-IN CSA, but that not all of these counties are included in the preliminary nonattainment area for the 2008 ozone NAAQS.

Table 8a. Factors Supporting Inclusion of Ohio Counties in the Cincinnati-Middletown-Wilmington, OH-KY-IN Ozone Nonattainment Area for the 2008 Ozone NAAQS

County	Violates Ozone Standard	High Emissions Population and Traffic Levels	Meteorology Favors Emissions Impact on Violating Monitor	Geography Favors High Ozone or Emissions Impact on Violating Monitor	Jurisdictional Basis for Inclusion In Nonattainment Area
Butler	X	X	X	NA	X
Clermont		X	X	NA	X

Clinton			X	NA	X
Hamilton	X	X	X	NA	X
Warren	X	X	X	NA	X

The results in the above table show that Butler, Hamilton, and Warren Counties, at minimum, should be included in the ozone nonattainment area based on air quality data. In addition, these counties also have comparatively high VOC and NOx emissions, populations (high population-related emissions), and traffic levels (traffic-related emissions), which favor their inclusion in the ozone nonattainment area.

Clermont County has comparatively high VOC and NOx emissions and relatively high populations and traffic levels, which, based on meteorological considerations, can also contribute to the monitored ozone standard violations in EPA's intended ozone nonattainment area. Therefore, Clermont County should also be included in the preliminary ozone nonattainment area.

Clinton County has no monitored ozone standard violations and generally lacks the higher VOC and NOx emissions and high population and traffic levels of the other Ohio counties discussed above. Therefore, these factors do not favor the inclusion of Clinton County in the intended ozone nonattainment area. However, it is noted that Clinton County has historically been included in the Cincinnati ozone nonattainment area for the 1997 ozone NAAQS. In addition, the State of Ohio, in its March 9, 2009 ozone designation submittal, has recommended that Clinton County should be included in the ozone nonattainment area for the 2008 ozone NAAQS. Based on the jurisdictional factor and the State's recommendation, we are including Clinton County in the intended, preliminary Cincinnati-Middletown-Wilmington, OH-KY-IN ozone nonattainment area for the 2008 ozone NAAQS.

Finally, it is noted Brown County lacks ozone standard violations, and the comparatively high emissions, populations, and traffic levels of other Ohio counties in the Cincinnati-Middletown-Wilmington, OH-KY-IN CSA. In addition, this county was not included in the nonattainment area for the 1997 ozone NAAQS and Ohio has not recommended the inclusion of this county in the ozone nonattainment area for the 2008 ozone NAAQS. Based on all of these factors and facts, we are not including Brown County in the intended Cincinnati-Middletown-Wilmington, OH-KY-IN ozone nonattainment area for the 2008 ozone NAAQS.

Indiana:

Based on the assessment of factors described above, EPA has preliminarily concluded that the following Indiana county should be included in the Cincinnati-Middletown-Wilmington, OH-KY-IN ozone nonattainment area because they are either violating the 2008 ozone NAAQS or contributing to a violation of the 2008 ozone NAAQS within this preliminary nonattainment area: Lawrence Township in Dearborn County.

Table 8b summarizes which factors, discussed above, support the inclusion of each Indiana county in the intended nonattainment area for the 2008 ozone NAAQS. Note that Table 8b covers all Indiana counties in the Cincinnati-Middletown-Wilmington, OH-KY-IN CSA, but that not all of these counties are included in the preliminary nonattainment area for the 2008 ozone NAAQS.

Table 8b. Factors Supporting Inclusion of Indiana Counties in the Cincinnati-Middletown-Wilmington, OH-KY-IN Ozone Nonattainment Area for the 2008 Ozone NAAQS

County	Monitored Violation for Ozone Standard	High Emissions Population and Traffic Levels	Meteorology Favors Emissions Impact on Violating Monitor	Geography Favors High Ozone or Emissions Impact on Violating Monitor	Jurisdictional Basis for Inclusion In Nonattainment Area
Dearborn - Partial		X	X	NA	X

EPA has preliminarily concluded that Franklin and Ohio Counties are not expected to contribute to the ozone standard violations in the recommended Cincinnati-Middletown-Wilmington, OH-KY-IN ozone nonattainment area. The areas are mostly rural with no point source emissions and minimal amounts of nonpoint source and mobile emissions. Franklin and Ohio Counties were not included in the Cincinnati ozone nonattainment area for the 1997 ozone NAAQS. EPA has preliminarily concluded that Franklin and Ohio Counties are to be excluded from the proposed nonattainment area.

Lawrenceburg Township in Dearborn County contains the American Electric Power (AEP) – Tanner’s Creek Generating Station and has high NOx and VOC emissions. Dearborn County also has the potential to have moderate mobile source and population related VOC and NOx emissions. The inclusion of Lawrenceburg Township in the Cincinnati-Middletown-Wilmington, OH-KY-IN ozone nonattainment area would be consistent with the ozone nonattainment area for the 1997 ozone NAAQS. Lawrenceburg Township contains the only major stationary source in the Indiana portion of Cincinnati-Middletown-Wilmington, OH-KY-IN CSA and accounts for the majority of the VOC and NOx emissions

in the Indiana portion of this area. The remainder of Dearborn County is fairly rural and is similar to Franklin and Ohio Counties. The inclusion of the Lawrenceburg Township portion of Dearborn County, Indiana in the intended Cincinnati-Middletown-Wilmington, OH-KY-IN nonattainment area for the 2008 ozone NAAQS is sufficient to account for the contribution of this county.

Kentucky:

Table 8c summarizes which factors discussed above support the inclusion of Kentucky counties in the intended nonattainment area for the 2008 ozone NAAQS. Note that Table 8c covers all Kentucky counties in the Cincinnati-Middletown-Wilmington, OH-KY-IN CSA, but that not all of these counties are included in the preliminary nonattainment area for the 2008 ozone NAAQS.

Table 8c. Factors Supporting Inclusion of Kentucky Counties in the Cincinnati-Middletown-Wilmington, OH-KY-IN Ozone Nonattainment Area for the 2008 Ozone NAAQS

County	Monitored Violation for Ozone Standard	High Emissions Population and Traffic Levels	Meteorology Favors Emissions Impact on Violating Monitor	Geography Favors High Ozone or Emissions Impact on Violating Monitor	Jurisdictional Basis for Inclusion In Nonattainment Area
Boone		X	X	NA	X
Campbell		X	X	NA	X
Kenton		X	X	NA	X

For Kentucky, based on the assessment of factors described above, EPA has preliminarily concluded that the following counties, Boone, Campbell and Kenton, should be included as part of the Cincinnati-Middletown-Wilmington nonattainment area because they are contributing to a violation in a nearby area. Source category emissions data indicate that mobile sources and area sources are not the primary contributors of NOx to ozone formation in the Cincinnati-Middletown -Wilmington area. The analysis reveals that mobile emissions make up approximately 28 percent of the total NOx in the Cincinnati-Middletown-Wilmington area, and area sources make up approximately 12 percent of the total NOx emissions in the Cincinnati-Middletown -Wilmington area. The total of mobile sources and area sources make up approximately 40 percent of the total NOx emissions in the Cincinnati area. However, VOC emissions in Cincinnati-Middletown-Wilmington area are high for area and mobile sources. The analysis reveals that mobile emissions make up approximately 37 percent of the total VOC in the Cincinnati-Middletown-Wilmington area, and area sources make up approximately 38 percent of the total VOC emissions in the Cincinnati area. The

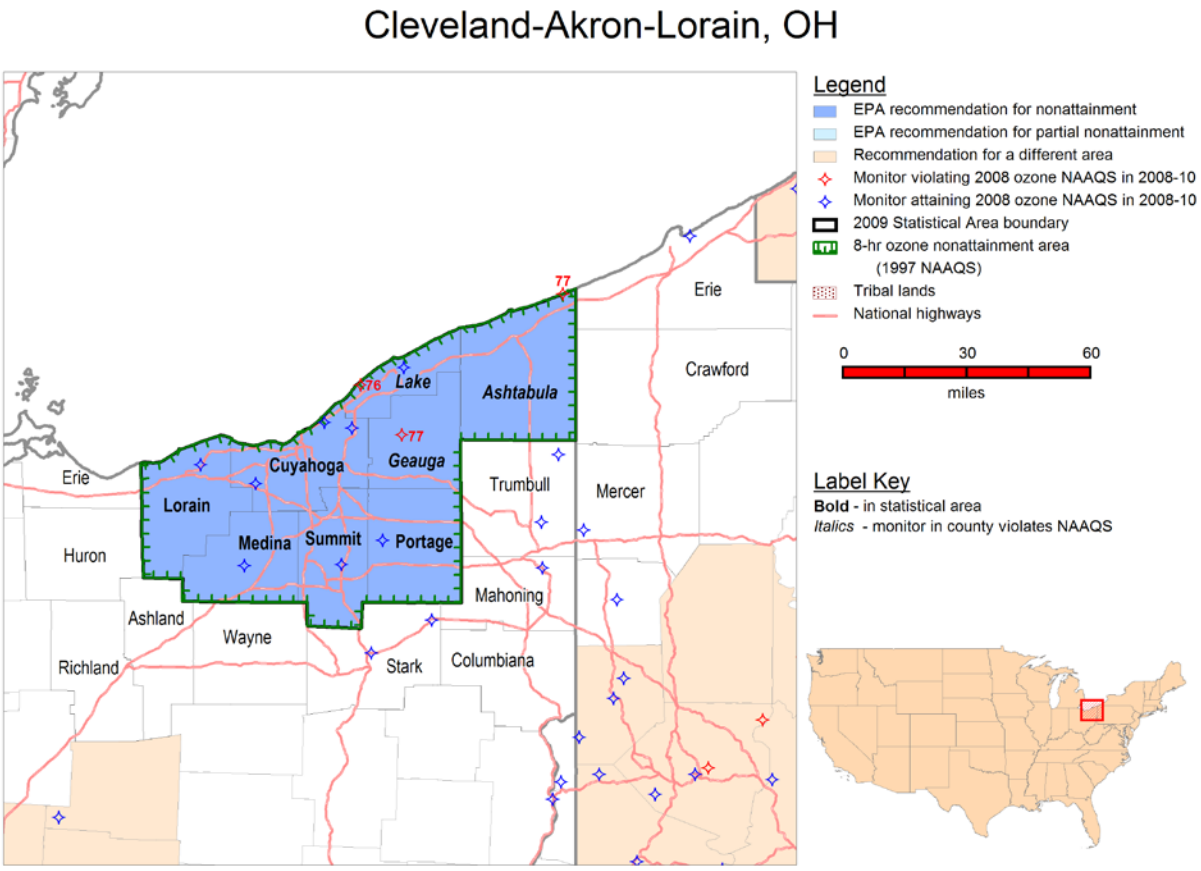
total of mobile sources and area sources make up approximately 75 percent of the total VOC emissions in the Cincinnati-Middletown-Wilmington area. Point sources in the area make up approximately 50 percent of the total NOx emissions and approximatley10 percent of the total VOC emissions in the Cincinnati-Middletown-Wilmington Area.

