UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5
AIR AND RADIATION DIVISION
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TECHNICAL SUPPORT DOCUMENT

DATE: November 15, 2018

SUBJECT: Proposed Revision of Sheboygan County, Wisconsin Nonattainment Designation for the 1997 and 2008 Ozone Standards

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TO: Docket EPA-R05-OAR-2018-0035

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1.0 Summary

This technical support document (TSD) provides the EPA's technical analyses to support its proposal to revise the boundary of the existing Sheboygan County, Wisconsin, nonattainment area for the 1997 ozone National Ambient Air Quality Standards (NAAQS) and 2008 ozone NAAQS, by splitting it into two separate nonattainment areas, the Inland Sheboygan County area and Shoreline Sheboygan County area. The two separate nonattainment areas would together cover the identical geographic area of the original area, and would retain their nonattainment designation and Moderate classification.

On July 14, 1997, the EPA promulgated revised primary and secondary ozone NAAQS, and strengthened both standards to a level of 0.08 parts per million (ppm) (62 FR 38856, July 16, 1997). In accordance with Section 107(d) of the Clean Air Act (CAA), whenever the EPA establishes a new or revised NAAQS, the EPA must promulgate designations for all areas of the country for that NAAQS. Also under Section 107(d), states are required to submit area designation recommendations to the EPA following promulgation of the new or revised NAAQS. On July 14, 2003, Wisconsin recommended that the entirety of Sheboygan County be designated as nonattainment for the 1997 zone NAAQS, based on air quality data from 2000-2002 showing a violation of the standards in Sheboygan County.

After considering these recommendations and based on the EPA's technical analysis, including a review of air quality data from 2001-2003, the EPA, on April 15, 2004, designated the entire county of Sheboygan as nonattainment for the 1997 ozone NAAQS (69 FR 23858, April 30, 2004). The analysis supporting this designation can be found in the TSD contained in the docket for that rulemaking.

On March 12, 2008, the EPA promulgated revised primary and secondary ozone NAAQS, and further strengthened both standards to a level of 0.075 ppm, often expressed as 75 parts per billion (ppb) (73 FR 16511,

March 27, 2008). On March 12, 2009, Wisconsin recommended that the entire state be designated as attainment for the 2008 ozone NAAQS based on air quality data from 2006-2008, despite that data showing violations of the standards in several counties, including Sheboygan County.

After considering these recommendations and based on the EPA's technical analysis, including a review of air quality data from 2008-2010, the EPA, on April 20, 2012, designated the entire county of Sheboygan as nonattainment for the 2008 ozone NAAQS (77 FR 30160, May 21, 2012). The analysis supporting this designation can be found in the TSD contained in the docket for that rulemaking.[1]

On June 27, 2013, Wisconsin submitted a request for EPA to reconsider the boundary of the Sheboygan nonattainment area for the 1997 ozone NAAQS and 2008 ozone NAAQS and reduce the area to a smaller size. Wisconsin requested that EPA reduce the area to a narrow strip of land along the eastern side of the county following the Lake Michigan shoreline. For regulatory purposes, Wisconsin recommended this boundary be composed of ten municipalities, with a varying width of roughly 3 to 9 miles. Under Section 107(d)(3)(D) of the CAA, the Governor of any state may, on the Governor's own motion, submit to the EPA a revised designation of any area or portion thereof within the state. Within 18 months of receipt of a complete state redesignation submittal, the Administrator shall approve or deny such redesignation. The EPA is treating the state's request to reconsider the nonattainment boundary as a request to revise the area boundary under Section 107(d)(3)(D) of the CAA.

After reviewing the state's request and based on the EPA's technical analysis as described in this TSD, including a review of air quality data from 2015-2017, the EPA proposes, under CAA section 107(d)(3), to revise the boundary for the existing Sheboygan nonattainment area by splitting it into two separate nonattainment areas for the 1997 ozone NAAQS and 2008 ozone NAAQS. Together, the proposed separate nonattainment areas would cover the identical geographic area as the existing nonattainment area. This proposed action would acknowledge the differences in the factors contributing to ozone levels in the separate areas, and provide Wisconsin with additional flexibility in meeting the CAA's nonattainment area planning and emissions control requirements. This flexibility would include the ability to account for differences in air quality in the separate areas such that one of the separate areas would attain the ozone standards faster than the other.

Detailed descriptions of the proposed nonattainment boundaries for these areas are found in the supporting technical analysis in Section 3. The existing Sheboygan area is classified as a Moderate nonattainment area for the 1997 ozone NAAQS and 2008 ozone NAAQS (81 FR 91841, December 19, 2016). Therefore, if this action is finalized as proposed, the two separate nonattainment areas would retain their Moderate classification.

2.0 Considerations for EPA's Technical Analysis

In determining whether to approve or deny a State's request for a revision to the designation of an area under section 107(d)(3)(D), the EPA believes it is appropriate to consider the same factors Congress directed the EPA to consider when the EPA initiates a revision to a designation of an area on its own motion under section 107(d)(3)(A). Those factors are "air quality data, planning and control considerations, or any other air quality-related considerations the Administrator deems appropriate." In this case, the EPA believes it is appropriate to

[1] This TSD can also be found at https://archive.epa.gov/ozonedesignations/web/pdf/r5_sheboygan_tsd_final2.pdf.

consider the factors set forth in the EPA's guidance that was used for the initial designations for the 1997 ozone NAAQS and the 2008 ozone NAAQS (hereafter referred to as the "ozone designations guidance").[2]

Clean Air Act section 107(d)(1)(A)(i) defines "nonattainment" as "any area that does not meet (or that contributes to ambient air quality in a nearby area that does not meet)" the NAAQS. Therefore, consistent with the statute and the EPA's ozone designations guidance, the EPA will not redraw the boundaries of nonattainment areas where one portion of the area, though monitoring clean data, contributes to the nonattainment of another portion of the area.

EPA's ozone designations guidance provides a framework for determining nonattainment area boundaries. After identifying each monitor indicating a violation of the ozone NAAQS in an area, the EPA analyzes those nearby areas with emissions potentially contributing to the violating area. In response to the state's request to reconsider the existing nonattainment area and to reduce its size, the EPA's starting point for a contribution analysis in this case is the existing nonattainment area, the entirety of Sheboygan County.[3] The EPA is not revisiting the full contribution analyses on which the initial designation boundary was based; rather, in this evaluation the EPA focused on what portions of the existing nonattainment area are contributing to the violation of the NAAQS in the area.[4] Because the monitoring data in the existing nonattainment area only indicated a violation of the 2008 ozone NAAQS at the Sheboygan Kohler Andrae monitor (i.e., the shoreline monitor), the EPA analyzed all potential contributions from within Sheboygan County to that monitor. In this evaluation, the EPA did not undertake an analysis of contributions to the Sheboygan Haven monitor (i.e., the inland monitor) because that monitor did not record any violations of the 2008 ozone NAAQS. Because the 2008 ozone NAAQS retains the same general form and averaging time as the 1997 ozone NAAQS, but is set at a more protective level, EPA's analysis for the 2008 ozone NAAQS suffices as a demonstration for an identical nonattainment area boundary revision for the less stringent 1997 ozone NAAQS.

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[2] Following promulgation of the 1997 ozone NAAQS, on March 28, 2000, the EPA issued a Memorandum entitled *Boundary Guidance on Air Quality Designations for the 8-Hour Ozone National Ambient Air Quality Standards*. Available at https://www3.epa.gov/ttn/naaqs/aqmguide/collection/cp2/20000328_seitz_boundary_guidance_(11-factor)_8-hr_ozone.pdf. Following promulgation of the 2008 ozone NAAQS, on December 4, 2008, the EPA issued a Memorandum entitled *Area Designations for the 2008 Revised Ozone National Ambient Air Quality Standards*. Available at https://archive.epa.gov/ozonedesignations/web/pdf/area_designations_for_the_2008_revised_ozone_naaqs.pdf. These guidance memoranda identify important factors that the EPA evaluates in determining appropriate area designations and nonattainment boundaries.

[3] When making initial designations, the EPA's ozone designations guidance recommends using statistical areas, as defined by the Office of Management and Budget (OMB), as a starting point for the contribution analysis. Lists of statistical areas are provided at https://www.census.gov/programs-surveys/metro-micro.html, and are periodically updated by OMB based on U.S. Census Bureau data. At the time of EPA's initial designation of the Sheboygan nonattainment area for the 1997 ozone NAAQS and 2008 ozone NAAQS, as well as the time of this proposed action, the statistical area associated with the violating monitor is the Sheboygan, WI Metropolitan Statistical Area (MSA), which consists solely of Sheboygan County. Although the existing nonattainment boundary and the associated statistical area are identical, the EPA's starting point for the contribution analysis is Sheboygan County because it is the existing nonattainment area.

[4] At the time of EPA's initial designation of the Sheboygan nonattainment area for the 2008 ozone NAAQS, EPA evaluated the Sheboygan, WI MSA, the statistical area consisting solely of Sheboygan County, and additionally chose to evaluate the five counties immediately adjacent to Sheboygan County.

