



**Missouri's Recommendation for
Area Boundary Designations for the
2012 Annual Fine Particulate Matter
National Ambient Air Quality Standard**

**Missouri Air Conservation Commission
Adoption
December 5th, 2013**



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FINE PARTICLE BOUNDARY RECOMMENDATION

Introduction and Purpose

On December 14, 2012, EPA promulgated PM_{2.5} air quality standards (78 FR 3036). These standards were based on a number of health studies showing that increased exposure to PM_{2.5} is correlated with increased mortality and a range of serious health effects, including aggravation of lung disease, asthma attacks, and heart problems. EPA established a new primary standard for PM_{2.5}. The standard is based on an annual average and was set at a level of 12.0 micrograms per cubic meter. Under the same action, EPA retained the existing secondary annual standard for PM_{2.5}, the existing primary and secondary 24-hour standards for PM_{2.5}, as well as the existing primary and secondary standards for particulate matter with aerodynamic diameters of 10 microns or less (PM₁₀).

Whenever a NAAQS is revised, the designation process is the first step in addressing this public health issue. Section 107(d)(1) of the Clean Air Act requires each state to recommend attainment/unclassifiable and nonattainment areas including appropriate boundaries within one year after a NAAQS is established. EPA can then accept the recommendations or make modifications, as it deems necessary. Section 107(d)(1)(A) of the Clean Air Act defines a nonattainment area as any area that does not meet or that contributes to nearby areas not meeting the ambient air quality standard. All other areas should be classified as attainment/unclassifiable.

The deadline for submittal of Missouri's boundary designation recommendations for the 2012 Annual PM_{2.5} NAAQS is December 13, 2013. By August 14, 2014, EPA is to notify Missouri concerning any modifications to the recommendation, and allow for comments to those changes. If Missouri has comments regarding EPA modifications to the state recommendation, they will need to be submitted by October 29, 2014. The deadline for EPA to finalize the boundary designations is December 12, 2014.

Upon designation, states have 18 months to prepare State Implementation Plans (SIPs) to address PM_{2.5} nonattainment areas. EPA intends to publish an implementation rule shortly after designations are finalized that will establish requirements for PM_{2.5} nonattainment areas. The deadline for attaining the PM_{2.5} standard is as expeditiously as practicable, but not later than the end of the sixth calendar year after the area is designated nonattainment. Depending on the timing of when the final designations become effective, the attainment deadline for areas designated nonattainment of the 2012 Annual PM_{2.5} NAAQS could be the end of the calendar year in 2020 or 2021.

The purpose of this document is to summarize the analysis of the National Ambient Air Quality Standard (NAAQS) for fine particulate (PM_{2.5}) in Missouri to support a recommendation to EPA for designation of geographic areas in the state for the 2012 Annual PM_{2.5} NAAQS. In general, the analysis is based on information collected from the years 2010 - 2012 and the U.S. Environmental Protection Agency (EPA) Guidance for Area Designations for the 2012 Annual PM_{2.5} NAAQS: <http://www.epa.gov/pmdesignations/2012standards/docs/april2013guidance.pdf>

Summary of Recommendation

Based on the weight of evidence evaluation performed by the Air Program with consideration of EPA guidance, the State of Missouri recommends each county in the State for designation as attainment/unclassifiable under the 2012 Annual PM_{2.5} NAAQS. These county-by-county designation recommendations are listed in Table 1.

Table 1 Missouri Classification Recommendations for the 2012 Annual PM_{2.5} NAAQS

County	Classification Recommendation
ADAIR	Attainment/Unclassifiable
ANDREW	Attainment/Unclassifiable
ATCHISON	Attainment/Unclassifiable
AUDRAIN	Attainment/Unclassifiable
BARRY	Attainment/Unclassifiable
BARTON	Attainment/Unclassifiable
BATES	Attainment/Unclassifiable
BENTON	Attainment/Unclassifiable
BOLLINGER	Attainment/Unclassifiable
BOONE	Attainment/Unclassifiable
BUCHANAN	Attainment/Unclassifiable
BUTLER	Attainment/Unclassifiable
CALDWELL	Attainment/Unclassifiable
CALLAWAY	Attainment/Unclassifiable
CAMDEN	Attainment/Unclassifiable
CAPE GIRARDEAU	Attainment/Unclassifiable
CARROLL	Attainment/Unclassifiable
CARTER	Attainment/Unclassifiable
CASS	Attainment/Unclassifiable
CEDAR	Attainment/Unclassifiable
CHARITON	Attainment/Unclassifiable
CHRISTIAN	Attainment/Unclassifiable
CLARK	Attainment/Unclassifiable
CLAY	Attainment/Unclassifiable
CLINTON	Attainment/Unclassifiable
COLE	Attainment/Unclassifiable
COOPER	Attainment/Unclassifiable
CRAWFORD	Attainment/Unclassifiable
DADE	Attainment/Unclassifiable
DALLAS	Attainment/Unclassifiable
DAVISS	Attainment/Unclassifiable
DeKALB	Attainment/Unclassifiable
DENT	Attainment/Unclassifiable
DOUGLAS	Attainment/Unclassifiable
DUNKLIN	Attainment/Unclassifiable
FRANKLIN	Attainment/Unclassifiable
GASCONADE	Attainment/Unclassifiable
GENTRY	Attainment/Unclassifiable
GREENE	Attainment/Unclassifiable
GRUNDY	Attainment/Unclassifiable
HARRISON	Attainment/Unclassifiable
HENRY	Attainment/Unclassifiable
HICKORY	Attainment/Unclassifiable
HOLT	Attainment/Unclassifiable

County	Classification Recommendation
HOWARD	Attainment/Unclassifiable
HOWELL	Attainment/Unclassifiable
IRON	Attainment/Unclassifiable
JACKSON	Attainment/Unclassifiable
JASPER	Attainment/Unclassifiable
JEFFERSON	Attainment/Unclassifiable
JOHNSON	Attainment/Unclassifiable
KNOX	Attainment/Unclassifiable
LACLEDE	Attainment/Unclassifiable
LAFAYETTE	Attainment/Unclassifiable
LAWRENCE	Attainment/Unclassifiable
LEWIS	Attainment/Unclassifiable
LINCOLN	Attainment/Unclassifiable
LINN	Attainment/Unclassifiable
LIVINGSTON	Attainment/Unclassifiable
McDONALD	Attainment/Unclassifiable
MACON	Attainment/Unclassifiable
MADISON	Attainment/Unclassifiable
MARIES	Attainment/Unclassifiable
MARION	Attainment/Unclassifiable
MERCER	Attainment/Unclassifiable
MILLER	Attainment/Unclassifiable
MISSISSIPPI	Attainment/Unclassifiable
MONITEAU	Attainment/Unclassifiable
MONROE	Attainment/Unclassifiable
MONTGOMERY	Attainment/Unclassifiable
MORGAN	Attainment/Unclassifiable
NEW MADRID	Attainment/Unclassifiable
NEWTON	Attainment/Unclassifiable
NODAWAY	Attainment/Unclassifiable
OREGON	Attainment/Unclassifiable
OSAGE	Attainment/Unclassifiable
OZARK	Attainment/Unclassifiable
PEMISCOT	Attainment/Unclassifiable
PERRY	Attainment/Unclassifiable
PETTIS	Attainment/Unclassifiable
PHELPS	Attainment/Unclassifiable
PIKE	Attainment/Unclassifiable
PLATTE	Attainment/Unclassifiable
POLK	Attainment/Unclassifiable
PULASKI	Attainment/Unclassifiable
PUTNAM	Attainment/Unclassifiable
RALLS	Attainment/Unclassifiable
RANDOLPH	Attainment/Unclassifiable
RAY	Attainment/Unclassifiable
REYNOLDS	Attainment/Unclassifiable
RIPLEY	Attainment/Unclassifiable
ST. CHARLES	Attainment/Unclassifiable
ST. CLAIR	Attainment/Unclassifiable
ST. FRANCOIS	Attainment/Unclassifiable
STE. GENEVIEVE	Attainment/Unclassifiable
ST. LOUIS COUNTY	Attainment/Unclassifiable
SALINE	Attainment/Unclassifiable
SCHUYLER	Attainment/Unclassifiable

County	Classification Recommendation
SCOTLAND	Attainment/Unclassifiable
SCOTT	Attainment/Unclassifiable
SHANNON	Attainment/Unclassifiable
SHELBY	Attainment/Unclassifiable
STODDARD	Attainment/Unclassifiable
STONE	Attainment/Unclassifiable
SULLIVAN	Attainment/Unclassifiable
TANEY	Attainment/Unclassifiable
TEXAS	Attainment/Unclassifiable
VERNON	Attainment/Unclassifiable
WARREN	Attainment/Unclassifiable
WASHINGTON	Attainment/Unclassifiable
WAYNE	Attainment/Unclassifiable
WEBSTER	Attainment/Unclassifiable
WORTH	Attainment/Unclassifiable
ST. LOUIS CITY	Attainment/Unclassifiable

Background

PM_{2.5} is generally emitted from activities such as industrial and residential combustion and from vehicle exhaust. Fine particles are also formed in the atmosphere when gases such as sulfur dioxide, nitrogen oxides, and volatile organic compounds; also emitted largely by combustion activities, are chemically transformed in the atmosphere into particles.

The annual PM_{2.5} NAAQS was originally established in 1997, and had not been revised until now. During the designation process for the 1997 standard, monitors in St. Louis on both the Illinois and Missouri sides were violating the standard and the final nonattainment area consisted of the City of St. Louis and the Counties of Franklin, Jefferson, St. Louis, and St. Charles on the Missouri side as well as the Baldwin Township in Randolph County and the Counties of Monroe, St. Clair, and Madison on the Illinois side. Since then, numerous state and federal control strategies have been implemented in the St. Louis area and around the country that have resulted in improvement in the monitored PM_{2.5} concentrations observed in St. Louis.

