Chicago, IL-IN-WI Nonattainment Area
Intended Area Designations for the
2015 Ozone National Ambient Air Quality Standards
Technical Support Document (TSD)

1.0 Summary

This technical support document (TSD) describes the EPA's intent to designate the Chicago, IL-IN-WI area in Illinois, Indiana, and Wisconsin as nonattainment for the 2015 ozone National Ambient Air Quality Standards (NAAQS).

On October 1, 2015, the EPA promulgated revised primary and secondary ozone NAAQS (80 FR 65292; October 26, 2015). The EPA strengthened both standards to a level of 0.070 parts per million (ppm). 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. The EPA must complete this process within 2 years of promulgating the NAAQS, unless the Administrator has insufficient information to make the initial designations decisions in that time frame. In such circumstances, the EPA may take up to 1 additional year to complete the designations.

Under section 107(d), states were required to submit area designation recommendations to the EPA for the 2015 ozone NAAQS no later than 1 year following promulgation of the standards, i.e., by October 1, 2016. Tribes were also invited to submit area designation recommendations. On September 30, 2016, Illinois recommended that the counties and partial counties identified in Table 1 be designated as nonattainment for the 2015 ozone NAAQS based on air quality data from 2013-2015. On September 16, 2016, Indiana recommended that the entire state be designated as attainment for the 2015 ozone NAAQS based on air quality data from 2013-2015. On September 21, 2016, Wisconsin recommended that the entire state be designated as attainment for the 2015 ozone NAAQS based on air quality data from 2013-2015.

After considering these recommendations and based on the EPA's technical analysis as described in this TSD, the EPA intends to designate as nonattainment for the 2015 ozone NAAQS all of the counties and partial counties recommended by the State of Illinois as well as two full counties in Indiana and a portion of one county in Wisconsin. The counties and partial counties EPA intends to designate as part of the Chicago, IL-IN-WI nonattainment area are listed in Table 1. The EPA must designate an area nonattainment if it has an air quality monitor that is violating the standard or if it has sources of emissions that are contributing to a violation of the NAAQS in a nearby area. Detailed descriptions of the intended nonattainment boundaries for the area are found in the supporting technical analysis for the area in Section 3.

Table 1. Chicago, IL-IN-WI Recommended Nonattainment Areas and the EPA's Intended Designated Nonattainment Areas for the 2015 Ozone NAAQS

Area	State's Recommended Nonattainment Counties	EPA's Intended Nonattainment Counties
Chicago, IL-IN-WI (IL)	Cook DuPage Grundy (partial) Kane Kendall (partial) Lake McHenry Will	Cook DuPage Grundy (partial) Kane Kendall (partial) Lake McHenry Will
Chicago, IL-IN-WI (IN)	None – recommended attainment	Lake Porter
Chicago, IL-IN-WI (WI)	None – recommended attainment	Kenosha (partial)

On November 6, 2017 (Published at 82 FR 5423), the EPA signed a notice designating most of the areas the State did not recommend for designation as nonattainment as attainment/unclassifiable[1] EPA explains in section 2.0 the approach it is now taking to designate the remaining areas in the State. EPA intends to designate other areas of Illinois, Indiana and Wisconsin nonattainment as part of other nonattainment areas and has prepared separate technical analyses for those areas.

In its recommendation letter, Illinois recommended that the EPA designate as "unclassifiable/attainment" all other counties and partial counties that it was not recommending for nonattainment as part of the Chicago, IL-IN-WI area or the St. Louis, MO-IL area. On November 6, 2017, EPA designated the remainder of Illinois not within the Chicago, IL-IN-WI area or St. Louis, MO-IL area as attainment/unclassifiable. The EPA's decision to designate these areas as attainment/unclassifiable is based on ambient monitoring data collected during the 2014-2016 period, where available, showing compliance with the 2015 ozone NAAQS, and the EPA's assessment that these areas are not contributing to a violation in a nearby area. This is consistent with the state's recommendation.

2.0 Nonattainment Area Analyses and Intended Boundary Determination

The EPA evaluated and determined the intended boundaries for each nonattainment area on a case-by-case basis, considering the specific facts and circumstances of the area. In accordance with the CAA section 107(d), the EPA intends to designate as nonattainment the areas with the monitors that are violating the 2015 ozone NAAQS and nearby areas with emissions sources (i.e., stationary, mobile, and/or area sources) that contribute to

[1] In previous ozone designations and in the designation guidance for the 2015 ozone NAAQS, the EPA used the designation category label Unclassifiable/Attainment to identify both areas that were monitoring attainment and areas that did not have monitors but for which the EPA had reason to believe were likely attainment and were not contributing to a violation in a nearby area. The EPA is now reversing the order of the label to be Attainment/Unclassifiable so that the category is more clearly distinguished from the separate Unclassifiable category.

the violations. As described in the EPA's designations guidance for the 2015 NAAQS (hereafter referred to as the "ozone designations guidance"),[2] after identifying each monitor indicating a violation of the ozone NAAQS in an area, the EPA analyzed those nearby areas with emissions potentially contributing to the violating area. In guidance issued in February 2016, the EPA provided that using the Core Based Statistical Area (CBSA) or Combined Statistical Area (CSA)[3] as a starting point for the contribution analysis is a reasonable approach to ensure that the nearby areas most likely to contribute to a violating area are evaluated. The area-specific analyses may support nonattainment boundaries that are smaller or larger than the CBSA or CSA. The EPA's analytical approach is described in Section 3 of this technical support document.

On November 6, 2017, EPA issued attainment/unclassifiable designations for approximately 85% of the United States and one unclassifiable area designation.[4] At that time, consistent with statements in the designations guidance regarding the scope of the area EPA would analyze in determining nonattainment boundaries, EPA deferred designation for any counties in the larger of a CSA or CBSA where one or more counties in the CSA or CBSA was violating the standard and any counties with a violating monitor not located in a CSA or CBSA. In addition, EPA deferred designation for any other counties adjacent to a county with a violating monitor. The EPA also deferred designation for any county that had incomplete monitoring data, any county in the larger of the CSA or CBSA where such a county was located, and any county located adjacent to a county with incomplete monitoring data.

The EPA is proceeding to complete the remaining designations consistent with the designations guidance (and EPA's past practice) regarding the scope of the area EPA would analyze in determining nonattainment boundaries for the ozone NAAQS as outlined above. For those deferred areas where one or more counties violating the ozone NAAQS or with incomplete data are located in a CSA or CBSA, in most cases the technical analysis for the nonattainment area includes any counties in the larger of the relevant CSA or CBSA. For counties with a violating monitor not located in a CSA or CBSA, EPA explains in the 3.0 Technical Analysis section, its decision whether to consider in the five-factor analysis for each area any other adjacent counties for which EPA previously deferred action. We intend to designate all counties not included in five-factor analyses for a specific nonattainment or unclassifiable area analyses, as attainment/unclassifiable. These deferred areas are identified in a separate document entitled "Intended Designations for Deferred Counties and Partial Counties Not Addressed in the Technical Analyses." which is available in the docket.