After establishing the boundary of the contribution analysis, EPA applied the five factors set forth in the ozone designations guidance, to analyze what areas are contributing to the NAAQS violation.[5] Those factors are:

1. Air Quality Data, including the design value calculated for each Federal Reference Method (FRM) or Federal Equivalent Method (FEM) monitor;
2. Emissions and Emissions-Related Data, including locations of sources, population, amount of emissions, and urban growth patterns;
3. Meteorology, including weather and transport patterns;
4. Geography/Topography, including mountain ranges or other physical features that may influence the fate and transport of emissions and ozone concentrations; and
5. Jurisdictional Boundaries, e.g., counties, air districts, existing nonattainment areas, areas of Indian country, Metropolitan Planning Organizations (MPOs).

The EPA's analysis is described in Section 3 of this technical support document.

3.0 Technical Analysis

In this technical analysis, the EPA is evaluating whether, after consideration of new available information – i.e., new air quality data and planning and control considerations – it is appropriate to revise the existing Sheboygan County nonattainment area boundary and divide the area into two separate nonattainment areas. As noted above, the EPA's area of analysis (or boundaries of the contribution analysis) is the existing nonattainment area.

The EPA evaluated the air quality monitor that is violating the 2008 ozone NAAQS and all nearby areas within the nonattainment area to determine whether those nearby areas have emissions sources that potentially contribute to ambient ozone concentrations at the violating monitor in the area. This evaluation was based on a weight-of-evidence analysis of the five factors recommended in the EPA's ozone designations guidance. In developing this technical analysis, the EPA used the latest data and information available to the EPA (and to the states and tribes through the Ozone Designations Mapping Tool and the EPA Ozone Designations Guidance and Data web page).[6] In addition, the EPA considered additional information submitted by Wisconsin on April 20, 2017. That information was submitted by the state for the purpose of informing the state's recommendation regarding designations for the 2015 ozone NAAQS, but the technical information contained in that submittal is relevant to this action as well.

Figure 1 is a map of the EPA's proposed two separate nonattainment areas, the Inland Sheboygan and Shoreline Sheboygan areas. The map shows the location of the ambient air quality monitors, county and other jurisdictional boundaries, and major roadways.

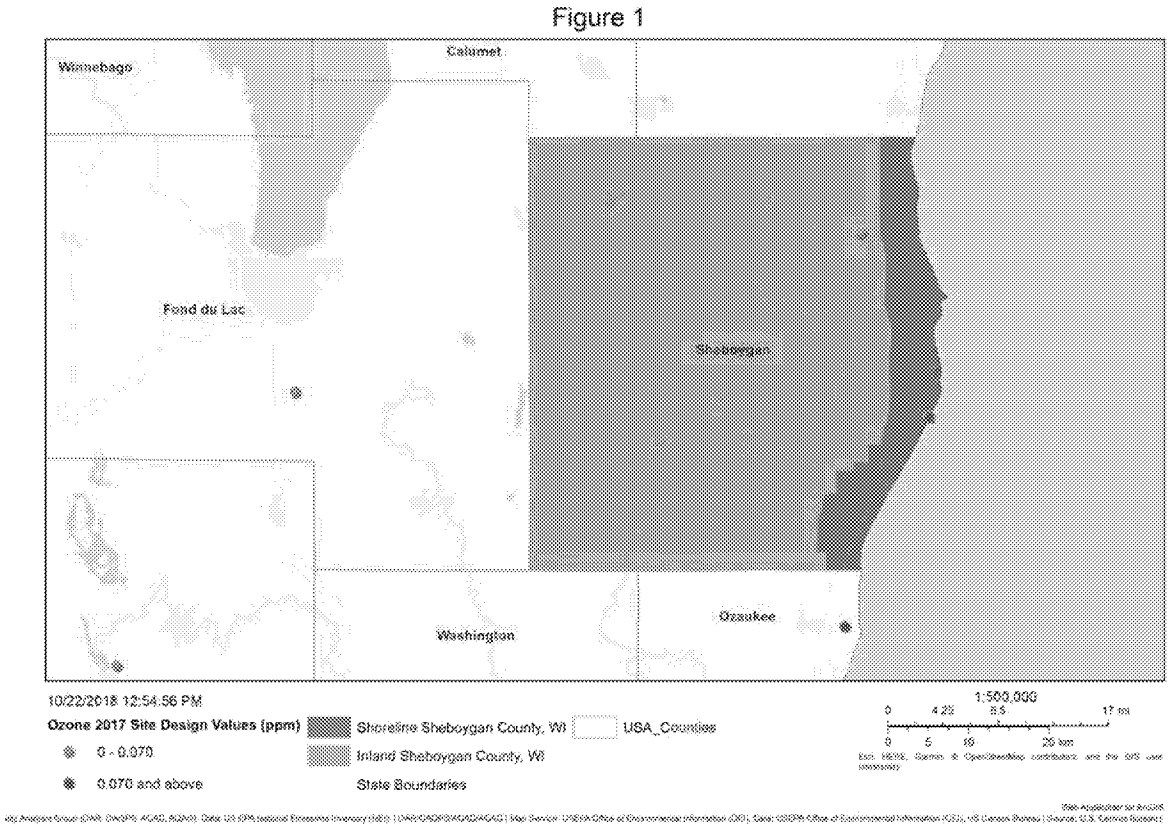
The EPA is proposing to split the current Sheboygan nonattainment area into two separate nonattainment areas that together cover the identical geographic area of the current area. The areas would be split along the following roadways (called the "split boundary"), going from the northern county boundary to the southern county boundary: Highway 43, Wilson Lima Road, Minderhaud Road, County Road KK/Town Line Road, N 10th Street, County Road A S/Center Avenue, Gibbons Road, Hoftiezer Road, Highway 32, Palmer Road/Smies

[5] The ozone designations guidance for the 1997 ozone NAAQS refers to 11 factors, and the guidance for the 2008 ozone NAAQS refers to nine factors. In the TSD for the initial designation of Sheboygan County for the 2008 ozone NAAQS, EPA grouped the emissions-related factors together, which results in five categories of factors. This current TSD uses that same grouping.

[6] The EPA's Ozone Designations Guidance and Data web page can be found at https://www.epa.gov/ozone-designations/ozone-designations-guidance-and-data.

Road/Palmer Road, Amsterdam Road/County Road RR, Termaat Road. The EPA's proposed nonattainment boundary for the Shoreline Sheboygan County area for the 1997 ozone NAAQS and 2008 ozone NAAQS is a portion of Sheboygan County inclusive and east of the split boundary, and would include the Sheboygan Kohler Andrae monitor. The EPA's proposed nonattainment boundary for the Inland Sheboygan County area for the 1997 ozone NAAQS and 2008 ozone NAAQS is a portion of Sheboygan County exclusive and west of the split boundary, and would include the Sheboygan Haven monitor. The EPA notes that its proposed boundary for the Shoreline Sheboygan nonattainment area for the 1997 ozone NAAQS and 2008 ozone NAAQS is identical to the EPA's final boundary for the Sheboygan nonattainment area for the 2015 ozone NAAQS.[7]

Figure 1. EPA's Proposed Nonattainment Boundaries for the Inland Sheboygan and Shoreline Sheboygan Areas



The following sections describe the five factor analysis. While the factors are presented individually, they are not independent. The five factor analysis process carefully considers the interconnections among the different factors and the dependence of each factor on one or more of the others, such as the interaction between emissions and meteorology for the area being evaluated. As described in the ozone designations guidance for initial designations, the EPA considers the presence of one or more violating monitors as the basis for designating that county or area as nonattainment. The remaining four factors are then used as the technical basis for determining the spatial extent of the designated nonattainment area surrounding the violating monitor(s)

[7] On June 4, 2018, the EPA published final designations for the 2015 ozone NAAQS (83 FR 25776). The TSD supporting the EPA's 2015 ozone NAAQS designations for Wisconsin can be found at https://www.epa.gov/sites/production/files/2018-05/documents/wi_tsd_final.pdf.

based on a consideration of what nearby areas are contributing to a violation of the NAAQS. In the case of this revised designation, the EPA believes it is appropriate to consider the same five factor analysis.

Factor 1: Air Quality Data

The EPA considered 8-hour ozone design values in ppm for air quality monitors in Sheboygan County based on data for the 2015-2017 period (i.e., the 2017 design value, or DV). This is the most recent three-year period with fully-certified air quality data. The design value is the 3-year average of the annual 4th highest daily maximum 8-hour average ozone concentration.[8] The 2008 ozone NAAQS are met when the design value is 0.075 ppm or less. Only ozone measurement data collected in accordance with the quality assurance (QA) requirements using approved (FRM/FEM) monitors are used for NAAQS compliance determinations.[9] The EPA uses FRM/FEM measurement data residing in the EPA's Air Quality System (AQS) database to calculate the ozone design values.[10] Whenever several monitors are located in a county (or designated nonattainment area), the design value for the county or area is determined by the monitor with the highest valid design value.

