Missouri
Department of
Natural Resources

AIR POLLUTION CONTROL PROGRAM

MISSOURI AIR MONITORING NETWORK ASSESSMENT 2010

June 2010

CONTENTS

EXECUTIVE SUMMARY 7

1.0 BACKGROUND AND INTRODUCTION 17
1.1 Regulatory Requirements 17
1.2 2010 Assessment Approach 17

2.0 POPULATION 19

3.0 GENERAL CLIMATE OF MISSOURI 27
3.1 Spring 27
3.2 Summer 27
3.3 Fall 27
3.4 Winter 27
3.5 Ozone 28
3.6 $PM_{2.5}$ 28
3.7 Windroses (Appendix A) 28

4.0 NEW EMISSION SOURCES 29
4.1 NO_2 and CO 29
4.2 Ozone 29
4.3 Lead 30
4.4 PM_{10} 30
4.5 SO_2 31

5.0 CARBON MONOXIDE NETWORK ASSESSMENT 34
5.1 Introduction: Carbon Monoxide Standards and Monitoring Requirements 34
5.2 CO Monitoring Results in Missouri 35
5.3 CO Emissions 38
5.4 Evaluation of the CO Monitoring Network 46

6.0 SULFUR DIOXIDE NETWORK ASSESSMENT 48
6.1 Introduction: Sulfur Dioxide Standards and Monitoring Requirements 48
6.2 SO_2 Monitoring Results in Missouri 48
6.3 SO_2 Emissions 57
6.4 Evaluation of the SO_2 Monitoring Network 61

7.0 NITROGEN DIOXIDE NETWORK ASSESSMENT 62
7.1 Nitrogen Dioxide Background 62
7.2 Summary of Current Missouri NO_2 Monitoring Network 62
7.3 NAAQS Compliance Review and NO_2 Design Value Trends 64
7.4 NO_X Emissions Assessment 68
7.4.1 Point Sources 68
7.4.2 Mobile Source NO_X Emissions 73

7.4.3 Area Source NO_X Emissions 75
7.5 Evaluation of the NO_2 Monitoring Network 77

8.0 PM_{10} NETWORK ASSESSMENT 81
8.1 PM_{10} Background 81
8.2 Summary of the Missouri PM_{10} Monitoring Network 82
8.3 Ambient Air Monitoring Data Analysis 84
8.3.1 1st Maximum 24-hour Averages, Exceedances and Violations 84
8.3.2 St. Louis PM_{10} Correlation Matrix 87
8.4 PM_{10} Emissions 90
8.4.1 Point Sources 90
8.4.2 Mobile Sources 91
8.4.3 Area Sources 91
8.5 Evaluation of the PM_{10} Monitoring Network 94

9.0 OZONE NETWORK ASSESSMENT 97
9.1 Background 97
9.2 Summary of the Current Missouri O_3 Monitoring Network 98
9.3 Ambient Air Monitoring Data Analysis 99
9.3.1 Design Value 101
9.3.2 Design Value Trends 104
9.3.3 Correlation Coefficients Analysis Results 109
9.3.4 Area Served Analysis Results 112
9.3.5 Removal Bias Analysis Results 112
9.4 Emissions 116
9.4.1 Point Sources 116
9.4.2 Mobile Source NO_X Emissions 121
9.4.3 Area Sources 121
9.5 Evaluation of the O_3 Monitoring Network 123

10.0 $PM_{2.5}$ NETWORK ASSESSMENT 125
10.1 Introduction: $PM_{2.5}$ Standards and Monitoring Requirements 125
10.2 $PM_{2.5}$ Monitoring Results in Missouri 126
10.3 Emission Sources 132
10.4 Evaluation of the $PM_{2.5}$ Monitoring Network 134

11.0 LEAD NETWORK ASSESSMENT 140
11.1 Introduction: Lead Standards and Monitoring Requirements 140
11.2 Lead Monitoring Network 140
11.3 Past Lead Monitoring Results 143
11.4 Recent Lead Monitoring Results 148
11.5 Lead Emissions 150
11.6 Evaluation of the Lead Monitoring Network 151

APPENDIX A: WINDROSES 152

APPENDIX B: EPA REGION VII AIR MONITORING NETWORK ASSESSMENT GUIDANCE.....188
APPENDIX C: NETWORK TABLE.....190

EXECUTIVE SUMMARY

Introduction

Each state is required (40 **CFR)** 58.10 (d)) to perform and submit to the Environmental Protection Agency (EPA) an assessment of the air quality monitoring network every five years to determine whether the network meets the monitoring objectives defined in 40 **CFR** 58 Appendix D, whether new sites are needed, and whether existing sites are no longer needed. The first required assessment is due July 1, 2010. This report presents the results of that assessment for Missouri. Similar assessments for individual air pollutants have been done in the past, but this is the first comprehensive assessment required by regulations. This assessment follows EPA Region VII guidance. Currently, most of the National Ambient Air Quality Standards (NAAQS) have either been recently revised or are currently being revised or reviewed. These changes in the NAAQS and associated monitoring requirements must be considered in assessing the air quality monitoring network.

The assessment (and this summary) first discusses Missouri population, climate, and new emission sources. Then the network for monitoring of each of the following air pollutants is discussed: carbon monoxide (CO), sulfur dioxide (SO_2), nitrogen dioxide (NO_2), particulate matter smaller than 10 micrometers (PM_{10}), ozone (O_3), particulate matter smaller than 2.5 micrometers ($PM_{2.5}$), and lead. This summary concludes with a table summarizing the characterization of monitoring sites as critical, credible, or marginal for each pollutant.

Population

The assessment must include consideration of population distribution, since one of the goals of an air monitoring network is to assess population exposure, and since some air pollutant emissions, especially from area and mobile sources, are associated with population. Missouri includes dominant population centers in the St. Louis and Kansas City areas, with the southwestern region an area of growth and some significance in population and population growth. Northern and western Missouri and the Ozark Highlands are less populated. The 2009 estimated populations of the three largest metropolitan statistical areas (MSA) in Missouri are:

- St. Louis: 2.8 million
- Kansas City MSA: 2.1 million
- Springfield MSA: 0.4 million

The largest recent growth in population has generally been in suburban areas within the St. Louis and Kansas City areas, not in the urban centers. There has also been population growth, particularly among people over 65 in areas such as the Branson area in southwestern Missouri.

Climate

Missouri is located in the middle of the North American continent and, therefore, normally experiences four full seasons, with extremes in temperature from 100F or greater to below 0F. The typical duration and dominant climatology of the four seasons is:

- Spring: March to May, the wettest season, variable winds, temperature 76F to 33F.
- Summer: June to August, warm moist air from the Gulf of Mexico, wind generally from the south, temperature 90F to 62F.
- Fall: September to November, wind generally from the south shifting to the northwest late in the season, temperature 81F to 33F.
- Winter: December to February, wind generally from the northwest, temperature 46F to 18F.

Ozone episodes generally occur in the summer when high pressure moves to the east of Missouri along with an upper level ridge over the area. High temperature, abundant sunshine, and light winds are characteristic of such episodes and contribute to the formation and accumulation of ozone. $PM_{2.5}$ levels, especially in the St. Louis area, are affected by regional weather patterns that bring air masses into the area from areas with emissions of PM2.5 precursors. For example, summertime high pressure systems are often centered over the Ohio River Valley area, which not only bring air masses from that SO_2 emissions-rich region into the St. Louis area, but also create local stagnant or nearly stagnant conditions that allow accumulation of both regional and locally-generated air contaminants.

New Emission Sources

New large point emission sources are primarily those permitted under the Prevention of Significant Deterioration (PSD) program. There have been some increases in emissions of nitrogen oxides (NO_X), CO and volatile organic compounds (VOCs), at several facilities associated with these permits, but these increases do not appear to be significant enough to require additional monitoring of these pollutants. NO_X and VOC emissions do, however, contribute to ozone formation, and locations of these sources must be considered in future evaluation of potential ozone monitoring locations as ozone standards are made more stringent in the future.

New lead monitoring requirements may require either lead monitoring or modeling evaluation near large coal combustion sources, such as electric generating stations. The new SO_2 NAAQS and associated monitoring requirements will also require either SO_2 monitoring or modeling evaluation near large coal combustion sources.

Carbon Monoxide

The primary NAAQS for CO are 35 parts per million (ppm) for one hour, and 9 ppm for eight hours. These concentrations must not be exceeded more than once per year. The CO NAAQS are currently under review, with the proposed rulemaking expected in October 2010 and final rulemaking expected in May 2011. A more stringent standard is likely to result from this review. There is currently no minimum requirement for CO monitoring, but the new rule may, as with other pollutants, require minimum numbers of monitoring sites and may, as with nitrogen dioxide (NO_2), require near-roadway monitoring.

CO is currently monitored at four sites in Missouri, three sites in the St. Louis area and one in Springfield. None of these sites has reported a violation of the NAAQS in recent years.

CO is primarily emitted as a component of motor vehicle exhaust, so that CO emissions are correlated with vehicle miles, which are highest on major roadways in population centers. In addition, area sources of CO include agricultural burning, principally in the southeastern part of Missouri.

The Blair Street site in St. Louis is an NCore site, which requires CO monitoring. Resources at other sites may be reallocated to locations more directly impacted by motor vehicle emissions along major roadways following adoption of the revised NAAQS and associated monitoring requirements.

Sulfur Dioxide

The SO_2 NAAQS was just revised in June 2010. The new primary NAAQS is 75 parts per billion (ppb); the form of the standard is the 3-year average of the 99th percentile of annual daily maximum 1-hour averages. The revised NAAQS includes minimum monitoring requirements (effective January 2013) based on a combination of population and SO_2 emissions in Core Based Statistical Areas (CBSAs). Five monitoring sites will be required in Missouri (two in the St. Louis area, two in the Kansas City Area, and one in Springfield). Each monitoring site may be determined on the basis of one or more of the following criteria: location near known emission sources, location to measure maximum concentrations, location to measure population exposure, location to measure regional transport, or location to measure regional background. The monitoring is to be supplemented by air quality simulation modeling of the impact of known SO_2 sources.

SO_2 is currently monitored by state and local agencies at nine sites in Missouri, five sites in the St. Louis area, one in Kansas City, two in Springfield, and one in a rural area. SO_2 is also being monitored by utilites or other industrial facilities near emission sources. Three state or local agency sites in Missouri are expected to be in (or near) violation of the new standard: one in Jefferson County, one in Kansas City, and one in Springfield.

SO_2 is primarily emitted from coal or fuel oil combustion facilities, especially electric generating stations.

The Blair Street site in St. Louis is an NCore site, which will require SO_2 monitoring starting in January 2011. Three of the current sites (Herculaneum, Troost, and South Charleston) are source-oriented sites that are likely to show violation of the new standard, and should be continued. The two source-oriented sites (James River South and Wildwood Lane) operated by City Utilities in Springfield should also be continued. Three of the sites in the St. Louis area (Margaretta, South Broadway, and Ladue) are population-oriented, not source-oriented, but show concentrations of SO_2 approaching the level of the new standard. It is desirable to maintain such population-oriented sites, but their continuance is being evaluated in part based on resource constraints. The remaining sites (Mark Twain State Park, Missouri State University, and Maryland Heights) are expected to comply with the new NAAQS. Monitoring resources allocated to these sites might be diverted to other sites in the future, based on planning for compliance with the new requirements effective in 2013.

Nitrogen Dioxide

The NO_2 NAAQS was revised in January 2010 to a 1-hour average of 100 ppb; the form of the standard is the 3-year average of the 99th percentile of annual daily maximum 1-hour averages. The annual average standard of 53 ppb was also retained with no change. The revised NAAQS includes minimum monitoring requirements (effective January 2013). Two near-roadway sites will be required in the St. Louis area and one in the Kansas City area. A minimum of one population-oriented monitor must be sited in any urban area with population greater than or equal to 1 million people. Additional monitors are to be sited to monitor exposure to susceptible and vulnerable communities.

NO_2 is currently monitored by state and local agencies at nine sites in Missouri, five sites in the St. Louis area, two in the Kansas City area, one in Springfield, and one in a rural area. None of these sites is in violation of either the annual or 1-hour standard.

NO_X is emitted from a variety of source types: point (electricity generating stations and other stationary combustion sources), mobile (on-road), and area (low level and non-road) sources. Some of the larger sources and a concentration of relatively smaller sources are located within the St. Louis, Kansas City, and Springfield urban areas. cores. Some large sources are located outside the urban areas, especially along the Missouri and Mississippi rivers. Point source NO_X emissions have generally decreased over the last few years (2003 to 2008). Mobile source NO_X emissions generally correlate with vehicular traffic density, and area source emissions generally correlate with population.

The Blair Street site in St. Louis is an NCore site, which will require NO_Y monitoring (NO_Y represents total reactive nitrogen oxides) starting in January 2011. The Margaretta site in St. Louis and the Troost site in Kansas City have measured somewhat higher NO_2 concentrations as compared to the new standard than others. The Magaretta site is considered to be critical. The Troost site is likely to be relocated, since it is located somewhat near a major roadway but not close enough to meet the new guidelines and not at the same elevation as the roadway. The other seven sites are all considered to be marginal. Resources allocated to these sites can be

reallocated to near-roadway and other sites as required by the new standard, including sites in the St. Louis and Kansas City areas and also possibly in the Springfield and Branson areas.

PM_{10}

The PM_{10} NAAQS is a 24-hour average of 150 micrograms per cubic meter ($\mu g/m^3$), not to be exceeded more than once per year. There are minimum monitoring requirements for PM_{10} in each MSA, based on MSA population and the monitored PM_{10} concentrations. A minimum of four to eight sites is required to monitor PM_{10} levels in the St. Louis area, one to two sites in the Kansas City area, and zero to one in the Springfield area.

PM_{10} is currently monitored by state and local agencies at 12 sites in Missouri, six sites in the St. Louis area, two sites in the Kansas City area, one site in Springfield, and three sites in other outstate areas. No sites exceeded the standard in 2009, but first maximum concentrations at the Branch Street, Hall Street, and Carthage sites did exceed 150 $\mu g/m^3$ in recent years.

PM_{10} point sources are concentrated in the St. Louis, Kansas City, and Springfield areas. Mobile source PM_{10} emissions generally correlate with vehicular traffic density, and area source emissions generally correlate with population.

The Blair Street site in St. Louis is an NCore site, which requires PM_{10} monitoring. The Branch Street, Hall Street, and Carthage sites are all source-oriented sites that have shown concentrations above the level of the new standard in recent years, so are critical. The Front Street site is a new source-oriented site that is considered to be critical. The St. Joseph Pump Station site has not shown recent exceedances, but has shown high enough concentrations that it should be maintained. The Mark Twain State Park site is considered to be critical as a monitor of regional background concentrations. The Oakville, Margaretta, Troost, and Missouri State University sites have measure lower values, so are considered to be credible to marginal, depending on whether other source areas are identified in the future. The Mound Street site is considered to be marginal.

Ozone

The current (2008) ozone primary NAAQS is an 8-hour average of 75 ppb, 3-year average of 4th highest annual average. In January 2010, EPA proposed to set a more stringent primary standard, an 8-hour average between 60 and 70 ppb. The final rule is expected in August 2010. A separate proposed rule in July 2009 modified the O_3 air monitoring network to include provisions for urban area monitoring in areas of population between 50 and 350 thousand people, non-urban monitoring to assess vegetation effects, population impact in smaller cities, and areas downwind of urban areas. This rule will increase the required minimum numbers of O_3 monitoring sites in various areas. Monitoring requirements are expected to be finalized at the same time as the revised standard.

Ozone is currently monitored at 23 sites in Missouri. Seven sites are in the St. Louis area, and five are in the Kansas City area. Ste. Genevieve County and the Southeast areas each have one site. Two sites are in Springfield, and the outstate areas have 7 sites. In the St. Louis area, the Orchard Farm, West Alton, and Maryland Heights sites have consistently violated the 75 ppb standard. These sites are located generally downwind of the St. Louis metropolitan area. The Blair Street, Pacific, Arnold West, and Foley sites are, as of 2009, in compliance after consistently being in violation since 2003. The regional scale Bonne Terre site in Ste. Genevieve County has been in violation of the 75 ppb standard since 2003. The Farrar site in southeastern Missouri has shown two violations of the standard since its establishment in 2005 but is currently in compliance. In the Kansas City area, the Trimble and Rocky Creek sites have consistently violated the standard since 2003. These sites are generally downwind of the central Kansas City metropolitan area. The Liberty and Watkins Mill sites violated the standard until 2009; the 2007-2009 design values for thse sites are now in compliance. The Richards-Gebaur South site has had only one violation (2005-2007) since 2003. This site is located generally upwind and at some distance from Kansas City. Only one violation of the standard was monitored (in 2007) at Springfield area sites. Outstate area sites are in compliance with the standard. All sites show a downward trend in 3-year design values over the last three 3-year periods from 2005 to 2009.

Nitrogen oxides (NO_X) and VOCs emissions contribute to formation of ozone in the atmosphere. NO_X emissions are discussed above. VOC point source emissions are concentrated in the larger urban areas in Missouri and have shown a decrease in recent years. Area emissions correlate with population, and mobile source emissions, like those of NO_X correlate with vehicle miles.

Based on minimum monitoring requirements (current and proposed) and measured O_3 levels near the standard, all of the current sites are considered to be critical, although the new site in Branson may be credible, depending on measurement results.

$PM_{2.5}$

The $PM_{2.5}$ primary NAAQS were established in 1997 as15.0 $\mu g/m^3$, based on the 3-year average of annual arithmetic mean concentrations from single or multiple community-oriented monitors, and 65 $\mu g/m^3$, based on the 3-year average of the 98th percentile of 24-hour concentrations at each population-oriented monitor within an area. In October 2006, the 24-hour standard was reduced from 65 to 35 $\mu g/m^3$. $PM_{2.5}$ standards are currently under review, with new standards expected to be proposed in about January 2011 and finalized in about October 2011. At the same time that the NAAQS was revised in 2006, EPA revised air monitoring requirements, including requirements for minimum numbers of $PM_{2.5}$ monitors in each MSA based on population and on whether the design value for either $PM_{2.5}$ standard exceeds 85 percent of the standard.

$PM_{2.5}$ is currently monitored at 11 sites in Missouri; five in the St. Louis area, three in the Kansas City area, one in Springfield, and two sites in outstate areas. All Missouri sites are now in compliance with both standards, but St. Louis area sites in Illinois, impacted by local sources, were in violation of the annual standard as recently as 2006-2008 and the 24-hour standard as recently as 2005-2007.

Airborne $PM_{2.5}$ at Missouri sites is dominated by the impact of regional or urban-scale influences (some of which are outside of Missouri) and by the contribution of secondary sources. However, primary $PM_{2.5}$ sources also contribute; identified point sources are generally distributed along the Missouri and Mississippi Rivers.

Because the $PM_{2.5}$ network has undergone recent reviews and elimination of some sites, and because of minimum monitoring requirements, there are no current sites believed to be marginal. In the St. Louis area, the Blair Street site is critical, because of its designation as an NCore site, and because of its location near the urban center and several large industrial sources. The Branch Street, South Broadway, and Arnold West sites are also considered to be critical. In the Kansas City area, the Troost and Liberty sites are critical, and the Richards-Gebaur South site is judged to be at least credible. The MSU site in the Springfield area is judged to be critical. In the outstate area, the El Dorado Springs, Bonne Terre and St. Joseph sites are all considered to be critical.

Lead

In October 2008, the EPA revised the level of the primary NAAQS for airborne lead from 1.5 $\mu g/m^3$ to 0.15 $\mu g/m^3$, measured as total suspended particulate matter (TSP). The calculation method for the averaging time was changed from calendar quarters to rolling three-month periods with a maximum (not-to-be-exceeded) form, evaluated over a three-year period. At the same time, EPA revised monitoring requirements. At a minimum, monitors must be placed in areas potentially impacted by sources of lead emissions greater than or equal to one ton per year. These source-oriented monitors were required to be operational by January 1, 2010. In December 2009, EPA proposed reducing the size of sources for source-oriented monitoring from 1 to 0.5 ton per year (tpy) and also proposed changing the urban area monitoring requirement to monitoring at NCore sites only. This rule is expected to be finalized in about September 2010. Monitoring at 0.5 ton sources is expected to be required approximately September 2011. EPA has communicated informally that monitoring at NCore sites is desired to begin by January 1, 2011, replacing the urban area requirement in the previous rule.

Lead is currently being monitored by state and local agencies at 16 sites in Missouri, one in the St. Louis area, six in the Herculaneum area, two in the formerly-mined Old Lead Belt area, six in the New Lead Belt area where lead is mined currently and where there is also a secondary lead smelter, and one in the formerly-mined Tri-State area. Lead monitoring sites are also operated by industries in some of these areas. Most of these sites were installed in January 2010 to meet the new monitoring requirements, so monitoring results are limited. However, past monitoring and limited new results indicate violation of the standard in the Herculaneum area and at at least one of the sites (Bixby West) in the New Lead Belt area impacted by the secondary lead smelter.

Identified emission sources that may exceed 1 tpy of lead emissions include the primary smelter in Herculaneum, the secondary smelter at Buick, and the three mine/mill complexes in the New Lead Belt area. Emissions from mining waste in past mining areas are not well-characterized. If the monitoring rule is revised as expected to include 0.5 tpy sources, the impact of emissions

from other lead sources such as electric generating stations will need to be evaluated (by modeling) for possible additional monitoring.

Because the lead monitoring network in Missouri as currently configured has only been operating for a few months, it is premature to classify these sites as critical, credible, or marginal based on only a few months of data. However, most or all of the sites near the larger emission sources (such as the Herculaneum and Buick smelters) should probably be considered to be either critical or credible. It remains to be seen how the sites near the mine/mill facilities and in the areas with old mining waste should be classified. Lead monitoring is planned at the Blair Street NCore site in St. Louis beginning in January 2011. Once lead monitoring begins at Blair Street, the Clayton site in St. Louis County will be reevaluated. The plan for operation of the network in 2012 is expected to include review and analysis of sources reported to emit as little as 0.25 tpy to ensure that 0.5 tpy sources are adequately accounted for.

Summary Table

Table ES-1 summarizes the assessment of current air monitoring sites in Missouri for CO, SO_2, NO_2, PM_{10}, Ozone, and $PM_{2.5}$. Existing sites have been characterized as critical, credible, or marginal for each pollutant. The table does not include all critical sites, because new regulations will require newly configured networks for SO_2 and NO_2 by January 2013 and possibly for other pollutants in the future. Lead sites are not listed in the table because they are almost all at different locations than sites for the other pollutants. All of the current lead sites and the Blair Street NCore site are considered to be critical because the network is new and data have not yet been adequately evaluated, with the exception of the Ladue site, which is marginal and could be discontinued when the Blair Street lead monitoring is begun.

Table ES-1. Summary of Monitoring Site Assessments for Current Sites
(Highlights indicate critical site/pollutant)

Site	Pollutant					
	CO	SO2	NO2	PM10	Ozone	PM2.5
St. Louis Area						
Blair Street (Ncore)	critical	critical	critical	critical	critical	critical
West Alton			marginal		critical	
Margaretta	credible	credible	critical	credible/marginal		
South Broadway		credible				critical
Branch Street				critical		critical
Hall Street				critical		
Mound Street				marginal		
Clayton/Ladue		credible	marginal			credible
Maryland Heights		marginal	marginal		critical	
Sunset Hills	marginal		marginal			
Oakville				credible/marginal		
Pacific					critical	
Arnold West					critical	critical
Herculaneum Main Street		critical				
Kansas City Area						
Troost		critical	marginal*	credible/marginal		critical
Van Brunt (relocating to Front Street)				critical		
Liberty			marginal		critical	critical
Trimble						
Watkins Mill					critical	
Rocky Creek						
Richards-Gebaur South					critical	credible
Springfield Area						
Missouri State University	credible	marginal		credible/marginal		critical
Hillcrest High School			marginal		critical	
South Charleston		critical				
James River South (operated by City Utilities)		critical				
Wildwood Lane (operated by City Utilities)		critical				
Fellows Lake					critical	
Outstate Area						
Mark Twain State Park		marginal			critical	
Bonne Terre			marginal		critical	critical
Carthage				critical		
St. Joseph Pump Station				critical		critical
Foley					critical	
Orchard Farm					critical	
Farrar					critical	
Branson					credible/critical	
Alba					critical	
Eldorado Springs					critical	critical
New Bloomfield					critical	
Finger Lakes					critical	
Savannah					critical	

*Troost NO2 to be relocated by January 2013 and an additional NO2 site installed in Kansas City.
One site will be near roadway, one site will be neighborhood scale.

1.0 BACKGROUND AND INTRODUCTION

1.1 Regulatory Requirements

The regulatory requirement for an air monitoring network assessment is found in 40 **Code of Federal Regulations (CFR)** 58.10 (d):

> "The State, or where applicable local, agency shall perform and submit to the EPA Regional Administrator an assessment of the air quality surveillance system every 5 years to determine, at a minimum, if the network meets the monitoring objectives defined in appendix D to this part, whether new sites are needed, whether existing sites are no longer needed and can be terminated, and whether new technologies are appropriate for incorporation into the ambient air monitoring network. The network assessment must consider the ability of existing and proposed sites to support air quality characterization for areas with relatively high populations of susceptible individuals (e.g., children with asthma), and, for any sites that are being proposed for discontinuance, the effect on data users other than the agency itself, such as nearby States and Tribes or health effects studies. For $PM_{2.5}$, the assessment also must identify needed changes to population-oriented sites. The State, or where applicable local, agency must submit a copy of this 5-year assessment, along with a revised annual network plan, to the Regional Administrator. The first assessment is due July 1, 2010."

This document is intended to meet this requirement.

1.2 Assessment Approach

Although the regulatory requirement for this assessment is new, assessment of various portions of the air monitoring network in Missouri have been a part of recent past planning documents, including:

- 2005 NO_2/SO_2/NCore Review,
- 2007 Monitoring Network Plan – various,
- 2008 Monitoring Network Plan – Ozone statewide, Van Brunt PM_{10}, Clarksville SO_2 discontinuance,
- 2009 Monitoring Network Plan – Lead, $PM_{2.5}$ TEOM FEM and others, NCore.

Table 1-1 lists some of the recent and near future milestones in the ongoing process of National Ambient Air Quality Standards (NAAQS) review and revision.

Table 1-1 Summary of NAAQS Milestones

NAAQS Milestones

	Pb	O3	NO2	SO2	CO	PM
Announcement of proposed rule (revised NAAQS)	12/2009*	12/2009	---	11/16/2009	10/2010	1/2011
Publication of proposed rule in Federal Register	1/2010?	1/2010?	7/15/2009	12/2009?		
Deadline for comments	3/2010?	3/2010?	9/14/2009	2/2010?		
Signature of final rule	mid-2010**	8/2010	1/2010	6/2/2010	5/2011	10/2011
State designation recommendations due	10/2009	12/2010?	1/2011	6/2011		
Monitoring plans due	7/1/2009, 7/1/2010			7/1/2011		
Final designations	1/2012	8/2011	1/2012***	6/2012****		
Revised monitoring begins	1/2011?	revised season 2011, added sites 2012	1/1/2013	1/1/2013	?	?

*
Revision to lead monitoring requirements, expected to include 0.5 ton sources and eliminate metro. area monitoring except at Ncore sites
**Revised standard, 10/15/2008; mid-2010 is date for changes to monitoring requirements
***Most areas unclassifiable because of lack of near-roadway monitors; final rule may change requirement for near-roadway monitoring and designate sooner
****Designation using data from existing monitors

This assessment incorporates the Environmental Protection Agency (EPA) Region VII guidance (Appendix B), and to the extent possible the February 2007 EPA Analytical Techniques for Technical Assessments

Based on the requirements and work done in past network plans, this assessment consists primarily of analysis of sulfur dioxide (SO_2), nitrogen dioxide (NO_2), particulate matter smaller than 10 micrometers (PM_{10}) and carbon monoxide (CO) networks, with some analysis of ozone in addition to the 2008 plan, and some analysis of particulate matter smaller than 2.5 micrometers ($PM_{2.5}$) in addition to the 2009 plan (making use of 24-hour designation analysis and annual attainment demonstration). The lead network primarily references the 2009 plan, as does discussion of NCore monitoring, given the recentness of these evaluations.

In addition to identification of monitoring sites in the subsequent sections, Appendix C, the Network Table, includes a complete list of monitoring sites, locations of the sites, parameters being monitored, etc. in Missouri.

2.0 POPULATION

Census 2000 population densities for the US (Figures 2-1 and 2-2) verify well known information that population centers in St. Louis and Kansas City are dominant, with the southwest region an area of growth and some significance in population. Northern and western Missouri and the Ozark Highlands are less populated.

Metropolitan Statistical Area (MSA) populations have generally seen some to little growth in estimated population since 2000 (Table 2-1). As expected, the St. Louis and Kansas City areas have shown the largest increase in numbers. The Springfield MSA, however, shows the largest percentage increase, with a relatively high difference for an area of its size. Cape Girardeau, Jefferson City, and St Joseph show the lowest percentage increases. This would indicate that the population gradients seen in the above mappings will continue.

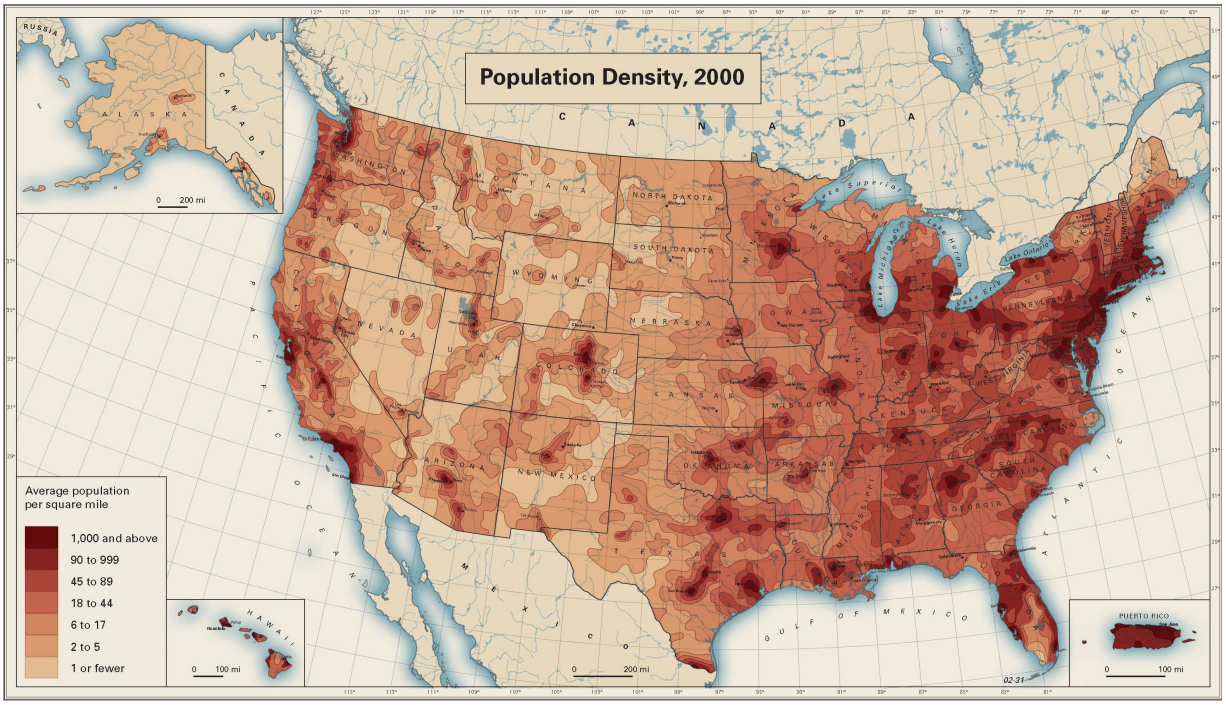


Figure 2-1 US population density, 2000.

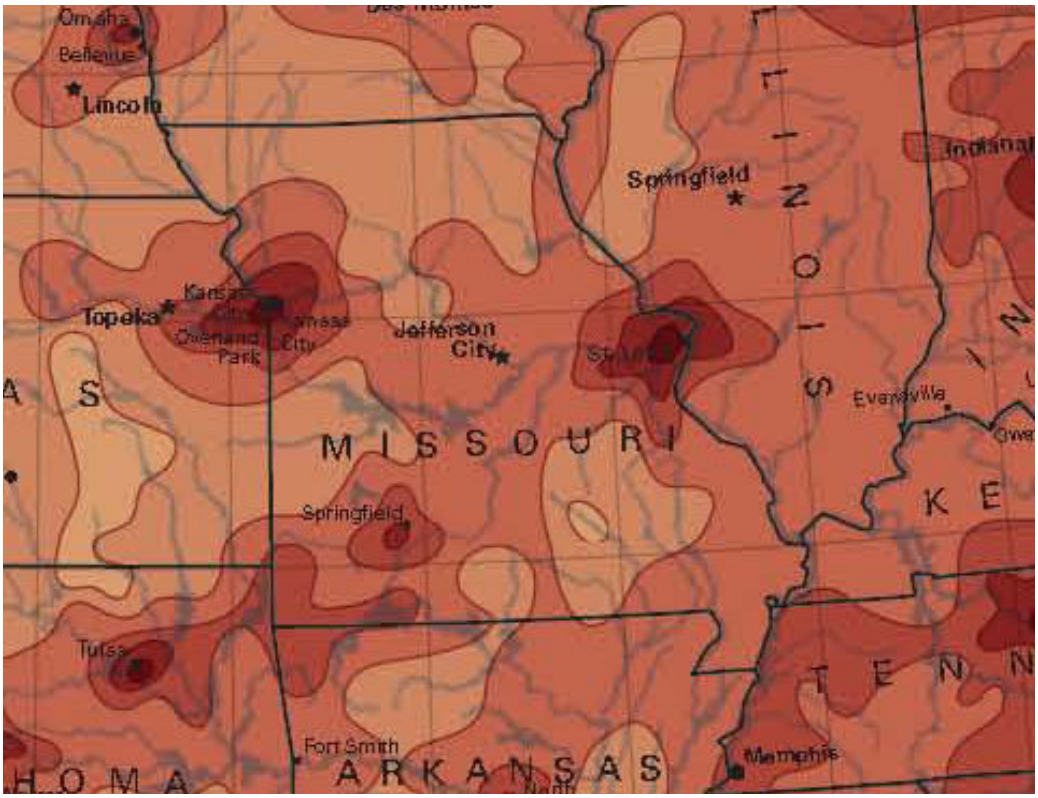


Figure 2-2 Missouri population density, 2000.

Table 2-1 Missouri Census 2000 MSA Populations and 2009 Estimate

MSA	2000 Population	2009 Estimate	Difference	Percent Change
Cape Girardeau MSA	90312	93712	3400	3.76%
Columbia MSA	145666	166234	20568	14.12%
Jefferson City MSA	140052	147438	7386	5.27%
Joplin MSA	157322	174300	16978	10.79%
Kansas City MSA	1836038	2067585	231547	12.61%
St. Joseph MSA	122336	126644	4308	3.52%
St. Louis MSA	2698687	2828990	130303	4.83%
Springfield MSA	368374	430900	62526	16.97%

Within the more significant MSAs mentioned above (Kansas City, St. Louis, Springfield), Table 2-2 indicates some changes in population in certain counties. In the Kansas City MSA, Missouri counties of Cass, Clay and Platte, and Johnson County, Kansas show high percentage increases and population differences. These increases in populations in the outer urban areas with smaller increases in the urban core will increase the need overall for monitoring. A similar situation exists for St. Louis, with high percentage growth and in raw numbers in Lincoln and St. Charles counties, and high growth numbers in Jefferson County. Urban core counties show little to no growth in population, but still high populations.

Table 2-2. Missouri MSA Counties and Estimated Census Population Changes from 2000-2009

MSA and Counties	2000 Population	2009 Estimate	Percent Difference
Cape Girardeau-Jackson, MO-IL MSA	90312	93712	3.76%
Alexander County, IL	9590	7914	-17.48%
Bollinger County, MO	12029	11841	-1.56%
Cape Girardeau County, MO	68693	73957	7.66%
Columbia, MO MSA	145666	166234	14.12%
Boone County, MO	135454	156377	15.45%
Howard County, MO	10212	9857	-3.48%
Jefferson City, MO MSA	140052	147438	5.27%
Callaway County, MO	40766	43727	7.26%
Cole County, MO	71397	75018	5.07%
Moniteau County, MO	14827	15132	2.06%
Osage County, MO	13062	13561	3.82%
Joplin, MO MSA	157322	174300	10.79%
Jasper County, MO	104686	118179	12.89%
Newton County, MO	52636	56121	6.62%
Kansas City, MO-KS MSA	1836038	2067585	12.61%
Franklin County, KS	24784	26441	6.69%
Johnson County, KS	451086	542737	20.32%
Leavenworth County, KS	68691	75227	9.52%
Linn County, KS	9570	9335	-2.46%
Miami County, KS	28351	30969	9.23%
Wyandotte County, KS	157882	155085	-1.77%
Bates County, MO	16653	16761	0.65%
Caldwell County, MO	8969	9160	2.13%
Cass County, MO	82092	100184	22.04%
Clay County, MO	184006	228358	24.10%
Clinton County, MO	18979	21002	10.66%
Jackson County, MO	654880	705708	7.76%
Lafayette County, MO	32960	32572	-1.18%
Platte County, MO	73781	90688	22.92%
Ray County, MO	23354	23358	0.02%
St. Joseph, MO-KS MSA	122336	126644	3.52%
Doniphan County, KS	8249	7624	-7.58%
Andrew County, MO	16492	17052	3.40%
Buchanan County, MO	85998	89856	4.49%
DeKalb County, MO	11597	12112	4.44%
St. Louis, MO-IL MSA	2698687	2828990	4.83%
Bond County, IL	17633	18103	2.67%
Calhoun County, IL	5084	5019	-1.28%
Clinton County, IL	35535	36368	2.34%
Jersey County, IL	21668	22549	4.07%
Macoupin County, IL	49019	47774	-2.54%
Madison County, IL	258941	268457	3.67%
Monroe County, IL	27619	33236	20.34%
St. Clair County, IL	256082	263617	2.94%

Franklin County, MO	93807	101263	7.95%
Jefferson County, MO	198099	219046	10.57%
Lincoln County, MO	38944	53311	36.89%
St. Charles County, MO	283883	355367	25.18%
St. Louis County, MO	1016315	992408	-2.35%
Warren County, MO	24525	31485	28.38%
Washington County, MO	23344	24400	4.52%
St. Louis city, MO	348189	356587	2.41%
Springfield, MO MSA	368374	430900	16.97%
Christian County, MO	54285	77455	42.68%
Dallas County, MO	15661	16637	6.23%
Greene County, MO	240391	269630	12.16%
Polk County, MO	26992	30626	13.46%
Webster County, MO	31045	36552	17.74%

Table 2-3 shows 2000 census population and growth estimates for Micropolitan areas in the state. Some growth is evident, with the Branson area showing the largest change.

Table 2-3. Missouri Micropolitan Areas and Estimated Census Population Changes 2000-2009

Micropolitan Area	2000 Population	2009 Estimate	Percent Difference
Branson, MO	68361	79447	16.22%
Farmington, MO	55641	63884	14.81%
Fort Leonard Wood, MO	41165	46457	12.86%
Hannibal, MO	37915	38083	0.44%
Kennett, MO	33155	31039	-6.38%
Kirksville, MO	29147	29279	0.45%
Lebanon, MO	32513	35432	8.98%
Marshall, MO	23756	22821	-3.94%
Maryville, MO	21912	22130	0.99%
Mexico, MO	25853	25556	-1.15%
Moberly, MO	24663	25501	3.40%
Poplar Bluff, MO	40867	41471	1.48%
Rolla, MO	39825	42248	6.08%
Sedalia, MO	39403	41421	5.12%
Sikeston, MO	40422	40855	1.07%
Warrensburg, MO	48258	52657	9.12%
West Plains, MO	37238	38921	4.52%

The State of Missouri has developed growth estimates through 2030, shown in Table 2-4. High growth areas over the last ten years appear likely to continue, including Kansas City, St. Louis, Springfield, and the southwest area of the state. One exception is the likelihood of increased growth in Boone County.

Table 2-4 – Missouri Counties and Estimated Population Growth 2000-2030

County	2000	2005	2010	2015	2020	2025	2030	2000-2030 Change
Adair	24,977	24,690	24,709	24,779	24,875	24,912	24,913	-64
Andrew	16,492	16,532	17,099	17,747	18,434	19,092	19,670	3,178
Atchison	6,431	6,182	5,927	5,715	5,559	5,419	5,280	-1,151
Audrain	25,853	25,810	25,806	25,966	26,217	26,564	27,027	1,174
Barry	34,010	35,327	37,072	38,986	40,917	42,695	44,295	10,285
Barton	12,541	12,940	12,910	12,994	13,173	13,430	13,730	1,189
Bates	16,653	16,914	17,232	17,673	18,129	18,539	18,923	2,270
Benton	17,180	18,315	18,935	19,500	19,934	20,187	20,228	3,048
Bollinger	12,029	12,185	12,260	12,403	12,555	12,683	12,805	776
Boone	135,454	145,758	158,353	170,796	183,101	194,516	204,264	**68,810**
Buchanan	85,998	85,469	87,049	88,757	90,380	91,783	93,007	7,009
Butler	40,867	41,335	41,489	41,594	41,613	41,577	41,491	624
Caldwell	8,969	9,084	9,342	9,656	9,987	10,312	10,633	1,664
Callaway	40,766	42,384	44,817	47,427	50,140	52,751	55,096	14,330
Camden	37,051	39,029	41,660	44,136	46,290	47,954	49,124	12,073
Cape G.	68,693	71,153	74,106	76,997	79,916	82,551	84,612	15,919
Carroll	10,285	10,126	9,777	9,489	9,232	9,014	8,816	-1,469
Carter	5,941	5,890	5,911	5,933	5,936	5,905	5,837	-104
Cass	82,092	92,387	102,491	112,247	121,499	129,880	136,933	**54,841**
Cedar	13,733	14,006	13,756	13,610	13,493	13,352	13,207	-526
Chariton	8,438	7,982	7,548	7,178	6,832	6,492	6,172	-2,266
Christian	54,285	65,687	79,937	93,862	107,318	119,898	131,066	**76,781**
Clark	7,416	7,260	7,181	7,117	7,054	6,982	6,904	-512
Clay	184,006	199,772	220,635	241,150	261,469	281,228	300,021	**116,015**
Clinton	18,979	20,569	22,015	23,459	24,821	26,049	27,124	8,145
Cole	71,397	72,398	74,620	76,979	79,333	81,571	83,583	12,186
Cooper	16,670	17,164	17,933	18,760	19,583	20,337	20,979	4,309
Crawford	22,804	23,623	24,608	25,614	26,561	27,319	27,895	5,091
Dade	7,923	7,729	7,559	7,434	7,294	7,145	6,977	-946
Dallas	15,661	16,216	17,432	18,723	19,984	21,148	22,172	6,511
Daviess	8,016	8,012	7,929	7,891	7,872	7,870	7,881	-135
DeKalb	13,077	12,326	12,372	12,462	12,564	12,669	12,755	-322
Dent	14,927	15,044	15,167	15,309	15,446	15,576	15,694	767
Douglas	13,084	13,335	13,481	13,655	13,809	13,900	13,934	850
Dunklin	33,155	32,271	31,363	30,575	29,870	29,277	28,765	-4,390
Franklin	93,807	98,156	102,419	106,652	110,704	114,251	117,122	23,315
Gasconade	15,342	15,590	15,611	15,743	15,890	15,958	15,921	579
Gentry	6,861	6,462	6,013	5,637	5,314	5,020	4,759	-2,102
Greene	240,391	254,329	272,322	289,253	305,012	318,820	329,825	**89,434**
Grundy	10,432	10,222	10,084	9,983	9,896	9,816	9,730	-702
Harrison	8,850	8,833	8,950	9,105	9,269	9,439	9,632	782
Henry	21,997	22,362	22,748	23,181	23,568	23,880	24,176	2,179
Hickory	8,940	9,084	9,177	9,290	9,362	9,372	9,292	352
Holt	5,351	5,018	4,781	4,591	4,428	4,265	4,094	-1,257
Howard	10,212	9,961	9,887	9,933	10,050	10,186	10,307	95
Howell	37,238	38,158	39,441	40,698	41,824	42,731	43,414	6,176
Iron	10,697	10,276	9,719	9,158	8,605	8,048	7,494	-3,203

Jackson	654,880	661,383	668,867	678,274	689,226	701,350	714,467	**59,587**
Jasper	104,686	110,658	119,317	127,957	136,389	144,578	152,490	**47,804**
Jefferson	198,099	210,366	222,183	233,487	244,003	253,080	260,276	**62,177**
Johnson	48,258	51,379	53,390	55,520	57,691	59,771	61,668	13,410
Knox	4,361	4,156	4,005	3,894	3,825	3,782	3,758	-603
Laclede	32,513	34,134	36,400	38,627	40,752	42,670	44,318	11,805
Lafayette	32,960	32,954	32,791	32,785	32,869	32,923	32,947	-13
Lawrence	35,204	36,825	38,905	41,092	43,272	45,316	47,249	12,045
Lewis	10,494	10,197	10,128	10,099	10,126	10,184	10,283	-211
Lincoln	38,944	46,849	56,010	65,293	74,529	83,294	91,294	**52,350**
Linn	13,754	13,053	12,406	11,898	11,477	11,069	10,696	-3,058
Livingston	14,558	14,082	14,080	14,124	14,187	14,238	14,246	-312
Macon	15,762	15,622	15,668	15,746	15,847	15,942	16,028	266
Madison	11,800	11,948	12,295	12,650	12,944	13,163	13,304	1,504
Maries	8,903	9,001	9,275	9,563	9,848	10,129	10,406	1,503
Marion	28,289	28,366	28,625	28,957	29,281	29,540	29,759	1,470
McDonald	21,681	22,514	23,401	24,465	25,625	26,823	28,078	6,397
Mercer	3,757	3,514	3,385	3,290	3,221	3,172	3,142	-615
Miller	23,564	24,596	25,550	26,464	27,277	27,928	28,404	4,840
Mississippi	13,427	13,807	13,297	12,784	12,285	11,840	11,443	-1,984
Moniteau	14,827	15,030	15,217	15,490	15,844	16,226	16,638	1,811
Monroe	9,311	9,224	9,259	9,340	9,438	9,513	9,590	279
Montgomery	12,136	12,008	11,881	11,803	11,727	11,622	11,513	-623
Morgan	19,309	20,354	21,386	22,394	23,357	24,183	24,827	5,518
New Madrid	19,760	18,189	16,972	15,764	14,621	13,549	12,554	-7,206
Newton	52,636	54,853	57,265	59,748	62,218	64,553	66,663	14,027
Nodaway	21,912	22,059	22,152	22,383	22,644	22,856	23,018	1,106
Oregon	10,344	10,329	10,339	10,384	10,457	10,524	10,558	214
Osage	13,062	13,237	13,280	13,379	13,493	13,608	13,704	642
Ozark	9,542	9,400	9,168	8,981	8,804	8,623	8,457	-1,085
Pemiscot	20,047	19,156	18,455	17,856	17,324	16,839	16,447	-3,600
Perry	18,132	18,410	18,948	19,529	20,100	20,655	21,164	3,032
Pettis	39,403	40,052	41,309	42,731	44,237	45,781	47,349	7,946
Phelps	39,825	41,880	43,206	44,558	45,824	46,864	47,635	7,810
Pike	18,351	18,653	18,589	18,614	18,669	18,702	18,728	377
Platte	73,781	81,794	88,964	95,966	102,810	109,228	114,904	**41,123**
Polk	26,992	28,997	31,470	33,866	36,172	38,301	40,139	13,147
Pulaski	41,165	43,951	44,466	44,989	45,497	46,003	46,520	5,355
Putnam	5,223	5,069	4,846	4,680	4,545	4,452	4,391	-832
Ralls	9,626	9,676	9,813	9,967	10,116	10,238	10,299	673
Randolph	24,663	25,350	25,847	26,341	26,842	27,308	27,738	3,075
Ray	23,354	23,563	23,616	23,787	24,012	24,230	24,435	1,081
Reynolds	6,689	6,554	6,495	6,447	6,389	6,332	6,285	-404
Ripley	13,509	13,578	13,715	13,887	14,003	14,024	14,008	499
Saline	23,756	23,010	22,486	22,082	21,740	21,430	21,140	-2,616
Schuyler	4,170	4,115	4,071	4,056	4,050	4,035	3,999	-171
Scotland	4,983	4,788	4,754	4,799	4,893	5,011	5,130	147
Scott	40,422	40,622	40,646	40,797	40,948	41,022	41,076	654
Shannon	8,324	8,293	8,579	8,900	9,214	9,472	9,693	1,369
Shelby	6,799	6,667	6,417	6,223	6,067	5,917	5,764	-1,035

St. Charles	283,893	325,235	364,607	402,519	439,068	472,104	499,126	**215,233**
St. Clair	9,652	9,520	9,477	9,451	9,401	9,316	9,184	-468
St. Francois	55,641	61,604	64,538	67,349	69,815	71,823	73,382	17,741
St. Louis	1,016,300	1,004,004	987,799	975,010	967,196	962,060	956,817	-59,483
St. Louis City	348,189	352,136	350,800	350,583	350,385	349,769	349,004	815
Ste. Genevieve	17,842	17,901	17,899	18,003	18,161	18,311	18,426	584
Stoddard	29,705	29,737	29,599	29,504	29,374	29,186	28,973	-732
Stone	28,658	30,530	32,994	35,328	37,427	39,113	40,346	11,688
Sullivan	7,219	6,916	6,543	6,253	6,033	5,893	5,822	-1,397
Taney	39,703	42,943	48,463	53,982	59,227	63,955	68,041	**28,338**
Texas	23,003	23,257	23,042	22,875	22,684	22,436	22,169	-834
Vernon	20,454	20,311	20,054	19,846	19,673	19,551	19,465	-989
Warren	24,525	28,306	32,377	36,410	40,174	43,468	46,241	21,716
Washington	23,344	23,898	24,789	25,614	26,294	26,842	27,294	3,950
Wayne	13,259	13,030	12,693	12,378	12,001	11,594	11,200	-2,059
Webster	31,045	34,145	37,946	41,911	45,880	49,675	53,282	22,237
Worth	2,382	2,139	2,047	1,975	1,917	1,867	1,826	-556
Wright	17,955	18,061	18,455	18,892	19,299	19,649	19,963	2,008
Statewide	5,596,687	5,781,293	5,979,344	6,184,390	6,389,850	6,580,868	6,746,762	1,150,075

While overall population growth seems to be a constant for the state as a whole and most age groups, one age group has been projected by the Census Bureau to have higher growth than others, that being those 65 and older. This population group is estimated to be likely to grow by 500,000 persons by 2025 from the 1995 numbers (see: http://www.census.gov/population/projections/state/stpjage.txt). With this type of growth, it is clear that pollutants to which older populations are susceptible may be of greater concern. Retirement communities, including the Branson Lakes area and Table Rock Lake appear to be focal points for residences for these older Missourians.

In determining population changes which affect the network, it appears that most of the changes in the last several years have reflected these population shifts, particularly downwind monitoring for ozone, which has increased, as well as MSA monitoring and in the Branson area. $PM_{2.5}$, while it has a strong regional basis, also is influenced by high urban core emissions. While urban core populations are not increasing, they are still large, and these areas will still need to be reflected in the network. SO_2 emissions are generated by large sources for the most part, many of them on the outer edges of urban areas, particularly Kansas City, St. Louis, and Springfield, and are coincident with the aforementioned high populations. Mobile sources are key for CO and NO_2 emissions, with high traffic in urban core and outlying areas, so monitoring will continue to be focused in that manner. Lead emissions are not necessarily generated in the same patterns as described above, so that urban populated areas are less of a focal point. On the other hand, lead is a persistent and highly toxic pollutant, so that effects on any rural populations can be quite significant, and lead emissions can have long lasting effects as they are deposited on area soils.

Past network changes have tended to be influenced by population information not inconsistent with that described above. The separate pollutant sections will again consider population information in the analysis of network needs.

3.0 GENERAL CLIMATE OF MISSOURI

Missouri is located in the middle of a continent and normally has the full four seasons of spring, summer, fall and winter. Summers are normally hot and humid and winters will be from cool to cold. Due to the location in the interior United States, Missouri often experiences extremes in temperatures that can range throughout the year from 100F or greater to below 0F. Not having either large mountains or oceans nearby to moderate the temperatures, the climate is influenced by air from the cold arctic in the winter to hot humid Gulf of Mexico air during the summer. There can be exceptionally high or low readings in temperatures through out the year. Missouri will occasionally receive the remains of hurricanes. Thunderstorms also have occurred every month of the year.

3.1 Spring

Spring ranges from March through May and is normally the wettest season of the year as the jet stream fluctuates and develops disturbances along its path. Winds will range throughout the compass as systems move through.

Average Temperature Ranges: 76F to 33F

3.2 Summer

Summer normally runs from June through August, with less precipitation, as high pressure usually dominates the area with warm moist air being moved in from the Gulf of Mexico. Winds are generally from a southerly component.

Average Temperature Ranges: 90F to 62F

3.3 Fall

Fall is considered from September to November. At this time of year temperatures can move into the 80F or higher range in the early fall season, but will normally drop slowly toward the end of fall. Winds normally are still from the southern component but will slowly shift to a more northwesterly component later in the season as the jet stream shifts south.

Average Temperature Ranges: 81F to 33F

3.4 Winter

Winter is classified as running from December through February. Normally the northern portion of the state receives most of the frozen precipitation but occasionally with the location of the jet stream and fluctuations of it, southern Missouri may receive more. Winds are generally from a

northwesterly component but occasionally winds will become southerly allowing for a slight warming period.

Average Temperature Ranges: 46F to18F

3.5 Ozone

Generally, ozone episodes occur in the summer when high pressure moves to the east of Missouri along with an upper level ridge over the area. Ozone may form in the spring and fall but mainly during the summer months. Temperatures will be allowed to increase and abundant sunshine will prevail. Winds will generally be calm to light and from a southerly component. With the downward motion of the air an inversion will set up and hold the air stagnant and trapped allowing for readings to increase. This is the predominant condition, but there have been other conditions when an episode has occurred such as air transport. Fires and controlled burns have also influenced high readings at times.

3.6 $PM_{2.5}$

Both local surface meteorology and transport can affect $PM_{2.5}$ levels. Regional weather patterns bring air masses into St. Louis from various emission source regions, including those with large SO_2 and nitrogen oxide (NO_X) precursor gases, and some sources of direct $PM_{2.5}$. The $PM_{2.5}$ which moves over a moderately stable air mass (light surface winds) located over an area will allow infusion of the fine particle laden air to settle into the area. For example, summertime high pressure systems are often centered over the Ohio Valley area which not only bring air masses from the SO_2 emissions- rich regions of the Ohio River Valley and Tennessee Valley into St. Louis, but also create local conditions which are often stagnant or nearly stagnant. NO_X transport is not so clearly defined, although it can occur from north and northwest, or the south and southwest.

3.7 Windroses (Appendix A)

Sites were selected to represent North, South, East and West of the State. Selected for the North is Mark Twain State Park. For the South, the Springfield Airport (KSGF) was selected. To the East, Blair Street ,West Alton and KSTL (Lambert-St. Louis International Airport). For the West the sites selected were Liberty in Kansas City and KMCI (Kansas City International Airport). Airport sites report official National Weather Service data and are located in open flat terrain, so that meteorological measurements are not hampered by local buildings and possible terrain modifications to wind speed and direction.

4.0 NEW EMISSION SOURCES

New larger emission sources are primarily those permitted under the Prevention of Significant Deterioration (PSD) program. For some years those permits have been issued, in which potential increases are tracked (often times conditionally limited in the permit) and air quality analysis conducted as necessary. Table 4-1 lists PSD permits issued in Missouri from the years 2000 through 2009 and the associated emission increases. If air quality analysis was part of the permit it may include modeling and/or ambient air monitoring. Monitoring may be predicated either on the need to determine localized ambient levels associated with the increment analysis, or in a few cases where modeled pollutant levels may have been close to the NAAQS to ensure that those are not exceeded in monitoring.

4.1 NO_2 and CO

There have been some large increases in emissions of NO_X, CO and volatile organic compound (VOC), at several facilities associated with these permits. In the case of NO_X and CO, point source emissions increases are not associated with NAAQS exceedances, but rather increment consumption. The increases also contribute to increases in urban-wide levels, which may contribute to background levels in the neighborhood of large mobile source emissions. Given the lack of association with direct NAAQS exceedance impacts, and the fact that the NO_X and CO increases are not in the urban core areas, we do not believe that those type point source emission increases are by themselves a cause for increased ambient monitoring, particularly to evaluate NAAQS compliance.

4.2 Ozone

In the case of VOCs, emissions are not generally correlated in monitoring or air quality analysis with a localized ozone NAAQS problem but instead cause additions to urban area or at least downwind ozone concentrations. Some individual permits for various pollutants have generated additional monitoring to determine current ozone levels downwind of the source of large VOC emissions increases, when current monitoring nearby was not available.

Both the Panda Montgomery and the American Energy Producers facilites from the list below are not in the process of construction. Because Panda has exceeded the time-frame for construction within the permit, it would now have to seek renewed permit authority.
The large VOC emissions increases at Ford Motor in Clay County were endemic to the Kansas City metropolitan area, it has been part of the overall area analysis. Similarly are the Holcim-Lee Island emissions increases and their effect on the St. Louis area. Even these increases are a relatively small fraction of the area emissions, and not likely to be a deciding component by themselves in monitoring site placement.