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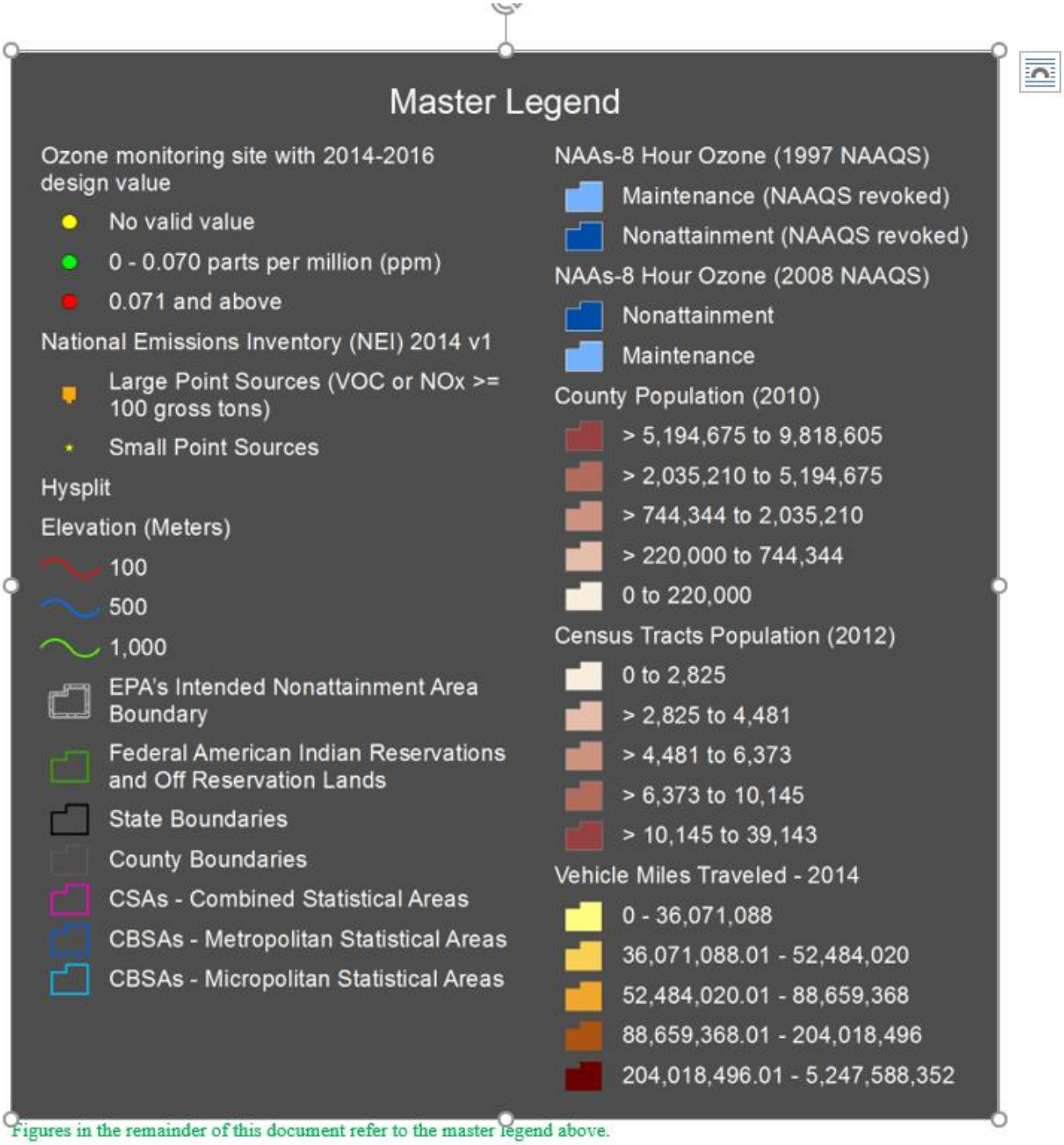
[2] The EPA issued guidance on February 25, 2016 that identified important factors that the EPA intends to evaluate in determining appropriate area designations and nonattainment boundaries for the 2015 ozone NAAQS. Available at *https://www.epa.gov/ozone-designations/epa-guidance-area-designations-2015-ozone-naaqs*

[3] Lists of CBSAs and CSAs and their geographic components are provided at www.census.gov/population/www/metroareas/metrodef.html. The Office of Management and Budget (OMB) adopts standards for defining statistical areas. The statistical areas are delineated based on U.S. Census Bureau data. The lists are periodically updated by the OMB. The EPA used the most recent July 2015 update (OMB Bulletin No. 15-01), which is based on application of the 2010 OMB standards to the 2010 Census, 2006-2010 American Community Survey, as well as 2013 Population Estimates Program data.

[4] Air Quality Designations for the 2015 Ozone National Ambient Air Quality Standards published on November 16, 2017(82 FR 54232).



Figures in the remainder of this document refer to the master legend above.

3.0 Technical Analysis for Chicago, IL-IN-WI Nonattainment Area

This technical analysis identifies the areas with monitors that violate the 2015 ozone NAAQS. The EPA evaluated these areas and any nearby areas to determine whether those nearby areas have emissions sources that potentially contribute to ambient ozone concentrations at the violating monitors in the area, based on the weight-of-evidence of the five factors recommended in the EPA's ozone designations guidance and any other relevant information. 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).[5] In addition, the EPA considered any additional data or information provided to the EPA by states or tribes.

EPA's area of analysis is the Chicago-Naperville, IL-IN-WI CSA, which includes the following 19 counties: Bureau, Cook, DeKalb, DuPage, Grundy, Kane, Kankakee, Kendall, Lake, LaSalle, McHenry, Putnam, and Will in Illinois, Jasper, Lake, LaPorte, Newton, and Porter in Indiana, and Kenosha in Wisconsin. The EPA applied the five factors recommended in its guidance to the area of analysis to determine the nonattainment boundary.

The five factors recommended in the EPA's guidance 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 (weather/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)).

Figure 1 is a map of the EPA's intended nonattainment boundary for the Chicago, IL-IN-WI nonattainment area. The map shows the location of the ambient air quality monitors, county, and other jurisdictional boundaries.

For purposes of the 1997 ozone NAAQS, the Chicago-Gary-Lake County, IL-IN nonattainment area included the entire counties of Cook, DuPage, Kane, Lake, McHenry, and Will and the partial counties of Grundy and Kendall in Illinois, and the entire counties of Lake and Porter in Indiana. For purposes of the 1997 ozone NAAQS, Kenosha County in Wisconsin was designated as part of the Milwaukee-Racine, WI nonattainment area.

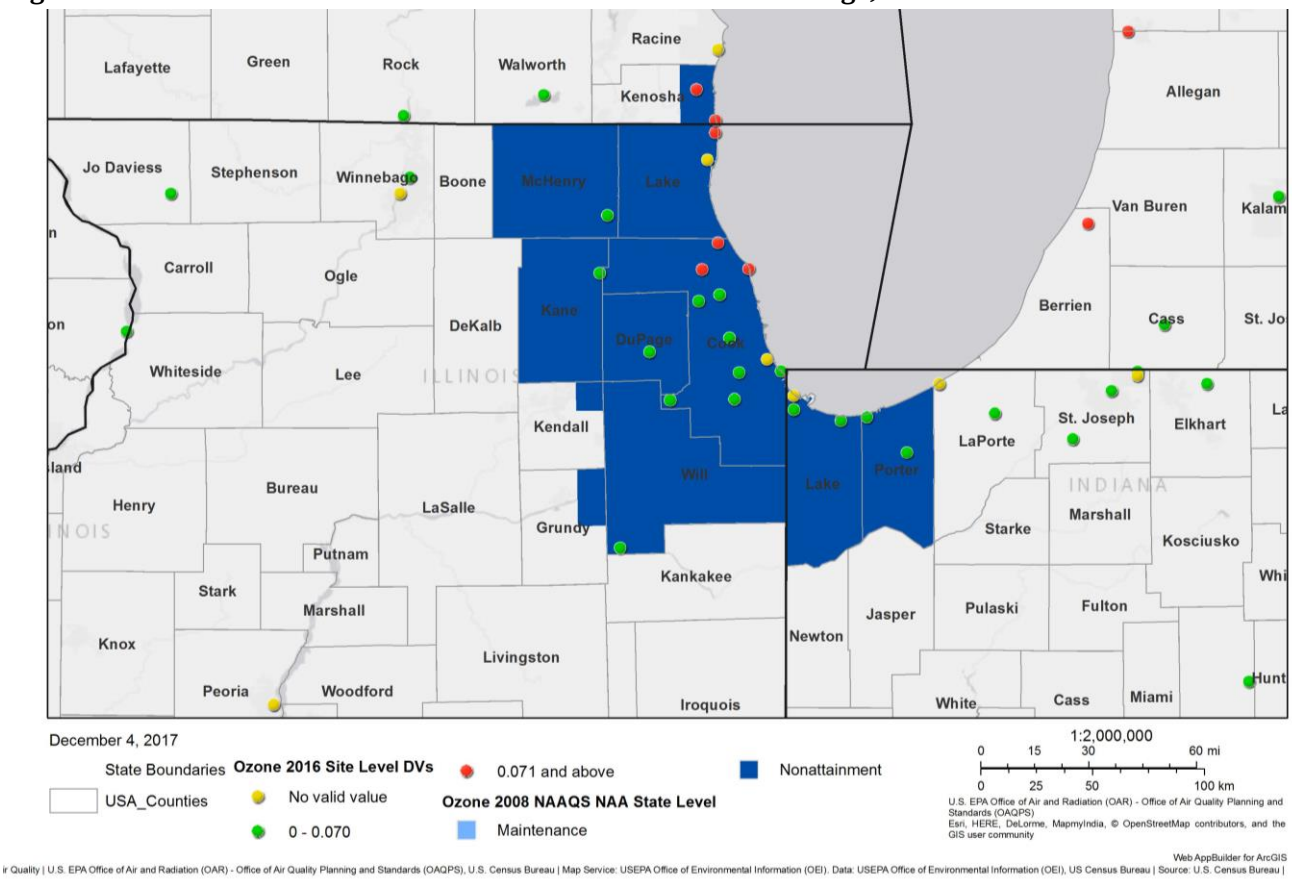
For purposes of the 2008 ozone NAAQS, the Chicago-Naperville, IL-IN-WI nonattainment area included the entire counties of Cook, DuPage, Kane, Lake, McHenry, and Will and portions of Grundy and Kendall Counties in Illinois, the entire counties of Lake and Porter in Indiana, and a portion of Kenosha County in Wisconsin.