In general, for initial designations the EPA identifies monitors where the most recent design values violate the NAAQS, and examines historical ozone air quality measurement data (including previous design values) to understand the nature of the ozone ambient air quality problem in the area. Eligible monitors for providing design value data generally include State and Local Air Monitoring Stations (SLAMS) that are operated in accordance with 40 CFR part 58, appendices A, C, D and E and operating with an FRM or FEM monitor. These requirements must be met in order to be acceptable for comparison to the 2008 ozone NAAQS for designation purposes. All data from Special Purpose Monitors (SPMs) using an FRM or FEM are eligible for comparison to the NAAQS, subject to the requirements given in the March 28, 2016 Revision to Ambient Monitoring Quality Assurance and Other Requirements Rule (81 FR 17248).

Table 1. Air Quality Data (all values in ppm).

County, State	AQS Site ID	Site Name	2015-2017 DV	2015 4th highest daily max value	2016 4th highest daily max value	2017 4th highest daily max value
Sheboygan, WI	55-117-0006	Sheboygan Kohler Andrae	**0.080**	0.081	0.085	0.075
	55-117-0009	Sheboygan Haven	0.070	0.067	0.074	0.070

Figure 1, shown previously, identifies the proposed nonattainment areas and the violating monitor. Table 1 identifies the design values for both monitors in Sheboygan County. As indicated on the map, there is one violating monitor that is located in Sheboygan County, the Sheboygan Kohler Andrae monitor (AQS Site ID 55-

[8] The specific methodology for calculating the ozone design values, including computational formulas and data completeness requirements, is described in 40 CFR part 50, appendix U.

[9] The QA requirements for ozone monitoring data are specified in 40 CFR part 58, appendix A. The performance test requirements for candidate FEMs are provided in 40 CFR part 53, subpart B.

[10] The EPA does not include in these calculations any individual violations of the 2008 ozone NAAQS that the EPA determines have been caused by an exceptional event that meets the administrative and technical criteria in the Exceptional Events Rule. In the case of 2015-2017 monitoring data from Sheboygan County, the state has not made any claims that data were affected by exceptional events, and so the Exceptional Events Rule does not apply. The EPA finalized the rule on the Treatment of Data Influenced by Exceptional Events (81 FR 68513) and the guidance on the Preparation of Exceptional Events Demonstrations for Wildfire Events in September of 2016. For more information, see https://www.epa.gov/air-quality-analysis/exceptional-events-rule-and-guidance.

117-0006), which is located within several hundred feet of the Lake Michigan shoreline. In 2014, Wisconsin installed a second monitor in Sheboygan County, the Sheboygan Haven monitor (AQS Site ID 55-117-0009), which is located approximately 3.2 miles inland from the shoreline of Lake Michigan and approximately 10.9 miles north northwest of the Sheboygan Kohler Andrae monitor. The Sheboygan Kohler Andrae monitor is located within the proposed Shoreline Sheboygan nonattainment area, and the Sheboygan Haven monitor is located within the proposed Inland Sheboygan nonattainment area. The Sheboygan Haven monitor has a valid 2017 design value of 0.070 ppm which indicates that this monitor is not violating the 2008 ozone NAAQS of 0.075 ppm.

Factor 2: Emissions and Emissions-Related Data

For this factor, the EPA generally evaluates emissions of ozone precursors, which include nitrogen oxides (NO_x) and volatile organic compounds (VOC), and other emissions-related data that provide information on areas contributing to violating monitors.

Emissions Data

The EPA reviewed data from the 2014 National Emissions Inventory (NEI). For Sheboygan County, the EPA examined the magnitude of large sources (NO_x or VOC emissions greater than 100 tons per year) and small point sources and the magnitude of county-level emissions reported in the NEI. These county-level emissions represent the sum of emissions from the following general source categories: point sources, non-point (i.e., area) sources, non-road mobile, on-road mobile, and fires. In general, significant emissions levels from sources in a nearby area indicate the potential for the area to contribute to monitored violations.

Table 2 provides a county-level emissions summary of NO_x and VOC (given in tons per year (tpy)) emissions for Sheboygan County.

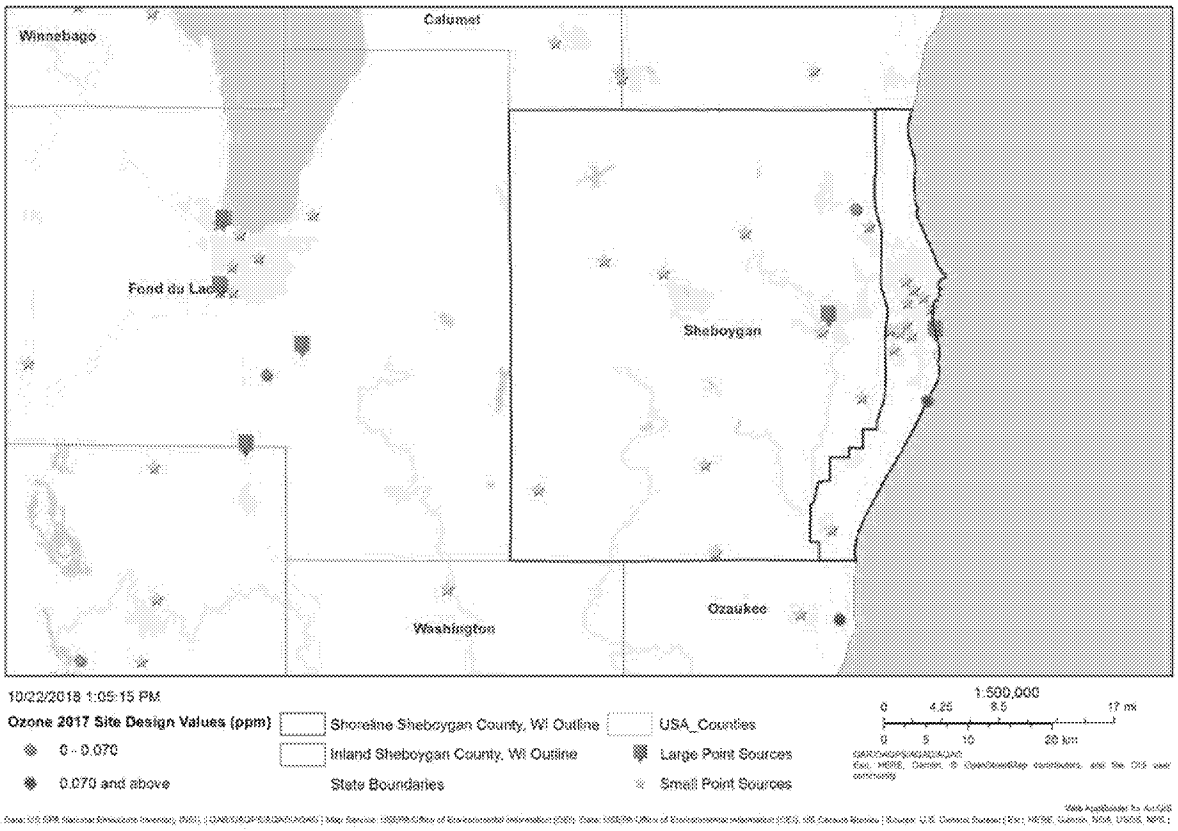
Table 2. Total County-Level NO_x and VOC Emissions.

County, State	Total NO_x (tpy)	Total VOC (tpy)
Sheboygan, WI	4,585	3,421

In addition to reviewing county-wide emissions of NO_x and VOC in Sheboygan County, the EPA also reviewed emissions from point sources. The location of these sources, together with the other factors, can help inform nonattainment boundaries. The locations of the point sources are shown in Figure 2 below. The proposed separate nonattainment area boundaries are also shown.

Figure 2. Point Sources in Sheboygan County.

Figure 2



The EPA's emissions analysis shows two large point sources in Sheboygan County, represented by the blue markers in Figure 2, which are the Wisconsin Power and Light (WPL)-Edgewater Generating Station, along the shoreline, and the Bemis Manufacturing Company-Plant B, further inland. WPL-Edgewater reported 1,639.74 tons of NO_x and 37.47 tons of VOC emitted in 2014. Bemis-Plant B reported 5.04 tons of NO_x and 183.89 tons of VOC emitted in 2014. The EPA's analysis shows approximately 23 small point sources in Sheboygan County, represented by the small yellow stars, 18 of which reported NO_x emissions, and all of which reported VOC emissions to the 2014 NEI. These 23 small point sources collectively emitted a reported 166.72 tons of NO_x and 329.64 tons of VOC in 2014. The largest NO_x emitter of these sources, Nemak Gateway Plant, emitted a reported 45.39 tons of NO_x and the largest VOC emitter of these sources, Plymouth Foam Inc., emitted a reported 56.67 tons of VOC in 2014. While the total of point source precursor emissions in Sheboygan County are not trivial, the NO_x and VOC emissions from the individual point sources in Sheboygan County, with the exception of WPL-Edgewater, are relatively low, and are concentrated in the central and eastern portion of the county east of I-43 and mostly in the city of Sheboygan.