Boone, Campbell, and Kenton counties' NOx and VOC precursor emissions, high VMT along with population growth suggest that these counties should be considered for inclusion in the Cincinnati-Middletown-Wilmington, OH-KY-IN ozone nonattainment area.

Technical Analysis for Cleveland-Akron-Elyria, OH

Figure 2 is a map of the intended Cleveland-Akron-Elyria, OH ozone nonattainment area for the 2008 ozone NAAQS. The map provides other relevant information, including the locations and ozone design values of air quality monitors recording violations of the 2008 ozone NAAQS, county and other jurisdictional boundaries, existing maintenance boundary for the 1997 ozone NAAQS, Cleveland-Akron-Elyria, OH CSA boundary and major transportation arteries.

Figure 2. Cleveland-Akron-Elyria, OH Area



For purposes of the 1997 ozone NAAQS, as noted in Figure 2, portions of this area were designated nonattainment and subsequently redesignated to attainment (maintenance). The boundary for the nonattainment area for the 1997 ozone NAAQS included all Ohio counties in the Cleveland-Akron-Elyria, OH CSA. In March 2009, Ohio recommended that the same counties in Ohio be designated as nonattainment for the 2008 ozone NAAQS based on air quality data from 2006-2008. These data are from monitors sited and operated in accordance with 40 CFR part 58.

After considering these recommendations and based on EPA's technical analysis described below, EPA intends to designate the same 8 counties in Ohio (identified in Table 9 below) as "nonattainment" for the 2008 ozone NAAQS for the Cleveland-Akron-Elyria, OH nonattainment area.

Table 9. EPA's Intended Nonattainment Counties for the Cleveland-Akron-Elyria, OH Ozone Nonattainment Area

State-Recommended Nonattainment	EPA Intended Nonattainment Counties

Counties in Ohio	in Ohio
Ashtabula	Ashtabula
Cuyahoga	Cuyahoga
Geauga	Geauga
Lake	Lake
Lorain	Lorain
Medina	Medina
Portage	Portage
Summit	Summit

Factor Assessment

Factor 1: Air Quality Data

For this factor, we considered 8-hour ozone design values (in ppm) for air quality monitors in counties in the Cleveland-Akron-Elyria, OH CSA based on data for the 2008-2010 period, which are the most recent years with fully-certified air quality data. As discussed above, a monitor's design value is the metric or statistic that indicates whether that monitor attains a specified air quality standard. The 2008 ozone NAAQS are met at a monitor when the annual fourth-highest daily maximum 8-hour ozone concentrations, averaged over 3 years is 0.075 ppm or less. A design value is valid only if minimum data completeness requirements are met. See 40 CFR part 50 Appendix P. Where several monitors are located in a county (or a designated nonattainment area or maintenance area), the design value for the county or area is determined by the monitor with the highest individual design value.

The 2008-2010 ozone design values for ozone monitors in the Cleveland-Akron-Elyria, OH CSA are shown in Table 10.

Table 10. Ozone Air Quality Data for the Cleveland-Akron-Elyria, OH CSA

County	Site Number	2008-2010 8-Hour Ozone Design Values (ppm)
Ashtabula	390071001	**0.077**†
Cuyahoga	390350064	0.068
Cuyahoga	390350034	0.075
Cuyahoga	390355002	0.075
Geauga	390550004	**0.077**†
Lake	390850003	**0.076**†
Lorain	390930018	0.070
Medina	391030004	0.070

Portage	391331001	0.067
Summit	391530020	0.075

† Monitored violation of the 2008 ozone NAAQS.

From Table 10, it can be seen that Ashtabula, Geauga, and Lake Counties in Ohio show violations of the 2008 ozone NAAQS for the period of 2008-2010. Therefore, these counties must be included in the ozone nonattainment area. As noted above, a county (or partial county) must also be designated nonattainment if it contributes to an air quality standard violation in a nearby area. Each county in the Cleveland-Akron-Elyria, OH CSA has been evaluated, as discussed below, based on the five factors summarized above and other relevant information to determine whether it contributed to the violations of the 2008 ozone NAAQS in Ashtabula, Geauga, and Lake Counties.

Please note that the State of Ohio, in its March 9, 2009 area designation recommendations and accompanying technical support documentation, based its area recommendations on 2006-2008 ozone data. Since these data no longer cover the most recent 3-year period with quality-assured, state-certified data and have been supplanted by the more current 2008-2010 ozone data, we are not reviewing the older ozone data covered by the state of Ohio.

Factor 2: Emissions and Emissions-Related Data

EPA evaluated emissions for VOC and NOx and other emissions-related data (primarily county population, population density, and traffic levels, and projected growth rates for county populations) that provide information on area contributions to local ozone standard violations.

Emissions Data

EPA evaluated county-level emission data for NOx and VOC derived from the 2008 NEI, version 1.5. These are the most recently available NEI emissions data. (See http://www.epa.gov/ttn/chief/net/2008inventory.html) Significant emission levels in a nearby area indicate the potential for the area to contribute to the observed ozone standard violation.

Table 11 shows the 2008 emissions of NOx and VOC (tons per year) for all counties in the Cleveland-Akron-Elyria, OH CSA. This table also indicates which of the counties were recommended to be nonattainment for the 2008 ozone NAAQS by the State of Ohio.

Table 11. Total 2008 VOC and NOx Emissions (tons/year) in the Cleveland-Akron-Elyria, OH CSA

State/County	State Recommended Nonattainment?	VOC Emissions (tpy)	NOx Emissions (tpy)
Ohio:			
Ashtabula	Yes	10,411	9,860
Cuyahoga	Yes	42,981	38,698
Geauga	Yes	3,891	2,237
Lake	Yes	10,382	19,286
Lorain	Yes	11,646	15,261
Medina	Yes	5,918	5,101
Portage	Yes	6,137	5,656
Summit	Yes	18,699	14,924
CSA Total		110,065	111,022

From the emissions data in Table 11, it can be seen that comparatively high 2008 VOC and NOx emissions in the vicinity of the violating counties originate in the following counties: Ashtabula, Cuyahoga, Lake, Lorain, and Summit. Emissions from these counties in 2008 account for 85.5 percent of the VOC emissions and 88.3 percent of NOx emissions for the entire Cleveland-Akron-Elyria, OH CSA.

The VOC and NOx emissions from Geauga, Medina, and Portage Counties are significantly smaller than those originating in the higher emitting counties within the Cleveland-Akron-Elyria, OH CSA. Note, however, that the collective emissions from these "lower emission" counties does constitute 12 to 15 percent of the CSA total emissions. So, even though individual VOC and NOx emissions are relatively low in the low emissions counties, their collective emission levels are equivalent to the emission levels for counties we are intending to include in the nonattainment area for the 2008 ozone NAAQS. On this basis, we conclude that these counties may have the potential to contribute to ozone standard violations in the Cleveland-Akron-Elyria, OH area.

Population, Population Density, and Degree of Urbanizaion

EPA evaluated the population and vehicle use characteristics and population trends of the area as indicators of the probable location and magnitude of non-point source emissions. These include ozone-creating emission from on-road and off-road vehicles and engines, consumer products, residential fuel combustion, and consumer services. Areas of dense population or commercial development are an indicator of area source and mobile source NOx and VOC emissions, which can contribute to local and downwind high ozone concentrations. Rapid population

or VMT growth in a county on the urban perimeter signifies increasing integration with the urban core area, and indicates that it may be appropriate to include this county in the ozone nonattainment area, particularly if this county already has moderate or higher VOC and/or NOx emissions.

Table 12 shows the 2010 population, population density, and population growth information for each county in the Cleveland-Akron-Elyria, OH CSA.

Table 12. Population and Population Growth in the Cleveland-Akron-Elyria, OH CSA

State/County	State Recommended Nonattainment?	2010 Population	2010 Population Density (1,000 per square mile)	Change in Population (2000-2010)	Population Percent Change (2000-2010)
Ohio:					
Ashtabula	Yes	101,497	0.14	-1,249	-1
Cuyahoga	Yes	1,280,122	2.79	-111,989	-8
Geauga	Yes	93,389	0.23	2,180	2
Lake	Yes	230,041	0.99	2,385	1
Lorain	Yes	301,356	0.61	16,224	6
Medina	Yes	172,332	0.41	20,496	13
Portage	Yes	161,419	0.32	9,036	6
Summit	Yes	541,781	1.29	-1,797	0
Area Totals		**2,881,937**	**0.79**	**-64,714**	**-2**

Sources: U.S. Census Bureau population estimates for 2010 as of August 4, 2011. (http://factfinder2.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=DEC_10_PL_GCTPL2.ST05&proType=table)

The population data show that Cuyahoga, Lake, Lorain, Medina, Portage, and Summit Counties have comparatively high populations and population densities. This implies that these counties are generally urbanized and relatively integrated with the urban core of the Cleveland-Akron-Elyria, OH CSA. It also implies that the population-related VOC and NOx emissions in these counties are comparatively high and contribute to the ozone standard violations in the Cleveland-Akron-Elyria, OH CSA.

The counties that experienced the largest population growth for the 2000-2010 period are Lorain and Medina. As noted above, this implies an increasing integration of these counties with the urban core of the Cleveland-Akron-Elyria, OH CSA, and favors the inclusion of these counties in the ozone nonattainment area.

Although some counties, to the contrary are experiencing population declines (Cuyahoga and Summit Counties), their base populations remain high, implying that they should not be excluded from the ozone nonattainment area.

Traffic and Commuting Patterns

EPA evaluated the total VMT for each county in the Cleveland-Akron-Elyria, OH CSA. In combination with the county-specific population/population density data and the locations of the main transportation arteries (see above), this information helps identify the probable locations of non-point source emissions. A county with high VMT is generally an integral part of an urban area and indicates the presence of relatively high motor vehicle emissions that may significantly contribute to ozone formation and transport that contributes to ozone standard violations in or downwind of the urban area. Rapid population or VMT growth in a county on the urban perimeter signifies increasing integration with the urban core area, and indicates that this county should be included in the ozone nonattainment area, particularly if the VOC and/or NOx emissions in this county are a significant portion of the total emissions in the nonattainment area.

Table 13 show the traffic levels, 2008 VMT, in each county in the Cleveland-Akron-Elyria, OH CSA.

Table 13. Traffic Levels in the Cleveland-Akron-Elyria, OH CSA

State/County	State Recommended Nonattainment?	2008 VMT (million miles)
Ohio:		
Ashtabula	Yes	1,039
Cuyahoga	Yes	10,148
Geauga	Yes	736
Lake	Yes	2,111
Lorain	Yes	2,359
Medina	Yes	1,532
Portage	Yes	1,651
Summit	Yes	5,471
Area Total		25,048

The VMT data show that VMT levels in all counties, with the exception of Geauga County, are relatively high. This implies that mobile source emissions in these counties are comparatively high and contribute to ozone standard violations in the Cleveland-Akron-Elyria, OH area.