For purposes of the 1997 and 2008 ozone NAAQS, the partial counties in Illinois are defined as Aux Sable Township and Goose Lake Township in Grundy County, and Oswego Township in Kendall County. For purposes of the 2008 ozone NAAQS, the partial county in Wisconsin is defined as the portion of Kenosha County bounded by the Lake Michigan shoreline on the East, the Kenosha County boundary on the North, the Kenosha County boundary on the South, and the I-94 corridor (including the entire corridor) on the West.

EPA intends to use the same boundaries from the 2008 ozone NAAQS for the 2015 ozone NAAQS.

[5] 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.*

Figure 1. EPA's Intended Nonattainment Boundaries for the Chicago, IL-IN-WI Area



The EPA must designate as nonattainment any area that violates the NAAQS and any nearby areas that contribute to the violation in the violating area. Cook County and Lake County in Illinois and Kenosha County in Wisconsin each have at least one monitor in violation of the 2015 ozone NAAQS, therefore these counties are included in the intended nonattainment area. The EPA's analysis finds that the counties of DuPage, Grundy (partial), Kane, Kendall (partial), McHenry, and Will in Illinois, Lake and Porter in Indiana, contribute to the violating area. The following sections describe the five factor analysis EPA used to identify the areas that contribute to the violations. 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.

Factor Assessment

Factor 1: Air Quality Data

The EPA considered 8-hour ozone design values in ppm for air quality monitors in the Chicago-Naperville, IL-IN-WI CSA based on data for the 2014-2016 period (i.e., the 2016 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.[6] The 2015 NAAQS are met when the design value is 0.070 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.[7] The EPA uses FRM/FEM measurement data residing in the EPA's Air Quality System (AQS) database to calculate the ozone design values. Individual violations of the 2015 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[8] are not included in these calculations. 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. The presence of one or more violating monitors (i.e. monitors with design values greater than 0.070 ppm) in a county or other geographic area forms 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) based on a consideration of what nearby areas are contributing to a violation of the NAAQS.

The EPA identified monitors where the most recent design values violate the NAAQS, and examined 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, appendix 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 2015 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).

The 2014-2016 design values for counties in the Chicago, IL-IN-WI nonattainment area and nearby surrounding area are shown in Table 2.

Table 2. Air Quality Data (all values in ppm)[a].

County, State	State Recommended Nonattainment?	AQS Site ID	2014-2016 DV	2014 4th highest daily max value	2015 4th highest daily max value	2016 4th highest daily max value
Bureau, IL	No	No monitor	N/A			
Cook, IL	Yes	170310001	0.069	0.066	0.066	0.075
		170310032	0.070	0.067	0.066	0.077
		170310076	0.069	0.067	0.065	0.075
		170311003	0.069	0.065	0.068	0.075
		170311601	0.069	0.070	0.066	0.073
		170313103	0.062	0.063	0.058	0.067
		170314002	0.066	0.063	0.061	0.076

[6] 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.

[7] 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.

[8] 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*.

County, State	State Recommended Nonattainment?	AQS Site ID	2014-2016 DV	2014 4th highest daily max value	2015 4th highest daily max value	2016 4th highest daily max value
		170314007	0.071	0.069	0.068	0.076
		170314201	0.071	0.068	0.068	0.079
		170317002	**0.072**	0.072	0.070	0.076
DeKalb, IL	No	No monitor	N/A			
DuPage, IL	Yes	170436001	**0.068**	0.064	0.067	0.074
Grundy, IL	Yes (partial)	No monitor	N/A			
Kane, IL	Yes	170890005	**0.068**	0.066	0.065	0.074
Kankakee, IL	No	No monitor	N/A			
Kendall, IL	Yes (partial)	No monitor	N/A			
Lake, IL	Yes	170971007	**0.073**	0.073	0.070	0.077
LaSalle, IL	No	No monitor	N/A			
McHenry, IL	Yes	171110001	**0.068**	0.067	0.064	0.073
Putnam, IL	No	No monitor	N/A			
Will, IL	Yes	171971011	**0.064**	0.064	0.064	0.064
Jasper, IN	No	No monitor	N/A			
Lake, IN	No	180890022	**0.067**	0.067	0.064	0.070
		180890030	N/A	0.065	0.070	N/A
		180892008	0.065	0.067	0.060	0.068
LaPorte, IN	No	180910005	N/A	0.070	0.067	N/A
		180910010	**0.063**	0.061	0.061	0.068
Newton, IN	No	No monitor	N/A			
Porter, IN	No	181270024	**0.069**	0.071	0.066	0.070
		181270026	0.066	0.067	0.060	0.071
Kenosha, WI	No	550590019	**0.077**	0.076	0.075	0.080
	No	550590025	**0.071**	0.070	0.068	0.076

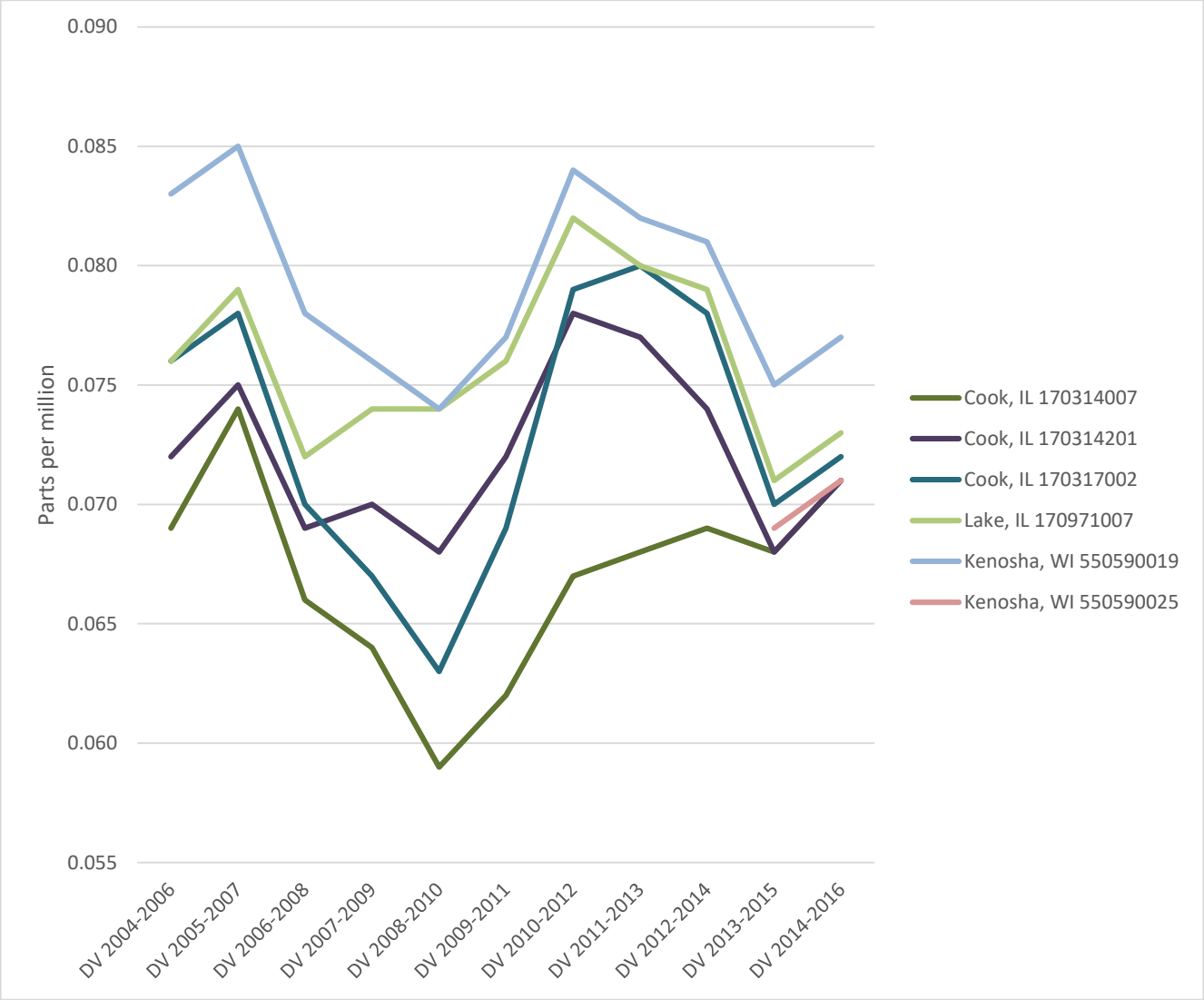
[a] The highest design value in each county is indicated in bold type.
N/A means that the monitor did not meet the completeness criteria described in 40 CFR, part 50, Appendix U, or no data exists for the county.