The EPA also looked at the Sheboygan County precursor emissions on either side of the proposed boundary between the proposed separate areas. Table 3 below shows that in delineating the spatial extent of the violating area, EPA has also captured many of the Sheboygan County precursor emissions. Table 3 indicates that 95% of the 2014 reported Sheboygan County point source NO_x emissions are captured within the proposed Shoreline Sheboygan area boundary. These point source NO_x emissions (which do not include area, on-road, and off-road mobile sources of emissions) are 38% of the total county NO_x emissions. This analysis shows that 41% of the 2014 reported Sheboygan County point source VOC emissions are captured within the proposed Shoreline

Sheboygan area boundary. These point source VOC emissions (which do not include area, on-road, and off-road mobile sources of emissions) are only 7% of the total county VOC emissions. However, results from an EPA study conducted in May 2017 for Ozone Advance areas suggest that NO_x is the more important ozone precursor relative to VOC in this region of the United States.[11]

Table 3. Sheboygan County percent precursor emissions from the two separate proposed nonattainment areas.

Precursor / Geographic Area	% of county point source emissions	% of total county emissions
NO_x emissions in Shoreline Sheboygan area	95	38
VOC emissions in Shoreline Sheboygan area	45	7
NO_x emissions in Inland Sheboygan area	5	2
VOC emissions in Inland Sheboygan area	55	9

Population Density and Degree of Urbanization

In this part of the factor analysis, the 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 emissions of NO_x and VOC from on-road and non-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 violations of the ozone NAAQS. Table 4 shows the population, population density, and population growth information for Sheboygan County.[12]

Table 4. Population and Growth for Sheboygan County.

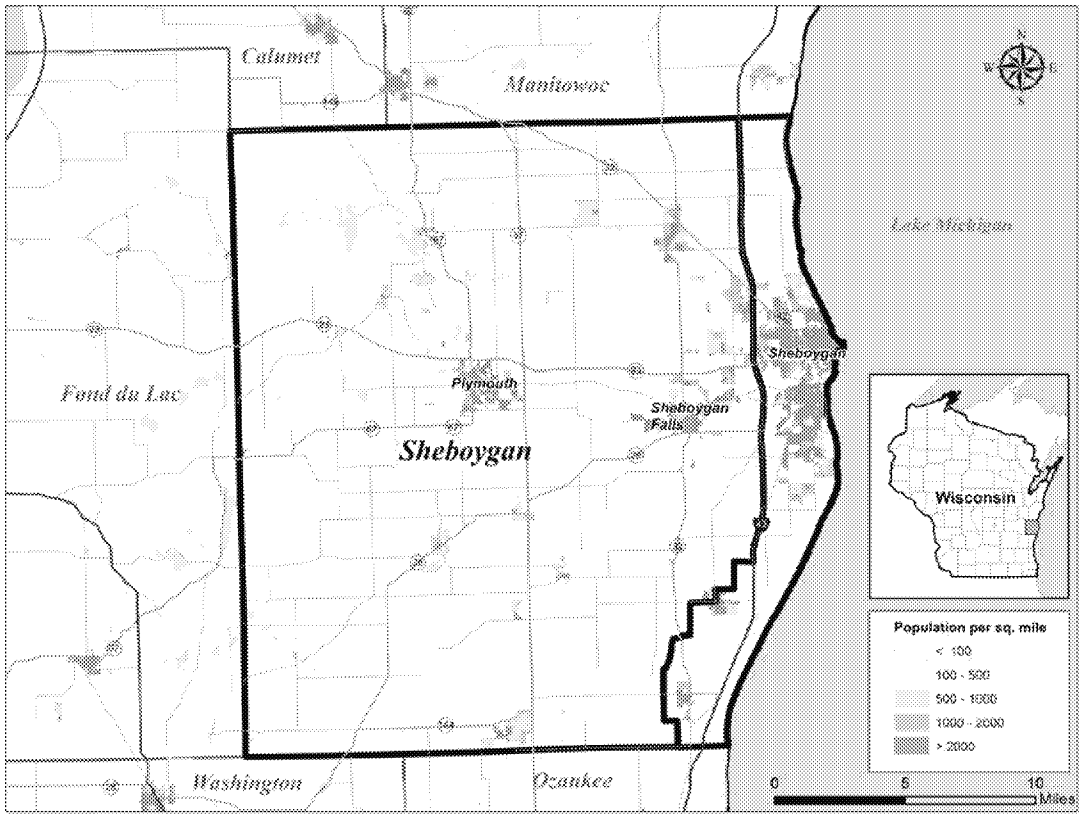
[11] Supplemental Information for Ozone Advance Areas Based On Pre-Existing National Modeling Analyses. EPA Office of Air Quality Planning and Standards, Air Quality Modeling Group, May 2017. Available at https://www.epa.gov/sites/production/files/2017-05/documents/national_modeling.advance.may_2017.pdf. Figures 1 and 3 in this document show maps of July 2011 modeled monthly maximum daily 8-hour ozone average (MDA8) changes with 50% VOC and 50% NOx across-the-board cuts, nationally. These results show that VOC reductions have some impact on ozone levels for the portion of the country in which Sheboygan County, Wisconsin, is located but that NOx reductions are expected to have larger impacts. This modeling is limited in that it only looks at one month and is thus not directly comparable to the design value calculated over 3 years. However, it is indicative that NOx reductions are likely to be more effective than VOC reductions for the portion of the country in which Sheboygan County, Wisconsin, is located but that VOC reductions may still have some impact.

[12] Population estimates for 2010 and 2015 are sourced from the U.S. Census Bureau and can be accessed at https://www.census.gov/popest/data.

County, State	2010 Population	2015 Population	2015 Population Density (per sq. mi.)	Absolute change in population (2010-2015)	Population % change (2010-2015)
Sheboygan, WI	115,507	115,569	226	62	0.1

A map of population density within Sheboygan County is provided in Figure 3. Although it has a much smaller geographic footprint, the proposed Shoreline Sheboygan area holds 54% of Sheboygan County's population. The proposed Inland Sheboygan area is less populous and less dense, holding 46% of the total county population. The City of Sheboygan, the largest city in Sheboygan County, is within the proposed Shoreline Sheboygan area. The other two cities in Sheboygan County, Plymouth and Sheboygan Falls, which are located within the proposed Inland Sheboygan area, together have a smaller population than the City of Sheboygan.

Figure 3. County-Level Population.



The population and population density in Sheboygan County are both relatively low. The non-point (area) source emissions reported to the 2014 NEI were 681 tons of NO_x and 1,405 tons of VOC. The on-road emissions reported to the 2014 NEI were 1,384 tons of NO_x and 676 tons of VOC. The non-road emissions reported to the 2014 NEI were 708 tons of NO_x and 775 tons of VOC. These quantities of precursor emissions are not trivial; however, the reported NO_x and VOC emissions from the non-point (area), on-road, and non-road

source sectors, which are the source sectors that are often correlated with population and population density, are relatively low in Sheboygan County.

Traffic and Vehicle Miles Traveled

The EPA evaluated the commuting patterns of residents, as well as the total vehicle miles traveled (VMT) for Sheboygan County. In combination with the population/population density data and the location of main transportation arteries, this information helps identify the probable location of non-point source emissions. In addition to VMT, the EPA evaluated worker data collected by the U.S. Census Bureau[13] for Sheboygan County. Table 5 shows the traffic and commuting pattern data, including total VMT, number of residents who work in Sheboygan County, and the percent of those residents that commute to work within Sheboygan County. The data in Table 5 are from 2014.

Table 5. Traffic and Commuting Patterns.

County	2014 Total VMT (Million Miles)	Number of County Residents Who Work	Number of County Residents Commuting Within the County	Percentage of County Residents Commuting Within the County
Sheboygan, WI	928	58,178	39,848	68%

Sheboygan County has a relatively low population density and degree of urbanization. The reported vehicle miles traveled (VMT) for 2014 were 928 million miles, and the on-road emissions reported to the 2014 NEI were 1,384 tons of NO_x and 676 tons of VOC.

The NO_x and VOC emissions from the various source sectors, including point (with the exception of WPL-Edgewater), non-point (area), on-road mobile, and off-road mobile, in Sheboygan County are relatively low, such that the emissions and emissions-related data factor of the analysis can be ranked relatively low (with the exception of WPL-Edgewater) in terms of potential contribution to ozone formation. Emission sources, emissions, and population are concentrated near the I-43 corridor and the cities of Sheboygan, Sheboygan Falls, and the village of Kohler.

