

St. Louis, MO-IL 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 St. Louis, MO-IL area in Missouri and Illinois 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 identified in Table 1 be designated nonattainment for the 2015 ozone NAAQS based on air quality data from 2013-2015, and on September 22, 2017, Missouri requested EPA consider information which they will be providing in the near future

After considering these recommendations and based on the EPA's technical analysis as described in this TSD, the EPA intends to designate the area listed in Table 1 as nonattainment for the 2015 ozone NAAQS. 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. A detailed description of the intended nonattainment boundary for the area is found in the supporting technical analysis in Section 3.

Table 1. Recommended Nonattainment Counties and the EPA’s Intended Designated Nonattainment Area for the 2015 Ozone NAAQS

| St. Louis, MO-IL | Recommended Nonattainment Counties | EPA’s Intended Nonattainment Counties |
|------------------|------------------------------------|---|
| Missouri | None ¹ | Franklin Jefferson City of St. Louis St. Louis County St. Charles |
| Illinois | Madison Monroe St. Clair | Madison Monroe St. Clair |

The St. Louis, MO-IL area is a part of a multi-state (Missouri and Illinois) core-based statistical area (CBSA). The Missouri counties in the CBSA are Franklin, Jefferson, Lincoln, St. Charles, St. Louis and Warren, and the City of St. Louis. The Illinois counties in the CBSA are Bond, Calhoun, Clinton, Jersey, Macoupin, Madison, Monroe, and St. Clair. There are two additional sparsely-populated micropolitan counties outside the CBSA (but part of the larger CSA) located to the distant east (Marion County, IL approximately 70 miles from St. Louis) and to the distant south (St. Francois County, MO approximately 60 miles from St. Louis) that we are not considering nearby for purposes of this assessment.

The EPA intends to designate Franklin, Jefferson, St. Charles and St. Louis counties, and the City of St. Louis in Missouri and Madison, Monroe and St. Clair counties in Illinois as nonattainment based on technical analyses discussed in Section 3 of this document. This intended boundary for the 2015 ozone NAAQS is the same as the nonattainment boundary for 2008 ozone NAAQS.

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 the violations. As described in the EPA’s designations guidance for the 2015 NAAQS (hereafter referred to as

¹ EPA received Missouri’s initial recommendation in a letter dated September 30, 2016. However, Missouri subsequently sent a letter on September 22, 2017, requesting the Agency not act on the state’s initial recommendations, and indicating MDNR’s desire to reconsider its previous boundary recommendation. Based on this information and because Missouri has not yet submitted revised recommendations, EPA is relying on its own five-factor analysis of current data and the state’s previous 2008 ozone nonattainment boundary to inform the Agency’s intended designation for the 2015 ozone NAAQS. So we are indicating no recommendation from MO at this time.

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.

On November 6, 2017, the EPA issued attainment/unclassifiable designations for approximately 85% of the United States and one unclassifiable area designation.⁴ 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. The EPA intends 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. Included in this category are the two micropolitan counties of Marion County, IL and St. Francois County, MO, in the larger St. Louis CSA.

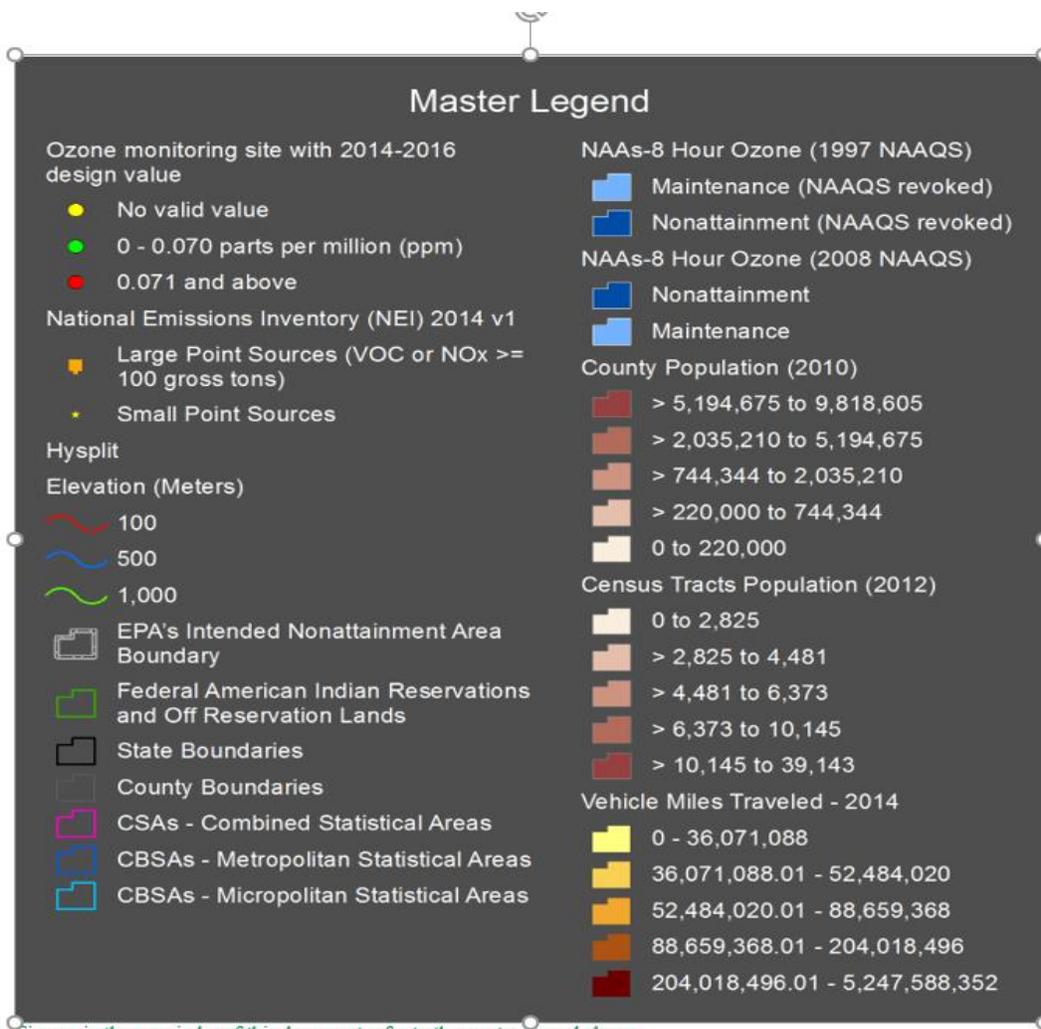
The EPA believes that using the CBSA⁵ is an appropriate starting point for the contribution analysis for the St. Louis area to ensure that the nearby areas most likely to contribute to a violating area are evaluated. The area-specific analyses may support nonattainment boundaries that are smaller or larger than the CBSA. As previously stated, the St. Louis CBSA includes the counties of Franklin, Jefferson, Lincoln, St. Charles, and St. Louis, Warren, and the City of St. Louis, in Missouri as well as the counties of Bond, Calhoun, Clinton, Jersey, Macoupin, Madison, Monroe, and St. Clair in Illinois. The EPA’s analytical approach is described in Section 3 of this technical support document.

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).

⁵ 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.



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

3.0 Technical Analysis for St. Louis, MO-IL

This technical analysis identifies the counties with monitors that violate the 2015 ozone NAAQS. The EPA evaluated counties with violating monitors and any nearby counties to determine whether those nearby counties had emissions sources that potentially contribute to ambient ozone concentrations at the violating monitors, 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).⁶ In addition, the EPA considered any additional data or information provided to the EPA by states or tribes.

The five factors recommended in the EPA’s guidance are:

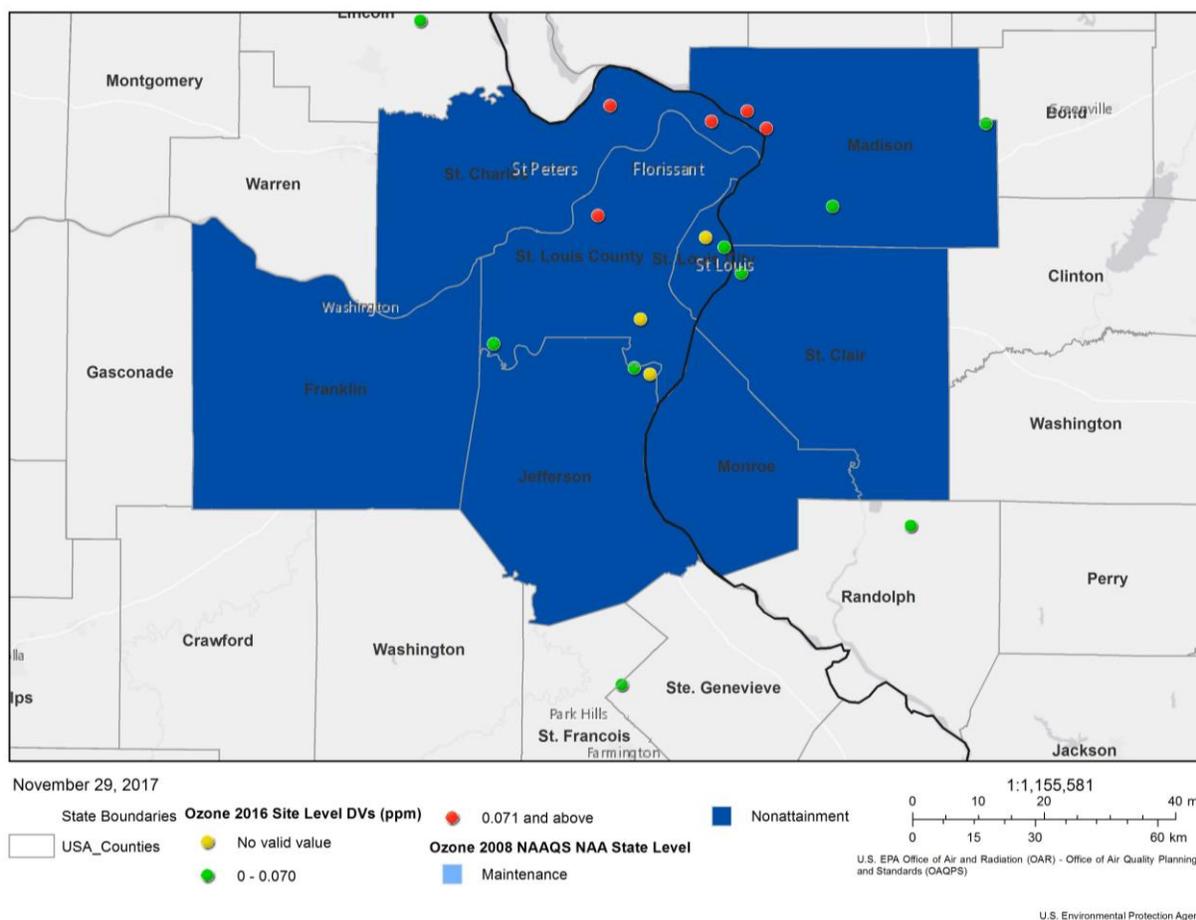
⁶ The EPA’s Ozone Designations Guidance and Data web page can be found at <https://www.epa.gov/ozone-designations/ozone-designations-guidance-and-data>.

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 St. Louis, MO-IL area. The map shows the location of the ambient air quality monitors, county, and other jurisdictional boundaries. The intended boundary for the 2015 ozone NAAQS is the same as the boundary for 2008 ozone NAAQS.

For purposes of the 1997 ozone NAAQS, this area was designated nonattainment. The boundary for the nonattainment area for the 1997 ozone NAAQS included the entire counties of Franklin, Jefferson, St. Charles, and St. Louis, and the City of St. Louis, Missouri as well as the entire counties of Jersey, Madison, Monroe, and St. Clair, Illinois. For purposes of the 2008 ozone NAAQS, this area was designated nonattainment and included the same counties as for the 1997 ozone NAAQS, with the exception of Jersey County in Illinois.

Figure 1. EPA's Intended Nonattainment Boundaries for the St. Louis, MO-IL Area



The EPA must designate as nonattainment any area that monitors a violation of the NAAQS and any nearby areas that contribute to the violation. The counties of St. Charles and St. Louis in Missouri and Madison in Illinois have monitors in violation of the 2015 ozone NAAQS, therefore these counties are included in the intended nonattainment area. Based on the analysis that follows, EPA intends to include the counties of Franklin, Jefferson, St. Charles, and St. Louis, and the City of St. Louis, Missouri as well as the counties of Madison, Monroe, and St. Clair, Illinois in the nonattainment area because they contribute to the violating area. 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.

Factor Assessment

Factor 1: Air Quality Data

The EPA considered 8-hour ozone design values in ppm for air quality monitors in the St. Louis, MO-IL area 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.⁷ The 2015 NAAQS is 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.⁸ 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 Rule⁹ 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

⁷ 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.

⁸ 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.

⁹ 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>.

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 the area of analysis are shown in Table 2.

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

| County/State | Local Site Name | State Recommended Nonattainment? | AQS Site ID | 2014-2016 Design Value | 2014 4th Highest Daily Max Value | 2015 4th Highest Daily Max Value | 2016 4th Highest Daily Max Value |
|-----------------------|----------------------------|----------------------------------|------------------|------------------------|----------------------------------|----------------------------------|----------------------------------|
| Jersey, IL | Illini Jr. High | No | 170831001 | 0.068 | 0.065 | 0.067 | 0.074 |
| Macoupin, IL | IEPA Trailer | No | 171170002 | 0.064 | 0.063 | 0.064 | 0.067 |
| Madison, IL | Clara Barton School | Yes | 171190008 | 0.071 | 0.072 | 0.069 | 0.073 |
| | Southwest Cable TV | Yes | 171191009 | 0.067 | 0.070 | 0.064 | 0.067 |
| | Water Plant | Yes | 171193007 | 0.071 | 0.070 | 0.069 | 0.075 |
| | Alhambra | Yes | 171199991 | 0.067 | 0.068 | 0.067 | 0.068 |
| Saint Clair, IL | IEPA-RAPS Trailer | Yes | 171630010 | 0.068 | 0.067 | 0.066 | 0.073 |
| Jefferson, MO | Arnold West | No ^b | 290990019 | 0.070 | 0.072 | 0.069 | 0.070 |
| Lincoln, MO | Foley | No ^b | 291130003 | 0.065 | 0.067 | 0.065 | 0.065 |
| Saint Charles, MO | West Alton | No^b | 291831002 | 0.072 | 0.072 | 0.070 | 0.075 |
| | Orchard Farm | No ^b | 291831004 | 0.071 | 0.072 | 0.066 | 0.076 |
| Saint Louis, MO | Pacific | No ^b | 291890005 | 0.065 | 0.065 | 0.065 | 0.067 |
| | Maryland Heights | No^b | 291890014 | 0.071 | 0.072 | 0.069 | 0.073 |
| City of St. Louis, MO | Blair Street | No ^b | 295100085 | 0.065 | 0.066 | 0.063 | 0.068 |

^a The highest design value in counties with multiple monitors is indicated in bold.

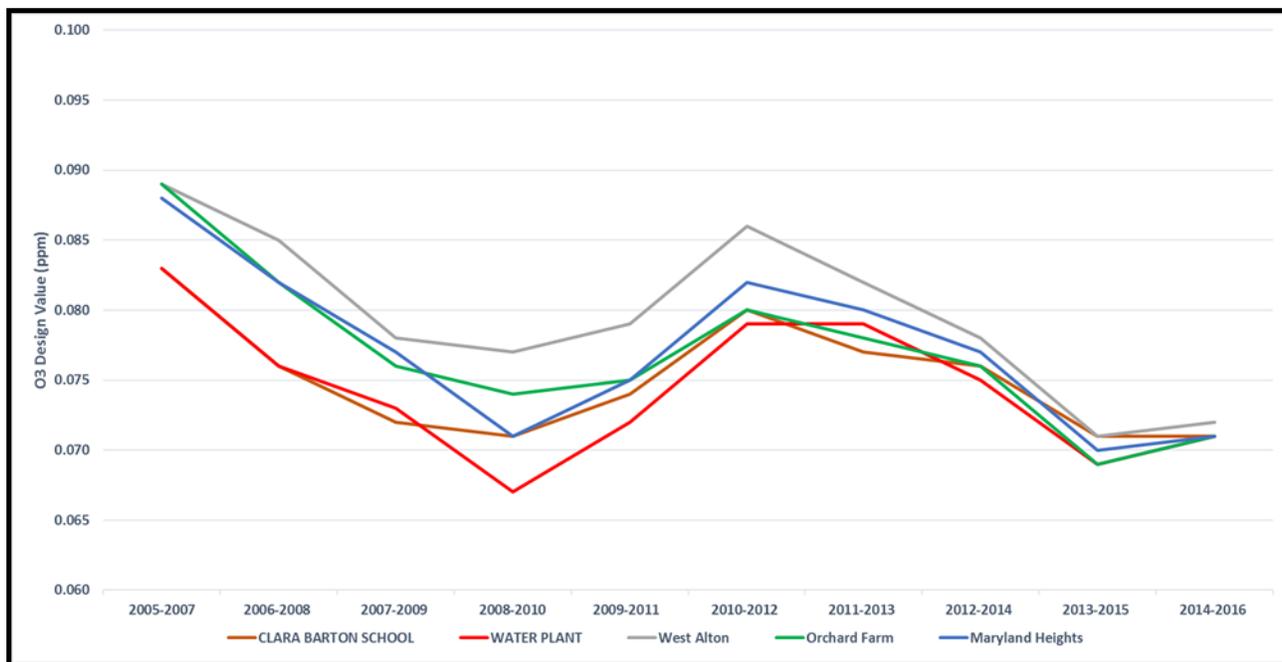
^b EPA received Missouri's initial recommendation in a letter dated September 30, 2016. However, Missouri subsequently sent a letter on September 22, 2017, requesting the Agency not act on the state's initial recommendations, and indicating MDNR's desire to reconsider its previous boundary recommendation. So we are indicating no recommendation from MO at this time.

Monitors in St. Charles and St. Louis Counties in Missouri and in Madison County, Illinois are in violation of the 2015 ozone NAAQS, therefore 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 near a county with a violating monitor has been evaluated based on the weight-of-evidence of the five factors and other relevant information to determine whether it contributes to the nearby violation.