On May 23, 2011, EPA published a final rule, known as a clean data determination, stating that the St. Louis PM_{2.5} nonattainment area covering both Missouri and Illinois has attained the 1997 annual PM_{2.5} standard based on three years of quality assured ambient air monitoring data (76 FR 29652). After this clean data determination was made, Missouri developed a maintenance plan and redesignation demonstration for the Missouri portion of the St. Louis PM_{2.5} nonattainment area under the 1997 standard and submitted the plan to EPA in August 2011. A review of 2011 and 2012 ambient PM_{2.5} monitoring data in the St. Louis area shows continued declining trends for annual PM_{2.5} design values across the area demonstrating that ambient concentrations of PM_{2.5} in St. Louis are improving at a steady pace as a result of controls that are already in place. It is anticipated that EPA will formally redesignate the area to attainment of the 1997 Annual PM_{2.5} NAAQS sometime in 2014.

Criteria for Designation

EPA issued a guidance document through a memorandum titled “Initial Area Designations for the 2012 Revised Primary Annual Fine Particle National Ambient Air Quality Standard.” on April 16, 2013. This guidance was written to outline the information that states are expected to consider when making their nonattainment boundary recommendations. In that guidance, EPA directs states to first identify all violating monitors. After identifying each monitor or group of monitors that indicate a violation of the standard in an area, states should analyze counties in the entire metropolitan area (Core Based Statistical Area (CBSA) or Combined Statistical Area (CSA)) in which the violating monitor is located. States are also directed by EPA through this guidance to evaluate adjacent counties to the CBSA or CSA that have the potential to contribute. Although the CBSA or CSA is the starting point, the EPA does not intend it to be a presumed nonattainment area boundary, and that a weight of evidence approach should be made on a case by case basis to determine the appropriate nonattainment boundaries for each violating monitor or group of violating monitors.

As stated above, ambient PM_{2.5} monitors in the counties of St. Clair and Madison in Illinois are violating the 2012 Annual PM_{2.5} NAAQS based on 2010 – 2012 ambient air quality monitoring data. Therefore in evaluating these violations and the appropriate nonattainment boundaries,

Missouri has analyzed data from all counties included in the St. Louis Metropolitan Statistical Area (MSA) (City of St. Louis, and St. Louis, St. Charles, Franklin, Jefferson, Warren, and Lincoln Counties) as well as counties adjacent to the St. Louis MSA (Pike, Montgomery, Gasconade, Crawford, Washington, St. Francois, and Ste. Genevieve).

EPA's guidance recommends that states base their boundary recommendations on an evaluation of information relevant to five factors: air quality data, emissions and emissions-related data, meteorology, geography/topography, and jurisdictional boundaries. Missouri has developed a weight of evidence analysis for each of the violating monitors located in Illinois in the St. Louis MSA. Each of these analyses considers these five factors in an effort to determine the likelihood of whether Missouri sources are causing/contributing to the violations.

Public Participation

The department's Air Pollution Control Program developed this document and it was widely shared with stakeholders and with the Illinois Environmental Protection Agency. Multiple informational meetings were held with stakeholders to discuss the boundary designation process, the data sets that were used, and the analyses that Missouri performed throughout this process. The proposed boundary recommendation was posted online for public review and comment by October 1, 2013 at the following web address: <http://www.dnr.mo.gov/env/apcp/stateplanrevisions.htm>. A public hearing was held before the Missouri Air Conservation Commission on November 21, 2013. Comments regarding the proposed boundary recommendations were accepted through the close of business on November 29, 2013, which was seven (7) days after the public hearing.

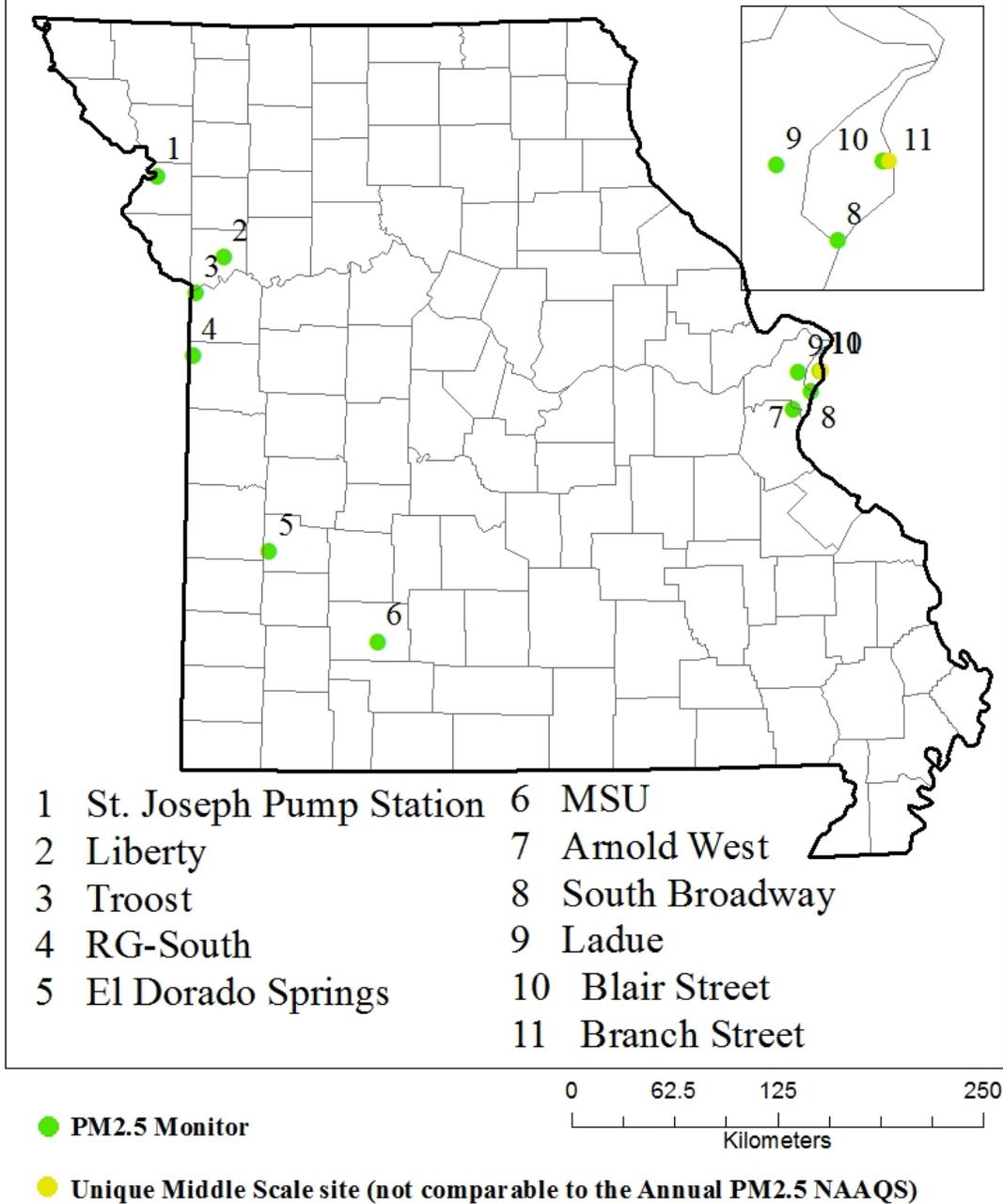
Technical Considerations – Overview

This recommendation has been developed based on a review of the technical information as suggested by EPA guidance. Of primary consideration is a review of the ambient air quality monitoring data in all relevant Missouri counties and in all relevant counties in other states that border Missouri.

Figure 1 displays Missouri's PM_{2.5} ambient air monitoring network and Table 2 displays the 2010 – 2012 design values for all ambient PM_{2.5} monitors that are suitable for comparison to the annual PM_{2.5} NAAQS. For the purposes of this document, only air quality monitoring data from monitors that are suitable for comparison to the annual PM_{2.5} NAAQS are considered. As noted in Figure 1, the Branch Street monitor is a unique middle scale monitor that is not suitable for comparison to the annual PM_{2.5} NAAQS, and is therefore not considered for analysis in this document. As seen in Table 2, there are no monitors in Missouri with annual PM_{2.5} design values in violation of the 2012 Annual PM_{2.5} NAAQS.

Figure 2 displays the annual PM_{2.5} design values from 2003 – 2012 for all monitors in Missouri that are suitable for comparison to the annual PM_{2.5} NAAQS. As seen in the figure, annual PM_{2.5} concentrations in Missouri have steadily declined over the past ten years. The fact that all monitors in Missouri are complying with the 2012 Annual PM_{2.5} NAAQS, and average annual PM_{2.5} concentrations across the state show a continued improvement over the last decade and in recent years supports a designation of attainment/unclassifiable for all counties in the state.

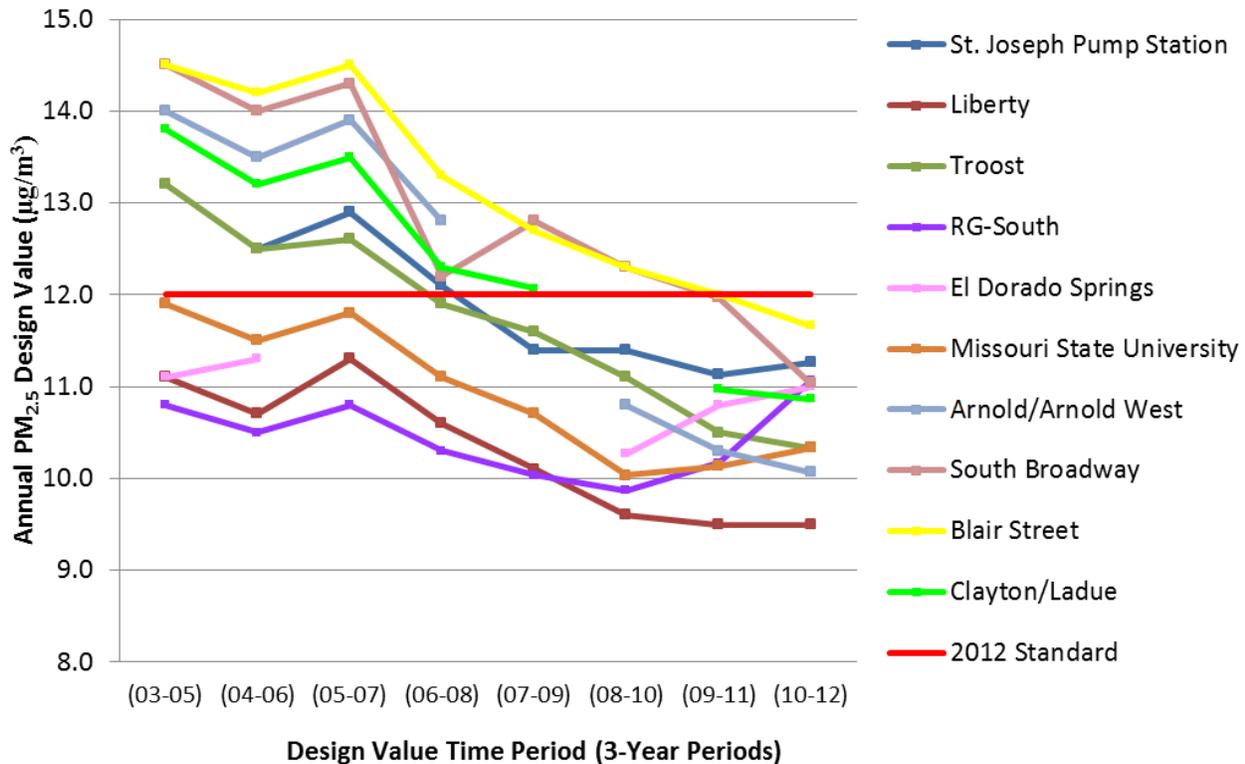
Figure 1. Missouri Ambient PM_{2.5} Monitoring Network