Cook County and Lake County in Illinois and Kenosha County in Wisconsin show a violation of the 2015 ozone NAAQS, therefore these counties or parts of these counties are included in the intended 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 in the area of analysis 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.

Figure 1, shown previously, identifies the Chicago, IL-IN-WI intended nonattainment area, the CSA boundary and the violating monitors. Table 2 identifies the design values for all monitors in the area of analysis and Figure 2 shows the historical trend of design values for the violating monitors. As indicated on the map, there are three violating monitors that are located in the northeast part of Cook County in Illinois, two additional violating monitors that are located along the Lake Michigan shoreline on either side of the Illinois-Wisconsin border, and a sixth violating monitor located further northwest into Kenosha County in Wisconsin. To the west, southwest, south, and southeast of the violating monitors, there are 16 monitors in the Chicago-Naperville, IL-IN-WI CSA

that are not violating for the 2014-2016 period. As shown in Figure 2, monitors in the Chicago-Naperville, IL-IN-WI CSA show fluctuations but an overall downward trend over the last decade, though there has been a small uptick based on the 2014-2016 design value.

Figure 2. Three-Year Design Values for Violating Monitors (2006-2016)



Under section 107(d) of the CAA, EPA must designate as nonattainment any area with at least one monitor that is violating the 2015 ozone NAAQS. In the Illinois portion of the Chicago-Naperville, IL-IN-WI CSA, violating monitors are located in Cook County and Lake County. In its September 30, 2016 letter, Illinois recommended that the entirety of these counties be designated as nonattainment for the 2015 ozone NAAQS, and EPA does not intend to modify this recommendation. In the Wisconsin portion of the Chicago-Naperville, IL-IN-WI CSA, two monitors in Kenosha County are violating the standard based on data from 2014-2016. In its September 21, 2016 letter, Wisconsin recommended that the entire state be designated as attainment for the 2015 ozone NAAQS based on data from 2013-2015 that showed that no monitors in the state were violating the 2015 ozone NAAQS. However, EPA must designate as nonattainment the area that includes the violating monitors in

Kenosha County, and EPA is notifying the state that it intends to designate as nonattainment the same partial county area surrounding the monitors that was designated as nonattainment for the 2008 ozone NAAQS. The remaining counties in the CSA are evaluated for contribution to violating monitors using the weight-of-evidence of the five factors.

Factor 2: Emissions and Emissions-Related Data

The EPA evaluated ozone precursor emissions of 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 each county in the area of analysis, 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. Emissions levels from sources in a nearby area indicate the potential for the area to contribute to monitored violations.

Table 3 provides a county-level emissions summary of NO_x and VOC (given in tons per year (tpy)) emissions for the area of analysis considered for inclusion in the intended Chicago, IL-IN-WI nonattainment area.

Table 3. Total County-Level NO_x and VOC Emissions.

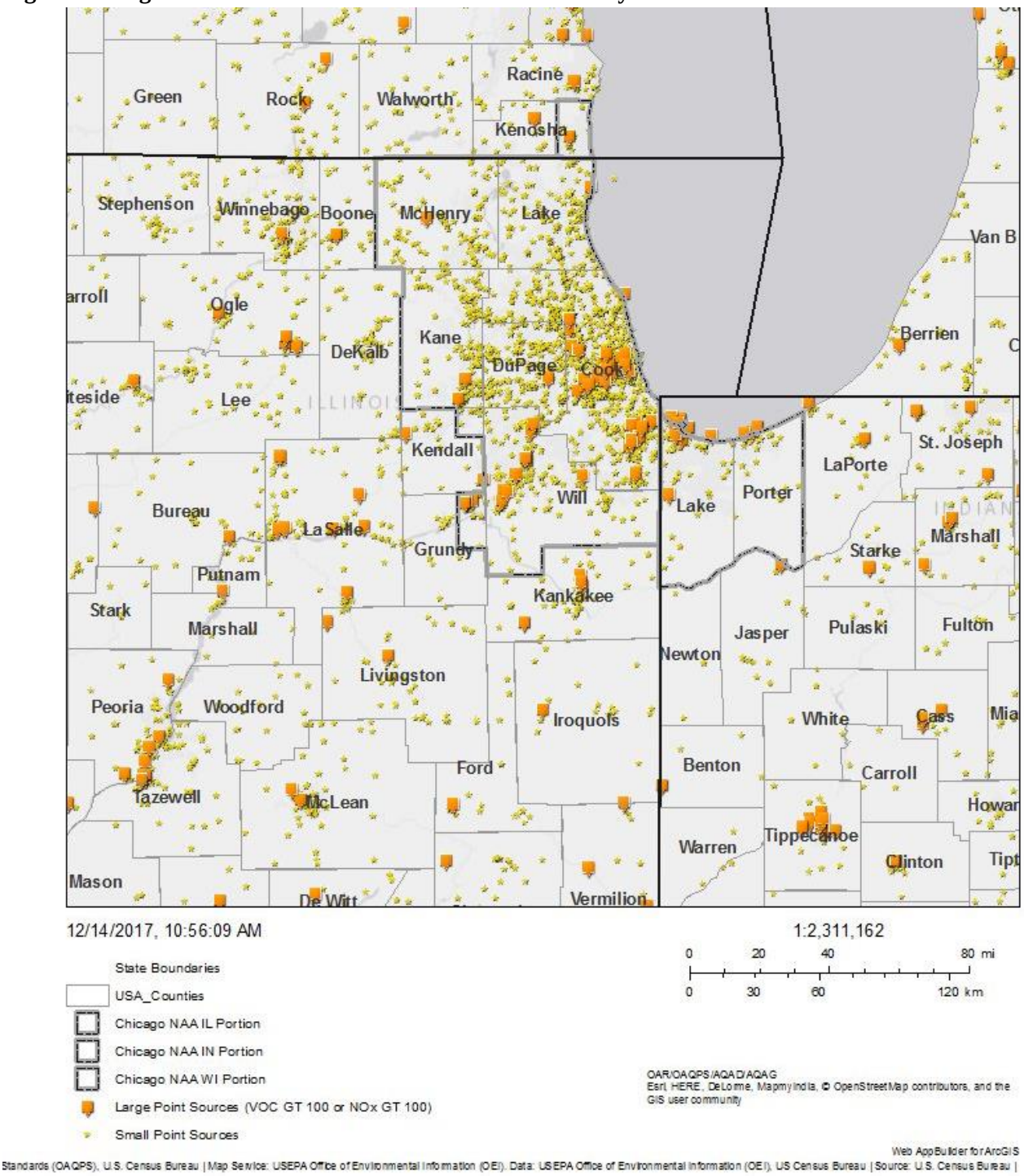
County	State Recommended Nonattainment?	Total NO_x (tpy)	Total VOC (tpy)
Cook, IL	Yes	95,864	86,253
Lake, IN	No	28,923	15,309
Will, IL	Yes	23,750	14,607
DuPage, IL	Yes	22,000	19,742
Lake, IL	Yes	17,615	15,143
Porter, IN	No	16,649	6,090
Kane, IL	Yes	11,335	10,533
Jasper, IN	No	10,212	1,999
La Salle, IL	No	7,992	5,073
La Porte, IN	No	7,586	4,534
McHenry, IL	Yes	6,675	6,353
Kenosha, WI	No	6,034	3,290
Kankakee, IL	No	4,053	4,216

Grundy, IL	Yes (partial)*	3,582	2,120
DeKalb, IL	No	3,391	3,288
Kendall, IL	Yes (partial)*	3,025	3,251
Bureau, IL	No	2,676	1,818
Putnam, IL	No	2,127	718
Newton, IN	No	952	1,838
	Area wide:	274,440	206,171

* For state recommended partial counties, the emissions shown are for the entire county.

In addition to reviewing county-wide emissions of NO_x and VOC in the area of analysis, the EPA also reviewed emissions from large point sources. The location of these sources, together with the other factors, can help inform nonattainment boundaries. The locations of the large and small point sources are shown in Figure 3 below. The intended nonattainment boundary is also shown.

Figure 3. Large and Small Point Sources in the Area of Analysis.