Figure 1, shown previously, identifies the St. Louis, MO-IL intended nonattainment area and the violating monitors. Table 2 identifies the design values for all monitors in the area of analysis. As indicated on the map, there are three violating monitors that are located in the Missouri portion of the intended boundary of

nonattainment; two monitors are in St. Charles County, Missouri (Orchard Farm and West Alton) and one is in St. Louis County, Missouri (Maryland Heights). There are also two violating monitors located in the Illinois portion of the intended boundary of nonattainment in Madison County, IL (Clara Barton School and Water Plant). There are 11 monitors in the area of analysis that are attaining the standard. Figure 2 shows the historical trend of design values for the violating monitors. Design values were decreasing from 2007 through 2010 before increasing again in 2012 and continuing to decrease through 2015. However, there was a small uptick in the 2016 design value.

Figure 2. Three-Year Design Values for Violating Monitors (2007-2016).



Factor 2: Emissions and Emissions-Related Data

The EPA evaluated ozone precursor emissions of NO_x and VOCs 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 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 St. Louis, MO-IL nonattainment area.

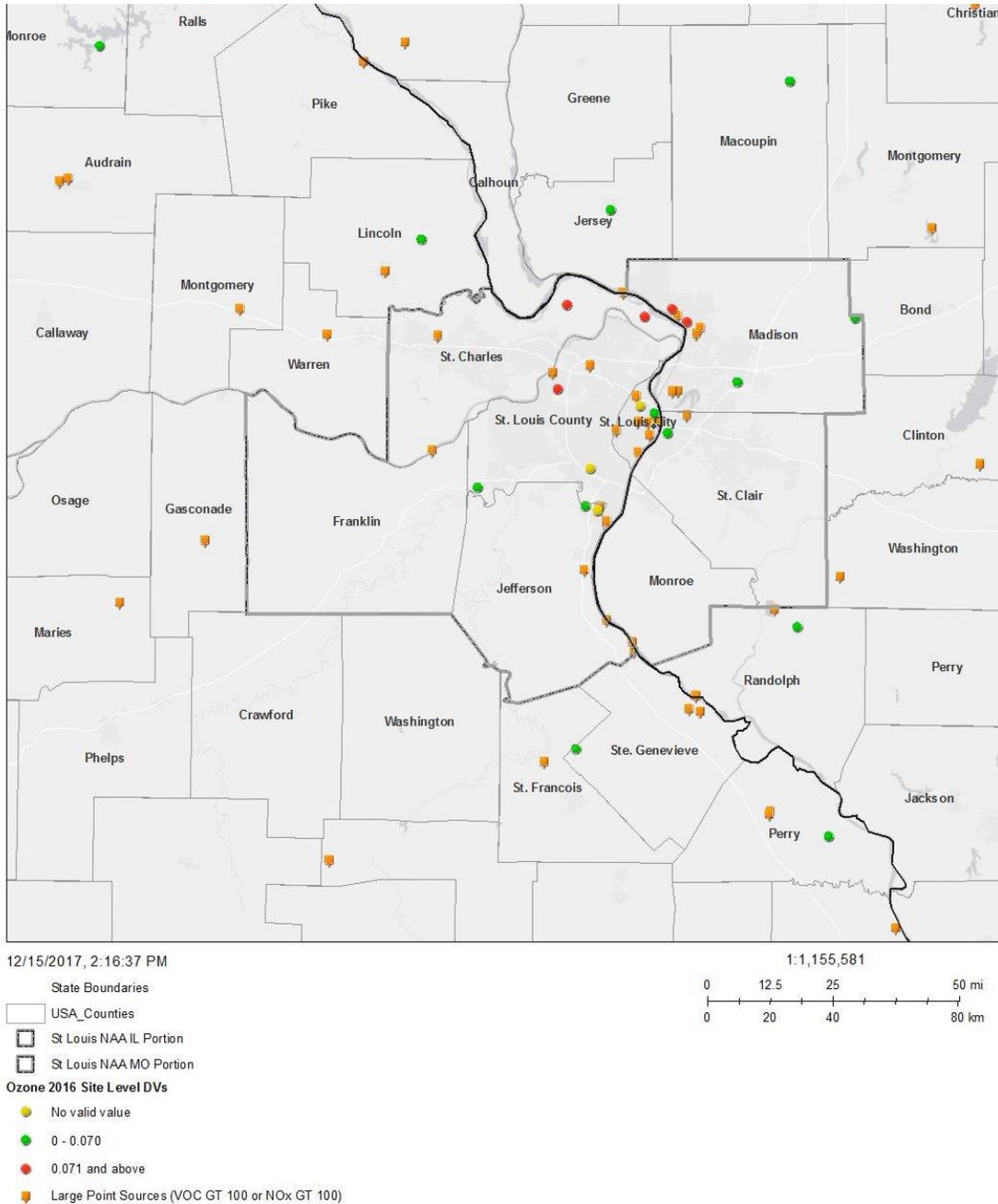
Table 3. Total County-Level NO_x and VOC Emissions.

| County | State Recommended Nonattainment? ¹⁰ | NO _x (tpy) | VOC (tpy) |
|-----------------------|--|-----------------------|-----------|
| St. Louis, MO | No | 34,847 | 26,869 |
| St. Charles, MO | No | 16,190 | 9,650 |
| Madison, IL | Yes | 14,818 | 9,036 |
| Jefferson, MO | No | 12,067 | 6,287 |
| Franklin, MO | No | 11,742 | 7,349 |
| St. Clair, IL | Yes | 7,639 | 5,949 |
| City of St. Louis, MO | No | 7,243 | 7,238 |
| Clinton, IL | No | 4,922 | 2,279 |
| Monroe, IL | Yes | 2,682 | 1,171 |
| Lincoln, MO | No | 2,268 | 2,506 |
| Macoupin, IL | No | 1,795 | 2,311 |
| Warren, MO | No | 1,519 | 1,516 |
| Bond, IL | No | 1,089 | 1,104 |
| Calhoun, IL | No | 1,075 | 981 |
| Jersey, IL | No | 1,025 | 911 |
| Area Wide: | | 120,921 | 85,156 |

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 point sources are shown in Figure 3 below. The intended nonattainment boundary is also shown. For each county not included in the nonattainment boundary, EPA believes these counties do not have sources of emissions that are contributing, in a consistent and substantive way, to a violation of the NAAQS in a nearby area.

¹⁰ EPA received Missouri's initial recommendation in a letter dated September 30, 2016. However, Missouri subsequently sent a letter on September 22, 2017, requesting the Agency not act on the state's initial recommendations, and indicating MDNR's desire to reconsider its previous boundary recommendation. So we are indicating no recommendation from MO at this time.

Figure 3. Large Point Sources in the Area of Analysis



For NO_x, St. Louis County has emissions that are more than twice as high as any of the other counties in the area of analysis. St. Charles and Madison counties have the next highest level of emissions – approximately 46 and 43 percent of the level of St. Louis County. Jefferson and Franklin Counties each have approximately 35 percent the level of emissions of St. Louis County. The next highest NO_x emissions are in St. Louis City and St. Clair County at slightly more than 20 percent the level in St. Louis County. The NO_x emissions in Clinton

County are about 15 percent the level in St Louis County and the remaining counties have NO_x emissions that are less than 8 percent.

St. Louis County also has significantly higher VOC emissions than the remaining counties. St. Charles and Madison Counties have VOC emissions at roughly 35 percent the level in St. Louis County. Franklin, Jefferson and St. Clair counties and the City of St Louis all have roughly 22 to 27 percent of the VOC emissions as St Louis County and the remaining counties all have less than 10 percent.

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 contains the county-level population. For each county not included in the nonattainment boundary, EPA believes these counties do not possess significant population density or urbanization which would contribute a violation of the NAAQS in a nearby area.