Note: The Branch Street monitor is defined as a unique middle scale monitor and has been given a legacy exemption meaning it is not comparable to the 2012 Annual PM_{2.5} NAAQS, per EPA’s July 2013 Air Quality Design Value Review: <http://www.epa.gov/ttn/analysis/dvreview.htm>. This monitor is not representative of area-wide PM_{2.5} concentrations as many of the episodes and trends recorded at the Branch Street monitor are unique to this location and not experienced across the St. Louis Region even by the neighborhood scale Blair Street monitor, which is less than 800 m from the Branch Street monitor location. Therefore, while trends and episodes at this monitor are useful and relevant for comparison and analysis of the 24-hour PM_{2.5} NAAQS, the episodes and design values at this monitor are not suitable for comparison and analysis of the Annual PM_{2.5} NAAQS. For additional details regarding the Branch Street monitor’s status as a unique middle scale monitor, please see Appendix C.

Table 2 Missouri Ambient PM _{2.5} Monitor Design Values (2010 – 2012)			
Site name	AQS Site ID	County	2010 - 2012 Annual PM _{2.5} Design Value
St. Joseph Pump Station	29-021-0005	Buchanan	11.3
Liberty	29-047-0005	Clay	9.4
Troost	29-095-0034	Jackson	10.3
RG-South	29-037-0003	Cass	11.1
El Dorado Springs	29-039-0001	Cedar	11.0
Missouri State University	29-077-0032	Greene	10.3
Arnold West	29-099-0019	Jefferson	10.1
South Broadway	29-510-0007	St. Louis City	11.0
Blair Street	29-510-0085	St. Louis City	11.7
Ladue	29-189-3001	St. Louis County	10.9

Figure 2 Annual PM_{2.5} Design Values for Missouri PM_{2.5} Monitors (2003 - 2012)

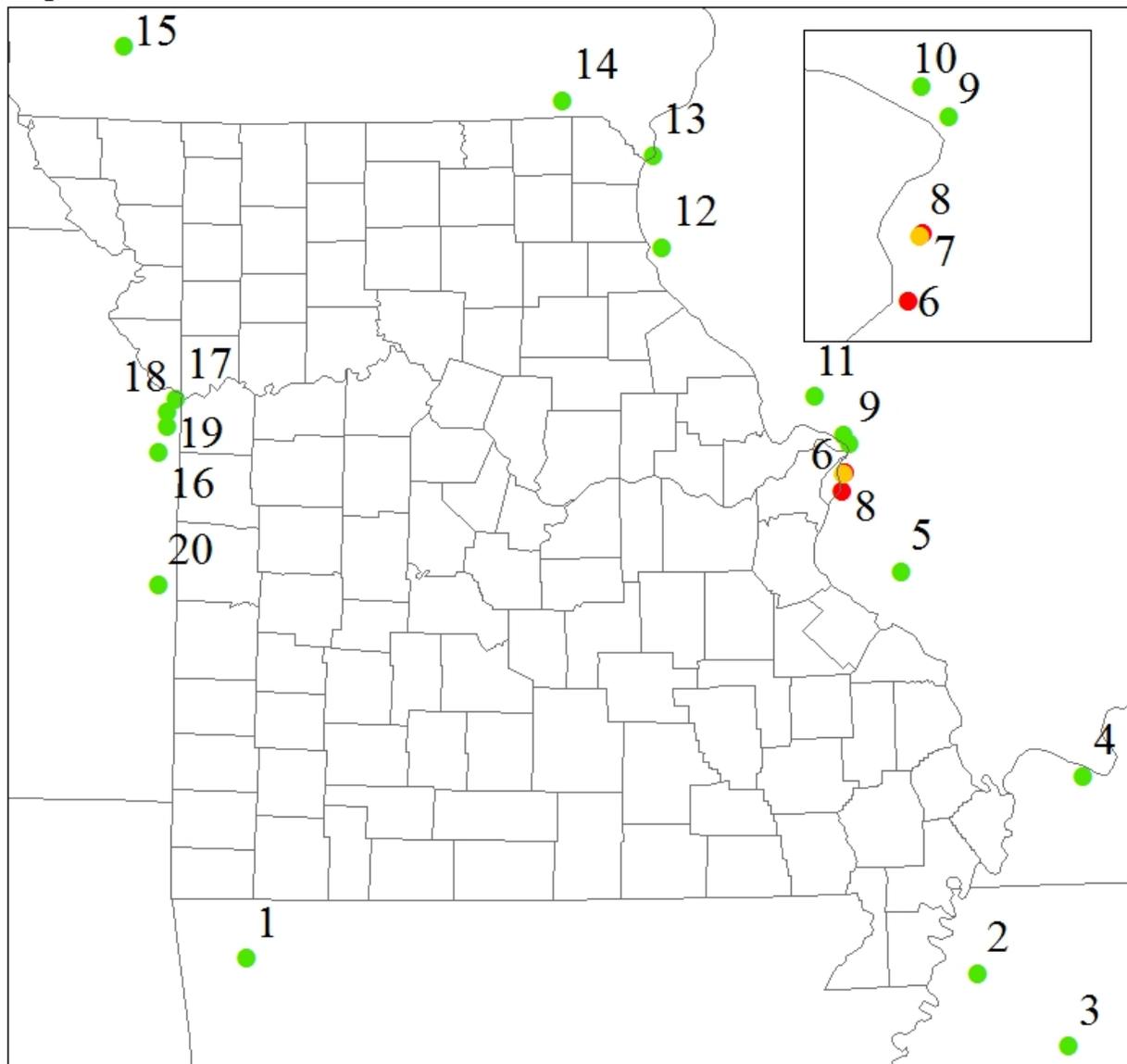


Per Section 107 of the Clean Air Act, areas should also be designated nonattainment if they are contributing to air pollutant concentrations in nearby areas that are out of compliance with the level of the NAAQS. The first step in determining if sources in Missouri are contributing to nearby areas outside Missouri that are violating the NAAQS is to determine if any other state has PM_{2.5} monitors located near Missouri that are violating the 2012 standard. Figure 3 displays all PM_{2.5} monitors outside Missouri but within 50 km from Missouri’s border. Monitors listed in red are monitors that have 2010 – 2012 design values in violation of the 2012 Annual PM_{2.5} NAAQS. Table 3, listed below, provides the 2010 – 2012 design values of each monitor included in Figure 3 that is suitable for comparison to the annual PM_{2.5} NAAQS. As seen in Table 3 and Figure 3, there are two monitors located within 50 km of Missouri’s border with 2010 – 2012 design values in violation of the 2012 Annual PM_{2.5} NAAQS. These monitors include the IEPA RAPS Trailer site located in East St. Louis, Illinois (AQS Site ID: 17-163-0010) (hereinafter referred to as the East St. Louis monitor), and the Fire Station #1 site located in Granite City, Illinois (AQS Site ID: 17-119-1007) (hereinafter referred to as the Granite City monitor). These monitors are located in the Illinois counties of St. Clair and Madison, both of which border the Missouri portion of the St. Louis Metropolitan Statistical Area (MSA). A more thorough analysis of these violating monitors was performed to determine if there are nearby emissions sources in Missouri that are causing/contributing to these violations.

Table 3 PM_{2.5} Design Values for Monitors Outside but Near Missouri (2010 – 2012)

Site name	AQS Site ID	State	County	2010 - 2012 Annual PM _{2.5} Design Value
Springdale	05-143-0005	Arkansas	Washington	10.8
Dyersburg	47-045-0004	Tennessee	Dyer	9.4
Jackson	47-113-0006	Tennessee	Madison	9.4
Paducah	21-145-1004	Kentucky	McCracken	10.6
IEPA Trailer	17-157-0001	Illinois	Randolph	9.3
IEPA RAPS Trailer	17-163-0010	Illinois	St. Clair	12.2
Fire Station #1	17-119-1007	Illinois	Madison	13.5
Water Plant	17-119-3007	Illinois	Madison	11.6
SIU Dental Clinic	17-119-2009	Illinois	Madison	11.8
Illini Jr. High School	17-083-1001	Illinois	Jersey	10.0
John Wood Community College	17-001-0007	Illinois	Adams	10.2
Keokuk Fire Station	19-111-0008	Iowa	Lee	11.4
Lake Sugema State Park II	19-177-0006	Iowa	Van Buren	9.6
Viking Lake State Park	19-137-0002	Iowa	Montgomery	9.2
Heritage Park	20-091-0010	Kansas	Johnson	7.7
JFK	20-209-0021	Kansas	Wyandotte	10.2
Midland Trail Elementary School	20-209-0022	Kansas	Wyandotte	8.8
Justice Center	20-091-0007	Kansas	Johnson	9.0
Mine Creek	20-107-0002	Kansas	Linn	9.1

Figure 3. Ambient PM2.5 Monitors Outside But Near Missouri



- | | | |
|---------------------|-----------------------------------|------------------------------------|
| 1 Springdale | 7 Fire Station #1 | 14 Lake Sugema State Park II |
| 2 Dyersburg PM2.5 | 8 Gateway Regional Medical Center | 15 Viking Lake State Park |
| 3 Jackson | 9 Water Plant | 16 Heritage Park |
| 4 Paducah | 10 SIU Dental Clinic | 17 JFK |
| 5 IEPA Trailer | 11 Illini Jr. High | 18 Midland Trail Elementary School |
| 6 IEPA RAPS Trailer | 12 John Wood Community College | 19 Justice Center |
| | 13 Keokuk Fire Station | 20 Mine Creek |

PM2.5 Concentration

- > 12 ug/m³
- < 12 ug/m³
- Unique Middle Scale site (not comparable to Annual PM2.5 NAAQS)

Note: The Gateway Regional Medical Center monitor is defined as a unique middle scale monitor and has been given a legacy exemption meaning it is not comparable to the 2012 Annual PM_{2.5} NAAQS, per EPA's July 2013 Air Quality Design Value Review: <http://www.epa.gov/ttn/analysis/dvreview.htm>.