Factor 3: Meteorology

The eastern boundary of Sheboygan County follows the shoreline of Lake Michigan. Due to its proximity to the lake, Sheboygan County has the potential to be impacted by lake breeze meteorology. The land breeze and lake breeze occur when wind blows from the land and lake, respectively, due to air pressure differences caused by the different heating capacities of the land and the water. Land absorbs and loses solar radiation much faster than water. The land breeze typically occurs in the early morning after air above the relatively warm nighttime water of Lake Michigan heats and rises, setting up an area of low pressure which is filled by the cooler air from the land. The lake breeze typically occurs in the afternoon when the area of low pressure is created by rising air over the heated land, creating winds off the cooler lake. The land/lake breeze is typically more localized than the prevailing (synoptic) winds. Studies indicate the land/lake breeze can trap, stratify, and recirculate offshore air,

[13] The worker data can be accessed at http://onthemap.ces.census.gov.

sometimes in a helical pattern. Daytime inversions over the lake can create shallow, stable layers of precursor plumes, which, on warm sunny days, are conducive to ozone formation. The afternoon lake breeze can carry photochemically aged, ozone-rich air toward the land from nearby and upwind plumes, to nearby and downwind areas like Sheboygan County where violations of the ozone standard can be measured at locations along the shoreline. Additionally, large scale, summertime, stagnant high pressure systems centered to the south and southeast of Lake Michigan have been implicated in high ozone episodes for areas near the shoreline of Lake Michigan, because they can produce southerly and southeasterly flows over Lake Michigan, which can enhance the flow of photochemically aged air. The relative role of each (the land/lake breeze and synoptic flow) is episode-specific and not fully understood.[14, 15, 16, 17, 18]

Evaluation of meteorological data helps to assess the fate and transport of emissions contributing to ozone concentrations and to identify areas potentially contributing to the monitored violations. Results of meteorological data analysis may inform the determination of nonattainment area boundaries. In order to determine how meteorological conditions, including, but not limited to, weather, transport patterns, and stagnation conditions, could affect the fate and transport of ozone and precursor emissions from sources in the area, the EPA evaluated 2015-2017 HYSPLIT (HYbrid Single-Particle Lagrangian Integrated Trajectory) trajectories at 100, 500, and 1000 meters above ground level (AGL) that illustrate the three-dimensional paths traveled by air parcels to a violating monitor. Figure 4 shows the 24-hour HYSPLIT back trajectories for each exceedance day (i.e., daily maximum 8-hour values that exceed the 2008 ozone NAAQS) for the violating monitor.

Figure 4. HYSPLIT Back Trajectories for Sheboygan Kohler Andrae Monitor.

[14] Cleary, P. A., Fuhrman, N., Schulz, L., Schafer, J., Fillingham, J., Bootsma, H., McQueen, J., Tang, Y., Langel, T., McKeen, S., Williams, E. J., and Brown, S. S.: Ozone distributions over southern Lake Michigan: comparisons between ferry-based observations, shoreline-based DOAS observations and model forecasts, Atmos. Chem. Phys., 15, 5109–5122, 2015.

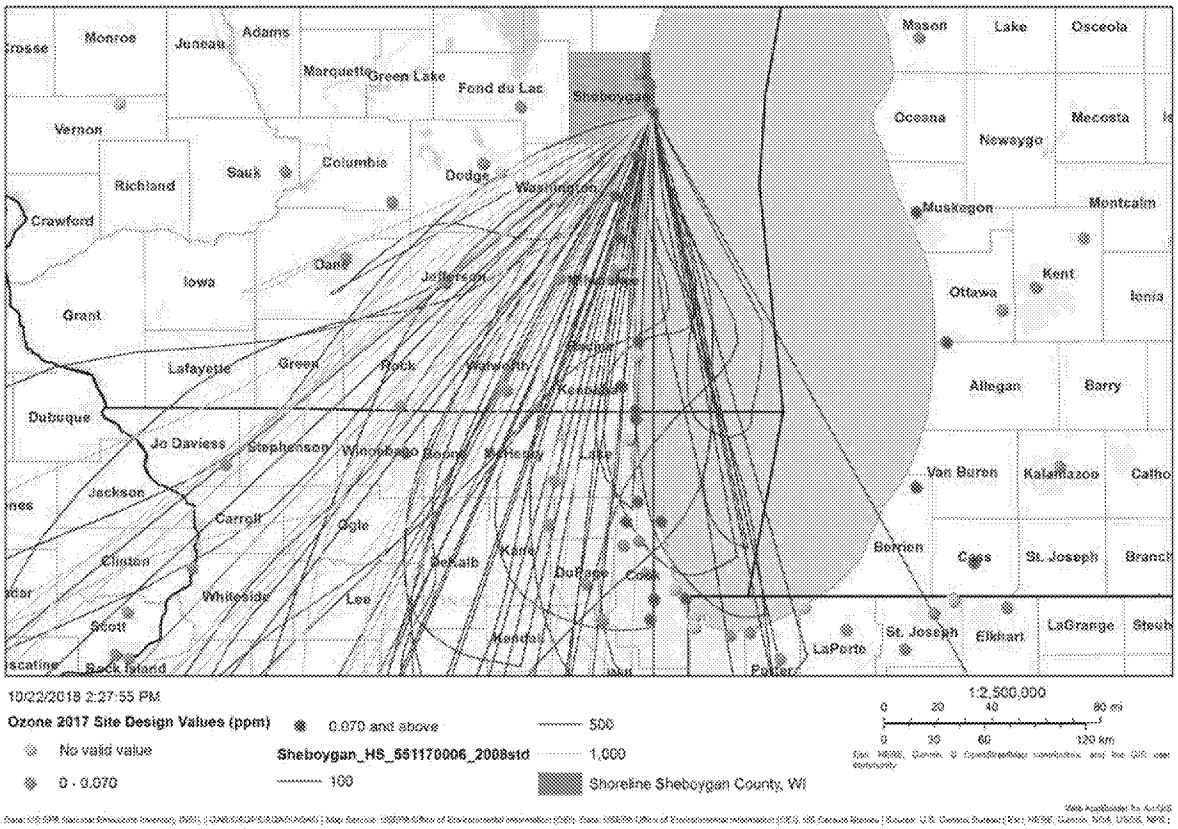
[15] Dye, T. S., Roberts, P. T., and Korc, M. E.: Observations of transport processes for ozone and ozone precursors during the 1991 Lake Michigan Ozone Study, J. Appl. Meteorol., 34, 1877–1889, 1995.

[16] Foley, T., Betterton, E. A., Jacko, P. E. R., and Hillery, J.: Lake Michigan air quality: The 1994–2003 LADCO Aircraft Project (LAP), Atmos. Environ., 45, 3192–3202, 2011.

[17] Hanna, S. R. and Chang, J. C.: Relations between meteorology and ozone in the Lake Michigan region, J. Appl. Meteorol., 34, 670–678, 1995.

[18] Lennartson, G. J., and Schwartz, M. D.: A synoptic climatology of surface-level ozone in Eastern Wisconsin, USA, Climate Research, 13, 207-220, 1999.

Figure 4



The HYSPLIT trajectories (Figure 4) indicate that exceedance day air masses generally traveled from the south and southwest prior to being detected at the violating monitor. Many of the lower level trajectories represented by the red lines at 100 meters AGL and the blue lines at 500 m AGL traveled from over Lake Michigan while the higher level trajectories represented by the green lines at 1,000 m AGL traveled over land. Scientific studies indicate ozone can be preferentially transported over the Great Lakes relative to the land surface.[19, 20, 21, 22, 23, 24] Sheboygan County is downwind of the Milwaukee-Racine-Waukesha Combined Statistical Area (CSA) (total 2014 reported CSA NO_x = 51,822 tons, VOC= 49,129 tons), as well as the Chicago CSA (total 2014 reported CSA NO_x = 274,440 tons, VOC= 206,171 tons) which includes counties in northeast Illinois and northwest

[19] Brook, J. R., Makar, P.A., Sills D. M. L., Hayden, K. L. and McLaren, R. Exploring the nature of air quality over southwestern Ontario: main findings from the Border Air Quality and Meteorology Study, Atmos. Chem. Phys., 13, 10461–10482, 2013.

[20] Lyons, W. A. and Cole, H. S., Fumigation and plume trapping on the shores of Lake Michigan during stable onshore flow, J. Appl. Meteor., 12, 494–510, 1973.

[21] Lyons, W. A. and Cole, H. S.: Photochemical oxidant transport–mesoscale lake breeze and synoptic-scale aspects, J. Appl. Meteor., 15, 733–743, 1976.

[22] Sillman, S., Samson, P. J., and Masters, J. M.: Ozone formation in urban plumes transported over water: photochemical model and case studies in the northeastern and midwestern U.S., J. Geophys. Res., 98, 12687–12699, 1993.

[23] Lyons, W. A., Pielke, R. A., Tremback, C. J., Walko, R. L., Moon, D. A., and Keen, C. S.: Modeling impacts of mesoscale vertical motions upon coastal zone air pollution dispersion, Atmos. Environ., 29, 283–301, 1995a.

[24] Lyons, W. A., Tremback, C. J., and Pielke, R. A.: Applications of the Regional Atmospheric Modeling System (RAMS) to provide input to photochemical grid models for the Lake Michigan Ozone Study (LMOS), J. Appl. Meteor., 34, 1762–1786, 1995b.

Indiana. The HYSPLIT trajectories indicate the exceedance day air masses traveled over these areas and Lake Michigan to reach the violating monitor in Sheboygan County. Any precursor emissions that flow out from these areas over the lake with the morning land breeze have the potential to photochemically react to form ozone, which has the potential to be transported by the afternoon lake breeze to the violating monitor in Sheboygan County as corroborated by the studies cited above and by the HYSPLIT trajectories shown in Figure 4.