VMT in Geauga County are comparatively lower than those in other counties in this area. This, however, does not imply that this county should be excluded from the ozone nonattainment area since this county has a monitored violation of the 2008 ozone NAAQS.

Additional Emissions-Related Data Discussed in Ohio's March 9, 2009 Designation Recommendation Submittal

OEPA has provided typical daily, county-specific total VOC and NOx emissions for 2005 and 2009 for each of the counties in the Cleveland-Akron-Elyria, OH CSA. These data confirm the conclusions we have drawn above using county-specific annual emissions.

OEPA has provided population projections through 2030 for each of the counties in the CSA. These data show significant population growth trends in Geauga, Lake, Lorain, Medina, Portage, and Wayne Counties. Populations are projected to be substantially unchanged in Ashtabula and Summit Counties through 2030. Populations are projected to decline over time in Cuyahoga County, however, the population in this county is projected to remain above 1 million through 2030.

OEPA provided graphs of daily VMT levels plotted for the period of 1990-2007 for each of the counties in the CSA. This visual VMT trend information shows that daily VMT grew moderately during the 1990-2007 period for Ashtabula, Cuyahoga, Geauga, Lake, Lorain, Medina, Portage, and Summit Counties.

OEPA provided inter-county commuter numbers and percentages for each of the counties in the Cleveland-Akron-Elyria, OH CSA. These numbers show a strong inter-county commuting pattern throughout the CSA.

Collectively, the OEPA-supplied population and traffic data support the conclusion that all of the counties in the Cleveland-Akron-Elyria, OH CSA, with the exception of Ashtabula County, are relatively integrated with the urban, industrial core of this area. Therefore, these data support including Cuyahoga, Geauga, Lake, Lorain, Medina, Portage, and Summit Counties in the Cleveland-Akron-Elyria, OH ozone nonattainment area. As noted elsewhere in this technical review, Ashtabula County must be included in this ozone nonattainment area as the result of its monitored violation of the 2008 ozone NAAQS.

Factor 3: Meteorology (Weather/Transport Patterns)

EPA evaluated available meteorological data to help determine how meteorological conditions, particularly transport conditions, affect the fate and transport of ozone and ozone precursors contributing to ozone formation in the Cleveland-Akron-Elyria, OH CSA. EPA examined the frequency distribution of wind directions for the four seasons of the year by averaging National Weather Service direction-sorted wind directions for each county for a 30 year period. To apply the results of this data analysis to the Cleveland-Akron-Elyria, OH CSA, we have considered the wind direction (direction from which winds are blowing, reflecting directions to potential source areas) frequencies during the summer months (June-August) for the three Ohio counties with recorded violations of the 2008 ozone NAAQS (See Table 10). Therefore, we have considered wind direction distributions for Ashtabula, Cuyahoga, and Geauga Counties in Ohio.

Table 14 shows the summertime 30-year averaged percentages of wind directions (winds blowing into the subject county from the specified wind direction sector) for the three ozone standard violation counties in the Cleveland-Akron-Elyria, OH CSA.

Table 14. Averaged Summertime Wind Direction Percentages for Ozone Standard Violation Counties in the Cleveland-Akron-Elyria, OH CSA

Wind Direction	Ashtabula County	Geauga County	Lake County
North-Northeast	10.1	13.4	14.8
East-Northeast	7.1	6.1	5.5
East-Southeast	8.5	8.3	6.9
South-Southeast	10.1	9.5	9.7
South-Southwest	25.1	24.8	26.8
West-Southwest	15.8	16.6	16.2
West-Northwest	13.2	10.9	10.2
North-Northwest	10.1	10.3	10.0

The wind direction percentages show that there is no single “preferred” wind direction during the summertime, when the highest ozone concentrations are generally monitored. Transport winds can and do blow from all directions in the counties with the recorded violations of the 2008 ozone NAAQS. There is, however, an indication that winds from the south-southwest and west-southwest may be more prevalent than winds from other wind directions during the summertime in all three ozone standard violation counties.

Unfortunately, EPA's wind direction percentage data do little to shed light on which counties in the Cleveland-Akron-Elyria, OH CSA are the most important from an ozone and ozone precursor transport standpoint. The wind directions considered have not been sorted based on peak ozone concentrations or specifically for high ozone days, the timing of peak ozone concentrations, wind speeds, or other factors that could have been used to isolate the most critical ozone precursor source areas.

Factor 4: Geography/Topography (Mountain Ranges or Other Air Basin Boundaries)

The geography/topography analysis evaluates the physical features of the land that might affect the airshed and, therefore, the distribution of ozone over the area.

The Cleveland-Akron-Elyria, OH CSA does not have any geographical or topographical barriers significantly limiting air pollution transport within its air shed. Therefore, this factor did not play a significant role in this evaluation.

Factor 5: Jurisdictional Boundaries

Once we identified the general area that we anticipated we would recommend as nonattainment for the 2008 ozone NAAQS, we then considered existing jurisdictional boundaries for the purposes of providing a clearly defined legal boundary and to help identify the area appropriate for carrying out the air quality planning and enforcement functions for an ozone nonattainment area. Examples of jurisdictional boundaries include existing/prior nonattainment boundaries for ozone or other urban-scale pollutants, county boundaries, air district boundaries, township boundaries, areas covered by metropolitan planning organizations, state lines, and Reservation boundaries. Where existing jurisdictional boundaries are not adequate or appropriate to describe the nonattainment area, other clearly defined and permanent landmarks or geographic coordinates may be considered.

The portion of the Cleveland-Akron-Elyria, OH CSA that we are considering as designating as nonattainment for the 2008 ozone NAAQS has a previously established nonattainment boundary associated with the 1997 8-hour ozone NAAQS. The State of Ohio has recommended the same counties (as included in the 1997 8-hour ozone nonattainment area) in Ohio to be included in the boundary of the nonattainment area for the 2008 ozone NAAQS. The prior inclusion of these counties in the ozone nonattainment

area for the 1997 ozone NAAQS forms the primary jurisdictional basis for the inclusion of these counties in the nonattainment area for the 2008 ozone NAAQS.

Conclusion

Based on the assessment of factors described above, EPA has preliminarily concluded that the following Ohio counties should be included in the Cleveland-Akron-Elyria, OH ozone nonattainment area because they are either violating the 2008 ozone NAAQS or are contributing to a violation of the 2008 ozone NAAQS within this preliminary nonattainment area: Ashtabula; Cuyahoga; Geauga; Lake; Lorain; Medina; Portage; and, Summit.

Table 15 summarizes which factors discussed above support the inclusion of each Ohio county in the preliminary nonattainment area for the 2008 ozone NAAQS.

Table 15. Factors Supporting Inclusion of Ohio Counties in the Cleveland-Akron-Elyria, OH Ozone Nonattainment Area for the 2008 Ozone NAAQS

County	Violates Ozone Standard	High Emissions Population and Traffic Levels	Meteorology Favors Emissions Impact on Violating Monitor	Geography Favors High Ozone or Emissions Impact on Violating Monitor	Jurisdictional Basis for Inclusion In Nonattainment Area
Ashtabula	X	X	X	NA	X
Cuyahoga		X	X	NA	X
Geauga	X		X	NA	X
Lake	X	X	X	NA	X
Lorain		X	X	NA	X
Medina		X	X	NA	X
Portage		X	X	NA	X
Summit		X	X	NA	X

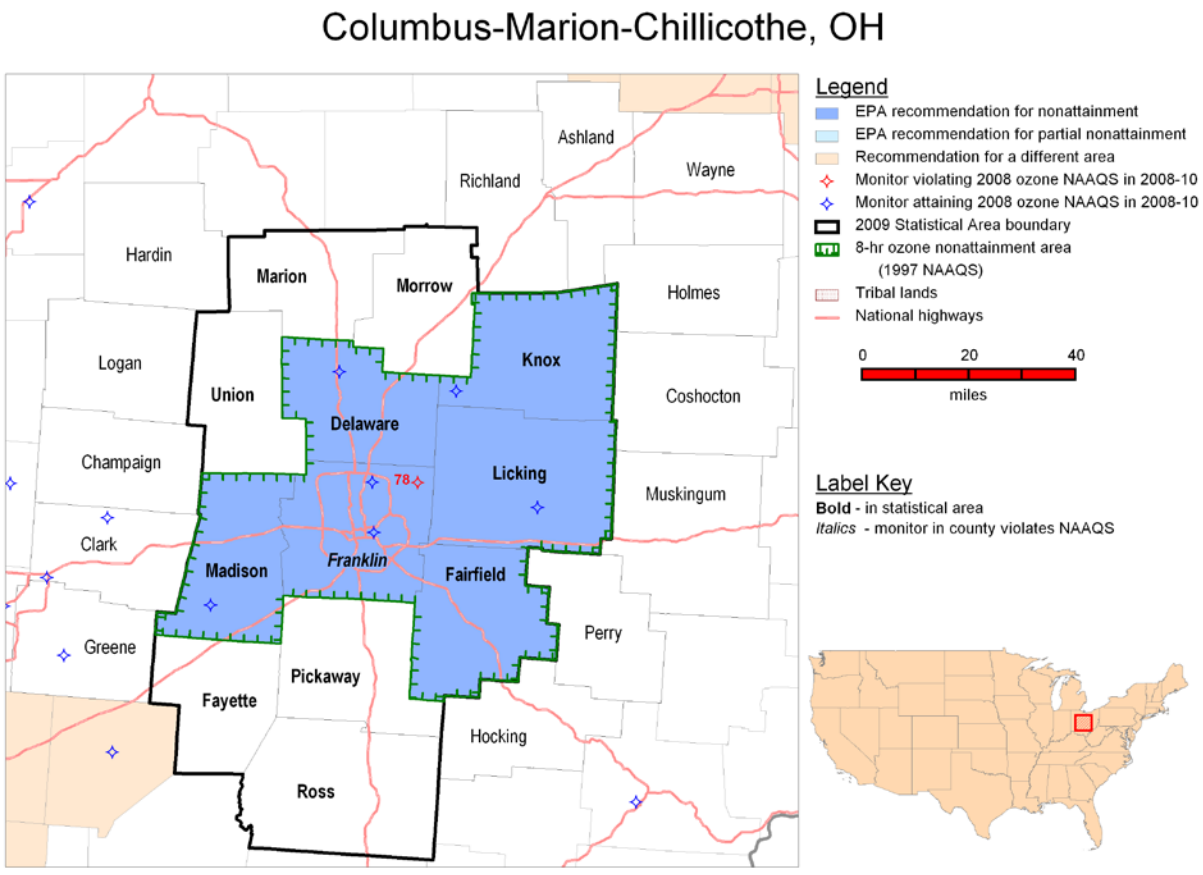
The results in the above table show that all counties in the Cleveland-Akron-Elyria, OH CSA should be included in the Cleveland-Akron-Elyria, OH nonattainment area for the 2008 ozone NAAQS. Ashtabula, Geauga, and Lake Counties have monitored violations of the 2008 ozone NAAQS. All counties, except Geauga County, have high emissions or emissions-related data (population, population growth, and/or traffic levels) that support inclusion in the nonattainment area. Finally, all of these counties are recommended for inclusion in the ozone nonattainment area by the State of Ohio and were included in the ozone nonattainment area for the 1997 ozone NAAQS.