Ozone monitoring for preconstruction and as a condition of the Proctor and Gamble permit was required some years ago at Farrar, Missouri with state monitoring ultimately being instituted in 2004. Similarly, state monitoring began last year at Savannah as a result of new regulations regarding ozone monitoring at MSAs and the levels which were monitored related to PSD.

Previous ozone monitoring associated with the AG Processing permit had also identified some elevated ozone in a nearby site location. The State monitoring site at Savannah is approximately one mile west, close enough to be within the same ozone source influences as the PSD monitoring site.

Preconstruction ozone monitoring in 2006 associated with the Associated Electric permit at Norborne (Carrol County), ENE of Kansas City, included an 81 parts per million (ppm) 4th-high. This location was more distant than state monitoring at Kansas City downwind sites such as Watkins Mill and Trimble, and at a similar distance from the Kansas City area as the Savannah site to the north. Ozone 4th-high values at the Trimble and Watkins Mill sites (higher concentrations than Norborne) have decreased by 12% between 2006 and 2009, with the Savannah site monitoring 0.066 ppm as a 4th-high in 2009. The Associated Electric Norborne plant permit has been rescinded, so this plant will not be built. The preconstruction data will be considered in determining the need for any further monitoring in the northwest part of the state, in the context of the revised ozone NAAQS. Generally, it seems unlikely that ozone concentrations at Norborne would be in excess of what is monitored at Savannah.

Finally, ozone monitoring conditioned by the Fort Leonard Wood permit continues. The maximum ozone 8-hour average concentration in 2007 was 77.23 parts per billion (ppb), with succeeding years 62.3 ppb in 2008 and 60.6 in 2009. Depending on final revised standards, state monitoring in some south central Missouri location will be considered.

4.3 Lead

Lead sources involving large emission increases are generally rare. The Doe Run Buick 2005 permit is the largest by far. This source is already the focus of a significant portion of the new lead network. The second largest permitted source of lead, City Utilities Southwest power plant, will be considered in the next lead plan update due after the final promulgation of the reconsidered lead monitoring regulations as we seek to determine which sources will require monitoring. It appears likely that any sources greater than 0.5 tpy will require monitoring unless a waiver request can be supported.

4.4 PM_{10}

With regard to PM_{10} permitted emissions increases, the largest sources included Holcim- Lee Island, Mississippi Lime, City Utilities Southwest, Noranda Aluminum, Kansas City Power and Light (KCP&L)-Iatan, Continental Cement, and Associated Electric Cooperatives. Several of these have conducted PM_{10} sampling, with no high values monitored, including:

- Holcim - Ambient air monitoring disclosed a maximum 41 micrograms per cubic meter ($\mu g/m^3$) 24-hour average in pre-construction. Post-construction monitoring has just begun.

- City Utilities - Modeling indicated it would not contribute to any PM_{10} NAAQS violation, and no PM_{10} monitoring was required.

- KCP&L-Iatan - ambient air analysis predicted no PM_{10} NAAQS exceedances. Post-construction PM_{10} sampling is to begin within the next few months to confirm this.

- Mississippi Lime - Monitoring from 2004 through 2007 showed a maximum 24-hour value of 78 $\mu g/m^3$.

- Continental Cement - Permit monitoring showed a 24-hour maximum value of 53.

As indicated above, the Associated Electric power plant at Norborne has not been built. Post construction monitoring near Noranda Aluminum did indicate some high levels of PM_{10} (no exceedances) at the two monitoring sites there. Additional PM_{10} sampling is included as part of the permit, to begin 360 days after permit completion.

4.5 SO_2

Several large sources of SO_2 are indicated in the table, including Holcim- Lee Island, City Utilities Southwest power plant, the Doe Run Company Buick Resource Recycling plant, Associated Electric, and Continental Cement. With regard to Continental Cement, interactive air quality analysis for a 50 kilometer radius indicated no significant impact to air quality violations, and the Associated Electric facility at Norborne has not been constructed, so as yet no increased SO_2 emissions have occurred.

Holcim preconstruction monitoring in late 1999-2000 disclosed relatively low values related to current standards, but one daily one-hour maximum of 0.121 ppm, and a 4th-high of 0.072 ppm were monitored. The source location of these air quality values is not clear, although there are a few very large sources within a 10 mile radius north into Jefferson County and south-southeast into Ste. Genevieve County. Close inspection of these sources with regard to their potential and actual emissions will be necessary to determine if any will require state monitoring to be sited in the area.

The City Utilities Southwest Power Plant is to be completed soon, after which post-construction SO_2 monitoring is to begin. Air quality analysis indicated that the facility would not contribute to any SO_2 NAAQS exceedances (this monitoring is designed to confirm that analysis), however, more stringent NAAQS such as that which has been proposed has not been analyzed. This future data should help in determining the need for SO_2 monitoring there.

SO_2 monitoring at the Doe Run Buick facility was conducted for 2007 and 2008 at two locations, one north and one south of the smelter. Monitoring concentrations there showed levels which are well below the current NAAQS, with only a few values slightly above an order of magnitude less. With regard to 1-hour values in the network, the highest 4th-high daily maximum value for 2007 includes a 0.077 ppm at the north site. For 2008, the highest 4th-high daily maximum is at

the south site, 0.080 ppm. This information will be considered in determining the need for monitoring generated by the new 1-hour NAAQS when it is finalized.

The Noranda Aluminum PSD permit has only recently been completed. Preconstruction monitoring in 2008 has shown one exceedance of the current 24-hour NAAQS, with a number of high 1-hour levels, many which would exceed the proposed NAAQS. This permit requires that Noranda begin additional SO_2 monitoring within the next 360 days for an undefined period of time. If after consideration of this data and other information it appears necessary under the revised SO_2 rule that state monitoring should ensue in the area, we will incorporate that into our network plan.

Table 4-1

2000-2009 Missouri PSD Permits

Facility Name	Easting	Northing	County	Permit Completion Date	Emission Increase SOx	NOx	PM10	VOC	CO	Pb
Holden Power Plant (AECI)	413441.191	4290056.99	Johnson	2/26/2001	57(91)	403(644)	77(122)			
Panda Montgomery Power			Montgomery	9/7/2001	72.3	533.5	381.1	221.8	1067.9	
Holcim, Inc - Lee Island	740330.8	42214966.1	Ste. Gen.	10/5/2004	3041	5755	1074	803	14506	
Doe Run Co.(The) -Resource Recycling Div	664495.5	4166686	Iron	1/26/2005	7484.37	133.89	89.83	5.65	14790	12.55
Empire Electric District - Energy Center	402032.205	4110479.36	Jasper	11/13/2002	34.1	221.3	23.8	44.2	128.8	
Procter & Gamble Paper Products	808826	4154069	Cape G.	4/30/2003	5.54	526.36	75.37	314.96	897.5	
Mississippi Lime Company	756550.53	4206351.36	Ste. Gen.	12/13/2002	445.9	2440.5	394.4	8.1	1564.6	
City Utilities of Springfield (Southwest	465565.42	4111718.34	Greene	12/15/2004	1143	954.4	243.6	43	1909	0.31
Aquila South Harper Peaking Fac.	371188.545	4282490.91	Cass	12/29/2004	2.86	247.42	35.47	17.26	250.53	
River Cement Company	731431.1	4226874.91	Jefferson	12/9/2005				28.8	2129.8	
Noranda Aluminum Inc	806980.57	4046330.02	New Madrid	10/4/2004	Limit of 40	0.04	191	1.5	3355	
LaFarge Corporation - Sugar Creek	377550.99	4333716.99	Jackson	11/6/2006			>100, but no sig modeled impact			
Kansas City Power & Light (Iatan)	329723.37	4368412.62	Platte	1/31/2006			941	164	9110	
Ag Processing, Inc.	339789.75	4398968.3	Buchanan	5/16/2007			14.66			
City Utilities of Springfield (James Riv	477046.58	4106718.01	Greene	3/8/2007		decrease			2993	
Continental Cement Company - Ilasco	644580.39	4393325.61	Ralls	7/11/2006	1162.35	1629.58	496.31	72.59	2168.62	0.045
Continental Cement Company - Ilasco			Ralls	7/24/2007	1162.35	1629.58	529.68	72.59	2168.62	0.045
Associated Electric Cooperatives			Carroll	2/25/2008	2429.74	1504.97	541.79	111.26	4552.05	
A E C I New Madrid			New Madrid	9/18/2006		decrease			33371	
Ford Motor Company - Kansas City Plant	372373.5	4340318.26	Clay	3/31/2008				838.51		
Archer Daniels Midland Co			Audrain		still in technical review					
American Energy Producers Inc			Carroll	2/6/2008	<40	<40	10.5	28.71	62.5	
Doe Run Co.(The) -Resource Recycling Div			Iron		still in technical review					
Noranda Aluminum Inc			New Madrid		still in technical review					
American Energy Producers Inc			Carroll		<40	<40	34.34	462.08	62.5	
Kansas City Power & Light (Iatan)			Platte		still in technical review					

5.0 CARBON MONOXIDE NETWORK ASSESSMENT

5.1 Introduction: Carbon Monoxide Standards and Monitoring Requirements

The primary NAAQS for CO are

- 35 parts per million by volume (ppm) for one hour, and
- 9 ppm for eight hours.

These concentrations must not be exceeded more than once per year (http://www.epa.gov/air/criteria.html). There is no secondary CO standard.

The CO NAAQS are currently under review, with the proposed rulemaking expected in October 2010 and final rulemaking expected in May 2011. The rule development is still in process, but early indications are that the one hour standard might be reduced to between 5 and 15 ppm, and the eight hour standard might be reduced to between 3 and 9 ppm. The form of the standard may change also, possibly to a 3-year average of 99th percentile or 4th highest in each year, similar to the form of standards for other pollutants.

In 2006 the United States Environmental Protection Agency (US EPA) issued revised air monitoring requirements (71 **Federal Register** 61235, October 17, 2006). Unlike monitoring requirements for other pollutants, there are no required minimum numbers of CO monitoring sites in cities or metropolitan statistical areas. Because airborne CO results primarily from internal combustion engine exhaust, sites chosen for CO monitoring should be microscale or middle scale, as described in the following quotations from the monitoring regulations (71 **Federal Register** 61319, October 17, 2006):

- Microscale: "This scale applies when air quality measurements are to be used to represent distributions within street canyons, over sidewalks, and near major roadways. In the case with carbon monoxide, microscale measurements in one location can often be considered as representative of other similar locations in a city."

- Middle Scale: "Middle scale measurements are intended to represent areas with dimensions from 100 meters to 0.5 kilometer. In certain cases, middle scale measurements may apply to areas that have a total length of several kilometers, such as ''line'' emission source areas. This type of emission sources areas would include air quality along a commercially developed street or shopping plaza, freeway corridors, parking lots and feeder streets.

Monitoring requirements may also change as a part of the rulemaking described above.

5.2 CO Monitoring Results in Missouri

First and second maximum 1-hour and 8-hour average CO concentrations measured at locations in Missouri since 1997 are listed in Table 5-1. CO at the Main Street site in Kansas City approached, but did not exceed the standard in 1997. The only measured exceedance of the NAAQS occurred at the Washington Avenue Station in St. Louis in 2002 (highlighted in the table). Conditions in the area of that monitoring site were reviewed extensively at that time, and the exceedances were believed to result from exhaust from construction equipment and trucks during major construction in the area and/or from CO escaping from sewers in the area, which were re-routed during the construction. Time series plots of CO concentrations at the Washington Avenue site were not consistent with diurnal traffic patterns. Monitoring was discontinued at that site because the City lost the lease for that location.

CO concentration measurements show dependence on both time of day and day of the week. Figure 5-1 shows measurements made at Blair Street with the trace level CO analyzer, averaged over eight months separately for weekdays, and for Saturdays, Sundays, and major holidays. There are clear morning and evening peaks on weekdays, probably resulting in part from traffic patterns and in part from nighttime wind abatement. The weekend and holiday averages do not show as clear a morning peak, but do show a similar evening peak.

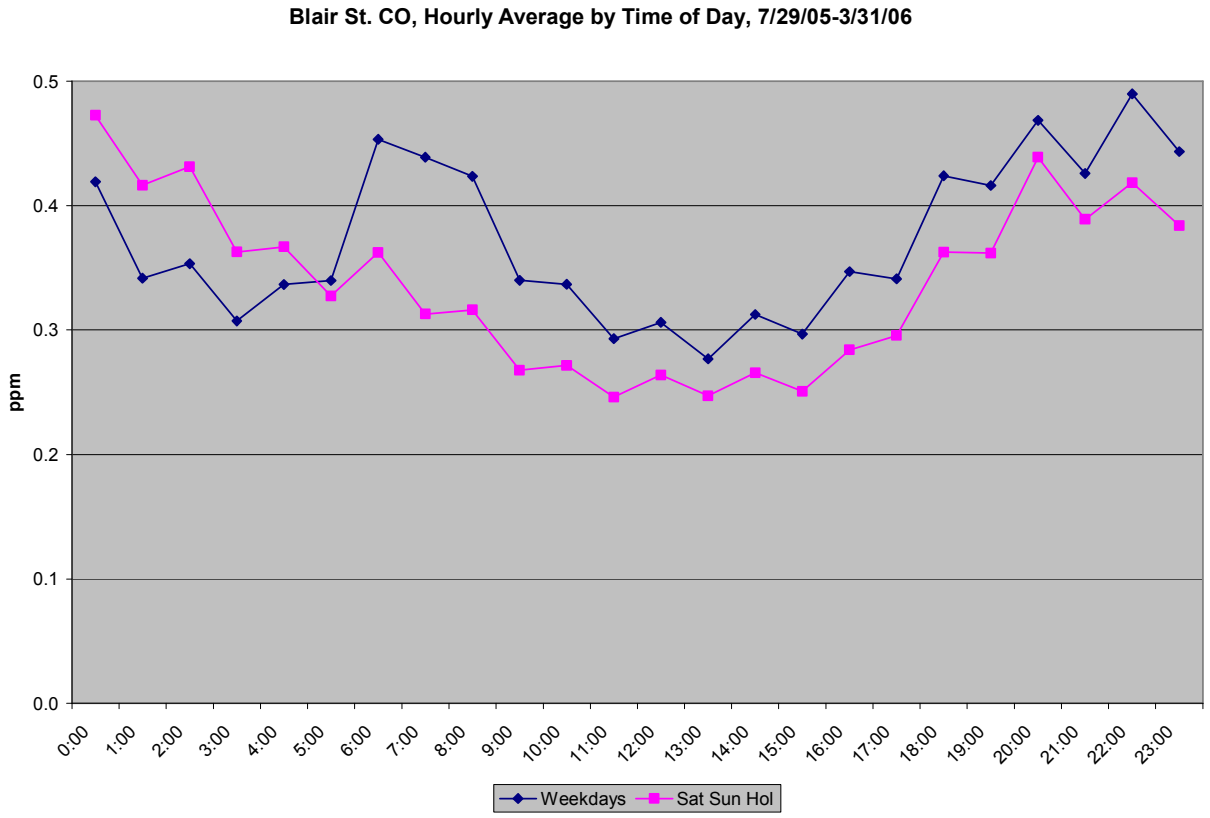


Figure 5-1

Table 5-1

Missouri CO Maximum Measured Concentrations, 1997-2009

Site	Year	1st Max 1-Hour Av ppm	2nd Max 1-Hour Av ppm	1st Max 8-Hour Av ppm	2nd Max 8-Hour Av ppm
Fire Station 6, Kansas City	1997	8.1	6.4	5.7	4.7
	1998	8.6	7.3	5.0	4.6
	1999	10.3	9.5	5.0	4.7
	2000	16.7	10.1	6.2	3.8
Independence	1997	4.0	3.0	2.5	2.5
UMKC, Kansas City	2004	3.6	3.4	3.1	2.2
	2005	3.9	3.6	2.6	2.4
	2006	2.2	2.1	1.5	1.5
Main St., Kansas City	1997	22.6	20.0	9.3	6.7
	1998	9.0	6.3	3.6	3.3
	1999	9.9	6.7	3.8	3.3
	2000	7.5	6.7	3.5	3.1
	2001	15.0	10.1	3.9	3.6
	2002	11.3	10.2	3.3	3.3
Broadway, Kansas City	1997	11.2	9.3	7.1	5.4
	1998	6.5	6.1	4.2	3.9
	1999	8.8	5.0	3.7	3.6
	2000	7.0	6.5	6.4	5.2
	2001	6.0	4.8	3.8	3.1
	2002	6.8	3.5	2.1	2.1
MSU, Springfield	1997	7.0	6.0	5.0	4.6
	1998	6.0	6.0	5.1	4.0
	1999	5.0	5.0	4.1	3.1
	2000	5.0	4.0	2.8	2.6
	2001	7.0	6.0	4.3	2.9
	2002	6.0	5.0	3.5	3.3
	2003	4.0	4.0	2.4	2.0
	2004	5.0	4.0	3.4	2.4
	2005	5.0	4.0	3.0	2.8
	2006	4.0	3.0	2.1	2.1
	2007	4.0	4.0	2.6	2.1
	2008	1.9	1.8	1.3	1.2
	2009	2.3	2.2	1.5	1.3
S. Glenstone, Springfield	2000	4.0	4.0	2.6	2.4
	2001	7.0	5.0	4.5	4.3
	2002	5.0	4.0	3.8	2.3
Affton	1997	3.5	3.5	2.6	2.5
Sunset Hills	1998	3.8	3.8	2.5	2.2
	1999	2.2	2.0	1.5	1.5
	2000	2.5	2.2	1.8	1.6
	2001	1.9	1.7	1.4	1.3
	2005	1.7	1.7	1.3	1.3
	2006	1.6	1.5	1.3	1.2
	2007	1.6	1.2	1.0	1.0
	2008	1.4	1.4	1.2	0.8
	2009	1.0	0.9	0.7	0.7

Missouri CO Maximum Measured Concentrations, 1997-2009 continued

Site	Year	1st Max 1-Hour Av ppm	2nd Max 1-Hour Av ppm	1st Max 8-Hour Av ppm	2nd Max 8-Hour Av ppm
Queeny	1997	2.2	2.1	1.9	1.6
	1998	2.5	2.5	2.2	1.9
	1999	2.0	1.7	1.6	1.3
	2000	2.0	2.0	1.7	1.5
Clayton	1997	5.3	4.9	4.2	3.8
	1998	4.8	4.2	3.5	3.4
	1999	4.6	4.0	2.9	2.7
	2000	4.0	3.7	2.6	2.5
Ferguson	1997	4.6	3.9	3.2	2.4
	1998	8.3	3.9	2.6	2.5
	1999	5.0	5.0	3.2	2.4
	2000	2.6	2.5	2.2	1.8
St. Ann	1997	8.0	7.1	3.9	3.7
	1998	10.9	6.3	4.0	4.0
	1999	4.2	4.2	2.6	2.4
	2000	5.0	4.3	3.5	3.0
Breckenridge	2001	4.7	4.3	2.4	2.3
	2002	6.8	4.5	3.2	2.5
	2003	3.6	3.3	2.4	2.1
	2004	2.6	2.3	1.9	1.6
Newstead & Cotebrilliant, St. Louis	1997	7.8	7.8	5.6	4.9
	1998	8.9	8.4	7.4	6.0
	1999	6.3	6.1	5.4	4.1
Washington Ave., St. Louis	1997	8.8	8.3	4.2	3.7
	1998	7.2	6.9	4.4	4.0
	1999	3.4	3.3	2.3	2.3
	2000	3.9	3.3	2.3	2.2
	2001	11.4	6.9	4.7	2.6
	2002	12.0	11.9	11.4	10.3
	2003	4.0	3.0	2.5	2.5
Blair St., St. Louis	2006	3.7	3.7	2.1	1.9
	2007	2.7	2.5	2.0	1.4
	2008	4.2	3.8	3.5	2.6
	2009	5.0	4.7	2.4	1.3
Margaretta, St. Louis	2000	5.8	5.6	4.6	3.8
	2001	8.1	8.1	6.6	4.5
	2002	5.8	5.5	3.6	3.3
	2003	4.9	4.5	3.1	3.0
	2004	4.9	4.3	3.3	2.8
	2005	5.1	4.7	4.2	3.0
	2006	4.3	3.9	2.5	2.5
	2007	4.3	3.4	2.7	2.7
	2008	4.4	4.2	3.8	2.8
	2009	2.5	2.4	1.8	1.7

Figure 5-2 shows first and second maximum 1-hour and 8-hour average CO concentrations measured at monitoring sites in Missouri in 2004 through 2009. Neither standard has been exceeded at these four currently-operating sites in recent years, and it is unlikely that more stringent standards in the expected ranges would be violated at these sites.

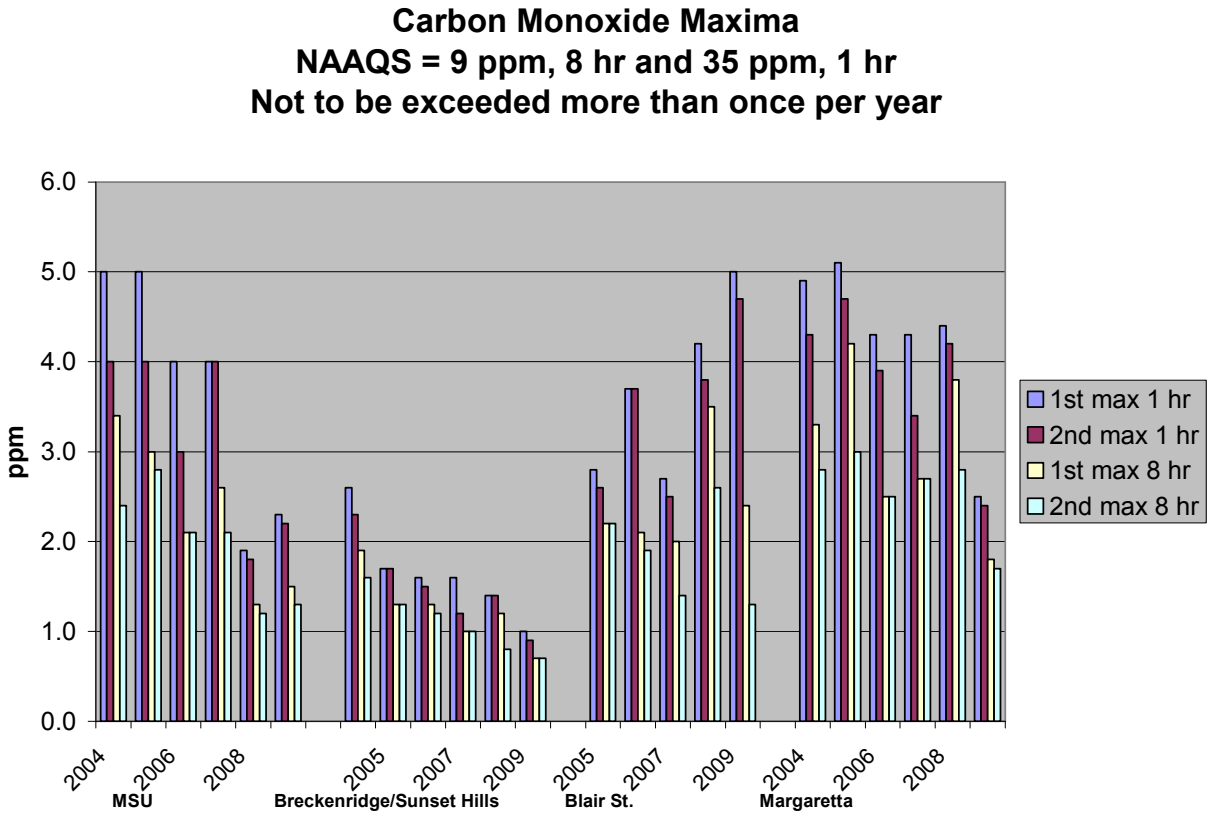


Figure 5-2

The locations of these current CO monitoring sites are shown on the map in the Figure 5-3.

5.3 CO Emissions

CO emissions occur primarily from internal combustion engines, and the majority of such emissions are from motor vehicles. Figures 5-4 and 5-5 show ranges of traffic counts indicated by color for major roadways in the St. Louis and Kansas City area and are an indicator of where most CO emissions occur. Figures 5-6, 5-7, and 5-8 show portions of Missouri Department of Transportation maps with numbers indicating annual average daily traffic on major roadways in the St. Louis, Kansas City, and Springfield areas.

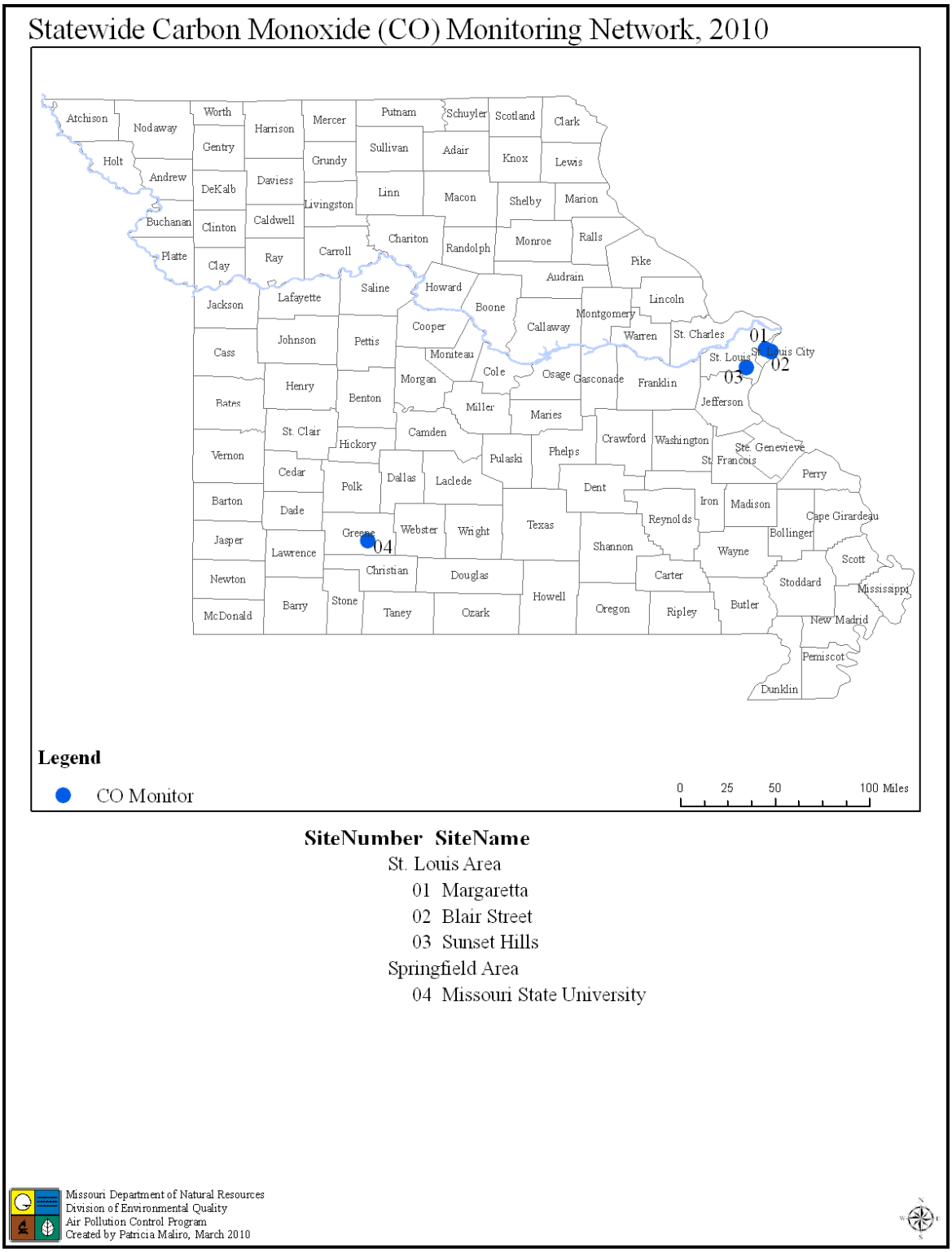


Figure 5-3. Missouri CO monitoring locations.

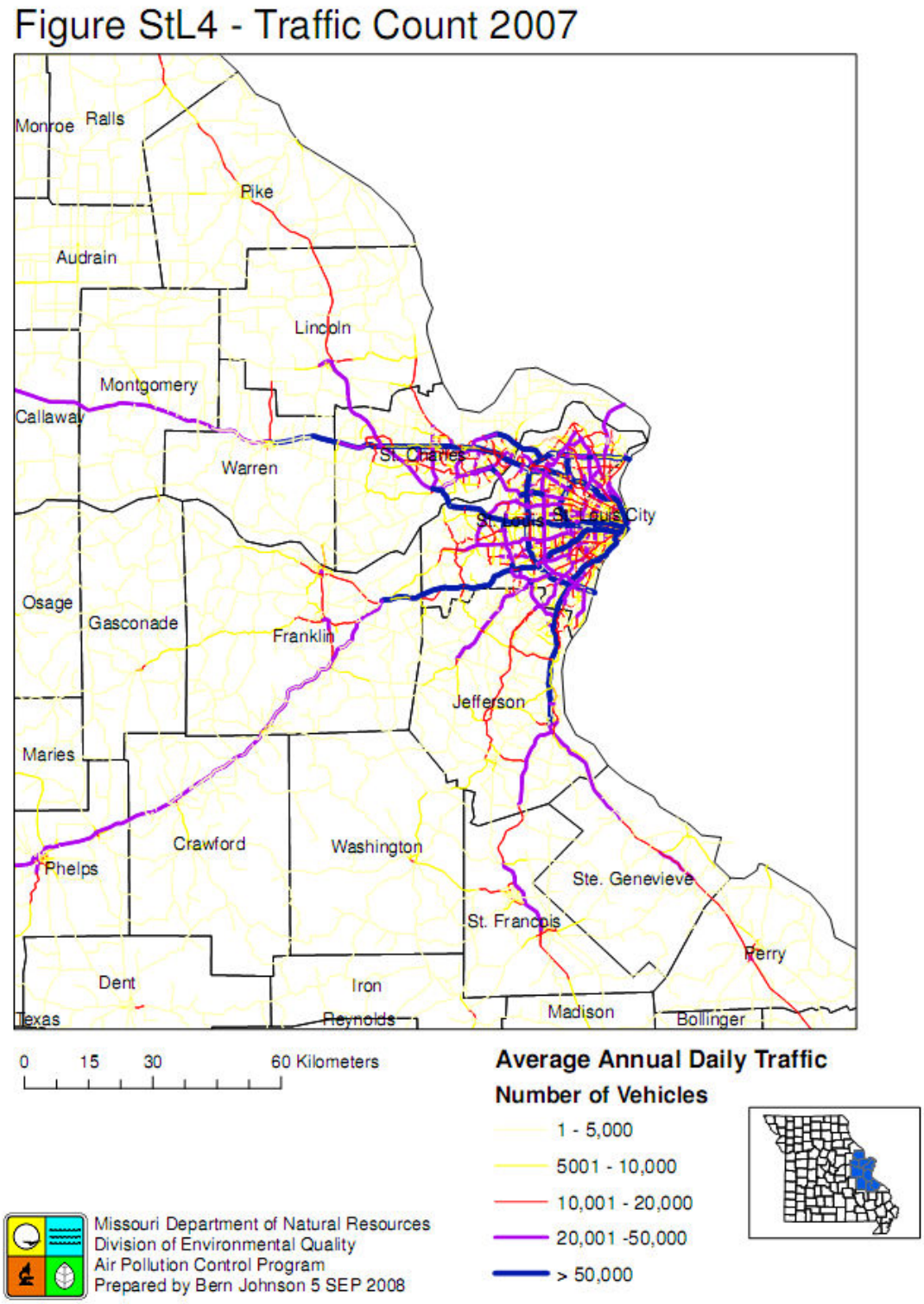


Figure StL4 - Traffic Count 2007
Monroe
Ralls
Pike
Audrain
Lincoln
Montgomery
Callaway
Warren
St. Charles
St. Louis City
Osage
Gasconade
Franklin
Jefferson
Maries
Crawford
Washington
Phelps
Ste. Genevieve
St. Francois
Perry
Dent
Iron
Texas
Reynolds
Madison
Bollinger
0 15 30 60 Kilometers
Average Annual Daily Traffic
Number of Vehicles
1 - 5,000
5001 - 10,000
10,001 - 20,000
20,001 -50,000
> 50,000
Missouri Department of Natural Resources
Division of Environmental Quality
Air Pollution Control Program
Prepared by Bern Johnson 5 SEP 2008

Figure 5-4

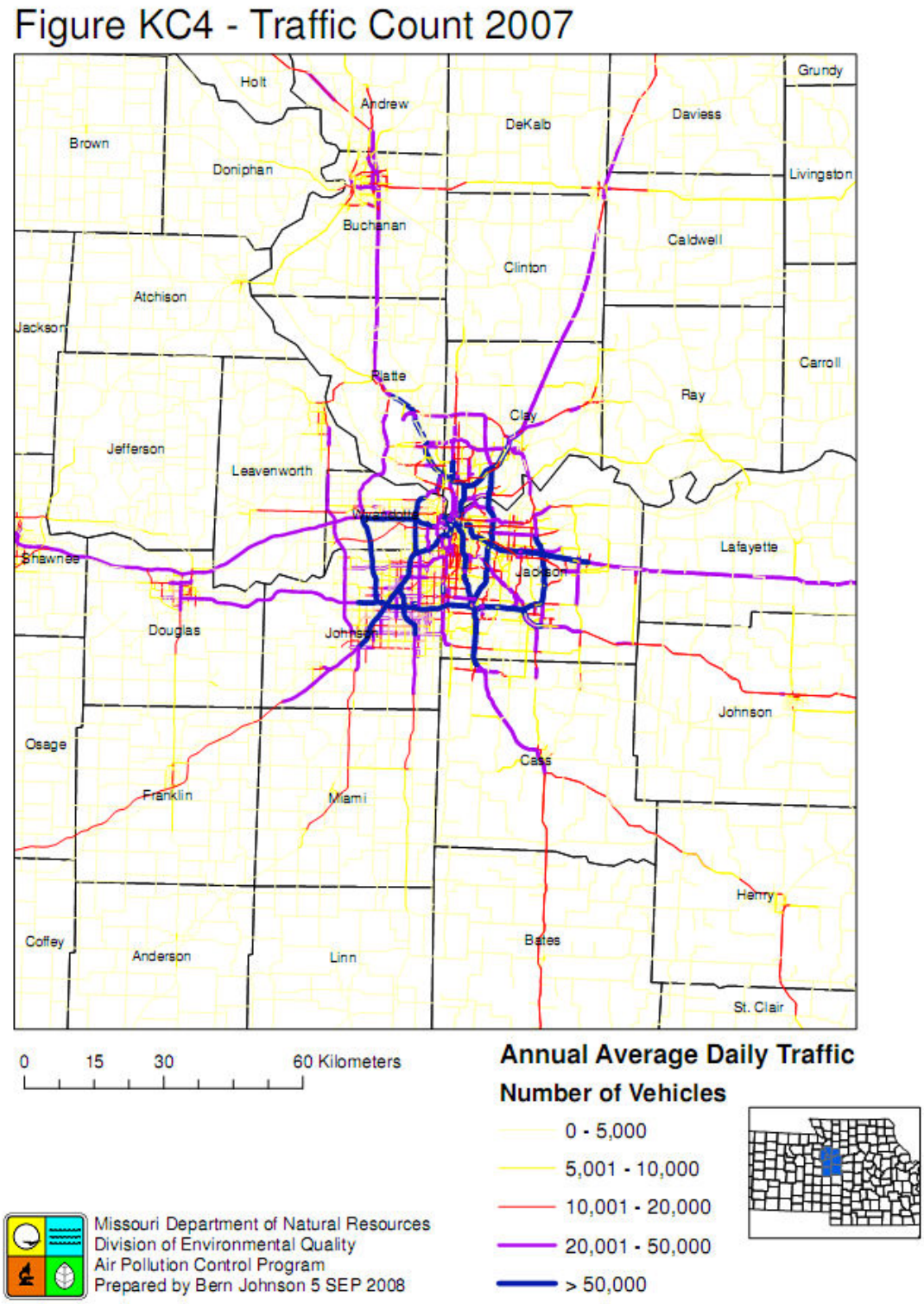


Figure KC4 - Traffic Count 2007
Holt
Andrew
DeKalb
Daviess
Grundy
Brown
Doniphan
Livingston
Buchanan
Caldwell
Clinton
Atchison
Jackson
Carroll
Platte
Ray
Clay
Jefferson
Leavenworth
Lafayette
Shawnee
Jackson
Douglas
Johnson
Johnson
Osage
Cass
Franklin
Miami
Henry
Coffey
Anderson
Linn
Bates
St. Clair
0 15 30 60 Kilometers
Annual Average Daily Traffic
Number of Vehicles
0 - 5,000
5,001 - 10,000
10,001 - 20,000
20,001 - 50,000
> 50,000
Missouri Department of Natural Resources
Division of Environmental Quality
Air Pollution Control Program
Prepared by Bern Johnson 5 SEP 2008

Figure 5-5

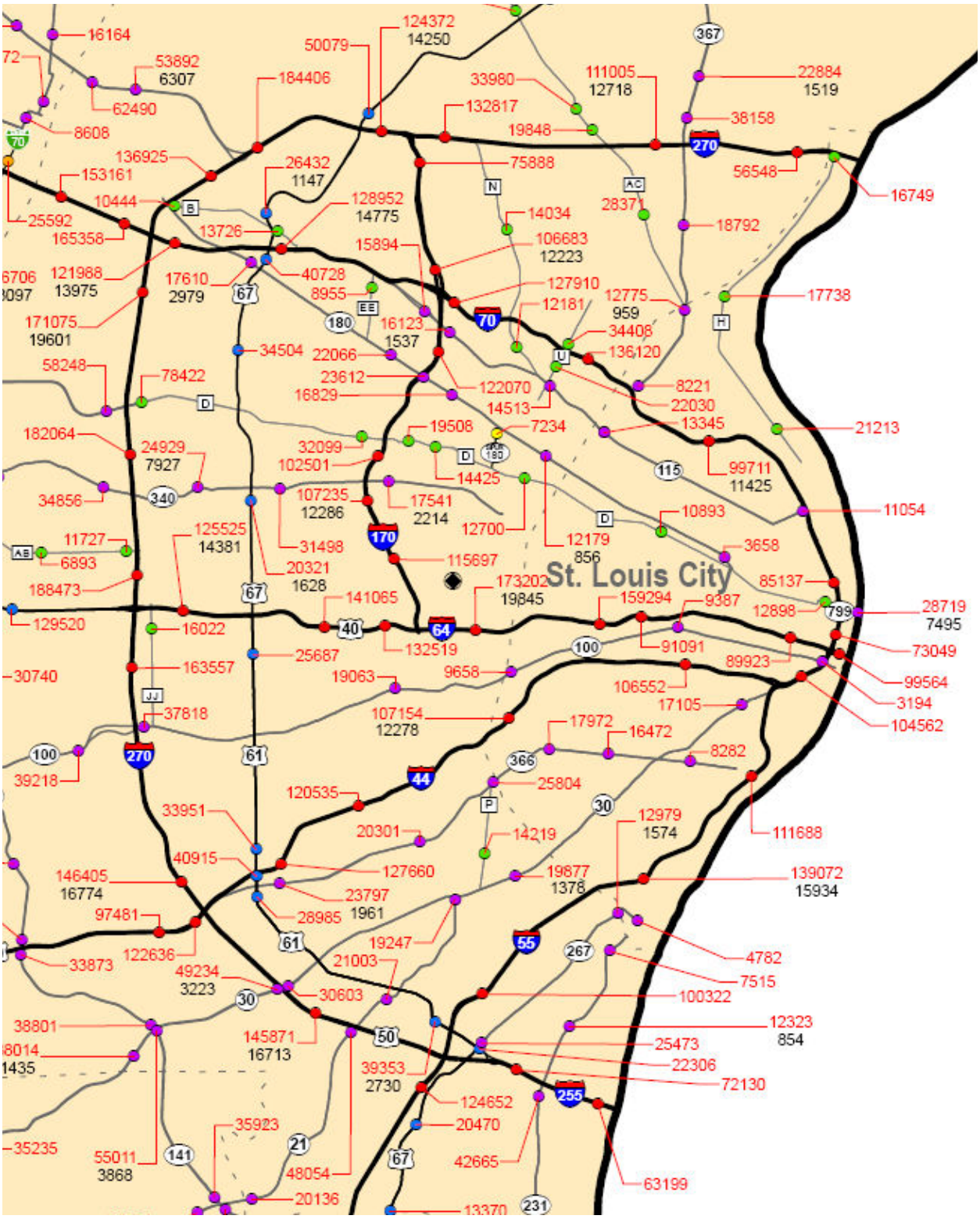


Figure 5-6. St. Louis area annual average daily traffic (AADT; in red) and truck volume (in black) for 2008. From http://www.modot.mo.gov/safety/trafficvolumemaps.htm

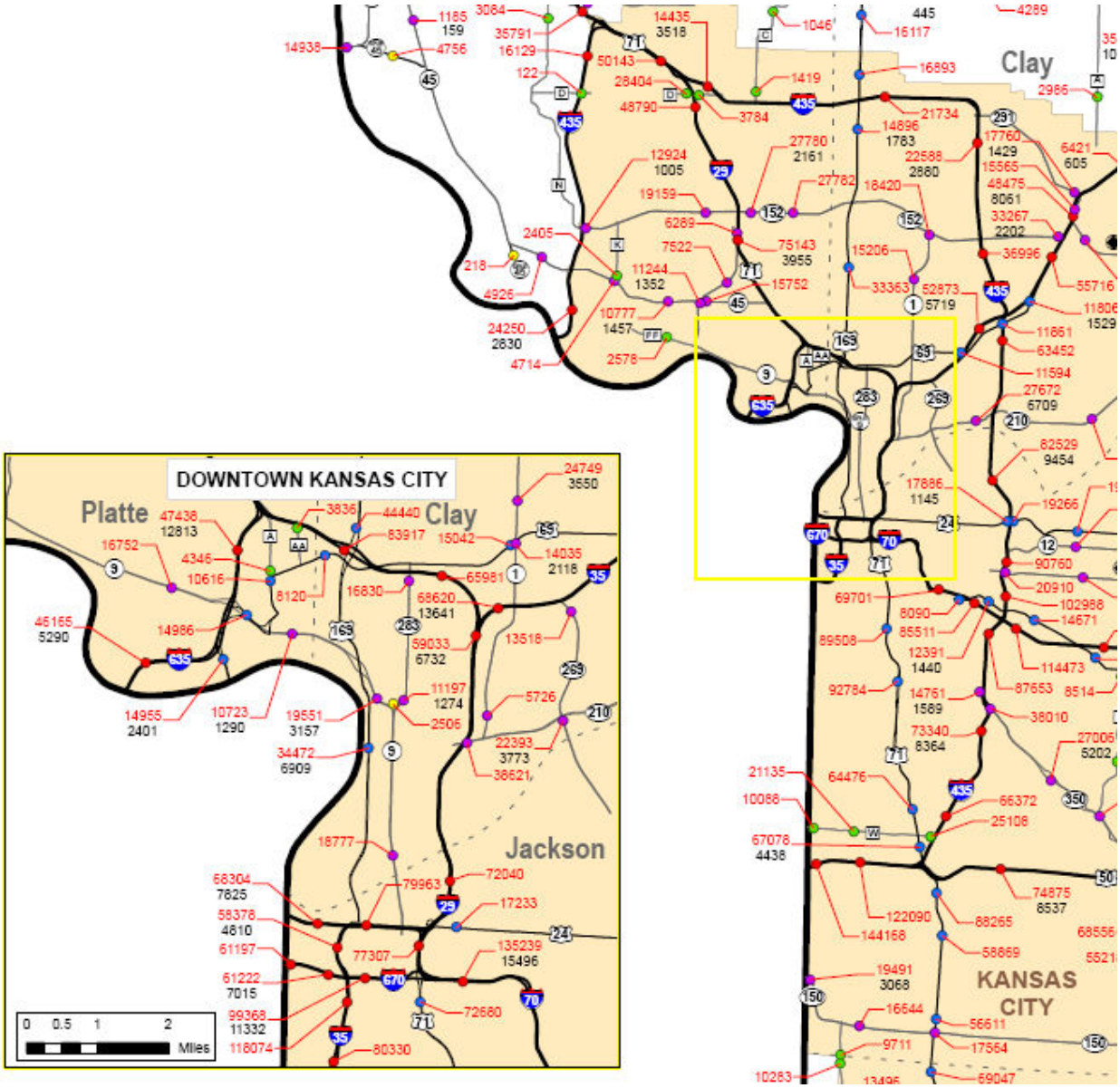


Figure 5-7. Kansas City area annual average daily traffic (AADT; in red) and truck volume (in black) for 2008. From http://www.modot.mo.gov/safety/trafficvolumemaps.htm

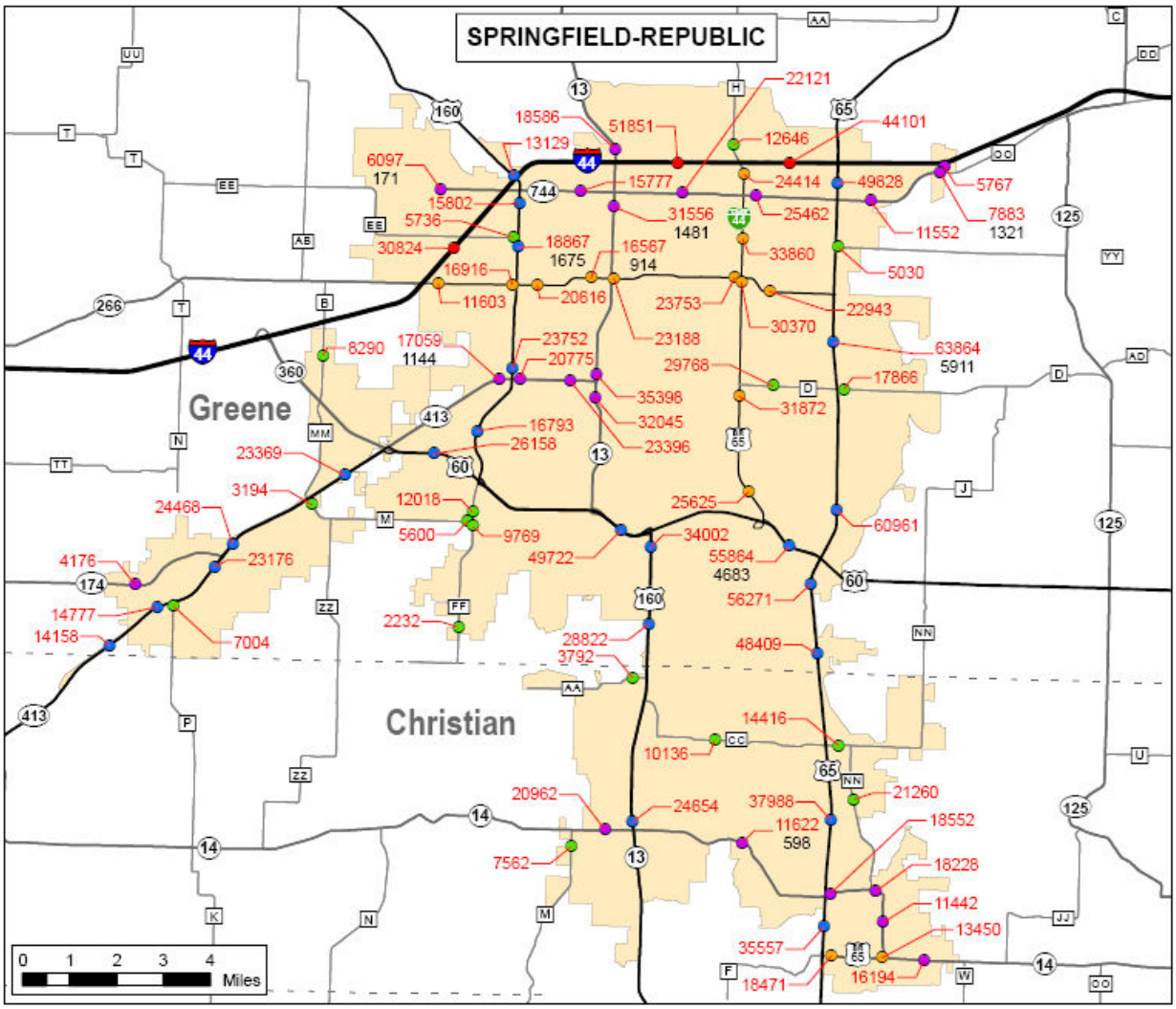


Figure 5-8. Springfield area annual average daily traffic (AADT; in red) and truck volume (in black) for 2008. From http://www.modot.mo.gov/safety/trafficvolumemaps.htm

Area sources of CO are not as significant as mobile sources, but may be significant in some areas, as indicated in Figure 5-9. The area sources indicated in southeast Missouri may be due to agricultural burning.

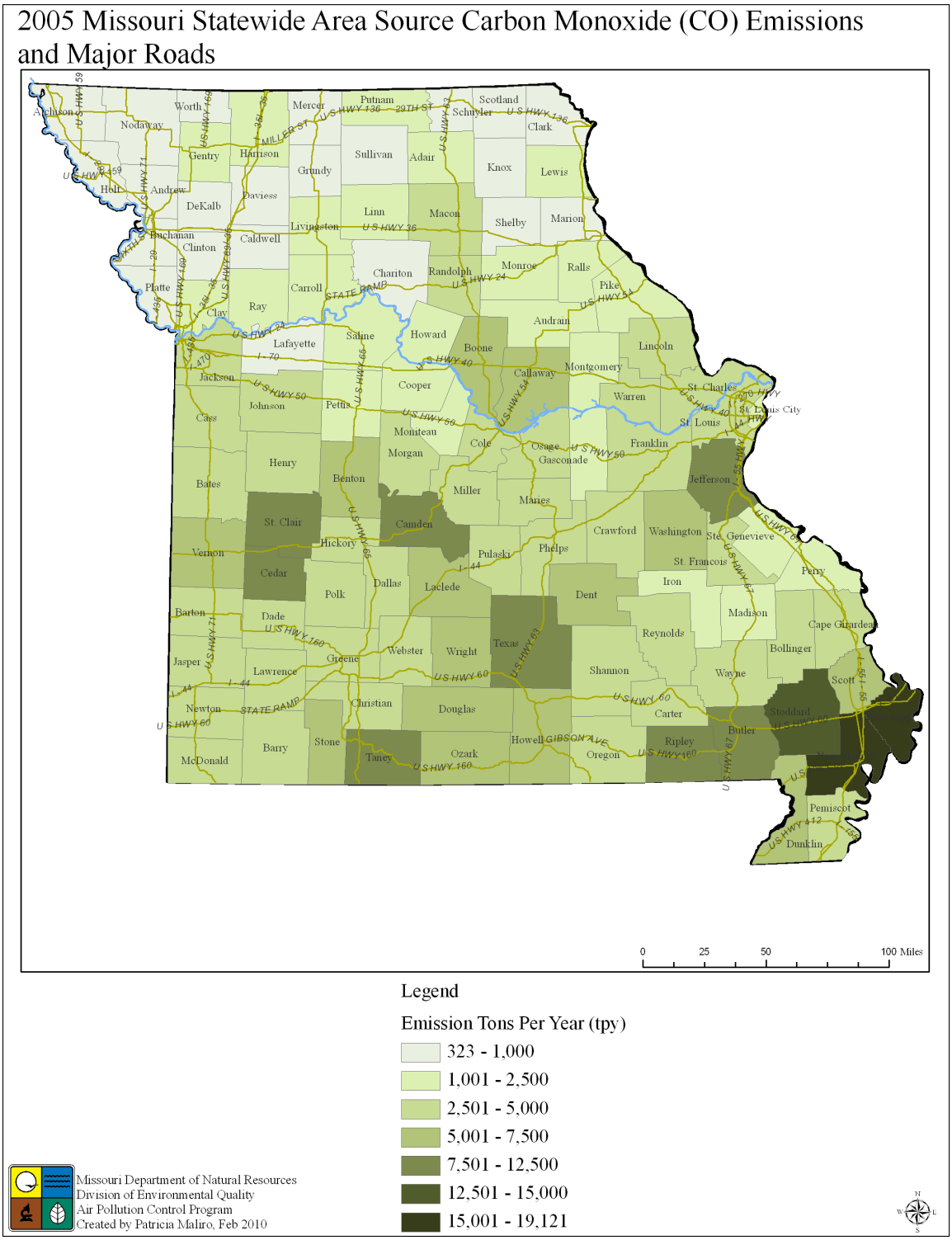


Figure 5-9

5.4 Evaluation of the CO Monitoring Network

As discussed above, CO emissions are primarily from motor vehicle exhaust, and CO monitoring sites should be either microscale, representing street canyons, or middle scale, representing areas including longer roadways or large parking areas. CO has been monitored in the past at such sites, including the Main Street and Broadway sites in Kansas City, the Washington Avenue site in St. Louis, and the South Glenstone site in Springfield. The Main Street site measured one 8-hour average concentration that slightly exceeded the standard concentration in 1997 (but the standard was not violated, since the second-highest concentration was within the standard). As discussed above, the Washington Avenue site in St. Louis measured 8-hour average concentrations that exceeded the standard in 2002, but that resulted from unique circumstances, not from normal vehicular traffic. Other street or roadway oriented sites have not measured concentrations near either standard.

Nevertheless, future monitoring at street canyon or near-roadway sites should be seriously considered after the NAAQS revision in St. Louis, where monitoring in downtown traffic areas has shown the highest concentrations in the state, and also possibly in Kansas City and Springfield, especially if the standard is made more stringent in the upcoming rulemaking, and if resources allow additional CO monitoring. Sites should be chosen based on traffic patterns and on locations of multistory buildings. The new NO_2 rule includes specific requirements for near-roadway monitoring at locations with high traffic density (see figures). It is possible that the new CO rule may also require near-roadway monitoring and/or that monitoring for CO also at the same locations as NO_2 may be desirable. Possible locations are suggested by the highest traffic counts shown in the figures. These monitoring sites will likely be **critical** to the network design.

The CO analyzer at the Blair Street site in St. Louis is a trace-level CO analyzer, which was installed at that site as a part of the National Air Toxics Trends Sites (NATTS) program and also in anticipation of the Blair Street site being designated as an NCore monitoring site. The trace-level CO analyzer is intended in part to measure CO as a surrogate for motor vehicle hydrocarbon emissions. The Blair Street site is a **critical** CO monitoring site.

CO has been monitored at the MSU site in Springfield for more than ten years. The data show a decrease in CO concentration over time. The Margaretta site and Sunset Hills site in the St. Louis area have never shown concentrations close to the standards. Neither of these sites meet current design criteria in 40 **CFR** Appendix D as middle or micro-scale sites. However, if as seems likely, a NAAQS revision similar to that for NO_2 is promulgated for CO, neighborhood scale locations for monitoring in large metropolitan areas may be required. At such a time, sites similar to Margaretta, and MSU, and one in Kansas City may be necessary. Given this rationale, Margaretta and MSU are currently determined to be **credible**, and Sunset Hills **marginal**, pending the outcome of the CO NAAQS review.

Regulations allow a state or local agency to request discontinuing a SLAMS CO site if the site has shown attainment for the previous five years and has a probability of less than 10% of exceeding 80% of the applicable NAAAQS during the next three years based on past levels, trends, and variability (40 **CFR** 58.14). Table 5-2 summarizes this analysis for the four CO

monitoring sites in Missouri. The Margaretta and MSU sites meet this test for both the 2004-2008 and 2005-2009 periods, and the Sunset Hills and Blair Street sites meet the test for the 2005-2009 period. Therefore, these sites (except for Blair Street) are potential sites for discontinuance of operation, subject to approval of the EPA Region VII Administrator. The Blair Street site is not a candidate for consideration of removal, because it is an NCore site.

Table 5-2. Analysis of CO Monitoring Sites for Possible Removal According to 40 CFR 58.14

CO NAAQS: 1-hour 2nd High - 35 ppm
CO NAAQS: 8-hour 2nd High - 9 ppm

Site	Averaging Time	2004	2005	2006	2007	2008	2009	2004-2008 Test			2005-2009 Test		
								90% Upper CI	0.8*NAAQS	Test	90% Upper CI	0.8*NAAQS	Test
Sunset Hills*	1-hour	-	1.7	1.5	1.2	1.4	0.9	-	29	-	1.630	29	Met
	8-hour	-	1.3	1.2	1.0	0.8	0.7	-	7.2	-	1.243	7.2	Met
Blair Street*	1-hour	-	2.6	3.7	2.5	3.8	4.7	-	29	-	4.335	29	Met
	8-hour	-	2.2	1.9	1.4	2.6	1.3	-	7.2	-	2.399	7.2	Met
Margaretta	1-hour	4.3	4.7	3.9	3.4	4.2	2.4	4.562	29	Met	4.554	29	Met
	8-hour	2.8	3.0	2.5	2.7	2.8	1.7	2.933	7.2	Met	3.019	7.2	Met
Missouri State University	1-hour	4.0	4.0	3.0	4.0	1.8	2.2	4.287	29	Met	3.962	29	Met
	8-hour	2.4	2.8	2.1	2.1	1.2	1.3	2.681	7.2	Met	2.528	7.2	Met

*Less than 5years of data for 2004-2008 test
All sites met the test, so any site may be a candidate for discontinuance, but additional assessment is necessary to make such a decision.

6.0 SULFUR DIOXIDE NETWORK ASSESSMENT

6.1 Introduction: Sulfur Dioxide Standards and Monitoring Requirements

The current primary National Ambient Air Quality Standards (NAAQS) for sulfur dioxide (SO_2) are

- 0.03 ppm, annual arithmetic average,
- 0.14 ppm, 24-hour average, not to be exceeded more than once per year.

