

US EPA ARCHIVE DOCUMENT

## Wisconsin 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 Wisconsin that EPA is designating 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 (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 this nonattainment area are provided below.

Table 1: Nonattainment Areas in Wisconsin

Area	Wisconsin’s Recommended Nonattainment Counties	EPA’s Nonattainment Counties
Sheboygan, WI	None	Sheboygan County

EPA is designating the remaining counties and areas of Indian country in Wisconsin that are not listed in the table above or being considered for inclusion as part of the Chicago-Naperville, IL-IN-WI ozone nonattainment area as “unclassifiable/attainment” for the 2008 ozone NAAQS. EPA will issue no later than May 31, 2012 one or more designations for the areas being considered as part of the Chicago-Naperville, IL-IN-WI ozone nonattainment area and will prepare a separate technical support document for that action. EPA received designation recommendations from the Forest County Potawatomi Community and the Oneida Tribe of Indians of Wisconsin. EPA is concurring with the recommendations submitted by both tribes that their areas of Indian country be designated as unclassifiable/attainment along with the surrounding state areas.

The analysis below provides the basis for the nonattainment area boundaries for the Sheboygan, WI nonattainment area. 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 the surrounding counties 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.<sup>1</sup>

1. Air quality data (including the 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 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))

<sup>1</sup> 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 is generally not emitted directly into the air, but is created by chemical reactions between oxides of nitrogen (NO<sub>x</sub>) and volatile organic compounds (VOC) in the presence of sunlight. Because NO<sub>x</sub> 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, in general, 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).<sup>2</sup> However, since the Sheboygan, WI Metropolitan Statistical Area (MSA) consists of a single county, EPA also chose to evaluate the counties immediately adjacent to Sheboygan County. 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<sup>3</sup> 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.

### **Technical Analysis for Sheboygan, WI**

The largest statistical area associated with Sheboygan County, WI is the Sheboygan, WI MSA. The Sheboygan, WI MSA consists of the single county of Sheboygan. Figure 1 is a map of the Sheboygan, WI nonattainment area. The map provides other relevant information including the locations and design values of air quality monitors, county and other jurisdictional boundaries, Sheboygan MSA boundary, existing nonattainment boundary for the 1997 ozone NAAQS, and major transportation arteries.

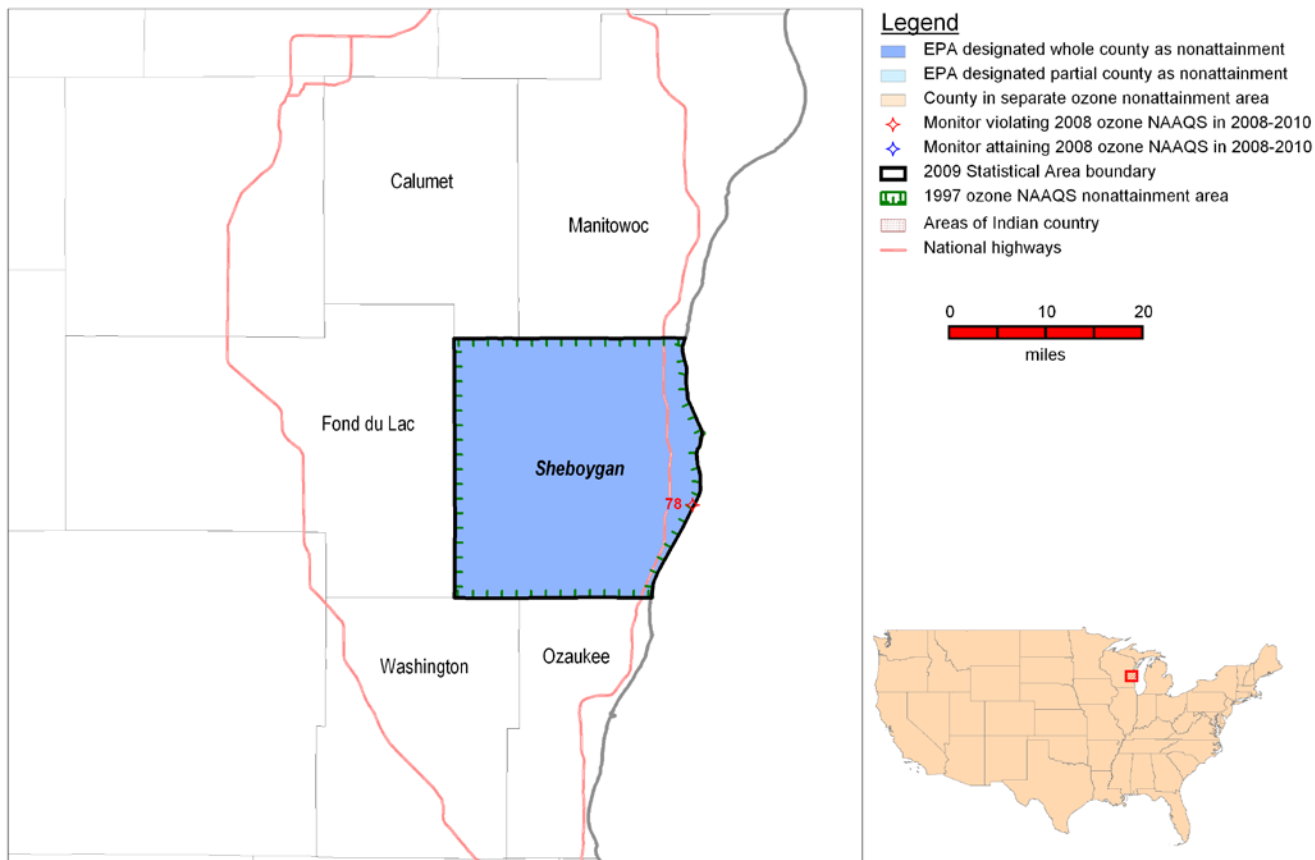
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<sup>2</sup> Lists of CBSAs and CSAs and their geographic components are provided at [www.census.gov/population/www/metroareas/metrodef.html](http://www.census.gov/population/www/metroareas/metrodef.html). The lists are periodically updated by the 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).