Appendix A provides the evaluation performed for the Granite City monitor, and Appendix B provides the evaluation performed for the East St. Louis monitor. Both evaluations perform a weight of evidence analysis as described in the EPA Guidance on the Area Designations for the 2012 Annual PM_{2.5} NAAQS taking into consideration the following five criteria: air quality data, emissions data, meteorology data, topography/geography, and jurisdictional boundaries. In addition to these five criteria, an evaluation of existing and planned future controls in the St. Louis area was performed to determine the potential for new additional control strategies on the Missouri side of the St. Louis MSA.

The evaluation of the Granite City monitor (Appendix A) supports a conclusion that Missouri does not contain nearby sources that are causing/contributing to the violation at this monitor. The evaluation concludes that the violation in Granite City is caused by a nearby source located in Granite City, Illinois. Based on the meteorological data evaluated, when winds are calm or are blowing from the south making the Granite City monitor downwind from the nearby Illinois source, this results in the highest PM_{2.5} concentrations at the site. Conversely, when winds are blowing from the northwest and the monitor is upwind of these two sources, this results in the lowest concentrations at the site. Furthermore, an evaluation of the time period surrounding a 1-year temporary shutdown of this source shows that the monitor's annual average dropped below the level of the 2012 Annual PM_{2.5} NAAQS during the shutdown but was well above the level of the NAAQS both before and after the shutdown. An evaluation of the chemical PM_{2.5} speciation data before, during, and after the temporary shutdown of this local source, shows that the direct PM_{2.5} components that are suspected to originate from this source are well above the St. Louis MSA background levels before and after the shutdown, but drop down to the background levels during the shutdown period. The evidence shows that without the influence of this local source, the monitor would attain the standard. For these reasons, the state is recommending a designation of attainment/unclassifiable for all counties on the Missouri side of the St. Louis MSA based on the evaluation of this violating monitor.

The evaluation of the East St. Louis monitor (Appendix B) provides evidence that local sources in Illinois could be causing the 2010 – 2012 design value to violate the NAAQS. This monitor only samples PM_{2.5} every 1-in-6 days limiting the amount of data available for a weight of evidence analysis. In addition, there is no co-located chemical speciation network monitor at this site, meaning PM_{2.5} speciation data is not available for analysis of this violating monitor. Due partly to these data limitations, the weight of evidence analysis did not provide any conclusive evidence of the specific sources that are causing/contributing to this violation. Additionally, looking at air quality trends at this site and across St. Louis it is possible that this monitor will come into compliance with the 2012 Annual PM_{2.5} NAAQS after the 2013 calendar year is over and the design value is based on more recent air quality data. The analysis did not provide any conclusive evidence that emissions sources in Missouri were causing/contributing to this violation, and with a review of the current and planned future controls in place in Missouri, it is expected that this monitor will likely come into compliance with the NAAQS in the near future, based on local and federal control measures already in place. For these reasons, Missouri is not recommending any areas be designated nonattainment on the Missouri side of the St. Louis MSA due to nearby contribution to this violating monitor.

Other than the two Illinois monitors in the St. Louis area, no other monitors outside Missouri within 50 km from the border of the state are in violation of the 2012 Annual PM_{2.5} NAAQS. Therefore no other evaluations aside from the evaluations performed for these two violating monitors were necessary in order to determine appropriate nonattainment boundaries. Based on the ambient air quality monitoring data from monitors located in Missouri and near Missouri, along with the evaluations performed for the Illinois monitors in the St. Louis MSA, Missouri's recommendation is for every county in the state to be designated attainment/unclassifiable.

Boundary Considerations – Technical Discussion

This evaluation was limited to the Missouri counties. Counties or portions of counties that exhibit a pattern of significant contribution are included for consideration to be included in a nonattainment area. A review of the contributing factors must be done in a consistent manner. In some cases a review of one of the factors argue for inclusion, but a review of other factors may not. The decision of whether or not a county is included must be made in a holistic fashion.

To determine trends, to make county comparisons, and to evaluate the information in a comprehensive manner, the department's Air Pollution Control Program chose to begin the review with counties located in the St. Louis MSA to determine based on a weight of evidence analysis if they are both nearby and contributing to the violations in the Illinois portion of the St. Louis area. The Missouri portion of the St. Louis MSA includes the City of St. Louis and the Counties of Franklin, Jefferson, St. Charles, St. Louis, Lincoln, and Warren. The next group of counties reviewed was the counties surrounding the MSA: Crawford, Gasconade, Montgomery, Pike, St. Francois, Ste. Genevieve, and Washington Counties. Finally, the rest of the state was analyzed based solely on ambient air quality data because no other areas in or nearby the state are violating the standard.

Missouri Portion of the St. Louis MSA - County by County Analysis

As mentioned above, weight of evidence evaluations have been performed for both of the violating monitors in the Illinois portion of the St. Louis MSA. These evaluations are included as Appendices A and B. The following discussions rely heavily upon these evaluations that have been performed. In an effort to consider all relevant data, county-by-county analyses are included below and include relevant data for each area evaluated. In the discussions below, emissions and emissions related data will compare each county's total emissions and emissions related data to the entire the IL/MO St. Louis MSA.

Table 4 includes the total IL/MO St. Louis emissions inventory for 2008 and 2011 for direct PM_{2.5} and the following PM_{2.5} precursors: oxides of nitrogen (NO_x), oxides of sulfur (SO_x), volatile organic compounds (VOC), and ammonia (NH₃). Area sources comprise a large percentage of direct PM_{2.5} emissions from all counties in the IL/MO St. Louis MSA. However, a vast majority of the direct PM_{2.5} emissions from area sources are calculated values for paved and unpaved roads and agricultural tilling. These emissions categories account for dust that is disturbed on roads by vehicles and in fields during agricultural tilling. These types of emissions are very local in nature, and quickly settle out of the air usually within 100 – 500 yards from their origin. Therefore, these types of emissions in Missouri, while significant to the overall percentage of direct PM_{2.5} emissions in the MSA, would not have an impact on PM_{2.5} concentrations recorded at the Granite City and East St. Louis monitors. Although it is noted that a marginal percentage of direct PM_{2.5} emissions from paved and unpaved roads nearby the Granite City and East St. Louis monitors in Madison and St. Clair Counties could have an impact on the PM_{2.5} concentrations recorded by these monitors, the vast majority of direct PM_{2.5} emissions from these three emissions source categories in the IL/MO St. Louis MSA are not impacting the PM_{2.5} concentrations in Granite City or East St. Louis. For this reason, direct PM_{2.5} emissions from these three categories have been excluded from the emission inventories evaluated in this document.

Table 4 2008 and 2011 IL/MO St. Louis MSA Annual Emissions Inventory for PM_{2.5} and PM_{2.5} Precursors			
Pollutant	2008 Annual Emissions Inventory		
	MO STL MSA	IL STL MSA	MO/IL STL MSA
Direct PM _{2.5} (tons/year) *	13,796.16	6,351.64	20,147.80
SO _x (tons/year)	214,538.28	25,893.58	240,431.86
NO _x (tons/year)	122,032.69	39,825.39	161,858.08
VOC (tons/year)	83,096.14	46,336.71	129,432.85
NH ₃ (tons/year)	7,637.40	7,332.89	14,970.29
Pollutant	2011 Annual Emissions Inventory		
	MO STL MSA	IL STL MSA	MO/IL STL MSA
Direct PM _{2.5} (tons/year) *	14,110.92	6,447.97	20,558.89
SO _x (tons/year)	126,256.03	14,035.30	140,291.33
NO _x (tons/year)	97,022.51	31,627.96	128,650.47
VOC (tons/year)	62,602.05	17,937.17	80,539.22
NH ₃ (tons/year)	6,656.07	6,773.28	13,429.35

* Note: This table does not include direct PM_{2.5} emissions from paved and unpaved roads or agricultural tilling operations.

In addition to emissions inventory data, emissions related data is also relevant to consider when defining attainment/nonattainment boundaries. Emissions related data that was considered in the weight of evidence analyses for the Missouri/Illinois St. Louis MSA counties includes annual vehicle miles traveled (VMT) data, population, and commuting connectivity data. Tables 5 – 7 display this information by county for these three categories, respectively.