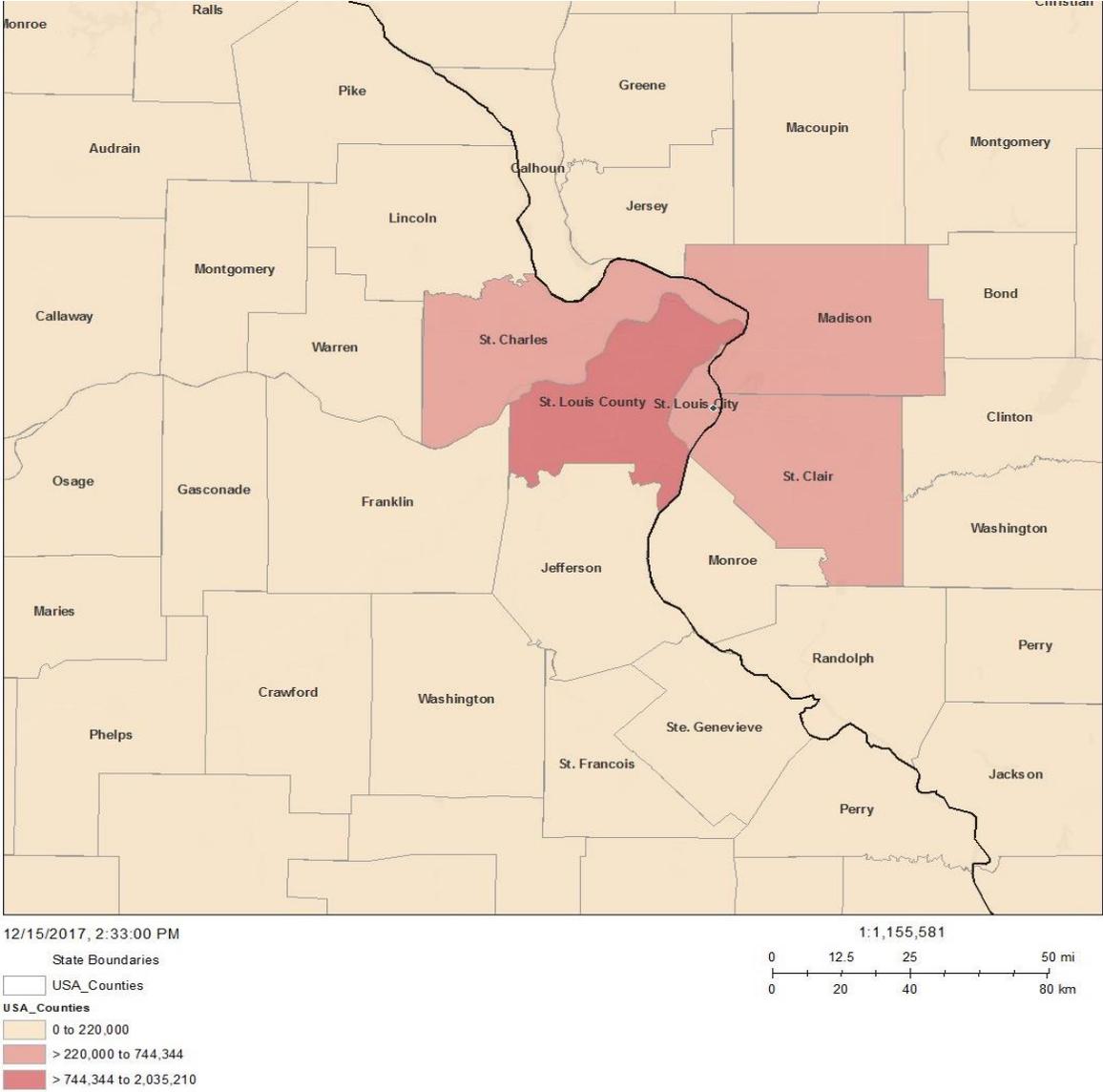
Table 4. Population and Growth.

| County Name | State Recommended for Nonattainment (yes/no) ¹¹ | 2010 Population | 2015 Population | 2015 Population Density (per sq. mi.) | Absolute change in population (2010-2015) | Population % change (2010-2015) |
|-----------------------|--|-----------------|-----------------|---------------------------------------|---|---------------------------------|
| St. Louis, MO | No | 998,954 | 1,003,362 | 1976 | 4,408 | 0.4 |
| St. Charles, MO | No | 360,485 | 385,590 | 688 | 25,105 | 7 |
| City of St. Louis, MO | No | 319,294 | 315,685 | 5099 | -3,609 | -1 |
| St. Clair, IL | Yes | 270,056 | 264,052 | 401 | -6,004 | -2 |
| Madison, IL | Yes | 269,282 | 266,209 | 372 | -3,073 | -1 |
| Jefferson, MO | No | 218,733 | 224,124 | 341 | 5,391 | 2 |
| Franklin, MO | No | 101,492 | 102,426 | 111 | 934 | 1 |
| Lincoln, MO | No | 52,566 | 54,696 | 87 | 2,130 | 4 |

¹¹ EPA received Missouri’s initial recommendation in a letter dated September 30, 2016. However, Missouri subsequently sent a letter on September 22, 2017, requesting the Agency not act on the state’s initial recommendations, and indicating MDNR’s desire to reconsider its previous boundary recommendation. So we are indicating no recommendation from MO at this time.

| | | | | | | |
|--------------|-----|--------|--------|----|--------|-----|
| Macoupin, IL | No | 47,765 | 46,045 | 53 | -1,720 | -4 |
| Clinton, IL | No | 37,762 | 37,786 | 80 | 24 | 0.1 |
| Monroe, IL | Yes | 32,957 | 33,879 | 88 | 922 | 3 |
| Warren, MO | No | 32,513 | 33,513 | 78 | 1,000 | 3 |
| Jersey, IL | No | 22,985 | 22,372 | 61 | -613 | -3 |
| Bond, IL | No | 17,768 | 16,950 | 45 | -818 | -5 |
| Calhoun, IL | No | 5,089 | 4,899 | 19 | -190 | -4 |

Figure 4. County-Level Population



Traffic and Vehicle Miles Travelled (VMT)

The EPA evaluated the commuting patterns of residents, as well as the total 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 Bureau¹² for the area of analysis. Table 5 shows the traffic and commuting pattern data, including total VMT for each county, 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.

¹² The worker data can be accessed at: <http://onthemap.ces.census.gov/>.

Table 5. Traffic and Commuting Patterns.

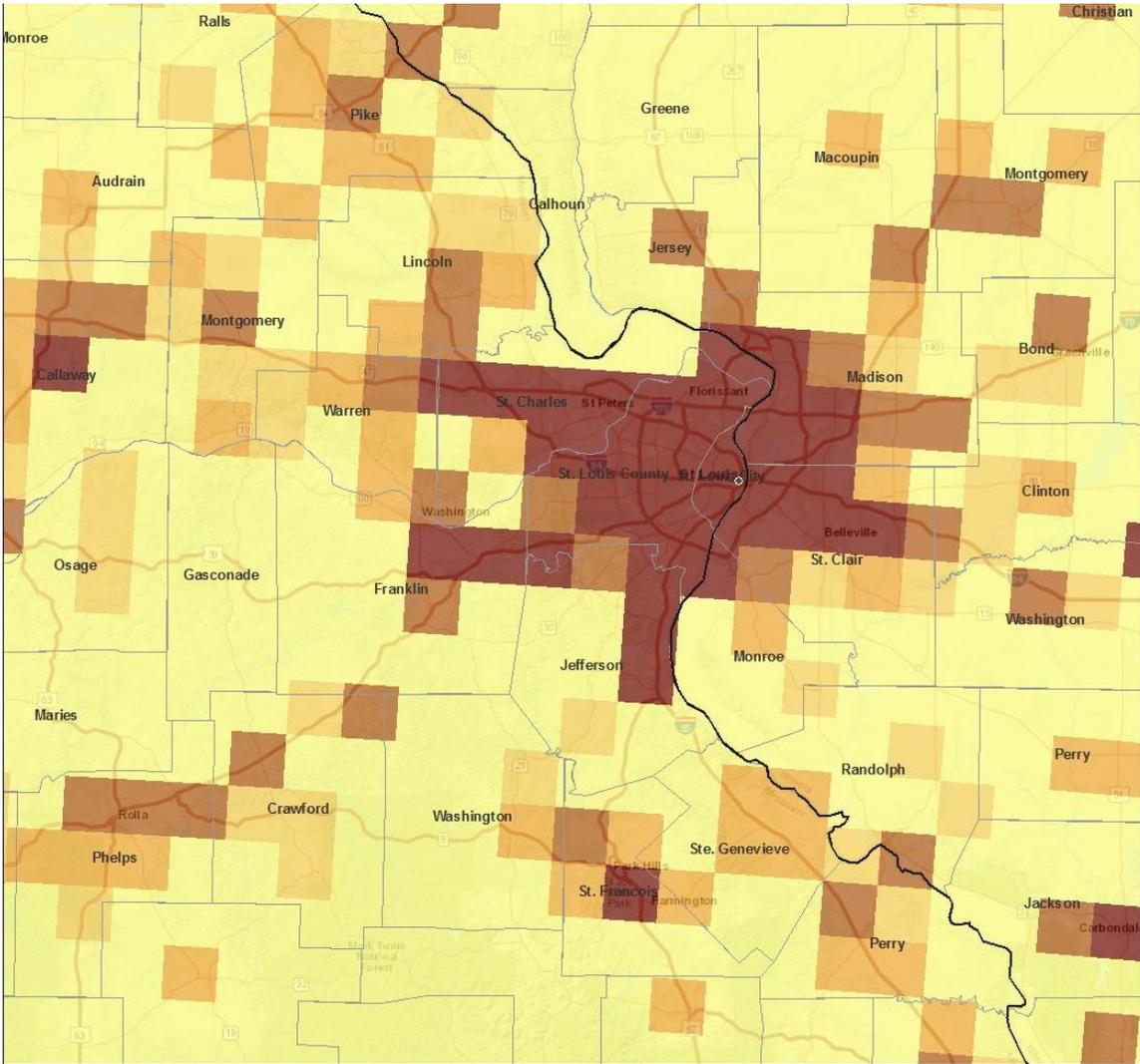
| County* | State Recommended Nonattainment (Yes/No) ¹³ | 2014 Total VMT (Million Miles) | Number of County Residents Who Work | Number Commuting to or Within Counties with Violating Monitor(s) | Percentage Commuting to or Within Counties with Violating Monitor(s) |
|------------------------|--|--------------------------------|-------------------------------------|--|--|
| St. Louis, MO | No | 11,275 | 454,912 | 323,305 | 71 |
| St. Charles, MO | No | 3,582 | 191,500 | 156,800 | 82 |
| Madison, IL | No | 2,935 | 118,354 | 74,894 | 63 |
| St. Clair, IL | Yes | 2,749 | 108,274 | 26,572 | 25 |
| Jefferson, MO | No | 2,238 | 106,596 | 53,122 | 50 |
| City of St. Louis, MO | No | 1,838 | 137,995 | 67,433 | 49 |
| Franklin, MO | No | 1,532 | 48,205 | 16,862 | 35 |
| Lincoln, MO | No | 573 | 25,002 | 13,475 | 54 |
| Warren, MO | No | 507 | 14,561 | 7,504 | 52 |
| Macoupin, IL | No | 406 | 21,165 | 5,235 | 25 |
| Clinton, IL | No | 391 | 17,075 | 2,903 | 17 |
| Monroe, IL | Yes | 368 | 17,519 | 5,255 | 30 |
| Bond, IL | No | 292 | 6,996 | 1,268 | 18 |
| Jersey, IL | No | 196 | 9,861 | 4,320 | 44 |
| Calhoun, IL | No | 36 | 2,864 | 942 | 33 |

*Counties with a monitor violating the NAAS 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.