The HYSPLIT trajectories are just one piece of evidence corroborating the body of scientific literature on the potential for lake breeze meteorology, and lake breeze meteorology combined with synoptic meteorology, to transport photochemically aged, ozone-rich air masses from nearby and upwind areas to nearby and downwind areas near the shoreline of Lake Michigan, such as Sheboygan County, Wisconsin. Evidence of the potential for land/lake breeze and synoptic meteorology to transport ozone to areas along the shoreline of Lake Michigan is documented in the peer-reviewed scientific literature from study data specific to Lake Michigan collected mostly in the early 1990's.[18, 19, 20, 21, 22] It is important to reiterate that the relative role of the land/lake breeze and synoptic flow on ozone transport in the Lake Michigan area is episode-specific and not fully understood. Specific details on the factors and mechanisms by which a large body of water like Lake Michigan can impact photochemical ozone production are not well-known (e.g. changes in precursor mixes, changes in radical concentrations, relative importance of multi-day ozone formation versus same day formation, lake breeze inland penetration distances, the extent to which shallow inversions above the cool lake water prevent vertical mixing, etc.).[25]

While there are many gaps in the peer-reviewed scientific literature regarding lake breeze impacts on ozone production and transport in the Lake Michigan area, Wisconsin has recently been able to conduct an analysis of lake breeze ozone inland penetration distances specific to Sheboygan County. Wisconsin used wind direction data, satellite data, and the ozone data from the two monitors in Sheboygan County to investigate and analyze the local lake breeze ozone inland penetration distances for Sheboygan County. The Sheboygan Kohler Andrae monitor (AQS Site ID 55-117-0006) is located within several hundred feet of the Lake Michigan shoreline, whereas the Sheboygan Haven monitor (AQS Site ID 55-117-0009) is located approximately 3.2 miles from the Lake Michigan shoreline and approximately 10.9 miles north northwest of the Sheboygan Kohler Andrae monitor. Given the relative proximity from the shoreline, we sometimes refer to the Sheboygan Kohler Andrae monitor as the "shoreline monitor" and the Sheboygan Haven monitor as the "inland monitor." The inland monitor began operating in 2014. Therefore, the 2014-2016 design value is the first design value for this monitor, making the data from this monitor a new component of the ozone analysis for Sheboygan County.

In its April 20, 2017, supplementary submittal, Wisconsin used these new data to classify days with peak 1-hour ozone concentrations above the 2015 ozone NAAQS of 0.070 ppm (70 ppb) into one of three event types: 1) "Deep" lake breeze, meaning a day on which the lake breeze affected both the shoreline and inland monitors; 2) "Shallow" lake breeze, meaning a day on which the lake breeze affected the shoreline but not the inland monitor; and 3) No lake breeze, meaning a day with no apparent lake breeze. Wisconsin was not able to classify some days according to the event types above because of complex patterns. Wisconsin's classification of high-ozone days into these categories yielded the distribution of event types shown in Table 6 below.

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[25] Pierce, B., Kaleel, R., Dickens, A., Bertram T., and Stanier, C., Kenski D.: White Paper: Lake Michigan Ozone Study 2017 (LMOS 2017), http://www.ladco.org, 2016.

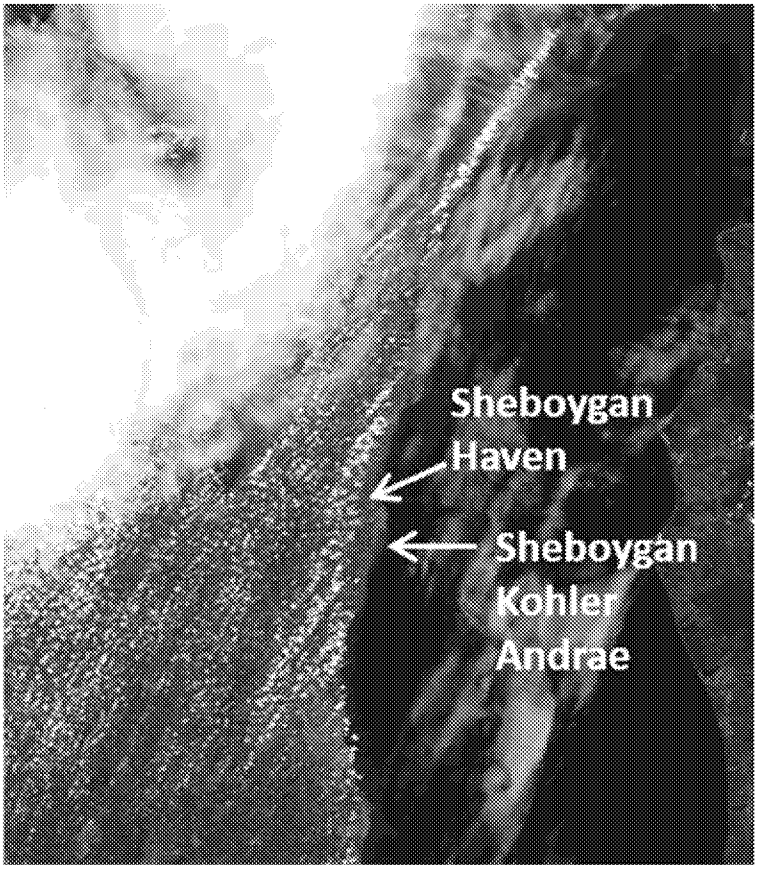
Table 6. Distribution of the Occurrence of Different Types of Lake Breeze Events at the Sheboygan County Monitors*

	Deep lake breeze	Shallow lake breeze	No lake breeze	Unclear	Total days
Sheboygan	33 (67%)	5 (10%)	11 (22%)	8	57 (2014-16)

*The percentage of the classifiable events (which excludes "unclear" events) in each category is shown in parentheses.

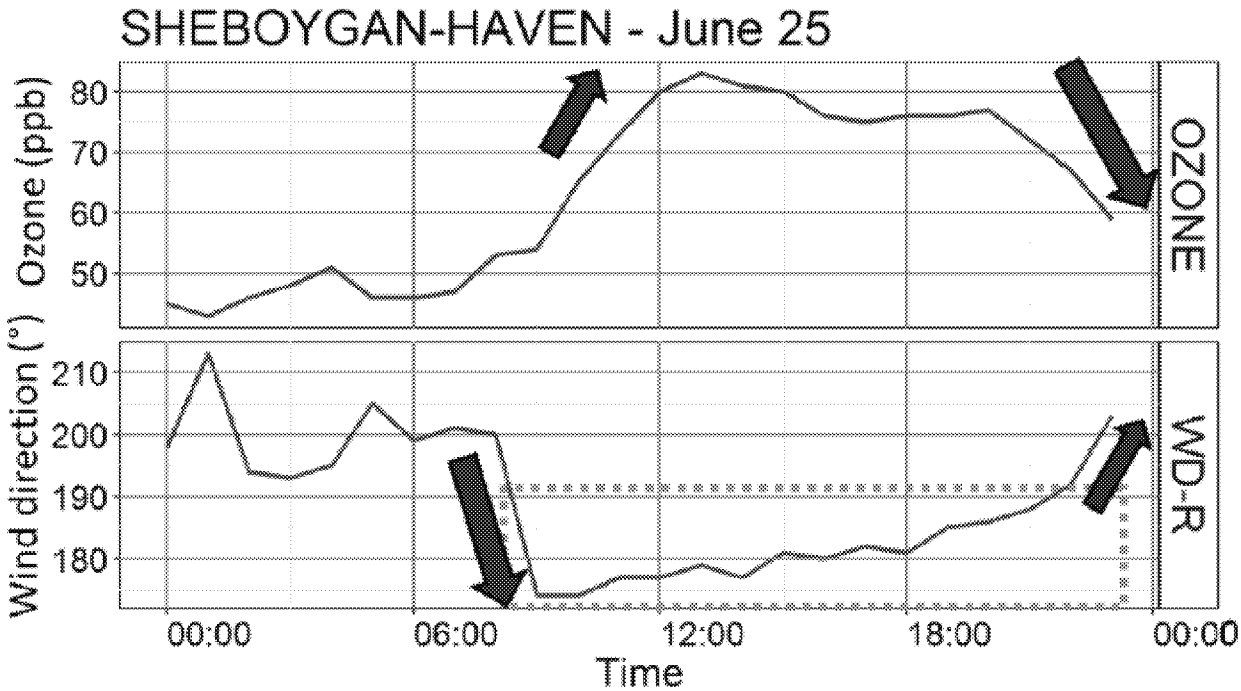
Wisconsin used Moderate Resolution Imaging Spectroradiometer (MODIS) satellite images to confirm lake breeze event types derived from the wind direction data. The MODIS satellite passes over the Lake Michigan region around 2:30 pm daily and collects visual images of the landscape. On days with a lake breeze and light cloud cover, lake breeze "fronts" can be seen as the interface between areas of clear skies towards the lake and light cloud cover to the west. The clear area is the area experiencing a lake breeze. On days with heavy cloud cover or no cloud cover, MODIS images cannot identify the presence or absence of a lake breeze front. The MODIS image in Figure 5 provided by Wisconsin shows a lake breeze impacting Sheboygan County. Wisconsin found that days with a shallow lake breeze did not show any obvious lake breeze in the MODIS images. If the lake breeze classification was not conclusive from the wind and MODIS data or if wind data was missing, Wisconsin looked for additional confirmation by examining the synoptic meteorology of that day or wind patterns at nearby airports or air quality monitors.

Figure 5. MODIS satellite image for the afternoon of August 4, 2016, showing a deep lake breeze at Sheboygan.