Table 5 MO/IL St. Louis MSA 2010 VMT	
Missouri	2010 Annual VMT (in millions)
St. Louis	12,796.5
St. Louis City	3,656.5
St. Charles	2,903.6
Jefferson	1,945.9
Franklin	1,627.3
Lincoln	471.0
Warren	553.0
Illinois	2010 Annual VMT (in millions)
Clinton	387.7
Jersey	190.0
Madison	2,847.0
Monroe	359.8
St. Clair	2,671.1
MO/IL St. Louis MSA Totals	30,409.6

* Note: This information was pulled from EPA’s PM_{2.5} Boundary Designations Guidance and Tools Webpage: <http://www.epa.gov/pmdesignations/2012standards/techinfo.htm>

Table 6 MO/IL St. Louis MSA 2010 Population	
Missouri	2010 Population (in thousands)
St. Louis	1,016.3
St. Louis City	348.2
St. Charles	283.9
Jefferson	198.1
Franklin	93.8
Lincoln	38.9
Warren	24.5
Illinois	2010 Population (in thousands)
Clinton	35.5
Jersey	21.7
Madison	258.9
Monroe	27.6
St. Clair	256.1
MO/IL St. Louis MSA Totals	2,603.6

* Note: This information was pulled from EPA’s PM_{2.5} Boundary Designations Guidance and Tools Webpage: <http://www.epa.gov/pmdesignations/2012standards/techinfo.htm>

Table 7 MO/IL St. Louis MSA Vehicle Commuting Connectivity Data *											
	Works In										
	Lincoln	Warren	Franklin	Washington	Jefferson	St. Charles	STL County	STL City	Madison	St. Clair	Monroe
Lives In											
Lincoln	9,167	473	95	0	114	7,278	4,150	720	52	43	0
Warren	333	5,088	979	0	54	4,935	2,068	325	63	48	0
Franklin	7	518	29,804	37	964	881	10,434	2,507	123	97	3
Washington	4	20	410	3,930	702	78	804	292	45	55	0
Jefferson	9	30	981	152	37,390	2,085	46,788	13,967	404	1,015	157
St. Charles	1,374	830	600	15	388	88,417	71,293	14,128	947	603	42
STL County	159	152	1,626	22	6,274	17,115	338,985	99,757	3,402	3,501	320
STL City	34	40	157	112	925	2,605	53,606	81,403	1,341	1,701	74
Madison	1	0	95	15	296	1,572	16,466	13,755	75,862	11,336	261
St. Clair	10	0	133	0	382	812	11,529	18,382	7,737	77,913	1,491
Monroe	0	0	39	0	335	169	3,718	2,792	365	2,457	5,747

* Note: The figures listed in the table above reflect the number of residents that live in the counties listed in the leftmost column and work in the counties listed in the top row. Source: US Census, 2006-2010 Residence County to Workplace County Flows, <http://www.census.gov/population/metro/data/other.html>

As seen in Tables 4 – 7, based on the magnitude of emissions alone, Missouri sources comprise a large percent of the region’s overall emissions inventory. However, aggregate emissions in the MSA alone are not enough to determine the relative contribution of these emission sources to a particular PM_{2.5} monitor violation. Analysis of emission point elevations, release parameters, and meteorological data are needed to perform quantitative dispersion/photochemical modeling and source apportionment analysis. However, despite limitations in quantitatively correlating aggregate emissions to unique monitored concentrations, a weight of evidence approach is used in Appendices A and B to demonstrate the likelihood of whether Missouri sources are causing or contributing to the magnitude of the violating monitors in Granite City and East St. Louis. This approach is discussed in detail in Appendices A and B and is appropriate since area wide monitored violations do not occur over the entire MO/IL St. Louis MSA.

In the pages that follow, a discussion of the weight of evidence analyses that were performed is provided for each county in the Missouri portion of the St. Louis MSA and each county in Missouri that borders the St. Louis MSA. The state’s recommendation for designation is also included at the end of the discussion for each county. Due to the unique nature of the two violating monitors in the Illinois portion of the St. Louis MSA, focused weight of evidence analyses were performed to determine nearby contributing sources to the PM_{2.5} concentrations in Granite City and East St. Louis (Appendices A and B). The conclusions drawn from Appendices A and B form the basis for the individual county by county recommendations listed below.

City of St. Louis

There are two ambient PM_{2.5} monitors located in St. Louis City that are suitable for comparison to the annual PM_{2.5} NAAQS. The Blair Street and South Broadway monitors each have 2010 – 2012 design values in compliance with the 2012 Annual PM_{2.5} NAAQS. Because there are no monitors in the City of St. Louis that are violating the 2012 standard, a determination must be made as to whether the City of St. Louis contains nearby sources that are contributing to the violations in Granite City and East St. Louis. The fact that both monitors in the City of St. Louis, which are each located within one (1) mile of the Missouri/Illinois border, have 2010 – 2012 design values in compliance with the NAAQS argues that emissions from the City of St. Louis are not causing/contributing to the violations on the Illinois side of the St. Louis MSA.

Table 8 displays the 2008 and 2011 Emissions Inventory Data for the City of St. Louis. As seen in Table 8, in 2011 the City of St. Louis comprised 8% of the direct PM_{2.5} emissions in MSA, 2% of the SO₂ emissions in the MSA, 8% of the NO_x emissions in the MSA, 11% of the VOC emissions in the MSA, and 6% of the NH₃ emissions in the MSA. Also as seen in Tables 5 – 7, 2010 VMT in the City of St. Louis comprised 12% of the total VMT in the MSA, and 2010 population in the City of St. Louis comprised 13% of the total MSA population. Commuting connectivity data suggests that a relatively insignificant number of St. Louis City residents work in Madison and St. Clair Counties (the counties with the violating monitors). While the emissions inventory data, VMT, and population in St. Louis City appear significant; emissions and emissions related data alone are not enough to determine the relative contribution of the emission sources in St. Louis City to the violating monitors in Granite City and East St. Louis.

Table 8 City of St. Louis 2008 and 2011 Annual Emissions Inventory Data *					
2008 Annual Emissions (tons/year)					
Source Category	Direct PM_{2.5}	SO₂/SO_x	NO_x	VOC	NH₃
Point Sources	271.66	5,729.67	1,415.83	1,155.67	568.40
Nonpoint Sources	1,247.78	3,273.63	1,033.57	7,656.98	129.50
On-Road Sources	353.18	68.87	9,165.29	3,278.08	169.20
Non-Road Sources	152.6	101.01	4,078.51	1,146.65	2.21
Totals	2,025.22	9,173.18	15,693.20	13,237.38	869.31
St Louis MSA Percentage	10%	4%	10%	10%	6%
2011 Annual Emissions (tons/year)					
Source Category	Direct PM_{2.5}	SO₂/SO_x	NO_x	VOC	NH₃
Point Sources	289.10	3,030.44	1,096.90	852.38	514.75
Nonpoint Sources	1,080.66	52.31	1,061.87	5,095.47	148.42
On-Road Sources	251.98	28.69	6,078.28	1,668.63	94.89
Non-Road Sources	95.12	28.29	2,064.89	985.94	1.47
Totals	1,716.86	3,139.73	10,301.94	8,602.42	759.53
St Louis MSA Percentage	8%	2%	8%	11%	6%

Note: This table does not include direct PM_{2.5} emissions from paved and unpaved roads or agricultural tilling operations.

The weight of evidence analyses included in Appendices A and B, which consider not only emissions and emissions related data, but also emissions source location, meteorology data on high PM_{2.5} episode days at each of the violating monitors, PM_{2.5} speciation data in the City of St. Louis and at the location of the Granite City monitor, an analysis of 24-hour PM_{2.5} concentrations on high PM_{2.5} episode days at each of the violating monitors compared with the same days' 24-hour concentration values in the City of St. Louis, an evaluation of a temporary shutdown at a major emissions source located in Illinois, and an evaluation of current and planned future emissions controls in the City, concludes that sources located in the City of St. Louis are not causing or contributing to the violations in Granite City or East St. Louis.

Conclusion: While certain relevant factors could be used to argue for inclusion of the City of St. Louis in the nonattainment area that will result from the violating monitors in Illinois, the weight of evidence analyses, when considered holistically, show strong evidence and justification for a recommendation of attainment/unclassifiable for the City of St. Louis.

St. Louis County

There is one monitor located in St. Louis County with a 2010 – 2012 annual PM_{2.5} design value that is suitable for comparison with the Annual PM_{2.5} NAAQS. The Ladue monitor has a 2010 – 2012 design value of 10.9 µg/m³. Because there are no monitors in St. Louis County that are violating the 2012 standard, a determination must be made as to whether St. Louis County contains nearby sources that are contributing to the violations in Granite City and East St. Louis. The fact that the only monitor in the County has a 2010 – 2012 design value well below the value of the NAAQS argues that emissions from St. Louis County are not causing/contributing to the violations on the Illinois side of the St. Louis MSA.

Table 9 displays the 2008 and 2011 Emissions Inventory Data for St. Louis County. As seen in Table 9, in 2011 St. Louis County comprised 27% of the direct PM_{2.5} emissions in MSA, 11% of the SO₂ emissions in the MSA, 30% of the NO_x emissions in the MSA, 38% of the VOC emissions in the MSA, and 13% of the NH₃ emissions in the MSA. Also as seen in Tables 5 – 7, 2010 VMT in the St. Louis County comprised 42% of the total VMT in the MSA, and 2010 population in the St. Louis County comprised 39% of the total MSA population. However, commuting connectivity data suggests that a relatively insignificant number of St. Louis County residents work in Madison and St. Clair Counties. While the emissions inventory data, VMT, and population in St. Louis County appear significant; emissions and emissions related data alone are not enough to determine the relative contribution of the emission sources in St. Louis County to the violating monitors in Granite City and East St. Louis.

Table 9 St. Louis County 2008 and 2011 Annual Emissions Inventory Data *					
2008 Annual Emissions (tons/year)					
Source Category	Direct PM_{2.5}	SO₂/SO_x	NO_x	VOC	NH₃
Point Sources	510.91	20,861.90	5,843.52	1,689.72	720.41
Nonpoint Sources	3,232.47	5,445.70	2,219.83	20,196.53	1,036.69
On-Road Sources	1,306.99	242.70	33,985.44	13,093.35	582.99
Non-Road Sources	618.2	329.92	9,344.46	6,513.17	7.33
Totals	5,668.57	26,880.22	51,393.25	41,492.77	2,347.42
St Louis MSA Percentage	28%	11%	32%	32%	16%
2011 Annual Emissions (tons/year)					
Source Category	Direct PM_{2.5}	SO₂/SO_x	NO_x	VOC	NH₃
Point Sources	208.96	15,315.56	5,110.66	615.49	666.26
Nonpoint Sources	3,759.63	141.63	2,680.64	16,227.59	718.37
On-Road Sources	993.87	112.61	24,407.41	7,769.30	369.32
Non-Road Sources	574.04	239.45	6,413.31	5,936.10	7.46
Totals	5,536.50	15,809.25	38,612.02	30,548.48	1,761.41
St Louis MSA Percentage	27%	11%	30%	38%	13%

Note: This table does not include direct PM_{2.5} emissions from paved and unpaved roads or agricultural tilling operations.