¹³ EPA received Missouri’s initial recommendation in a letter dated September 30, 2016. However, Missouri subsequently sent a letter on September 22, 2017, requesting the Agency not act on the state’s initial recommendations, and indicating MDNR’s desire to reconsider its previous boundary recommendation. So we are indicating no recommendation from MO at this time.

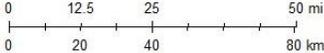
Figure 5. Twelve Kilometer Gridded VMT (Miles)



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1:1,155,581

- State Boundaries
- USA_Countries
- Vehicle Miles Traveled**
- 0 - 36,071,088
- 36,071,088.01 - 52,484,020
- 52,484,020.01 - 88,659,368
- 88,659,368.01 - 204,018,496
- 204,018,496.01 - 5,247,588,352



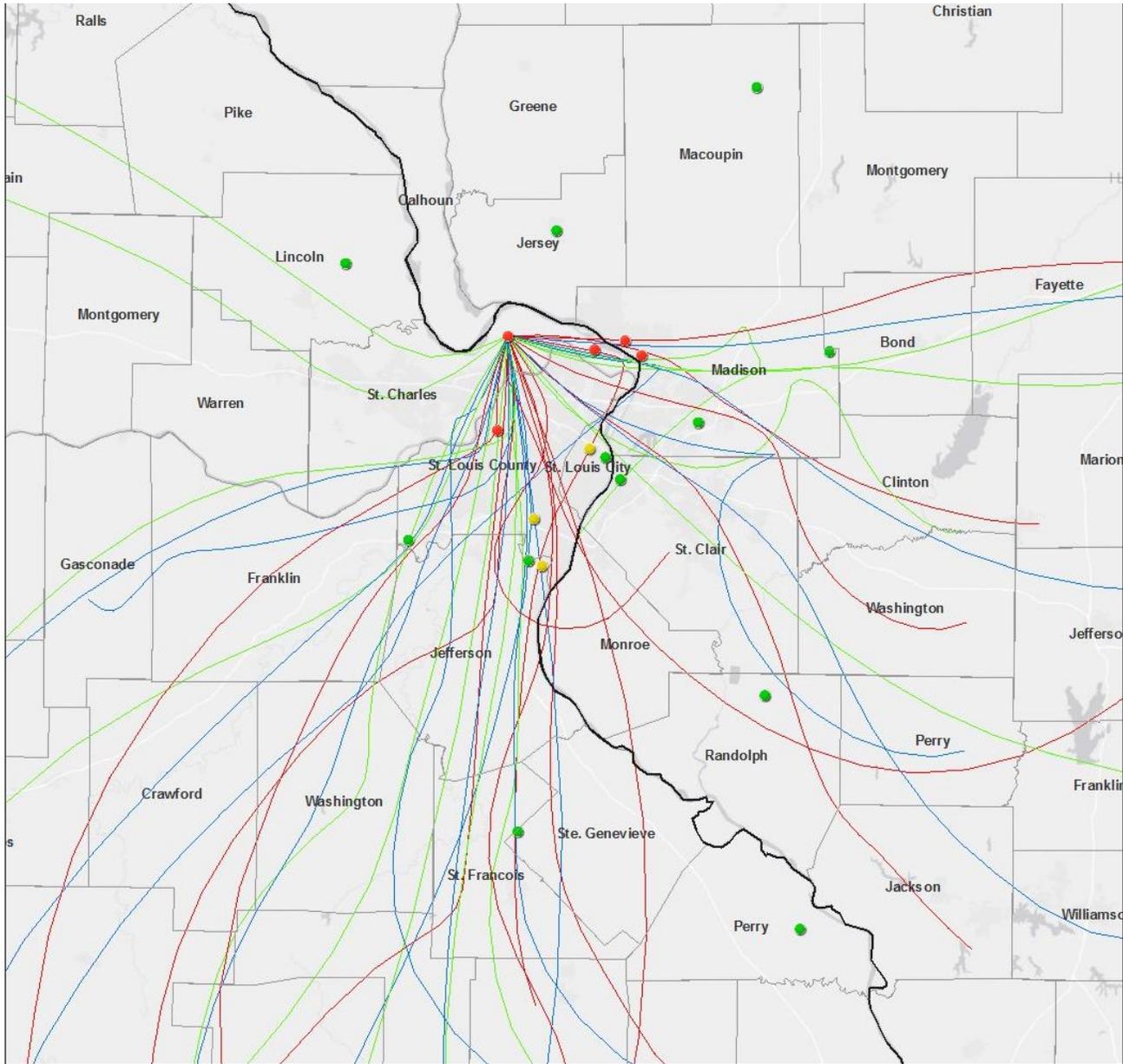
The three counties with the violating monitors St. Louis, St. Charles, and Madison counties have the highest percentage of commuters that travel to or within a county with a violating monitor. Jefferson, Lincoln and Warren Counties, and the City of St. Louis have the next highest level with approximately 50 percent of commuters traveling to a county with a violating monitor; Jersey County has 44 percent and the remaining counties all have 35 percent or less. St. Louis County has the largest VMT and the largest number of residents that travel to or within a county with a violating monitor for work with over 11 million vehicle miles traveled and over 323,000 residents commuting to or within counties with a violating monitor, which translates to

approximately 71 percent of total commuters from the area of analysis into St. Louis County. St. Charles has the second highest VMT with over 3 million vehicle miles traveled and over 156, 000 commuting to or within counties with a violating monitor, which is approximately 82 percent of total commuters in the county. Madison County has the third highest VMT in the area of analysis nearly 3 million vehicles miles traveled and nearly 75, 000 residents who commute to or within counties with a violating monitor, which translates to approximately 63 percent of the commuters in the county. In addition, Franklin, Jefferson, and the City of St. Louis, in Missouri and St. Clair in Illinois have more than 1.5 million vehicle miles traveled and more than 16, 000 residents that commute to or within a county with a violating monitor. The City of St. Louis has the highest number of commuters and the highest percentages of commuters to or within counties with violating monitors. Lincoln, St. Louis, St. Charles, and Madison counties each have 50% or more commuters traveling to or within counties with violating monitors. The counties outside the existing 2008 NAAQS nonattainment area have relatively low VMTs as compared to the rest of the area of analysis.

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. Figures 6a through 6e show 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 in the area of analysis.

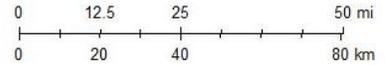
Figure 6a. HYSPLIT Back Trajectories for the Orchard Farm (291831004) Violating Monitor.