The 15 Illinois counties in the CSA account for 74% of all NO_x emissions in the CSA, as well as 84% of all VOC emissions in the CSA. The five Indiana counties in the CSA account for 23% and 14% of total CSA NO_x and VOC emissions, respectively; a majority of NO_x and VOC emissions from the Indiana portion of the CSA come from Lake County and Porter County. Kenosha County in Wisconsin accounts for 2% of both total NO_x and total VOC emissions in the CSA.

Cook County in Illinois has significantly higher emissions than all of the other counties. NOx emissions in Cook County are over 95,000 tpy and are 3 to 5 times greater than those in counties with the next highest NOx emissions – DuPage and Will in Illinois and Lake in Indiana. VOC emissions in Cook County are over 86,000 tpy and are 4 to 6 times greater than those in the counties with the next highest VOC emissions – DuPage, Lake and Will in Illinois and Lake in Indiana. Kane and Lake Counties in Illinois and Jasper and Porter Counties in Illinois also have relatively high NO_x emissions of over 10,000 tpy, and Kane County in Illinois has VOC emissions exceeding 10,000 tpy.

LaSalle and McHenry Counties in Illinois and LaPorte County in Indiana have the next highest emissions, each with total emissions of NOx and VOC around 12,000 tpy. DeKalb, Grundy, Kankakee, and Kendall in Illinois, LaPorte in Indiana, and Kenosha in Wisconsin all emit between approximately 3,000 to 6,000 tpy of NO_x, and 2,100 to 6,000 tpy of VOC.

The lowest emissions in the CSA are from Bureau and Putnam in Illinois and Newton in Indiana, with all three counties emitting under 3,000 tpy of NO_x and 1,900 tpy of VOC.

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 NAAQS. Table 4 shows the population, population density, and population growth information for each county in the area of analysis. Figure 4 shows the county-level population density map of the area of analysis.

Table 4. Population and Growth.

County	State Recommended Nonattainment?	2010 Population	2015 Population	2015 Population Density (per sq. mi.)	Absolute change in population (2010-2015)	Population % change (2010-2015)
Cook, IL	Yes	5,194,675	5,238,216	5,541	43,541	1%
DuPage, IL	Yes	916,924	933,736	2,851	16,812	2%
Lake, IL	Yes	703,462	703,910	1,587	448	0%
Will, IL	Yes	677,560	687,263	821	9,703	1%
Kane, IL	Yes	515,269	530,847	1,021	15,578	3%

Lake, IN	No	496,005	487,865	978	-8,140	-2%
McHenry, IL	Yes	308,760	307,343	510	-1,417	0%
Kenosha, WI	No	166,426	168,437	619	2,011	1%
Porter, IN	No	164,343	167,688	401	3,345	2%
Kendall, IL	Yes (partial)*	114,736	123,355	385	8,619	8%
LaSalle, IL	No	113,924	111,333	98	-2,591	-2%
LaPorte, IN	No	111,467	110,884	185	-583	-1%
Kankakee, IL	No	113,449	110,879	164	-2,570	-2%
DeKalb, IL	No	105,160	104,352	165	-808	-1%
Grundy, IL	Yes (partial)*	50,063	50,541	121	478	1%
Bureau, IL	No	34,978	33,587	39	-1,391	-4%
Jasper, IN	No	33,478	33,470	60	-8	0%
Newton, IN	No	14,244	14,008	35	-236	-2%
Putnam, IL	No	6,006	5,644	35	-362	-6%
	Area wide:	9,840,929	9,923,358	933	82,429	1%

* For state recommended partial counties, the population shown is for the entire county.
Source: U.S. Census Bureau population estimates for 2010 and 2015. www.census.gov/data.html

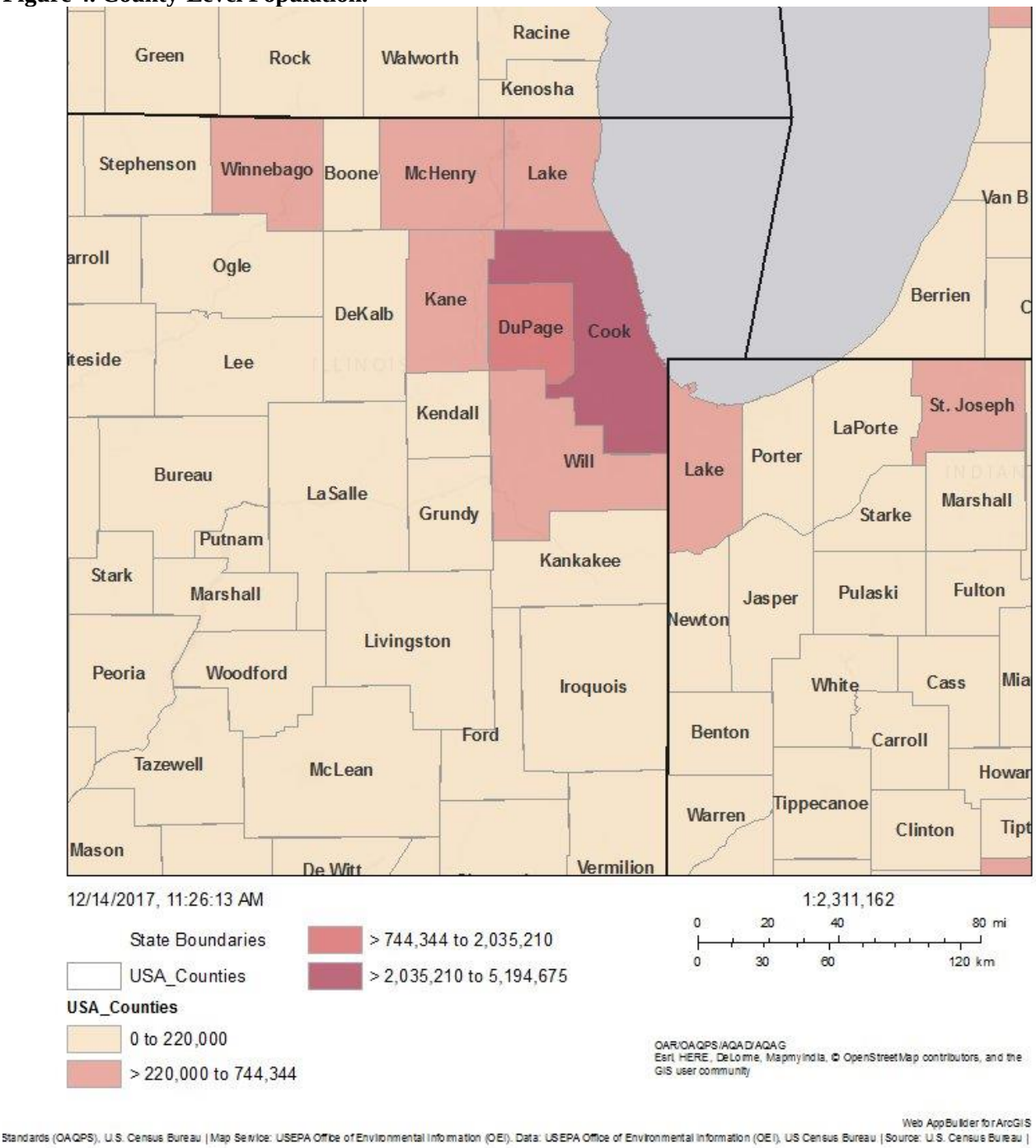
The total population of Cook County is more than 5 times greater than that of DuPage County, Illinois, which has the second highest population. The population density of Cook County is almost twice that of DuPage County, Illinois, which is the next most densely populated county in the area of analysis. DuPage, Kane, Lake, McHenry, and Will in Illinois all have relatively high populations in excess of 300,000, with population densities ranging from approximately 500 to 2800. Lake County in Indiana is similar in terms of total

population and population density. Kendall County in Illinois, Porter County in Indiana, and Kenosha County in Wisconsin all have moderately high population densities and have populations over 100,000.

The fastest-growing county in the CSA is Kendall in Illinois, with an increase in population of 8% between 2010 and 2015. Growth in most of the remaining counties has been relatively stagnate, ranging from a slight decline of 2% to minor growth of 3%. Two of the least populated counties have seen a more significant decline of 4% in Bureau, Illinois and 6% in Putnam, Illinois.