The weight of evidence analyses included in Appendices A and B, which consider not only emissions and emissions related data, but also emissions source location, meteorology data on high PM_{2.5} episode days at each of the violating monitors, PM_{2.5} speciation data, an analysis of 24-hour PM_{2.5} concentrations on high PM_{2.5} episode days at each of the violating monitors, an evaluation of a temporary shutdown at a major emissions source located in Illinois, and an evaluation of current and planned future emissions controls in the Missouri portion of the St. Louis MSA, concludes that sources located in St. Louis County are not causing or contributing to the violations in Granite City or East St. Louis.

Conclusion: While certain relevant factors could be used to argue for inclusion of St. Louis County in the nonattainment area that will result from the violating monitors in Illinois, the weight of evidence analyses, when considered holistically, show strong evidence and justification for a recommendation of attainment/unclassifiable for St. Louis County.

St. Charles County

There are no PM_{2.5} monitors located in St. Charles County; therefore, the primary consideration is whether St. Charles County contains nearby sources that are contributing to the violations in Granite City and East St. Louis.

Table 10 displays the 2008 and 2011 Emissions Inventory Data for St. Charles County. As seen in Table 10, in 2011 St. Charles County comprised 10% of the direct PM_{2.5}

emissions in MSA, 4% of the SO₂ emissions in the MSA, 14% of the NO_x emissions in the MSA, 12% of the VOC emissions in the MSA, and 8% of the NH₃ emissions in the MSA. Also as seen in Tables 5 – 7, 2010 VMT in St. Charles County comprised 10% of the total VMT in the MSA, and 2010 population in St. Charles County comprised 11% of the total MSA population. However, the commuting connectivity data for St. Charles County is insignificant Madison County and St. Clair County. Furthermore, as displayed in Table 10, emissions of SO_x have decreased significantly from 2008 to 2011 in St. Charles County due mainly to installed controls at an Ameren UE electric generating facility located in the county. While the emissions inventory data, VMT, and population in St. Charles County appear significant; emissions and emissions related data alone are not enough to determine the relative contribution of the emission sources in St. Charles County to the violating monitors in Granite City and East St. Louis.

Table 10 St. Charles County 2008 and 2011 Annual Emissions Inventory Data *					
	2008 Annual Emissions (tons/year)				
Source Category	Direct PM_{2.5}	SO₂/SO_x	NO_x	VOC	NH₃
Point Sources	316.21	48,595.17	7,649.32	936.97	8.04
Nonpoint Sources	630.05	895.18	461.25	5,758.92	883.43
On-Road Sources	302.58	55.44	8,119.75	3,663.73	132.82
Non-Road Sources	205.09	57.55	3,043.73	1,934.74	2.58
Totals	1,453.93	49,603.34	19,274.05	12,294.36	1,026.87
St Louis MSA Percentage	7%	21%	12%	9%	7%
	2011 Annual Emissions (tons/year)				
Source Category	Direct PM_{2.5}	SO₂/SO_x	NO_x	VOC	NH₃
Point Sources	445.05	5,323.84	7,369.86	802.09	4.78
Nonpoint Sources	1,120.96	33.58	626.90	4,791.81	899.54
On-Road Sources	313.41	34.81	7,761.68	2,627.92	113.53
Non-Road Sources	180.06	49.67	2,178.97	1,700.07	2.46
Totals	2,059.48	5,441.90	17,937.41	9,921.89	1,020.31
St Louis MSA Percentage	10%	4%	14%	12%	8%

Note: This table does not include direct PM_{2.5} emissions from paved and unpaved roads or agricultural tilling operations.

The weight of evidence analyses included in Appendices A and B, which consider not only emissions and emissions related data, but also emissions source location, meteorology data on high PM_{2.5} episode days at each of the violating monitors, PM_{2.5} speciation data, an analysis of 24-hour PM_{2.5} concentrations on high PM_{2.5} episode days at each of the violating monitors, an evaluation of a temporary shutdown at a major emissions source located in Illinois, and an evaluation of current and planned future emissions controls in the Missouri portion of the St. Louis MSA, concludes that sources located in St. Charles County are not causing or contributing to the violations in Granite City or East St. Louis. In fact, meteorological data indicates that a significant portion of the lowest PM_{2.5} episode days at these two monitors are associated with winds traveling over St. Charles County into the Illinois Counties of St. Clair and Madison.

Conclusion: While certain relevant factors could be used to argue for inclusion of St. Charles County in the nonattainment area that will result from the violating monitors in Illinois, the weight of evidence analyses, when considered holistically, show strong evidence and justification for a recommendation of attainment/unclassifiable for St. Charles County.

Franklin County

There are no PM_{2.5} monitors located in Franklin County; therefore, the primary consideration is whether Franklin County contains nearby sources that are contributing to the violations in Granite City and East St. Louis.

Table 11 displays the 2008 and 2011 Emissions Inventory Data for Franklin County. As seen in Table 11, in 2011 Franklin County comprised 12% of the direct PM_{2.5} emissions in MSA, 41% of the SO₂ emissions in the MSA, 11% of the NO_x emissions in the MSA, 5% of the VOC emissions in the MSA, and 10% of the NH₃ emissions in the MSA. However, as seen in Tables 5 – 7, 2010 VMT in Franklin County comprised only 5% of the total VMT in the MSA, and 2010 population in Franklin County comprised only 4% of the total MSA population. Also, the commuting connectivity data for Franklin County is insignificant Madison County and St. Clair County. While the emissions inventory data in Franklin County appears significant; aggregate emissions data alone are not enough to determine the relative contribution of the emission sources in Franklin County to the violating monitors in Granite City and East St. Louis.

Table 11 Franklin County 2008 and 2011 Annual Emissions Inventory Data *					
	2008 Annual Emissions (tons/year)				
Source Category	Direct PM_{2.5}	SO₂/SO_x	NO_x	VOC	NH₃
Point Sources	1,448.96	57,944.69	9,178.19	685.48	2.82
Nonpoint Sources	423.94	991.04	282.40	1,603.65	1,300.09
On-Road Sources	142.43	30.12	4,187.48	1,574.13	77.75
Non-Road Sources	138.11	36.52	3,056.58	1,036.21	1.74
Totals	2,153.44	59,002.37	16,704.65	4,899.47	1,382.40
St Louis MSA Percentage	11%	25%	10%	4%	9%
	2011 Annual Emissions (tons/year)				
Source Category	Direct PM_{2.5}	SO₂/SO_x	NO_x	VOC	NH₃
Point Sources	1,714.56	57,948.83	9,898.13	640.66	3.07
Nonpoint Sources	513.07	37.28	227.38	1,469.19	1,265.49
On-Road Sources	117.34	13.14	2,896.06	912.88	43.05
Non-Road Sources	96.30	25.81	1,712.41	918.33	1.23
Totals	2,441.27	58,025.06	14,733.98	3,941.06	1,312.84
St Louis MSA Percentage	12%	41%	11%	5%	10%

Note: This table does not include direct PM_{2.5} emissions from paved and unpaved roads or agricultural tilling operations.

The weight of evidence analyses included in Appendices A and B, which consider not only emissions and emissions related data, but also emissions source location, meteorology data on high PM_{2.5} episode days at each of the violating monitors, PM_{2.5} speciation data, an analysis of 24-hour PM_{2.5} concentrations on high PM_{2.5} episode days at each of the violating monitors, an evaluation of a temporary shutdown at a major emissions source located in Illinois, and an evaluation of current and planned future emissions controls in the Missouri portion of the St. Louis MSA, concludes that sources located in Franklin County are not causing or contributing to the violations in Granite City or East St. Louis.

Conclusion: While certain relevant factors could be used to argue for inclusion of Franklin County in the nonattainment area that will result from the violating monitors in Illinois, the weight of evidence analyses, when considered holistically, show strong evidence and justification for a recommendation of attainment/unclassifiable for Franklin County.

Jefferson County

There is one monitor located in St. Louis County with a 2010 – 2012 annual PM_{2.5} design value that is suitable for comparison with the Annual PM_{2.5} NAAQS. The Ladue monitor has a 2010 – 2012 design value of 10.1 µg/m³ (the lowest design value out of all PM_{2.5} monitors in the IL/MO St. Louis MSA). Because there are no monitors in Jefferson County that are violating the 2012 standard, a determination must be made as to whether Jefferson County contains nearby sources that are contributing to the violations in Granite City and East St. Louis. The fact that the only monitor in the county has a 2010 – 2012 design value in compliance with the NAAQS and is lower than any other monitor's design value in the entire MSA argues that emissions from Jefferson County are not causing/contributing to the violations on the Illinois side of the St. Louis MSA.

Table 12 displays the 2008 and 2011 Emissions Inventory Data for Jefferson County. As seen in Table 12, in 2011 Jefferson County comprised 8% of the direct PM_{2.5} emissions in MSA, 31% of the SO₂ emissions in the MSA, 9% of the NO_x emissions in the MSA, 8% of the VOC emissions in the MSA, and 2% of the NH₃ emissions in the MSA. As seen in Tables 5 – 7, 2010 population in Jefferson County comprised 8% of the total MSA population. However, 2010 VMT in Jefferson County comprised only 6% of the total VMT in the MSA, and the commuting connectivity data for Jefferson County is insignificant Madison County and St. Clair County. While the emissions inventory data and population in Jefferson County appear significant; emissions and emissions related data alone are not enough to determine the relative contribution of the emission sources in Jefferson County to the violating monitors in Granite City and East St. Louis.

Table 12 Jefferson County 2008 and 2011 Annual Emissions Inventory Data *					
	2008 Annual Emissions (tons/year)				
Source Category	Direct PM_{2.5}	SO₂/SO_x	NO_x	VOC	NH₃
Point Sources	945.65	68,569.28	7,016.40	600.04	8.97
Nonpoint Sources	717.78	904.61	383.49	3,127.96	165.26
On-Road Sources	192.81	36.88	5,476.95	2,552.86	90.42
Non-Road Sources	85.82	19.29	1,199.29	914.76	1.06
Totals	1,942.06	69,530.06	14,076.13	7,195.62	265.71
St Louis MSA Percentage	10%	29%	9%	6%	2%
	2011 Annual Emissions (tons/year)				
Source Category	Direct PM_{2.5}	SO₂/SO_x	NO_x	VOC	NH₃
Point Sources	511.82	43,702.04	5,608.14	483.33	7.61
Nonpoint Sources	965.22	35.11	368.80	3,157.62	175.35
On-Road Sources	183.67	20.45	4,600.80	1,637.25	66.35
Non-Road Sources	77.01	20.04	886.91	846.05	1.03
Totals	1,737.72	43,777.64	11,464.65	6,124.25	250.34
St Louis MSA Percentage	8%	31%	9%	8%	2%

Note: This table does not include direct PM_{2.5} emissions from paved and unpaved roads or agricultural tilling operations.