12/19/2017, 11:54:37 AM

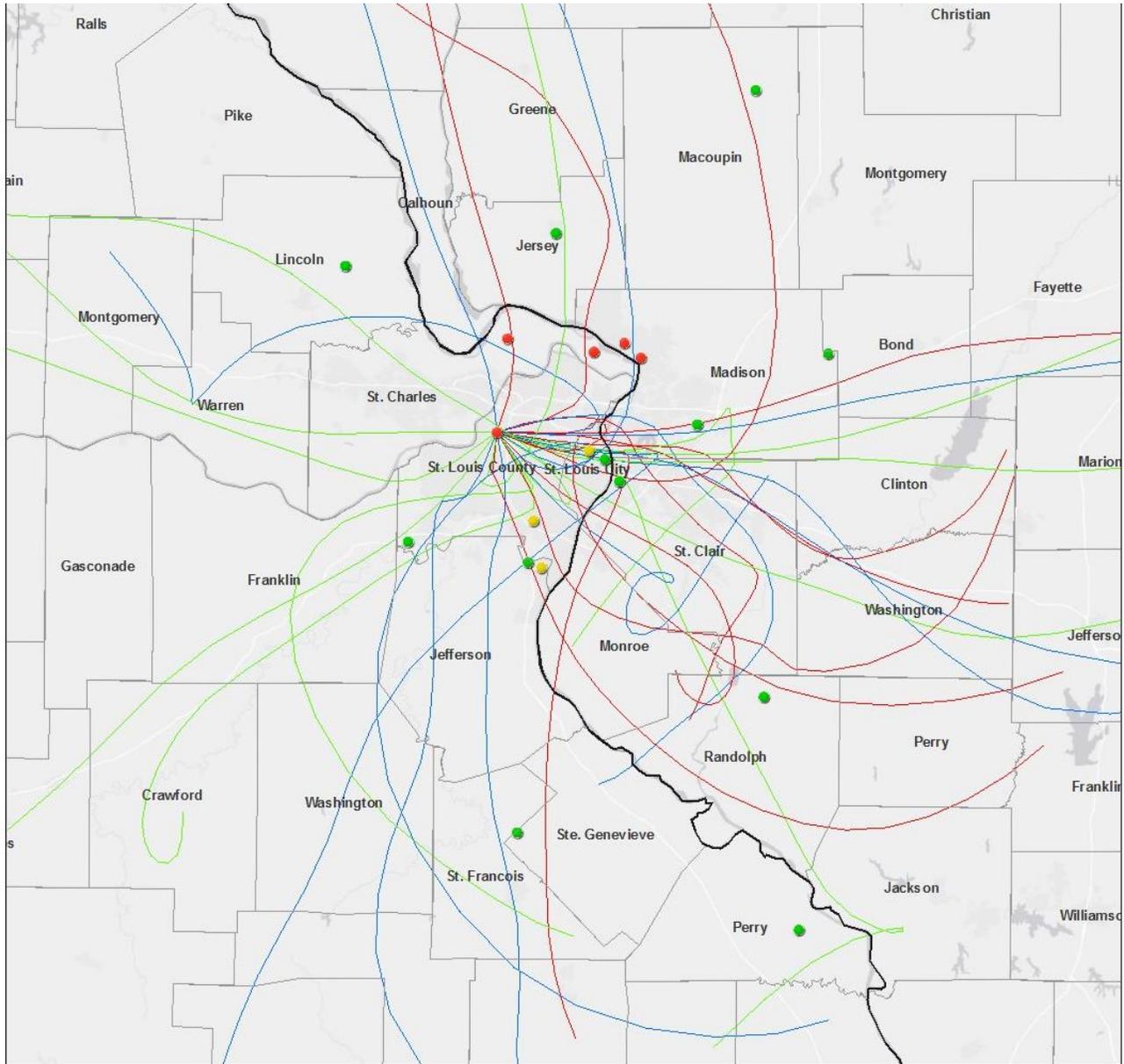
1:1,155,581

- State Boundaries
- USA_Countries
- Ozone 2016 Site Level DVs**
 - No valid value
 - 0 - 0.070
 - 0.071 and above
- St_Louis_MO_IL_291831004**
 - 100
 - 500
 - 1,000



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 Map Service: USEPA Office of Environmental Information (OEI)
 Data: U.S. EPA Office of Air and Radiation (OAR) - Office of Air Quality

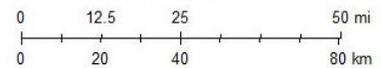
Figure 6b. HYSPLIT Back Trajectories for the Maryland Heights (291890014) Violating Monitor.



12/19/2017, 12:00:41 PM

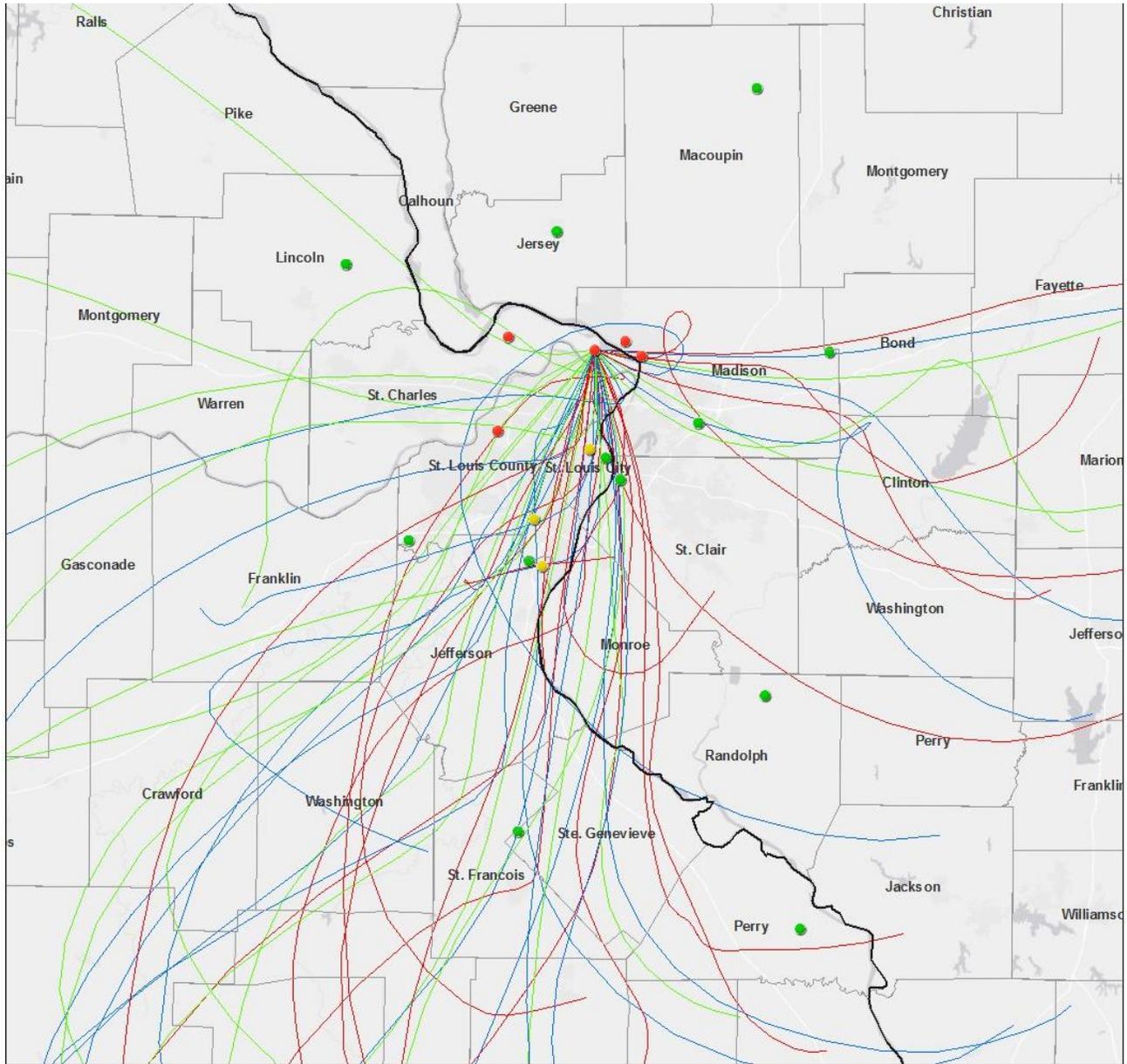
1:1,155,581

- State Boundaries
- USA_Countries
- Ozone 2016 Site Level DVs
 - No valid value
 - 0 - 0.070
 - 0.071 and above
- St_Louis_MO_IL_291890014
 - 100
 - 500
 - 1,000



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 Map Service: USEPA Office of Environmental Information (OEI).
 Data: U.S. EPA Office of Air and Radiation (OAR) - Office of Air Quality

Figure 6c. HYSPLIT Back Trajectories for the West Alton (291831002) Violating Monitor.