Wisconsin found that days with a lake breeze typically begin with winds from the southwest during the early morning hours. Wisconsin observed that these wind directions typically shift abruptly to come from a more southerly or southeasterly direction with this shift typically occurring in the morning at the shoreline monitor and later in the day at the inland monitor. Wisconsin observed that the lake breeze may occur for anywhere from a few minutes to 15 or more hours. For its classification scheme, Wisconsin only counted as "lake breeze" a wind pattern that held for at least 2-3 hours. Wisconsin observed that at the conclusion of a lake breeze event, winds usually revert to their original southwesterly direction unless the lake breeze event is ended by a synoptic wind shift such as a frontal passage. Figure 6, provided by Wisconsin, shows an example of a deep lake breeze wind pattern with co-located ozone data from the Sheboygan Haven inland monitor.

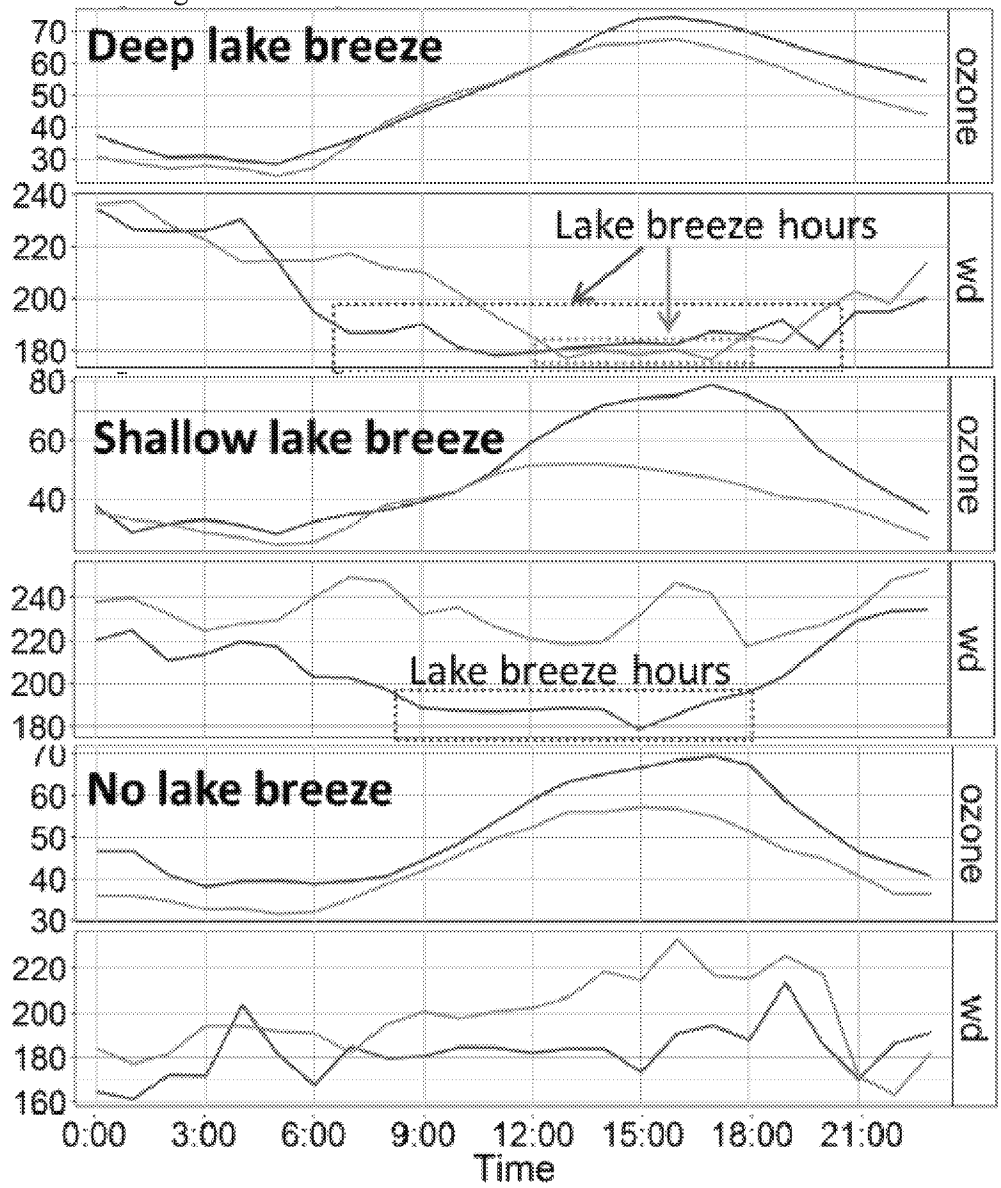
Figure 6. Hourly ozone concentrations (top) and wind directions (bottom) for an example day (June 25, 2016) at the Sheboygan Haven monitor. The red arrows show the onset and cessation of the lake breeze and when ozone concentrations rose and declined. The blue box encloses the hours with a lake breeze.



Wisconsin found that during "deep" lake breeze events, wind shifts occurred at both the inland and shoreline monitor, whereas on "shallow" lake breeze days, they only occurred at the shoreline monitor. Such shifts were absent on days without a lake breeze. Figure 7 shows the average (mean) ozone concentration and wind direction profile for each event type. The average ozone concentration profiles were similar for all three classes of events at the shoreline monitor and follow the typical diurnal pattern associated with ozone formation. The highest mean peak shoreline ozone concentrations were observed during lake breeze events and the lowest during events without a lake breeze. The greatest ozone concentrations at the inland monitor were observed during the deep lake breeze events. Shallow lake breeze events resulted in relatively low average peak mean inland ozone concentrations when the peak shoreline concentrations were relatively high. Wisconsin reasoned that during deep lake breeze events, the lower ozone concentrations at the inland monitor likely resulted from dilution of ozone-rich air via mixing with less ozone-rich overlying air as the air moved inland from the shoreline. This reasoning is consistent with the conceptual model of Lake Michigan ozone formation and transport developed by Dye et al. as a result of the aircraft and ground-based monitoring data collected during several high ozone episodes which occurred over the course of the Lake Michigan ozone study during the summer of 1991. Dye et al. indicate that when ozone-rich air from over the lake flowed downwind to onshore locations, air with the highest ozone concentrations mixed down to the surface first, causing the highest ozone observations along the shoreline. Eventually air from higher altitudes mixed down to the surface farther inland, but ozone in these air masses had lower concentrations.[26]

[26] Dye, T. S., Roberts, P. T., and Korc, M. E.: Observations of transport processes for ozone and ozone precursors during the 1991 Lake Michigan Ozone Study, J. Appl. Meteorol., 34, 1877–1889, 1995.

Figure 7. Plots of mean hourly ozone concentrations (in ppb) and wind direction ("wd", in degrees) for Sheboygan County monitors for high ozone episodes with a deep lake breeze (top), a shallow lake breeze (middle), and no lake breeze (bottom). Values for the shoreline monitor are shown in blue and those for the inland monitor in green.



To summarize, many details of the various factors regarding how the local lake breeze (alone or combined with synoptic-scale meteorology) influences ozone production and transport around Lake Michigan are episode-specific and not well-understood. There are gaps in the peer-reviewed scientific literature on this topic. However, the basic concepts of lake breeze meteorology and its potential to influence ozone production and transport are understood well enough to weight the meteorology factor relatively high given the above analysis. The peer-reviewed results from the Lake Michigan-specific ozone studies, the HYSPLIT trajectories presented here, and Wisconsin's lake breeze ozone inland penetration distance analysis which relies on the ozone data from the new inland monitor without which this analysis would not have been possible, together provide evidence that meteorology plays a role in ozone production and transport to this area of analysis. Therefore, this factor can be weighted relatively high in terms of potential contribution to ozone formation with respect to

Sheboygan County. Specifically, this analysis supports the proposed finding that the inland Sheboygan area is not contributing to the violation of the standards in the shoreline Sheboygan area.

Factor 4: Geography/topography

Consideration of geography or topography can provide additional information relevant to defining nonattainment area boundaries. Analyses should examine the physical features of the land that might define the airshed. Mountains or other physical features may influence the fate and transport of emissions as well as the formation and distribution of ozone concentrations. The absence of any such geographic or topographic features may also be a relevant consideration in selecting boundaries for a given area.

Sheboygan County does not have any geographical or topographical features significantly limiting air pollution transport within its airshed. The eastern boundary of Sheboygan County follows the shoreline of Lake Michigan. As described under Factor 3: Meteorology, areas geographically located along the shoreline of Lake Michigan, including Sheboygan County, can be impacted by lake breeze meteorology which has the potential to transport photochemically aged air masses containing ozone-rich air originating from nearby and upwind precursor plumes to nearby and downwind coastal areas along Lake Michigan.

Factor 5: Jurisdictional boundaries

In general, once the geographic extent of the violating area and the nearby area contributing to violations is determined, the EPA considers existing jurisdictional boundaries for the purposes of providing a clearly defined legal boundary to carry out the air quality planning and enforcement functions for nonattainment areas. In defining the boundaries of the proposed Inland Sheboygan and Shoreline Sheboygan nonattainment areas, the EPA considered existing jurisdictional boundaries, which can provide easily identifiable and recognized boundaries for purposes of implementing the NAAQS. Examples of jurisdictional boundaries include, but are not limited to: counties, air districts, areas of Indian country, metropolitan planning organizations, and existing nonattainment areas. If an existing jurisdictional boundary is used to help define the nonattainment area, it must encompass all of the area that has been identified as meeting the nonattainment definition. Where existing jurisdictional boundaries are not adequate or appropriate to describe the nonattainment area, the EPA considered other clearly defined and permanent landmarks, such as roadways, or geographic coordinates for purposes of identifying the boundaries of the proposed separate areas.