The weight of evidence analyses included in Appendices A and B, which consider not only emissions and emissions related data, but also emissions source location, meteorology data on high PM_{2.5} episode days at each of the violating monitors, PM_{2.5} speciation data, an analysis of 24-hour PM_{2.5} concentrations on high PM_{2.5} episode days at each of the violating monitors, an evaluation of a temporary shutdown at a major emissions source located in Illinois, and an evaluation of current and planned future emissions controls in the Missouri portion of the St. Louis MSA, concludes that sources located in Jefferson County are not causing or contributing to the violations in Granite City or East St. Louis.

Conclusion: While certain relevant factors could be used to argue for inclusion of Jefferson County in the nonattainment area that will result from the violating monitors in Illinois, the weight of evidence analyses, when considered holistically, show strong evidence and justification for a recommendation of attainment/unclassifiable for Jefferson County.

Lincoln and Warren Counties

There are no PM_{2.5} monitors located in Lincoln or Warren Counties; therefore, the primary consideration is whether the Counties of Lincoln or Warren contain nearby sources that are contributing to the violations in Granite City and East St. Louis.

Tables 13 – 14 display the 2008 and 2011 Emissions Inventory Data for the Counties of Lincoln and Warren, respectively. As seen in the tables, emissions are much lower in Lincoln and Warren Counties as compared to the other counties of the Missouri MSA.

Also as seen in Tables 5 – 7, the VMT, general population, and commuting connectivity data associated with Madison and St. Clair Counties is insignificant. All of these factors argue for a designation of attainment/unclassifiable for these two counties.

Table 13 Lincoln County 2008 and 2011 Annual Emissions Inventory Data *					
	2008 Annual Emissions (tons/year)				
Source Category	Direct PM_{2.5}	SO₂/SO_x	NO_x	VOC	NH₃
Point Sources	0.27	0.06	37.29	79.04	-
Nonpoint Sources	222.50	87.53	74.97	880.44	1,010.92
On-Road Sources	41.46	9.36	1,398.85	744.21	22.93
Non-Road Sources	65.30	29.67	1,166.46	520.81	0.79
Totals	329.53	126.62	2,677.57	2,224.50	1,034.64
St Louis MSA Percentage	2%	0%	2%	2%	7%
	2011 Annual Emissions (tons/year)				
Source Category	Direct PM_{2.5}	SO₂/SO_x	NO_x	VOC	NH₃
Point Sources	0.33	0.04	29.56	66.11	-
Nonpoint Sources	255.15	16.00	89.00	909.00	863.00
On-Road Sources	44.99	10.88	1,326.74	494.68	18.42
Non-Road Sources	44.69	12.11	618.41	444.22	0.58
Totals	345.16	39.03	2,063.71	1,914.01	882.00
St Louis MSA Percentage	2%	0%	2%	2%	7%

Note: This table does not include direct PM_{2.5} emissions from paved and unpaved roads or agricultural tilling operations.

Table 14 Warren County 2008 and 2011 Annual Emissions Inventory Data *					
	2008 Annual Emissions (tons/year)				
Source Category	Direct PM_{2.5}	SO₂/SO_x	NO_x	VOC	NH₃
Point Sources	0.86	0.06	10.24	171.17	0.77
Nonpoint Sources	140.14	205.98	78.27	674.21	681.24
On-Road Sources	53.66	9.66	1,740.09	633.81	28.70
Non-Road Sources	28.75	6.79	385.24	272.85	0.34
Totals	223.41	222.49	2,213.84	1,752.04	711.05
St Louis MSA Percentage	1%	0%	1%	1%	5%
	2011 Annual Emissions (tons/year)				
Source Category	Direct PM_{2.5}	SO₂/SO_x	NO_x	VOC	NH₃
Point Sources	-	-	0.11	206.12	-
Nonpoint Sources	191.73	5.36	57.09	663.71	647.55
On-Road Sources	56.54	10.96	1,553.57	448.78	21.77
Non-Road Sources	25.66	7.10	298.03	231.33	0.32
Totals	273.93	23.42	1,908.80	1,549.94	669.64
St Louis MSA Percentage	1%	0%	1%	2%	5%

Note: This table does not include direct PM_{2.5} emissions from paved and unpaved roads or agricultural tilling operations.

In addition to the relatively low emissions inventories and emissions related data, the location of these two counties are further from the violating monitors in Illinois than any other counties in the entire IL/MO St. Louis MSA, which would support a designation of

attainment for these two counties. In addition, the weight of evidence analyses included in Appendices A and B, which consider not only emissions and emissions related data, but also emissions source location, meteorology data on high PM_{2.5} episode days at each of the violating monitors, PM_{2.5} speciation data, an analysis of 24-hour PM_{2.5} concentrations on high PM_{2.5} episode days at each of the violating monitors, an evaluation of a temporary shutdown at a major emissions source located in Illinois, and an evaluation of current and planned future emissions controls in the Missouri portion of the St. Louis MSA, also concludes that sources located in Lincoln and Warren Counties are not causing or contributing to the violations in Granite City or East St. Louis.

Conclusion: Virtually all factors considered in the weight of evidence analyses show strong evidence and justification for a designation of attainment/unclassifiable for the Counties of Lincoln and Warren.

Missouri Areas Surrounding the St. Louis MSA – County by County Analysis

Per EPA's Guidance on Boundary Designations under the 2012 Annual PM_{2.5} NAAQS, evaluations should also be performed for all counties that are adjacent to CBSAs with violating monitors. For this reason, the designation criteria in each Missouri County that borders the St. Louis MSA have also been evaluated. There are no ambient PM_{2.5} monitors located in the Missouri counties that border the St. Louis MSA, so the primary question is whether these counties contain nearby emissions sources that cause/contribute to the violations in the Illinois portion of the St. Louis MSA.

Table 15 displays the 2010 annual VMT and the 2010 general populations of each Missouri County that borders the St. Louis MSA, and Tables 16 – 22 display the 2008 and 2011 Emissions Inventory Data for the Missouri counties that border the MSA. As seen in the tables, VMT, general population, and emissions inventory data are much lower in the counties surrounding the MSA than in the counties that comprise the MSA. Commuting connectivity data is not available for the surrounding counties, but it is assumed that there is very low connectivity associated with any of the surrounding counties and the counties in Illinois with the violating monitors. All of these points argue for each Missouri County surrounding the MSA to be designated attainment/unclassifiable. However, point sources in these counties were included in the weight of evidence analyses included in Appendices A and B, due to the fact that some of the counties that surround the MSA do contain relatively large point sources, which could potentially argue for inclusion in the nonattainment area that will result from the violating monitors on the Illinois side of the St. Louis MSA.

	2010 Annual VMT (in millions)	2010 Population (in thousands)
Washington	209.6	23.3
Gasconade	148.8	15.3
Crawford	520.3	22.8
St. Francois	540.6	55.6
Ste. Genevieve	435.3	17.8
Pike	263.4	18.4
Montgomery	429.2	12.1

* Note: This information was pulled from EPA's PM_{2.5} Boundary Designations Guidance and Tools Webpage: <http://www.epa.gov/pmdesignations/2012standards/techinfo.htm>

2008 Annual Emissions (tons/year)					
Source Category	Direct PM_{2.5}	SO₂/SO_x	NO_x	VOC	NH₃
Point Sources	0.72	0.03	5.42	18.31	0.09
Nonpoint Sources	103.00	142.74	61.64	333.23	212.59
On-Road Sources	23.01	4.09	744.59	373.06	11.56
Non-Road Sources	9.27	2.18	131.94	106.44	0.12
Totals	136.00	149.04	943.59	831.04	224.36
St Louis MSA Percentage	1%	0%	1%	1%	1%
2011 Annual Emissions (tons/year)					
Source Category	Direct PM_{2.5}	SO₂/SO_x	NO_x	VOC	NH₃
Point Sources	0.87	0.01	4.43	39.99	0.10
Nonpoint Sources	114.91	3.72	38.33	369.72	184.67
On-Road Sources	22.50	4.62	653.31	243.51	8.99
Non-Road Sources	7.87	2.32	101.00	90.89	0.11
Totals	146.15	10.67	797.07	744.11	193.87
St Louis MSA Percentage	1%	0%	1%	1%	1%

Note: This table does not include direct PM_{2.5} emissions from paved and unpaved roads or agricultural tilling operations.

Table 17 Gasconade County 2008 and 2011 Annual Emissions Inventory Data *					
Source Category	2008 Annual Emissions (tons/year)				
	Direct PM _{2.5}	SO ₂ /SO _x	NO _x	VOC	NH ₃
Point Sources	0.14	0.01	1.88	145.12	0.06
Nonpoint Sources	58.32	91.59	36.89	481.71	585.89
On-Road Sources	17.45	2.97	558.30	314.91	8.22
Non-Road Sources	41.88	12.05	1,048.58	214.95	0.56
Totals	117.79	106.62	1,645.65	1,156.69	594.73
St Louis MSA Percentage	1%	0%	1%	1%	4%
Source Category	2011 Annual Emissions (tons/year)				
	Direct PM _{2.5}	SO ₂ /SO _x	NO _x	VOC	NH ₃
Point Sources	0.14	0.01	1.84	122.75	0.06
Nonpoint Sources	84.62	5.13	39.66	427.03	515.86
On-Road Sources	16.87	3.39	497.50	213.09	6.49
Non-Road Sources	26.10	7.95	576.14	165.81	0.36
Totals	127.73	16.48	1,115.14	928.68	522.77
St Louis MSA Percentage	1%	0%	1%	1%	4%

Note: This table does not include direct PM_{2.5} emissions from paved and unpaved roads or agricultural tilling operations.