Because EPA has designated several partial counties for previous ozone standards and the State recommended and/or EPA is considering designating partial counties for the 2015 ozone standard, EPA examined total population for those portions of the counties that had previously been included as part of the nonattainment area for previous standards. The partial counties in Illinois are defined as Aux Sable Township and Goose Lake Township in Grundy County, and Oswego Township in Kendall County. Using 2010 data from American FactFinder provided by the U.S. Census Bureau, the most recent township-level data available, Aux Sable Township and Goose Lake Township together account for 14,735 of the total 50,063 people in Grundy County, or 29% of the county population. Oswego Township accounts for 50,870 of the 114,736 total people in Kendall County, or 44% of the county population. The partial county in Wisconsin is defined as the portion of Kenosha County bounded by the Lake Michigan shoreline on the East, the Kenosha County boundary on the North, the Kenosha County boundary on the South, and the I-94 corridor (including the entire corridor) on the West. Using 2010 data from American FactFinder provided by the U.S. Census Bureau, the most recent census tract-level data available, Kenosha census tracts 1 through 26, which are roughly contiguous with this partial county area, together account for 127,931 of the total 166,426 people in Kenosha County, or 77% of the county population.

Figure 4. County-Level Population.



Traffic and Vehicle Miles Travelled (VMT)

The EPA evaluated the commuting patterns of residents, as well as the total vehicle miles traveled (VMT) for each county in the area of analysis. 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. A county with high VMT and/or a high number of commuters is generally an integral part of an

urban area and high VMT and/or high number of commuters indicates the presence of motor vehicle emissions that may contribute to violations of the NAAQS. Rapid population or VMT growth in a county on the urban perimeter may signify increasing integration with the core urban area, and thus could indicate that the associated area source and mobile source emissions may be appropriate to include in the nonattainment area. In addition to VMT, the EPA evaluated worker data collected by the U.S. Census Bureau[9] for the area of analysis. Table 5 shows the traffic and commuting pattern data, including total VMT for each county in the area of analysis, number of residents who work in each county, number of residents that work in counties with violating monitor(s), and the percent of residents working in counties with violating monitor(s). The data in Table 5 are 2014 data.

Table 5. Traffic and Commuting Patterns.

County	State Recommended Nonattainment?	2014 Total VMT (Million Miles)	Number of County Residents Who Work	Number Commuting to or Within Counties with Violating Monitor(s)	Percentage Commuting to or Within Counties with Violating Monitor(s)
Cook, IL	**Yes**	**30,968**	**2,281,855**	**1,880,913**	**82.4%**
DuPage, IL	Yes	8,432	473,828	196,322	41.4%
Will, IL	Yes	5,991	328,451	119,431	36.4%
Lake, IN	No	5,784	206,639	41,770	20.2%
Lake, IL	**Yes**	**5,773**	**315,423**	**266,440**	**84.5%**
Kane, IL	Yes	3,825	237,495	74,361	31.3%
McHenry, IL	Yes	2,345	155,466	65,714	42.3%
Porter, IN	No	2,120	79,113	5,027	6.4%
LaPorte, IN	No	1,628	47,902	1,345	2.8%
LaSalle, IL	No	1,356	50,930	4,896	9.6%
Kenosha, WI	**No**	**1,313**	**80,194**	**50,036**	**62.4%**
Kankakee, IL	No	980	47,850	9,677	20.2%
DeKalb, IL	No	899	44,297	5,093	11.5%
Jasper, IN	No	809	15,981	479	3.0%
Kendall, IL	Yes (partial)*	777	63,080	16,638	26.4%
Grundy, IL	Yes (partial)*	711	25,581	5,508	21.5%

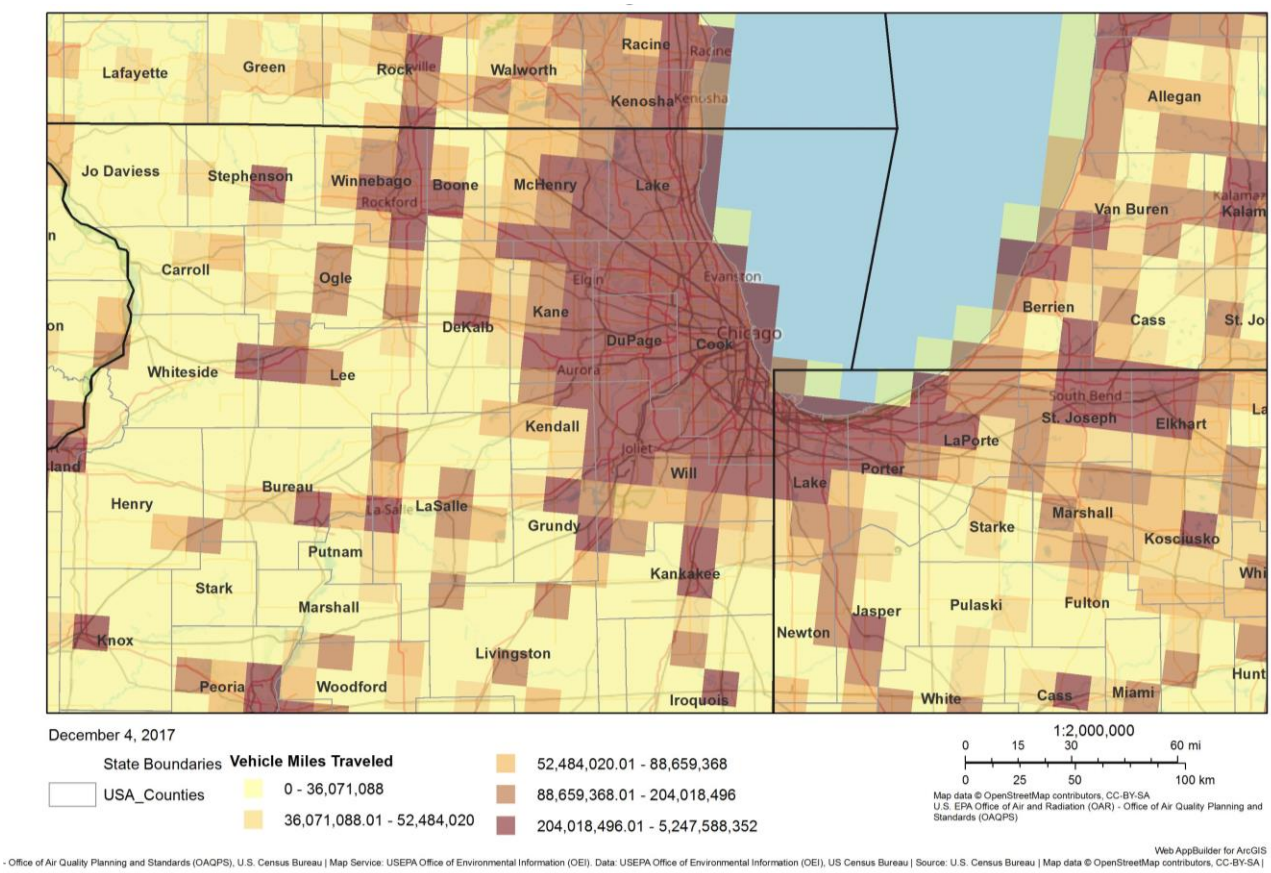
[9] The worker data can be accessed at: http://onthemap.ces.census.gov/.

Bureau, IL	No	540	16,440	873	5.3%
Newton, IN	No	246	6,625	269	4.1%
Putnam, IL	No	66	2,932	145	4.9%
	Total:	74,563	4,480,082	2,744,937	61.3%

* For state recommended partial counties, the data provided are for the entire county.
Counties with a monitor(s) violating the NAAQS are indicated in bold.

To show traffic and commuting patterns, Figure 5 overlays twelve-kilometer gridded VMT from the 2014 NEI with a map of the transportation arteries.

Figure 5. Twelve Kilometer Gridded VMT (Miles) Overlaid with Transportation Arteries.



Commuting data is drawn from On the Map from the U.S. Census Bureau.