Based on these factors, we conclude that the entire Cleveland-Akron-Elyria, OH CSA should be included in the Cleveland-Akron-Elyria, OH nonattainment area for the 2008 ozone NAAQS.

Technical Analysis for Columbus-Marion-Chillicothe, OH

Figure 3 is a map of the intended Columbus, OH ozone nonattainment area for the 2008 ozone NAAQS. The map provides other relevant information, including the locations and ozone design values of air quality monitors recording violations of the 2008 ozone NAAQS, county and other jurisdictional boundaries, existing maintenance boundary for the 1997 ozone NAAQS, Columbus-Marion-Chillicothe, OH CSA boundary and major transportation arteries.

Figure 3. Columbus-Marion-Chillicothe, OH Area



For purposes of the 1997 ozone NAAQS, as noted in Figure 3, portions of this area were designated nonattainment and subsequently redesignated to attainment (maintenance). The

boundary for the nonattainment area for the 1997 ozone NAAQS included only a portion of the Columbus-Marion-Chillicothe, OH CSA. In March 2009, Ohio recommended that the same counties (the same counties included in the nonattainment area for the 1997 ozone NAAQS) in Ohio be designated as nonattainment for the 2008 ozone NAAQS based on air quality data from 2006-2008 and other considerations. The 2006-2008 ozone data are from monitors sited and operated in accordance with 40 CFR part 58.

After considering these recommendations and based on EPA's technical analysis described below, EPA intends to designate the same 6 counties in Ohio (identified in Table 16 below) as "nonattainment" for the 2008 ozone NAAQS as part of the Columbus, OH nonattainment area.

Table 16. EPA's Intended Designated Nonattainment Counties for the Columbus, OH Ozone Nonattainment Area

State-Recommended Nonattainment Counties in Ohio	EPA Intended Nonattainment Counties in Ohio
Delaware	Delaware
Fairfield	Fairfield
Franklin	Franklin
Knox	Knox
Licking	Licking
Madison	Madison

Factor Assessment

Factor 1: Air Quality Data

For this factor, we considered 8-hour ozone design values (in ppm) for air quality monitors in counties in the Columbus-Marion-Chillicothe, OH CSA based on data for the 2008-2010 period, which are the most recent years with fully-certified air quality data. As discussed above, a monitor's design value is the metric or statistic that indicates whether that monitor attains a specified air quality standard. The 2008 ozone NAAQS are met at a monitor when the annual fourth-highest daily maximum 8-hour ozone concentrations, averaged over 3 years is 0.075 ppm or less. A design value is valid only if minimum data completeness requirements are met. See 40 CFR part 50 Appendix P. Where several monitors are located in a county or area (or a designated nonattainment area or maintenance area), the design value for the county or area is determined by the monitor with the highest individual design value.

The ozone design values for ozone monitors in the Columbus-Marion-Chillicothe, OH CSA are shown in Table 17.

Table 17. Ozone Air Quality Data for the Columbus-Marion-Chillicothe, OH CSA

State/County	Site Number	2008-2010 8-Hour Ozone Design Values (ppm)
Delaware	390410002	0.073
Franklin	390490081	0.069
Franklin	390490037	0.071
Franklin	390490029	**0.078**†
Knox	390830002	0.071
Licking	390890005	0.072
Madison	390970007	0.070

† Monitored violation of the 2008 ozone NAAQS.

From Table 17, it can be seen that Franklin County is the only county in the Columbus-Marion-Chillicothe, OH CSA with a monitored violation of the 2008 ozone NAAQS for the period of 2008-2010. Therefore, at minimum, Franklin County must be included in the ozone nonattainment area. As noted above, a county (or partial county) must also be designated nonattainment if it contributes to an air quality violation in a nearby area (to the violation of the 2008 ozone NAAQS recorded in Franklin County). Each county in the Columbus-Marion-Chillicothe, OH CSA has been evaluated, as discussed below, based on the five factors discussed above and other relevant information to determine whether it contributed to the violation of the 2008 ozone NAAQS in Franklin County.

Please note that the State of Ohio, in its March 9, 2009 area designation recommendations and accompanying technical support documentation, based its area recommendations on 2006-2008 ozone data. Since these data no longer cover the most recent 3-year period with quality-assured, state-certified data and have been supplanted by the more current 2008-2010 ozone data, we are not reviewing the older ozone data covered by the state of Ohio.

Factor 2: Emissions and Emissions-Related Data

EPA evaluated emissions for VOC and NOx and other emissions-related data (primarily county population, population density, and traffic levels, and projected growth rates for these emissions-related data) that provide information on area contributions to local ozone standard violations.

EPA's Accumulated Emissions and Emissions-Related Data

Emissions Data

EPA evaluated county-level emission data for NOx and VOC derived from the 2008 NEI, version 1.5. These are the most recently available NEI emissions data. (See http://www.epa.gov/ttn/chief/net/2008inventory.html) Significant emission levels in a nearby area (in a county near to a county with a violating ozone monitor) indicate the potential for the area to contribute to the observed ozone standard violation.

Table 18 shows the 2008 emissions of NOx and VOC (in tons per year) for all counties in the Columbus-Marion-Chillicothe, OH CSA. This table also indicates which of the counties were recommended to be nonattainment for the 2008 ozone NAAQS by the State of Ohio.

Table 18. Total 2008 VOC and NOx Emissions (tons/year) in the Cleveland-Akron-Elyria, OH CSA

State/County	State Recommended Nonattainment?	VOC Emissions (tpy)	NOx Emissions (tpy)
Ohio:			
Delaware	Yes	5,686	5,655
Fairfield	Yes	4,459	4,915
Fayette	No	1,887	1,981
Franklin	Yes	38,690	32,092
Knox	Yes	2,324	1,539
Licking	Yes	7,016	6,008
Madison	Yes	2,373	2,809
Marion	No	3,588	3,509
Morrow	No	1,983	2,190
Pickaway	No	2,969	3,919
Ross	No	3,292	5,010
Union	No	3,404	2,413
CSA Total		77,671	72,041

From the emissions data in Table 18, it can be seen that the VOC and NOx emissions in the Columbus-Marion-Chillicothe, OH CSA are dominated by those in Franklin County. The VOC emissions in Franklin County are 49.8 percent of the CSA total, and the NOx emissions in Franklin County are 44.5 percent of the CSA total. All other counties in this CSA have significantly lower and similar (to each other) VOC and NOx emissions. However, the accumulative VOC and NOx emissions in these remaining counties is a significant portion of the total VOC and NOx emissions in the CSA.

The high emissions in Franklin County, along with the monitored violation of the 2008 ozone NAAQS in this county, implies that Franklin County should be part of the nonattainment area for the 2008 ozone NAAQS. The VOC and NOx emissions for the remaining counties in the Columbus-Marion-Chillicothe, OH CSA do not provide a definitive basis for inclusion or exclusion from the nonattainment area. Note that the counties Ohio is recommending for exclusion from the nonattainment area have similar VOC and NOx emissions to many of the Ohio-recommended nonattainment counties in the Columbus-Marion-Chillicothe, OH CSA.

Population, Population Density, and Degree of Urbanization

EPA evaluated the population and vehicle use characteristics and trends of the area as indicators of the probable location and magnitude of non-point source emissions. These include ozone-creating emissions from on-road and off-road vehicles and engines, consumer products, residential fuel combustion, and consumer services. Areas of dense population or commercial development are an indicator of area source and mobile source NOx and VOC emissions, which can contribute to local and downwind high ozone concentrations. Rapid population or VMT growth in a county on the urban perimeter signifies increasing integration with the urban core area, and indicates that it may be appropriate to include this county in the ozone nonattainment area, particularly if this county already has moderate or higher VOC and/or NOx emissions.

Table 19 shows the 2010 population, population density, and population growth information for each county in the Columbus-Marion-Chillicothe, OH CSA.

Table 19. Population and Population Growth in the Columbus-Marion-Chillicothe, OH CSA

State/County	State Recommended Nonattainment?	2010 Population	2010 Population Density (1,000 per square mile)	Change in Population (2000-2010)	Population Percent Change (2000-2010)
Ohio:					
Delaware	Yes	174,214	0.38	62,504	56
Fairfield	Yes	146,156	0.29	22,736	18
Fayette	No	29,030	0.07	595	2
Franklin	Yes	1,163,414	2.14	91,127	8
Knox	Yes	60,921	0.12	6,278	11
Licking	Yes	166,492	0.24	20,421	14
Madison	Yes	43,435	0.09	3,223	8

Marion	No	66,501	0.16	351	1
Morrow	No	34,827	0.09	3,033	10
Pickaway	No	55,698	0.11	2,882	5
Ross	No	78,064	0.11	4,614	6
Union	No	52.300	0.12	11,105	27
CSA Totals		2,071,052	0.34	228,869	12

Sources: U.S. Census Bureau population estimates for 2010 as of August 4, 2011. (http://factfinder2.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=DEC_10_PL_GCTPL2.STO5&proType=table)

The population data show that half of the 2010 population and almost half of the 2000-2010 population growth in the Columbus-Marion-Chillicothe, OH CSA can be found in Franklin County. Comparatively large 2010 populations and 2000-2010 population growths can also be found in Delaware, Fairfield, and Licking Counties. The 2010 populations in the remaining counties in the CSA are comparatively smaller. Union County has a comparativley high population growth percentage, however, its 2010 population is small compared to those of Delaware, Fairfield, Franklin, and Licking Counties. Finally, the 2010 populations and 2000-2010 population growths of Fayette and Marion Counties are comparatively lower than those of other counties in the Columbus-Marion-Chillicothe, OH CSA.

Traffic and Commuting Patterns

EPA evaluated the commuting patterns of residents in the Columbus-Marion-Chillicothe, OH CSA. In combination with the county-specific population/population density data and the locations of the main transportation arteries (see above), this information helps identify the probable locations of non-point source emissions. A county with high VMT and/or a high number of commuters is generally an integral part of an urban area and indicates the presence of relatively high motor vehicle emissions that may significantly contribute to ozone standard violations in or downwind of the urban area. Rapid population or VMT growth in a county on the urban perimeter signifies increasing integration with the urban core area, and indicates that this county should be included in the ozone nonattainment area, particularly if the VOC and/or NOx emissions in this county are a significant portion of the total emissions in the nonattainment area.