The secondary NAAQS is 0.5 ppm, 3-hour average, not to be exceeded more than once per year. These standards were set in 1971 and reviewed, but not changed, in 1996.

In 2006 the United States Environmental Protection Agency (US EPA) issued revised air monitoring requirements (71 **Federal Register** 61235, October 17, 2006). Unlike monitoring requirements for other pollutants, there are no required minimum numbers of SO_2 monitoring sites in cities or metropolitan statistical areas.

In June 2010, EPA announced a revision to the SO_2 primary NAAQS that also includes revision of the monitoring requirements (http://www.epa.gov/air/sulfurdioxide/actions.html). The revised NAAQS is expected to be published in the Federal Register in late June or early July 2010 and will be effective and will replace the old primary NAAQS 60 days following publication. The new primary NAAQS is 75 ppb; the form of the standard is the 3-year average of the 99th percentile of annual daily maximum 1-hour averages.

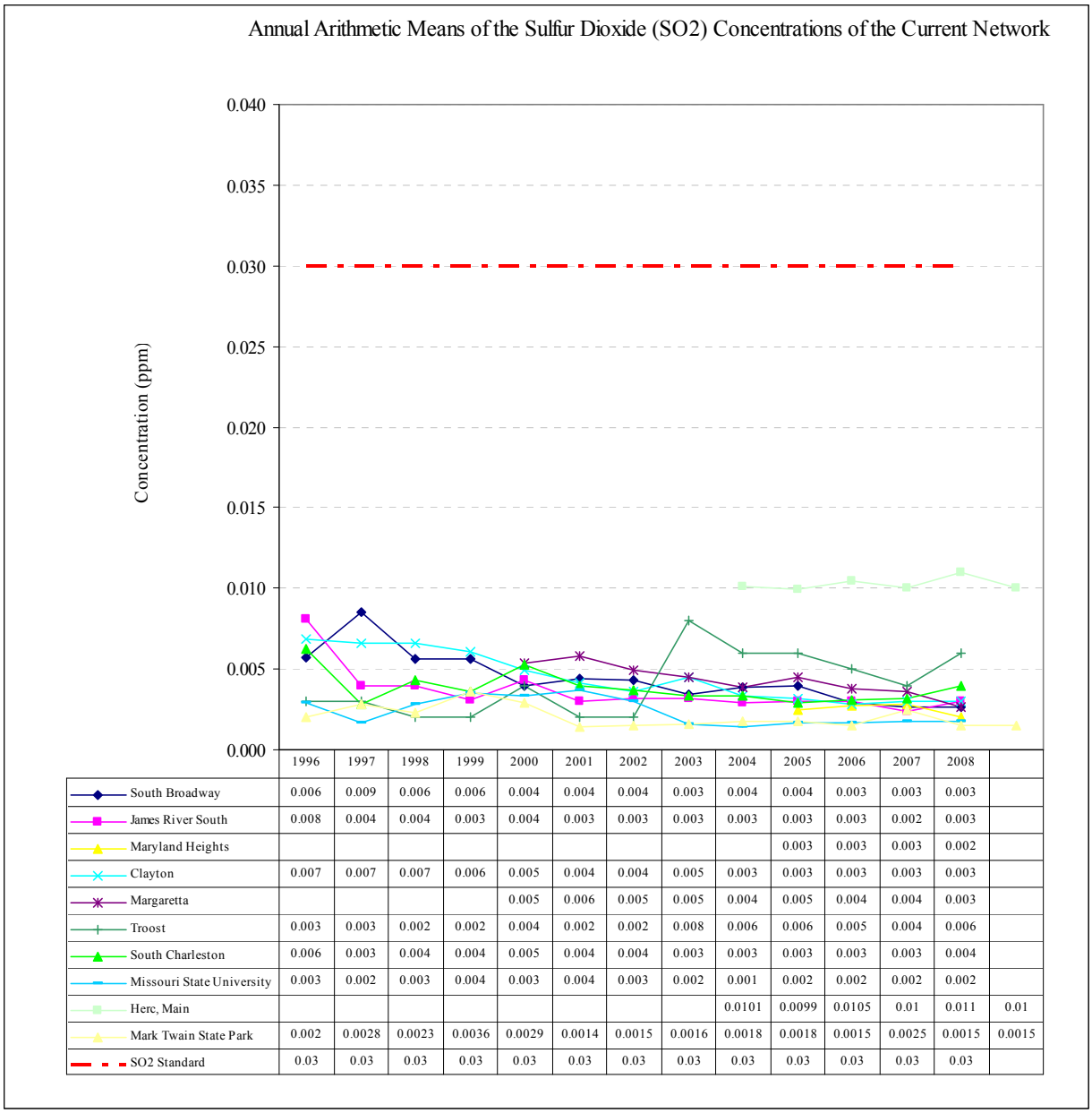
Minimum monitoring requirements are based on a combination of population and SO_2 emissions in Core Based Statistical Areas (CBSAs). Five monitoring sites will be required in Missouri (two in the St. Louis area, two in the Kansas City Area, and one in Springfield). Each monitoring site may be determined on the basis of one or more of the following criteria: location near known emission sources, location to measure maximum concentrations, location to measure population exposure, location to measure regional transport, or location to measure regional background. These sites must be planned by July 1, 2012 and operational by January 1, 2013. Additional monitoring sites may be required by EPA.

In addition to these requirements, each NCore site must include a trace-level SO_2 analyzer, to be operational by January 1, 2011. The Blair Street station in St. Louis has been designated as an NCore site, and trace-level SO_2 measurement is planned to begin there by January 2011.

6.2 SO_2 Monitoring Results in Missouri

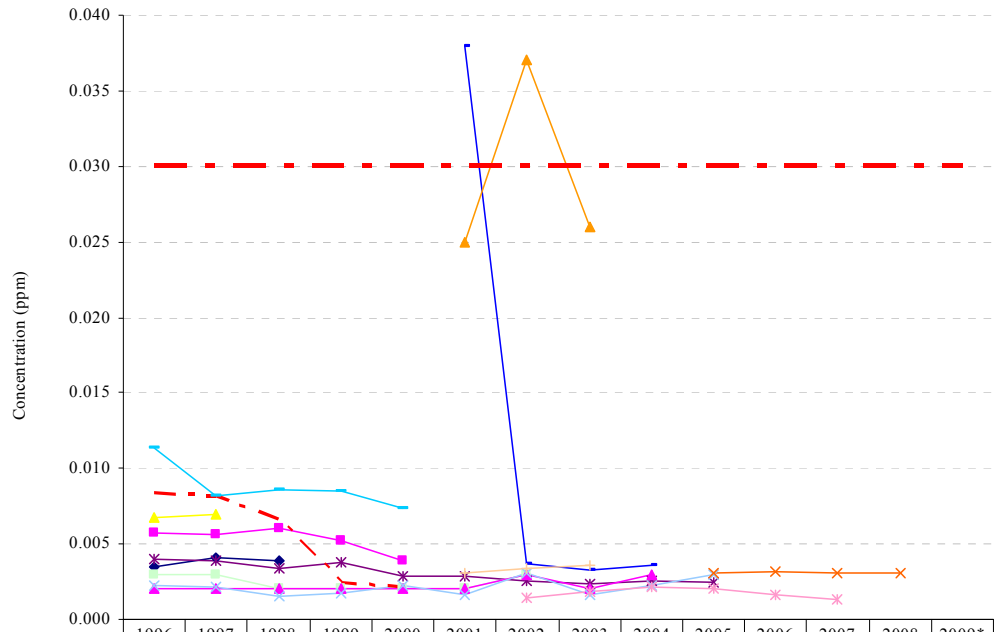
Figures 6-1 through 6-4 (and the embedded tables) show the annual mean SO_2 concentrations measured in recent years compared to the current annual standard and the second-high 24-hour

average compared to the current 24-hour standard. No site has violated either of the current standards in recent years (since 2002).



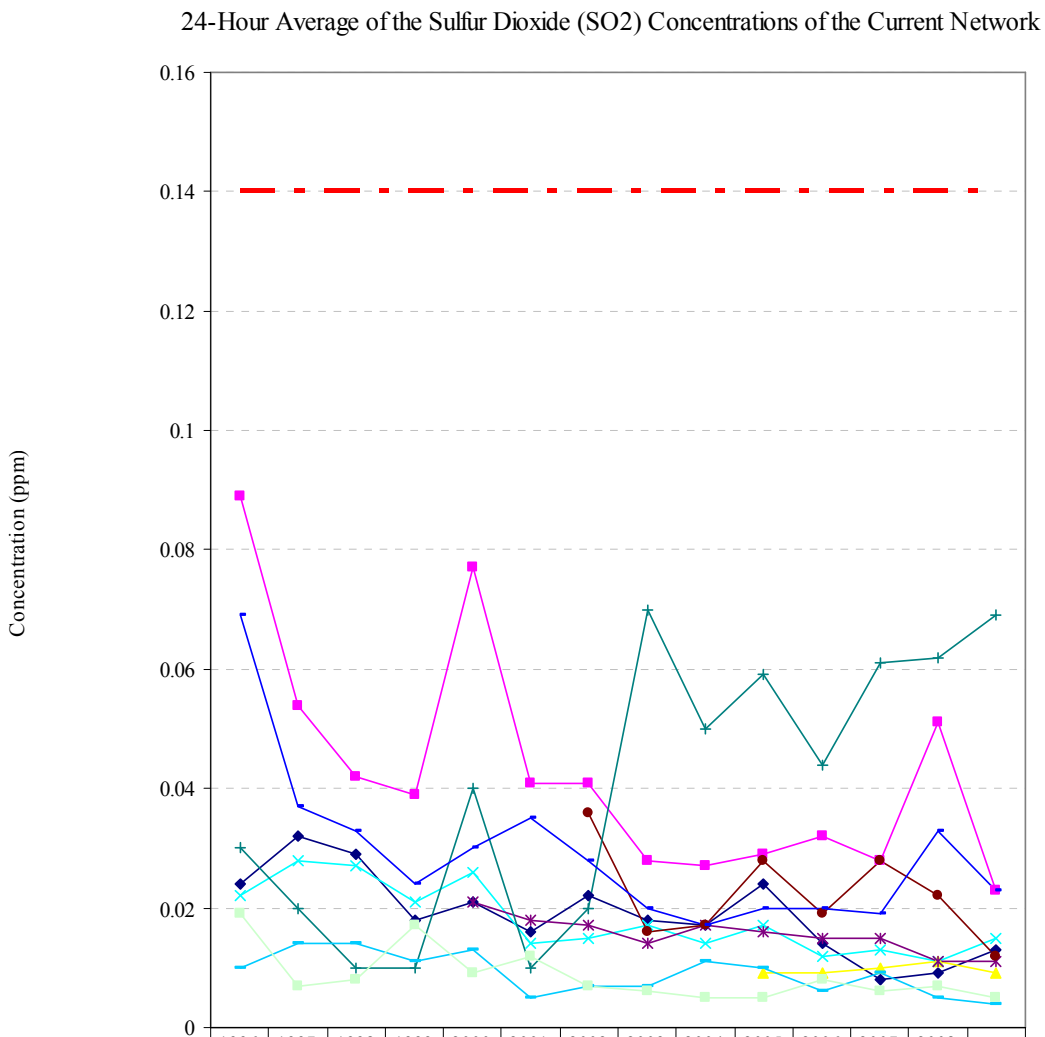
	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	
South Broadway	0.006	0.009	0.006	0.006	0.004	0.004	0.004	0.003	0.004	0.004	0.003	0.003	0.003	
James River South	0.008	0.004	0.004	0.003	0.004	0.003	0.003	0.003	0.003	0.003	0.003	0.002	0.003	
Maryland Heights										0.003	0.003	0.003	0.002	
Clayton	0.007	0.007	0.007	0.006	0.005	0.004	0.004	0.005	0.003	0.003	0.003	0.003	0.003	
Margaretta					0.005	0.006	0.005	0.005	0.004	0.005	0.004	0.004	0.003	
Troost	0.003	0.003	0.002	0.002	0.004	0.002	0.002	0.008	0.006	0.006	0.005	0.004	0.006	
South Charleston	0.006	0.003	0.004	0.004	0.005	0.004	0.004	0.003	0.003	0.003	0.003	0.003	0.004	
Missouri State University	0.003	0.002	0.003	0.004	0.003	0.004	0.003	0.002	0.001	0.002	0.002	0.002	0.002	
Herc, Main									0.0101	0.0099	0.0105	0.01	0.011	0.01
Mark Twain State Park	0.002	0.0028	0.0023	0.0036	0.0029	0.0014	0.0015	0.0016	0.0018	0.0018	0.0015	0.0025	0.0015	0.0015
SO2 Standard	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	

Figure 6-1



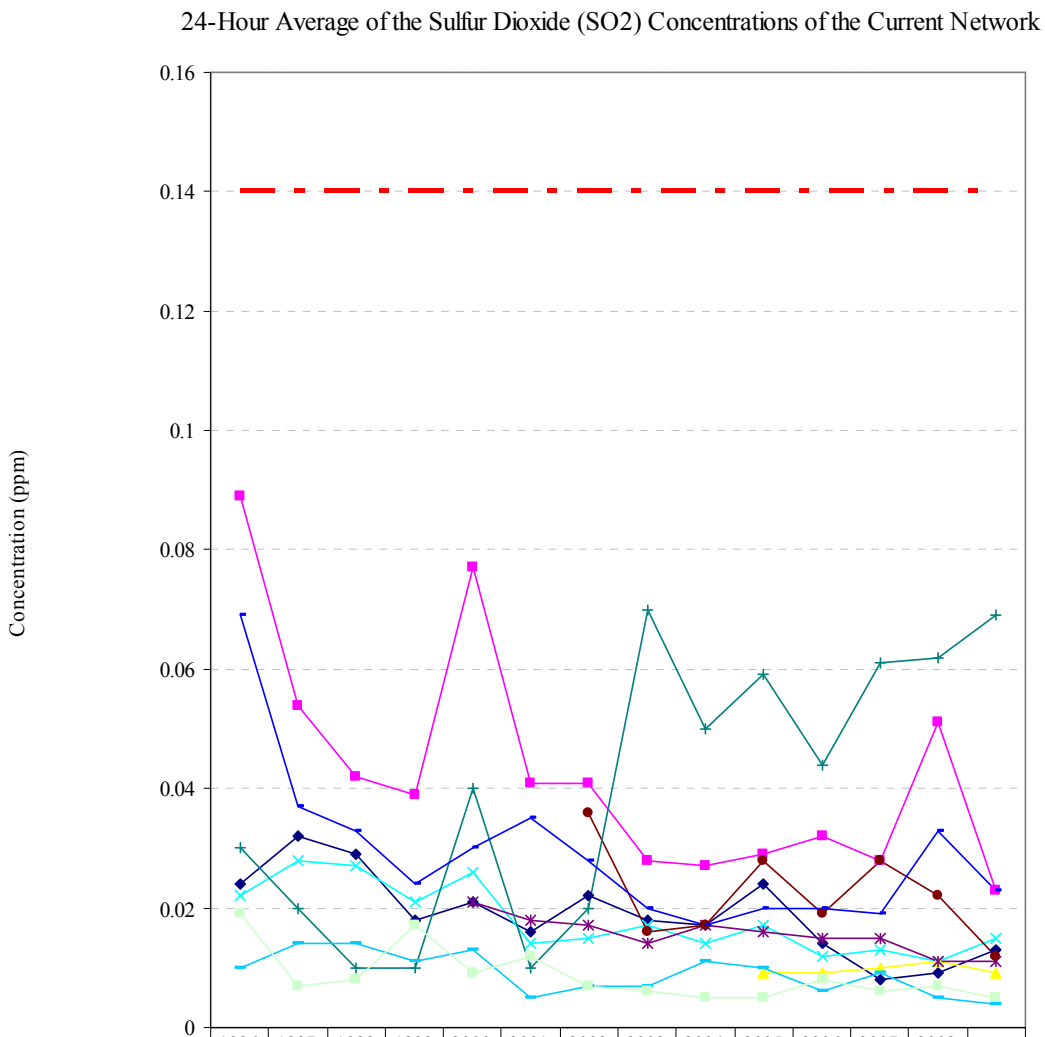
	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009*
Augusta	0.004	0.004	0.004											
West Alton	0.006	0.006	0.006	0.005	0.004									
Affton	0.007	0.007												
Queeny Park	0.004	0.004	0.003	0.004	0.003	0.003	0.003	0.002	0.003	0.003				
Breckenridge Hills						0.038	0.004	0.003	0.004					
Clark	0.011	0.008	0.009	0.009	0.007									
Worlds of Fun	0.003	0.003	0.002	0.002	0.002	0.002	0.003							
KCI- 49th Winchester	0.002	0.002	0.002	0.002	0.002	0.002	0.003	0.002	0.003					
KCI-11500 N 71 Hwy	0.002	0.002	0.002	0.002	0.002	0.002	0.003	0.002	0.002	0.003				
Wisdom Lane							0.001	0.002	0.002	0.002	0.002	0.001		
St. Joseph Pump Station	0.008	0.008	0.007	0.003	0.002									
5402 Packers-St. Joe						0.003	0.003	0.004						
Herc, Creek						0.025	0.037	0.026						
Clarksville										0.003	0.003	0.003	0.003	

Figure 6-2



	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	
SO2 Standard	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14
South Broadway	0.024	0.032	0.029	0.018	0.021	0.016	0.022	0.018	0.017	0.024	0.014	0.008	0.009	0.013
James River South	0.089	0.054	0.042	0.039	0.077	0.041	0.041	0.028	0.027	0.029	0.032	0.028	0.051	0.023
Maryland Heights										0.009	0.009	0.010	0.011	0.009
Clayton	0.022	0.028	0.027	0.021	0.026	0.014	0.015	0.017	0.014	0.017	0.012	0.013	0.011	0.015
Margaretta					0.021	0.018	0.017	0.014	0.017	0.016	0.015	0.015	0.011	0.011
Wildwood Lane							0.036	0.016	0.017	0.028	0.019	0.028	0.022	0.012
Troost	0.030	0.020	0.010	0.010	0.040	0.010	0.020	0.070	0.050	0.059	0.044	0.061	0.062	0.069
South Charleston	0.069	0.037	0.033	0.024	0.030	0.035	0.028	0.020	0.017	0.020	0.020	0.019	0.033	0.023
Mark Twain State Park	0.010	0.014	0.014	0.011	0.013	0.005	0.007	0.007	0.011	0.010	0.006	0.009	0.005	0.004
Missouri State University	0.019	0.007	0.008	0.017	0.009	0.012	0.007	0.006	0.005	0.005	0.008	0.006	0.007	0.005

Figure 6-3

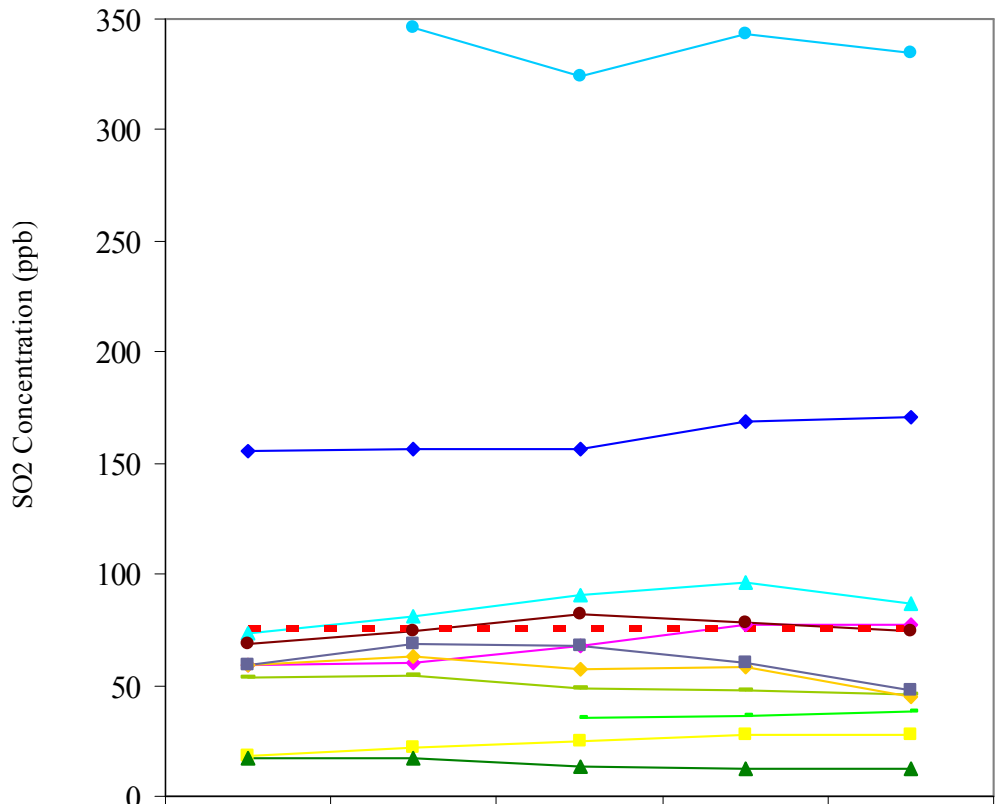


	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	
SO2 Standard	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14
South Broadway	0.024	0.032	0.029	0.018	0.021	0.016	0.022	0.018	0.017	0.024	0.014	0.008	0.009	0.013
James River South	0.089	0.054	0.042	0.039	0.077	0.041	0.041	0.028	0.027	0.029	0.032	0.028	0.051	0.023
Maryland Heights										0.009	0.009	0.010	0.011	0.009
Clayton	0.022	0.028	0.027	0.021	0.026	0.014	0.015	0.017	0.014	0.017	0.012	0.013	0.011	0.015
Margaretta					0.021	0.018	0.017	0.014	0.017	0.016	0.015	0.015	0.011	0.011
Wildwood Lane							0.036	0.016	0.017	0.028	0.019	0.028	0.022	0.012
Troost	0.030	0.020	0.010	0.010	0.040	0.010	0.020	0.070	0.050	0.059	0.044	0.061	0.062	0.069
South Charleston	0.069	0.037	0.033	0.024	0.030	0.035	0.028	0.020	0.017	0.020	0.020	0.019	0.033	0.023
Mark Twain State Park	0.010	0.014	0.014	0.011	0.013	0.005	0.007	0.007	0.011	0.010	0.006	0.009	0.005	0.004
Missouri State University	0.019	0.007	0.008	0.017	0.009	0.012	0.007	0.006	0.005	0.005	0.008	0.006	0.007	0.005

Figure 6-4

Figure 6-5 shows the 3-year average for 2007-2009 of the 99th percentile 1-hour maximum SO_2 concentration at each current site and the 75 ppb level that defines the new standard. Three of the state or agency sites would be in violation of the new NAAQS (if current concentrations continue), Herculaneum, Troost, and South Charleston).

The current SO_2 monitoring network is shown on the map in Figure 6-6.



	2003-2005	2004-2006	2005-2007	2006-2008	2007-2009
S. Charleston	59	60	68	77	77
MSU	18	22	25	28	28
James River-S	73	81	91	96	87
Wildwood Lane	69	74	82	78	74
Troost	155	156	156	169	171
Herc., Main		346	324	343	335
MTSP	17	17	13	12	12
Maryland Heights			35	36	38
Ladue	53	54	49	48	46
South Broadway	59	63	57	58	45
Margaretta	59	69	68	60	48
New Standard	75	75	75	75	75

Figure 6-5

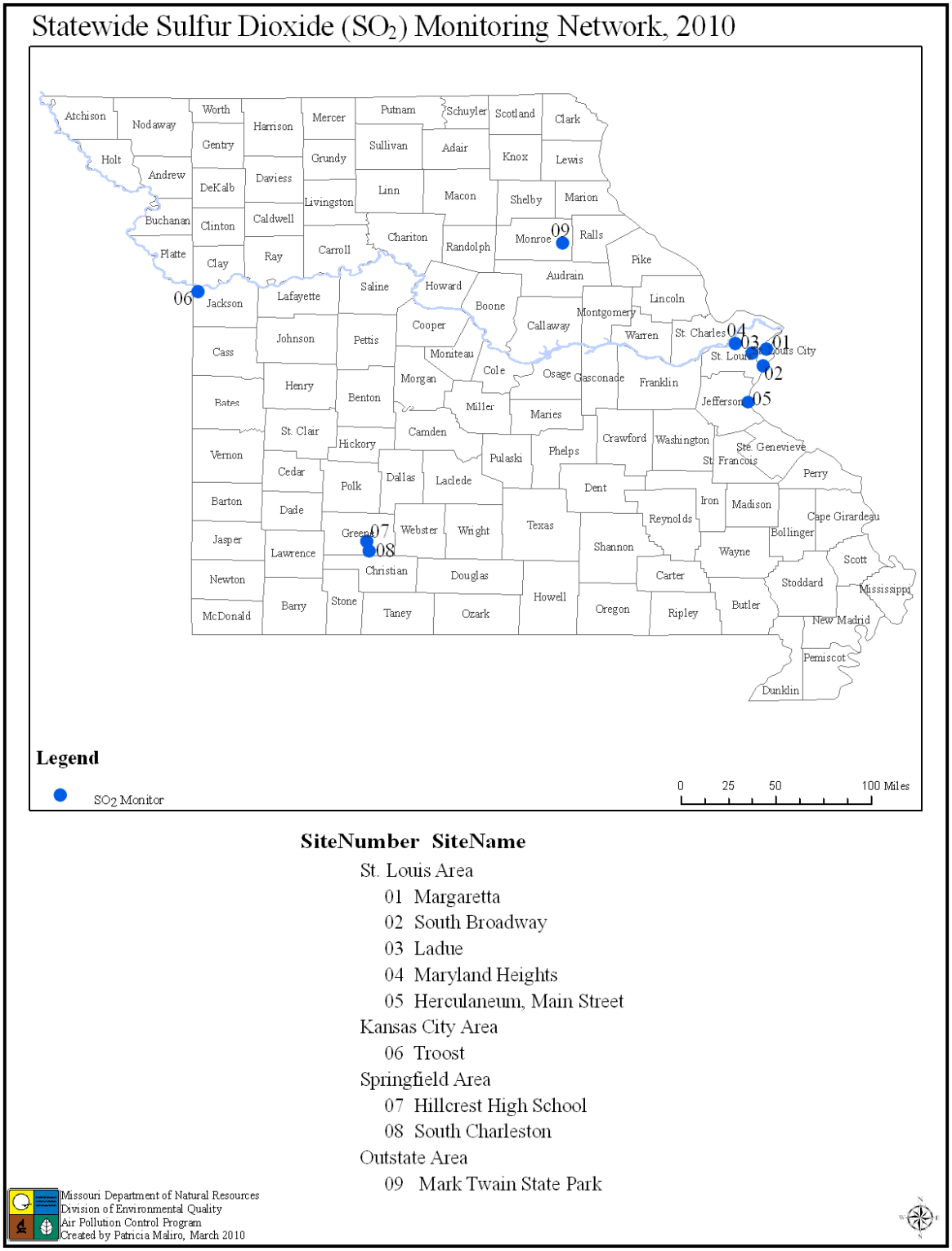


Figure 6-6. Missouri SO_2 monitoring locations.

6.3 SO_2 Emissions

Fossil fuel combustion at electric generating stations (66% of emissions nationally) and other industrial facilities (29% of emissions nationally) are the predominant sources of SO_2 emissions. Other sources include other industrial processes and fuel combustion by mobile sources (motor vehicles, locomotives, ships, and off-road equipment). Figures 6-7 and 6-8 show the locations and relative size of SO_2 emission point sources in Missouri (based on the 2008 inventory) and the area source SO_2 by county (for 2005). The area emissions by county are relatively small in comparison to those from point sources.

Review of recent monitoring data from source-oriented SO_2 monitors shows that ambient monitoring design values calculated according to the proposed standard are, for some sources, as high as 1 to 3 parts per billion (ppb) per 100 tpy of SO_2 emissions. In other words, a 5000 tpy source may result in a nearby design value on the order of 50 to 150 ppb. This approximate ratio is characteristic of relatively small sources (smaller electric or steam generating facilities) with lower stack elevations. Emissions and monitoring results from one such source (with average design value on the order of 3 ppb per 100 tpy) are shown in Table 6-1.

Table 6-1. SO_2 Source Emissions and Nearby Ambient Concentrations for a Small Steam Generating Facility

Year	Trigen Energy Plant SO_2 Emissions, TPY	Troost Monitoring Station 1-hour 4th High Daily Maximum SO_2, ppb
2003	4315	168
2004	4020	159
2005	3551	139
2006	4927	170
2007	6077	160
2008	6295	177

Larger sources tend to have taller stacks, which provide for greater dilution before the plume reaches ground level. Because the current SO_2 NAAQS were less stringent than the newly adopted NAAQS, monitoring was discontinued at some source-oriented sites in Missouri due to resource constrains, but even these larger sources with tall stacks have shown past design values on the order of 1 to 2 ppb per 1000 tpy at less-than-optimal monitor locations. Emissions and monitoring results from one such source (with average design value on the order of 2 ppb per 1000 tpy) are shown in Table 6-2. SO_2 emissions from this source have continued at similar levels since 2000.

Table 6-2. SO_2 Source Emissions and Nearby Ambient Concentrations for a Large Electric Generation Facility

Year	Ameren UE Sioux Plant SO_2 Emissions, TPY	West Alton Monitoring Station 1-hour 4th High Daily Maximum SO_2, ppb
1996	56,403	161
1997	55,116	94
1998	41,954	80
1999	43,775	103
2000	36,541	64

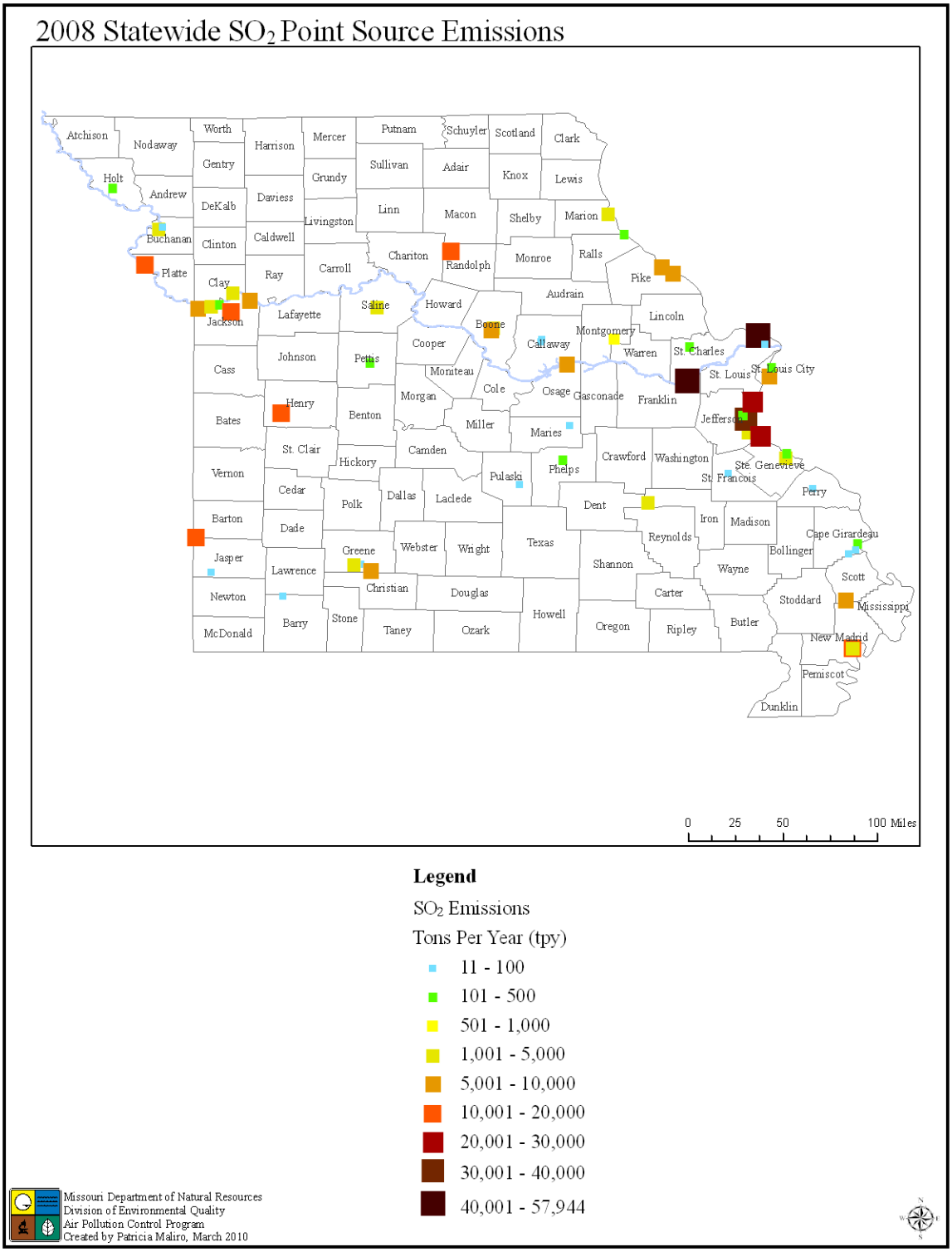

2008 Statewide SO_2 Point Source Emissions
Atchison
Nodaway
Worth
Harrison
Mercer
Putnam
Schuyler
Scotland
Clark
Holt
Andrew
Gentry
Grundy
Sullivan
Adair
Knox
Lewis
DeKalb
Daviess
Livingston
Linn
Macon
Shelby
Marion
Buchanan
Clinton
Caldwell
Chariton
Randolph
Monroe
Ralls
Platte
Clay
Ray
Carroll
Pike
Audrain
Jackson
Lafayette
Saline
Howard
Boone
Lincoln
Montgomery
Cooper
Callaway
Warren
St. Charles
Cass
Johnson
Pettis
Moniteau
St. Louis
St. Louis City
Cole
Osage
Gasconade
Franklin
Morgan
Henry
Bates
Benton
Miller
Jefferson
Maries
St. Clair
Hickory
Camden
Crawford
Washington
Ste. Genevieve
Vernon
Pulaski
Phelps
St. Francois
Cedar
Polk
Dallas
Laclede
Perry
Dent
Barton
Dade
Iron
Madison
Reynolds
Cape Girardeau
Jasper
Greene
Webster
Wright
Texas
Bollinger
Lawrence
Shannon
Wayne
Scott
Newton
Christian
Douglas
Carter
Stoddard
Mississippi
Barry
Stone
Howell
Oregon
Butler
McDonald
Taney
Ozark
Ripley
New Madrid
Pemiscot
Dunklin
0
25
50
100 Miles
Legend
SO_2 Emissions
Tons Per Year (tpy)
11 - 100
101 - 500
501 - 1,000
1,001 - 5,000
5,001 - 10,000
10,001 - 20,000
20,001 - 30,000
30,001 - 40,000
40,001 - 57,944
Missouri Department of Natural Resources
Division of Environmental Quality
Air Pollution Control Program
Created by Patricia Maliro, March 2010

Figure 6-7

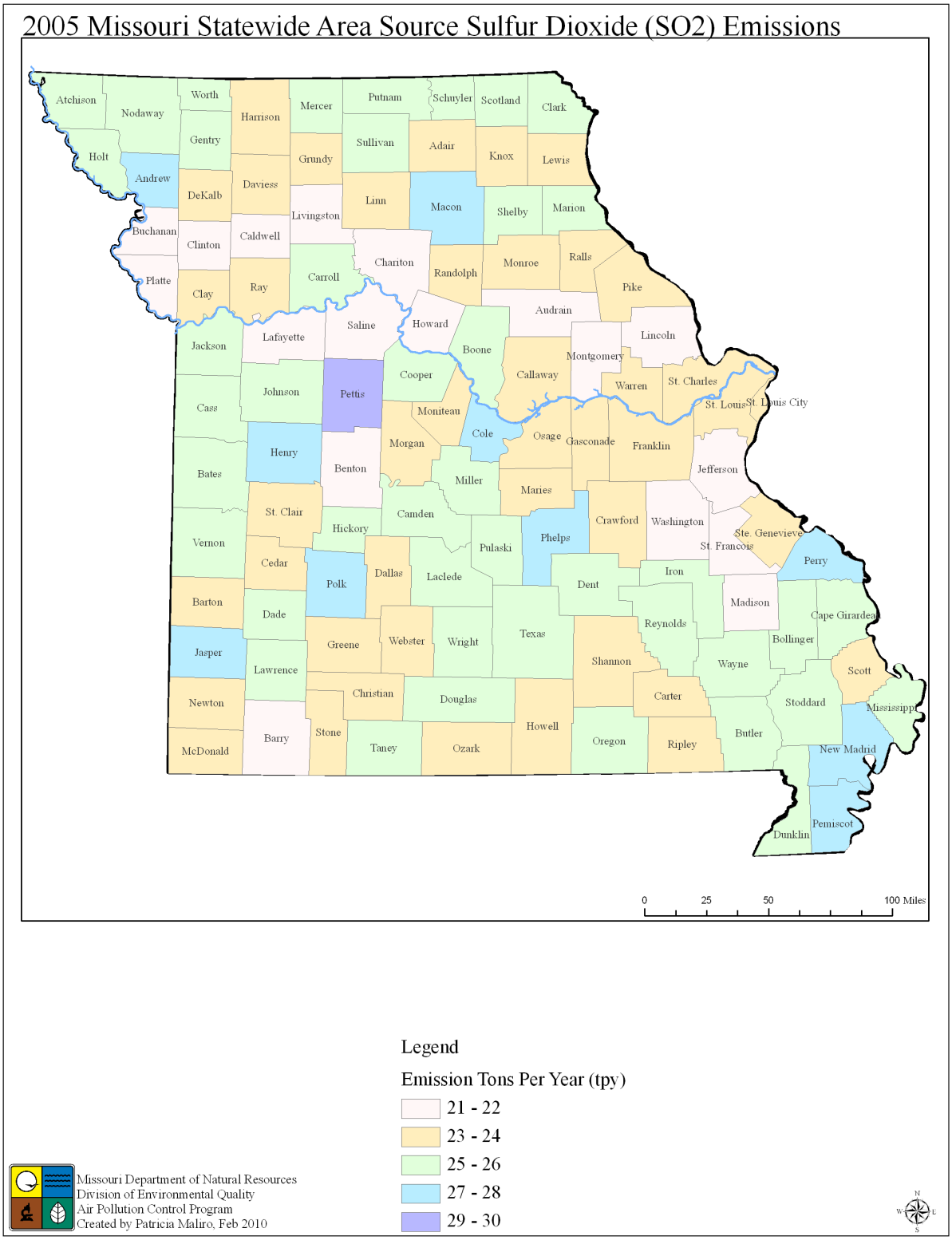

2005 Missouri Statewide Area Source Sulfur Dioxide (SO2) Emissions
Atchison
Nodaway
Worth
Harrison
Mercer
Putnam
Schuyler
Scotland
Clark
Holt
Andrew
Gentry
Grundy
Sullivan
Adair
Knox
Lewis
DeKalb
Daviess
Livingston
Linn
Macon
Shelby
Marion
Buchanan
Clinton
Caldwell
Chariton
Randolph
Monroe
Ralls
Platte
Clay
Ray
Carroll
Pike
Audrain
Lincoln
Jackson
Lafayette
Saline
Howard
Boone
Montgomery
Callaway
Warren
St. Charles
Cass
Johnson
Pettis
Cooper
Moniteau
St. Louis
St. Louis City
Henry
Morgan
Cole
Osage
Gasconade
Franklin
Bates
Benton
Miller
Maries
Jefferson
St. Clair
Camden
Crawford
Washington
Ste. Genevieve
Vernon
Hickory
Pulaski
Phelps
St. Francois
Perry
Cedar
Polk
Dallas
Laclede
Dent
Iron
Madison
Barton
Dade
Reynolds
Cape Girardeau
Jasper
Greene
Webster
Wright
Texas
Shannon
Bollinger
Lawrence
Wayne
Scott
Newton
Christian
Douglas
Carter
Stoddard
Mississippi
Barry
Stone
Howell
Oregon
Ripley
Butler
McDonald
Taney
Ozark
New Madrid
Pemiscot
Dunklin
0
25
50
100 Miles
Legend
Emission Tons Per Year (tpy)
21 - 22
23 - 24
25 - 26
27 - 28
29 - 30
Missouri Department of Natural Resources
Division of Environmental Quality
Air Pollution Control Program
Created by Patricia Maliro, Feb 2010

Figure 6-8

6.4 Evaluation of the SO_2 Monitoring Network

The following sites are source-oriented and show some potential to violate the primary NAAQS if the currently proposed NAAQS is finalized as proposed:

- James River South (operated by Springfield City Utilities),
- Wildwood Lane (operated by Springfield City Utilities),
- South Charleston,
- Herculaneum Main St.,
- Troost.

These sites are, therefore, judged to be **critical**. The NCore site at Blair Street in St. Louis is also judged to be **critical** because of the requirement for trace-level SO_2 measurement at all NCore sites.

As discussed in the previous section, there are 19 sources in Missouri with emissions greater than 5000 tpy, 14 of which are electric generating facilities, and there are also newly permitted sources as described in another section. And, as noted in the previous section, 5000 tpy sources may result in ambient SO_2 design values approaching the level of the new NAAQS. SO_2 sources in Missouri will be evaluated following new modeling guidance when it becomes available. Source-oriented ambient SO_2 monitoring in the development of future air monitoring network plans, if found necessary to determine ground-level SO_2 concentrations near the level of the new standard by any new modeling or past PSD modeling and monitoring data analysis, will also likely be judged **critical**. Permit monitoring has indicated some point sources where SO_2 ambient levels are elevated (Holcim, Doe Run, Noranda), and there are other sources where future monitoring will be conducted (Noranda, City Utilities Southwest). At the least the requirement for two SO_2 monitoring sites in the Kansas City CBSA will require an additional site in that area, and that additional site may well be a source-oriented site.

The Margaretta and South Broadway sites in St. Louis and the Ladue site in St. Louis County are not located in the vicinity of known point sources of SO_2 emissions, but show SO_2 concentrations approaching the level of the new NAAQS. These sites are judged to be **credible** because of the SO_2 concentrations measured there. It is desirable to maintain such population-oriented sites, but their continuance is being evaluated in part based on resource constraints.

The Mark Twain State Park, Missouri State University, and Maryland Heights sites are all expected to comply with the new NAAQS and are, therefore, judged to be **marginal**. Monitoring resources allocated to these sites might be diverted to other sites in the future, based on the analysis described above that will be a part of the network planning process.

7.0 NITROGEN DIOXIDE NETWORK ASSESSMENT

7.1 Nitrogen Dioxide Background

On January 22, 2010, EPA announced a new and more stringent 1-hour primary NAAQS for nitrogen dioxide (NO_2). The new standard is set at 100 ppb (75 Federal Register 6475, Tuesday, February 9, 2010) and the current annual average standard has been retained at 53 ppb with no change. EPA is also considering the need for changes to the secondary standard under a separate review and making conforming changes to the Air Quality Index (AQI).

In light of the new standard, EPA has establishing new NO_2 monitoring and reporting requirements. The requirements, as stated in the Federal Register Vol 75 pg 6504, Tuesday, February 9, 2010, include provisions for;

1. Near-road: At least one monitor near major road in any areas with population greater than or equal to 500,000 people.
2. Community-wide:
    a. A minimum of one monitor in any urban area with population greater than or equal to 1 million people.
    b. A second monitor near a major road in area with either population greater than or equal to 2.5 million or one or more segments with an annual daily traffic count greater than or equal to 2500,000 vehicles.
3. Susceptible and vulnerable communities: 40 additional NO_2 monitors to be sited nationally by the EPA Regional Administrators with states' assistance.

7.2 Summary of Current Missouri NO_2 Monitoring Network

There are a total of nine NO_2 monitoring sites in Missouri (Figure 7-1). Five sites are located in the St. Louis area, two in the Kansas City area and one in Springfield. The outstate area has one NO_2 site located in the southwest part of the state.

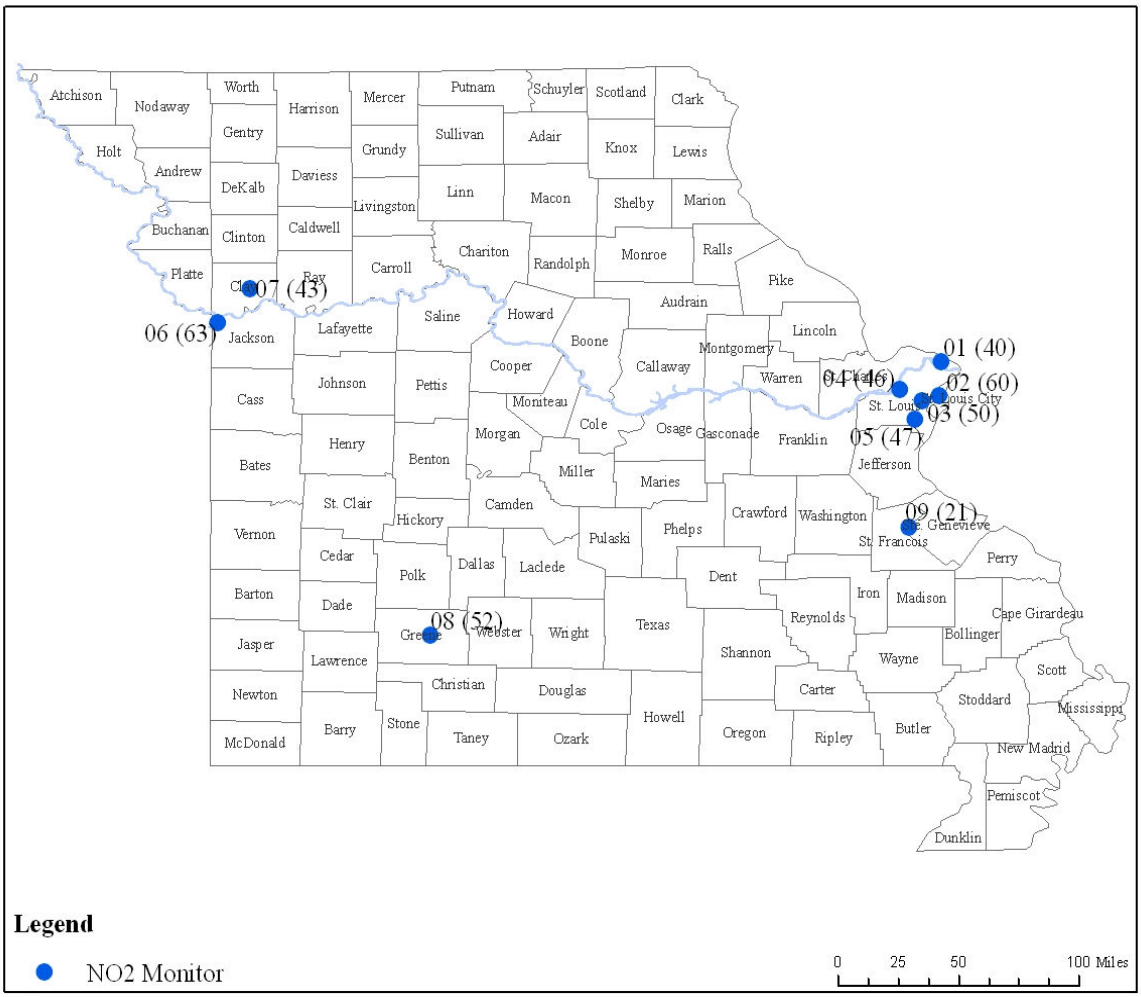
The Missouri NO_2 monitoring network was designed to meet the following basic objectives in accordance with 40 **CFR** Part 58, Appendix D:

1. Support compliance with ambient air quality standards and emissions strategy development.
2. Provide air pollution data to the general public in a timely manner.
3. Support for air pollution research studies.

Specifically, the network is designed to meet the state's needs of

4. establishing background levels,
5. gathering air mass information needed to determine regional transport effect, and
6. measuring NO_2 and nitric oxide (NO; a precursor of ozone formation) related to maximum ozone production.

Figure 7-1. Statewide NO_2 Monitoring Network, 2010
(New NAAQS = 100 ppb)



SiteNumber SiteName

St. Louis Area
- 01 West Alton
- 02 Margaretta
- 03 Ladue
- 04 Maryland Heights
- 05 Sunset Hills

Kansas City Area
- 06 Troost
- 07 Liberty

Springfield Area
- 08 Hillcrest High School

Outstate Area
- 09 Bonne Terre

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Air Pollution Control Program
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(#) 2006-2008 3-year average of the 4th highest 1-hour NO2 Concentrations

To meet the stated objectives, the Missouri NO_2 sites are sited at and represent the following spatial scales:

Urban Scale: Sites at this scale characterize NO_2 concentrations within an area of city-like-dimensions, on the order of 4 to 50 kilometers. These sites serve multiple monitoring objectives from NAAQS comparison to photochemical assessment to characterizing concentrations NO_2 upwind and downwind of the urban. All the current sites except Bonne Terre represent urban scale.

Regional Scale: Sites at this scale are usually in a rural setting where the area is usually homogeneous geographically without large sources. The area presented extends from tens to hundreds of kilometer. Sites representing this scale determine general background level and the extent of regional pollutant transport. Bonne Terre represents the regional scale.

The current NO_2 urban networks could meet the community-wide monitoring requirement in their respective urban areas. EPA has proposed to require the area-wide monitors to characterize maximum NO_2 concentrations at neighborhood or larger scales (75 **Federal Register** 6508, Tuesday, February 9, 2010). However, changes to the network are required to meet the near-road monitoring requirement.

7.3 NAAQS Compliance Review and NO_2 Design Value Trends

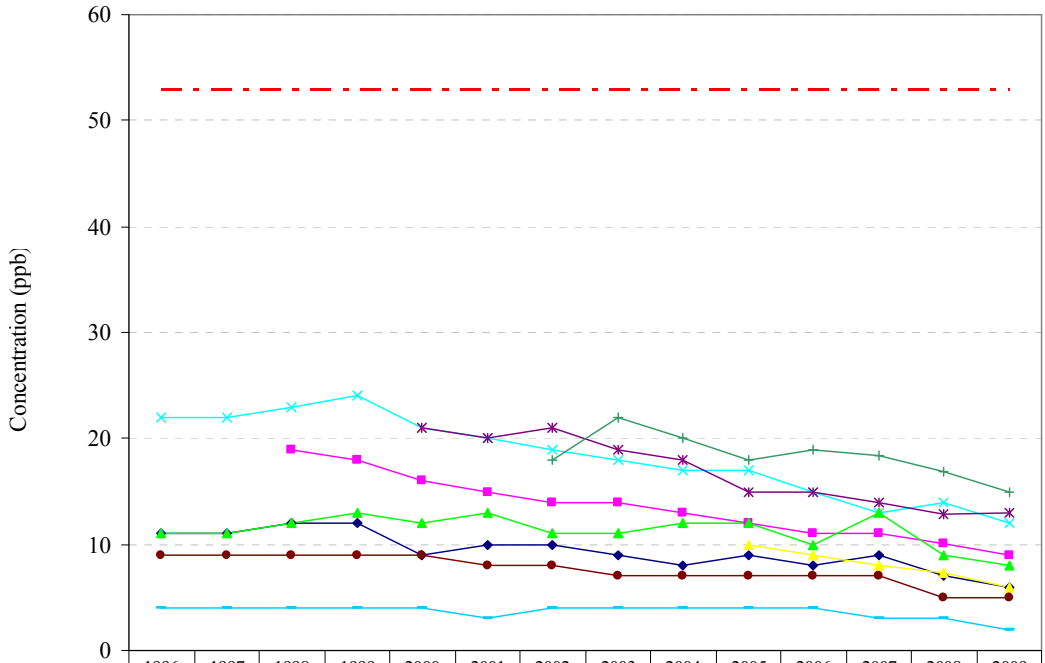
1996 through 2008 NO_2 ambient air monitoring data was used to assess the current and discontinued sites against the NAAQS. The NAAQS for NO_2 are an annual arithmetic mean of 53 ppb and a 1-hour average of 100 ppb (new).

There have been no violations of the annual standard at any of the current nine sites since prior to 1996, Figure 7-2. NO_2 concentrations have measured about half or less than half of the standard at all the current sites. They have ranged from 3 ppb at Bonne Terre (background site) in 2008 to 24 ppb at Ladue in 1999. Additionally, noticeable downward trends can be seen at Ladue, West Alton, Sunset Hills, Maryland Heights, Margaretta, Troost, and Liberty. For example, concentrations at Ladue have declined from 24 ppb in 1999, when concentrations measured highest at the site, to 14 ppb in 2008. Downward to stable trends can also be noted at Bonne Terre and Hillcrest.

No violations have also been monitored at any of the discontinued sites, Figure 7-3. Downward to stable trends can also been noted at all these sites.

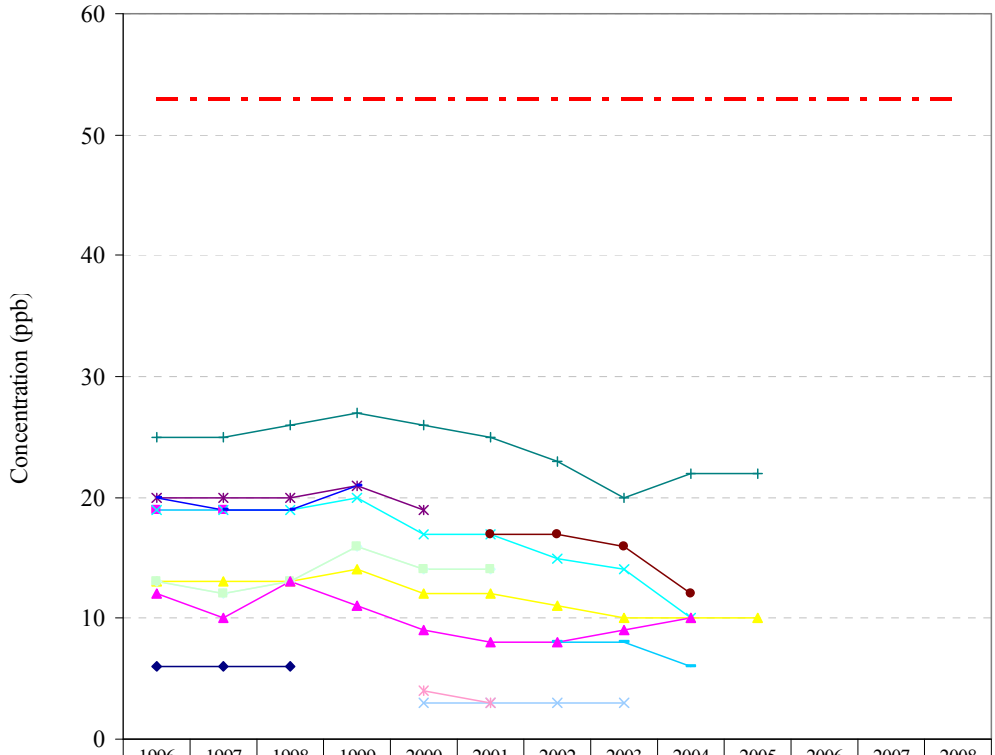
Compared to the new 1-hour standard of 100 ppb, none of the current sites violate the standard. Design values have ranged from 19 ppb (Bonne Terre) to 73 ppb (Toost) since 2001. The current design values (2006-2008) range from 21 ppb at Bonne Terre to 63 ppb at Troost.