12/19/2017, 12:05:17 PM

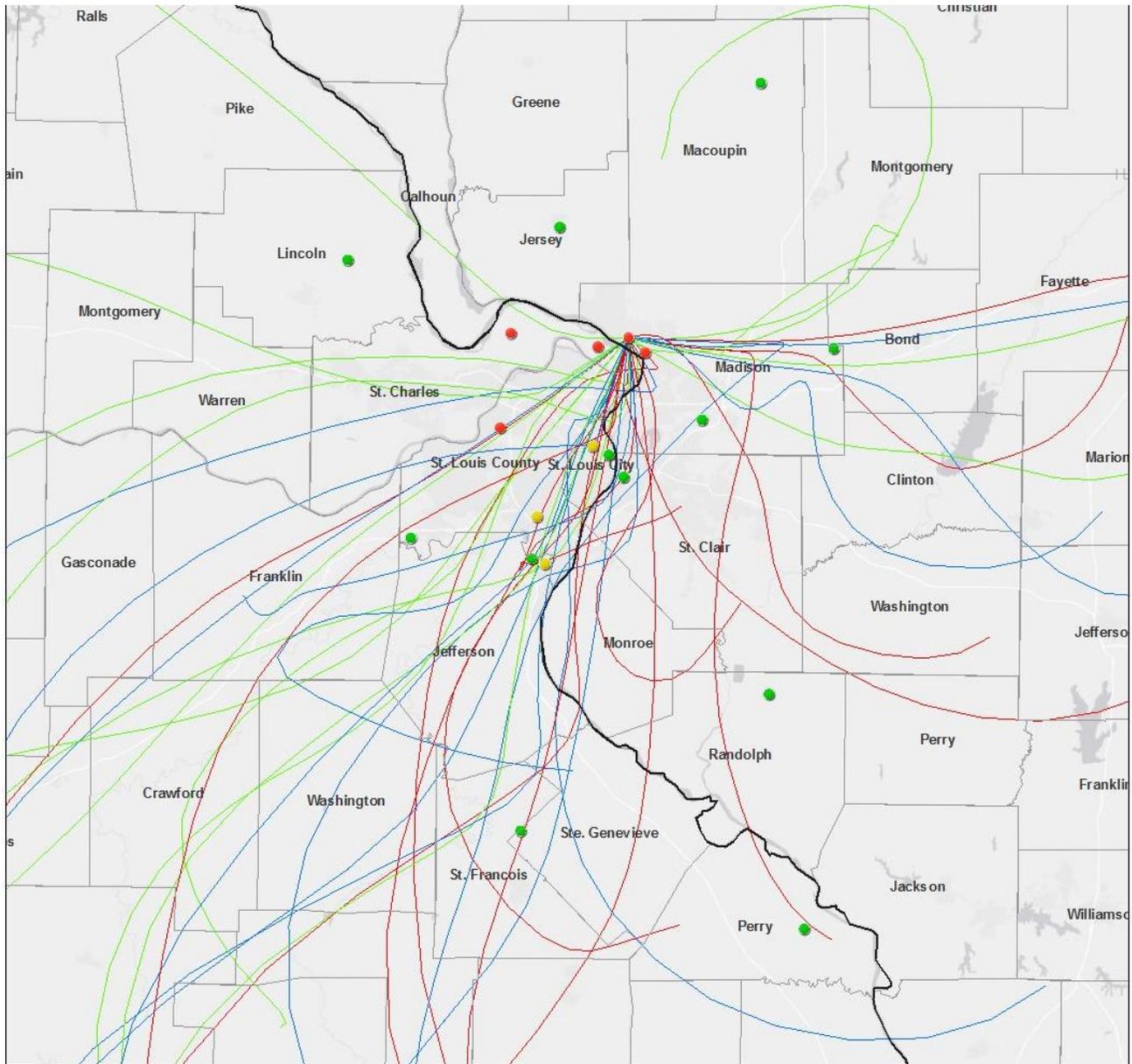
1:1,155,581

- State Boundaries
- USA_Countries
- Ozone 2016 Site Level DVs
 - No valid value
 - 0 - 0.070
 - 0.071 and above
- St_Louis_MO_IL_291831002
 - 100
 - 500
 - 1,000

0 12.5 25 50 mi
0 20 40 80 km

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Map Service: USEPA Office of Environmental Information (OEI).
Data: U.S. EPA Office of Air and Radiation (OAR) - Office of Air Quality

Figure 6d. HYSPLIT Back Trajectories for the Clara Barton School (171190008) Violating Monitor.



12/19/2017, 12:09:30 PM

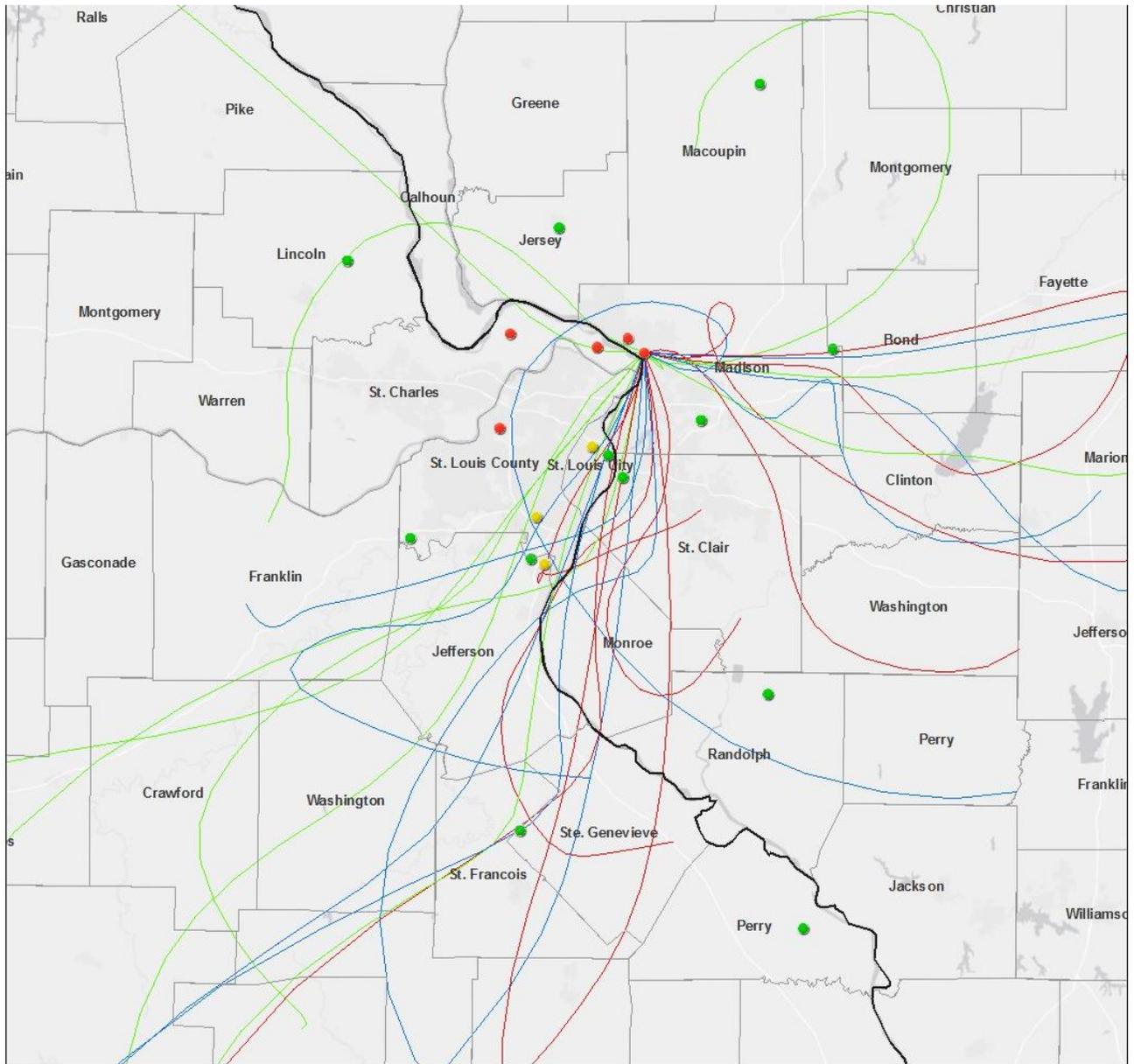
1:1,155,581

- State Boundaries
- USA_Counties
- Ozone 2016 Site Level DVs**
 - No valid value
 - 0 - 0.070
 - 0.071 and above
- St. Louis MO IL_171190008**
 - 100
 - 500
 - 1,000

0 12.5 25 50 mi
0 20 40 80 km

Esri, HERE, DeLorme, MapmyIndia, © OpenStreetMap contributors, and the GIS user community
Map Service: USEPA Office of Environmental Information (OEI)
Data: U.S. EPA Office of Air and Radiation (OAR) - Office of Air Quality

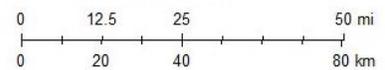
Figure 6e. HYSPLIT Back Trajectories for the Water Plant (171190007) Violating Monitor.



12/19/2017, 12:11:53 PM

1:1,155,581

- State Boundaries
- USA_Countries
- Ozone 2016 Site Level DVs
 - No valid value
 - 0 - 0.070
 - 0.071 and above
- St_Louis_MO_IL_171193007
 - 100
 - 500
 - 1,000



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 Map Service: USEPA Office of Environmental Information (OEI).
 Data: U.S. EPA Office of Air and Radiation (OAR) - Office of Air Quality

The HYSPLIT back trajectories in Figures 6a through 6e indicates that transport to the St. Louis, MO-IL area is predominately from the south. This southern component to the back trajectories highlights the potential impacts from the counties to the south of St. Louis, Missouri. HYSPLIT also shows transport from east through Madison County, IL.