Table 20 shows the traffic levels, 2008 VMT, in each county in the Columbus-Marion-Chillicothe, OH CSA.

Table 20. Traffic Levels in the Columbus-Marion-Chillicothe, OH CSA

State/County	State Recommended Nonattainment?	2008 VMT (million miles)
Ohio:		
Delaware	Yes	1,530
Fairfield	Yes	1,035
Fayette	No	505
Franklin	Yes	10,645
Knox	Yes	397
Licking	Yes	1,780
Madison	Yes	704
Marion	No	629
Morrow	No	605
Pickaway	No	648
Ross	No	772
Union	No	630
CSA Total		19,881

The VMT data show that county-specific VMT levels are the highest in Delaware, Franklin, Fairfield, and Licking Counties. These VMT account for 75.4 percent of the total VMT in the Columbus-Marion-Chillicothe, OH CSA.

The VMT data plus the population data in Table 19 indicate that Delaware, Fairfield, Franklin, and Licking Counties are relatively urbanized with significant population- and traffic-related emissions that contributed to the ozone standard violation in Franklin County. This contribution is much smaller for the remaining counties in the Columbus-Marion-Chillicothe, OH CSA.

Additional Emissions-Related Data Discussed in Ohio's March 9, 2009 Designation Recommendation Submittal

OEPA has provided typical daily, county-specific total VOC and NOx emissions for 2005 and 2009 for each of the counties in the Columbus-Marion-Chillicothe, OH CSA. These data confirm the conclusions we have drawn above using county-specific annual emissions.

OEPA has provided population projections through 2030 for each of the counties in the CSA. Populations are projected to increase significantly in Delaware, Fairfield, Franklin, Licking, Medina, Morrow, Pickaway, Ross, and Union Counties. Populations are projected to increase moderately in Fayette and Marion Counties. Populations are expected to decline in Knox County.

OEPA provided graphs of daily VMT levels plotted for the period of 1990-2007 for each of the counties in the CSA. This visual VMT trend information shows that daily VMT grew significantly during the 1990-2007 period for Delaware, Fairfield, Franklin, Licking and Morrow Counties. The VMT trend information shows that daily VMT grew moderately during the 1990-2007 period for Knox, Marion, Pickaway (VMT levels remained substantially unchanged after 1999 in this county), and Ross Counties.

OEPA provided inter-county commuter numbers and percentages for each of the counties in the Columbus-Marion-Chillicothe, OH CSA. These numbers show a moderate to high inter-county commuting pattern between Franklin County and other counties (with the exceptions of Fayette, Knox, Ross, Marion, and Morrow Counties) in the Columbus-Marion-Chillicothe, OH CSA. Inter-county commuter numbers between other counties (other than Franklin County) in the CSA are moderate to small.

Collectively, the OEPA-supplied population and traffic/commuter data show moderate integration between Franklin, Delaware, Fairfield, Licking, Medina, Morrow, Pickaway, Ross, and Union Counties. Less integration is apparent between Franklin, Fayette, Knox, and Marion Counties. This implies that, from an emissions standpoint, the Columbus, OH ozone nonattainment area should include Delaware, Fairfield, Franklin, Licking, Medina, Morrow, Pickaway, Ross, and Union Counties. Remaining counties in the CSA could be excluded on the basis that their emissions are not significant contributors to the monitored violations of the 2008 ozone NAAQS in Franklin County.

Factor 3: Meteorology (Weather/Transport Patterns)

EPA's Accumulated Meteorological Data

EPA evaluated available meteorological data to help determine how meteorological conditions, particularly transport conditions, affect the fate and transport of ozone and ozone precursors contributing to ozone formation in the Columbus-Mario-Chillicothe, OH CSA. EPA examined the frequency distribution of wind directions for the four seasons of the year by averaging National Weather Service direction-sorted wind directions for each county for a 30-year period. To apply the results of this data analysis to the Columbus-Marion-Chillicothe, OH CSA, we have considered the wind direction (direction from which winds are blowing, reflecting directions to potential source areas) frequencies during the summer months (June-August) for Franklin County, which is the only county in

the CSA with a monitored violation of the 2008 ozone NAAQS (See Table 17).

Table 21 shows the summertime 30-year averaged percentages of wind directions (winds blowing into the subject county from the specified wind direction sector) for Franklin County.

Table 21. Averaged Summertime Wind Direction Percentages For Franklin County

Wind Direction	Franklin County
North-Northeast	15.3
East-Northeast	9.6
East-Southeast	11.4
South-Southeast	12.0
South-Southwest	22.0
West-Southwest	11.0
West-Northwest	9.7
North-Northwest	9.0

The wind direction percentages show that there is no single "preferred" wind direction during the summertime, when the highest ozone concentrations are generally monitored. Winds from south-southwest may be more prevalent than the winds from other wind directions during the summertime.

Unfortunately, EPA's wind direction percentage data do little to shed light on which counties in the Columbus-Marion-Chillicothe, OH CSA are the most important from an ozone and ozone precursor transport standpoint. The wind directions considered have not been sorted based on peak ozone concentrations or specifically for high ozone days, the timing of peak ozone concentrations, wind speeds, or other factors that could have been used to isolate the most critical ozone precursor source areas.

Factor 4: Geography/Topography (Mountain Ranges or Other Air Basin Boundaries)

The geography/topography analysis evaluates the physical features of the land that might affect the airshed and, therefore, the distribution of ozone over the area.

The Columbus-Marion-Chillicothe, OH CSA does not have any geographical or topographical barriers significantly limiting air pollution transport within its air shed. Therefore, this factor did not play a significant role in this evaluation.

Factor 5: Jurisdictional Boundaries

Once we identified the general area that we anticipated we would recommend as nonattainment for the 2008 ozone NAAQS, we then considered existing jurisdictional boundaries for the purposes of providing a clearly defined legal boundary and to help identify the area appropriate for carrying out the air quality planning and enforcement functions for an ozone nonattainment area. Examples of jurisdictional boundaries include existing/prior nonattainment boundaries for ozone or other urban-scale pollutants, county boundaries, air district boundaries, township boundaries, areas covered by metropolitan planning organizations, state lines, and Reservation boundaries. Where existing jurisdictional boundaries are not adequate or appropriate to describe the nonattainment area, other clearly defined and permanent landmarks or geographic coordinates may be considered.

The portion of the Columbus-Marion-Chillicothe, OH CSA that we are considering for designation as nonattainment for the 2008 ozone NAAQS has a previously established nonattainment boundary associated with the 1997 8-hour ozone NAAQS. The State of Ohio has recommended the same counties (as included in the 1997 8-hour ozone nonattainment area) in Ohio be included in the boundary of the nonattainment area for the 2008 ozone NAAQS. The prior inclusion of these counties in the ozone nonattainment area for the 1997 ozone NAAQS forms the primary jurisdictional basis for the inclusion of these counties in the nonattainment area for the 2008 ozone NAAQS.

Conclusion

Based on the assessment of factors described above, EPA has preliminarily concluded that the following Ohio counties should be included in the Columbus, OH ozone nonattainment area because they are either violating the 2008 ozone NAAQS or are contributing to a violation of the 2008 ozone NAAQS within this intended ozone nonattainment area: Delaware; Fairfield; Franklin; Knox; Licking; and, Madison.

Table 22 summarizes which factors discussed above support the inclusion of each Ohio county in the Columbus, OH preliminary nonattainment area for the 2008 ozone NAAQS.

Table 22. Factors Supporting Inclusion of Ohio Counties in the Columbus, OH Ozone Nonattainment Area for the 2008 Ozone NAAQS

County	Violates	High	Meteorology	Geography	Jurisdictional

	Ozone Standard	Emissions Population and Traffic Levels	Favors Emissions Impact on Violating Monitor	Favors High Ozone or Emissions Impact on Violating Monitor	Basis for Inclusion In Nonattainment Area
Delaware		X	X	NA	X
Fairfield		X	X	NA	X
Franklin	X	X	X	NA	X
Knox			X	NA	X
Licking		X	X	NA	X
Madison			X	NA	X

The results in the above table show that Delaware, Fairfield, Franklin and Licking Counties should be included in the Columbus, OH ozone nonattainment area on the bases of a violation of the 2008 ozone NAAQS and/or significant emissions that contribute to the violation of the 2008 ozone NAAQS.

The issue is less clear for Knox and Madison Counties due to the lack of a monitored ozone standard violation and relatively low VOC and NOx emissions, populations, and traffic levels in these counties. The only bases for including these counties in the intended, preliminary ozone nonattainment area for the 2008 ozone NAAQS are the facts that the State of Ohio has recommended their inclusion in the nonattainment area and that these counties were included in the nonattainment area for the 2007 ozone NAAQS. Based on these facts, we agree with the State of Ohio that these counties should also be included in the Columbus, OH nonattainment area.

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LOUISIANA
Area Designations for the 2008 Ozone National Ambient Air Quality Standards

The table below identifies the areas and associated parishes or parts of parishes in Louisiana that EPA intends to designate as nonattainment for the 2008 ozone national ambient air quality standards (2008 NAAQS). In accordance with section 107(d) of the Clean Air Act, EPA must designate an area "nonattainment" if it is violating the 2008 ozone NAAQS or if it is contributing to a violation of the 2008 ozone NAAQS in a nearby area. The technical analyses supporting the boundaries for the one nonattainment area are provided below.

Intended Nonattainment Areas in Louisiana

Area	Louisiana's Recommended Nonattainment Parishes	EPA's Intended Nonattainment Parishes
Baton Rouge-Pierre Part, LA	East Baton Rouge	Ascension East Baton Rouge Iberville Livingston West Baton Rouge

EPA intends to designate the remaining parishes in Louisiana that are not listed in the table above as "unclassifiable/attainment" for the 2008 ozone NAAQS.

The analysis below provides the basis for intended nonattainment area boundaries. It relies on our analysis of whether and which monitors are violating the 2008 ozone NAAQS, based on certified air quality monitoring data from 2008-2010 and an evaluation of whether nearby areas are contributing to such violations. EPA has evaluated contributions from nearby areas based on a weight of evidence analysis considering the factors identified below. EPA issued guidance on December 4, 2008 that identified these factors as ones EPA would consider in determining nonattainment area boundaries and recommended that states consider these factors in making their designations recommendations to EPA.[1]

1. Air quality data (including the design value calculated for each FRM or FEM[2] monitor in the area);
2. Emissions and emissions-related data (including location of sources and population, amount of emissions and emissions controls, and urban growth patterns);
3. Meteorology (weather/transport patterns);
4. Geography and topography (mountain ranges or other basin boundaries);
5. Jurisdictional boundaries (e.g., parishes, air districts, existing nonattainment areas, Indian country, metropolitan planning organizations (MPOs))

[1] The December 4, 2008 guidance memorandum "Area Designations for the 2008 Revised Ozone National Ambient Air Quality Standards" refers to 9 factors. In this technical support document we have grouped the emissions-related factors together under the heading of "Emissions and Emissions-Related Data," which results in 5 categories of factors.