Figure 7-2. Annual Arithmetic Means of NO_2 Concentration of the Current Network
(Annual NAAQS = 53 ppb)



	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
West Alton	11	11	12	12	9	10	10	9	8	9	8	9	7	6
Sunset Hills			19	18	16	15	14	14	13	12	11	11	10	9
Maryland Heights										10	9	8	7	6
Ladue	22	22	23	24	21	20	19	18	17	17	15	13	14	12
Margaretta					21	20	21	19	18	15	15	14	13	13
Liberty	9	9	9	9	9	8	8	7	7	7	7	7	5	5
Troost							18	22	20	18	19	18	17	15
Hillcrest	11	11	12	13	12	13	11	11	12	12	10	13	9	8
Bonne Terre	4	4	4	4	4	3	4	4	4	4	4	3	3	2
NO2 Annual Standard	53	53	53	53	53	53	53	53	53	53	53	53	53	53

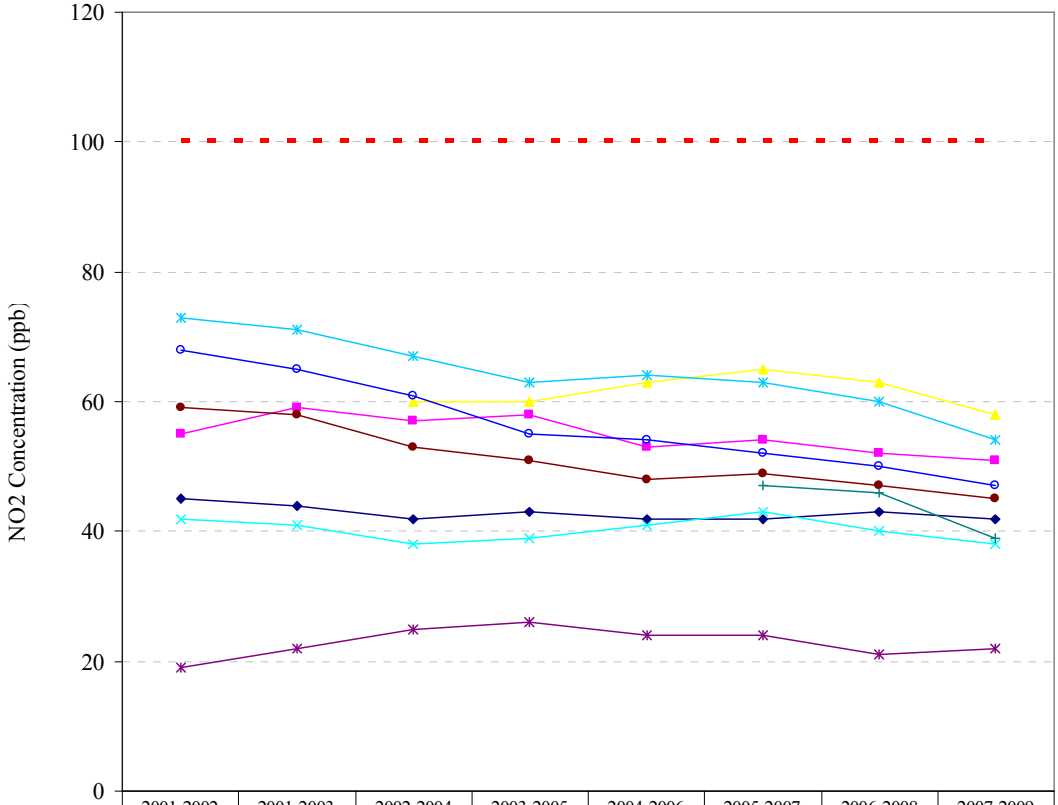
Figure 7-3. Annual Arithmetic Means of NO_2 Concentration of the Discontinued Monitoring Sites
(Annual NAAQS = 53 ppb)



	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Augusta	6	6	6										
Affton	19	19											
Queeny Park	13	13	13	14	12	12	11	10	10	10			
Ferguson	19	19	19	20	17	17	15	14	10				
St. Ann	20	20	20	21	19								
Breckenridge Hills						17	17	16	12				
Clark	25	25	26	27	26	25	23	20	22	22			
Newstead & Cotebrilliant	20	19	19	21									
Rocky Creek							8	8	6				
Worlds of Fun	13	12	13	16	14	14							
KCI- 49th Winchester	13	12	13	16	14	14							
KCI-11500 N 71 Hwy	12	10	13	11	9	8	8	9	10				
Eldorado Springs					3	3	3	3					
Mercer					4	3							
NO2 Annual Standard	53	53	53	53	53	53	53	53	53	53	53	53	53

Figure 7-4. 3-Year Average of the 4th Highest Daily 1-Hour NO_2 Maximum Concentrations for the Current Network

(New 1-hour NAAQS = 100 ppb)



	2001-2002	2001-2003	2002-2004	2003-2005	2004-2006	2005-2007	2006-2008	2007-2009
Liberty	45	44	42	43	42	42	43	42
Hillcrest	55	59	57	58	53	54	52	51
Troost			60	60	63	65	63	58
West Alton	42	41	38	39	41	43	40	38
Bonn Terre	19	22	25	26	24	24	21	22
Sunset Hill	59	58	53	51	48	49	47	45
Maryland Heights						47	46	39
Ladue	68	65	61	55	54	52	50	47
Margaretta	73	71	67	63	64	63	60	54
Proposed Standard	100	100	100	100	100	100	100	100

7.4 NO_X Emissions Assessment

Nitrogen oxides (NO_X) are emitted from a wide variety of source types; point (electricity generating units and other stationary combustion sources), mobile (on-road), and area (low level and non-road) sources. Review of the NO_X emissions include all the three categories and are presented in Figures 7-5 through 7-10.

7.4.1 Point Sources

Point Source Emissions
Statewide 2008 point sources with their respective emissions are presented in Figure 7-5. As shown in the figure, some of the larger sources are located within the boundaries of the St. Louis, Kansas City, and Springfield urban cores. In addition, areas of higher concentrations of relatively smaller sources are located within these boundaries, especially in St. Louis and Kansas City. Impacts from these sources on the areas could be significant.

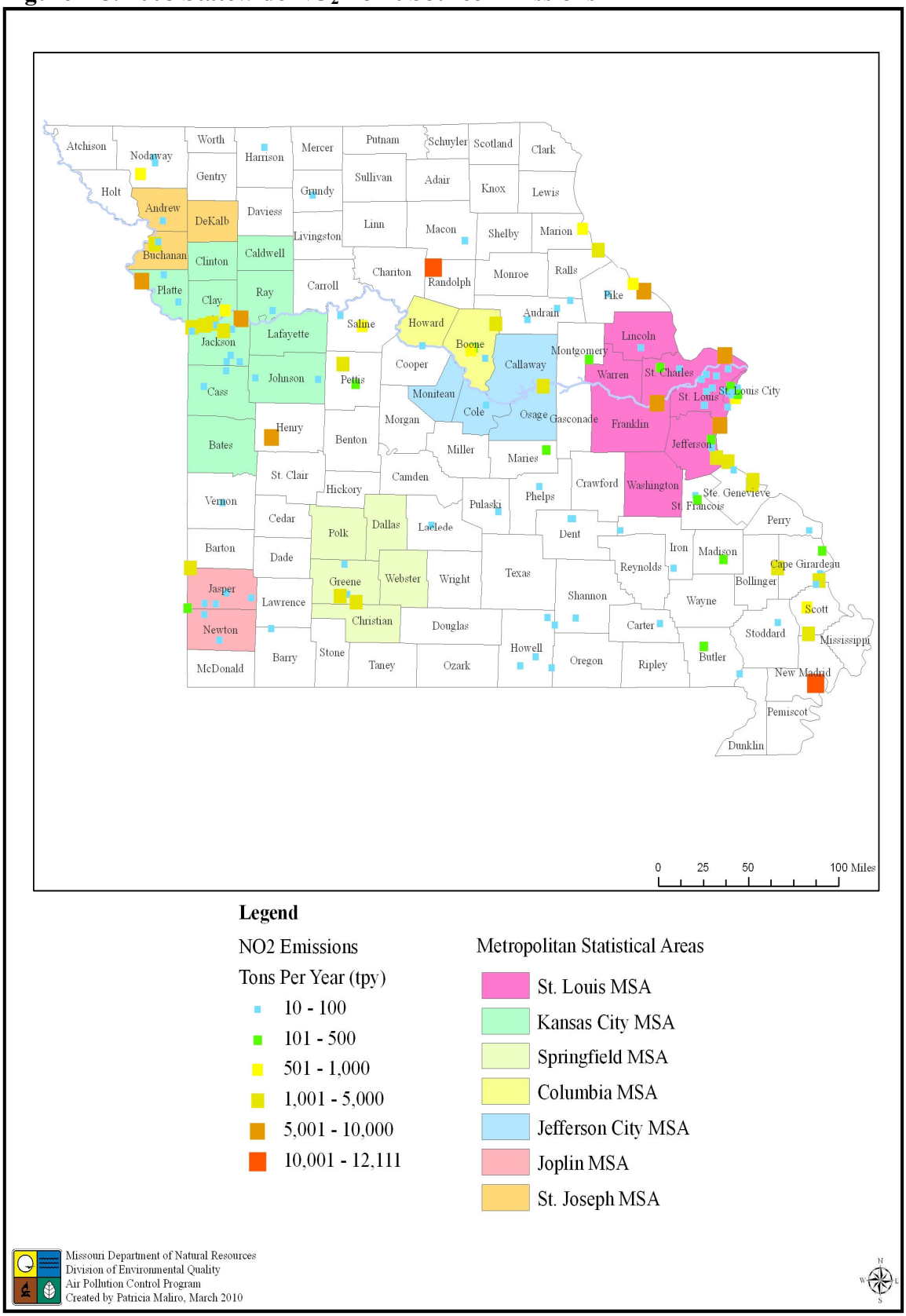
Some large sources are located outside the urban cores, especially along the Missouri and Mississippi rivers. A relatively large concentration of point sources is also noted in the southwest part of the state, in the Joplin MSA. This is a growing area in terms of population. New Madrid (New Madrid County) and Thomas Hill Energy (Randolph County) power plants are statewide the first and second largest point sources, respectively. However, neither plant is located within the urban core or metropolitan statistical areas. There are no other identified point sources in the immediate surroundings of both plants. The plants emissions represent yearly total point source emissions for their respective counties.

Point Source NO_X Emission Trends
2008 yearly total emissions by county point source emissions trends are presented in Figures 7-6 through 7-10.

St. Louis MSA
Overall point source emissions have decreased by about 28% in the St. Louis area from 2003 to 2008, Figure 7-6. Significant decrease is seen in the St. Charles, St. Louis, and Jefferson Counties emissions. A slight upward trend is noted in emissions from Franklin County. The Ameren UE Labadie power plant is primarily the source of point source emissions in Franklin County. Located west of the St. Louis urban core, Labadie is a potential major contributor to the area's NO_X emissions. Emissions from St. Louis City and Lincoln County have remained low and stable.

Pike County, just outside the St. Louis MSA, shows emissions that have been relatively higher have slightly increased, Figure 7-9. Limited impacts from the county are expected as it is located downwind of the MSA. Ste. Genevieve County (also in Figure 7-9) has measured about half the emissions of the larger county contributors within the St. Louis MSA. Located upwind of the St. Louis MSA, its impacts, though small, may be registered within St. Louis. All the other immediate counties of the St. Louis MSA have had emissions of no more than 400 tpy, Figure 7-10.

Figure 7-5. 2008 Statewide NO_2 Point Source Emissions



Legend

NO2 Emissions

Tons Per Year (tpy)

- 10 - 100
- 101 - 500
- 501 - 1,000
- 1,001 - 5,000
- 5,001 - 10,000
- 10,001 - 12,111

Metropolitan Statistical Areas

- St. Louis MSA
- Kansas City MSA
- Springfield MSA
- Columbia MSA
- Jefferson City MSA
- Joplin MSA
- St. Joseph MSA

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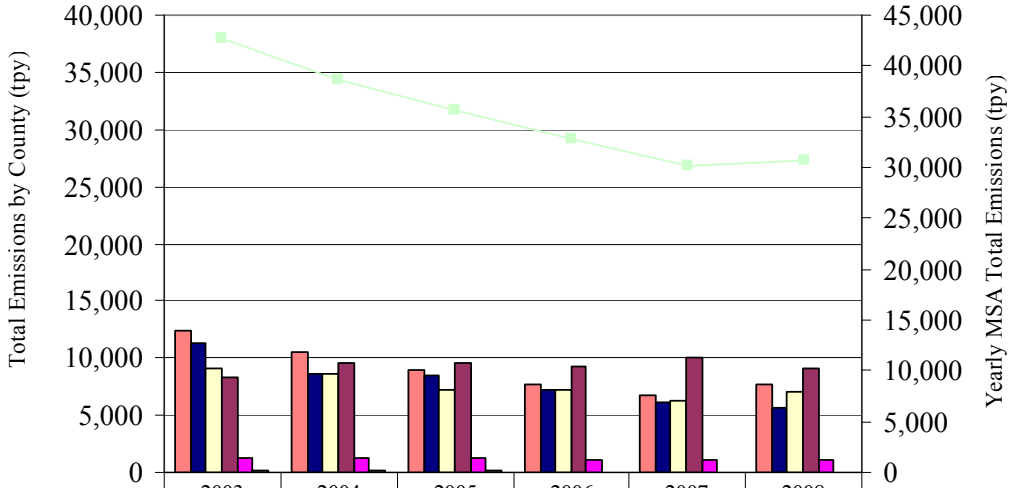
Figure 7-6. St. Louis MSA Point Source NO_X Emission Trends, 2003-2008



	2003	2004	2005	2006	2007	2008
St.Charles County	12,462	10,501	8,910	7,728	6,737	7,616
St. Louis County	11,372	8,575	8,531	7,290	6,052	5,683
Jefferson County	9,107	8,645	7,291	7,267	6,202	6,991
Franklin County	8,309	9,577	9,504	9,315	9,997	9,169
St. Louis City	1,300	1,260	1,234	1,157	1,158	1,161
Lincoln County	89	126	112	72	60	32
Total MSA Emissions	42,639	38,683	35,580	32,828	30,207	30,651

Kansas City MSA

Again, about a 28% decline is noted in the overall point source emissions in the Kansas City MSA, Figure 7-7. Jackson and Platte Counties have had noticeable declines in emissions. Clay, Cass, and Ray Counties show trends that have been more or less stable.

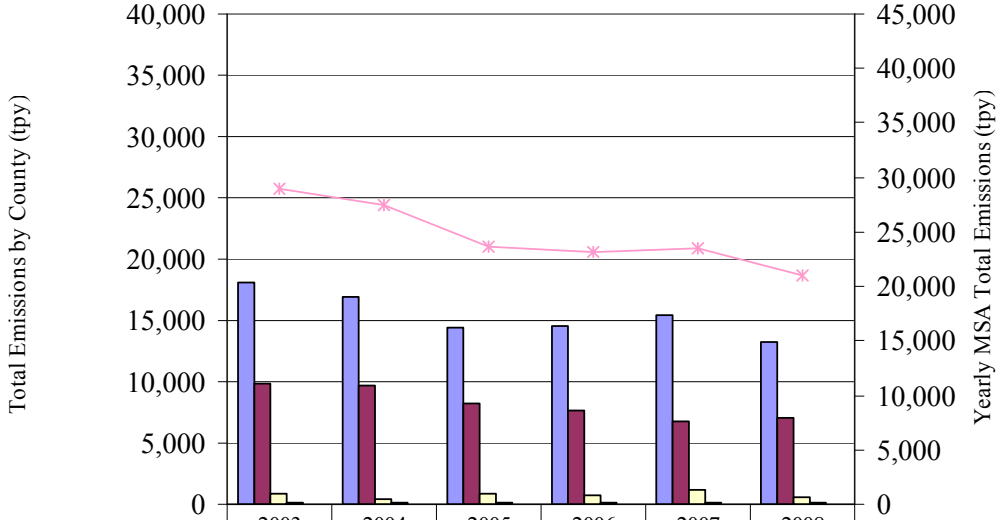
Henry County located southwest and upwind of the Kansas City MSA shows emissions that have slightly trended upward and have been greater than 5,000 tpy, Figure 7-9. The county's emissions are generally from the Kansas City Power Plant (see Figure 7-5). NO_X emissions from the plant have ranged from 5,096 tpy to 6,442 tpy between 2003 and 2008. Impacts from Henry County on the Kansas City MSA NO_X levels are plausible, to some extent.

Buchanan has the second highest emissions among counties that share boundary with the Kansas City MSA. However, because it is located downwind of the area, NO_X impacts from the county are limited.

Springfield MSA

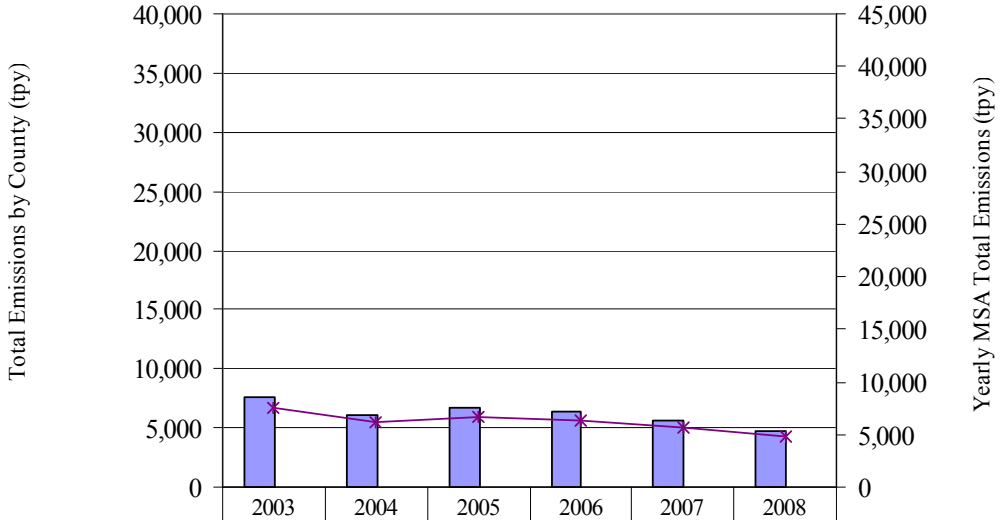
Total Springfield MSA point source NO_X emissions have declined 36%, Figure 7-8. The area's emissions are largely from Green County, year after year. Compared to the St. Louis and Kansas City emissions, Springfield yearly emissions are 4 to 6 times lower. None of the surrounding counties have had NO_X emissions that are more than 50 tpy in the years 2003 through 2008 (Figure 7-10).

Figure 7-7. Kansas City MSA Point Source NO_X Emission Trends, 2003-2008



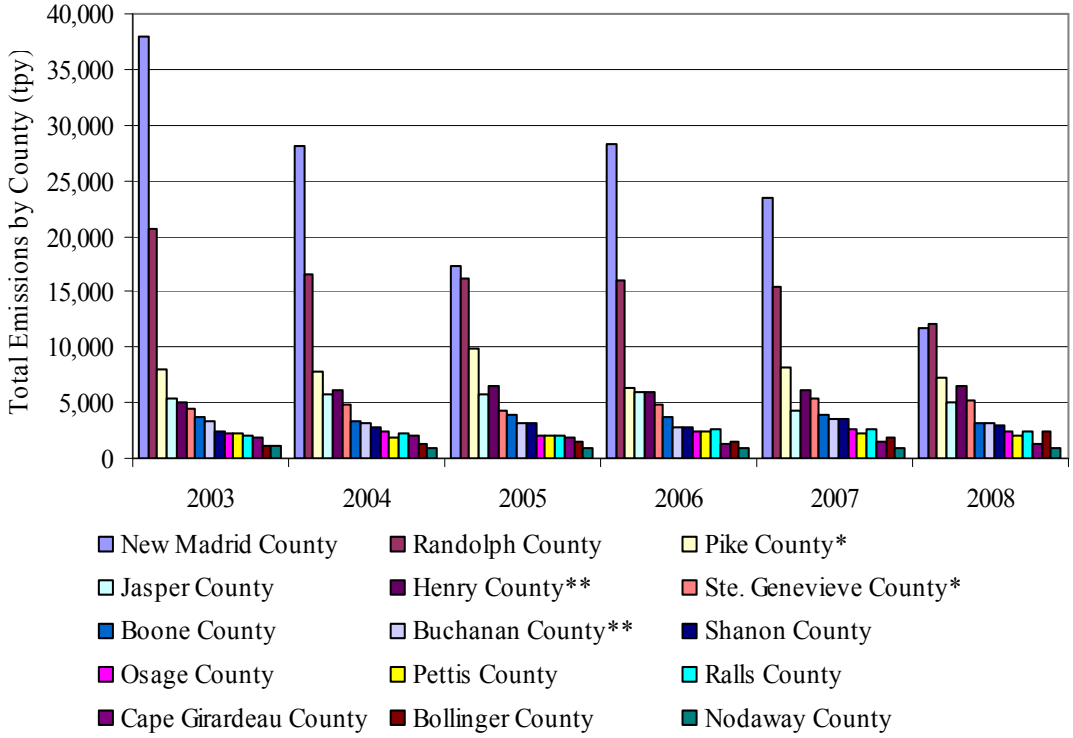
	2003	2004	2005	2006	2007	2008
Jackson County	18,100	16,985	14,466	14,568	15,431	13,226
Platte County	9,924	9,749	8,182	7,718	6,711	6,994
Clay County	830	488	906	725	1,218	530
Cass County	132	150	92	126	170	152
Ray County	35	33	37	44	44	40
Yearly MSA Total Emissions	29,022	27,406	23,683	23,181	23,575	20,941

Figure 7-8. Springfield MSA Point Source NO_X Emission Trends, 2003-2008



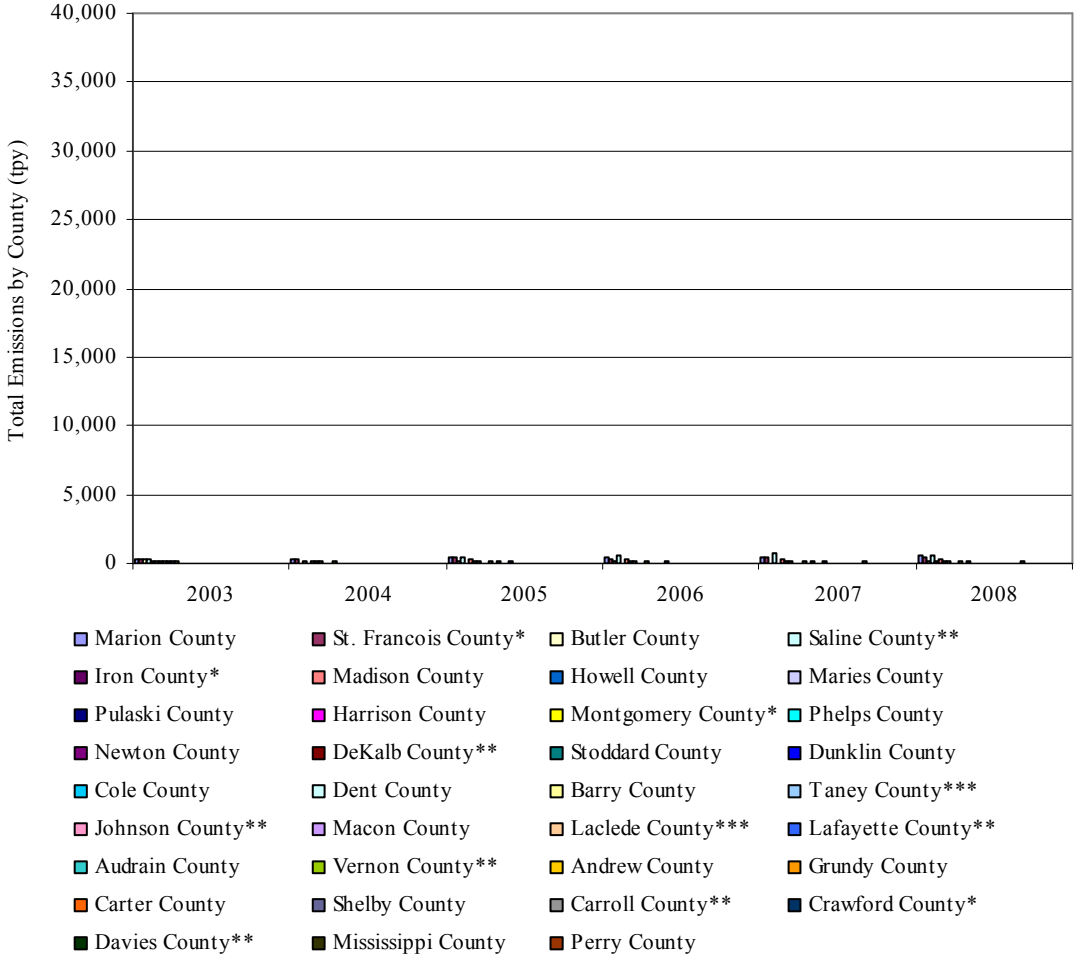
	2003	2004	2005	2006	2007	2008
Green County	7,538	6,076	6,688	6,363	5,675	4,751
Webster County			11			
Yearly MSA Total Emissions	7,538	6,076	6,699	6,363	5,675	4,751

Figure 7-9. Outstate Point Source NO_X Emission Trends, 2003-2008 (Emissions >1,000 tpy)



*Counties bordering the St. Louis MSA
**Counties bordering the Kansas City MSA
***Counties bordering the Springfield MSA

Figure 7-10. Outstate Point Source NO_X Emission Trends, 2003-2008 (Emissions =<1,000 tpy)



*Counties boardering the St. Louis MSA
**Counties boardering the Kansas City MSA
***Counties boardering the Springfield MSA

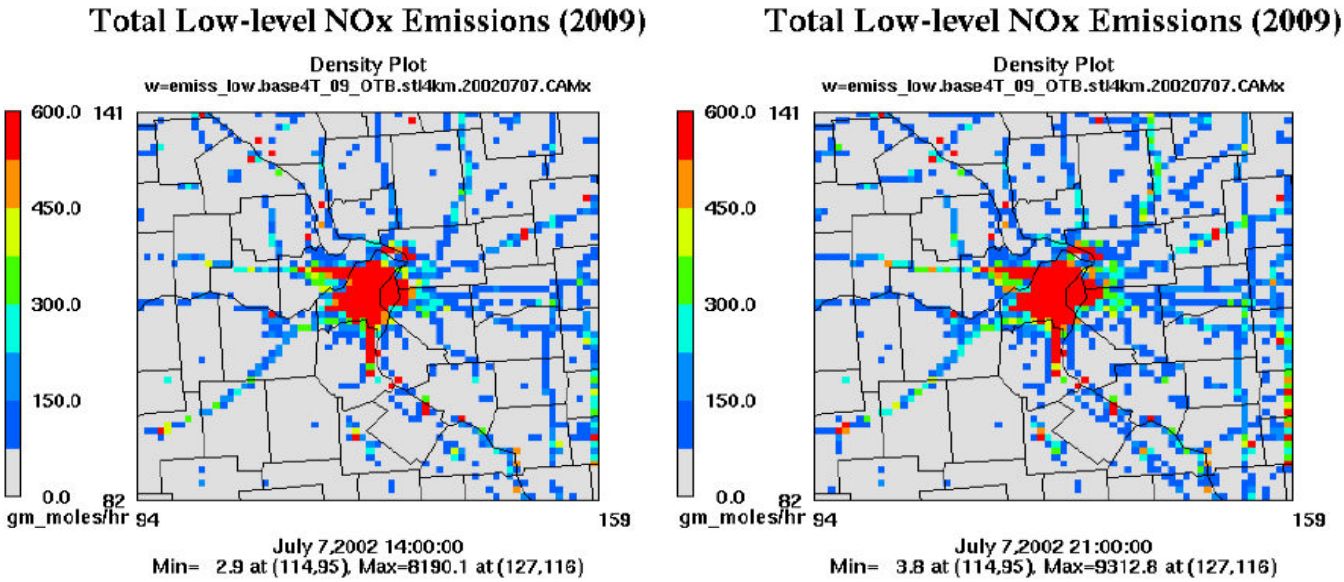
7.4.2 Mobile Source NO_X Emissions

Mobile source NO_X emissions are estimated from the traffic volume count (TVC) and expressed as Average Annual Daily Traffic (AADT). The Missouri Department of Transportation estimates some of the most trafficked segments of the major highways to be in the approximate centers of the St. Louis, Kansas City and to some extent Springfield metropolitan areas. See http://www.modot.mo.gov/safety/trafficvolumemaps.htm and Figures 5-4 to 5-8.

Low level 2002 NO_X emission densities during the rush hours of 7:00 AM and 3:00 PM in the St. Louis, Kansas City, and Springfield areas, respectively, are shown in Figures 7-11 through 7-13. St. Louis experiences the highest emission levels followed by Kansas City and Springfield in that order. The results are consistent with TVC. Also, as expected, emission levels increase as

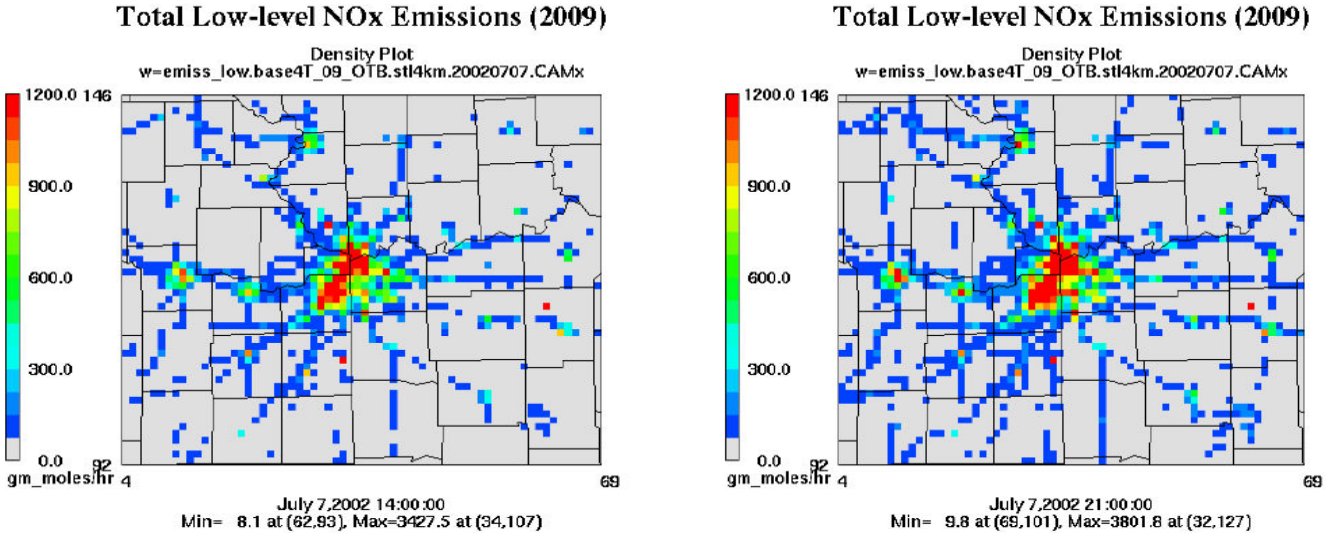
traffic moves closer to the urban core and are highest within the urban centers. The emission intensity is relatively high during the afternoon rush hour.

Figure 7-11. St. Louis Area NO_X Emission Density



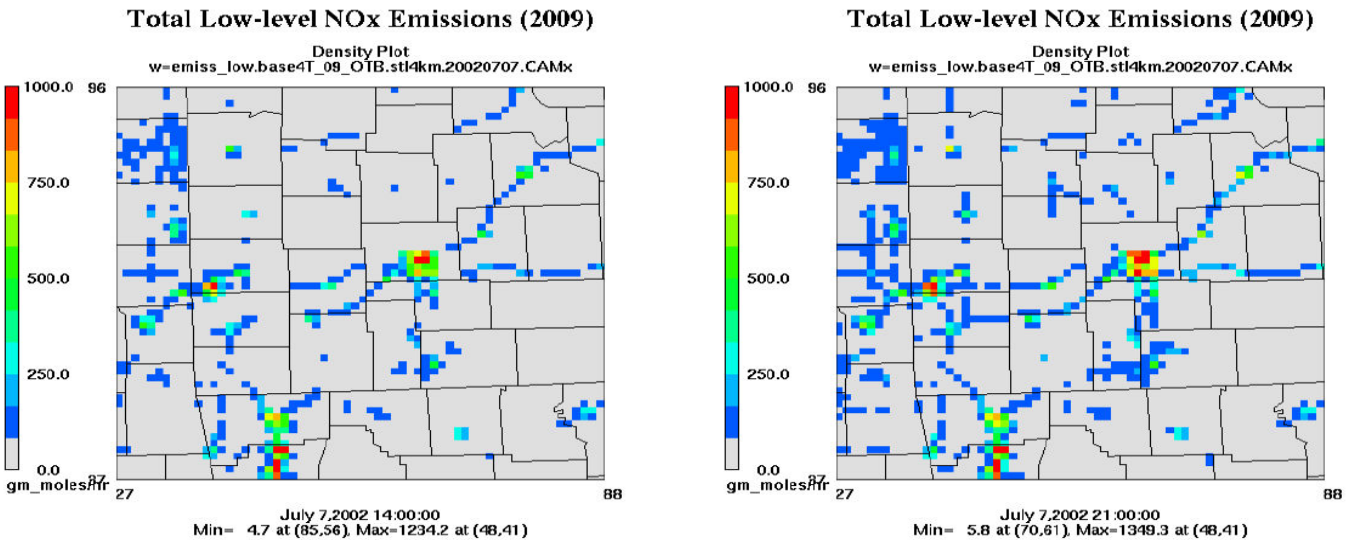
July 7, 22 8-AM *July 7, 22 3-PM*

Figure 7-12. Kansas City Area NO_X Emission Density



July 7, 22 8-AM *July 7, 22 3-PM*

Figure 7-13: Springfield Area NO_X Emission Density

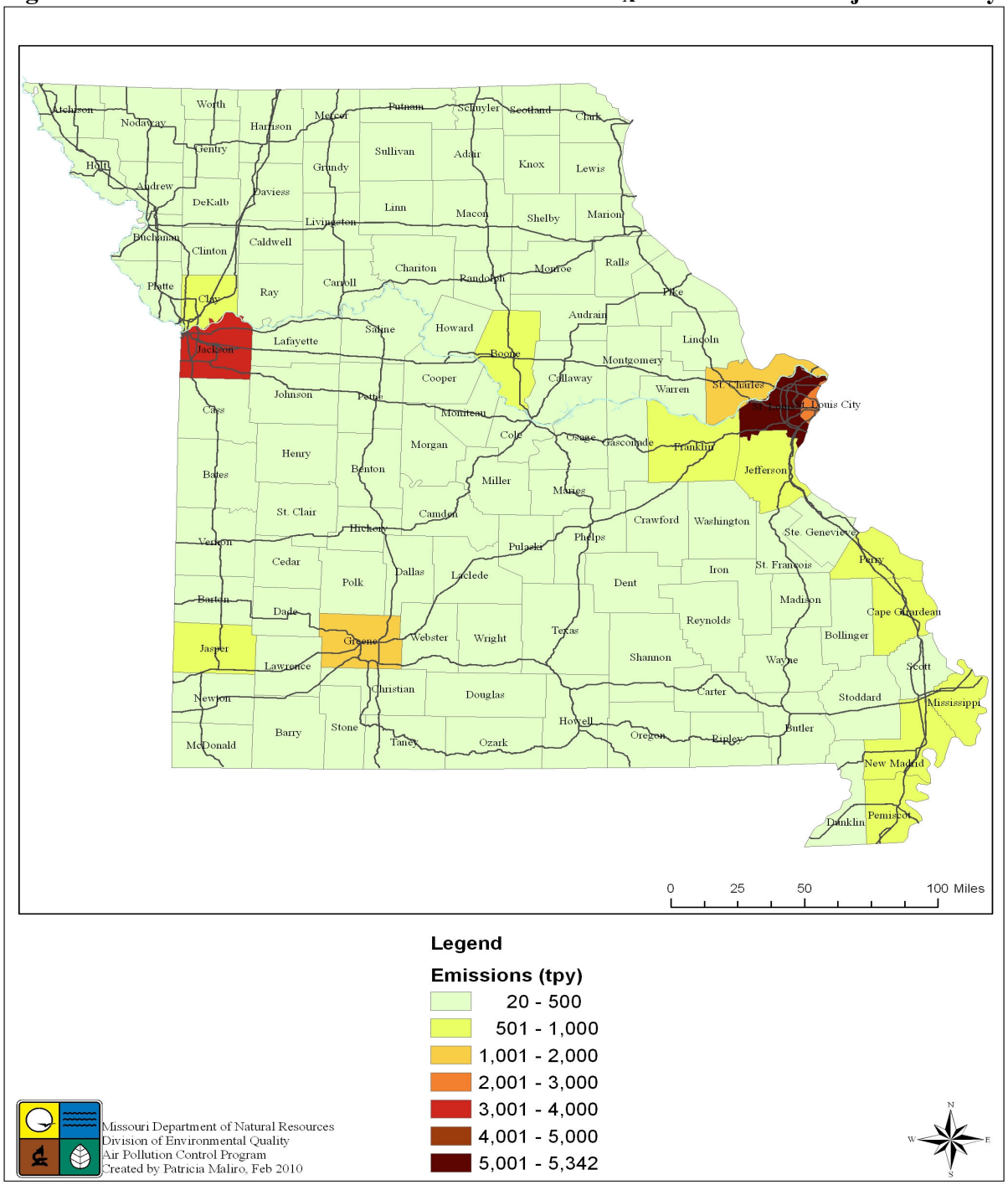


July 7, 22 8-AM *July 7, 22 3-PM*

7.4.3 Area Source NO_X Emissions

Figure 7-14 shows the 2005 area source emissions in the range of 3,000 to 5,000 tpy in counties especially within the St. Louis and Kansas City metropolitan areas. The Springfield area shows moderate emissions of about 1,000 tpy. Counties along the Mississippi river and Boone and Jasper counties show emissions of between 500 and 1,000 tpy.

Figure 7-14. 2005 Missouri Statewide Area Source NO_X Emissions and Major Roadways



Legend

Emissions (tpy)

- 20 - 500
- 501 - 1,000
- 1,001 - 2,000
- 2,001 - 3,000
- 3,001 - 4,000
- 4,001 - 5,000
- 5,001 - 5,342

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Air Pollution Control Program
Created by Patricia Maliro, Feb 2010

7.5 Evaluation of the NO_2 Monitoring Network

Past monitoring has been in both downwind and in central areas of the major MSAs and near large power plants. In general that monitoring has shown that the concentrations are so consistently and far below the annual NAAQS that there are no legitimate concerns with regard to that standard. As shown in Figures 7-2 and 7-4, NO_2 concentrations at West Alton, Liberty, Hillcrest, and Bonne Terre have been low and trending down over the years. Hillcrest, West Alton and Liberty are located northerly and downwind of the urban areas and in much less urbanized areas. The three sites are located at a distance from the respective emissions centroids, as is Maryland Heights. Ladue is located west on the outskirts of the urban core. Values at Ladue have also been low and trending down. Bonne Terre, located upwind of the St. Louis area has consistently monitored the lowest NO_2 concentrations in the state. There are no major NO_2 sources near the site and is also in less urban area.

With regard to the new 1-hour NAAQS, Troost in Kansas City and Margaretta in St. Louis are shown to have monitored NO_2 concentrations somewhat higher than the rest of the sites, Figure 7-1. Other downwind monitoring, at Maryland Heights, Ladue, Sunset Hills, West Alton, Liberty and Hillcrest is slightly lower. Upwind monitoring at Bonne Terre would indicate that concentrations outside the sphere of the metropolitan areas are lower still. Based on this analysis, West Alton, Liberty, Hillcrest, Maryland Heights, Sunset Hills, Ladue, and Bonne Terre are evaluated as **marginal**. 40 **CFR** § 58.14 criteria for discontinuation of a SLAMS monitor indicate that any sampler which has shown attainment during the previous five years and that has a probability of less than 10 percent of exceeding 80 percent of the NAAQS during the next three year based on the levels, trends, and variability observed in the past is a candidate for discontinuance. Table 7-1 shows all the NO_2 Missouri sites meeting the criteria as stated in 40 **CFR** § 58.14. However, as stated above, Troost and Margaretta have monitored relatively higher 1-hour averages. These sites are not considered for discontinuation.

Table 7-1. Evaluation of the NO_2 Monitoring Sites in Accordance to 40 CFR § 58.14

		Annual Arithmetic Mean						2004-2008 Test			2005-2009 Test		
Site	**Averaging Time**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**90% Upper CI**	**80% of NAAQS**	**Fail/Met**	**90% Upper CI**	**80% of NAAQS**	**Fail/Met**
West Alton	Annual Average	0.008	0.009	0.008	0.009	0.007	0.006	0.009	0.042	Met	0.009	0.042	Met
Sunset Hills	"	0.013	0.012	0.011	0.011	0.010	0.009	0.012	0.042	Met	0.012	0.042	Met
Maryland Heights*	"	-	0.010	0.009	0.008	0.007	0.006	-	0.042	-	0.010	0.042	Met
Ladue	"	0.017	0.017	0.015	0.013	0.014	0.012	0.017	0.042	Met	0.016	0.042	Met
Liberty	"	0.007	0.007	0.007	0.007	0.005	0.005	0.007	0.042	Met	0.007	0.042	Met
Troost	"	0.020	0.018	0.019	0.018	0.017	0.015	0.019	0.042	Met	0.019	0.042	Met
Hillcrest	"	0.012	0.012	0.010	0.010	0.009	0.008	0.012	0.042	Met	0.011	0.042	Met
Bonne Terre	"	0.004	0.004	0.004	0.003	0.003	0.002	0.004	0.042	Met	0.004	0.042	Met

* Less than 5-years of data

Alternatively, based on the above NO_X emissions review and past monitoring data, high emission levels of NO_X are plausible in the central areas of St. Louis, Kansas City, and Springfield. These areas contain highly traveled highway segments and some of the larger point sources. Areas of higher concentrations of smaller point sources and counties with high area emissions are also located within these metropolitan areas. In addition, these are some of the most densely populated areas in the state, (see population maps in Section 2.0). The importance of NO_X monitoring in these areas, to ascertain NO_X health impacts, cannot therefore be overstated.

The new NO_2 NAAQS includes provision for near-road monitoring and urban area monitoring. The current Missouri monitoring network does not include any near-road sites. Troost is located fairly close to Interstate 70, but with regard to the main traffic lanes is still more distant than 50 meters. In addition, the elevation gradient from Interstate 70 is extreme at Troost, and not ideal for roadway monitoring. As a result two monitors in St. Louis and one monitor in Kansas City will need to be installed for near-roadway NO_2 monitoring in accordance with the EPA final 2009 NAAQS revision as stated in 75 **Federal Register** 6512, February 9,2010;

> "NO_2 monitoring stations shall be selected by ranking all road segments within a CBSA by AADT and then identifying a location or locations adjacent to those highest ranked road segments where maximum hourly NO_2 concentrations are expected to be highest and siting criteria can be met in accordance with that proposed for 40 **CFR** Part 58 Appendix E (discussed in III.B.7). Where a State or local air monitoring agency identifies multiple acceptable candidate sites where maximum hourly NO_2 concentrations are expected to occur, the monitoring agency should consider taking into account the potential for population exposure in the criteria utilized to select the final site location. Where one CBSA is required to have two near-road NO_2 monitoring stations, we proposed that the sites shall be differentiated from each other by one or more of the following factors: Fleet mix; congestion patterns; terrain; geographic area within the CBSA; or different route, interstate, or freeway designation".

The recommended near-road sites are therefore **critical** NO_2 monitoring sites. In addition, roadway monitoring at a high traffic location in the Springfield MSA would be desirable, to determine what levels are in this somewhat smaller, but growing area, which we would designate **critical**. Finally, additional NO_X/NO_Y (NO_Y represents total reactive nitrogen oxides) monitoring is to commence at the Blair Street NCore site. The Blair Street site would also be a **critical** site to the current monitoring network.

A near-roadway site is also recommended for the Branson area (not at the new ozone site). The Branson micropolitan area is estimated to have had the highest percentage population growth (16.22%) between 2000 and 2009 in the state (Table 2-3). There are a significant number of older persons and families engaging in outdoor activities throughout the area. Hence, it is important to characterize the NO_2 concentrations there in the area. This site would be **critical** to determine if high NO_2 concentrations are occurring.

While Troost is not ideal for roadway monitoring, it does indicate high concentrations in the urban core, as does Margaretta, and possibly Ladue. Both Troost and Margaretta could meet the

area-wide monitoring requirement, with the possible relocation of Troost to minimize the influence of roadway traffic and increase its scale of representation. The Margaretta site is therefore **critical**, with the potential for the movement of Troost making it **marginal**. Given the secondary nature of the Ladue site, it would be **marginal**.

8.0 PM_{10} NETWORK ASSESSMENT

8.1 PM_{10} Background

On September 21, 2006 the EPA announced the retention of the 1987 24-hour PM_{10} primary and secondary standards at 150 µg/m^3 (71 **Federal Register** 61144, October 17, 2006) but revoked the annual standard. The standards are met when the expected number of days with a 24-hour average concentration above 150 µg/m^3 do not exceed more than once per year on average over a 3-year period, as determined in accordance with Appendix K to 40 **CFR** 50.

The revisions proposed the standard for the $PM_{10-2.5}$ (PM_{Coarse}) but did not finalize the rule due to limited body of evidence on health effects associated with the coarse particles (EPA has proposed revoking the 24-hour PM_{10} standard as well as the annual PM_{10} upon finalization of the 24-hour standard for PM_{Coarse}). The revisions, however, included a new Federal Reference method (FRM) for the ambient air measurement of PM_{Coarse}. This will provide a basis for gathering scientific data to support future reviews of PM NAAQS and approving Federal Equivalent Methods (FEMs).

There are minimum monitoring requirements for PM_{10} in each MSA. 40 **CFR** 58 Appendix D outlines the requirements and are presented below in Table 8-1. The minimum requirements are based on the MSA population and the monitored PM_{10} concentrations relative to the NAAQS.

Table 8-1. PM_{10} Minimum Monitoring Requirements
(Approximate Number of Stations per MSA)[1]

Population category	High concentration[2]	Medium concentration[3]	Low concentration[4,5]
>1,000,000	6–10	4–8	2–4
500,000–1,000,000	4–8	2–4	1–2
250,000–500,000	3–4	1–2	0–1
100,000–250,000	1–2	0–1	0

[1]Selection of urban areas and actual numbers of stations per area will be jointly determined by EPA.
[2]High concentration areas are those for which ambient PM_{10} data show ambient concentrations exceeding the PM_{10} NAAQS by 20 percent or more.
[3]Medium concentration areas are those for which ambient PM_{10} data show ambient concentrations exceeding 80 percent of the PM_{10} NAAQS.
[4]Low concentration areas are those for which ambient PM_{10} data show ambient concentrations less than 80 percent of the PM_{10} NAAQS.
[5]These minimum monitoring requirements apply in the absence of a design value.

8.2 Summary of the Missouri PM_{10} Monitoring Network

There are 12 sites currently monitoring PM_{10} concentrations in Missouri. six sites are located within the St. Louis area, two in the Kansas City area, one in Springfield and three in the outstate areas (see Figure 8-1).

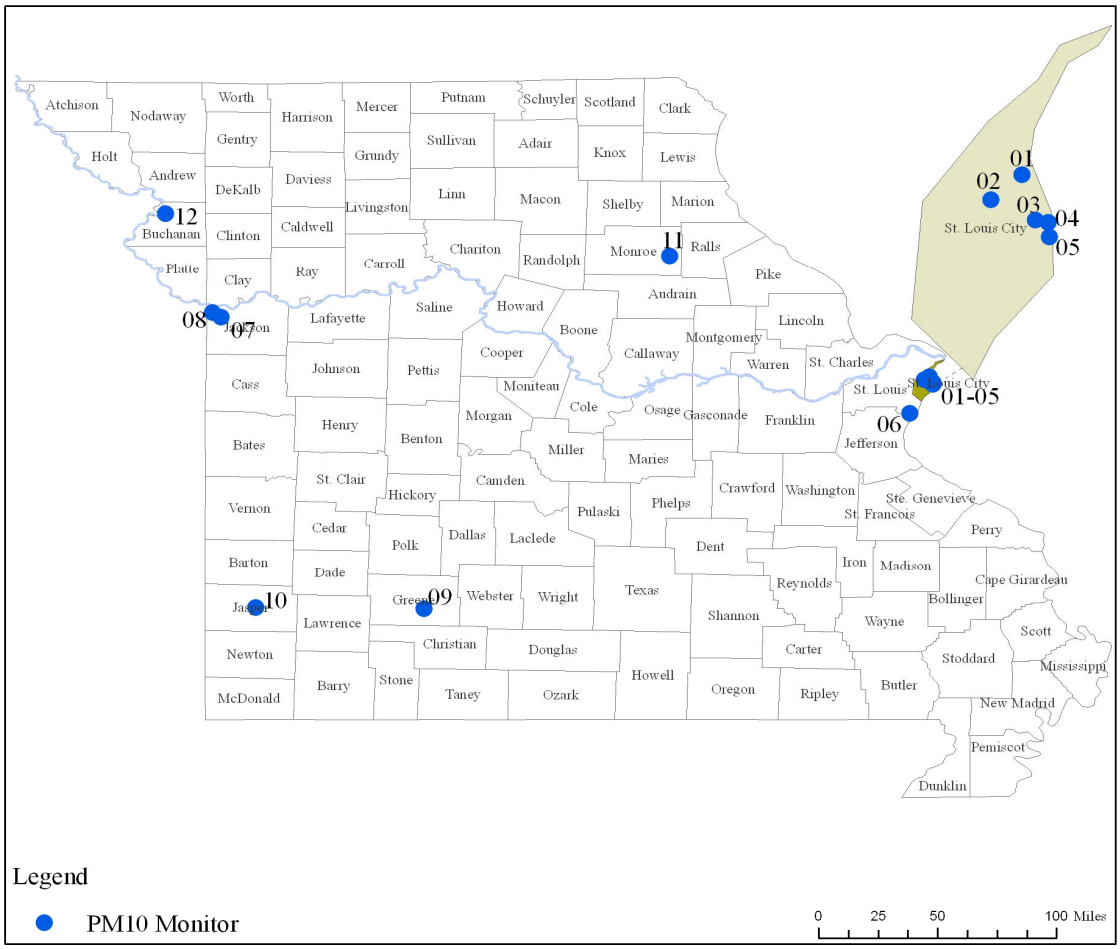
The Missouri PM_{10} network is designed to meet a minimum of six basic objectives:

1. determining the highest concentrations expected to occur in the area covered by the network,
2. determining representative concentrations in areas of high population density,
3. determining the impact on ambient pollution levels of significant sources or source category,
4. determining background concentration levels,
5. determining the extent of regional pollutants transport among populated areas, and in support of secondary levels, and
6. determining the welfare-related impacts in more rural and remote areas.

Appendix D also indicates that middle and neighborhood scales are the most important for PM_{10} monitoring, although micro scales are not precluded. To meet the above objectives, current PM_{10} sites represent the following spatial scale:

1. Middle Scale: Defines the concentration typical of area up to several city blocks in size with dimensions ranging from about 100 meters to 0.5 kilometers; Hall Street, Branch Street, and Mound Street -Special Purpose Monitor (SPM), and.
2. Neighborhood Scale: Defines the concentrations within some extended area of the city that has relatively uniform land use with dimensions in the 0.5 to 4.0 kilometers; Margaretta, Blair Street, Oakville, Front Street, Troost, Missouri State University, Carthage, and St. Joseph Pump Station.
3. Regional Scale: Defines usually a rural area of reasonably homogeneous geography without large sources, and extends from tens to hundreds of kilometers; Mark Twain State Park

Figure 8-1. Statewide PM_{10} Monitoring Network, 2010



SiteNumber	SiteName
St. Louis Area	
01	Hall Street
02	Margaretta
03	Blair Street
04	Branch Street
05	Mound Street
06	Oakville
Kansas City Area	
07	Van Brunt
08	Troost
Springfield Area	
09	Missouri State University

SiteNumber	SiteName (Cont')
Outstate Area	
10	Carthage
11	Mark Twain State Park
12	St. Joseph Pump Station

Missouri Department of Natural Resources
Division of Environmental Quality
Air Pollution Control Program
Created by Patricia Maliro, March 2010

8.3 Ambient Air Monitoring Data Analysis

8.3.1 1st Maximum 24-hour Averages, Exceedances and Violations

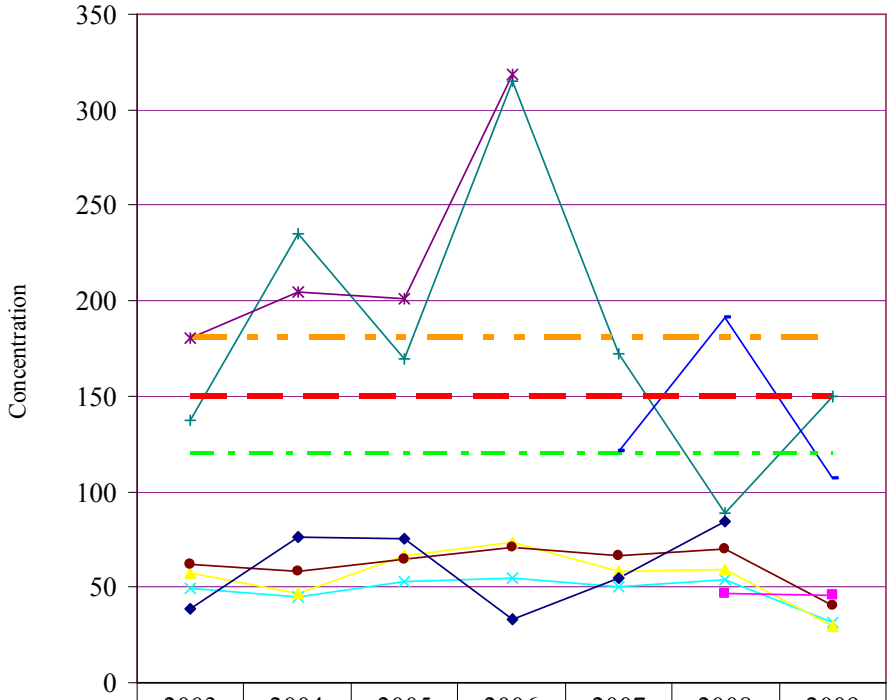
St. Louis area

The 1st maximum of the 24-hour averages of PM_{10} concentrations for the St. Louis sites are presented in Figure 8-2. Branch Street and Hall Street have, in the past, monitored 1st highs above 150 $\mu g/m^3$. North Market also has had high PM_{10} concentrations. This site was located in close proximity of metal shredding operation. Because of changes in the site area so that it did not meet siting criteria, it was determined that it should be relocated nearby to Branch Street

Exceedances of the 24-hour standard have also been monitored at the Branch Street and Hall Street sites, Table 8-2. As four exceedances in 3 years constitute a violation, Hall Street violated the PM_{10} 24-hour standard from 2006 through 2008. It is now in compliance status, as of 2009. Branch has had two exceedances in 2008 and none in 2009, under daily sampling. Unless Branch monitors at least two exceedances in 2010, the Branch street site will be in compliance of the standard. No exceedance and therefore no violations have been monitored at Margaretta, Blair Street, Mound Street, and Oakville.

With the estimated PM_{10} concentrations that exceed 80% of the NAAQS (120 $\mu g/m^3$) but not exceeding the NAAQS by 20% or more (180 $\mu g/m^3$) a minimum of four to 8 sites are required to monitor PM_{10} levels in St. Louis. There are a total of 6 PM_{10} sites in the area; just a little over the minimum requirement (Table 8-1).

Figure 8-2. St. Louis Area 1st Maximums of the 24-Hour PM_{10} Averages
(24-hour NAAQS = 150 µg/m^3)



	2003	2004	2005	2006	2007	2008	2009
Hall Street	137	235	170	315	172	89	150
Margaretta	49	45	53	55	50	54	31
Blair Street	57	47	66	74	58	59	30
Branch Street					121	191	107
2nd & Mound	62	58	65	71	66	70	40
Oakville						47	46
Ferguson	39	76	75	33	55	84	
North Market	180	205	201	319			
Standard	150	150	150	150	150	150	150
20% Above the NAAQS	180	180	180	180	180	180	180
80% of the NAAQS	120	120	120	120	120	120	120

Kansas City Area

PM_{10} Concentrations in Kansas City have been estimated at less than 80% of the NAAQS, see Figure 8-3. With 2 sites, Troost and Van Brunt, currently monitoring PM_{10} in the area, Kansas City meets the minimum monitoring requirement. No values higher than 150 µg/m^3, or exceedances, and/or violations have been monitored at either site since 2003. The Van Brunt site is, however, in the process of being relocated to a location along Front Street near an area of intermodal freight operations. The Troost Site will continue to represent the neighborhood scale.

Table 8-2: 2003-2009 PM_{10} Exceedances and Violations of the 24-Hour Standard
(24-hour NAAQS = 150 µg/m^3)

	Yearly Exceedances								Estimated Exceedances				
Site Name	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**		**03-05**	**04-06**	**05-07**	**06-08**	**07-09**
St. Louis Area													
Hall Street[1]	0	1	1	3	1	0	0		0.7	**1.7**	**1.7**	**1.3**	0.3
Margaretta	0	0	0	0	0	0	0		0.0	0.0	0.0	0.0	0.0
Blair Street	0	0	0	0	0	0	0		0.0	0.0	0.0	0.0	0.0
North Market*	2	11	7	21	-	-	-		**6.7**	**13.0**	**14.0**	-	-
Branch Street[1]	-	-	-	0	0	2	0		-	-	-	0.7	0.7
Mound Street[1]	0	0	0	0	0	0	0		0.0	0.0	0.0	0.0	0.0
Oakville	-	-	-	-	-	0	0		-	-	-	-	-
Kansas City Area													
Van Brunt	0	0	0	0	0	0	0		0.0	0.0	0.0	0.0	0.0
Troost	0	0	0	0	0	0	0		0.0	0.0	0.0	0.0	0.0
Springfield Area													
Missouri State University	0	0	0	0	0	0	0		0.0	0.0	0.0	0.0	0.0
Outstate Area													
Carthage[1]	2	0	1	2	1	0	0		**1.0**	**1.0**	**1.3**	**1.0**	0.3
Mark Twain State Park	0	0	0	0	0	0	0		0.0	0.0	0.0	0.0	0.0
St. Joseph Pump Station	0	0	0	0	0	0	0		0.0	0.0	0.0	0.0	0.0

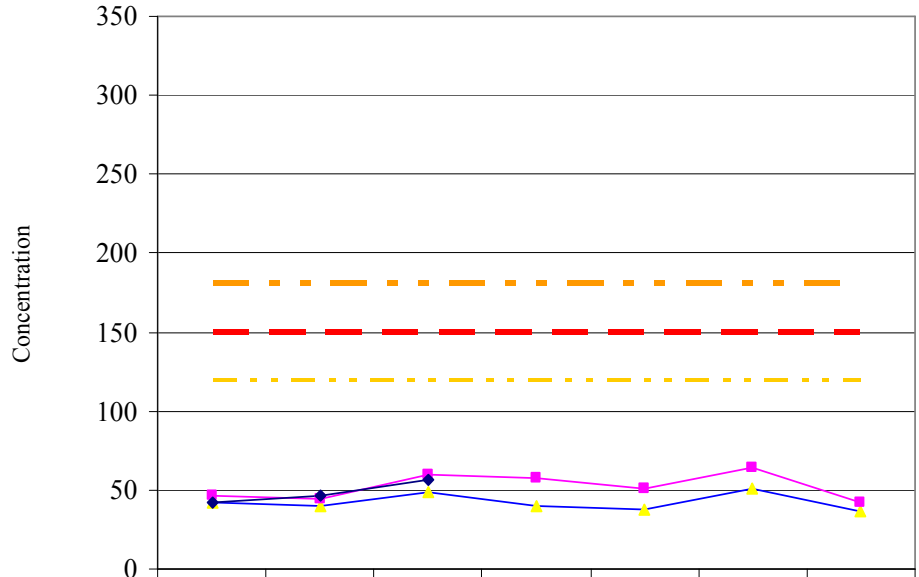
[1]Middle Scale Sites
*Relocated to Branch Street
Bold values are violations of the 24-hour standard

Springfield and the Outstate Area

PM_{10} concentrations in Springfield (Figure 8-4) have been below the standard and below 80% of the NAAQS. With one PM_{10} site in the area, the Springfield MSA also meets the minimum requirement for monitoring PM_{10}.