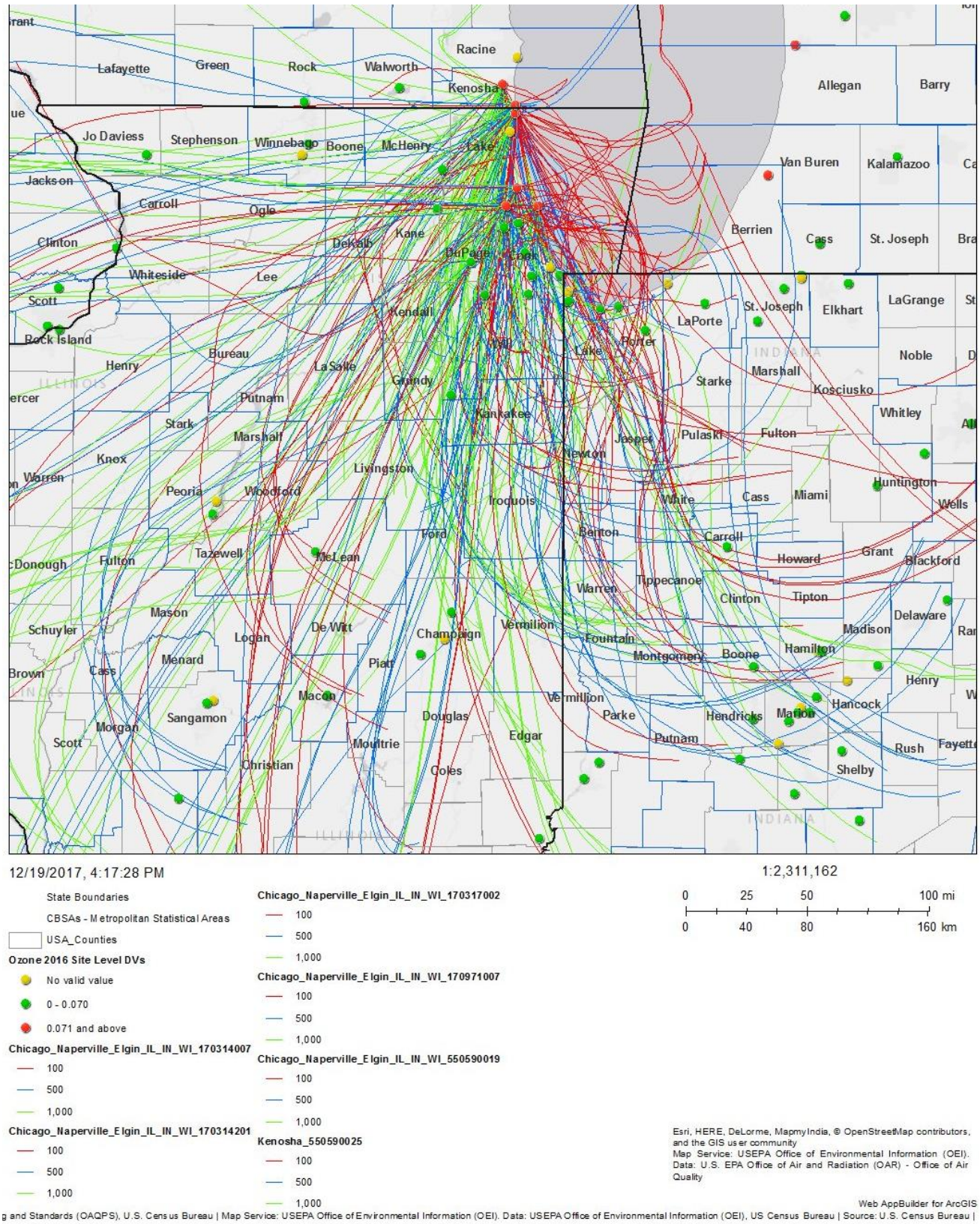
Cook County in Illinois has most traffic in the CSA, with annual VMT above 30 billion. DuPage County in Illinois ranks second in the CSA, with annual VMT above 8 billion. Will and Lake Counties in Illinois and Lake County in Indiana all have annual VMT between 5 billion and 6 billion. Kane, McHenry, and LaSalle Counties in Illinois, Porter and LaPorte Counties in Indiana, and Kenosha County in Wisconsin all have annual VMT between 1 billion and 4 billion. The other counties in the CSA have annual VMT below 1 billion. Within the CSA, monitors violating the 2015 ozone NAAQS are located in Cook and Lake Counties in Illinois and Kenosha County in Wisconsin. DuPage, Grundy, Kane, Kankakee, Kendall, McHenry, and Will in Illinois, and

Lake in Indiana all report that at least 20% of workers commute to or within a county in the CSA with a violating monitor.

Factor 3: Meteorology

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 2014-2016 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 6 shows the 24-hour HYSPLIT back trajectories for each exceedance day (i.e., daily maximum 8 hour values that exceed the 2015 ozone NAAQS) for the violating monitors.

Figure 6. HYSPLIT Back Trajectories for Violating Monitors.



HYSPLIT back trajectories show that transport winds blew predominantly from the west, southwest, south, and southeast during times when the violating monitors in the Chicago-Naperville, IL-IN-WI CSA measured exceedances of the 2015 ozone NAAQS. Figure 6 shows the densest pattern of back trajectories across Cook, DuPage, Lake, and Will in Illinois. Moderately dense trajectories are also present over DeKalb, Grundy, Kane, Kankakee, Kendall, LaSalle, and McHenry in Illinois and Jasper, Lake, Porter, and Newton in Indiana. The least dense trajectories in the CSA pass over Bureau and Putnam in Illinois, LaPorte in Indiana, and Kenosha in Wisconsin.

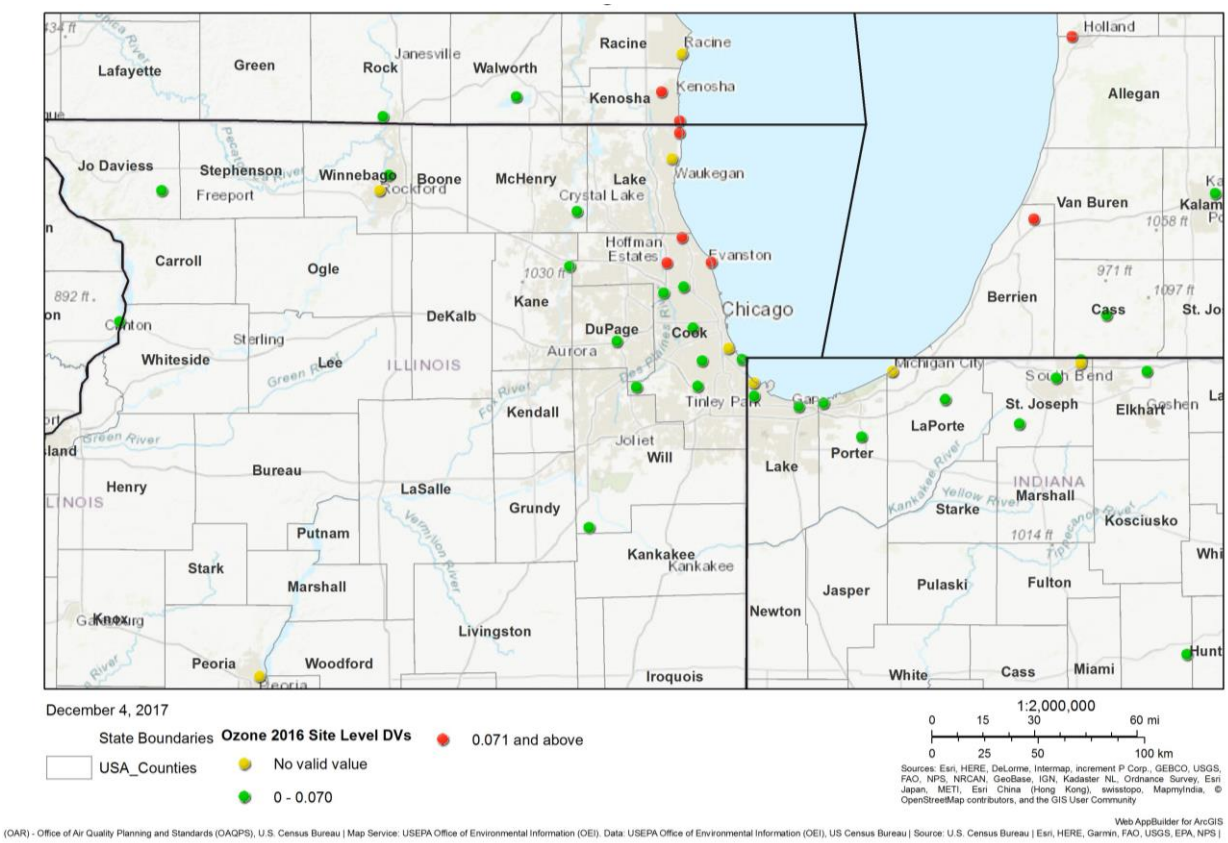
Factor 4: Geography/topography

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.

The EPA used geography/topography analysis to evaluate the physical features of the land that might affect the airshed and, therefore, the distribution of ozone over the area. Figure 7 illustrates the physical features in the area of analysis.