[2] FRM refers to Federal Reference Method, and FEM refers to Federal Equivalent Method. FRM monitors utilize a chemi-luminescent technique to measure ozone, while many FEM monitors use a technique involving ultraviolet photometry. FEM methods began to be developed in the late 1970's and early1980's and are now the most widely utilized methods for monitoring ozone levels. Refer to 40 CFR Part 53 for a more detailed description of FEM and FRM methods. http://www.epa.gov/ttnamti1/files/ambient/criteria/reference-equivalent-methods-list.pdf

Ground-level ozone generally is not emitted directly into the air, but is created by chemical reactions between oxides of nitrogen (NOx) and volatile organic compounds (VOC) in the presence of sunlight. Because NOx and VOC emissions from a broad range of sources over a wide area typically contribute to violations of the ozone standards, EPA believes it is important to consider whether there are contributing emissions from a broad geographic area. Accordingly, EPA chose to examine the 5 factors with respect to the larger of the Combined Statistical Area (CSA) or Core Based Statistical Area (CBSA) associated with the violating monitor(s).[3] All data and information used by EPA in this evaluation are the latest available to EPA and/or provided to EPA by states or tribes.

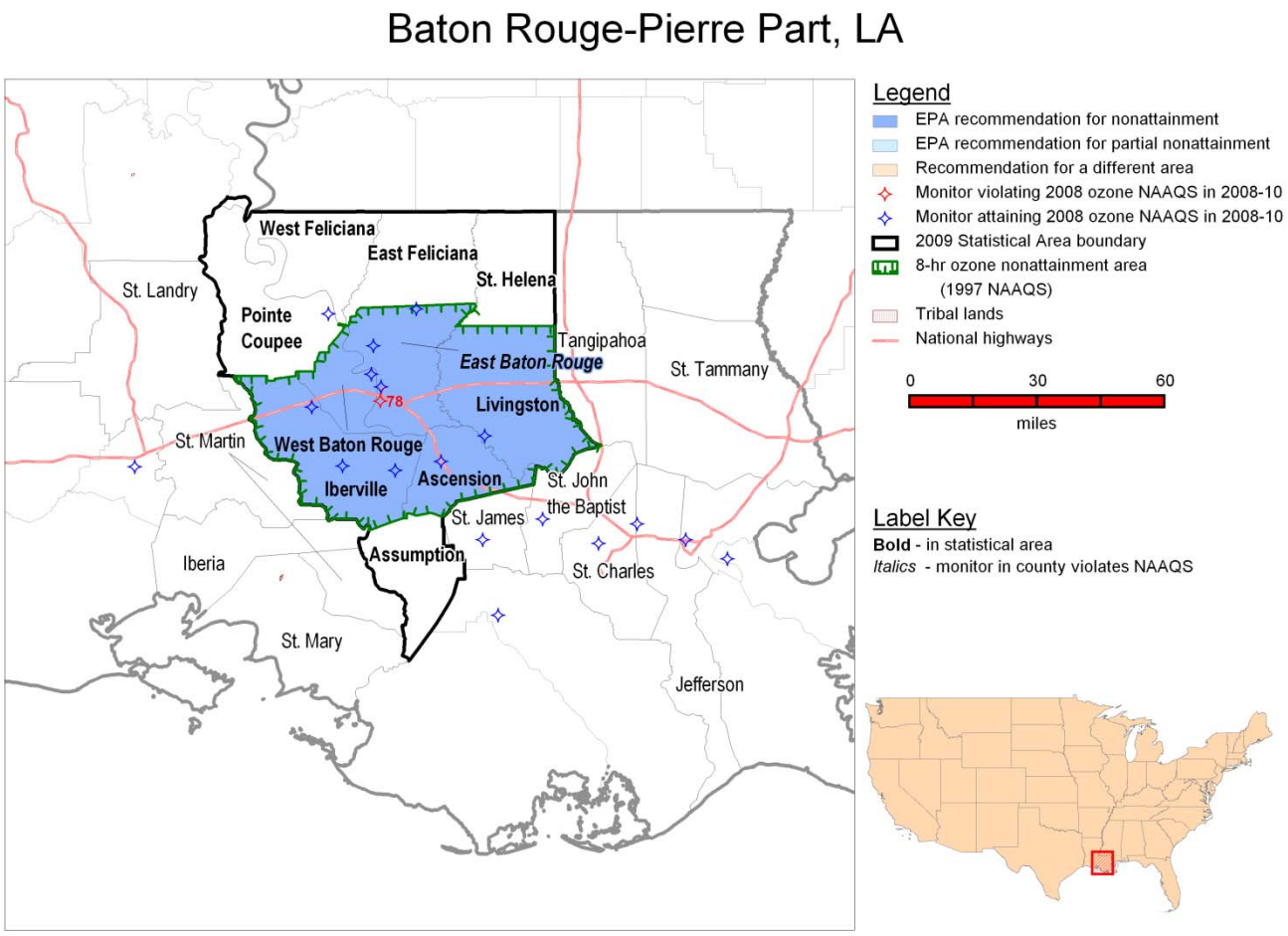
In EPA's designations guidance for the 2008 ozone NAAQS EPA recommended examining CSA/CBSAs because certain factors used to establish CSAs and CBSAs are similar to the factors EPA is using in this technical analysis to determine if a nearby area is contributing to a violation of the 2008 ozone NAAQS. Congress required a similar approach in 1990 for areas classified as serious or above for the 1-hour ozone standard and EPA used the same basic approach in the designation process for the 1997 ozone NAAQS. Where a violating monitor is not located in a CSA or CBSA, EPA's guidance recommended using the boundary of the parish containing the violating monitor as the starting point for considering the nonattainment area's boundary.

Technical Analysis for Baton Rouge-Pierre Part

Figure 1 is a map of the Baton Rouge-Pierre Part intended nonattainment area. The map provides other relevant information including the locations and design values of air quality monitors, parish and other jurisdictional boundaries, relevant statistical area boundaries, the nonattainment area boundary for the 1997 ozone NAAQS, and major transportation arteries.

[3] Lists of CBSAs and CSAs and their geographic components are provided at www.census.gov/population/www/metroareas/metrodef.html . The lists are periodically updated by the Office of Management and Budget. EPA used the most recent update, based on 2008 population estimates, issued on December 1, 2009 (OMB Bulletin No. 10-02).

Figure 1: Intended Baton Rouge-Pierre Part nonattainment area.



For purposes of the 1997 8-hour ozone NAAQS, this area was designated nonattainment. The boundary for the nonattainment area for the 1997 ozone NAAQS included the entire parishes of Ascension, East Baton Rouge, Iberville, Livingston, and West Baton Rouge.

In March 2009,[4] Louisiana recommended that eleven parishes throughout the state, including East Baton Rouge Parish, be designated as nonattainment for the 2008 ozone NAAQS based on air quality data from 2006-2008. In January 2011[5], Louisiana provided a revised recommendation that only East Baton Rouge Parish be designated nonattainment. This revised recommendation was based on air quality data from 2008-2010, which was obtained from Federal Equivalent Method (FEM) monitors sited and operated in accordance with 40 CFR Part 58.

After considering these recommendations and based on EPA's technical analysis described below, EPA intends to designate five (5) parishes in Louisiana (identified in Table 1 below) as “nonattainment” for the 2008 ozone NAAQS as part of the Baton Rouge nonattainment area.

[4] Initial 2008 ozone NAAQS designation recommendation letter from Secretary Leggett to Acting Regional Administrator Starfield, dated March 12, 2009.
[5] Updated ozone designation letter from Secretary Hatch to Regional Administrator Armendariz, dated January 25, 2011.

Table 1. Louisiana's Recommended and EPA's Intended Designated Nonattainment Parishes for Baton Rouge-Pierre Part.

Baton Rouge-Pierre Part	State-Recommended Nonattainment Parishes	EPA Intended Nonattainment Parishes
Louisiana	East Baton Rouge	Ascension East Baton Rouge Iberville Livingston West Baton Rouge

Factor Assessment

Factor 1: Air Quality Data

For this factor, we considered 8-hour ozone design values (in ppm) for air quality monitors in parishes in the Baton Rouge CMSA based on data for the 2008-2010 period (i.e., the 2010 design value, or DV), which are the most recent years with fully-certified air quality data. A monitor's DV is the metric or statistic that indicates whether that monitor attains a specified air quality standard. The 2008 ozone NAAQS are met at a monitor when the annual fourth-highest daily maximum 8-hour average concentration, averaged over 3 years is 0.075 ppm or less. A DV is only valid if minimum data completeness criteria are met. See 40 CFR part 50 Appendix P. Where several monitors are located in a parish (or a designated nonattainment area or maintenance area), the DV for the parish or area is determined by the monitor with the highest level.

The 2010 DVs for the ozone NAAQS for parishes in Baton Rouge and nearby surrounding area are shown in Table 2.

Table 2. Air Quality Data.

Parish	State Recommended Nonattainment?	2008-2010 Design Value (ppb)
Ascension, LA	No	75
Assumption, LA	No	--
East Baton Rouge, LA	Yes	78
East Feliciano, LA	No	--
Iberville, LA	No	73
Livingston, LA	No	75
Pointe Coupee, LA	No	75
St. Helena, LA	No	--
West Baton Rouge, LA	No	71
West Feliciano, LA	No	--

Ambient monitoring in East Baton Rouge Parish indicates a violation of the 2008 ozone NAAQS, therefore this parish is included in the nonattainment area. A parish (or partial parish) must also be designated nonattainment if it contributes to a violation in a nearby area. Each parish without a violating monitor that is located near a parish with a violating monitor has been evaluated, as discussed below, based on the five factors and other relevant information to determine whether it contributes to the nearby violation. EPA also notes that, in addition to the violating monitor in East Baton Rouge Parish, ambient

monitors in three parishes in the Baton Rouge area, Ascension Parish, Livingston Parish, and Pointe Coupee Parish, indicate design values just under the nonattainment threshold.

Factor 2: Emissions and Emissions-Related Data

EPA evaluated emissions of ozone precursors (NO_x and VOC) and other emissions-related data that provide information on areas contributing to violating monitors.

Emissions Data

EPA evaluated parish-level emission data for NO_x and VOC derived from the 2008 National Emissions Inventory (NEI), version 1.5. This is the most recently available NEI. (See http://www.epa.gov/ttn/chief/net/2008inventory.html) Significant emissions levels in a nearby area indicate the potential for the area to contribute to observed violations. We will also consider any additional information we receive on changes to emissions levels that are not reflected in recent inventories. These changes include emissions reductions due to permanent and enforceable emissions controls that will be in place before final designations are issued and emissions increases due to new sources.