Also in Figure 8-4, a 1st maximum higher than 150 µg/m^3 has been monitored at Carthage. A total of six exceedances have been monitored at the site since 2003, Table 8-2. Exceedances in 2005, 2006, and 2007 constituted a violation in 2007. Carthage has since then been in compliance. Lastly, no exceedances and no violations of the standard have been monitored at St. Joseph Pump Station and Mark Twain. The Mark Twain site is the background site and St. Joseph Pump Station site meets the minimum monitoring requirement for the St. Joseph MSA.

Figure 8-3. Kansas City Area 1st Maximums of the 24-Hour PM_{10} Averages
(24-hour NAAQS = 150 µg/m^3)



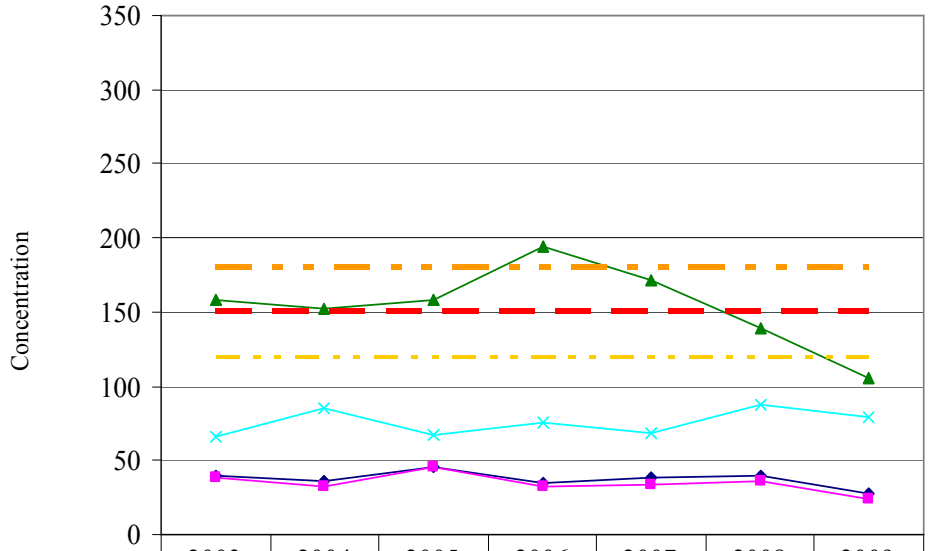
	2003	2004	2005	2006	2007	2008	2009
Van Brunt	42	40	49	40	38	51	37
Troost	46	44	60	58	51	64	42
N. KC	42	47	56				
Standard	150	150	150	150	150	150	150
20% Above the NAAQS	180	180	180	180	180	180	180
80% of the NAAQS	120	120	120	120	120	120	120

8.3.2 St. Louis PM_{10} Correlation Matrix

Figures 8-5 and 8-6 show correlation coefficients for the PM_{10} sites in St. Louis and Kansas City, respectively. The matrices were generated by cormat.dat, a Network Assessment Tool provided by the EPA. The narrower the ellipse, the higher the correlation and the lower the relative difference, i.e., the more similar are the sites in overall measurement (correlation and relative difference are functions of distance). As shown in the figure, PM_{10} sites are, for the most part, poorly correlated and are unique in monitoring the concentrations. Correlations of no more than 40% can be noted between sites in St. Louis and 20% between sites in Kansas regardless of the

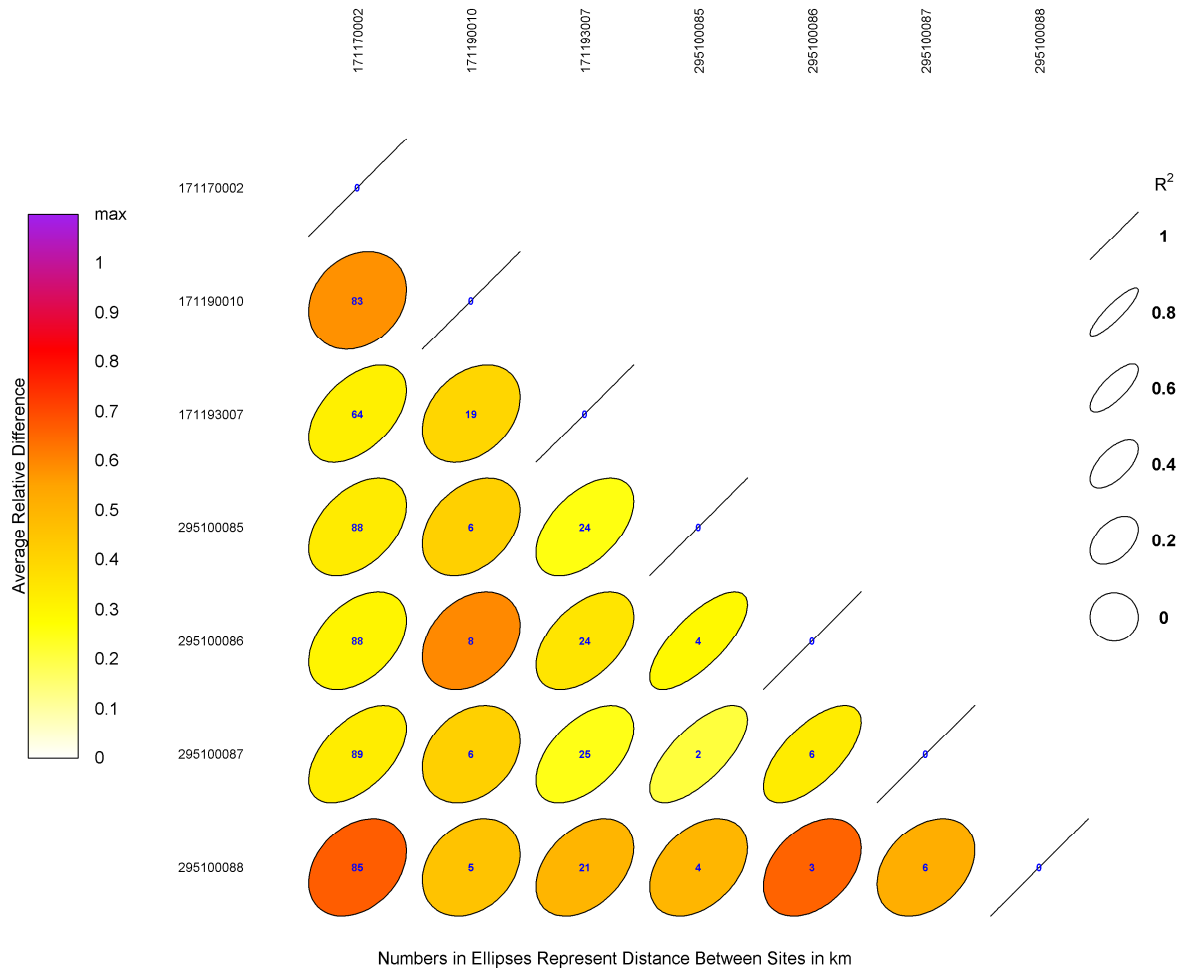
shorter distance of 4 kilometers. The Troost and Van Brunt correlations are not available and therefore were not included in the matrix. The poor PM_{10} concentration correlations are expected because PM_{10} emissions are more localized than $PM_{2.5}$. PM_{10} particles can stay in the air for shorter periods of time and can travel shorter distances because they are larger and heavier. In addition, sites like Hall Street, Branch, and Carthage represent middle scale and are source oriented.

Figure 8-4. Springfield and Outstate Areas 1st Maximums of the 24-Hour PM_{10} Averages
(24-hour NAAQS = 150 µg/m^3)



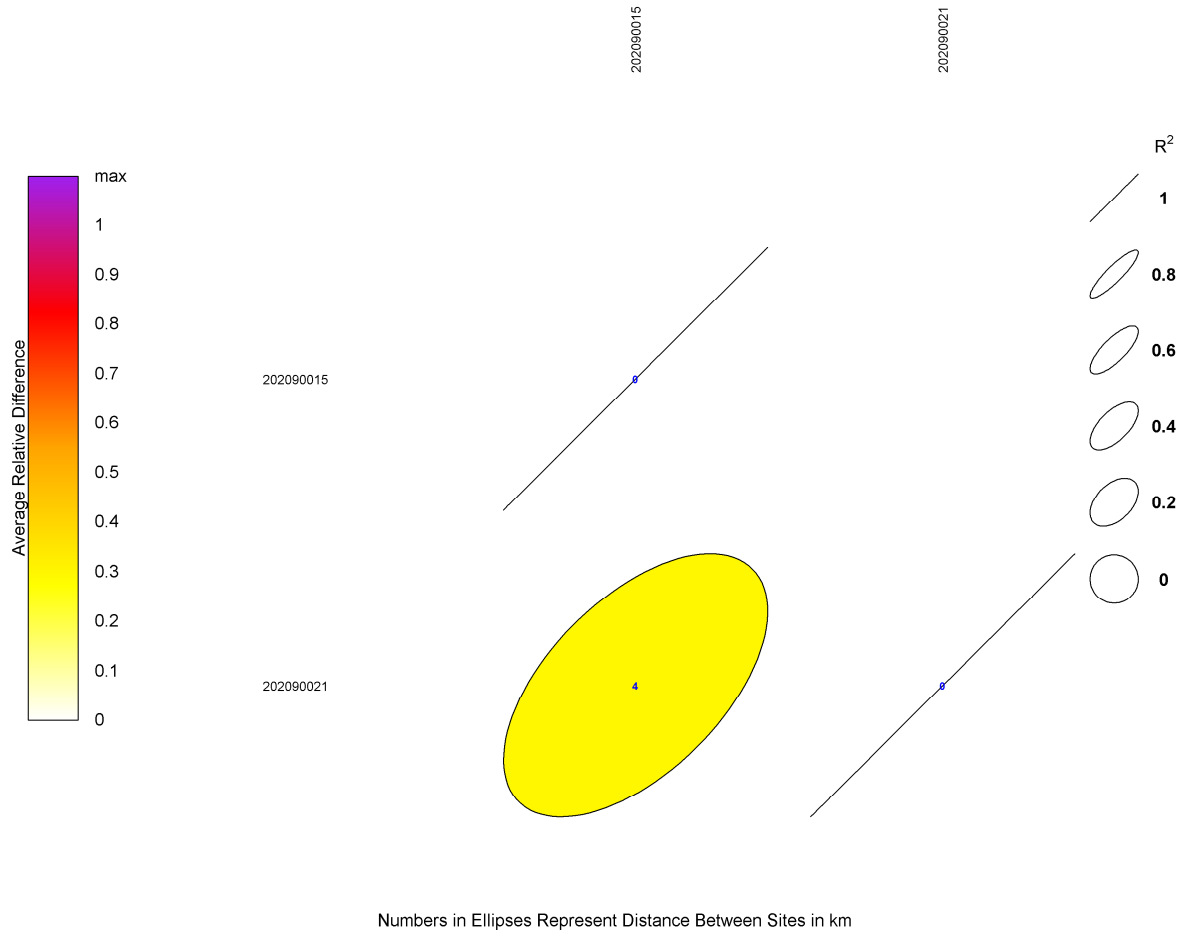
	2003	2004	2005	2006	2007	2008	2009
MSU*	40	36	45	35	38	39	27
Carthage-TEOM	158	152	158	194	171	139	106
Mark Twain State Park	38	32	46	32	33	36	24
St. Joseph Pump Station	66	85	67	76	68	88	79
Standard	150	150	150	150	150	150	150
20% Above the NAAQS	180	180	180	180	180	180	180
80% of the NAAQS	120	120	120	120	120	120	120

Figure 8-5. St. Louis Area PM_{10} Correlation Matrix, 2006-2008



Site ID	Site Name
171170002	Nilwood IL
171190010	Granite City IL
171193007	Wood River
295100085	Blair Street
295100086	Margaretta
295100087	Mound Street
295100088	Hall Street

Figure 8-6. Kansas City Area PM_{10} Correlation Matrix, 2006-2008



Site ID	Site Name
202090015	Fire Station KC KS
202090021	JFK KS

8.4 PM_{10} Emissions

8.4.1 Point Sources

Statewide locations of the 2008 PM_{10} point sources with emissions greater than or equal to 10 tpy in MOEIS are presented in Figure 8-7. As expected, high concentrations of sources are in the metropolitan areas of St. Louis, Kansas City, and Springfield. Table 8-3 shows statewide MOEIS trends for facilities with at least 0.5 tpy. It shows higher emissions particularly in 2008, which is principally due to large combustion sources, mainly power plants. Most of this is not a

true increase, but rather a revised method of counting condensable emissions which added to the total.

Table 8-3: Statewide PM_{10} Emission Trends, 2003-2008

Year	2003	2004	2005	2006	2007	2008
Yearly Total Emission (tpy)	17,708	17,835	17,972	18,305	17,468	21,516

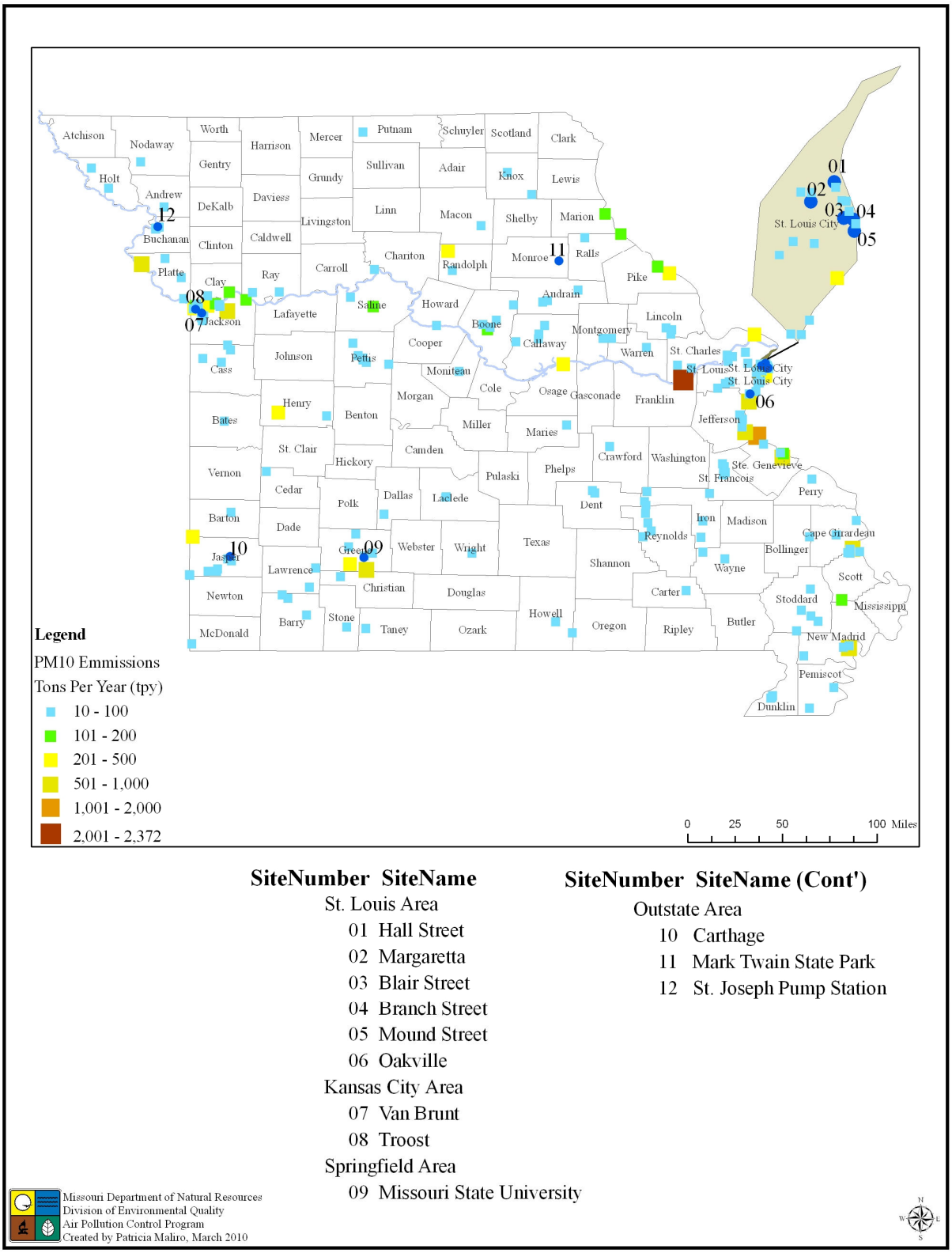
8.4.2 Mobile Sources

The 2008 Traffic Volume Counts (TVCs) were used as a surrogate for mobile sources of PM_{10} emissions. TVCs for St. Louis, Kansas City, and Springfield, are presented in Figures 5-4 to 5-8. PM_{10} mobile source emissions are reasonably high especially in the central areas of the metropolitan areas. Several highly trafficked segments of traffic arteries and major interstate highways are located within these areas.

8.4.3 Area Sources

Area sources are greatest in the areas of St. Louis, Springfield, and Kansas City. Population levels are used as surrogate for area emissions. Figure 8-8 shows Jefferson County has the highest emissions in the St. Louis area. This does not coincide with high population levels in the area. St. Louis County has the highest population (Table 2-2). The inconsistency in Jefferson County may be explained by the road type, i.e., paved and unpaved roads and/or other factors. Jackson County in the Kansas City area has the highest area source emissions.

Figure 8-7. 2008 Statewide PM_{10} Point Source Emissions and the Current PM_{10} Monitoring Network



SiteNumber	SiteName
St. Louis Area	
01	Hall Street
02	Margaretta
03	Blair Street
04	Branch Street
05	Mound Street
06	Oakville
Kansas City Area	
07	Van Brunt
08	Troost
Springfield Area	
09	Missouri State University

SiteNumber	SiteName (Cont')
Outstate Area	
10	Carthage
11	Mark Twain State Park
12	St. Joseph Pump Station

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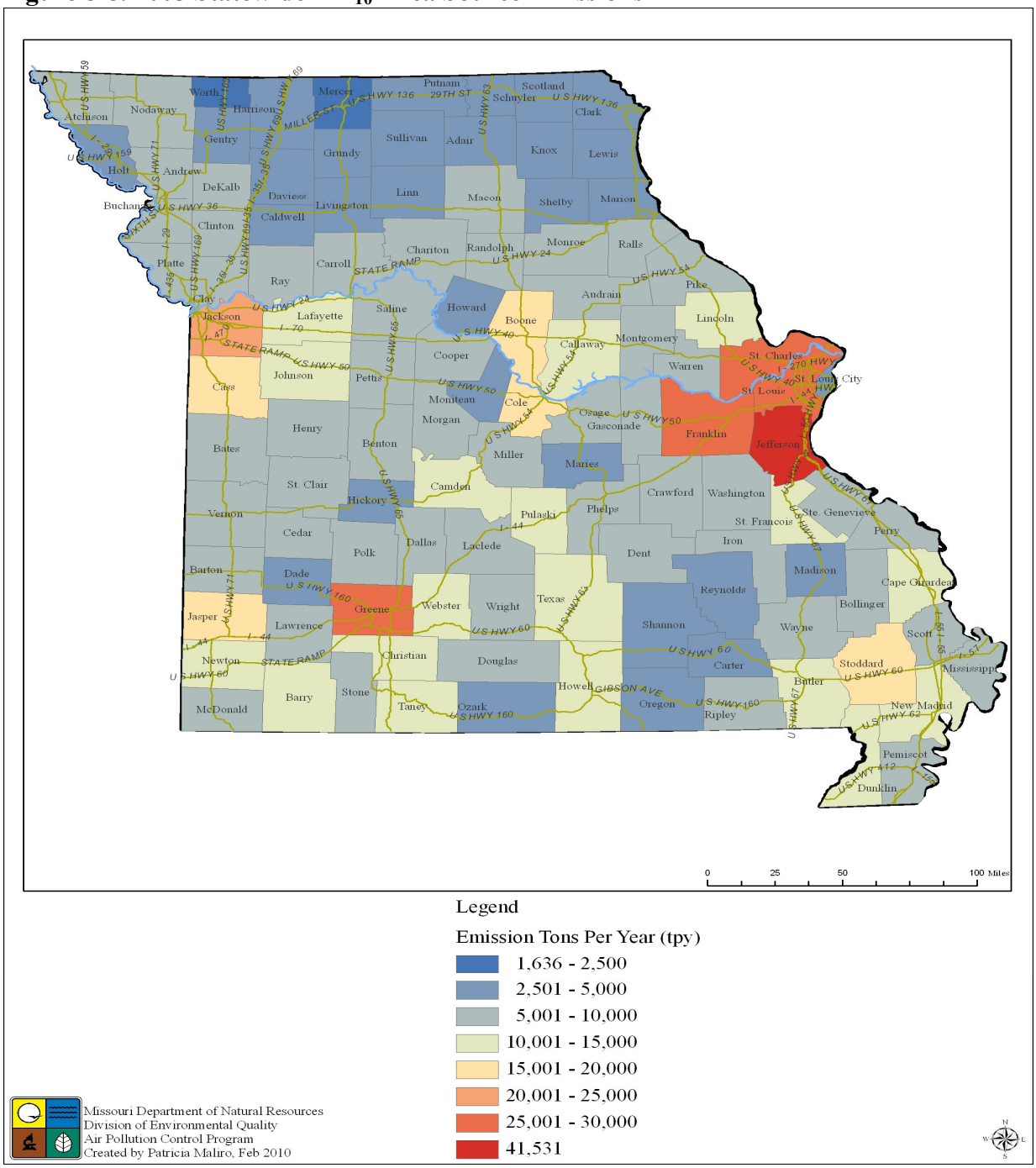
Division of Environmental Quality
Air Pollution Control Program
Created by Patricia Maliro, March 2010

Figure 8-8. 2005 Statewide PM_{10} Area Source Emissions



8.5 Evaluation of the PM_{10} Monitoring Network

Hall Street and Branch Street are middle scale sites and are source oriented. The sites are located in areas of significant point sources and are **critical** in evaluating possible short-term exposure public health effects. Exceedances of the PM_{10} 24-hour standard have been monitored at the three sites in the past, an indication that the sites are meeting their objective of determining the impact on ambient pollution levels of significant sources.

In addition, Hall Street and Carthage show greater than 10 percent probability of exceeding 80 percent of the NAAQS during the next three years (Table 8-4). 40 **CFR** § 58.14 states that the Regional Administrator will approve a state's request for discontinuing a SLAMS monitor which has shown attainment during the previous five years and that has a probability of less than 10 percent of exceeding 80 percent of the NAAQS during the next three year based on the levels, trends and variability observed in the past. Neither of these two sites meet this criterion; therefore these sites are **critical**.

Low and stable PM_{10} concentrations have been monitored at Blair Street, located slightly downwind of the urban core and in a mixed residential/industrial area. As Blair Street is to be designated as an NCore site, this site is **critical**. Mound Street, however, is a SPM middle scale site. This site has monitored low PM_{10} concentrations and no exceedances from 2003-2009. In addition, it meets the criteria as stated in 40 **CFR** § 58.14 (see Table 8-4). Mound Street is evaluated as **marginal** given the above criteria. In addition, after 2008, given that compliance has been monitored at all area sites, the St. Louis area is only required to maintain a minimum of four PM_{10} monitoring stations. Hall Street, Blair Street, Margaretta, and Oakville fulfill that requirement, so that monitoring at Mound Street is no longer necessary.

With regard to the Margaretta and Oakville sites, values at both sites are relatively low, with maximums at only 1/3 of the NAAQS. Monitoring at Margaretta has been ongoing for ten years in a residential area of north St. Louis City. After 2 years of PM_{10} monitoring at Oakville, it has been observed that concentrations at the site have been just above the background levels and less than 1/3 of the NAAQS in both years (see Figure 8-2) with the lowest 2-year average maximum for the St. Louis area. For Oakville, there is no reasonable concern with regard to NAAQS compliance and no need to maintain the monitor for 5 years. Based on this assessment, both Oakville and Margaretta are **credible**/**marginal**, depending on whether locations of significantly higher PM_{10} concentrations can be located in the St. Louis area. There are a few other stationary source locations which may be of interest, and there are some areas of rail and freight transportation confluence which may be the cause of elevated PM_{10}. However, it may be premature at this time to relocate either site, given the NAAQS particulate matter review which is ongoing, scheduled for proposal of retained or revised standards in January 2011. At that time, a decision as to the need to relocate these sites should be made, with changes to the 2011 or 2012 Monitoring Network Plan for PM_{10} monitoring considered

Appendix D criteria require two PM_{10} sites in the Kansas City area. The soon to be located Front Street site is **critical**, given its identification as an area of significant intermodal freight traffic with potential for high particulate emissions. Troost is similar in character to Margaretta and Blair Street, with relatively low PM_{10} values. A similar plan for Troost should be followed as for

Margaretta, in which consideration of the PM_{10} NAAQS review to be proposed in six months will inform the need to relocate the site, which is **credible**/**marginal**.

The Missouri State University site is the only one that monitors PM_{10} concentrations in the Springfield area. It is located in an area with high traffic and large population. The 2009 projected Springfield MSA population is 430,900, and at the previous rate of growth the area should have reached 500,000 in 2010, making one site required for the area, given the MSA monitored values. Similar to Margaretta and Troost in character, the MSU values are relatively low, and as with both of those samplers, results of the NAAQS review may generate the potential for relocating the sampler to an area of high PM_{10} emissions, either from one or more point sources, or high freight roadway and rail emissions areas. MSU is therefore classified as **credible**/**marginal**.

St. Joseph Pump Station is located within the St. Joseph MSA. The 2009 MSA population was estimated at 126,644 (Table 2-2). Values have decreased significantly, however are still somewhat elevated. Given the past history, this site is **critical** and should be maintained.

Finally, Mark Twain State Park is a regional scale site. It located far from the metropolitan areas and larger sources. It monitors rural (background) and regional concentrations for the state and is therefore a **critical** site.

Table 8-4. Evaluation of the PM_{10} Monitoring Sites in Accordance to 40 CFR § 58.14

	24-hour Average 1st Maximums							2004-2008 Test			2005-2009 Test		
Site	**Averaging Time**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**90% Upper CI**	**80% of NAAQS**	**Fail/Met**	**90% Upper CI**	**80% of NAAQS**	**Fail/Met**
Oakville*	24-hour Average	-	-	-	-	47	46	-	-	-	-	-	-
Blair Street	"	47	66	74	58	59	43	70	120	Met	71	120	Met
Margaretta	"	45	53	55	50	54	42	55	120	Met	56	120	Met
Mound Street	"	58	65	71	66	70	40	71	120	Met	75	120	Met
Hall Street	"	235	170	315	172	89	150	276	120	**Fail**	258	120	**Fail**
Branch Street*	"	-	-	-	121	191	107	-	-	-	-	-	-
Troost	"	44	60	58	51	63	42	62	120	Met	63	120	Met
Van Brunt**	"	40	49	40	38	51	37	49	120	Met	49	120	Met
MSU	"	36	45	35	38	39	27	42	120	Met	43	120	Met
Mark Twain State Park	"	32	46	32	33	35	36	41	120	Met	42	120	Met
Carthage-FRM***	"	119	123	153	150	68	-	155	120	**Fail**	-	-	-
Carthage-TEOM	"	152	158	194	171	139	106	183	120	**Fail**	185	120	**Fail**
St. Joseph Pump Station	"	85	67	76	68	88	79	86	120	Met	84	120	Met

*Less than 5-years of data
** To be relocated
*** Discontinued

9.0 OZONE NETWORK ASSESSMENT

9.1 Background

On January 6, 2010, EPA proposed to set different primary and secondary standards than those set in the 2008 ozone (O_3) NAAQS final rule (75 **Federal Register** 16436, March 27, 2008). The Agency proposed to set the 8-hour primary standard at a lower level within the range of 60 to 70 ppb, a reduction from 75 ppb.

Regarding the secondary standard for O_3, EPA proposed that the standard should instead be a new cumulative, seasonal standard expressed as an annual index of the sum of weighted hourly concentrations, cumulated over 12 hours per day (8 am to 8 pm) during the consecutive 3-month period within the O_3 season with the maximum index value set at a level within the range of 7-15 ppm-hours. The secondary standard was set identical to the revised primary standard in the 2008 final rule.

In a separate rule on July 8, 2009, EPA proposed to modify the O_3 air quality monitoring network design requirements (Proposed rule EPA-HQ-OAR-2008-0338). The proposed rule includes provisions for:

1. Urban Area Monitoring: At least one monitor in urban area with populations between 50, 000 to 350,000 people.
2. Non-Urban Area Monitoring: Operate a minimum of three O_3 monitors to allow for
   a. assessing O_3 concentrations in areas that have O_3-sensitive natural vegetation and/or ecosystems,
   b. assessing O_3 concentrations in smaller population centers of between 10,000 and 50,000 people that are expected to have O_3 concentration of at least 85% of the NAAQS, and
   c. monitoring in the locations of expected maximum O_3 concentration outside any urban area, potentially including the far-downwind transport zones of the current well-monitored urban areas.
3. O_3 Monitoring Season: Lengthen the O_3 monitoring season for many states to account for the lower level of the NAAQS.

EPA plans to issue the final rule of the O_3 standard in August 2010.

There are generally two O_3 monitoring network systems: the SLAMS and the NCore according to 40 **CFR** 58. Appendix D to Part 58 of 40 **CFR** outlines specific design for the SLAMS and NCore networks. In addition, Special Purpose Monitoring (SPM) is sometimes conducted. Table 9-1 from 40 **CFR** 58 presents the minimum requirements for O_3 monitoring. States and, where appropriate, local agencies must operate O_3 sites for various locations depending on the size of the area and typical O_3 peak concentration. The NCore sites are expected to complement the SLAMS O_3 data. Both SLAMS and NCore sites can be used to meet the network minimum requirements. The total number of O_3 sites necessary to meet basic O_3 monitoring objectives will generally include more sites than the required minimums in Table 9-1.

Table 9-1. SLAMS Minimum O_3 Monitoring Requirements

MSA population[1,2]	Most recent 3-year design value concentrations ≥85% of any O_3 NAAQS[3]	Most recent 3-year design value concentrations <85% of any O_3 NAAQS[3,4]
>10 million	4	2
4–10 million	3	1
350,000–<4 million	2	1
50,000–<350,000[5]	1	0

[1]Minimum monitoring requirements apply to the Metropolitan statistical area (MSA).
[2]Population based on latest available census figures.
[3]The O_3 National Ambient Air Quality Standards (NAAQS) levels and forms are defined in 40 **CFR** part 50.
[4]These minimum monitoring requirements apply in the absence of a design value.
[5]Metropolitan statistical areas (MSA) must contain an urbanized area of 50,000 or more population.

The basic O_3 monitoring objectives include;

a. public data reporting,
b. air quality mapping
c. NAAQs compliance
d. understanding O_3-related atmospheric processes

9.2 Summary of the Current Missouri O_3 Monitoring Network

There are currently 23 sites that monitor O_3 in Missouri (Figure 9-1). Seven sites are within the St. Louis area, and five are in the Kansas City area. Ste. Genevieve County and the Southeast areas each have one site. These areas have been recommended to the EPA for the O_3 non-attainment re-designation. Two sites are located in Springfield and the outstate areas have 7 sites in total.

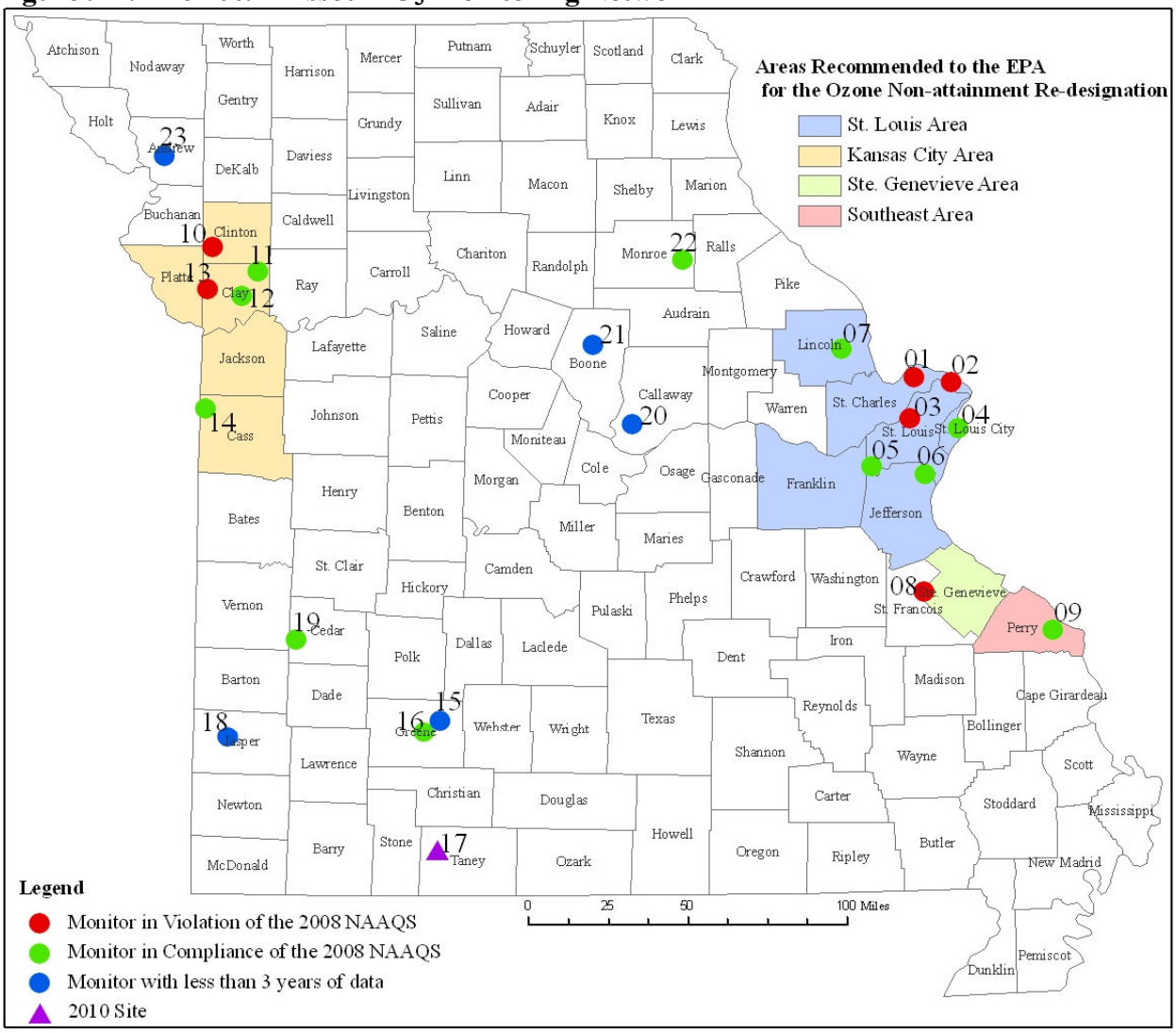
The current Missouri O_3 sites represent the spatial scales defined in 40 **CFR** 58 Appendix D as:

1. Neighborhood: Defines the concentrations within some extended area of the city that has relatively uniform land use with dimensions in the 0.5 to 4.0 kilometers.
2. Urban: Defines the concentrations within an area of the city dimensions of 4.0 to 50 kilometers.
3. Regional: Defines usually a rural area of reasonably homogeneous geography without large sources, and extends from tens to hundreds of kilometers.

9.3 Ambient Air Monitoring Data Analysis

O_3 data analysis results for all the current sites from 2003 through 2009 are presented in Table 9-2 (Design Values), Table 9-3 (Number of Exceedances of the 75 ppb standard), and Figures 9-2 through 9-5 (Design Value Trends), Correlation Coefficients in Figures 9-6 and 9-7, Area Served in Figure 9-8, and Removal Bias in Table 9-4.

Figure 9-1. The 2009 Missouri O_3 Monitoring Network



Site#	SiteName (07-09 DV)
St. Louis Area	
01	Orchard Farm (76)
02	West Alton (78)
03	Maryland Heights (77)
04	Blair Street (75)
05	Pacific (71)
06	Arnold West (75)
07	Foley (75)
Ste. Genenieve Area	
08	Bonne Terre (76)
Southeast Area	
09	Farrar (74)
Kansas City Area	
10	Trimble (76)
11	Watkins Mill (72)
12	Liberty (74)
13	Rocky Creek (76)
14	Richards Gebauer-South (67)
Springfield Area	
15	Fellows Lake (69)*
16	Hillcrest High School (69)
Outstate Area	
17	Branson-SPM
18	Alba (74)*
19	Eldorado Springs (67)
20	New Bloomfield (60)*
21	Finger Lakes (60)*
22	Mark Twain (67)
23	Savannah (66)*

SPM Special Purpose Monitor
DV Design Value
** 2009 4th Highest Value*

Department of Natural Resources
Air Pollution Control Program
(Prepared by Patricia Maliro, April 2010)

9.3.1 Design Values

St. Louis Area
As shown in the Table 9-2, Orchard Farm, West Alton, and Maryland Heights in St. Louis have continuously been in violation of the 75 ppb standard (see also Figure 9-1). These sites are located relatively downwind (see Section 3.0 and Appendix A) and at the exterior of the St. Louis metropolitan MSA (although not at the extreme). The 2007-2009 design values for the sites ranged from 76 ppb to 78 ppb at West Alton. Table 9-3 of the number of O_3 exceedances shows four or more exceedances per year have successively been monitored at these three sites, up until 2007. Note; there were comparatively fewer exceedances in 2004, 2008, and 2009 at these sites and at the rest of the sites. The fewer exceedances during these years are to be interpreted with the understanding that the meteorological conditions in 2004, 2008, and 2009 were unusually cloudy and wet which resulted in depressed O_3 values across all the sites.

Blair Street, Pacific, Arnold West, and Foley (also in Table 9-2) are, as of 2009, in compliance after consistently being in violation since 2003. Blair Street is relatively close within the core of the urban area. Pacific and Arnold West are located southerly and generally upwind of the St. Louis urban core, not in the most prevalent wind direction. Foley is located downwind but at a greater distance from the core of the metropolitan area. As expected, the four sites have registered fewer exceedances than Orchard Farm, West Alton, and Maryland Heights, Table 9-3.

Ste. Genevieve Area
The Bonne Terre site has been in violation of the 8-hour 75 ppb standard since 2003. The current design value is just above the standard, 76 ppb (Table 9-2). Bonne Terre represents regional scale and is mostly impacted by regional transport. There are no larges sources near or in the adjacent areas of the site.

Southeast Area
Two violations of the 2008 standard have been monitored at Farrar since its establishment in 2005. Farrar is currently in compliance with the standard with the 2007-2009 design value at 74 ppb, Table 9-2.

Kansas City Area
Two sites, Trimble and Rocky Creek, in the Kansas City area have consistently violated the standard since 2003. The current design value for both sites is at 76 ppb (see Table 9-2). Trimble and Rocky Creek are located north and downwind relative to the central Kansas City and on the outskirts of the Kansas City MSA. The 2 sites have generally ranked higher in number of the exceedances year after year, Table 9-3.

Until 2009 Liberty and Watkins Mill violated the current standard. The 2007-2009 design values for the sites are 74 ppb and 72 ppb, respectively (Table 9-2). Trimble and Rocky Creek continue to be in violation of the 2008 NAAQS. These four sites have been most significant in ozone NAAQS violations over the last several years, with southerly winds predominant during the ozone season. As also shown in Table 9-2, Richards-Gebaur South has had only one violation (2005-2007 design value) since 2003. This site is located upwind and at a distance, beyond the

immediate areas of the central part of the metropolitan area. Note; the above areas, as outlined in Figure 9-1, have been recommended to the EPA for the O_3 non-attainment re-designation.

Table 9-2. O_3 Summary of the 8-hour Design Values, 2003-2009 (8-hour NAAQS = 75 ppb)

Site	2003-2005	2004-2006	2005-2007	2006-2008	2007-2009
St. Louis Area					
Orchard Farm	**86**	**86**	**89**	**82**	**76**
West Alton	**85**	**85**	**89**	**85**	**78**
Maryland Heights	-	-	**88**	**82**	**77**
Blair Street	-	-	**84**	**78**	75
Pacific	-	-	**83**	**76**	71
Arnold West	**81**	**80**	**86**	**78**	75
Foley	-	**81**	**87**	**81**	75
Ste. Genevieve Area					
Bonne Terre	**79**	**77**	**83**	**79**	**76**
Southeast Area					
Farrar	-	75	**80**	**77**	74
Kansas City Area					
Trimble	-	**81**	**85**	**79**	**76**
Watkins Mill	**77**	**79**	**81**	**77**	72
Liberty	**83**	**84**	**87**	**81**	74
Rocky Creek	**81**	**81**	**87**	**81**	**76**
Richards Gebauer-South (RG-S)	74	73	**77**	72	67
Springfield Area					
Fellows Lake[2]	-	-	-	69*	66*
Hillcrest High School	71	71	**77**	73	69
Outstate Area					
Branson[1]-SPM	-	-	-	-	-
Alba[2]	-	-	-	-	74*
Eldorado Springs	52	75	**76**	72	67
New Bloomfield[2]	-	-	-	-	60*
Finger Lakes[2]	-	-	-	-	60*
Mark Twain	70	70	75	71	67
Savannah[2]	-	-	-	-	66*

[1]New site, 2010

[2]Less than 3 years of data

*As the 4th Highest Value of the yaer

SPM = Special Purpose Monitor

Bold = 2008 NAAQS Violation

Table 9-3. O_3 Summary of Number of 8-hour Exceedances, 2003-2009
(8-hour NAAQS = 75 ppb)

Site	2003	2004	2005	2006	2007	2008	2009
St. Louis Area							
Orchard Farm	18	4	24	12	14	2	2
West Alton	17	5	29	19	24	4	2
Maryland Heights	-	-	23	15	20	1	0
Blair Street	-	-	16	4	11	1	1
Pacific	-	-	11	6	13	0	0
Arnold West	10	1	21	6	20	2	1
Foley	-	-	17	13	15	0	0
Ste. Genevieve Area							
Bonne Terre	9	0	12	5	15	1	2
Southeast Area							
Farrar	-	0	10	6	20	0	2
Kansas City Area							
Trimble	-	2	20	16	10	2	3
Watkins Mill	15	0	7	10	3	0	3
Liberty	19	1	18	23	10	0	2
Rocky Creek	19	0	22	23	16	1	2
RG-S	10	1	7	5	2	1	1
Springfield Area							
Fellows Lake	-	-	-	-	-	1	0
Hillcrest High School	3	1	7	2	4	1	0
Outstate Area							
Branson[1]-SPM	-	-	-	-	-	-	-
Alba	-	-	-	-	-	-	1
Eldorado Springs	5	3	6	3	3	1	0
New Bloomfield	-	-	-	-	-	-	0
Finger Lakes	-	-	-	-	-	-	0
Mark Twain	3	0	4	2	4	0	0
Savannah	-	-	-	-	-	-	0

[1]New site, 2010
[2]Less than 3 years of data
SPM = Special Purpose Monitor

Springfield Area
The 2007-2009 Hillcrest High School design value has been monitored at 69 ppb. Only one violation (2007), in Table 9-2, is shown to have been monitored at the site. Hillcrest is located north and downwind of the Springfield central area. Fellows Lake, located northeast and downwind but a little farther from the urban core has monitored O_3 for less than 3 years. The 4th highest values at the site (in Table 9-2) have been higher than 4th highs at Hillcrest. The 2008 and 2009 Hillcrest 4th highs were monitored at 67 ppb and 62 ppb (not presented in this assessment), respectively.

Outstate Area
Eldorado Springs and Mark Twain are the background sites for O_3. They are located in rural areas and away from large source emissions. Except for a violation in 2007 at Eldorado Springs, no violation has been monitored at either site. The current design value for both sites is at 67 ppb.

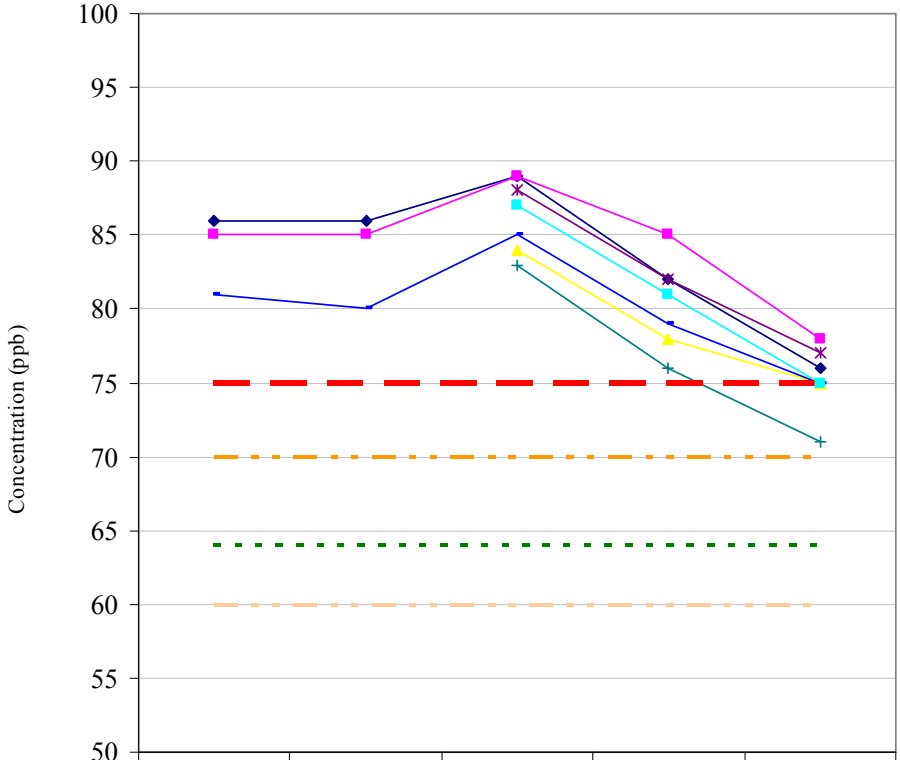
Alba, New Bloomfield, Finger Lakes, and Savannah began monitoring O_3 in 2009 (Figure 9-1). They represent Joplin, Jefferson City, Columbia, and St. Joseph MSAs respectively in characterizing O_3 concentrations. The 2009 4th highest values for New Bloomfield (60 ppb), Finger Lakes (60 ppb), and Savannah (66 ppb) compare favorably to the 4th highs at the background sites (Figure 9-2). The 2009 Eldorado Springs 4th high was monitored at 62 ppb and Mark Twain at 61 ppb. However, Alba's 4th high was monitored at 74 ppb. It is the second highest 4th high of 2009, statewide. The highest 4th high was monitored at 75 ppb at Trimble.

9.3.2 Design Value Trends

St. Louis MSA
Figure 9-2 shows design value trends for the current O_3 sites in the St. Louis MSA. Initially, O_3 concentrations slightly declined at Arnold but remained high and stable at Orchard Farm and West Alton. The 2005-2007 design values however, reversed the trends to upward. O_3 levels have since trended down at these three sites and also at Blair Street, Pacific, and Foley. The later three sites were established in 2005 and are shown to have monitored O_3 concentrations in that year that compare favorably to the existing sites. Note; as indicated earlier, the lower O_3 levels in 2004, 2008, and 2009 are to be interpreted with caution especially with the unusually overcast and wet meteorological conditions in those years. Nevertheless, despite the downward trends, across sites and after 2007, Orchard Farm, West Alton, and Maryland Heights are, as of 2009, still in violation of the 2008 standard with respective 2007-2009 design values of 76, 78, and 77 ppb. And as shown in the figure, the three sites including the rest of the St. Louis sites appear to be likely to violate the new standard regardless of the level in the final rule.

The St. Louis MSA meets and goes beyond the minimum requirement (Figure 9-2 and Table 9-1) for O_3 monitoring with the current seven Missouri sites in operation. Illinois also operates O_3 sites in its respective part of the St. Louis area.

Figure 9-2. The 2007-2009 St. Louis MSA (Missouri) Design Value Trends
(2008 NAAQS = 75 ppb)
(Proposed NAAQS = 60 – 70 ppb)



	03-05	04-06	05-07	06-08	07-09
Orchard Farm	86	86	89	82	76
West Alton	85	85	89	85	78
Blair			84	78	75
Maryland Heights			88	82	77
Pacific			83	76	71
Arnold	81	80	85	79	75
Foley			87	81	75
Standard	75	75	75	75	75
85% of the NAAQS	64	64	64	64	64
Prop U. Limit of NAAQS	70	70	70	70	70
Prop L. Limit of NAAQS	60	60	60	60	60

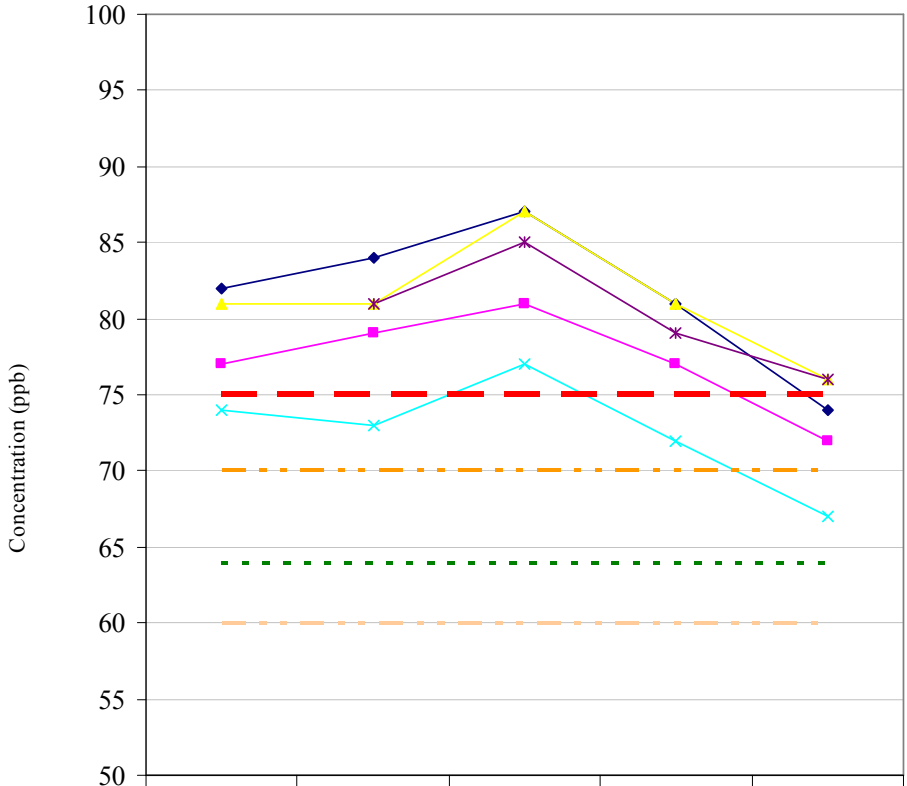
Kansas City MSA

Time series plots in Figure 9-3 for the Kansas City area sites show design values that also initially trended up (except at Richards-Gebaur South) from 2003 through 2007 but have significantly trended down since then. However, Trimble and Rocky Creek still violate the standard. Both sites have the 2007-2009 design values of 76 ppb. Liberty, Watkins Mill, and

Richards-Gebaur South are now in compliance. Nevertheless, as shown in the figure, all but Richards-Gebaur South are likely to violate the new standard if set at 70 ppb or lower.

The Kansas City area also meets the minimum O_3 monitoring requirement; see also Table 9-1 and Figure 9-3. There are five sites operated by Missouri and two by Kansas, a total of seven, more than the minimum requirement of two.

Figure 9-3. The 2007-2009 Kansas City MSA (Missouri) Design Value Trends
(2008 NAAQS = 75 ppb)
(Proposed NAAQS = 60 – 70 ppb)

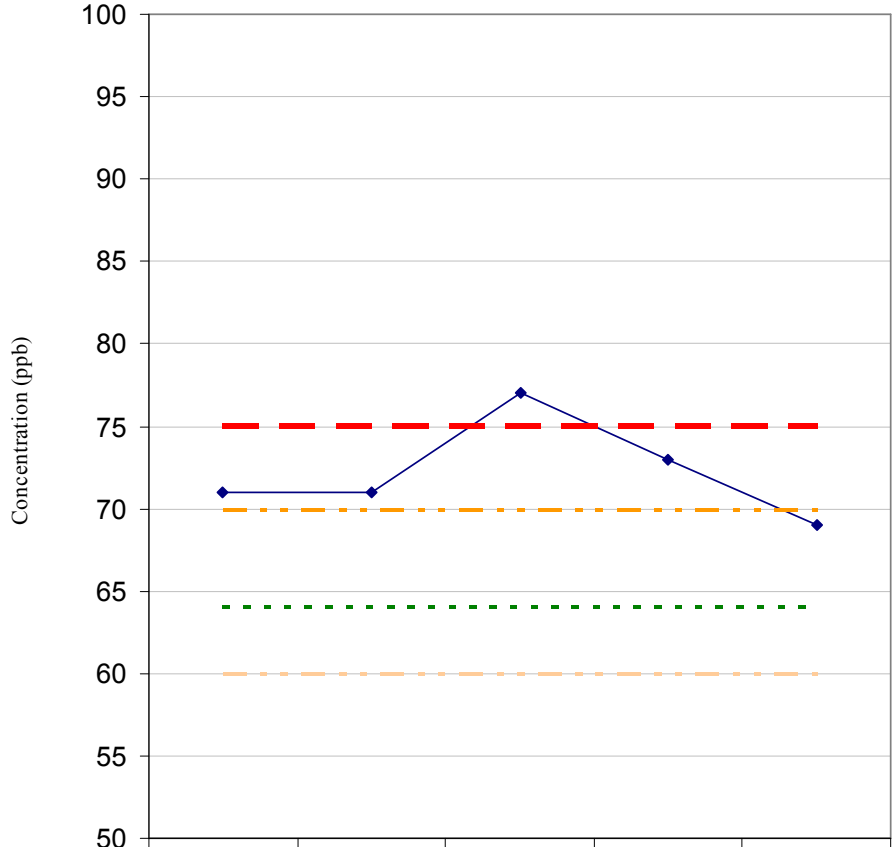


	03-05	04-06	05-07	06-08	07-09
Liberty	82	84	87	81	74
Watkins Mill	77	79	81	77	72
Rocky Creek	81	81	87	81	76
RG South	74	73	77	72	67
Trimble		81	85	79	76
Standard	75	75	75	75	75
85% of the NAAQS	64	64	64	64	64
Prop U. Limit of NAAQS	70	70	70	70	70
Prop L. Limit of NAAQS	60	60	60	60	60

Springfield MSA

A similar trend to Orchard Farm and West Alton is observed for O_3 concentrations at Hillcrest in Springfield, Figure 9-4. But unlike those two sites, Hillcrest concentrations have declined to below the standard. Hillcrest will also comply with the standard if set at 70 ppb, based on the most recent design value of 69 ppb. Unless Fellows Lake monitors a 2010 4th high of 75 ppb or higher, this site will also be in compliance with a 70 ppb standard. The Springfield MSA, with a 2000 population of 368,374 (Table 2-1) meets the minimum requirement of at least two O_3 monitoring sites, in accordance with 40 **CFR** 58 Appendix D, see Table 9-1.

Figure 9-4. The 2007-2009 Springfield MSA (Missouri) Design Value Trends
(2008 NAAQS = 75 ppb)
(Proposed NAAQS = 60 – 70 ppb)



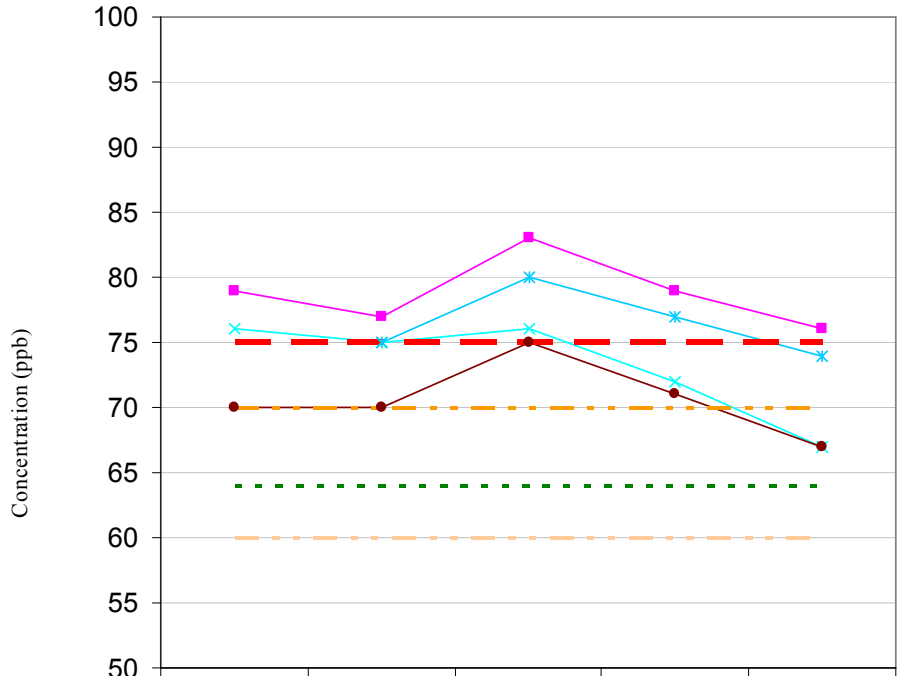
	03-05	04-06	05-07	06-08	07-09
Hillcrest High School	71	71	77	73	69
Standard	75	75	75	75	75
Prop U. Limit of NAAQS	70	70	70	70	70
Prop L. Limit of NAAQS	60	60	60	60	60
85% of the NAAQS	64	64	64	64	64

Outstate

All the outstate sites show similar O_3 trends of downward/stable followed by upward and downward trends, see Figure 9-5. Only the Bonne Terre site still violates the 2008 O_3 NAAQS and will violate the new standard regardless of the level.