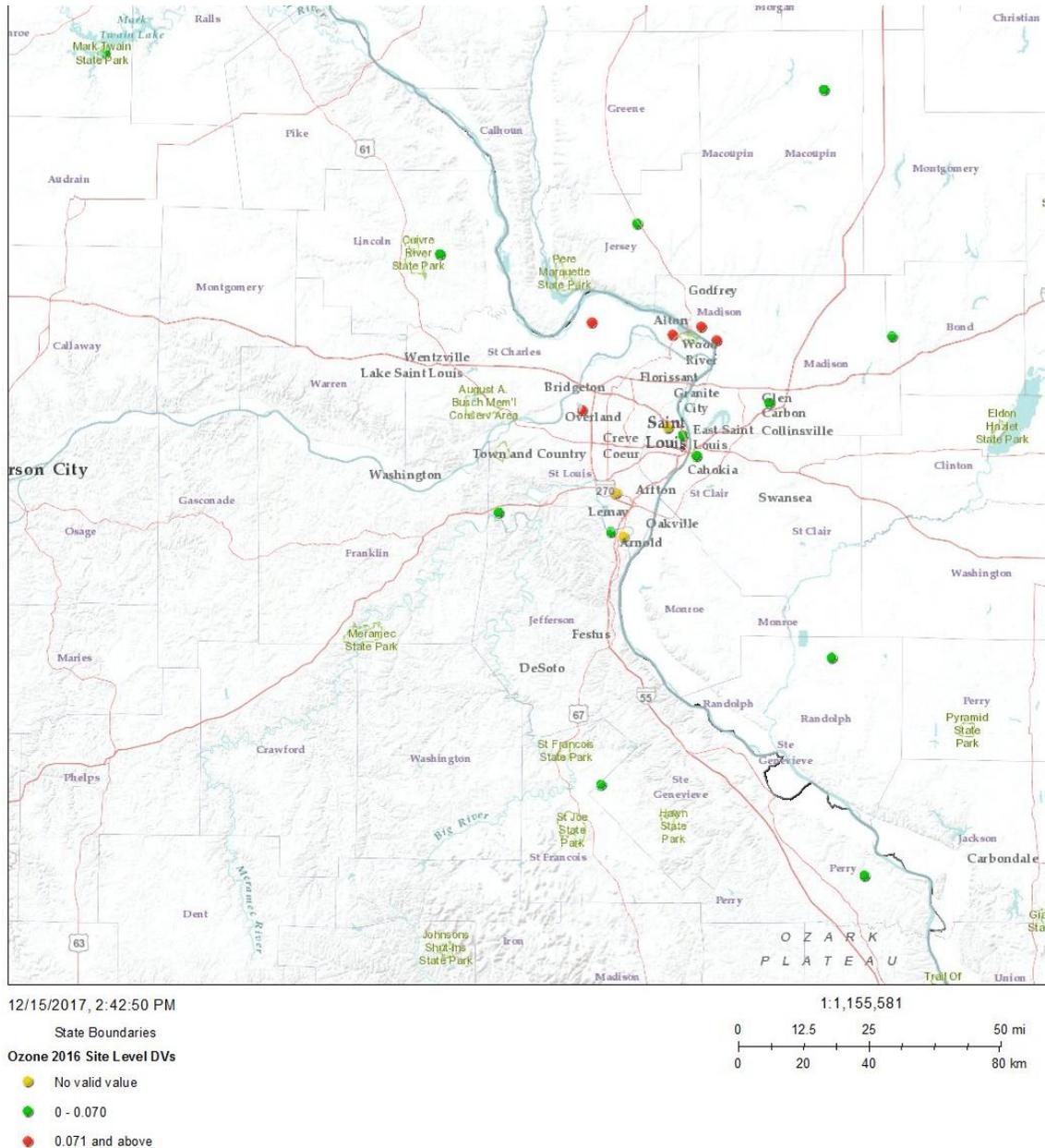
Factor 4: Geography/topography

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 air shed. 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 air shed and, therefore, the distribution of ozone over the area.

The St. Louis, MO-IL area does not have geographical or topographical features significantly limiting air pollution transport within its air shed. St. Louis is located at the confluence of the Missouri and Mississippi rivers, and they are the most significant topographic feature of the area. These valley effects do not cause the trapping of pollutants and do not cause the long term buildup of pollutants seen in more extreme topographically influenced areas of the country. Therefore, this factor did not play a pivotal role in this analysis.

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 St. Louis, MO-IL 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 St. Louis, MO-IL area has previously established nonattainment boundaries associated with the 1997 and 2008 ozone NAAQS. For the 1997 NAAQSs, this boundary included the City of St. Louis and the counties of Franklin, Jefferson, St. Charles, and St. Louis in Missouri, and Jersey, Madison, Monroe, and St. Clair in Illinois. For the 2008 NAAQS, Missouri recommended and the EPA finalized designations for the same boundary for its portion of the area. For the 2008 NAAQS, Illinois recommended the same boundary for its portion of the area with the exception of Jersey County, and EPA finalized nonattainment designations for those three counties. For the 2015 NAAQS, Illinois recommended the same three-county boundary that was designated nonattainment for the 2008 NAAQS.

In addition, the East-West Gateway Council of Governments is the designated MPO for the area including the City of St. Louis and the counties of Franklin, Jefferson, St. Charles, and St. Louis in Missouri, and Madison, Monroe, and St. Clair counties in Illinois.

Conclusion for the St. Louis, MO-IL Area

Based on the assessment of factors described above, EPA has determined to include the following Missouri areas in the intended St. Louis, MO-IL nonattainment area because they are either violating the 2015 ozone NAAQS or contributing to a violation in a nearby area: Franklin County, Jefferson County, St. Charles County, City of St. Louis, and St. Louis County.¹⁴ EPA does not intend to modify the State of Illinois' recommendation to include Madison County, Monroe County, and St. Clair County in the St. Louis MO-IL nonattainment area for the 2015 ozone NAAQS. For both states, these are the same counties that were included in the St. Louis, MO-IL nonattainment area for the 2008 8-hour ozone NAAQS.

Based on 2014-2016 design values, monitors in St. Charles and St. Louis Counties in Missouri and in Madison County, Illinois, are in violation of the 2015 ozone NAAQS. In addition, these counties are in the top five in terms of population within the area of analysis, and both NO_x and VOC emissions from these counties account for a large portion of total emissions in the area. Therefore, these counties are included in the nonattainment area.

Franklin County, Jefferson County, and the City of St. Louis in Missouri and St. Clair County in Illinois, do not have violating monitors. These counties have, however, among the highest NO_x and VOC emissions in the area of analysis and among the highest VMT in those counties. Franklin County ranked in the top five within the area of analysis in NO_x and VOC emissions, and in the top seven for both population and VMT. Jefferson County ranked fourth and sixth, respectively, for NO_x and VOC emissions; sixth for population; and fifth for total VMT. The City of St. Louis has the third largest population and the highest population density, and ranks in the top

¹⁴ EPA received Missouri's initial recommendation in a letter dated September 30, 2016. However, Missouri subsequently sent a letter on September 22, 2017, requesting the Agency not act on the state's initial recommendations, and indicating MDNR's desire to reconsider its previous boundary recommendation. So we are indicating no recommendation from MO at this time. EPA is relying on its own five-factor analysis of current data and the state's previous 2008 ozone nonattainment boundary to inform the Agency's intended designation for the 2015 ozone NAAQS

seven for in NO_x and VOC emissions when compared to the rest of the area of analysis. St. Clair ranks fourth in VMT and sixth in both NO_x and VOC emissions and population. In addition, HYSPLIT back trajectories indicate that air masses traverse these counties on ozone exceedance days, providing evidence of potential contribution to the violating monitors. The back trajectories from each of the five violating monitors are provided in Figures 6a-e and highlights the potential impacts to the violating monitors from counties to the south of the St. Louis, MO-IL area.

For the remaining counties in the area of analysis, our analysis of the totality of the factors presented in the preceding sections for each county do not support a decision to include them as part of the nonattainment area. The EPA does not intend to include the Counties of Lincoln and Warren in Missouri in the St. Louis MO-IL nonattainment area and intends to designate those counties as attainment/unclassifiable. The EPA does not intend to modify the State of Illinois recommendation to designate Bond, Calhoun, Clinton, Jersey and Macoupin Counties as attainment/unclassifiable for the 2015 ozone NAAQS. The exclusion of these counties from the 2015 ozone NAAQS nonattainment area boundary is consistent with the boundaries for the 2008 ozone NAAQS nonattainment area.

The remaining counties generally rank lowest for most or all of the factors. These counties are also the most distant from the core of the metropolitan area. Calhoun, Jersey and Macoupin are all located to the north and northeast and few back trajectories pass through the county showing limited potential impact. Similarly, Warren County, Missouri is located to the west-northwest of the metropolitan area where fewer trajectories flow from that area than from the east. Lincoln County has a monitor that attains the 2015 ozone NAAQS, and ranks relatively low in VMT (8th), NO_x emissions (10th), and population (8th) when compared to other counties in the area of analysis. Examination of back trajectories show limited potential impact from Lincoln county. Jersey County ranks very low in population (13th), VMT (14th), and emissions (15th), when compared to the area of analysis, and examination of back trajectories show limited potential impact from Jersey County. Calhoun County is among the lowest in emissions (14th), population (15th), experienced negative VMT growth from 2010 to 2015, and back trajectories indicate limited potential impact from Calhoun County. Bond County ranks among the lowest NO_x emissions (12th), VMT (13th) population (14th), and has less than 20% of commuters traveling to or between counties with violating monitors. Clinton County has relatively low population (10th), VMT (11th), and NO_x (8th) and VOC (10th) emissions when compared to the area of analysis. Macoupin County has relatively low VMT (10th), NO_x (10th) and VOC (9th) emissions when compared to the area of analysis, and experienced negative VMT growth from 2010 to 2015. Warren County ranks relatively low in VMT (9th), total emissions (11th), and population (12th) when compared to the area of analysis. HYSPLIT trajectories show the potential for air masses to traverse Warren, Clinton, and Bond Counties. However, these same trajectories subsequently pass through counties with much higher emissions, VMT, and population. For example, a trajectory passing through Bond County, Illinois also passes downwind through Madison County, Illinois, which has nearly 10 times greater emissions and much higher VMT and population than Bond County, before reaching the violating monitor. Likewise, a trajectory passing through Warren County, Missouri subsequently passes downwind through St. Charles County, Missouri before reaching the violating monitor.

Based on the assessment of factors described above, EPA intends to designate the following Missouri counties as part of the St. Louis, MO-IL nonattainment for the 2015 ozone NAAQS: Franklin County, Jefferson County, St. Charles County, City of St. Louis, and St. Louis County. In addition, the EPA does not intend to modify the State of Illinois' recommendation to designate Madison County, Monroe County, and St. Clair County. These are the same counties that were included in the St. Louis, MO-IL nonattainment area for the 2008 8-hour ozone

NAAQS. The EPA intends to designate Lincoln and Warren Counties in Missouri and Bond, Calhoun, Clinton, Jersey and Macoupin Counties in Illinois as attainment/unclassifiable for the 2015 ozone NAAQS.