Table 18 Crawford County 2008 and 2011 Annual Emissions Inventory Data *					
Source Category	2008 Annual Emissions (tons/year)				
	Direct PM _{2.5}	SO ₂ /SO _x	NO _x	VOC	NH ₃
Point Sources	-	-	-	36.04	-
Nonpoint Sources	114.81	86.05	56.14	886.15	265.33
On-Road Sources	49.04	9.05	1,599.71	631.48	27.01
Non-Road Sources	31.02	3.88	277.05	668.55	0.28
Totals	194.87	98.98	1,932.90	2,222.22	292.62
St Louis MSA Percentage	1%	0%	1%	2%	2%
Source Category	2011 Annual Emissions (tons/year)				
	Direct PM _{2.5}	SO ₂ /SO _x	NO _x	VOC	NH ₃
Point Sources	-	-	-	27.14	-
Nonpoint Sources	127.02	6.94	67.69	673.66	235.19
On-Road Sources	48.58	10.03	1,365.95	414.76	19.86
Non-Road Sources	27.40	4.22	187.27	648.11	0.26
Totals	203.00	21.19	1,620.91	1,763.67	255.31
St Louis MSA Percentage	1%	0%	1%	2%	2%

Note: This table does not include direct PM_{2.5} emissions from paved and unpaved roads or agricultural tilling operations.

Table 19 St. Francois County 2008 and 2011 Annual Emissions Inventory Data *					
Source Category	2008 Annual Emissions (tons/year)				
	Direct PM _{2.5}	SO ₂ /SO _x	NO _x	VOC	NH ₃
Point Sources	27.36	25.71	403.95	46.73	17.59
Nonpoint Sources	209.56	380.71	127.00	912.00	461.00
On-Road Sources	72.58	11.32	2,057.37	1,028.77	29.35
Non-Road Sources	19.74	4.16	235.50	267.44	0.23
Totals	329.24	421.90	2,823.82	2,254.94	508.17
St Louis MSA Percentage	2%	0%	2%	2%	3%
Source Category	2011 Annual Emissions (tons/year)				
	Direct PM _{2.5}	SO ₂ /SO _x	NO _x	VOC	NH ₃
Point Sources	28.89	28.17	439.70	30.57	11.05
Nonpoint Sources	306.15	11.50	127.17	941.13	404.66
On-Road Sources	55.65	11.57	1,645.41	661.42	22.40
Non-Road Sources	18.55	4.84	191.88	241.04	0.24
Totals	409.24	56.08	2,404.16	1,874.16	438.35
St Louis MSA Percentage	2%	0%	2%	2%	3%

Note: This table does not include direct PM_{2.5} emissions from paved and unpaved roads or agricultural tilling operations.

Table 20 Ste. Genevieve County 2008 and 2011 Annual Emissions Inventory Data *					
Source Category	2008 Annual Emissions (tons/year)				
	Direct PM _{2.5}	SO ₂ /SO _x	NO _x	VOC	NH ₃
Point Sources	302.80	4,432.97	5,246.81	59.96	0.06
Nonpoint Sources	113.83	258.47	67.56	555.92	799.93
On-Road Sources	36.39	7.27	1,203.34	432.05	21.73
Non-Road Sources	23.66	5.95	440.60	219.62	0.30
Totals	476.68	4,704.66	6,958.31	1,267.55	822.02
St Louis MSA Percentage	2%	2%	4%	1%	5%
Source Category	2011 Annual Emissions (tons/year)				
	Direct PM _{2.5}	SO ₂ /SO _x	NO _x	VOC	NH ₃
Point Sources	808.62	3,716.98	6,918.07	347.95	54.28
Nonpoint Sources	100.27	5.12	49.48	403.95	829.47
On-Road Sources	40.57	7.95	1,065.00	304.86	15.68
Non-Road Sources	20.00	6.15	357.87	183.47	0.29
Totals	969.46	3,736.20	8,390.42	1,240.23	899.72
St Louis MSA Percentage	5%	3%	7%	2%	7%

Note: This table does not include direct PM_{2.5} emissions from paved and unpaved roads or agricultural tilling operations.

Table 21 Pike County 2008 and 2011 Annual Emissions Inventory Data *					
Source Category	2008 Annual Emissions (tons/year)				
	Direct PM _{2.5}	SO ₂ /SO _x	NO _x	VOC	NH ₃
Point Sources	287.55	13,422.42	7,244.57	686.71	44.96
Nonpoint Sources	115.97	850.82	174.91	500.70	1,415.95
On-Road Sources	30.06	5.18	916.87	380.23	14.55
Non-Road Sources	72.02	24.98	1,403.71	567.07	0.86
Totals	505.60	14,303.40	9,740.06	2,134.71	1,476.32
St Louis MSA Percentage	3%	6%	6%	2%	10%
Source Category	2011 Annual Emissions (tons/year)				
	Direct PM _{2.5}	SO ₂ /SO _x	NO _x	VOC	NH ₃
Point Sources	62.20	1,835.92	807.43	67.70	23.27
Nonpoint Sources	72.12	2.77	37.84	505.99	2,193.73
On-Road Sources	33.29	6.49	914.85	264.78	12.91
Non-Road Sources	48.93	13.50	806.48	482.70	0.63
Totals	216.54	1,858.68	2,566.60	1,321.17	2,230.54
St Louis MSA Percentage	1%	1%	2%	2%	17%

Note: This table does not include direct PM_{2.5} emissions from paved and unpaved roads or agricultural tilling operations.

Table 22 Montgomery County 2008 and 2011 Annual Emissions Inventory Data *					
Source Category	2008 Annual Emissions (tons/year)				
	Direct PM _{2.5}	SO ₂ /SO _x	NO _x	VOC	NH ₃
Point Sources	25.04	578.44	170.16	-	-
Nonpoint Sources	67.00	86.94	38.56	481.16	855.85
On-Road Sources	35.43	6.84	1,212.25	377.61	21.12
Non-Road Sources	30.00	7.10	427.85	139.66	0.31
Totals	157.47	679.32	1,848.83	998.42	877.28
St Louis MSA Percentage	1%	0%	1%	1%	6%
Source Category	2011 Annual Emissions (tons/year)				
	Direct PM _{2.5}	SO ₂ /SO _x	NO _x	VOC	NH ₃
Point Sources	0.05	549.52	147.67	-	-
Nonpoint Sources	65.53	2.21	26.92	479.04	857.58
On-Road Sources	42.70	8.45	1,154.87	273.35	17.03
Non-Road Sources	24.34	6.80	322.80	115.55	0.29
Totals	132.62	566.98	1,652.27	867.94	874.89
St Louis MSA Percentage	1%	0%	1%	1%	7%

Note: This table does not include direct PM_{2.5} emissions from paved and unpaved roads or agricultural tilling operations.

In addition to the relatively low emissions inventory and emissions related data, the Missouri counties that surround the St. Louis MSA are located even further away from the violating monitors in Illinois, which also argues for a designation of attainment/unclassifiable. In addition, the weight of evidence analyses included in Appendices A and B, which consider not only emissions and emissions related data, but also emissions source location, meteorology data on high PM_{2.5} episode days at each of the violating monitors, PM_{2.5} speciation data, an analysis of 24-hour PM_{2.5} concentrations on high PM_{2.5} episode days at each of the violating monitors, an evaluation of a temporary shutdown at a major emissions source located in Illinois, and an evaluation of current and planned future emissions controls in the Missouri portion of the St. Louis MSA and the counties that surround the MSA, concludes that sources located in Missouri counties that surround the MSA are not causing or contributing to the violations in Granite City and East St. Louis.

Conclusion: Even though there are a few large point sources located in some of the Missouri counties that surround the MSA, the location of these sources in proximity to the violating monitors, the total emissions from these counties, the emissions related data from these counties, and the weight of evidence analyses performed provide strong evidence and justification for each of Missouri's counties that surround the St. Louis MSA to be designated attainment/unclassifiable.

Other Counties – The Rest of the State

As discussed in the Summary of Recommendation Section of this document, all PM_{2.5} monitors that are suitable for comparison to the annual PM_{2.5} NAAQS that are located in the State of Missouri have 2010 – 2012 design values in compliance with the 2012 Annual PM_{2.5} NAAQS. In addition, no monitors outside Missouri but within 50 km of the state border are violating the NAAQS aside from the two monitors on the Illinois side of the St. Louis MSA. For this reason, all areas of Missouri outside the St. Louis area are also recommended for designation as attainment/unclassifiable because the air quality in these areas is in compliance with the standard, and there are no areas nearby any of these counties that are violating the standard that would warrant an evaluation of nearby contributing sources to determine appropriate designation boundaries.

Conclusion

All ambient PM_{2.5} monitors in Missouri that are suitable for comparison to the 2012 Annual PM_{2.5} NAAQS are complying with the standard based on EPA certified monitoring data from 2010 – 2012. There are two ambient PM_{2.5} monitors near Missouri in the Illinois portion of the St. Louis MSA that are violating the 2012 Annual PM_{2.5} NAAQS. The state performed evaluations for each of these two violating monitors in an effort to determine nearby sources that were causing/contributing to these violations.

These evaluations (Appendices A and B) both come to the conclusion that a recommendation of attainment/unclassifiable is most appropriate for all Missouri counties located in and surrounding the St. Louis MSA. The evaluations are based on a weight of evidence approach and consider each of the five criteria that EPA includes in its guidance for determining boundaries under the 2012 Annual PM_{2.5} NAAQS. In addition to the criteria included in the EPA guidance, the state evaluated the potential for additional controls that could be installed on Missouri sources in the St. Louis area. Even if areas in Missouri were to be included in a nonattainment area as a result of the violating monitors in the Illinois portion of the St. Louis MSA, few if any new controls in Missouri, beyond what is already in place or expected in the near future, would actually be required for the area. This means there would be no net air quality benefit by designating areas in Missouri nonattainment based on these violating monitors; it would only require Missouri to develop a resource intensive attainment demonstration for the area. Finally, the downward trend in annual PM_{2.5} concentrations across the state and in the St. Louis area over the last decade is only expected to continue as a result of control measures that are already in place.

For all of these reasons the State of Missouri recommends each county in the State for designation as attainment/unclassifiable under the 2012 Annual PM_{2.5} NAAQS.