The above analysis (in Figures 9-2 through 9-5) show that all the Missouri O_3 sites will violate the NAAQS if set at 60 ppb in the final rule in August.

Figure 9-5. The 2007-2009 Outstate Area (Missouri) Design Value Trends
(2008 NAAQS = 75 ppb)
(Proposed NAAQS = 60 – 70 ppb)



	03-05	04-06	05-07	06-08	07-09
Bonne Terre	79	77	83	79	76
Eldorado Springs	76	75	76	72	67
Farrar		75	80	77	74
Mark Twain State Park	70	70	75	71	67
Standard	75	75	75	75	75
Prop U. Limit of NAAQS	70	70	70	70	70
Prop L. Limit of NAAQS	60	60	60	60	60
85% of the NAAQS	64	64	64	64	64

9.3.3 Correlation Coefficients Analysis Results

St. Louis MSA

Figure 9-6 shows correlation coefficients for sites in the St. Louis area. The correlations were generated by the Network Assessment Tool provided by the EPA. As shown in the figure, O_3 concentrations are fairly highly correlated at most sites in the St. Louis MSA as indicated by the shapes of the ellipses and the average relative differences. The narrower the ellipse the higher the correlation between the sites and the lower the relative difference, i.e., the more similar are the sites in overall measurement. Both the correlation and relative difference are functions of distance.

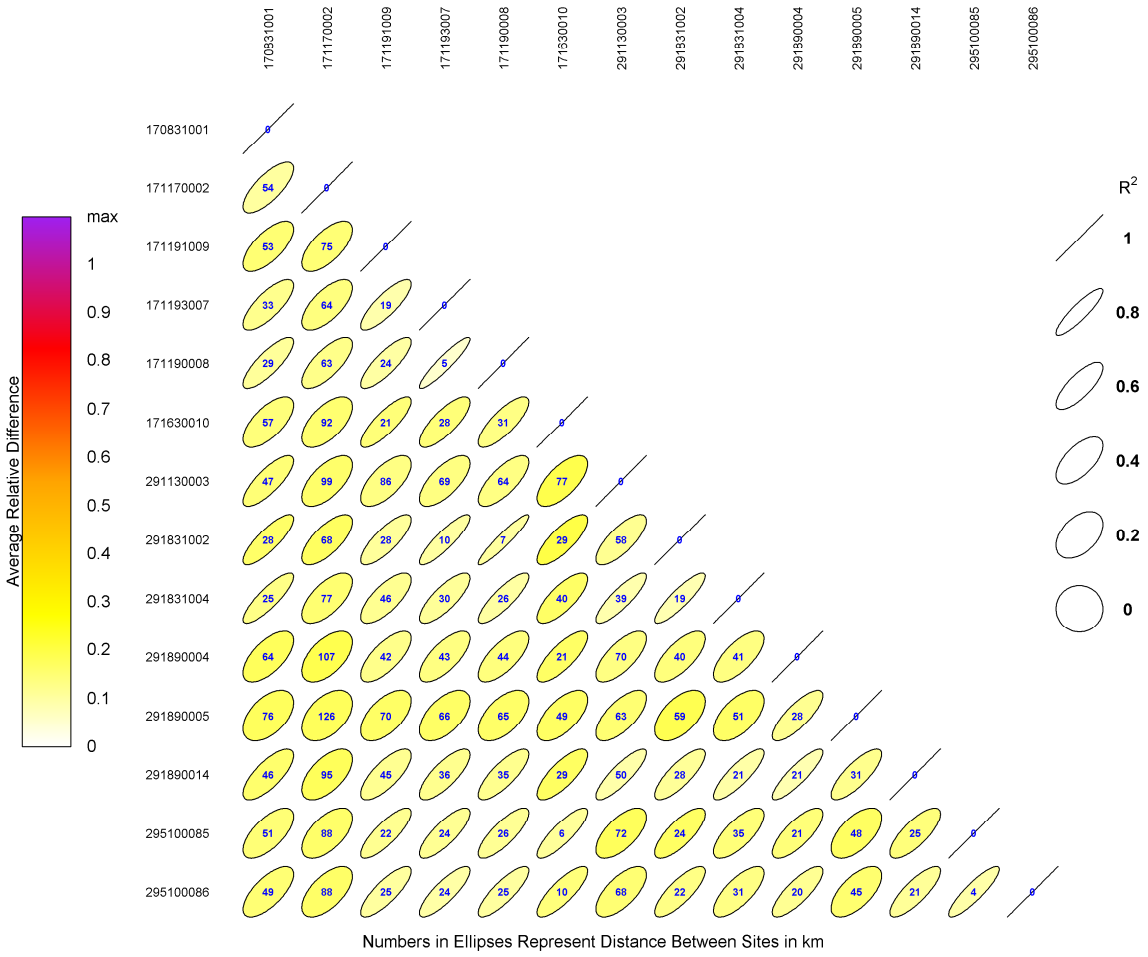
Correlation between sites is indicative of some amount of redundancy in O_3 monitoring. In Figure 9-6, West Alton is shown to be correlated to Orchard Farm and Maryland Heights in Missouri and to Alton, Wood River, Maryville, and Jerseyville in Illinois. In turn, Orchard Farm is also correlated to West Alton and to Maryland Heights, Foley (Missouri), Jerseyville, and Alton. Some correlation is evident between Pacific and Maryland Heights and Pacific and Sunset Hills. Sunset Hills was discontinued in 2008. Correlation is seen between Maryland Heights and the following sites: West Alton, Orchard Farm, Margaretta, Sunset Hills, Foley, and Pacific. Margaratta was, however, discontinued in 2008. Blair Street is located relatively closer to Margaretta, East St. Louis, Maryville, Wood River, and Alton. As expected, Blair Street is correlated to these sites.

Kansas City MSA

As shown Figure 9-7, Richards-Gebaur South is correlated to Heritage Park. The two sites are 16 kilometers apart despite being located in different states. There is correlation between Rocky Creek and Trimble. Trimble is located 22 kilometers downwind of Rocky Creek. Liberty is somewhat correlated to Watkins Mill and Rocky Creek to Liberty. Overall, there is some correlation among Trimble, Rocky Creek, Liberty, and Watkins Mill.

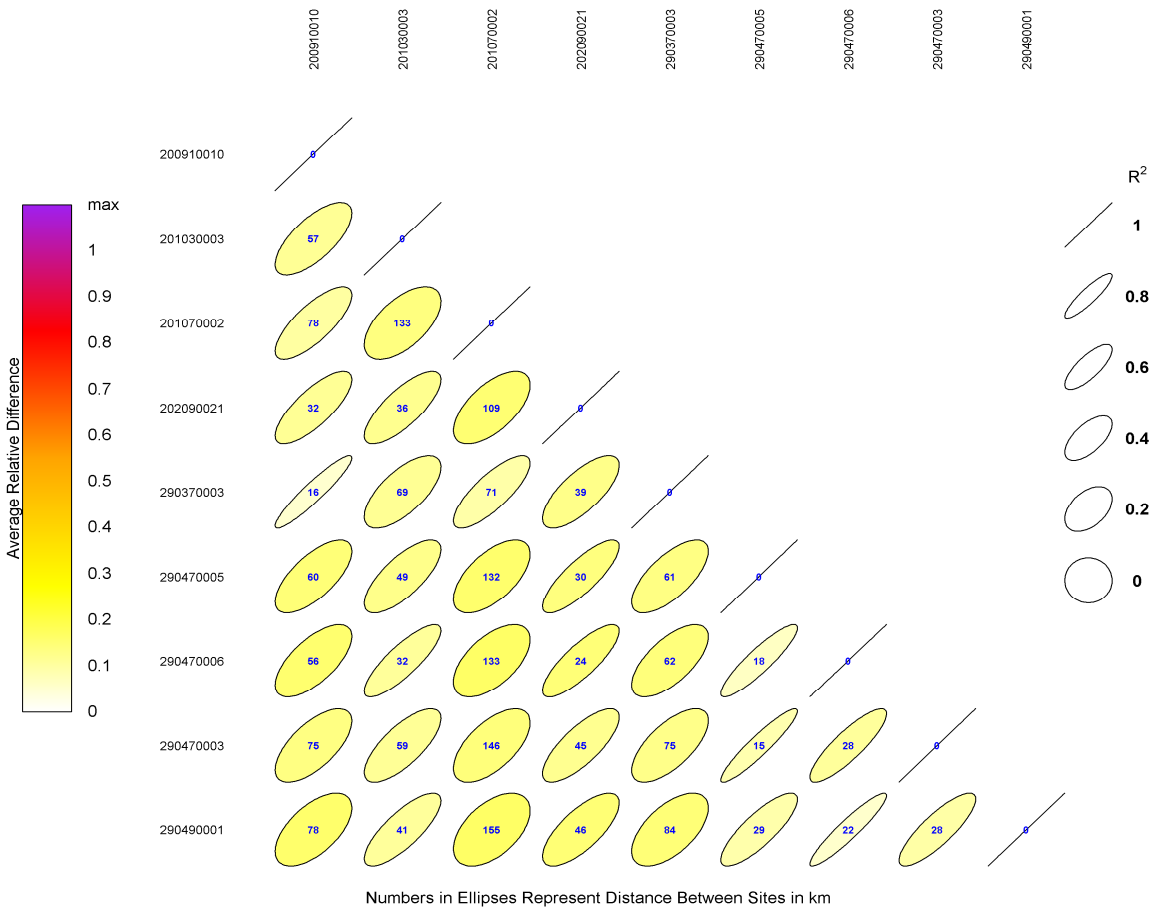
The correlations among sites within the St. Louis and Kansas City urban networks are expected, given the regional nature of ozone and the urban mix of emissions and upwind major NO_X and VOC sources. St. Charles sites and Maryland Heights show the most correlation in the Missouri portion of the St. Louis area. These, however, are key design values sites. Less correlation is seen in the Kansas City area, although again there appears to be some between the key design value sites (those trading status from year to year as the area design value site). This would seem to indicate that maintaining all these sites is necessary, even given their higher correlation.

Figure 9-6. St. Louis Area O_3 Correlation Matrix, 2006-2008



Site ID	Site Name
170831001	Jerseyville, IL
171170002	Nilwood, IL
171191009	Maryville, IL
171193007	Wood Rive,r IL
171190008	Alton, IL
171630010	East St. Louis, IL
291130003	Foley
291831002	West Alton
291831004	Orchard Farm
291890004	Sunset Hills
291890005	Pacific
291890014	Maryland Heights
295100085	Blair Street
295100086	Margaretta

Figure 9-7. Kansas City Area O_3 Correlation Matrix, 2006-2008



Site ID	Site Name
200910010	Heritage Park Olathe KS
201030003	Leavenworth KS
201070002	Mine Creek KS
202090021	JFK KS
290370003	RG-S
290470005	Liberty
290470006	Rocky Creek
290470003	Watkins Mill
290490001	Trimble

9.3.4 Area Served Analysis Results

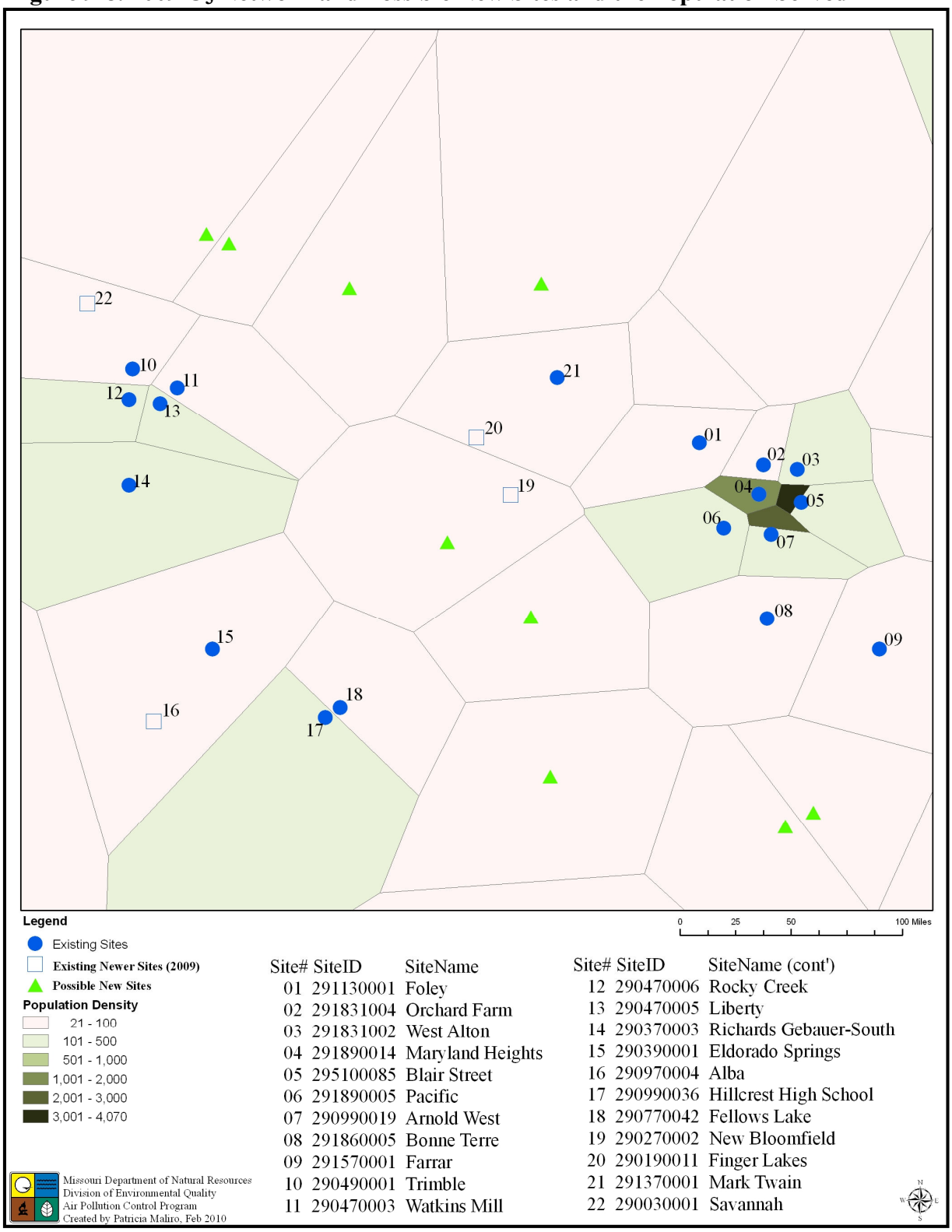
Figure 9-8 shows areas that each O_3 site represents and population that each site serves. The Area Served Tool is one of the Network Assessment Tools provided by the EPA. The Maryland Heights site represents more people than any other existing sites. Two densely populated areas lack representation in St. Louis. However, Blair Street and Arnold West are in close proximity to these areas. West Alton, Pacific, Hillcrest High School, Richards-Gebaur South, Liberty, and Rocky Creek represent larger areas and fairly populated areas. The rest of the sites are located in less populated areas. All possible new sites are suggested for areas with low population density and are away from high NO_X and VOC emission areas.

9.3.5 Removal Bias Analysis Results

The Removal Bias Tool, also a tool provided by the EPA, was used to estimate the redundancy of a given site as an additional means of validating the current O_3 network. The analysis estimates concentration for a location of the site assuming that that given site never existed. Concentration from the nearest neighboring sites are used in the interpolation. Positive average bias means that the neighboring sites usually measure higher concentrations than the site in question. Likewise, a negative bias means that the neighboring sites measure lower concentrations than the site.

Table 9-4 shows the average removal bias for the O_3 sites. As is shown in the table, West Alton, Foley (St. Louis area); Liberty, Rocky Creek (Kansas City area); Fellows Lake (Springfield area), and Mark Twain, Bonne Terre, and Farrar in the outstate areas have consistently measured O_3 concentrations that are higher than and statistically (largely) different from the neighboring sites. These sites show negative average biases for 2005 through 2008 concentrations. Orchard Farm, Maryland Heights, Arnold West, Trimble, and Richards-Gebaur South have also measured high concentrations compared to the neighboring sites but not continuously. Only three sites, Blair Street, Pacific, and Watkins Mill, tend to measure O_3 concentrations that are lower than the neighboring sites. These sites have positive average biases.

Figure 9-8. 2009 O_3 Network and Possible New Sites and the Population Served



Site#	SiteID	SiteName
01	291130001	Foley
02	291831004	Orchard Farm
03	291831002	West Alton
04	291890014	Maryland Heights
05	295100085	Blair Street
06	291890005	Pacific
07	290990019	Arnold West
08	291860005	Bonne Terre
09	291570001	Farrar
10	290490001	Trimble
11	290470003	Watkins Mill

Site#	SiteID	SiteName (cont')
12	290470006	Rocky Creek
13	290470005	Liberty
14	290370003	Richards Gebauer-South
15	290390001	Eldorado Springs
16	290970004	Alba
17	290990036	Hillcrest High School
18	290770042	Fellows Lake
19	290270002	New Bloomfield
20	290190011	Finger Lakes
21	291370001	Mark Twain
22	290030001	Savannah

Table 9-4. Average Removal Bias Analysis for 2005-2008 8-hour O_3 Data

Site Name	Site Id	Year	Mean Bias	Number of Observations	Statistical Significance	Comment
Orchard Farm	291831004	2005	-0.001	153	sig	
		2006	-0.002	152	sig	
		2007	0.002	153	sig	
		2008	0	153	insig	
West Alton	291831002	2005	-0.002	149	sig	
		2006	-0.005	149	sig	
		2007	-0.004	152	sig	
		2008	-0.004	141	sig	
Maryland Heights	291890014	2005	-0.002	153	sig	
		2006	-0.001	153	sig	
		2007	-0.002	153	sig	
		2008	0.001	153	sig	
Blair Street	295100085	2005	0.002	152	sig	
		2006	0	131	insig	
		2007	0.001	153	sig	
		2008	0.001	151	sig	
Pacific	291890005	2005	0	153	insig	
		2006	0.003	150	sig	
		2007	0.003	151	sig	
		2008	0.004	153	sig	
Arnold	290990012	2005	-0.001	153	insig	
		2006	0	152	insig	
		2007	0	152	insig	Relocated to
		2008	-	-	-	Arnold West
Arnold West	290990019	2005	-	-	-	
		2006	-	-	-	
		2007	-	-	-	Begun Sampling
		2008	-0.003	153	sig	in 2008
Foley	291130003	2005	-0.002	153	sig	
		2006	-0.002	153	sig	
		2007	-0.003	153	sig	
		2008	-0.003	151	sig	
Bonne Terre	291860005	2005	-0.001	153	sig	
		2006	-0.001	145	insig	
		2007	-0.002	153	sig	
		2008	-0.001	152	sig	
Farrar	291570001	2005	-0.002	153	sig	
		2006	-0.002	153	sig	
		2007	-0.002	153	sig	
		2008	-0.004	153	sig	

Table 9-4 continued. Average Removal Bias Analysis for 2005-2008 8-hour O3 Data

Site Name	Site Id	Year	Mean Bias	Number of Observations	Statistical Signficance	Comment
Trimble	290490001	2005	-0.001	153	sig	
		2006	0.001	153	sig	
		2007	-0.001	153	sig	
		2008	-0.001	153	sig	
Watkins Mill	290470003	2005	0.006	153	sig	
		2006	0.003	153	sig	
		2007	0.004	150	sig	
		2008	0.003	153	sig	
Liberty	290470005	2005	-0.003	153	sig	
		2006	-0.003	153	sig	
		2007	-0.002	151	sig	
		2008	-0.001	152	sig	
Rocky Creek	290470006	2005	-0.001	152	sig	
		2006	-0.002	153	sig	
		2007	-0.003	153	sig	
		2008	-0.002	152	sig	
RG-South	290370003	2005	0	150	insig	
		2006	0	153	sig	
		2007	-0.002	149	sig	
		2008	-0.001	151	sig	
Hillcrest H. Sch	290770036	2005	0.002	152	sig	
		2006	0.001	153	insig	
		2007	-0.002	153	sig	
		2008	0.002	153	sig	
Fellows Lake	290770042	2005	-	-	-	
		2006	-	-	-	
		2007	-	-	-	Begun Sampling
		2008	-0.002	152	sig	in 2008
Eldorado Springs	290390001	2005	-0.001	153	sig	
		2006	0	153	insig	
		2007	0	153	insig	
		2008	0	151	insig	
Mark Twain	291370001	2005	-0.001	153	insig	
		2006	-0.002	152	sig	
		2007	-0.002	153	sig	
		2008	-0.002	153	sig	

9.4 Emissions

NO_X and VOCs are known precursors of O_3. Emissions of the precursors from point, mobile, and area sources are assessed in relation to the O_3 concentrations and presented below.

9.4.1 Point Sources

NO_X Point Sources

As expected, larger sources and high concentration of smaller sources are mostly in and around the two major metropolitan areas, St. Louis and Kansas City, and Springfield (Figure 7-5 of NO_2 Network Assessment). Quite a number of sources are can be seen mostly along the Missouri and Mississippi Rivers and in the Joplin areas. As pointed out in the NO_2 Network Assessment Section 7.0), the central areas of the St. Louis, Kansas City, and Springfield metropolitan areas are assessed as high emissions areas. However, NO_X point source emissions have significantly decreased in all the metropolitan areas from 2003 to 2008, see Figures 10-6 to 10-8.

VOC Point Sources

VOC point sources emissions are presented in Figure 9-9. Again a great number of sources are located in the central areas of the St. Louis and Kansas City metropolitan areas and along the Missouri and Mississippi rivers. Like NO_X sources, quite a few point sources are also located in the Joplin area.

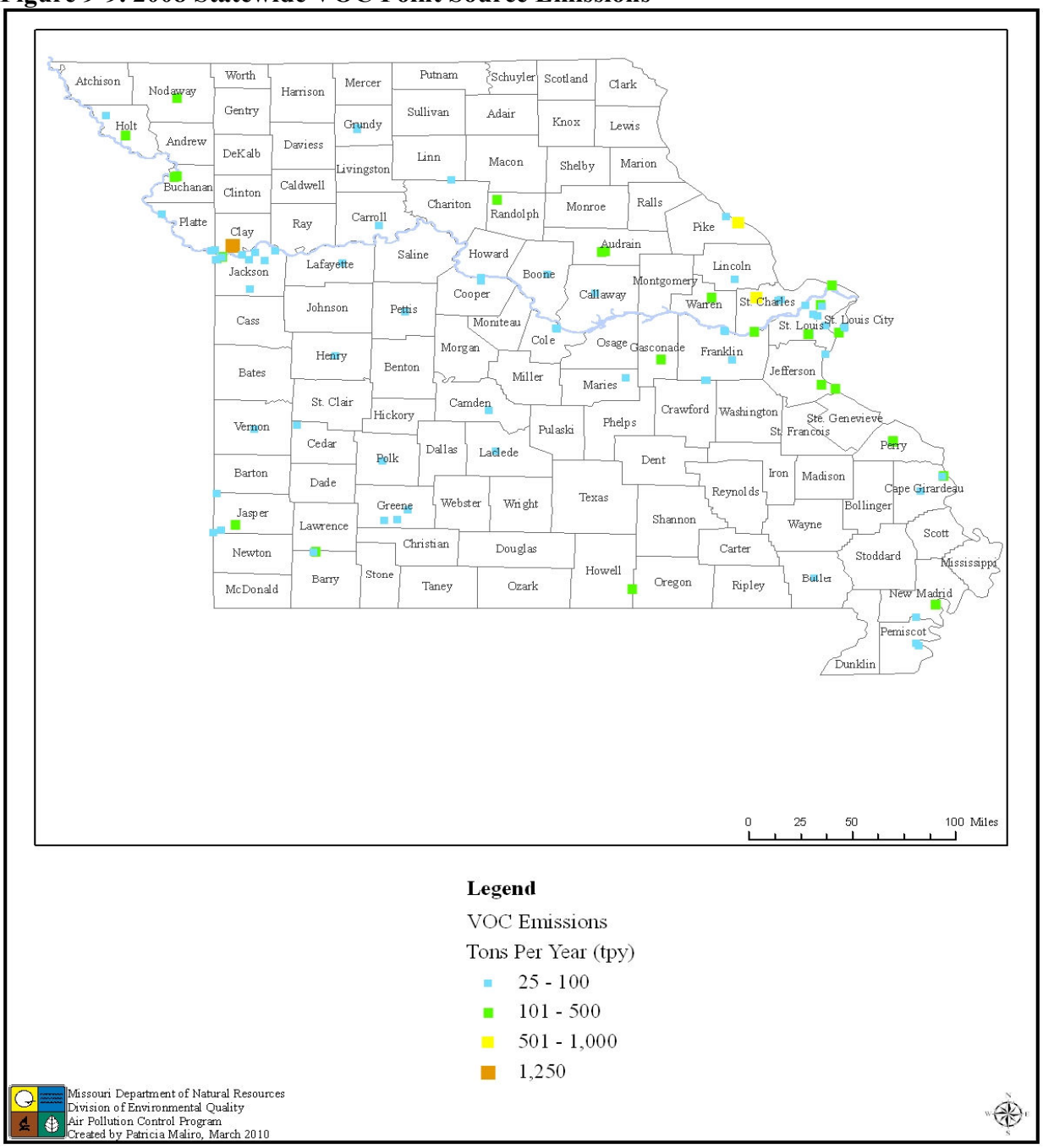
2008 VOC emissions in the St. Louis MSA are estimated at half of the 2003 emissions, a 51 percent decrease, Figure 9-10. Significant decreases can be noted in emissions from St. Louis County and St. Louis City. Franklin, St. Charles, and Jefferson Counties show downward trends that are slightly smaller to stable.

VOC emissions have also decreased in the Kansas City area (Figure 9-11) but by about 28 percent. In particular, emissions from Clay County have decreased considerably. Emissions from Jackson and Platte Counties have remained stable but low.

VOC point source emissions in the Springfield MSA are largely from Greene County (Figure 9-12). A 28-percent decrease can be noted in total emissions trend in the area.

VOC emissions from counties outside the MSAs are presented in Figure 9-13. Pike County has the highest yearly VOC point source emissions among counties outside of the MSAs. But emissions have decreased from 1,841 to 627 tpy in the county. Impacts from the county, on the St. Louis MSA, could be limited because of the county's location (downwind) relative to the MSA. The rest of the counties have had yearly emissions of less than or equal to 700 tpy and decreasing.

Figure 9-9. 2008 Statewide VOC Point Source Emissions



Legend

VOC Emissions

Tons Per Year (tpy)

- 25 - 100
- 101 - 500
- 501 - 1,000
- 1,250

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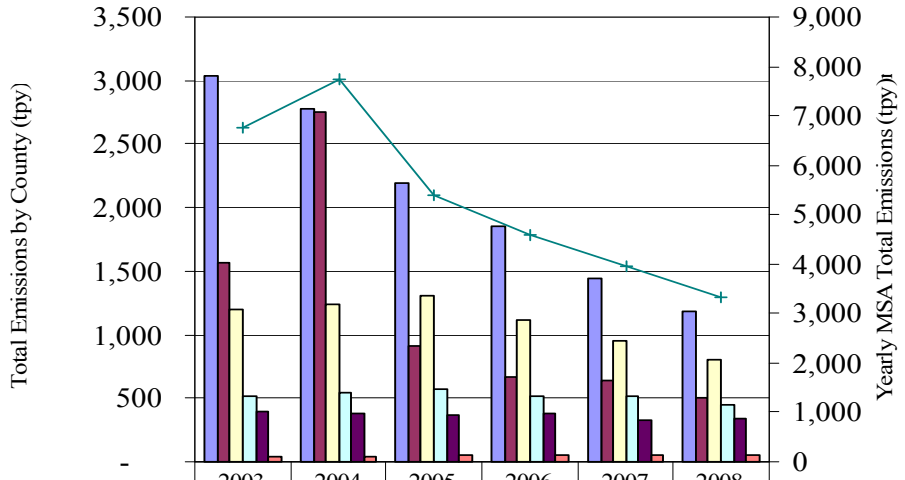
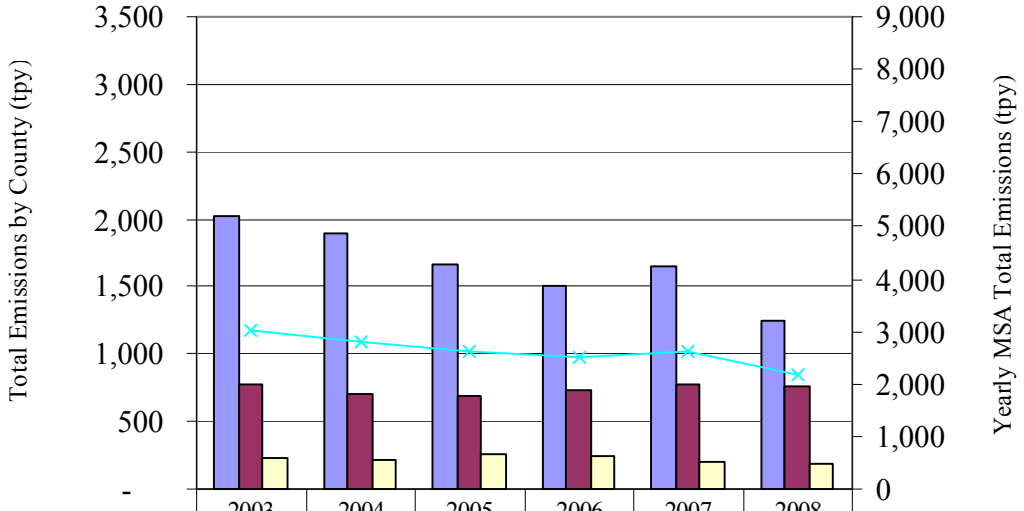
Division of Environmental Quality
Air Pollution Control Program
Created by Patricia Maliro, March 2010

Figure 9-10. St. Louis MSA Point Source VOC Emission Trends, 2003-2008



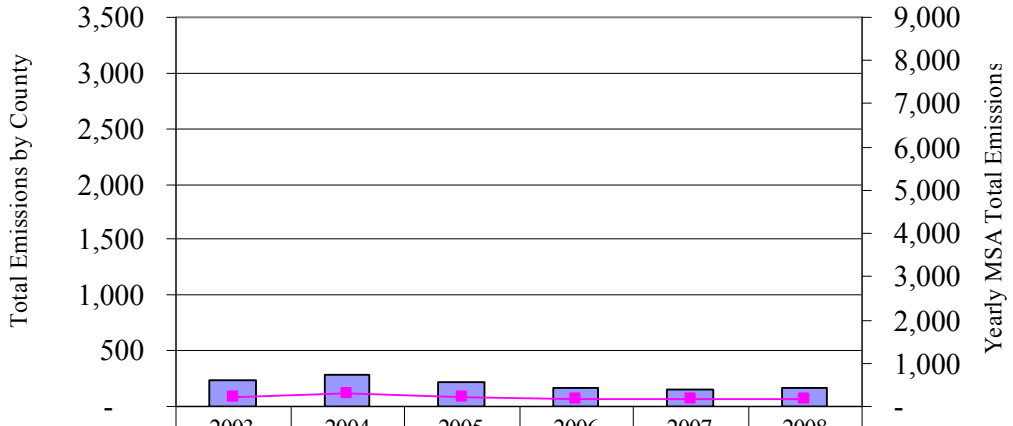
	2003	2004	2005	2006	2007	2008
St. Louis County	3,039	2,777	2,191	1,857	1,450	1,178
St. Louis City	1,566	2,751	911	673	642	501
St. Charles County	1,202	1,233	1,311	1,123	957	808
Franklin County	522	549	575	514	514	446
Jefferson County	394	387	373	378	331	345
Lincoln County	40	47	49	53	52	50
Total MSA Emissions	6,764	7,744	5,409	4,599	3,945	3,329

Figure 9-11. Kansas City MSA Point Source VOC Emission Trends, 2003-2008



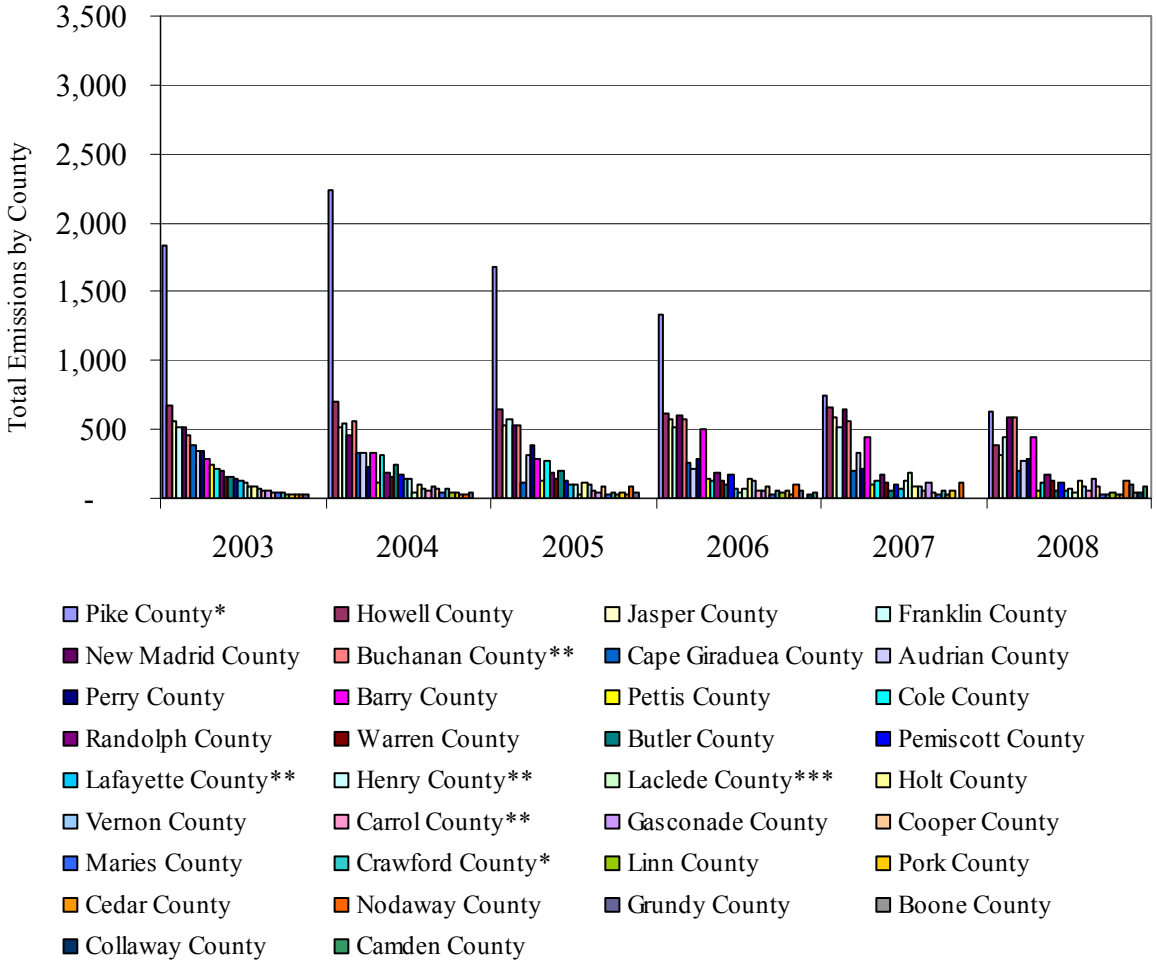
	2003	2004	2005	2006	2007	2008
Clay County	2,025	1,895	1,665	1,509	1,647	1,250
Jackson County	782	707	682	738	775	762
Platte County	231	220	254	244	205	181
Yearly MSA Total Emissions	3,038	2,821	2,601	2,491	2,628	2,193

Figure 9-12. Springfield MSA Point Source VOC Emission Trends, 2003-2008



	2003	2004	2005	2006	2007	2008
Green County	226	293	213	175	152	162
Yearly MSA Total Emissions	226	293	213	175	152	162

Figure 9-13. VOC Point Emission Trends in Counties outside the MSAs, 2003-2008



*Counties boardering the St. Louis MSA
**Counties boardering the Kansas City MSA
***Counties boardering the Springfield MSA

9.4.2 Mobile Source NO_X Emissions

Figures 5-4 through 5-8 show the 2008 Traffic Volume Count (TVC) in St. Louis, Kansas City, and Springfield. This information is used as a surrogate for mobile source emissions of NO_X and VOCs. Traffic is directly associated with NO_X and VOC emissions. As shown in the figures, the central areas of the metropolitan areas contain some of the most traveled segments of traffic arteries and major interstate highways. It would, therefore, be expected for these areas to have high levels of mobile emissions.

9.4.3 Area Sources

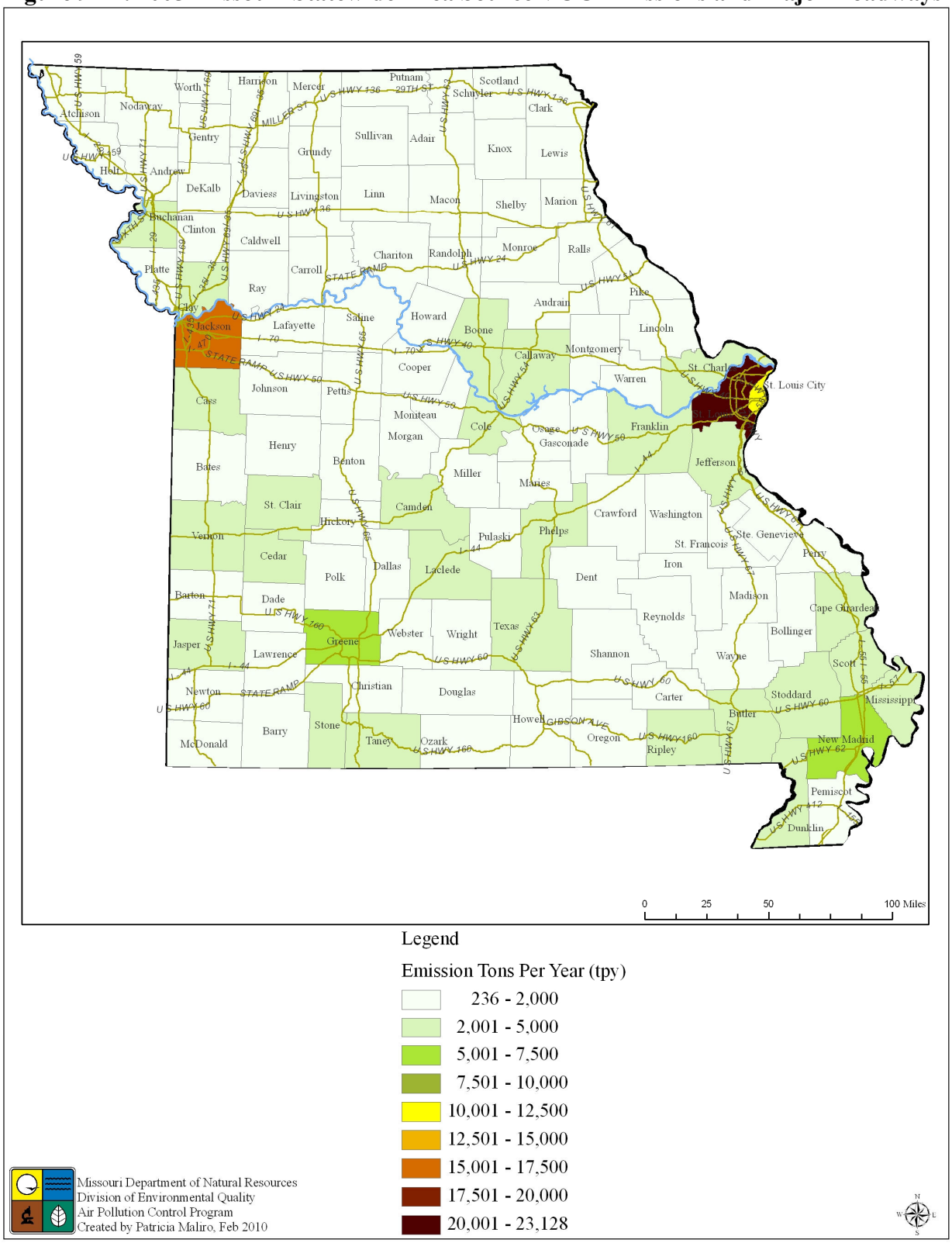
NO_X and VOC Area Sources

Figure 9-14 presents the 2005 VOC area source emissions. High emissions are estimated for St. Louis County and St. Louis City in the St. Louis area, in that order, and Johnson County in the Kansas City area. The high VOC emissions in these counties coincide with high NO_X area emissions (see Figures 7-7 to 7-10 of the NO_2 Network Assessment). Moderate emissions are estimated for Greene and New Madrid counties.

As NO_X and VOC area source emissions generally correlate with population densities, it is no surprise that, according to the State of Missouri population growth estimates in Table 2-2, St. Louis County, Johnson County, St. Charles County, and St. Louis City show the highest population growth since the 2000 census. These areas would be considered potential source areas of high NO_X and VOC emissions and hence the high emissions in Figure 9-13 of VOC and Figure 7-10 of NO_X.

The above assessment of the VOC emissions is comparable to the NO_X emissions assessment (Section 7.0) in that VOC emissions have been assessed to also be potentially high in the central areas of St. Louis, Kansas City, and Springfield. Some of the VOC point sources, highly traveled segments of roadways, and densely populated areas are located within the central areas of the metropolitan areas. Also areas west towards south of St. Louis, slightly north of Kansas City and southerly of the Springfield urban cores are areas of high VOC emissions.

Figure 9-14. 2005 Missouri Statewide Area Source VOC Emissions and Major Roadways



Legend

Emission Tons Per Year (tpy)

- 236 - 2,000
- 2,001 - 5,000
- 5,001 - 7,500
- 7,501 - 10,000
- 10,001 - 12,500
- 12,501 - 15,000
- 15,001 - 17,500
- 17,501 - 20,000
- 20,001 - 23,128

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Division of Environmental Quality
Air Pollution Control Program
Created by Patricia Maliro, Feb 2010

9.5 Evaluation of the O_3 Monitoring Network

West Alton, Orchard Farm, and Maryland Heights, in the St. Louis area and Trimble and Rocky Creek in Kansas City are shown to have consistently measured O_3 concentrations above the NAAQS despite the downward trends in concentrations. These sites are located downwind from areas of maximum precursor emissions (point, mobile, and areas source emission areas) and this poses a high probability for the sites to violate the NAAQS in the future. They also represent densely to fairly densely populated areas, and the removal bias analysis shows that these sites tend to measure higher O_3 concentrations than the neighboring sites. Additionally, 40 **CFR** 58.14(c) states that Regional Administrator may approve discontinuation of any O_3 SLAMS monitor which has shown attainment during the previous five years. None of the sites meet the criteria under the 2008 NAAQS and will not under the new rule. These sites are therefore judged to be **critical**.

Blair Street is located near areas of high emissions (not enough time for the precursors to mix in forming O_3) but has had violations of the NAAQS in the past. Besides the violations, Blair Street is to be designated as an NCore site where year-round O_3 monitoring will be required. This therefore is a **critical** site.

Alba, New Bloomfield, Finger Lakes, and Savannah are **critical** sites. These sites represent MSAs of at least 50,000 to 350,000 people, i.e., Joplin, Jefferson City, Columbia, and St. Joseph, respectively. EPA proposed to modify air quality monitoring requirements in the 2009 rule. Thus these sites will be critical in characterizing O_3 concentrations and meeting the minimum monitoring requirements for the targeted MSAs.

Hillcrest High School and Fellows Lake in Springfield are located about 10-15 miles downwind of the Springfield urban core, an area with high NO_X and VOC emissions. According to the 2000 census, the Springfield population has grown to over 360,000 people, and the most recent 3-year design value concentrations were measured at more than 85% of the NAAQS. Based on this assessment, Hillcrest and Fellows Lake not only help the Springfield MSA to meet the minimum monitoring requirement but also help to characterize and track O_3 levels in the area, as has been indicated by the past monitored violations at Hillcrest and higher concentrations at Fellows Lake. Both sites are therefore **critical**.

Bonne Terre, which represents a regional scale, has been in violation of the NAAQS since 2003, according to 2003 -2008 data. The high monitored concentrations are an indication of how capable the site is in meeting its objective of monitoring transport impacts. Also the Bonne Terre site is located in an area that has been recommended to the EPA for the O_3 non-attainment re-designation. Based on this evaluation, this site is **critical**.

Farrar is also located in an area that has been recommended for the non-attainment re-designation for O_3. It is located north and downwind of in-state and out-of-state sources of NO_X and VOC that may potentially impact the Farrar site, as is evidenced by the registered NAAQS violations in 2007 and 2008. This analysis renders the Farrar site as **critical**.

The Foley, Liberty, and Watkins Mill sites are located relatively downwind of the high emissions areas. All three sites have had concentrations above the NAAQS in the past five years. Also, previous O_3 network assessments in 2003 and 2007 have indicate that these sites have significantly been involved in containing O_3 episodes thereby providing validation and more spatial coverage for the network. These sites are therefore assessed as **critical**.

Arnold West, Pacific, and Richards-Gebaur South are located south and generally upwind of their respective metropolitan areas. Their locations help to determine O_3 impacts in the areas they each represent and before the impacts enter the metropolitan areas. All three sites have monitored violations of the NAAQS in the past and have also been shown to contain some of the O_3 episodes in their respective areas. Their part in the network is their ability to validate the network in the southern part of the individual urban networks, a **critical** function.

Eldorado Springs and Mark Twain monitor rural O_3 levels (background sites) in the state. These sites are evaluated as being **critical** to the network. Because of their location, one of the sites could potentially be used to meet the non-urban area monitoring requirement, especially the Mark Twain site.

Branson (Figure 9-1) is a new site that began O_3 monitoring this year, 2010. The Branson area experiences high visitor populations during the summer months. It also important to note, as shown in Figure 2-2, that MSAs such as Rogers/Fayetteville, Fort Smith and Tulsa have had very high population growth rates. The associated emissions from these population growth rates have high potential of contributing to possible elevated O_3 levels in the southwest region of Missouri. The Branson site, which is a SPM site, is **credible** to the Missouri O_3 monitoring network. If high values are monitored, this site will instead be **critical**.

The 2000 census classifies the Cape Girardeau area as a MSA with the total population in Cape Girardeau, Bollinger and Alexander, Illinois Counties at 90,312. Given this, ozone monitoring in the MSA will be required by the 2013 ozone season.

10.0 $PM_{2.5}$ NETWORK ASSESSMENT

10.1 Introduction: $PM_{2.5}$ Standards and Monitoring Requirements

The EPA promulgated NAAQS for $PM_{2.5}$ in 1997 (62 **Federal Register** 38652, July 17, 1997). The standards were:

- 15.0 μg/m^3, based on the 3-year average of annual arithmetic mean concentrations from single or multiple community-oriented monitors,

- 65 μg/m^3, based on the 3-year average of the 98th percentile of 24-hour concentrations at each population-oriented monitor within an area.

EPA promulgated a revised 24-hour $PM_{2.5}$ standard in 2006 (71 **Federal Register** 61144, October 17, 2006). This revision reduced the 24-hour standard from 65 to 35 μg/m^3. $PM_{2.5}$ standards are currently under review. Proposed new standards are expected to be announced in about January 2011 and finalized in about October 2011. The new standards are expected to include a secondary standard related to urban-focused visibility, with a possible monitoring requirement for either sub-daily continuous $PM_{2.5}$ mass measurement or measurement of parameters related to light scattering and/or absorption.

At the same time that the NAAQS was promulgated in 2006, EPA revised air monitoring requirements, including requirements for minimum numbers of $PM_{2.5}$ monitors in each metropolitan statistical area (MSA) (71 **Federal Register** 61235, October 17, 2006). Minimum numbers of samplers in each MSA are based on population and on whether the design value for either $PM_{2.5}$ exceeds 85 percent of the standard, as shown in Table 10-1. Eighty-five percent of the 24-hour standard is 29.75 μg/m^3, and 85 percent of the annual standard is 12.75 μg/m^3.

Table 10-1. Minimum Numbers of $PM_{2.5}$ Samplers Required

MSA population	3-Year DV≥85% of either standard	3-Year DV<85% of either standard or no applicable DV
>1,000,000	3	2
500,000-1,000,000	2	1
50,000-500,000 and includes an urban area of ≥50,000	1	0

Missouri includes all or part of eight MSAs, with estimated populations as listed in Table 10-2 (http:// www.census.gov/popest/metro/CBSA-est2009-annual.html).

Table 10-2. Missouri MSA Populations

Missouri MSA	7/1/2009 Estimated Population
St. Louis MO-IL	2,828,990
Kansas City MO-KS	2,067,585
Fayetteville-Springdale-Rogers AR-MO*	464,623
Springfield MO	430,900
Joplin MO	174,300
Columbia MO	166,234
Jefferson City MO	147,438
St. Joseph MO-KS	126,644
Cape Girardeau-Jackson MO-IL	93,712

*Includes only one county in Missouri and no urban area ≥ 50,000 population.

10.2 $PM_{2.5}$ Monitoring Results in Missouri

$PM_{2.5}$ design values for the past ten years in Missouri and in the Kansas City area (in Kansas) and St. Louis area (in Illinois) as determined according to the annual and 24-hour NAAQS are shown in Figures 10-1 to 10-6. All Missouri sites are now in compliance with both standards.