Table 3 shows emissions of NO_x and VOC (given in tons per year) for violating and nearby parishes that we considered for inclusion in the Baton Rouge-Pierre Part intended nonattainment area.

Table 3. Total 2008 NO_x and VOC Emissions.

Parish	State Recommended Nonattainment?	NO_x (tpy)	VOC (tpy)
Ascension, LA	No	14,128	13,524
Assumption, LA	No	1,654	2,008
East Baton Rouge, LA	Yes	21,863	24,473
East Feliciana, LA	No	1,142	1,631
Iberville, LA	No	14,818	10,152
Livingston, LA	No	3,087	4,780
Pointe Coupee, LA	No	15,733	2,560
St. Helena, LA	No	1,154	1,001
West Baton Rouge, LA	No	9,268	3,467
West Feliciana, LA	No	1,107	793
	Area-wide:	83,954	64,389

Five parishes in the CBSA are characterized by comparatively high emissions of NOx, which exceed 9,000 tons per year, and three parishes have comparatively high VOC emissions in excess of 10,000 tons per year. Collectively, the parishes of Ascension, East Baton Rouge, Iberville, Pointe Coupee, and West Baton Rouge contribute 90 percent of the NOx emissions for the ten-parish area. Similarly, Ascension, East Baton Rouge, and Iberville Parishes collectively contribute 75 percent of the ten-parish area's VOC emissions. The relatively high emissions of ozone precursors in these parishes is a factor that EPA considered in evaluating their possible inclusion in the Baton Rouge-Pierre Part nonattainment area.

In our analysis of the emissions data for the area, we took note that the NOx emissions from Pointe Coupee are primarily from a single point source that is already well-controlled and may undergo further emissions reductions resulting from implementation of regional air quality measures such as CSAPR.

The remaining parishes are characterized by comparatively low NOx and VOC emissions, in the range of 1,000 to 5,000 tons per year.

Population density and degree of urbanization

EPA evaluated the population and vehicle use characteristics and trends of the area as indicators of the probable location and magnitude of non-point source emissions. These include ozone-creating emissions from on-road and off-road vehicles and engines, consumer products, residential fuel combustion, and consumer services. Areas of dense population or commercial development are an indicator of area source and mobile source NO_x and VOC emissions that may contribute to ozone formation that contributes to nonattainment in the area. Rapid population or VMT growth (see below) in a parish on the urban perimeter signifies increasing integration with the core urban area, and indicates that it may be appropriate to include the area associated with area source and mobile source emissions as part of the nonattainment area. Table 4 shows the population, population density, and population growth information for each parish in the area.

Table 4. Population and Growth.

Parish	State Recommended Nonattainment?	2010 Population	2010 Population Density (1,000 pop/sq mi)	Absolute change in population (2000-2010)	Population % change (2000-2010)
Ascension, LA	No	107,215	0.35	29,937	39
Assumption, LA	No	23,421	0.06	42	0
East Baton Rouge, LA	Yes	440,171	0.93	27,281	7
East Feliciana, LA	No	20,267	0.04	(1,098)	(5)
Iberville, LA	No	33,387	0.05	72	0
Livingston, LA	No	128,026	0.18	35,496	38
Pointe Coupee, LA	No	22,802	0.04	46	0
St. Helena, LA	No	11,203	0.03	695	7
West Baton Rouge, LA	No	23,788	0.12	2,224	10
West Feliciana, LA	No	15,625	0.04	488	3
	Area-wide:	825,905	0.18	95,183	13

Sources: U.S. Census Bureau population estimates for 2010 as of August 4, 2011 (http://factfinder2.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=DEC_10_PL_GCTPL2.STO5&prodType=table)

The 2010 Census data indicates that the population of the Baton Rouge area is centered around the parishes of Ascension, East Baton Rouge, and Livingston; each of these parishes is characterized by population counts in excess of 100,000 people and population densities greater than 150 people per square mile. Although West Baton Rouge has a lower population count than Ascension, East Baton Rouge, and Livingston, it does have a population density of 120 people per square mile, which is similar to that of the larger parishes.

Three of the parishes, Ascension, Livingston, and West Baton Rouge, have undergone increases in population of 10 percent or more since the 2000 Census was taken. The growth in population in these three parishes accounts for almost all the total population growth for the area.

The presence of large populations, and high population density, is an indicator of high area and mobile source emissions of ozone precursors that may contribute to observed violations of the 2008 ozone NAAQS in this area, which argues for inclusion of these parishes in the nonattainment area. The remaining parishes are mostly rural with little urbanization.

The attachment to this document contains Figure 2, Baton Rouge Ozone and Ozone Precursor Monitoring Network, and Figure 3, Population Density Change Percentage Between 2000 and 2010 Census for Baton Rouge Ozone and Ozone Precursor Monitoring Network, which present graphical information on population density and growth for the Baton Rouge area.

Traffic and commuting patterns

EPA evaluated the commuting patterns of residents in the area, as well as the total Vehicle Miles Traveled (VMT) for each parish. In combination with the population/population density data and the location of main transportation arteries (see above), this information helps identify the probable location of non-point source emissions. A parish with high VMT and/or a high number of commuters is generally an integral part of an urban area and indicates the presence of motor vehicle emissions that may contribute to ozone formation that contributes to nonattainment in the area. Rapid population or VMT growth in a parish on the urban perimeter signifies increasing integration with the core urban area, and indicates that the associated area source and mobile source emissions may be appropriate to include in the nonattainment area. Table 5 shows traffic and commuting pattern data, including total 2008 VMT and 10-year VMT growth, and the total vehicle miles traveled (VMT) for each parish.

Table 5. Traffic and Commuting Patterns (As Indicated by VMT).

Parish	State Recommended Nonattainment?	2008 VMT* (million miles)	% Change in VMT (2002 – 2008)
Ascension, LA	No	1,141	+28
Assumption, LA	No	261	+54
East Baton Rouge, LA	Yes	3,572	+19
East Feliciana, LA	No	225	-19
Iberville, LA	No	516	+28
Livingston, LA	No	1,287	+12
Pointe Coupee, LA	No	289	+25
St. Helena, LA	No	136	+8
West Baton Rouge, LA	No	596	+102
West Feliciana, LA	No	160	-33
	Area-wide:	8,183	---

* MOBILE model VMTs are those inputs into the NEI version 1.5.

Five of the parishes in the Baton Rouge area are characterized by comparatively high VMT. These parishes are: Ascension, East Baton Rouge, Iberville, Livingston, and West Baton Rouge. Collectively these five parishes account for 87 percent of the total VMT for the area. Because motor vehicle emissions can contribute significantly to an area's NOx emissions inventory, indicators such as high VMT and growth in VMT argue for inclusion of these parishes in the nonattainment area designation. The parishes of East Feliciana and Pointe Coupee are characterized by low total VMTs, relative to the core parishes discussed above.

Factor 3: Meteorology (weather/transport patterns)

EPA evaluated available meteorological data to help determine how meteorological conditions, such as weather, transport patterns and stagnation conditions, would affect the fate and transport of precursor emissions contributing to ozone formation. We conducted an analysis of back trajectories to assess where air masses originated when ozone exceedances (greater than 75 ppb) occur in the Baton Rouge area. We used the NOAA HYSPLIT model to assess all exceedances at the Design Value monitor for the area, the LSU monitor, for the years 2008 to 2010 and also evaluated 2006 and 2007.

The attachments to this document contain Figures 2 and 4. Figure 2, Baton Rouge Ozone and Ozone Precursor Monitoring Network, presents locations of major stationary sources, and locations of ambient monitors with their design values. Figure 4, Baton Rouge Ozone and Ozone Precursor Monitoring Network with Wind Trajectories, includes an overlay of the back trajectories (on Figure 2), which characterizes where the centerline of the air mass originated for the 24 hours preceding the afternoon of the violation. An examination of the 24-hour back trajectories for the recent 3 years of violations of the 75 ppb standard at the LSU monitor indicates that emissions from Pointe Coupee Parish do not appear to contribute to observed violations of the 2008 ozone NAAQS in East Baton Rouge Parish for days with ozone concentrations above 75 ppb at the LSU site for the three-year period from 2008-2010. For the 2008-10 back trajectories, only one back-trajectory traverses through the southwest edge of the Pointe Coupee Parish, where no major sources are present. For this one back trajectory, it does not appear that the one major source, a power plant in the northeast part of the Parish, could contribute based on the trajectory. Normally when we are developing a conceptual model understanding of what yields ozone exceedances in an area we will evaluate 5 to 10 years worth of meteorological data. Therefore we decided to evaluate all days that had ozone exceedances at LSU monitor for the 2006-2007 period as well. Looking back a little further to the 2006-2007 period, there were two days out of 25 with back trajectories that traversed Pointe Coupee Parish, but for the five-year 2006-2010 time period only 5 percent of all days with ozone concentrations greater than 75 ppb at the LSU site had wind back trajectories that went back through Pointe Coupee Parish.

Conversely, examination of the back trajectory data depicted in Figure 4 indicates that emissions from Ascension, Iberville, Livingston, Pointe Coupee, and West Baton Rouge Parishes could contribute at times to nonattainment in East Baton Rouge Parish. We note that the back trajectories passed through the Pointe Coupee Parish only 5% of the time.

Factor 4: Geography/topography (mountain ranges or other air basin boundaries)

The geography/topography analysis evaluates the physical features of the land that might affect the airshed and, therefore, the distribution of ozone over the area. The Baton Rouge area does not have any geographical or topographical barriers significantly limiting air pollution transport within its air shed. Therefore, this factor did not play a significant role in this evaluation.

Factor 5: Jurisdictional boundaries

Once we identified the general areas we anticipated we would recommend should be included in the nonattainment area, we then considered existing jurisdictional boundaries for the purposes of providing a clearly defined legal boundary and to help identify the areas appropriate for carrying out the air quality planning and enforcement functions for nonattainment areas. Examples of jurisdictional boundaries include existing/prior nonattainment area boundaries for ozone or other urban-scale pollutants, parish lines, air district boundaries, township boundaries, areas covered by a metropolitan planning organization, state lines, Reservation boundaries, and urban growth boundaries. Where existing jurisdictional boundaries were not adequate or appropriate to describe the nonattainment area, other clearly defined and permanent landmarks or geographic coordinates were considered.

The Baton Rouge area has previously established nonattainment boundaries associated with the 1-hour and 1997 8-hour ozone NAAQS, the latter of which encompassed all of Ascension, East Baton Rouge, Iberville, Livingston, and West Baton Rouge Parishes. Louisiana has recommended a different boundary for the 2008 ozone NAAQS, limiting their recommended nonattainment area to East Baton Rouge Parish, which has the only ambient monitor indicating a violation of the 2008 ozone standard. For evaluation of the boundary for the 2008 ozone nonattainment area, EPA gave strong consideration to the nonattainment area boundary for the 1997 ozone standard.