The Chicago-Naperville, IL-IN-WI CSA borders Lake Michigan. Transport of emissions and formation of ozone in the CSA is influenced by the "lake effect", which is the offshore flow of polluted air from the Chicago area to locations over the lake at night and the subsequent onshore flow of polluted air from over Lake Michigan back onto land locations in afternoon hours due to temperature differences between the lake surface and the onshore surface. HYSPLIT back trajectories illustrate this effect, and show in particular how ozone and precursor emissions from the Indiana portion of the CSA can follow a low-altitude path across Lake Michigan and along the Lake Michigan shoreline to contribute to exceedances at the three violating monitors in Cook County, the two additional violating monitors along the Lake Michigan shoreline on either side of the Illinois-Wisconsin border, and the sixth violating monitor located further northwest into Kenosha County in Wisconsin.

Figure 7. Topographic Illustration of the Physical Features.



Factor 5: Jurisdictional boundaries

Once the geographic extent of the violating area and the nearby area contributing to violations is determined, the EPA considered 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 intended Chicago, IL-IN-WI nonattainment area, 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 or geographic coordinates for purposes of identifying the boundaries of the intended designated areas.

The Chicago, IL-IN-WI area has previously established nonattainment boundaries associated with the 1997 and 2008 ozone NAAQS. For the 1997 area, this boundary included the entire counties of Cook, DuPage, Kane, Lake, McHenry, and Will in Illinois, the entire counties of Lake and Porter in Indiana, and parts of Grundy and Kendall in Illinois. For the 2008 area, this boundary included the entire counties of Cook, DuPage, Kane, Lake, McHenry, and Will in Illinois, the entire counties of Lake and Porter in Indiana, parts of Grundy and Kendall in Illinois, and parts of Kenosha in Wisconsin. Illinois has recommended the same boundary for the Illinois portion

of the area for the 2015 ozone NAAQS. Indiana and Wisconsin have each recommended that the entirety of their state be designated attainment for the 2015 ozone NAAQS.

For purposes of the 1997 and 2008 ozone NAAQS, the partial counties in Illinois are defined as Aux Sable Township and Goose Lake Township in Grundy County, and Oswego Township in Kendall County. For purposes of the 2008 ozone NAAQS, the partial county in Wisconsin is defined as the portion of Kenosha County bounded by the Lake Michigan shoreline on the East, the Kenosha County boundary on the North, the Kenosha County boundary on the South, and the I-94 corridor (including the entire corridor) on the West.

Conclusion for Chicago, IL-IN-WI Area

The EPA applied the five-factor analysis to the 19 counties in the Chicago-Naperville, IL-IN-WI CSA: Bureau, Cook, DeKalb, DuPage, Grundy, Kane, Kankakee, Kendall, Lake, LaSalle, McHenry, Putnam, and Will in Illinois, Jasper, Lake, LaPorte, Newton, and Porter in Indiana, and Kenosha in Wisconsin.

Air quality monitors in Cook County and Lake County in Illinois indicate violations of the 2015 ozone NAAQS based on the 2016 design values, and Illinois recommended that the entirety of these counties be designated nonattainment; therefore, these counties are included in the intended nonattainment area.

Air quality monitors in Kenosha County in Wisconsin indicate a violation of the 2015 ozone NAAQS based on the 2016 design values. The EPA intends to include the same partial county area surrounding the monitor that was designated as nonattainment for the 2008 ozone NAAQS in the intended nonattainment area. This partial county area contains approximately 77% of the total county population. HYSPLIT back trajectories from violating monitors in the area of analysis show that transport winds blew predominantly from the west, southwest, south, and southeast during times when the monitors measured exceedances of the 2015 ozone NAAQS; there were far fewer trajectories crossing the western portion of Kenosha County compared to the rest of the area of analysis. Therefore, EPA does not intend to include the remaining areas of Kenosha County in the Chicago, IL-IN-WI nonattainment area for the 2015 ozone NAAQS.

Of the remaining 16 counties in the CSA without violating monitors, DuPage, Kane, and Will in Illinois and Lake and Porter in Indiana have the highest NO_x emissions. These five counties, plus McHenry in Illinois, also have the highest VOC emissions. These same six counties also have the most traffic, with VMT above 2 billion, and the highest populations, with over 150,000 people. Meteorological analysis shows that emissions from these areas are capable of transporting to the locations of the violating monitors on the days that the monitored ozone values exceed the standard. The EPA's evaluation of these factors indicates that these areas contribute to the ozone concentrations in violation of the 2015 ozone NAAQS through emissions from point and non-point sources and from commuters into the counties with violating monitors. Therefore, the EPA intends to include DuPage, Kane, McHenry, and Will in Illinois and Lake and Porter in Indiana in the nonattainment area for the 2015 ozone NAAQS.

Illinois recommended that Sable Township and Goose Lake Township in Grundy County and Oswego Township in Kendall County be designated as nonattainment for the 2015 ozone NAAQS. Grundy County and Kendall County have emissions that are relatively low for the area, with Grundy County ranking 14th for NO_x emissions and 15th for VOC emissions, and Kendall County ranking 16th for NO_x emissions and 14th for VOC emissions, out of the 19 counties in the CSA. However, a significant number of HYSPLIT back trajectories cross Grundy and Kendall Counties, showing that emissions from these counties can contribute to exceedances

at the violating monitors. These counties also have ties to the CSA, with over 21% of workers commuting to a county with a violating monitor. The townships defining the partial-county areas are located in the northeast parts of both Grundy County and Kendall County, comprising the portions of these counties most contiguous to the urban area of the CSA. Based on the evidence, EPA does not believe that it should modify the state's recommendation that Sable Township and Goose Lake Township in Grundy County and Oswego Township in Kendall County be designated as nonattainment for the 2015 ozone NAAQS as part of the Chicago area, and that the remaining areas in Grundy County and Kendall County not be included as part of the nonattainment area for the 2015 ozone NAAQS.

Jasper County in Indiana has relatively high NO_x emissions, ranking 8th in the CSA, and there are a significant number of HYSPLIT back trajectories that pass through Jasper County. However, Jasper County ranks near the bottom for most of the remaining factors, including 16th (out of 19 counties) in the CSA for both VOC emissions and population density. The population of Jasper County decreased between 2010 and 2015. Only 3% of Jasper County workers commute to a county with a violating monitor, which ranks Jasper County 18th in the CSA. Considering the five factors, the EPA does not intend to modify Indiana's recommendation that Jasper County not be included as part of the Chicago nonattainment area.

Very few HYSPLIT back trajectories pass through LaPorte County in Indiana. In addition, LaPorte County has limited ties to the urban core with only 2.8% of LaPorte workers commuting to a county with a violating monitor; this ranks 19th in the 19-county CSA. For the other factors, LaPorte ranks toward the middle or lower end of the 19 counties. Newton County in Indiana has very low NO_x emissions, ranking 19th in the CSA, and low VOC emissions, ranking 17th in the CSA. Only 4.1% of Newton workers commute to a county with a violating monitor, ranking 17th in the CSA. The EPA does not intend to modify Indiana's recommendation that LaPorte County and Newton County not be included as part of the Chicago nonattainment area.

LaSalle in Illinois has NOx and VOC emissions both ranking 9th in the CSA, and Bureau and Putnam in Illinois rank in the bottom three CSA counties for both NOx and VOC emissions. These three neighboring counties are predominantly rural, with population densities ranking 17th, 18th, and 15th, respectively. DeKalb and Kankakee in Illinois have NO_x emissions ranking 15th and 13th, respectively, and VOC emissions ranking 13th and 11th, respectively; these emissions are below average for the CSA. Their population densities rank 12th and 13th, respectively, which are also below average for the CSA. HYSPLIT back trajectories through these counties are relatively modest. The EPA does not intend to modify Illinois's recommendation that Bureau, DeKalb, Kankakee, LaSalle, and Putnam Counties not be included as part of the Chicago nonattainment area.

Cook, DuPage, Grundy, Kane, Kendall, Lake, McHenry, and Will in Illinois, Lake and Porter in Indiana, and Kenosha in Wisconsin together account for 86% of all NO_x emissions in the CSA and 89% of all VOC emissions in the CSA. These same 11 counties together account for 95% of total population in the CSA, as well as 110% of population growth in the CSA; this figure is above 100% because the other eight counties in the CSA have lost population overall. These 11 counties together account for 91% of VMT in the CSA, and are home to 99% of workers in the CSA who commute to or within a county with a violating monitor.

Based on the assessment of factors described above, the EPA intends to designate the following counties as part of the Chicago, IL-IN-WI nonattainment area: the entire counties of Cook, DuPage, Kane, Lake, McHenry, and Will in Illinois, the entire counties of Lake and Porter in Indiana, parts of Grundy and Kendall in Illinois, and

parts of Kenosha in Wisconsin. These are the same counties and partial counties that are included in the Chicago-Naperville, IL-IN-WI nonattainment area for the 2008 ozone NAAQS.