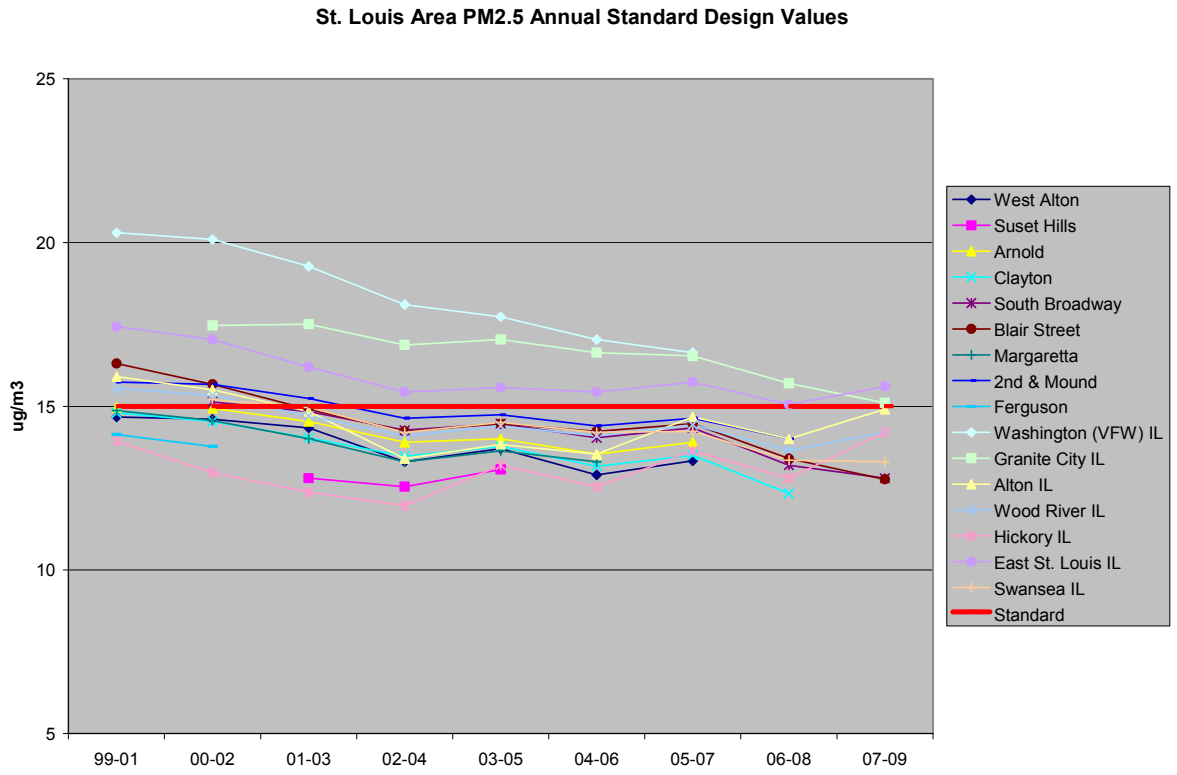


Figure 10-1

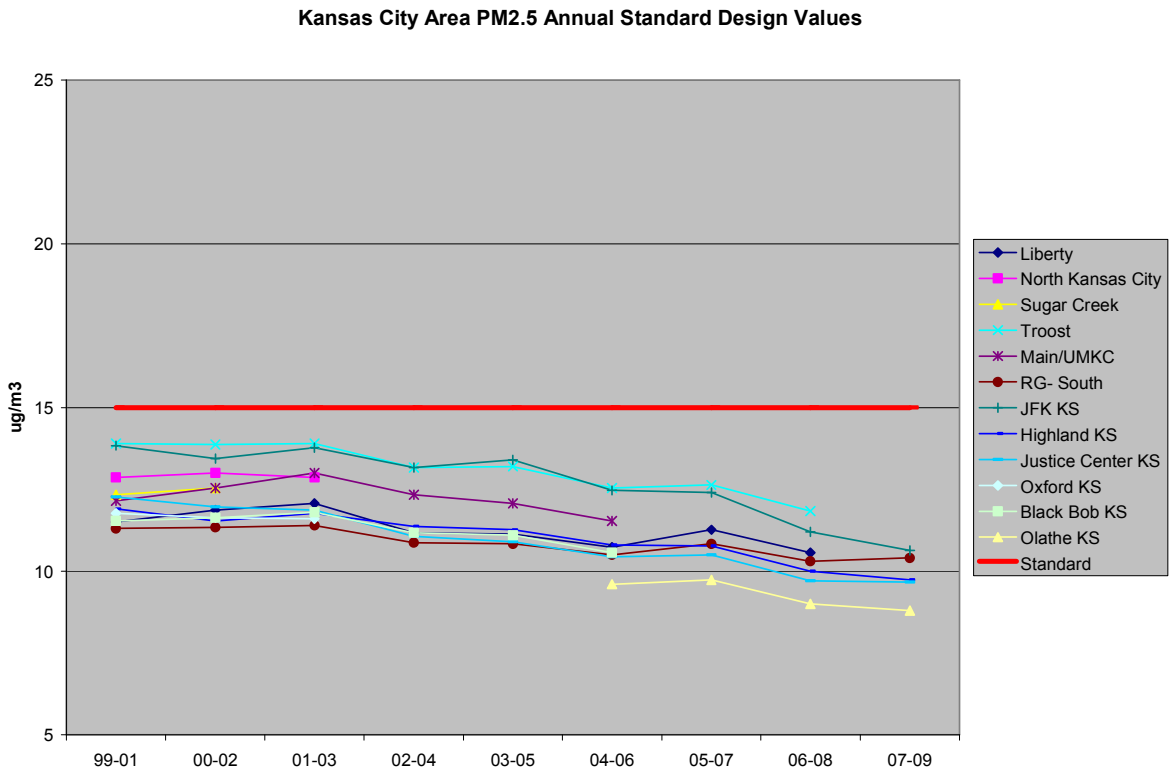


Figure 10-2

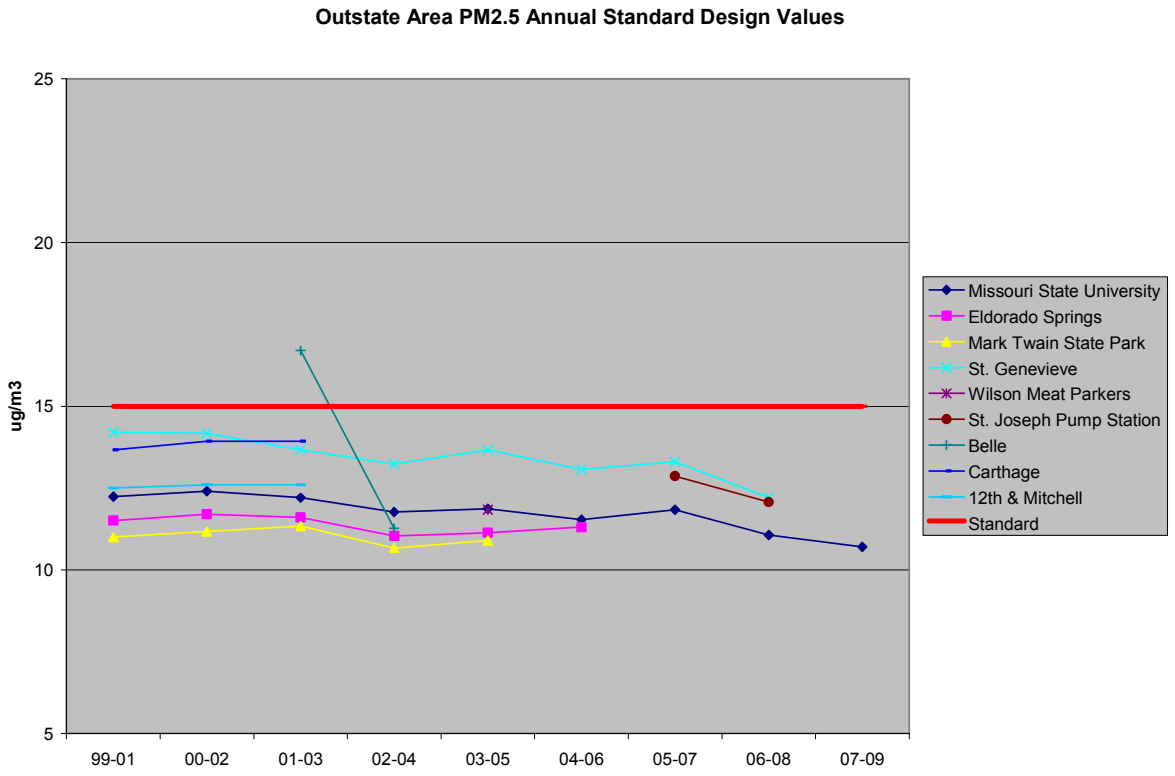


Figure 10-3

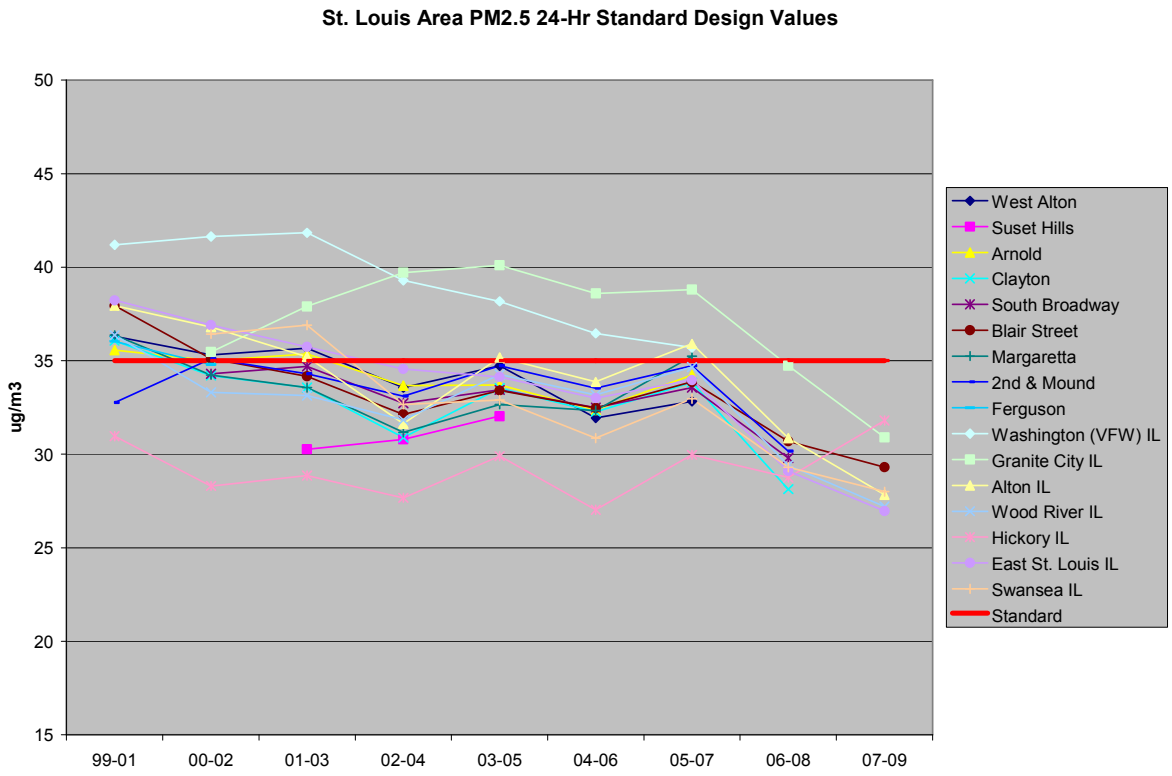


Figure 10-4

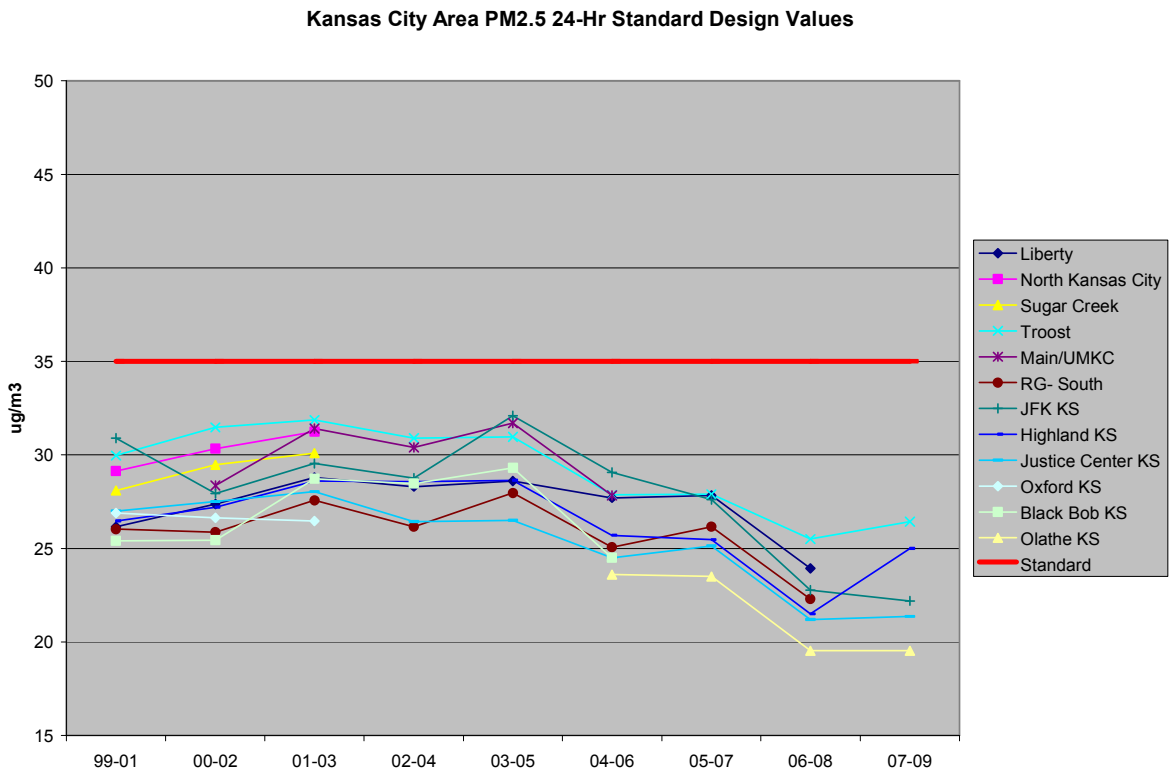


Figure 10-5

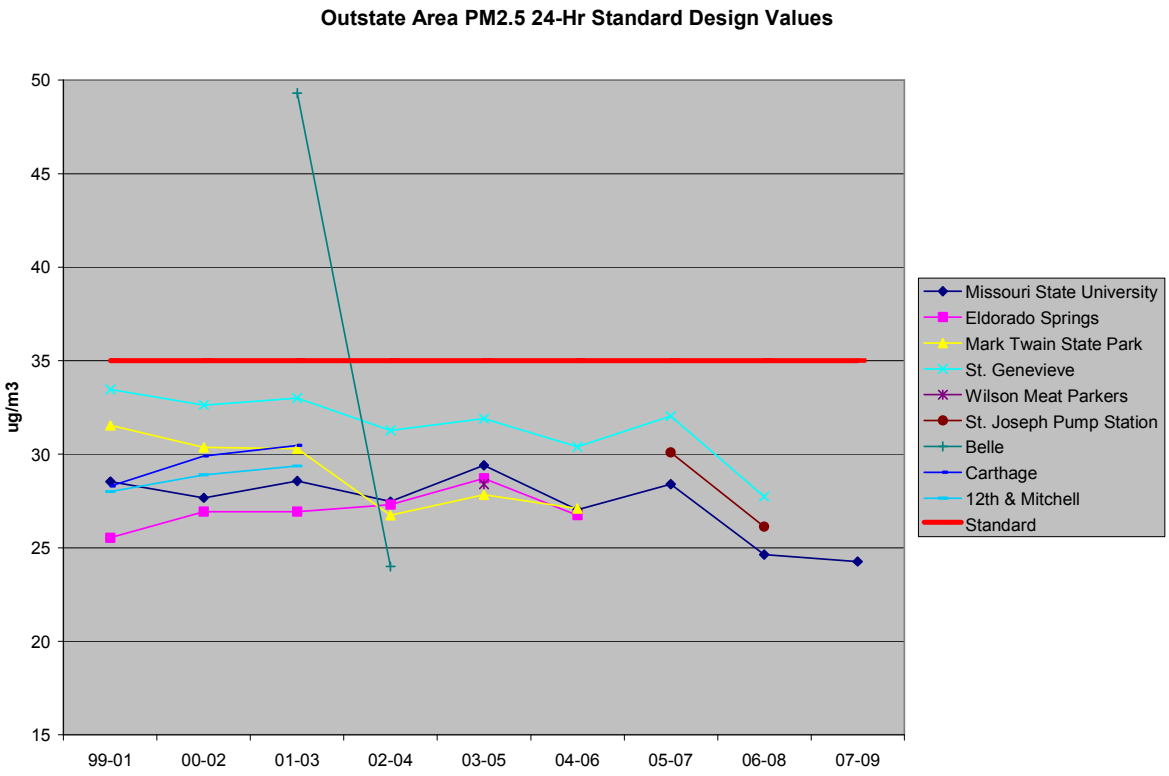


Figure 10-6

Table 10-3 lists the minimum numbers of $PM_{2.5}$ monitors required in Missouri, based on the monitoring requirements, population data, and monitoring data presented above. Table 10-3 also lists the numbers of existing monitoring sites in each area.

Table 10-3. Required and Current Numbers of $PM_{2.5}$ Monitoring Sites in Missouri

MSA	Required Minimum Number of $PM_{2.5}$ Monitoring Sites	Current Number of $PM_{2.5}$ Monitoring Sites in MSA within Missouri
St. Louis	3	5
Kansas City	2	3
Springfield	0	1
Joplin	0	0
Columbia	0	0
Jefferson City	0	0
St. Joseph	1	1
Cape Girardeau	0	0
(not in a MSA)	0	1

In the context of this monitoring network assessment and network plans, it is important to note that "While this final rule requires fewer monitors than are now operating for O_3 and $PM_{2.5}$, as did the pre-existing monitoring rule, EPA does not intend to encourage net reductions in the number of O_3 and $PM_{2.5}$ monitoring sites in the U.S. as a whole. The surplus in the existing

networks relative to minimum requirements gives States more flexibility to choose where to apply monitoring resources for O_3 and $PM_{2.5}$," (71 **Federal Register** 61240, October 17, 2006). Continuous $PM_{2.5}$ monitors must be operated at a minimum of half of these required sites. At least one required FRM/FEM monitor in each MSA must be collocated (71 **Federal Register** 61322, October 17, 2006). Continuous monitors are being operated at 3 of the St. Louis area sites at the 3 Kansas City area sites, and at the St. Joseph site, and there is collocated monitoring at one of the Kansas City area sites, so these requirements are being met.

$PM_{2.5}$ monitoring sites are shown on the map in Figure 10-7. Sites and monitor types are also listed in Tables 10-4 in the analysis section below. As indicated in the table, the network has been recently been modified to maximize use of FEMs in order to reduce the labor-intensive use of FRM samplers to the extent possible consistent with availability of equipment and with monitoring requirements in the Federal Register.

In addition to sites identified above, $PM_{2.5}$ speciation samplers are located at Blair Street in St. Louis; Arnold West, a suburban site south of St. Louis; Bonne Terre, a regional background site south of St. Louis: and Liberty, generally downwind of Kansas City. An IMPROVE protocol sampler is located at El Dorado Springs, and IMPROVE samplers (operated by other agencies) are located at Mingo National Wildlife Refuge and Hercules Glades Wilderness.

In addition to the minimum numbers of sites in each MSA, each state must monitor at one regional background site and one regional transport site. El Dorado Springs is a regional background site in southwestern Missouri, and the Bonne Terre $PM_{2.5}$ Speciation Trends Network (STN) site provides background data for eastern Missouri. The Liberty site, generally downwind of Kansas City and the Alton IL site, generally downwind of St. Louis, provide regional transport information.

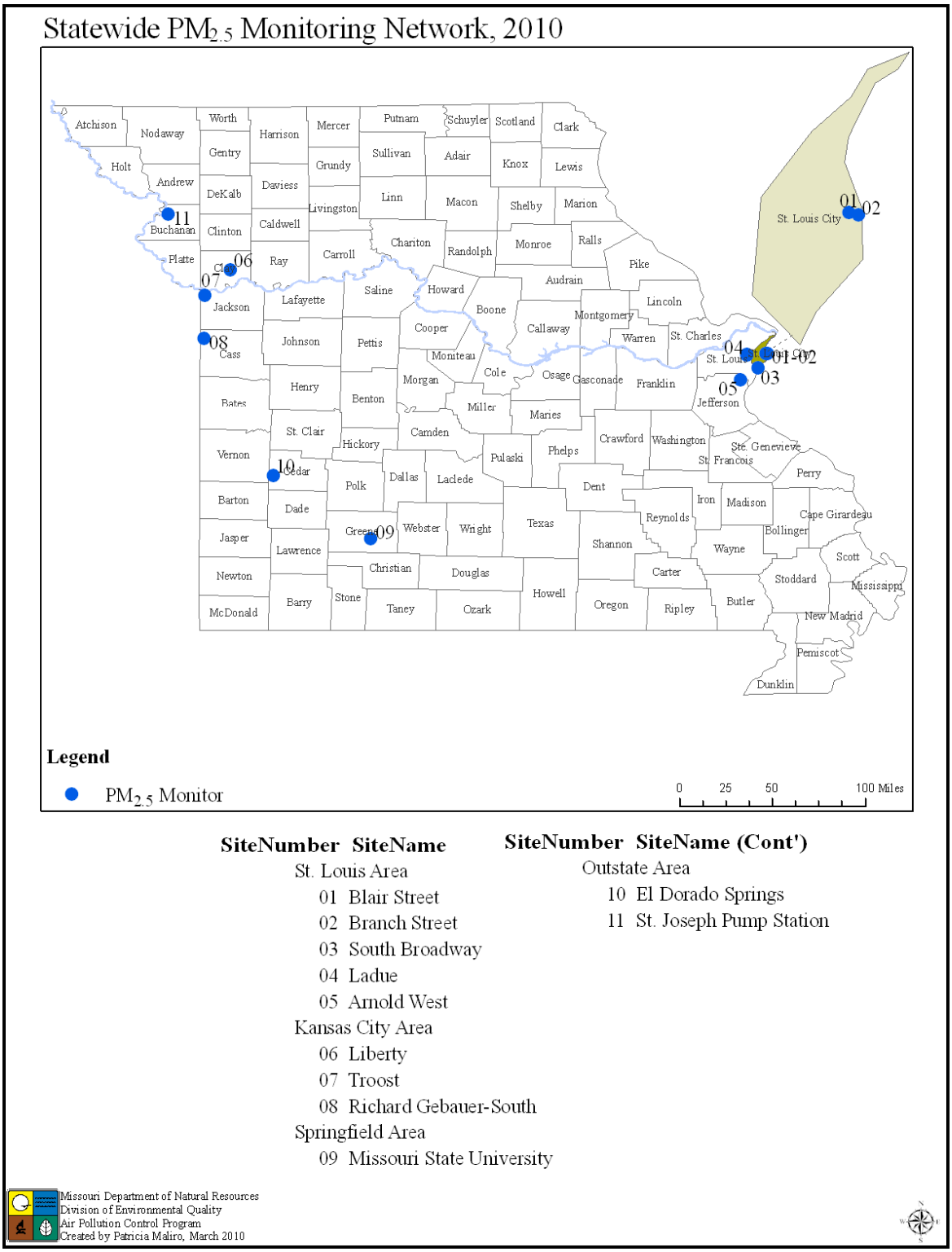


Figure 10-7. Missouri $PM_{2.5}$ monitoring locations.

10.3 Emission Sources

Fine particulate matter is chiefly composed of the effluent from combustion processes taking place in fossil fuel-fired power plants, transportation, industry, agriculture, construction, waste disposal, and other sectors. In addition to the primary $PM_{2.5}$ directly emitted from these combustion processes, the majority of airborne $PM_{2.5}$ is secondary, formed downstream from emission points by the condensation of sulfur and nitrogen oxides (SO_X and NO_X), volatile organic compounds (VOC), and ammonia (NH_3) emitted by these same processes. The same sources that emit $PM_{2.5}$ and its precursors are largely responsible for emissions of the VOC and NO_X that cause the formation of ozone as well. Therefore, in addition to direct $PM_{2.5}$ emission sources, sources of PM_{10}, SO_X, NO_X, VOC, and NH_3 also contribute to atmospheric $PM_{2.5}$.

$PM_{2.5}$ speciation results in the St. Louis area indicate that the species contributing most of the $PM_{2.5}$ mass are ammonium sulfate, ammonium nitrate, and carbonaceous material (organic compounds and elemental carbon). The sulfate contribution is highest in the summer, and the nitrate contribution is highest in the winter. Analysis of speciation results on summer days with high mass concentration shows that the excess over average summer days is dominated by ammonium sulfate, which is widespread in the region. The combined effect of the regional and urban emissions in the area is to create levels of $PM_{2.5}$ during high pollution events that, in St. Louis, Missouri, are primarily due to either regional sources of sulfate and/or urban-wide/regional sources of nitrate.

Comparison of $PM_{2.5}$ mass and speciation measurement results for the St. Louis area to results for rural areas shows an urban excess of 4 to 6 $\mu g/m^3$, which (on an annual basis) is predominantly carbonaceous material (organic compounds and elemental carbon) and nitrate. Differences in these species (carbonaceous material and nitrate) also appear between urban core and suburban sites in the St. Louis area. Sulfate, on the other hand, appears to be more regional, with sulfate concentrations being higher in eastern Missouri and lower in western Missouri, likely because of the relative proximity to coal combustion sources in the general area along the Ohio River.

Airborne $PM_{2.5}$ in the St. Louis, Missouri area is dominated by the impact of regional or urban-scale influences and by the contribution of secondary sources, and large SO_X and NO_X sources generally have tall stacks that reduce their near-source impact. However, it is still worthwhile to consider the location of emission sources, in order to help ascertain that source influences are not being either overlooked or overemphasized because of the location of monitoring stations. Figure 10-8 shows the locations of primary $PM_{2.5}$ sources, which are somewhat concentrated in the Kansas City and St. Louis areas. The locations of SO_2, NO_X, and VOC sources are shown in other sections of this assessment.

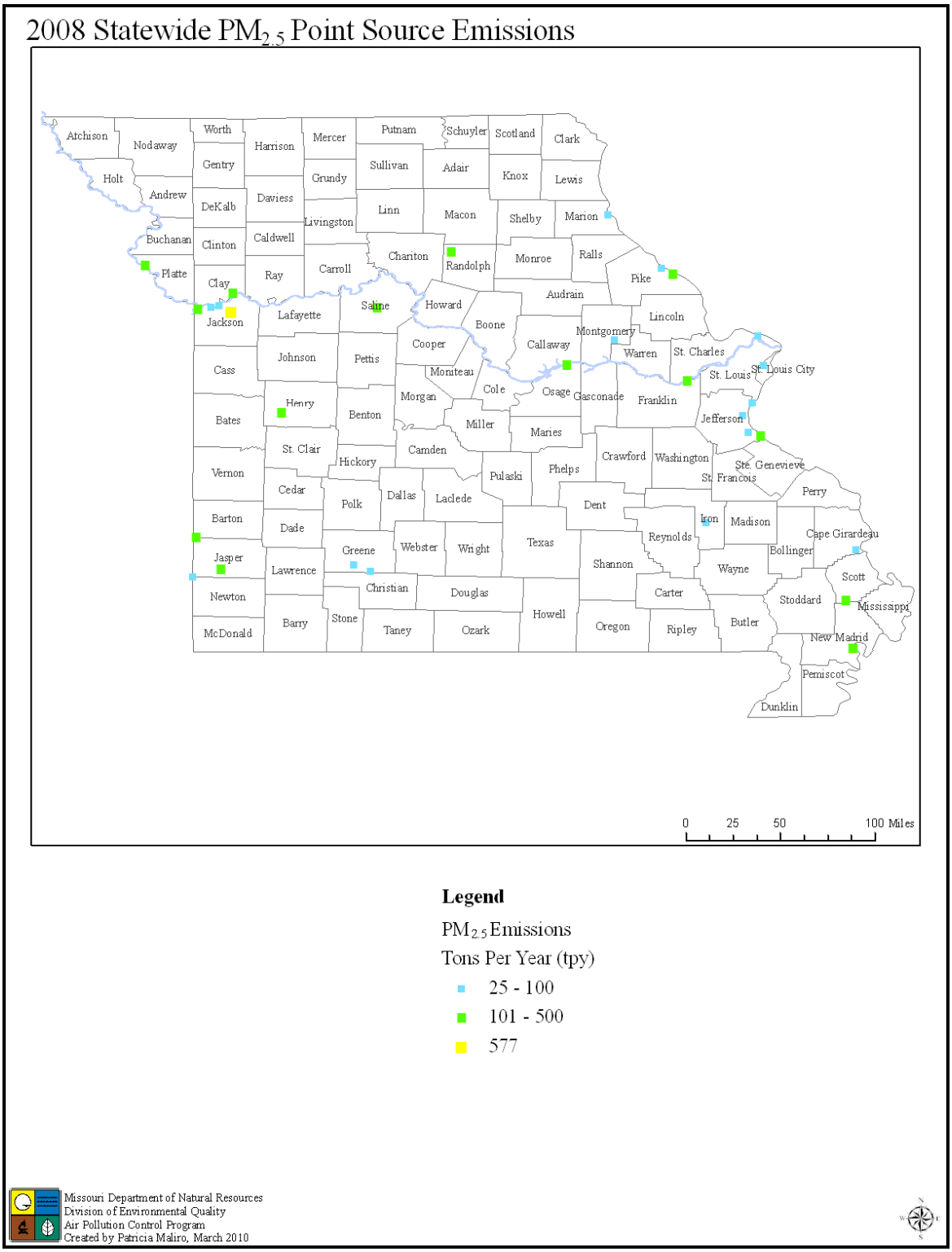
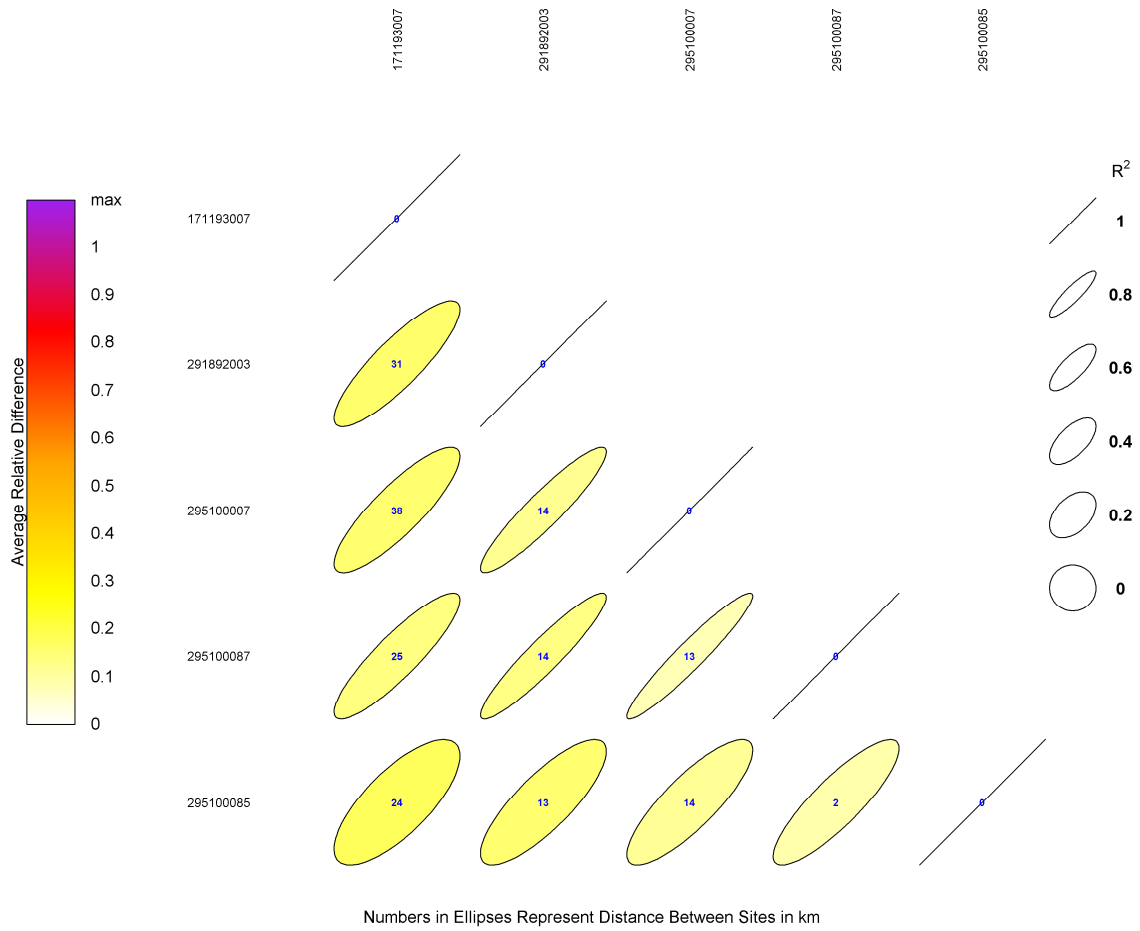

2008 Statewide PM2.5 Point Source Emissions
Atchison
Nodaway
Worth
Harrison
Mercer
Putnam
Schuyler
Scotland
Clark
Holt
Andrew
Gentry
Grundy
Sullivan
Adair
Knox
Lewis
DeKalb
Daviess
Livingston
Linn
Macon
Shelby
Marion
Buchanan
Clinton
Caldwell
Chariton
Randolph
Monroe
Ralls
Platte
Clay
Ray
Carroll
Pike
Audrain
Jackson
Lafayette
Saline
Howard
Boone
Lincoln
Montgomery
Cooper
Callaway
Warren
St. Charles
Cass
Johnson
Pettis
Moniteau
St. Louis
St. Louis City
Henry
Morgan
Cole
Osage
Gasconade
Franklin
Bates
Benton
Miller
Jefferson
Maries
St. Clair
Camden
Crawford
Washington
Hickory
Ste. Genevieve
Vernon
Pulaski
Phelps
St. Francois
Cedar
Polk
Dallas
Laclede
Perry
Dent
Barton
Dade
Iron
Madison
Reynolds
Cape Girardeau
Jasper
Greene
Webster
Wright
Texas
Bollinger
Lawrence
Shannon
Wayne
Scott
Christian
Douglas
Carter
Newton
Stoddard
Mississippi
Howell
Barry
Stone
Taney
Ozark
Oregon
Ripley
Butler
McDonald
New Madrid
Pemiscot
Dunklin
0
25
50
100 Miles
Legend
PM2.5 Emissions
Tons Per Year (tpy)
25 - 100
101 - 500
577
Missouri Department of Natural Resources
Division of Environmental Quality
Air Pollution Control Program
Created by Patricia Maliro, March 2010

Figure 10-8

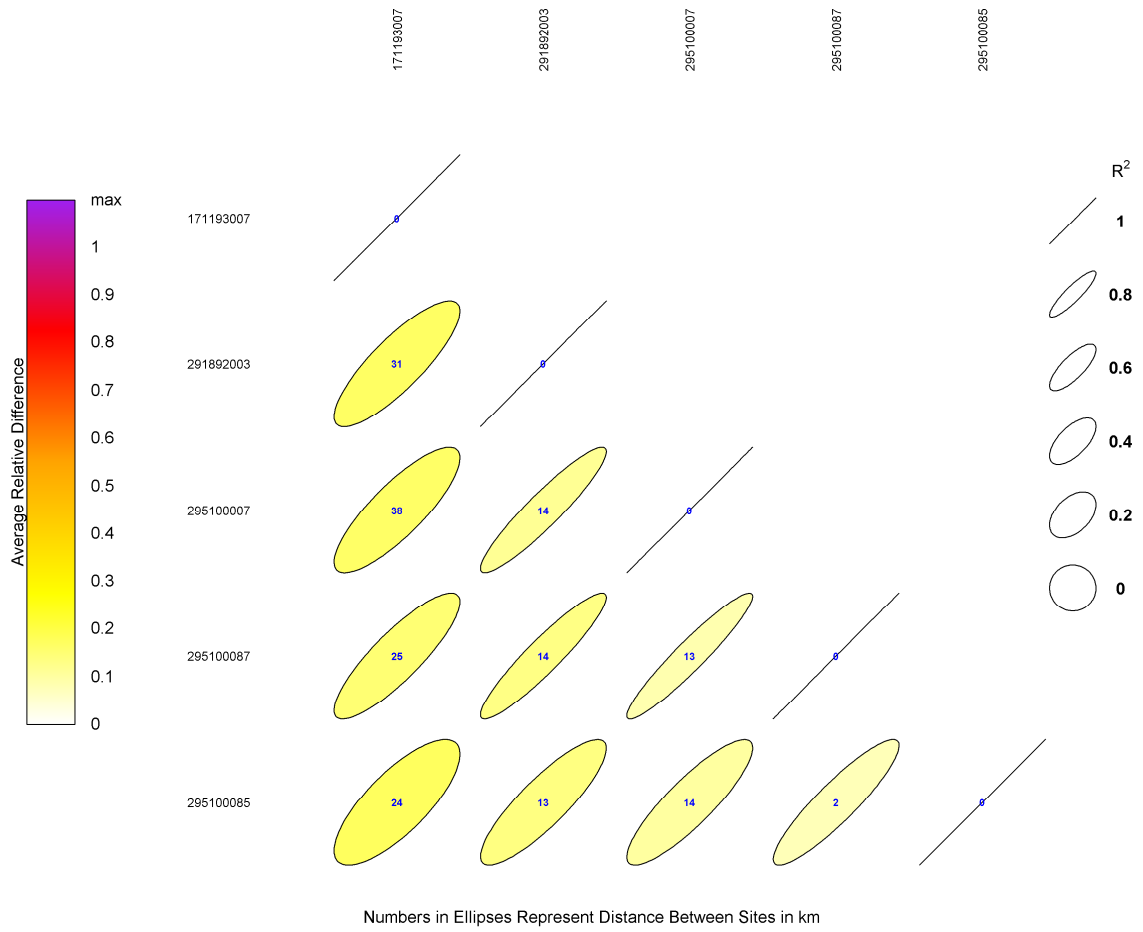
10.4 Evaluation of the $PM_{2.5}$ Monitoring Network

Figures 10-9 and 10-10 show correlation matrices for $PM_{2.5}$ monitoring sites in the St. Louis area, generated using the network assessment tools as provided by EPA. The thinner the ellipse for a pair of sites, i.e., the more it approaches a line, the more correlation exists between data from those two sites. Thus the Mound St. site (no longer operating) is relatively highly correlated with both the Clayton (now relocated to the nearby Ladue site) and South Broadway sites. The Clayton and South Broadway sites are also relatively highly correlated. These results suggest some possible redundancy between the Ladue and South Broadway sites.



171193007 Wood River IL
291892003 Clayton
295100007 South Broadway
295100087 Mound Street
295100085 Blair Street

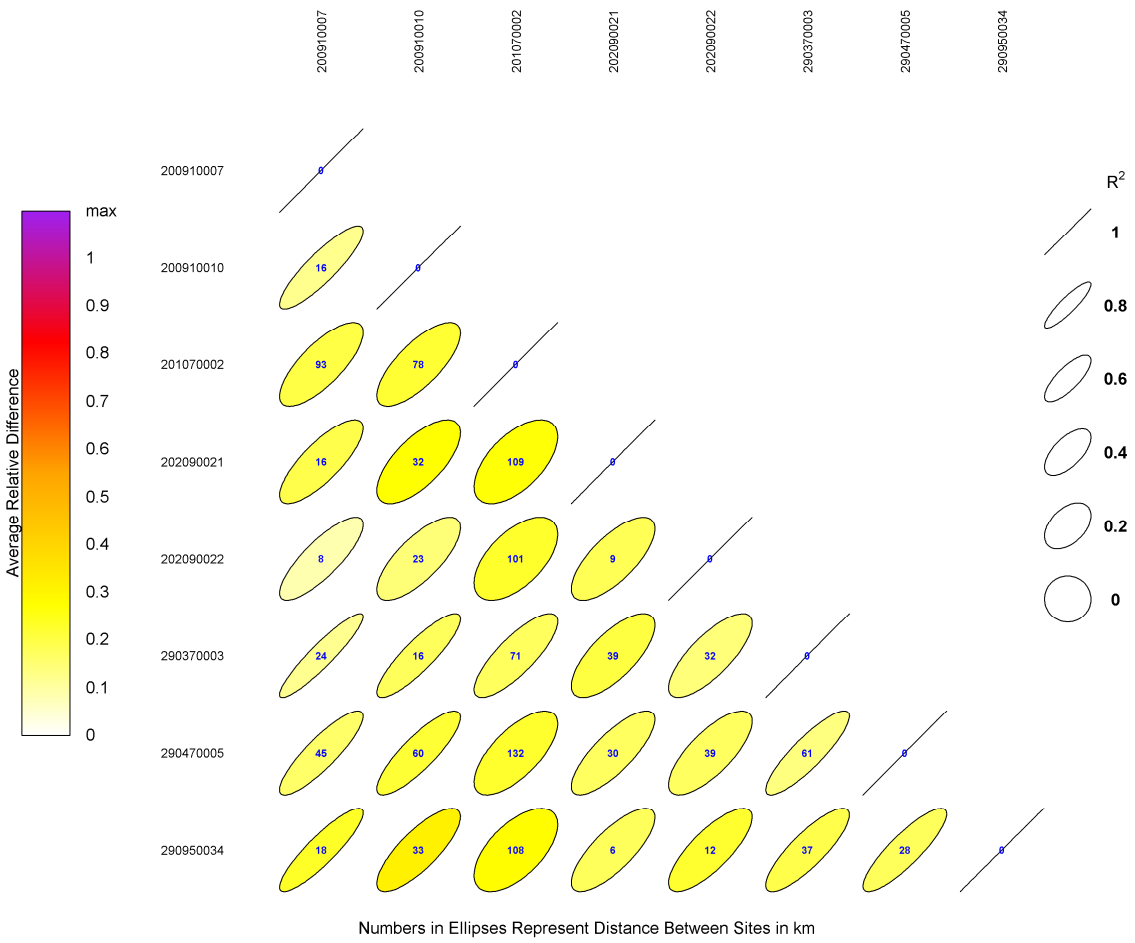
Figure 10-9. St. Louis Area 6-day $PM_{2.5}$ Correlation Matrix, 2006-2008



171193007 Wood River
291892003 Clayton
295100007 South Broadway
295100087 Mound Street
295100085 Blair Street

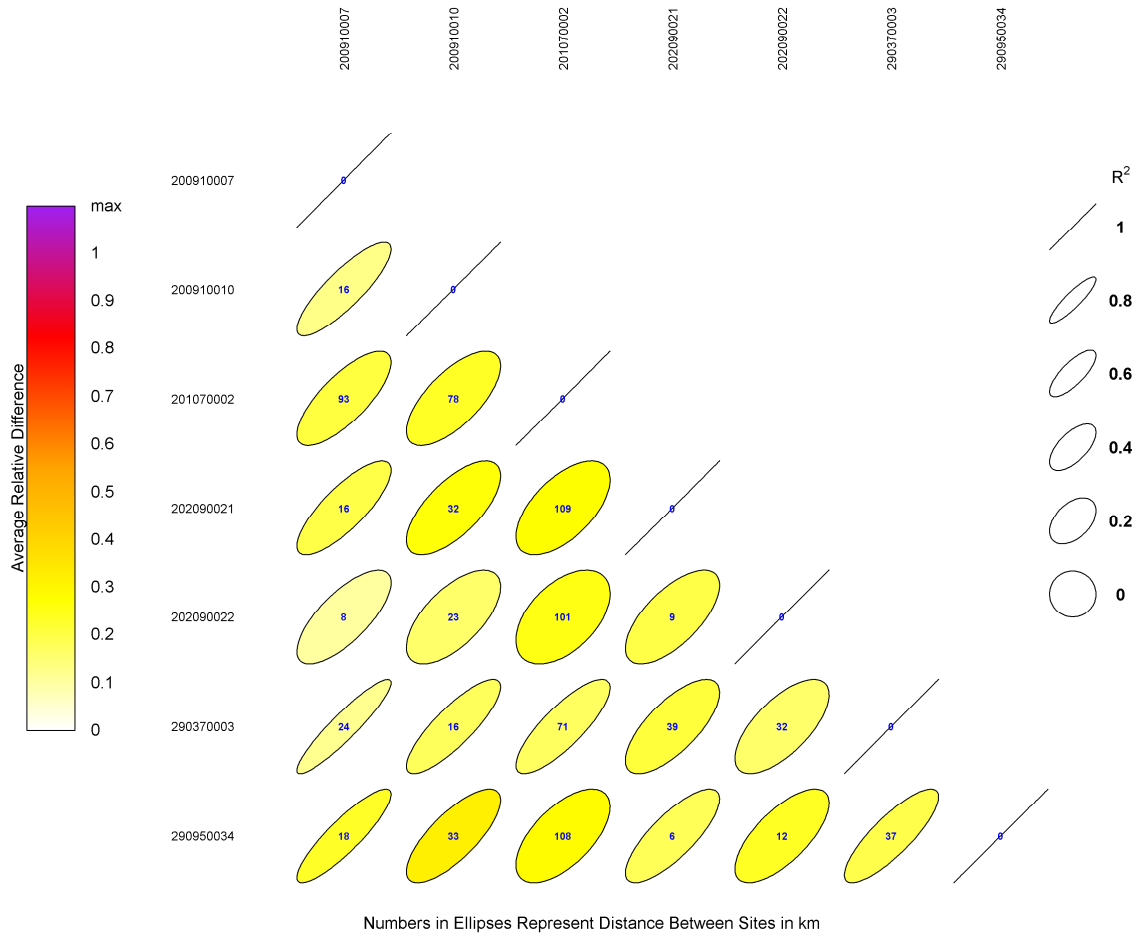
Figure 10-10. St. Louis Area 3-day $PM_{2.5}$ Correlation Matrix, 2006-2008

Figures 10-11 and 10-12 show similar correlation matrices for Kansas City area sites. The highest correlation is between the Justice Center site (in Kansas) and the Richards-Gebaur South site, but note that these sites are 24 kilometers apart and within different states.



200910007 Justice Center Overland Park KS
200910010 Heritage Park Olathe KS
201070002 Mine Creek KS
202090021 JFK KS
202090022 Midland Trail Elementary KS
290370003 Richards-Gebaur South
290470005 Liberty
290950034 Troost

Figure 10-11. Kansas City Area 3-day $PM_{2.5}$ Correlation Matrix, 2006-2008



200910007 Justice Center Overland Park KS
200910010 Heritage Park Olathe KS
201070002 Mine Creek KS
202090021 JFK KS
202090022 Midland Trail Elementary KS
290370003 Richards-Gebaur South
290950034 Troost

Figure 10-12. Kansas City Area 6-day $PM_{2.5}$ Correlation Matrix, 2006-2008

In the St. Louis area, the Blair Street site is **critical**, in part because of its designation as an NCore site, and because of its location near the urban center and several large industrial sources. The Branch St. site is near the Blair Street site, but is located in a significant PM emission source area, so is also **critical**. The South Broadway and Ladue (formerly nearby Clayton) sites are fairly well correlated, but are 13 kilometers apart. The South Broadway site generally shows higher $PM_{2.5}$ concentration than Ladue, and is also more generally upwind of the central St. Louis area. Therefore, the South Broadway site is judged as **critical**, and the Ladue site as **credible**. The Arnold West site is an important suburban site, generally downwind of the nearby Ameren UE Meramac plant and generally upwind of the central St. Louis area and also provides important speciation data, so is judged to be **critical**.

In the Kansas City area, the Troost site is **critical**, because it is the only $PM_{2.5}$ site near the center of the Kansas City metropolitan area. The Liberty site is **critical** because it is the only $PM_{2.5}$ site generally downwind of the Kansas City area and is also a speciation site. The Richards-Gebaur South site is judged to be at least **credible**, because it provides important upwind background data for the Kansas City area.

The MSU site is the only $PM_{2.5}$ site in the Springfield area and therefore judged to be **critical**.

In the outstate area, the El Dorado Springs and Bonne Terre sites are both considered to be **critical**, because they provide important rural, regional background data for the Kansas City and St. Louis areas, respectively. The St. Joseph site is **critical**, because there is a requirement for at least one site in the St. Joseph area.

Because the $PM_{2.5}$ network has undergone recent reviews and elimination of some sites, there are no current sites believed to be marginal.

Table 10-4 summarizes the current $PM_{2.5}$ monitoring network and the characterization of each site as discussed in this section.

The $PM_{2.5}$ network will need to be reviewed again after the NAAQS review that will be finalized in about October 2011. Possible new candidate sites that may be evaluated, depending on the level of the standard, include the new Front St. PM_{10} site in the Kansas City area and a site in southeast Missouri, where the impact of agricultural burning on air quality is of some concern, although past measurements in southeast Missouri (including both short-term studies and measurements at the IMPROVE site at Mingo) have not shown violation of current standards.

Table 10-4. Summary of Current $PM_{2.5}$ Monitoring Sites and Site Characterizations

Area / $PM_{2.5}$ Monitoring Site	$PM_{2.5}$ Monitors	Site Characterization
St. Louis Area	**(minimum 3 sites required)**	
Blair Street	2 FRM, TEOM*, Speciation	Critical
Branch Street	FRM	Critical
South Broadway	FRM	Critical
Ladue	FEM	Credible
Arnold West	FEM, Speciation	Critical
Kansas City Area	**(minimum 2 sites required)**	
Liberty	FEM, Speciation	Critical
Troost	FEM, FRM	Critical
Richards-Gebaur South	FEM	Credible
Springfield Area	**(minimum 0 sites required)**	
MSU	2 FRM, Sharp	Critical
Outstate Area	**(minimum 1 site required in St. Joseph, plus required background sites)**	
El Dorado Springs	FEM, IMPROVE protocol	Critical
St. Joseph Pump Station	FEM	Critical
Bonne Terre	Speciation	Critical

*TEOM at Blair Street is not currently FEM but will be converted to FEM.

11.0 LEAD NETWORK ASSESSMENT

11.1 Introduction: Lead Standards and Monitoring Requirements

On October 15, 2008, the EPA revised the level of the primary (health-based) NAAQS for airborne lead from 1.5 $\mu g/m^3$, to 0.15 $\mu g/m^3$, measured as total suspended particulate matter (TSP). EPA changed the calculation method for the averaging time to use rolling three-month periods with a maximum (not-to-be-exceeded) form, evaluated over a three-year period. This replaced the previous use of calendar quarter averages. A rolling three-month average considers each of the 12 three-month periods associated with a given year, not just the four calendar quarters within that year.

At the same time, EPA revised monitoring requirements to assess compliance with the new standards. State and local monitoring agencies are required to conduct monitoring, taking into account lead sources that may exceed the standards. At a minimum, monitors must be placed in areas potentially impacted by sources of lead emissions greater than or equal to one ton per year. EPA Regional Administrators may waive the source-oriented monitoring requirements if the monitoring agency can demonstrate that emissions from the source will not contribute to maximum air lead concentrations greater than 50 percent of the revised standard, or 0.075 $\mu g/m^3$. These source-oriented monitors were required to be operational by January 1, 2010.

EPA will also require a monitor to be operated in each of the 101 urban areas with populations greater than 500,000 to gather information on general population exposure to airborne lead. These urban area samplers must be operational by January 1, 2011. This requirement applies to the St. Louis and Kansas City areas in Missouri.

Details of the new standard and monitoring requirements may be found in the **Federal Register**, Vol. 73, No. 219 (November 12, 2008), p. 66964. This Federal Register notice and other information are available on the internet (http://epa.gov/air/lead/actions.html).

On December 30, 2009 (**Federal Register**, Vol. 74, No. 249, p. 69050), EPA proposed reducing the size of sources for source-oriented monitoring from 1 to 0.5 ton per year and also proposed changing the urban area monitoring requirement to monitoring at NCore sites only. This rule is expected to be finalized in about September 2010. Monitoring at 0.5 ton sources is expected to be required no sooner than one year following publication of the final rule, approximately September 2011. EPA has communicated informally that monitoring at NCore sites is desired to begin by January 1, 2011, replacing the urban area requirement in the previous rule; this requirement will also be formalized in the September 2010 final rule.

11.2 Lead Monitoring Network

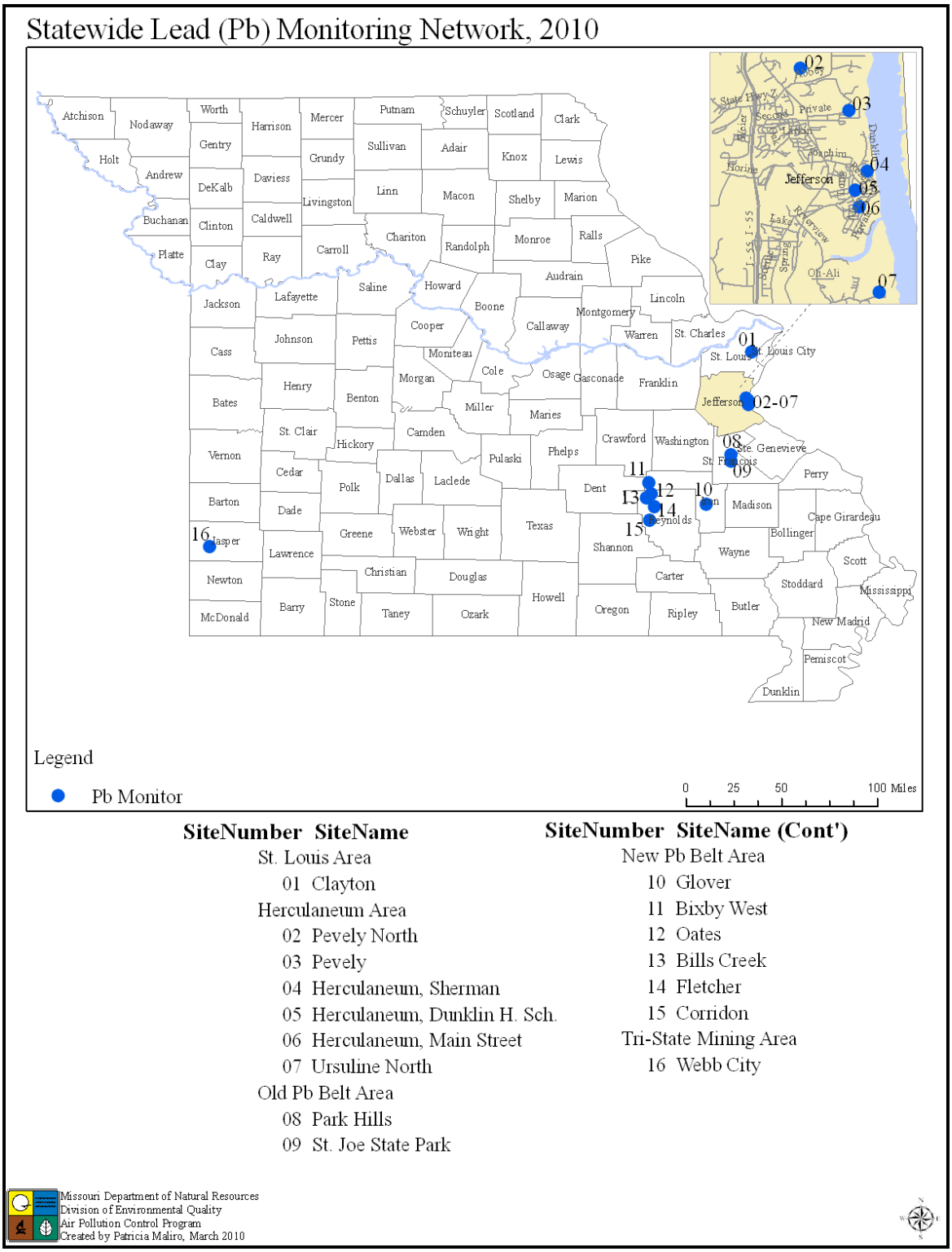
A monitoring plan for implementation of the source-oriented monitoring requirement in Missouri was submitted to EPA in July 2009, revised in August 2009, and finalized in October 2009. Because of the major change in the lead standard and related monitoring requirements, the lead

monitoring network plan was prepared as a separate document from the overall air monitoring network plan. The network sites are listed in Table 11-1 and shown on the map in Figure 11-1. More discussion of past monitoring results, evaluation of potential sources, and selection of new monitoring sites may be found in the plan (**Missouri Lead Monitoring Network Plan**, October 2009, Missouri Department of Natural Resources Air Pollution Control Program). All of these sites except the Clayton site in St. Louis County are located near identified or potential lead sources related to current or past lead mining or processing activities. Final approval of that plan is still pending, but EPA communicated to the State of Missouri in late October 2009 that preparation for and commencement of monitoring according to that plan should proceed.

The network in the Herculaneum area was modified by relocating all state samplers outside of the revised facility fence line, and expanding the geographical extent of the network to better define the extent of the area of nonattainment of the new standard. In addition to the state sites listed in the table, the Doe Run Company operates approximately six lead monitoring sites in the Herculaneum area. All of the other lead monitoring sites except the Clayton site in St. Louis County were newly installed.

Table 11-1. State of Missouri Lead Monitoring Sites

Area/Site Description
Herculaneum (near Doe Run Herculaneum facility)
Main St.
Dunklin High School
Sherman
Pevely
Pevely North
Ursuline North
New Lead Belt (Buick, Viburnum Trend, Glover)
Bixby West (near Doe Run Buick smelter)
Oates (between Buick and Brushy Creek mines)
Bills Creek (near Brushy Creek mine)
Fletcher (near Fletcher mine)
Corridon (near Sweetwater mine)
Glover (near Doe Run Glover facility)
Old Lead Belt (near chat or tailings areas from past mining activity)
Park Hills
St. Joe State Park
Tri-State Mining Area (near chat or tailings areas from past mining activity)
Webb City
St. Louis County (urban area site)
Clayton



SiteNumber	SiteName
	St. Louis Area
01	Clayton
	Herculaneum Area
02	Pevely North
03	Pevely
04	Herculaneum, Sherman
05	Herculaneum, Dunklin H. Sch.
06	Herculaneum, Main Street
07	Ursuline North
	Old Pb Belt Area
08	Park Hills
09	St. Joe State Park

SiteNumber	SiteName (Cont')
	New Pb Belt Area
10	Glover
11	Bixby West
12	Oates
13	Bills Creek
14	Fletcher
15	Corridon
	Tri-State Mining Area
16	Webb City

Figure 11-1. Missouri lead monitoring locations.

11.3 Past Lead Monitoring Results

Lead monitoring was done at multiple sites in the past in the St. Louis and Kansas City areas and in other parts of Missouri. Airborne lead concentrations decreased significantly in the past consistent with the gradual reduction of lead in gasoline used as motor vehicle fuel, begun in the early 1970s, with significant reductions in 1985 and 1986, and complete elimination of lead in motor vehicle fuel gasoline at the end of 1996. Because of this decrease in airborne lead, monitoring was reduced. The only lead monitoring in Missouri that is not in known or potential source areas is currently at the Clayton Station in St. Louis County. Recent measurements at that site have been reported at half the detection limit or 0.05 $\mu g/m^3$.

Figures 11-2 and 11-3 show three-month rolling average airborne lead concentrations (calculated as per the new NAAQS) measured at Herculaneum area state and Doe Run lead monitoring sites for November 2005 through December 2008. Results are plotted on the time scale at the final month for each three-month period. In other words, results plotted at "March" are for the January-February-March period, etc. Results for collocated samplers, whether operated by the same organization or by the two different organizations, are in very good agreement. The figures also show the level of the new lead NAAQS, 0.15 $\mu g/m^3$ (three-month rolling average). Except for a few results at the Bluff and Sherman sites, almost all of these results would be above the level of the new NAAQS if it were applied retroactively.

Figure 3-2. ESP Herculaneum Airborne Lead Concentrations, 3-Month Rolling Averages (plotted at third month)

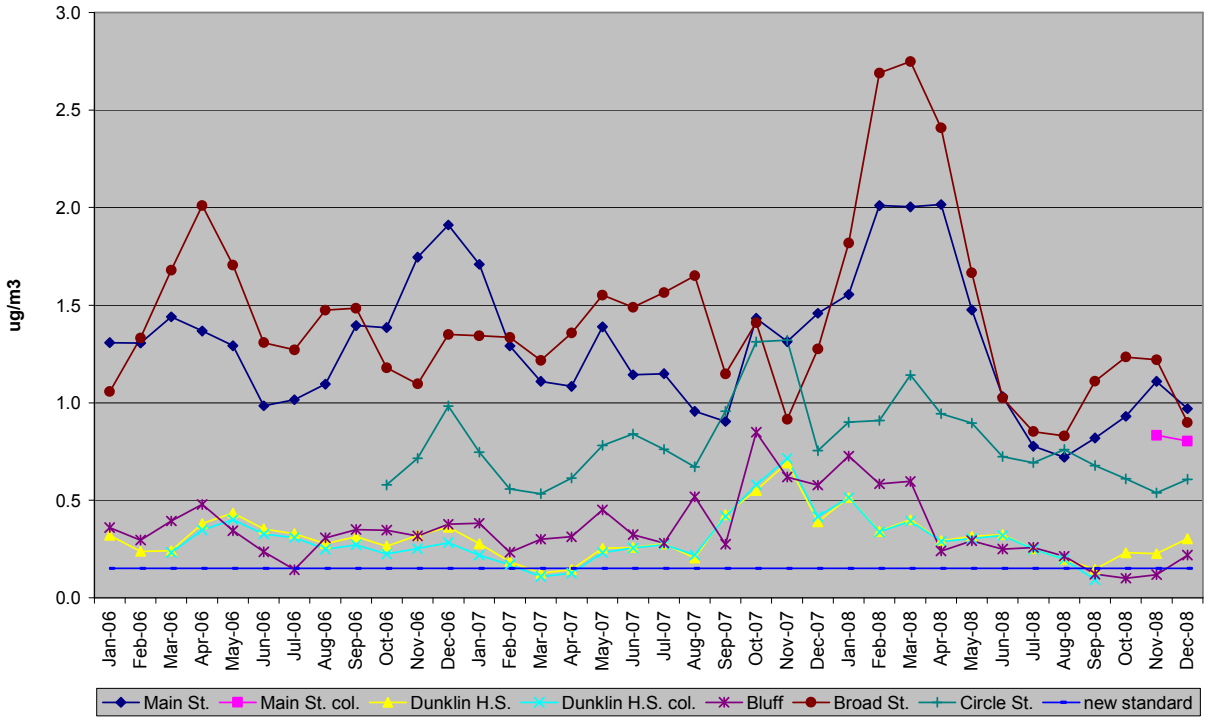


Figure 11-2

Figure 3-3. Doe Run Herculaneum Airborne Lead Concentrations, 3-Month Rolling Averages (plotted at third month)

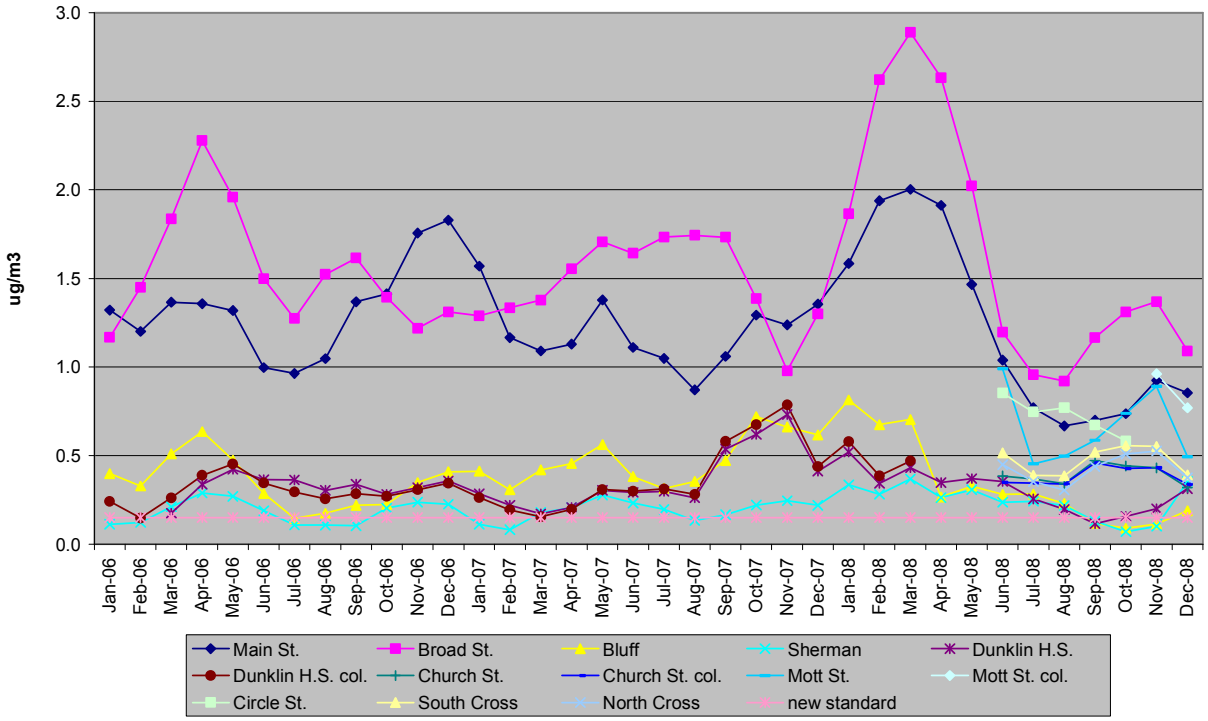


Figure 11-3

The Doe Run Company operates two lead monitoring stations near the Buick smelter, one approximately 1.2 miles to the north, called Buick North, and one approximately 0.8 mile to the south, called Buick South, with two collocated lead samplers. Both stations were in compliance with the previous lead NAAQS of 1.5 $\mu g/m^3$ until a recent upset at the plant caused a violation of that standard in the fourth quarter of 2008. Figure 11-4 shows three-month rolling average airborne lead concentrations (calculated as per the new NAAQS) measured at these sites for November 2005 through December 2008. Results are plotted on the time scale at the final month for each three-month period. Results would not be in compliance with the new NAAQS, averaging generally about four to five times the level of the standard, with fourth quarter 2008 data being an order of magnitude higher than the new standard.