Conclusion

Based on the assessment of the factors described above, EPA has preliminarily concluded that the following parishes should be included as part of the Baton Rouge-Pierre Part nonattainment area because they are either violating the 2008 ozone NAAQS or contributing to a violation in a nearby area: Ascension, East Baton Rouge, Iberville, Livingston, and West Baton Rouge Parishes. These are the same parishes that were included in the Baton Rouge-Pierre Part nonattainment area for the 1997 ozone NAAQS. The air quality monitors in East Baton Rouge Parish indicate a violation of the 2008 ozone NAAQS based on the 2010 design value; therefore this parish is included in the nonattainment area.

Ascension, Iberville, Livingston, and West Baton Rouge are nearby parishes that do not have monitors indicating a violation of the NAAQS, but EPA has preliminarily concluded that these parishes contribute, through emissions from point sources and non-point sources (e.g., vehicles and other small area sources), to the ozone concentrations in violation of the 2008 ozone NAAQS in East Baton Rouge Parish.

Ascension, East Baton Rouge, Iberville, Livingston, Pointe Coupee, and West Baton Rouge Parishes have among the highest NOx and VOC emissions in the area. Pointe Coupee Parish is not being preliminarily proposed for inclusion in the 2008 ozone nonattainment area because analysis of back trajectory meteorological data indicate that the transport of emissions from Pointe Coupee Parish do not contribute very often to observed violations of 2008 ozone NAAQS in East Baton Rouge Parish. We note that, other than the large power plant point source, the Pointe Coupee Parish ranks low on the other factors of population, and VMT. We also note that most of the emissions of NOx from Pointe Coupee are emitted by a single point source that is already well-controlled and that will likely further reduce emissions to comply with future regional air quality measures like CSAPR. In past attainment demonstration SIPs for the Baton Rouge area, Louisiana has controlled point sources outside the Baton Rouge nonattainment are when it determined it was needed. Overall, Pointe Coupee parish does not rank high on factors other than point source emissions that will be further reduced in the future and could be

even further controlled by the state if the state finds it necessary, therefore our preliminary conclusion is to not include the Pointe Coupee Parish in the Baton Rouge Pierre Part nonattainment area for the 2008

Finally, the parishes of Ascension, East Baton Rouge, Iberville, Livingston, and West Baton Rouge are the most densely populated in the Baton Rouge area. Collectively, these five parishes account for almost all of the VMT within East Baton Rouge Parish.

ATTACHMENTS

Figure 2. Baton Rouge Ozone and Ozone Precursor Monitoring Network, with Population Density.

Figure 3. Population Density Change Percentage Between 2000 and 2010 Census for Baton Rouge Ozone and Ozone Precursor Monitoring Network.

Figure 4. Overlay of 24-hour HYSPLIT back trajectories of all 75 ppb exceedances at the LSU monitor for the 2006-2010 period.

Figure 2 - Baton Rouge Ozone and Ozone Precursor Monitoring Network., with Population Density

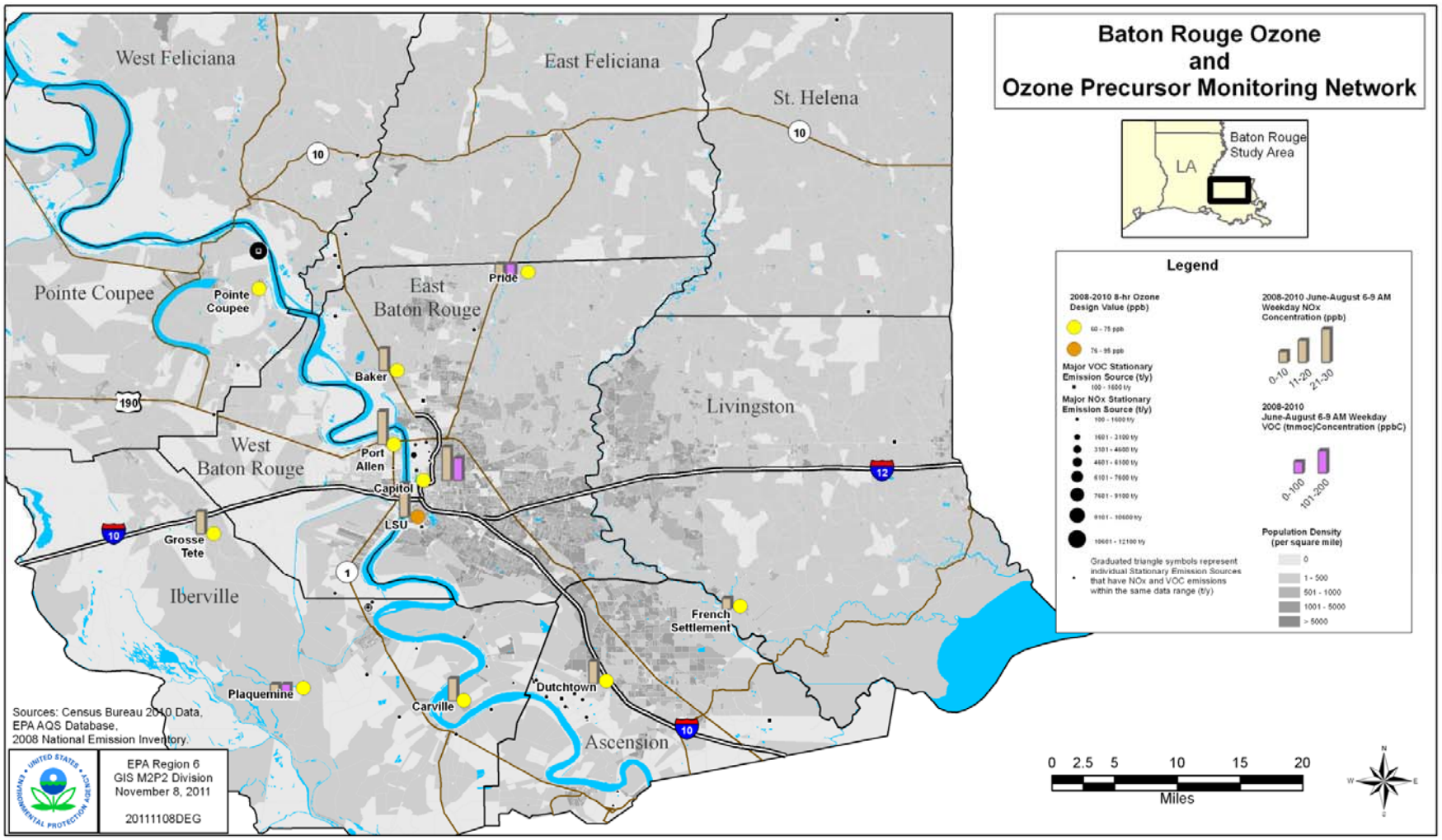


Figure 3 - Population Density Change Percentage Between 2000 and 2010 Census
for Baton Rouge Ozone and Ozone Precursor Monitoring Network.

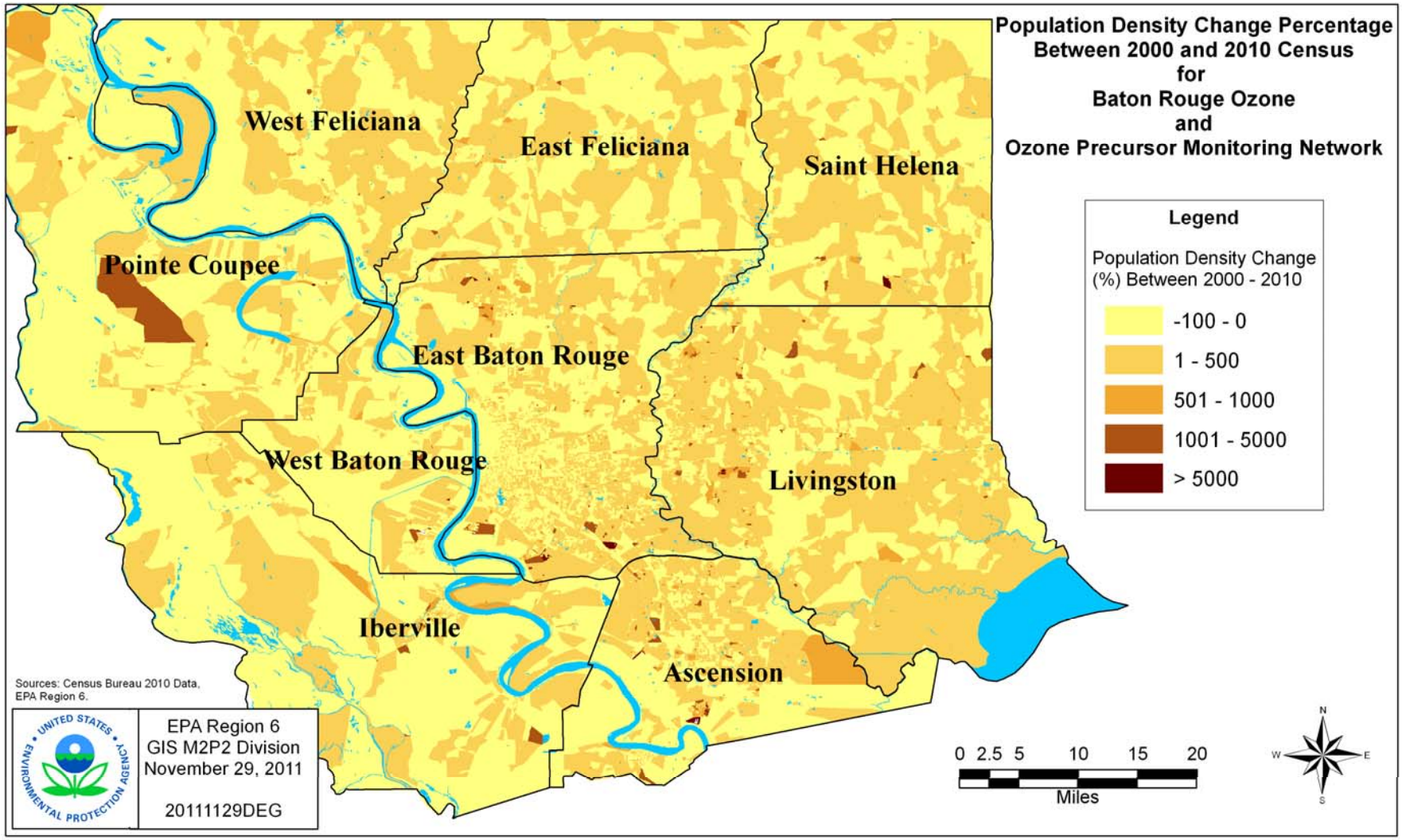


Figure 4 – Overlay of 24-hour HYSPLIT back trajectories of all 75 ppb exceedances at the LSU monitor for the 2008-2010 period.