On June 4, 2018, the EPA designated the partial-county Sheboygan area as nonattainment for the 2015 ozone NAAQS (83 FR 25776). The EPA's proposed nonattainment boundary for the Shoreline Sheboygan area for the 1997 ozone NAAQS and 2008 ozone NAAQS is identical to EPA's final nonattainment boundary for the Sheboygan area for the 2015 ozone NAAQS. The EPA's proposed nonattainment boundary for the Inland Sheboygan area for the 1997 ozone NAAQS and 2008 ozone NAAQS is the remaining portion of Sheboygan County.

4.0 Conclusion

When making initial designations under a new NAAQS, the EPA must designate as nonattainment any area that violates the NAAQS or any area that contributes to a nearby area that violates the NAAQS. For EPA to split an existing nonattainment area into two separate areas, EPA must determine that each separate area does not contribute to a violation of the standard in the other area. Therefore, this TSD is structured as an analysis of the potential for contribution from the proposed Inland Sheboygan area to the violation in the proposed Shoreline

Sheboygan area. This TSD does not consider whether the proposed Shoreline Sheboygan area contributes to a violation in the proposed Inland Sheboygan area, as monitoring data show that no such violation exists.

The emissions data and emissions-related data factor analysis including information about sources of precursor emissions, population density, degree of urbanization, traffic, and vehicle miles traveled for Sheboygan County indicates that overall ozone precursor emissions from sources in Sheboygan County (total 2014 reported NO_x = 4,585 tons, VOC= 3,421 tons) are relatively low albeit non-trivial and are mainly concentrated in the proposed separate Shoreline Sheboygan area. Most importantly, the proposed Shoreline Sheboygan area, which contains the violating Sheboygan Kohler Andrae monitor, also contains 95% of total county NO_x emissions from point sources, including the largest NO_x emitting point source in Sheboygan County, WPL-Edgewater. This is significant in light of the EPA study conducted in May 2017 for Ozone Advance areas, which suggests that NO_x is the more important ozone precursor relative to VOC in this region of the United States.[27] The emissions related-data analysis suggests the proposed Inland Sheboygan area contains very few point sources of NO_x emissions, and that Sheboygan County's non-point (area, on-road, and off-road mobile) emissions (for both NO_x and VOC) are mainly concentrated in the proposed Shoreline Sheboygan area.

The peer-reviewed scientific literature, the HYSPLIT trajectories, and Wisconsin's lake breeze ozone inland penetration distance analysis together indicate that lake breeze meteorology can influence ozone transport to Sheboygan County. The HYSPLIT trajectories indicate that the exceedance day air masses traveled over the Milwaukee and Chicago areas and Lake Michigan to reach the violating monitor in Sheboygan County. The peer-reviewed scientific literature indicates that precursor emissions have the potential to flow out over the lake with the morning land breeze, photochemically react to form high concentrations of ozone in a shallow, stable, inversion layer over the lake, and be transported back toward land by the afternoon lake breeze toward nearby and downwind areas such as the location of the violating monitor in Sheboygan County.

The violating shoreline monitor was the basis for the EPA's initial designation of the nonattainment area for the 1997 ozone NAAQS and 2008 ozone NAAQS. In determining a boundary for the nonattainment area, the EPA's ozone designations guidance recommends using the boundary of the statistical area containing the violating monitor as the starting point for the contribution analysis. In the case of the violating shoreline monitor, the relevant geographical entity was the Sheboygan Metropolitan Statistical Area, which consists of the entirety of Sheboygan County. Additionally, when considering a clearly defined legal boundary for the nonattainment area, factor five in the ozone designations guidance recommends considering existing jurisdictional boundaries, including previous nonattainment area boundaries. The entirety of Sheboygan County had been designated as nonattainment for previous ozone standards, including the 1-hour 1979 ozone NAAQS. At the time of these initial designations, a full-county nonattainment designation was consistent with EPA's guidance, and information to support a sub-county area was not available. However, in 2014, Wisconsin began operating the

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[27] Supplemental Information for Ozone Advance Areas Based On Pre-Existing National Modeling Analyses. EPA Office of Air Quality Planning and Standards, Air Quality Modeling Group, May 2017. Available at https://www.epa.gov/sites/production/files/2017-05/documents/national_modeling.advance.may_2017.pdf.
Figures 1 and 3 in this document show maps of July 2011 modeled monthly maximum daily 8-hour ozone average (MDA8) changes with 50% VOC and 50% NOx across-the-board cuts, nationally. These results show that VOC reductions have some impact on ozone levels for the portion of the country in which Sheboygan County, Wisconsin, is located but that NOx reductions are expected to have larger impacts. This modeling is limited in that it only looks at one month and is thus not directly comparable to the design value calculated over 3 years. However, it is indicative that NOx reductions are likely to be more effective than VOC reductions for the portion of the country in which Sheboygan County, Wisconsin, is located but that VOC reductions may still have some impact.

Sheboygan Haven (3.2 miles inland) monitor, making the data from this monitor a new component of the ozone analysis for Sheboygan County. This monitor is showing attainment of the 1997 ozone NAAQS and 2008 ozone NAAQS.

However, the EPA does not consider eliminating or separating geographic areas with attaining monitors from a nonattainment area or area of analysis with violating monitors for nonattainment designations purposes on the basis of the monitoring data alone. The EPA must consider the monitoring data in conjunction with other relevant factors, including the emissions and meteorological data, as a basis for excluding or separating a geographic area. The HYSPLIT trajectories indicate that exceedance day air masses traveled over the Milwaukee and Chicago areas and Lake Michigan. The peer-reviewed scientific literature indicates that areas along the shoreline of Lake Michigan, such as Sheboygan County, can be impacted by land/lake breeze-related ozone production and transport. Wisconsin's lake breeze ozone inland penetration distance analysis, which would not have been possible without the new inland monitor, indicates that ozone measurements in Sheboygan County are related to the lake breeze observations in Sheboygan County. This information supports the EPA's proposed finding that the proposed Inland Sheboygan area does not contribute to the violation of the standards in the proposed Shoreline Sheboygan area. Considered together, the five factor analyses contained in this TSD enable the EPA to propose revising the designation for the Sheboygan nonattainment area for the 1997 ozone NAAQS and 2008 ozone NAAQS, by splitting the existing nonattainment area into two separate areas.

The factor analysis above suggests that Sheboygan County is impacted by ozone transport from neighboring areas, like the Milwaukee area, which is immediately upwind and adjacent to Sheboygan County, and from areas farther upwind like the Chicago area, rather than from the proposed Inland Sheboygan area, and that ozone production from precursor pollutants from these upwind areas and subsequent downwind transport can be exacerbated by the lake breeze meteorology. The meteorology factor in conjunction with the information from the inland monitor, which is attaining the 2008 ozone NAAQS, indicate that the spatial extent of the violating area is not likely to extend beyond the boundary of the proposed Shoreline Sheboygan area. Similarly, based on the assessment of factors described above, the EPA proposes to conclude that the proposed Inland Sheboygan area does not contribute to the violation in the proposed Shoreline Sheboygan area.

This proposed revision to the boundaries of the initial nonattainment area designation under the 1997 ozone NAAQS and 2008 ozone NAAQS is possible due to new information from the second ozone monitor in Sheboygan County, coupled with a review of existing information on lake breeze meteorology including a recent ozone inland penetration distance analysis submitted by Wisconsin. This information was all considered in the context of the relevant statutory factors of Section 107(d)(3)(A) in addition to the five-factor weight-of-evidence analysis used by EPA for initial designations under Section 107(d)(1).

The EPA is proposing to split the current Sheboygan nonattainment area into two separate nonattainment areas that together cover the identical geographic area of the current area. The areas would be split along the following roadways, going from the northern county boundary to the southern county boundary: Highway 43, Wilson Lima Road, Minderhaud Road, County Road KK/Town Line Road, N 10th Street, County Road A S/Center Avenue, Gibbons Road, Hoftiezer Road, Highway 32, Palmer Road/Smies Road/Palmer Road, Amsterdam Road/County Road RR, Termaat Road. The EPA's proposed nonattainment boundary for the Shoreline Sheboygan County area for the 1997 ozone NAAQS and 2008 ozone NAAQS is a portion of Sheboygan County inclusive and east of the split boundary, and the EPA's proposed nonattainment boundary for

the Inland Sheboygan County area for the 1997 ozone NAAQS and 2008 ozone NAAQS is a portion of Sheboygan County exclusive and west of the split boundary.

The two proposed separate nonattainment areas together cover the identical geographic area of the existing Sheboygan County nonattainment area. Should this action be finalized as proposed, both areas would continue to be designated nonattainment for the 1997 ozone NAAQS and 2008 ozone NAAQS and would continue to be classified as Moderate.