<sup>3</sup> See Appendix [x] for a copy of the guidance memorandum.

Figure 1.

## Sheboygan County, WI



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 county of Sheboygan.

In March 2009, Wisconsin recommended that all counties in the state be designated as “attainment” for the 2008 ozone NAAQS based on air quality data from 2006-2008.<sup>4</sup> It should be noted that 2006-2008 monitoring data showed a violation of the 2008 ozone NAAQS in Sheboygan County. These data are from a monitor sited and operated in accordance with 40 CFR Part 58.

After considering these recommendations and based on EPA's technical analysis described below, for the Sheboygan, WI nonattainment area, EPA is designating Sheboygan County (see Table 1 above) as “nonattainment” for the 2008 ozone NAAQS.

### Factor Assessment

<sup>4</sup> Wisconsin supplied its designation recommendations in a March 12, 2009 letter from Governor Jim Doyle. The state also provided a Technical Support Document dated February 27, 2009, which included a nine factor analysis to support the Governor's recommendation decisions.

**Factor 1: Air Quality Data**

For this factor, we considered 8-hour ozone design values (in ppm) for air quality monitors in the Sheboygan, WI area and immediately adjacent counties 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 average concentration, averaged over 3 years is 0.075 ppm or less. A design value 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 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 2010 design value for the Sheboygan, WI MSA is shown in Table 2.

Table 2. Air Quality Data.

County	State Recommended Nonattainment?	2008-2010 Design Value (ppb)
Sheboygan County	No	78
Calumet County	No	
Fond du Lac County	No	63
Manitowoc County	No	73
Ozaukee County	No	71
Washington County	No	

Sheboygan County shows a violation of the 2008 ozone NAAQS, therefore this county is included in the nonattainment area. Although none of the counties adjacent to Sheboygan County are monitoring a violation of the 2008 8-hour ozone NAAQS, each of these counties has been evaluated, as discussed below, based on the five factors to determine whether it contributes to the 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 NO<sub>x</sub> 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 the observed ozone standard violation. Table 3 shows 2008 emissions of NO<sub>x</sub> and VOC (in tons per year) for the Sheboygan, WI MSA (Sheboygan County) and all adjacent counties. This table also indicates which of the counties were recommended to be nonattainment for the 2008 ozone NAAQS by Wisconsin.

Table 3 shows 2008 emissions of NO<sub>x</sub> and VOC (in tons per year) for the Sheboygan, WI MSA and the adjacent counties.

Table 3. Total 2008 NO<sub>x</sub> and VOC Emissions.

County	State Recommended Nonattainment?	NO <sub>x</sub> (tpy)	VOC (tpy)
Sheboygan County	No	7,885	6,291
Calumet County	No	1,287	2,323
Fond du Lac County	No	3,810	5,066
Manitowoc County	No	3,668	4,626
Ozaukee County	No	3,690	3,375
Washington County	No	3,977	6,675

Sheboygan County must be included in the nonattainment area because of the monitored violation of the NAAQS within the county. Sheboygan County has the highest level of emissions of the counties; however, Sheboygan and the adjacent counties all have relatively low emissions. The low emission levels in the area indicate that longer range transport is the significant contributor to violations of the standard in the Sheboygan, WI area. This conclusion is supported by modeling performed for the Cross-State Air Pollution Rule which shows the states of Illinois, Indiana, Wisconsin and Michigan contributing 28.209 ppb, 11.244 ppb, 8.437 ppb, and 3.117 ppb, respectively, to ozone concentrations at the Sheboygan County monitoring site.

## Population Density and Degree of Urbanization

EPA evaluated the population, 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<sub>x</sub> and VOC emissions. Rapid population or Vehicle Miles Traveled (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 area source and mobile source emissions as part of the nonattainment area. Table 4 shows the population, population density, and population growth information for Sheboygan County and the adjacent counties.

Table 4. Population and Growth.

County	State Recommended Nonattainment?	2010 Population	2010 Population Density (1000 pop/sq mi)	Absolute Change in Population	Population % Change (2000-2010)
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				(2000-2010)	
Sheboygan County	No	115,507	0.22	2,762	+2%
Calumet County	No	48,971	0.12	8,243	+20%
Fond du Lac County	No	101,633	0.13	4,250	+4%
Manitowoc County	No	81,442	0.14	-1483	-2%
Ozaukee County	No	86,395	0.37	3,867	+5%
Washington County	No	131,887	0.30	13,928	+12%

Sources: U.S. Census Bureau population estimates for 2010 as of August 4, 2011

Population data show that the adjacent counties, as well as Sheboygan County, have relatively low populations and population densities. This implies that the population-related NOx and VOC emissions in these counties are relatively low.

**Traffic Data**

EPA evaluated the total 2008 VMT and percent growth in VMT from 2002 to 2008 for Sheboygan County and the adjacent counties. Table 5 shows this data.

Table 5. Traffic Data

County	State Recommended Nonattainment?	2008 VMT* (million miles)	Percent VMT Growth (2002-2008 )
Sheboygan County, WI	No	1,018	-10%
Calumet County	No	371	-13%
Fond du Lac County	No	1,132	+46%
Manitowoc County	No	807	-27%
Ozaukee County	No	962	-7%
Washington County	No	1,363	+31%

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

Traffic data show that the adjacent counties, as well as Sheboygan County, have relatively low VMT.

***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 in the Sheboygan, WI MSA. EPA examined the frequency distribution of wind directions for summer (June-August) by averaging National Weather Service direction-sorted wind directions for a 30 year period. Table 6 shows the summertime 30-year averaged percentages of wind directions (winds blowing into the subject county from the specified wind direction sector).

Table 6. Averaged Summertime Wind Direction Percentages for the Sheboygan, WI MSA

Wind Direction	Percentage
North-Northeast	15.41%
East-Northeast	6.91%
East-Southeast	9.82%
South-Southeast	10.96%
South-Southwest	20.57%
West-Southwest	15.70%
West-Northwest	13.60%
North-Northwest	7.02%

The wind direction data presented in Table 6 show that there is no “predominant” summertime wind direction for Sheboygan County. The distribution is fairly even, with a slightly stronger southern component.

The state provided wind direction data for hours from 2006 through 2008 when the 1-hour ozone concentration was greater than or equal to 75 ppb. This data is presented in Table 7.

Table 7. Primary Wind Direction Percentages for Hours from 2006 Through 2008 When the 1-hour Ozone Concentration Was Greater Than or Equal to 75ppb in the Sheboygan, WI MSA

Wind Direction	Percentage
North	0%
North-Northeast	0%
Northeast	0%
East-Northeast	1.7%
East	0%
East-Southeast	0.6%
Southeast	0.6%
South-Southeast	4.6 %
South	9.8%
South-Southwest	76.4%
Southwest	5.7%
West-Southwest	0.6%
West	0%
West-Northwest	0%
Northwest	0%
North-Northwest	0%

Table 7 indicates that when considering wind direction data for hours from 2006 through 2008 when the 1-hour ozone concentration was greater than or equal to 75 ppb in the Sheboygan, WI MSA, the primary wind direction was from the south-southwest 76.4% of the time, and the wind had a southerly component 98.3% of the time. Thus winds that blow through Washington and Ozaukee counties and to a lesser extent Fond du Lac County may bring ozone or ozone precursors into the area on days when there are exceedances of the ozone standard at the violating monitor.



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

The Sheboygan, WI 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***

Jurisdictional boundaries are considered 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, areas covered by a metropolitan planning organization, state lines, and Reservation boundaries.

The Sheboygan, WI area has previously established nonattainment boundaries associated with the 1-hour and 1997 8-hour ozone NAAQS. For both previous ozone NAAQS, the nonattainment area was comprised of the entirety of Sheboygan County, which is synonymous with the Sheboygan, WI MSA.

#### **Conclusion**

The air quality monitor in Sheboygan County indicates a violation of the 2008 ozone NAAQS based on the 2010 design values. Based on the assessment of factors described above, EPA has concluded that Sheboygan County meets the CAA criteria for inclusion in the Sheboygan, WI nonattainment area. This is the same area that comprised the Sheboygan, WI nonattainment area for the 1997 ozone NAAQS and the same area that was designated as nonattainment under the 1-hour NAAQS. The other counties considered all had low emissions, population, and VMT. Available meteorological data shows that winds that blow through Washington and Ozaukee counties and to a lesser extent Fond du Lac County may bring ozone or ozone precursors into the area on days when there are exceedances of the ozone standard at the violating monitor. However, the low emissions, population, and VMT in these counties leads to the conclusion that longer range transport is the significant contributor to violations of the standard in the Sheboygan, WI area. This conclusion is supported by modeling performed for the Cross-State Air Pollution Rule which shows the states of Illinois, Indiana, Wisconsin and Michigan contributing 28.209 ppb, 11.244 ppb, 8.437 ppb, and 3.117 ppb, respectively, to ozone concentrations at the Sheboygan County monitoring site. In conclusion, EPA is only designating the county of Sheboygan as nonattainment for the Sheboygan, WI nonattainment area.