Figure 4-2. Buick Airborne Lead Concentrations, 3-Month Rolling Averages (plotted at third month)

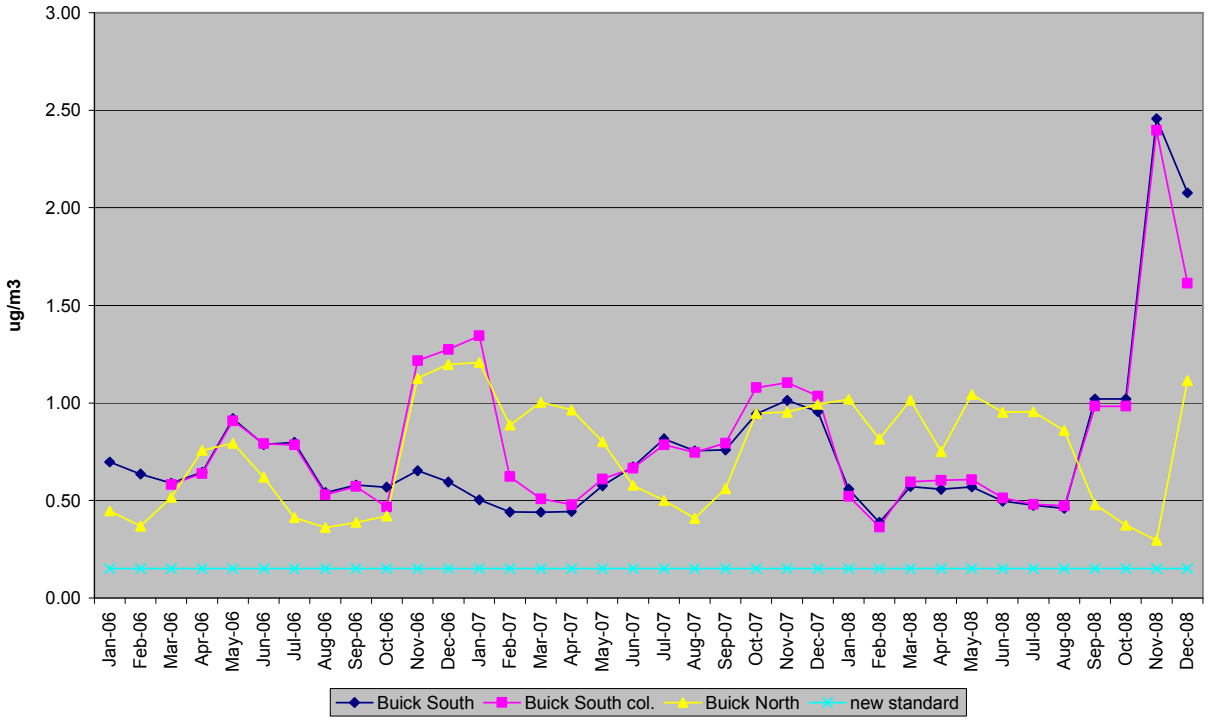


Figure 11-4

Operation of the primary lead smelter at Glover, Missouri was suspended in December 2003, and it is currently in "care and maintenance status" according to the Doe Run Company website (www.doerun.com). However, some lead ore has been stored in the past at the facility, zinc and copper concentrate from the mine/mill facilities is shipped by rail from Glover, and smelter or other operation may be resumed or begun in the future.

Airborne lead monitoring has been done at multiple sites near the Glover smelter in the past by both MDNR ESP and the Doe Run Company. Figure 11-5 shows monitoring results (calendar quarter average concentrations) from third quarter 1987 through third quarter 2008. Results are plotted on the time scale at the initial month for each quarter. In other words, results plotted at "January" are for the January-February-March quarter, etc. The Hogan, Dunn, and South sites were operated by MDNR ESP. The North, Post Office, Big Creek, and Chloride sites were operated by Doe Run Company (abbreviated in the figure legend as DRG N, DRG PO, DRG BC, and DRG CL). The Glover facility is located in a narrow valley that trends from North to South, and the monitoring sites, as listed in the legend, generally trend from north to south. Results clearly fall into three time periods with different ranges of lead concentrations: results through the end of 1996, results from 1997 through 2003, and results since 2003. In late 1996 the sinter plant was enclosed and ventilated under negative pressure, and some other operations at the facility were also enclosed. These changes resulted in the changes seen in the figure starting at January 1997. In December 2003, smelter operation was suspended, and this change resulted in the changes seen in the figure starting at January 2004.

Figure 4-3. Glover Airborne Lead Concentrations, Calendar Quarter Averages

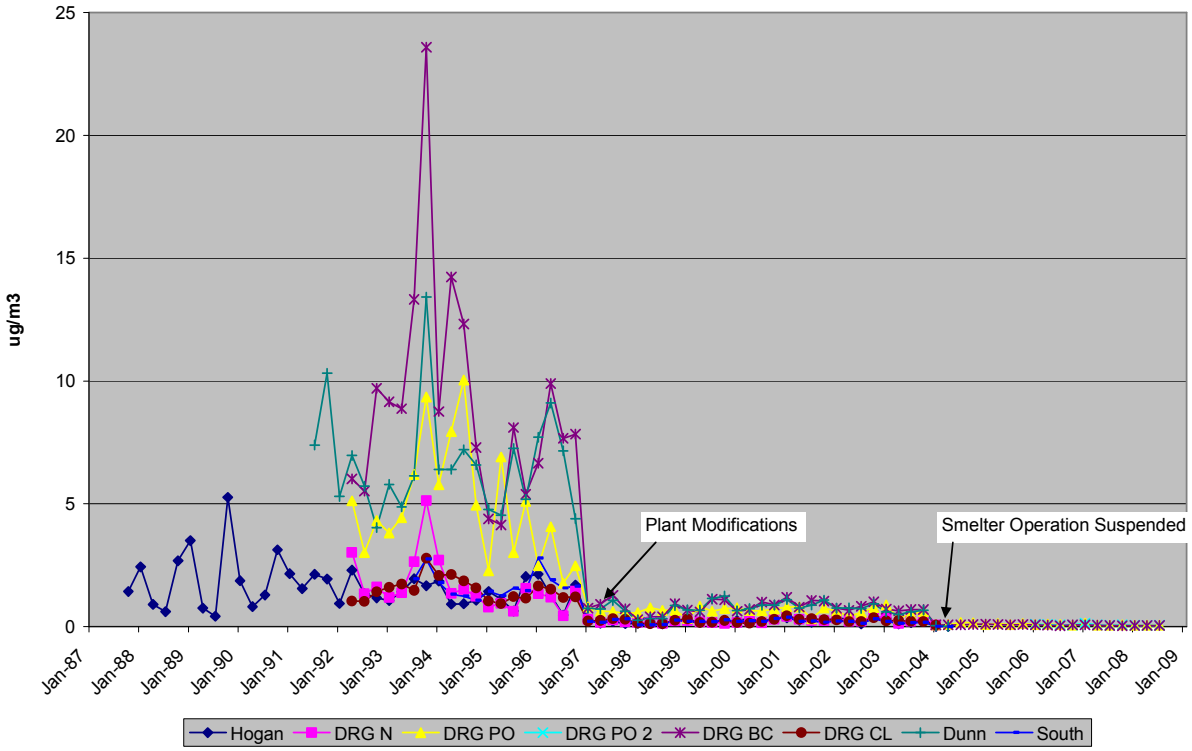


Figure 11-5

Monitoring at all but the DRG Post Office and Big Creek sites was discontinued following the suspension of smelter operations. Figure 11-6 shows three-month rolling average airborne lead concentrations (calculated as per the new NAAQS) measured at these sites for November 2005 through December 2008, plotted at the final month for each three-month period. Results would be in compliance with the new NAAQS, averaging about half the level of the standard.

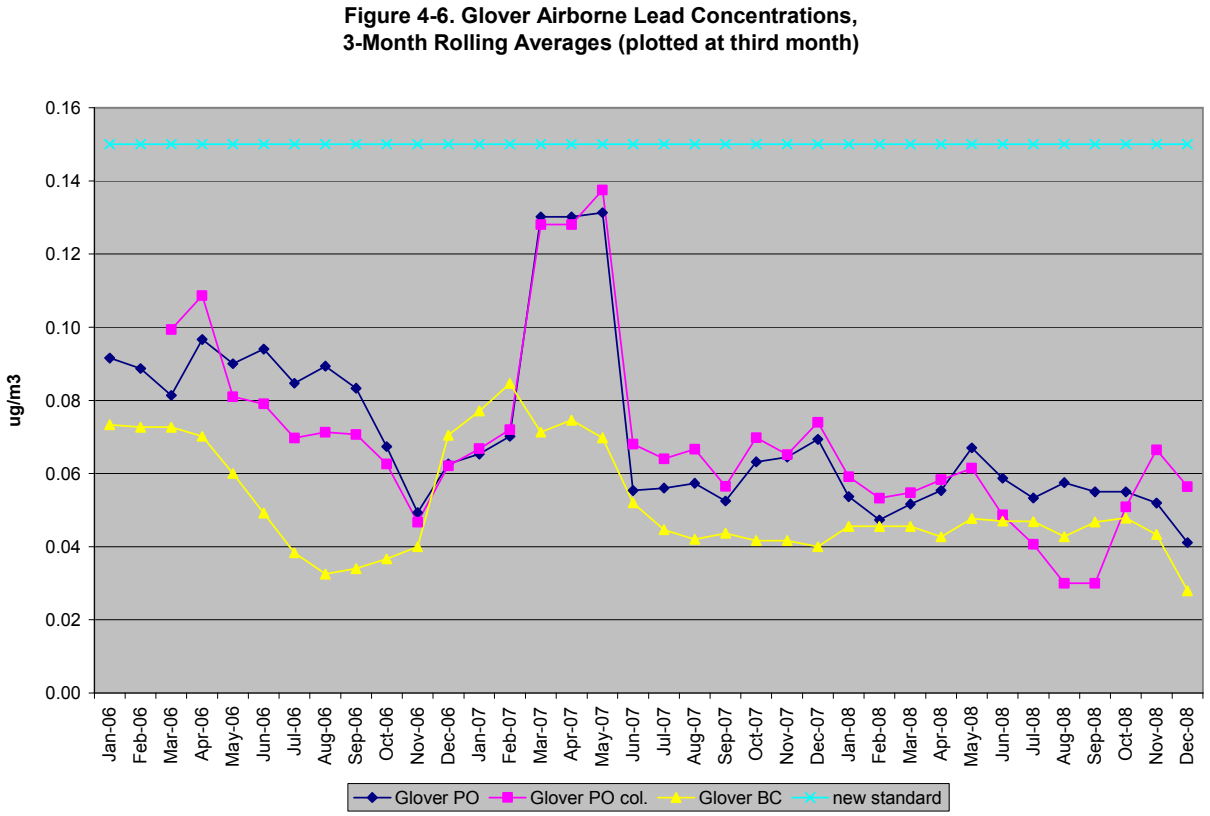


Figure 11-6

Limited lead monitoring was done in the past at old lead belt areas. MDNR ESP conducted lead monitoring at three locations in St. Joe State Park from 1993 to 1995. The Missouri Mines site was north of the tailings area at the Missouri Mines historical site. The other sites were south of, but somewhat distant from the tailings area. These sites were not optimally located because of the unavailability of electric power. Figure 11-7 shows monitoring results (calendar quarter average concentrations) from third quarter 1993 through second quarter 1995. Measured concentrations are below the level of the new standard, averaging about 0.06 $\mu g/m^3$. However, reported concentration averages, based on analysis requirements associated with the old standard, may be somewhat lower than would have been measured if the new analysis requirements had been met.

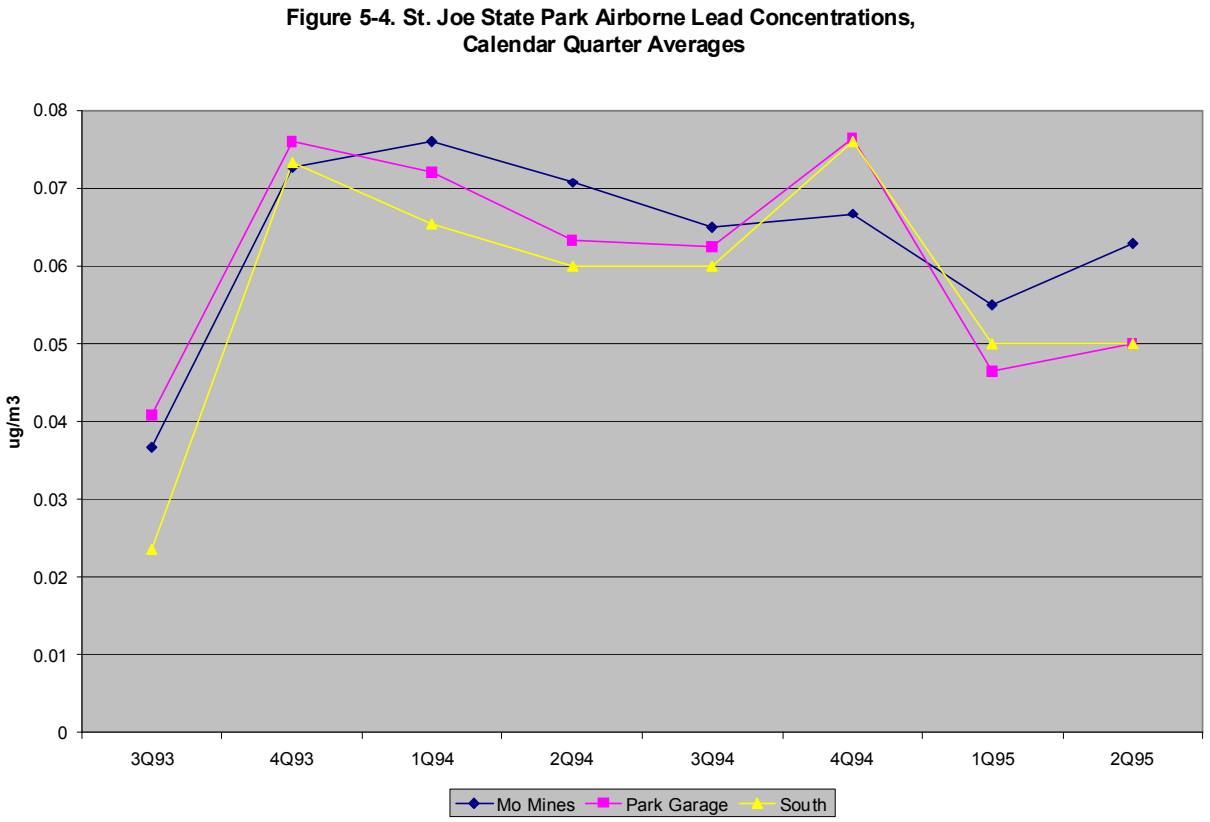


Figure 11-7

11.4 Recent Lead Monitoring Results

The lead monitoring network as currently configured has only been operating since January 2010. Therefore, only limited preliminary results are available. Table 11-2 lists preliminary monthly and 3-month average concentrations for January through April 2010 from the current state network.

Table 11-2. Preliminary Monthly and 3-Month Average Lead Concentrations, 2010, ug/m3

(Highlights indicate 3-month averages greater than 0.15)

Site	January	February	March	April		Jan-Mar Avg	Feb-Apr Avg
Herculaneum Area							
Pevely North	0.060	0.019	0.013	0.042		0.030	0.025
Pevely		0.030	0.015	0.087		0.023	0.044
Sherman	0.033	0.028	0.011	0.071		0.024	0.037
Dunklin	0.124	0.083	0.386	0.471		0.197	0.313
Herculaneum Main St.	0.502	0.534	0.928	0.860		0.655	0.774
Herculaneum Main St. Collocated	0.660	0.546	1.081	0.762		0.762	0.796
Ursuline North	0.012	0.029	0.059	0.016		0.033	0.035
Old Lead Belt Area							
Park Hills	0.015	0.027	0.009	0.089		0.017	0.042
St. Joe State Park	0.015	0.009	0.008	0.021		0.011	0.012
New Lead Belt Area							
Glover	0.023	0.017	0.011	0.078		0.017	0.035
Bixby West		0.033	0.607	0.987			0.542
Bixby West Collocated		0.036	0.607	0.949			0.530
Oates	0.033	0.087	0.142	0.042		0.088	0.090
Bills Creek	0.043	0.068	0.013	0.013		0.041	0.031
Fletcher	0.014	0.059	0.019	0.028		0.030	0.035
Corridon	0.268	0.026	0.007	0.008		0.100	0.013
Tri-State Mining Area							
Webb City	0.007	0.012	0.007	0.019		0.009	0.013

11.5 Lead Emissions

In the process of developing the lead monitoring plan discussed above, emission inventory data in the MDNR APCP MoEIS system and the National Emission Inventory (NEI) and Toxic Release Inventory (TRI) were reviewed to identify lead sources in Missouri that have been reported as historically emitting one-half tpy or more. After detailed review and recalculation where necessary of lead emissions, the facilities listed in Table 11-3 were identified as potential one-ton emitters. All of these sources are related to lead mining and milling, primary lead smelting, or secondary lead smelting. All of these sources are operated by the Doe Run Company and include the four operating mills and four of the six operating mines in the Viburnum Trend area. Doe Run states that emissions from the Sweetwater facility in recent years have been less than one ton per year, but emission estimates for these complex facilities are uncertain, and, as indicated by the reported emissions for 2002-2004, that facility has the capability of emitting more than one ton per year.

Table 11-3. One Ton or Greater Per Year Lead Emission Sources and Reported Emissions

Site	Year/Emissions (tons per year)					
	2002	**2003**	**2004**	**2005**	**2006**	**2007**
Buick Mine/Mill	15.48	16.49	17.27	6.58	4.24	5.47
Glover Smelter*	14.78	14.33	*	*	*	*
Buick Smelter	11.00	7.16	7.01	7.28	4.03	33.71
Herculaneum Smelter	58.80	25.13	25.95	28.09	26.42	21.81
Sweetwater Mine/Mill**	3.20	1.88	2.07	**	0.73**	0.57**
Brushy Creek Mine/Mill	13.71	12.83	9.66	3.20	2.70	2.26
Fletcher Mine/Mill	13.43	13.20	11.74	3.67	3.63	2.87

*Operation of the primary lead smelter at Glover was suspended in December 2003, and it is currently in maintenance status. However, some lead ore has been more recently stored at the facility, and smelter or other operation may be resumed or begun in the future at Glover.

**The Sweetwater mine/mill operating permit allows for reduced reporting, so that emissions were not reported for 2005-2007. However, it is currently operated at about half the throughput of the Brushy Creek or Fletcher facilities, so has the capability of being a greater-than-one-ton emitter, as indicated by the 2002 to 2004 emissions. Emission estimates shown for 2006 and 2007 were provided by Doe Run in their comments on this plan and have not been verified. Doe Run's estimated emissions for these facilities may now be even lower, based on revised emission factors for mine vents.

In addition to these sources, areas with large deposits of chat or tailings from past lead mining activity were identified as potential sources of airborne lead and included in the monitoring plan.

The plan for operation of the network in 2012 is expected to include review and analysis of sources reported to emit as little as 0.25 ton per year in order to be sure that 0.5 ton sources are considered, assuming that the proposed rule change is finalized as expected. That review may add a few sources for consideration of monitoring, possibly including some of the larger coal-fired electric generating stations in Missouri. However, preliminary modeling analysis indicates that the NAAQS is unlikely to be violated near such facilities, so that such modeling analysis may preclude the necessity of monitoring near such facilities.

11.6 Evaluation of the Lead Monitoring Network

The airborne lead monitoring network in Missouri as currently configured has only been operating for a few months. Therefore it would be premature to classify these sites as critical, credible, or marginal based on only a few months of data. However, most or all of the sites near the larger emission sources (such as the Herculaneum and Buick smelters) should probably be considered to be either **critical** or **credible**. It remains to be seen how the sites near the mine/mill facilities and in the areas with old mining waste should be classified. The air monitoring network plan for operation of the network in 2011 is expected to call for continuation of the same network (except for addition of lead monitoring at the Blair Street NCore site in St. Louis). The plan for operation of the network in 2012 is expected to include review and analysis of sources reported to emit as little as 0.25 ton per year as noted above. That plan is also expected to include classification of most or all of the current lead monitoring sites based on available data.

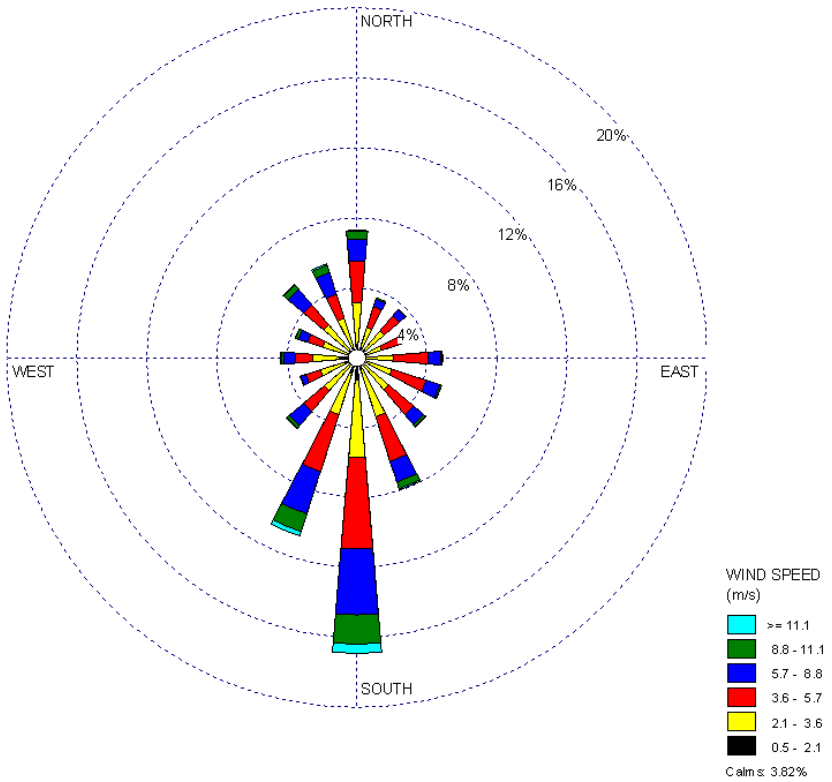
APPENDIX A: WINDROSES

WIND ROSE PLOT:

KMCI 2007 Annual
2007

DISPLAY:

Wind Speed
Direction (blowing from)



COMMENTS:	DATA PERIOD:	COMPANY NAME:	
	2007 **Jan 1 - Dec 31** **00:00 - 23:00**	MODELER:	
	CALM WINDS: **3.82%**	TOTAL COUNT: **8760 hrs.**	
	AVG. WIND SPEED: **4.51 m/s**	DATE: **5/3/2010**	PROJECT NO.:

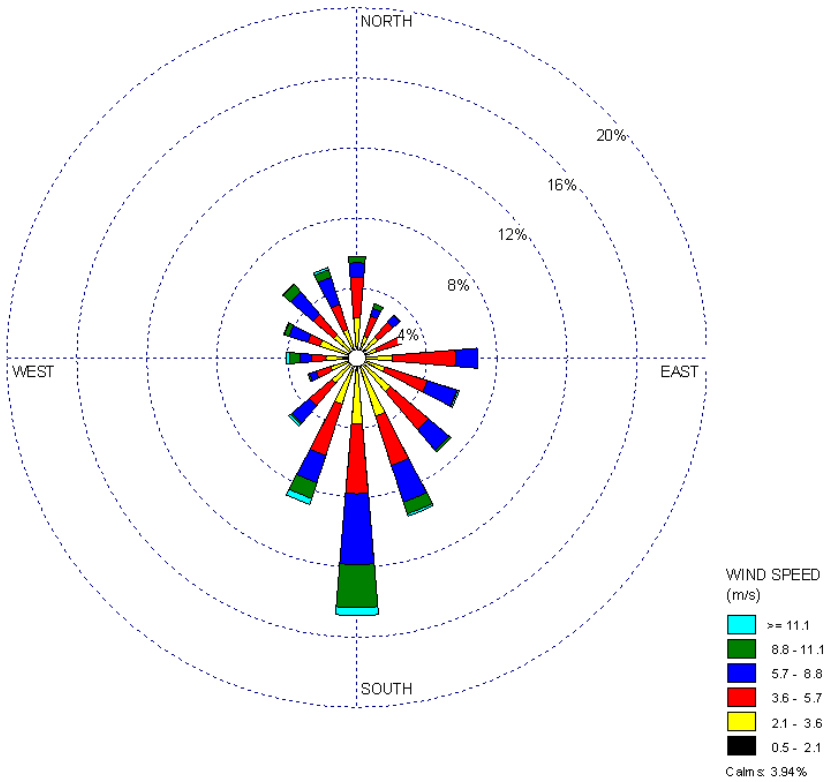
WRPLOT View - Lakes Environmental Software

WIND ROSE PLOT:

KMCI 2007 Spring 2007

DISPLAY:

Wind Speed
Direction (blowing from)



COMMENTS:	DATA PERIOD:	COMPANY NAME:	
	2007 **Mar 1 - May 31** **00:00 - 23:00**	MODELER:	
	CALM WINDS: **3.94%**	TOTAL COUNT: **2208 hrs.**	
	AVG. WIND SPEED: **4.91 m/s**	DATE: **5/4/2010**	PROJECT NO.:

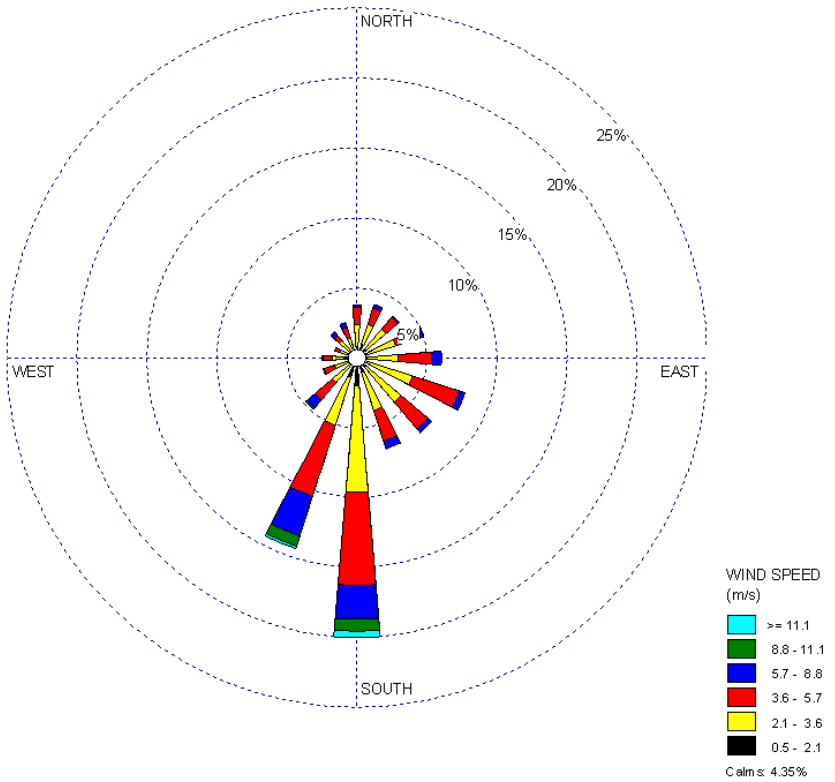
WRPLOT View - Lakes Environmental Software

WIND ROSE PLOT:

KMCI 2007 Summer 2007

DISPLAY:

Wind Speed
Direction (blowing from)



COMMENTS:	DATA PERIOD:	COMPANY NAME:	
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	CALM WINDS: **4.35%**	TOTAL COUNT: **2208 hrs.**	
	AVG. WIND SPEED: **3.89 m/s**	DATE: **5/4/2010**	PROJECT NO.:

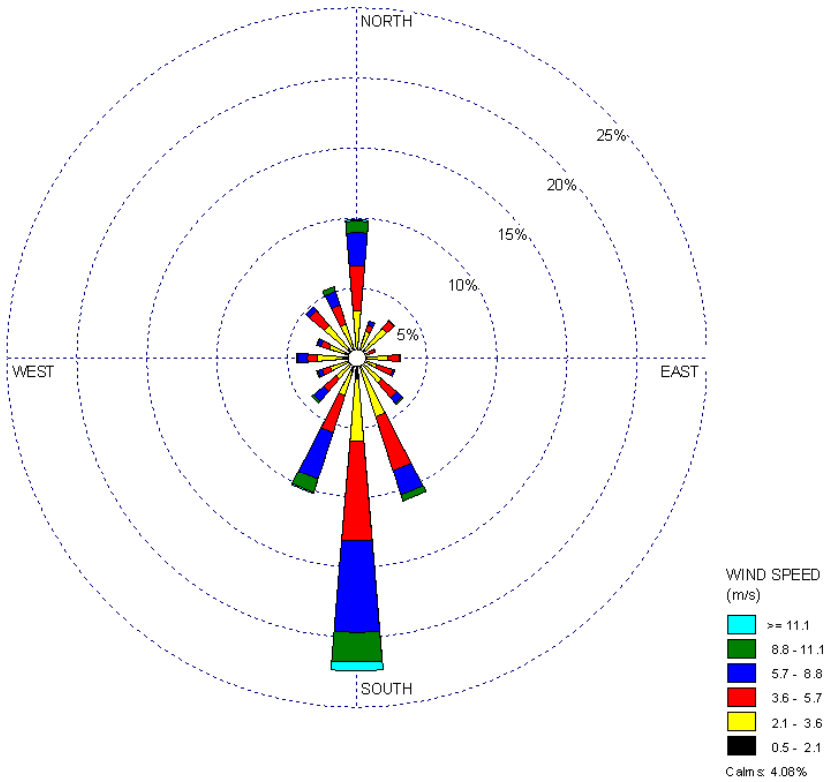
WRPLOT View - Lakes Environmental Software

WIND ROSE PLOT:

KMCI 2007 Fall 2007

DISPLAY:

Wind Speed
Direction (blowing from)



COMMENTS:	DATA PERIOD:	COMPANY NAME:	
	2007 **Sep 1 - Nov 30** **00:00 - 23:00**	MODELER:	
	CALM WINDS: **4.08%**	TOTAL COUNT: **2184 hrs.**	
	AVG. WIND SPEED: **4.46 m/s**	DATE: **5/4/2010**	PROJECT NO.:

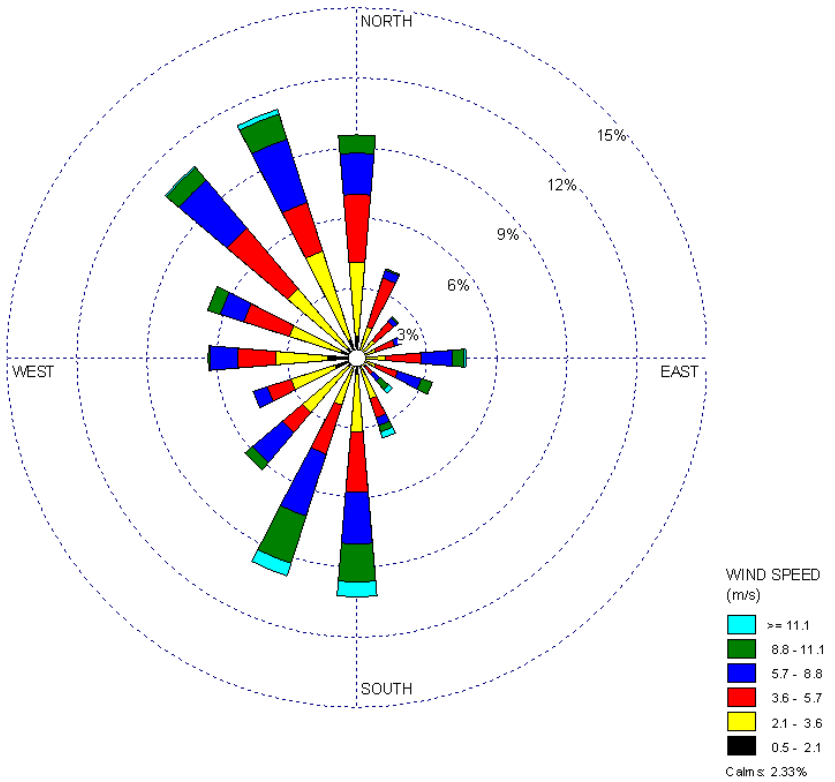
WRPLOT View - Lakes Environmental Software

WIND ROSE PLOT:

KMCI 2007 Winter 2007

DISPLAY:

Wind Speed
Direction (blowing from)



COMMENTS:	DATA PERIOD:	COMPANY NAME:	
	2007 **Jan 1 - Feb 28** **00:00 - 23:00**	MODELER:	
	CALM WINDS: **2.33%**	TOTAL COUNT: **1416 hrs.**	
	AVG. WIND SPEED: **5.03 m/s**	DATE: **5/4/2010**	PROJECT NO.:

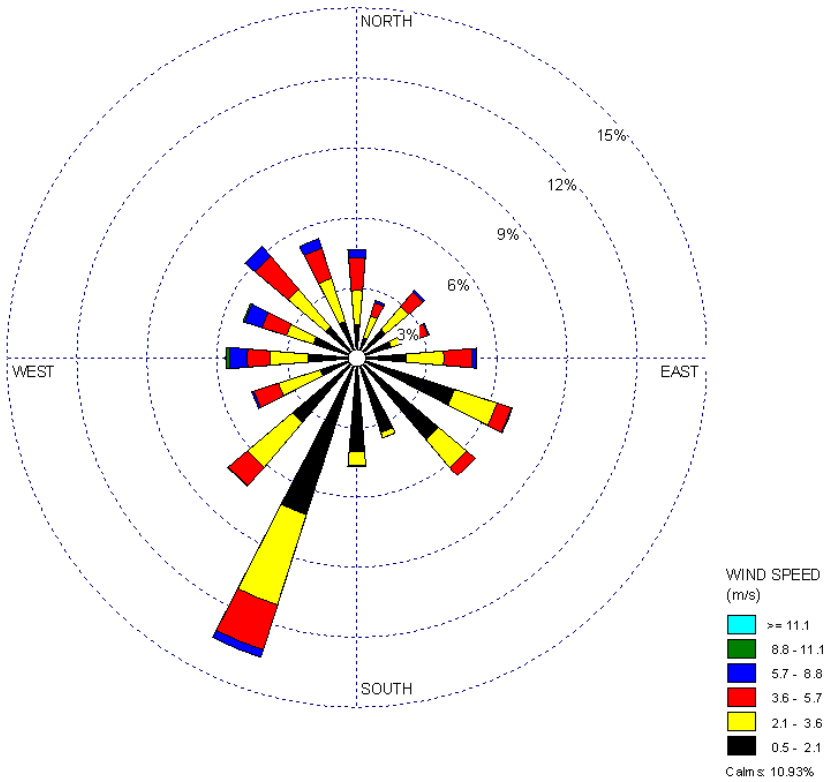
WRPLOT View - Lakes Environmental Software

WIND ROSE PLOT:

Liberty 2007 Annual
2007

DISPLAY:

Wind Speed
Direction (blowing from)



COMMENTS:	DATA PERIOD:	COMPANY NAME:	
	2007 **Jan 1 - Dec 31** **00:00 - 23:00**	MODELER:	
	CALM WINDS: **10.93%**	TOTAL COUNT: **8644 hrs.**	
	AVG. WIND SPEED: **2.27 m/s**	DATE: **4/29/2010**	PROJECT NO.:

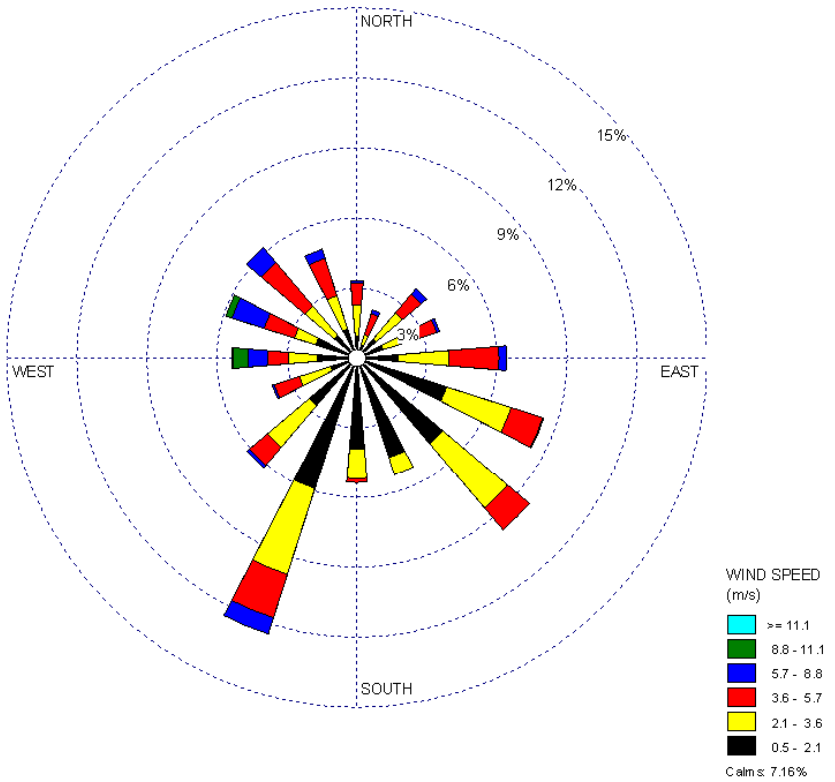
WRPLOT View - Lakes Environmental Software

WIND ROSE PLOT:

Liberty 2007 Spring 2007

DISPLAY:

Wind Speed
Direction (blowing from)



COMMENTS:	DATA PERIOD:	COMPANY NAME:	
	2007 **Mar 1 - May 31** **00:00 - 23:00**	MODELER:	
	CALM WINDS: **7.16%**	TOTAL COUNT: **2207 hrs.**	
	AVG. WIND SPEED: **2.68 m/s**	DATE: **4/29/2010**	PROJECT NO.:

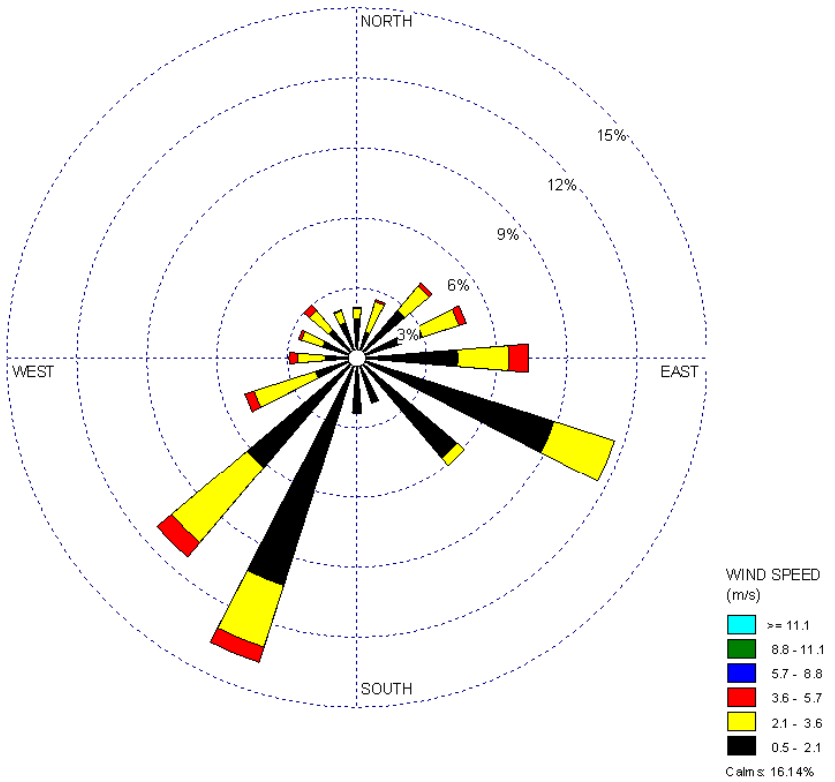
WRPLOT View - Lakes Environmental Software

WIND ROSE PLOT:

Liberty 2007 Summer 2007

DISPLAY:

Wind Speed
Direction (blowing from)



COMMENTS:	DATA PERIOD:	COMPANY NAME:	
	2007 **Jun 1 - Aug 31** **00:00 - 23:00**	MODELER:	
	CALM WINDS: **16.14%**	TOTAL COUNT: **2206 hrs.**	
	AVG. WIND SPEED: **1.55 m/s**	DATE: **4/29/2010**	PROJECT NO.:

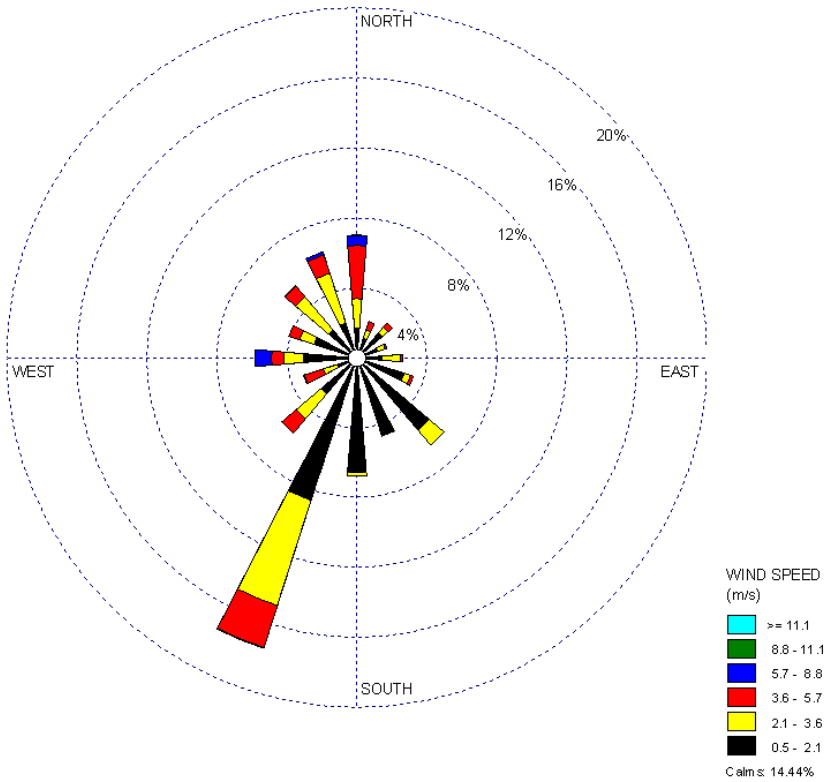
WRPLOT View - Lakes Environmental Software

WIND ROSE PLOT:

Liberty 2007 Fall 2007

DISPLAY:

Wind Speed
Direction (blowing from)



COMMENTS:	DATA PERIOD:	COMPANY NAME:	
	2007 **Sep 1 - Nov 30** **00:00 - 23:00**	MODELER:	
	CALM WINDS: **14.44%**	TOTAL COUNT: **2182 hrs.**	
	AVG. WIND SPEED: **1.91 m/s**	DATE: **4/29/2010**	PROJECT NO.:

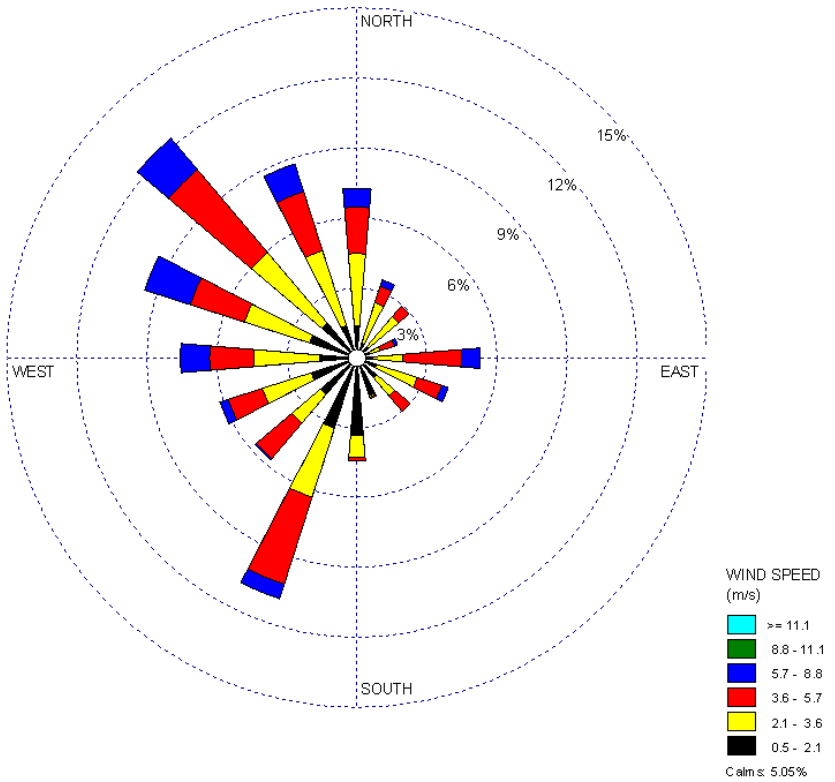
WRPLOT View - Lakes Environmental Software

WIND ROSE PLOT:

Liberty 2007 Winter 2007

DISPLAY:

Wind Speed
Direction (blowing from)



COMMENTS:	DATA PERIOD:	COMPANY NAME:	
	2007 **Jan 1 - Feb 28** **00:00 - 23:00**	MODELER:	
	CALM WINDS: **5.05%**	TOTAL COUNT: **1365 hrs.**	
	AVG. WIND SPEED: **3.19 m/s**	DATE: **4/29/2010**	PROJECT NO.:

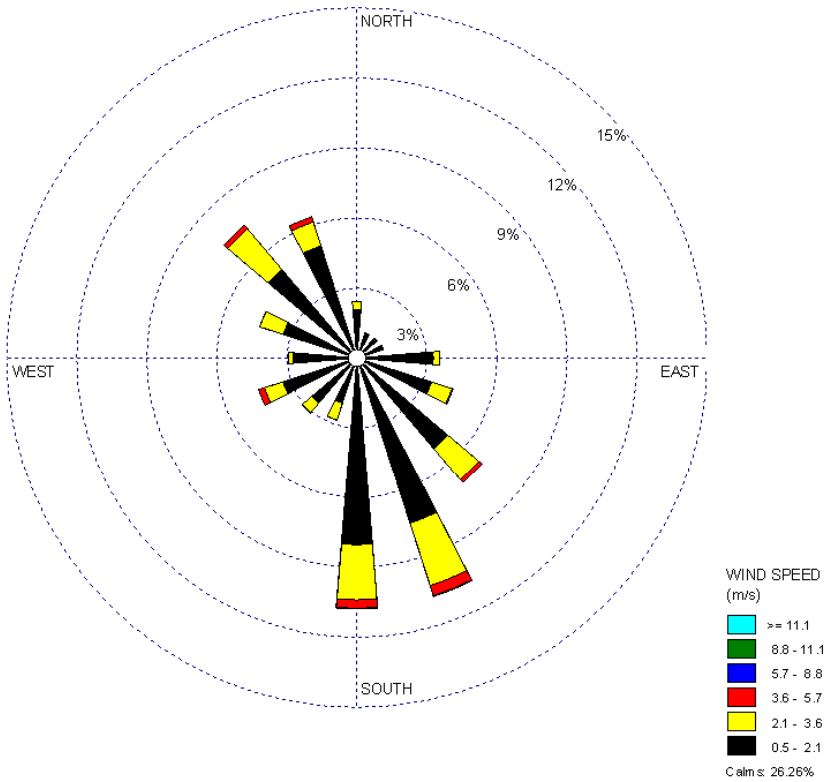
WRPLOT View - Lakes Environmental Software

WIND ROSE PLOT:

Mark Twain 2007 Annual
2007

DISPLAY:

Wind Speed
Direction (blowing from)



COMMENTS:	DATA PERIOD:	COMPANY NAME:	
	2007 **Jan 1 - Dec 31** **00:00 - 23:00**	MODELER:	
	CALM WINDS: **26.26%**	TOTAL COUNT: **8660 hrs.**	
	AVG. WIND SPEED: **1.18 m/s**	DATE: **5/4/2010**	PROJECT NO.:

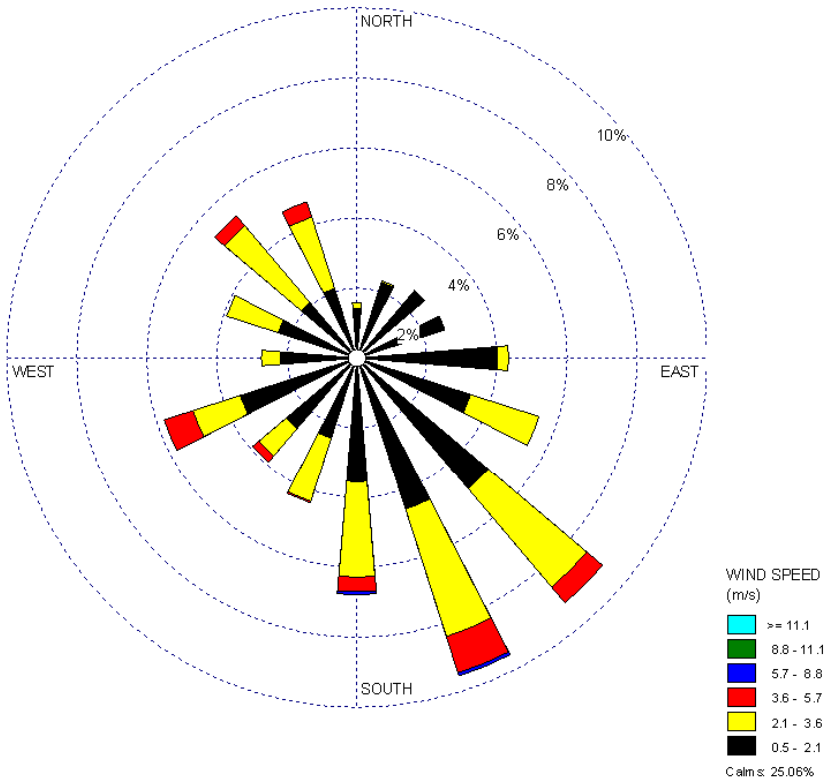
WRPLOT View - Lakes Environmental Software

WIND ROSE PLOT:

Mark Twain 2007 Spring 2007

DISPLAY:

Wind Speed
Direction (blowing from)



COMMENTS:	DATA PERIOD:	COMPANY NAME:	
	2007 **Mar 1 - May 31** **00:00 - 23:00**	MODELER:	
	CALM WINDS: **25.06%**	TOTAL COUNT: **2203 hrs.**	
	AVG. WIND SPEED: **1.44 m/s**	DATE: **5/4/2010**	PROJECT NO.:

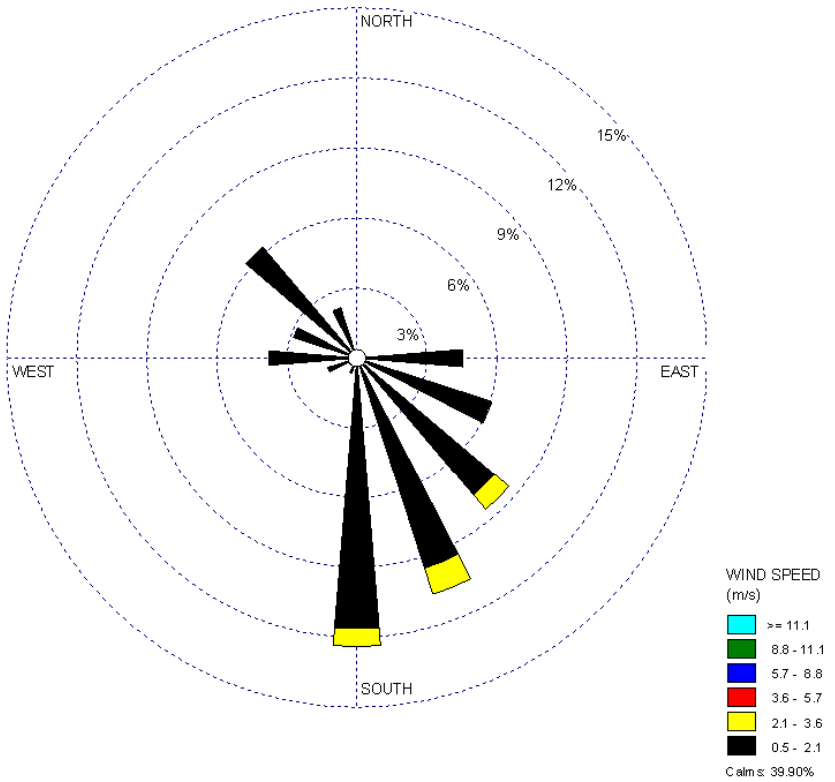
WRPLOT View - Lakes Environmental Software

WIND ROSE PLOT:

Mark Twain 2007 Summer 2007

DISPLAY:

Wind Speed
Direction (blowing from)



COMMENTS:	DATA PERIOD:	COMPANY NAME:	
	2007 **Jun 1 - Aug 31** **00:00 - 23:00**	MODELER:	
	CALM WINDS: **39.90%**	TOTAL COUNT: **2208 hrs.**	
	AVG. WIND SPEED: **0.66 m/s**	DATE: **5/4/2010**	PROJECT NO.:

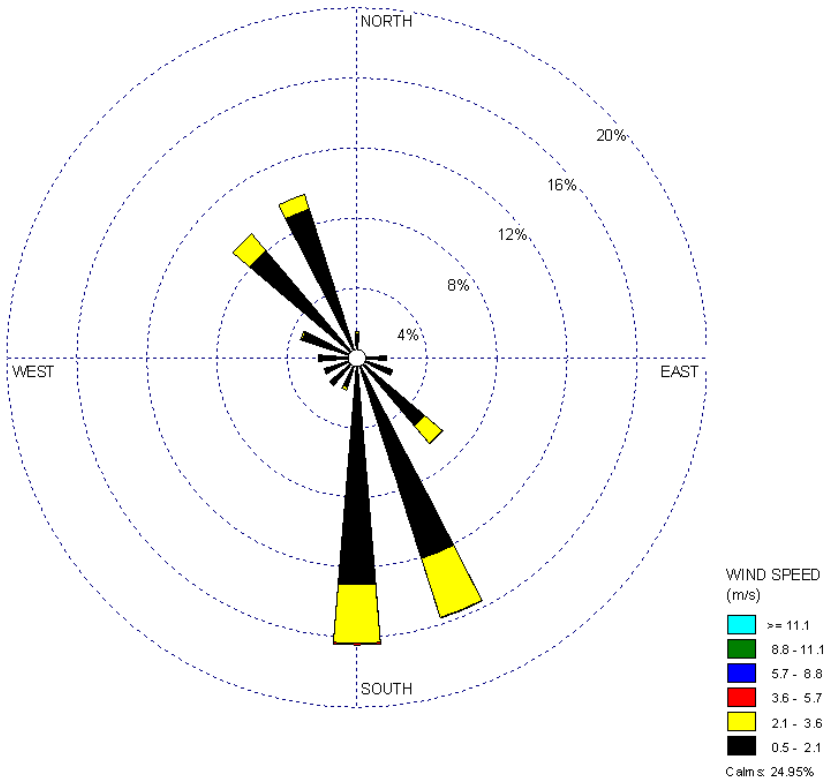
WRPLOT View - Lakes Environmental Software

WIND ROSE PLOT:

Mark Twain 2007 Fall 2007

DISPLAY:

Wind Speed
Direction (blowing from)



COMMENTS:	DATA PERIOD:	COMPANY NAME:	
	2007 **Sep 1 - Nov 30** **00:00 - 23:00**	MODELER:	
	CALM WINDS: **24.95%**	TOTAL COUNT: **2184 hrs.**	
	AVG. WIND SPEED: **1.09 m/s**	DATE: **5/4/2010**	PROJECT NO.:

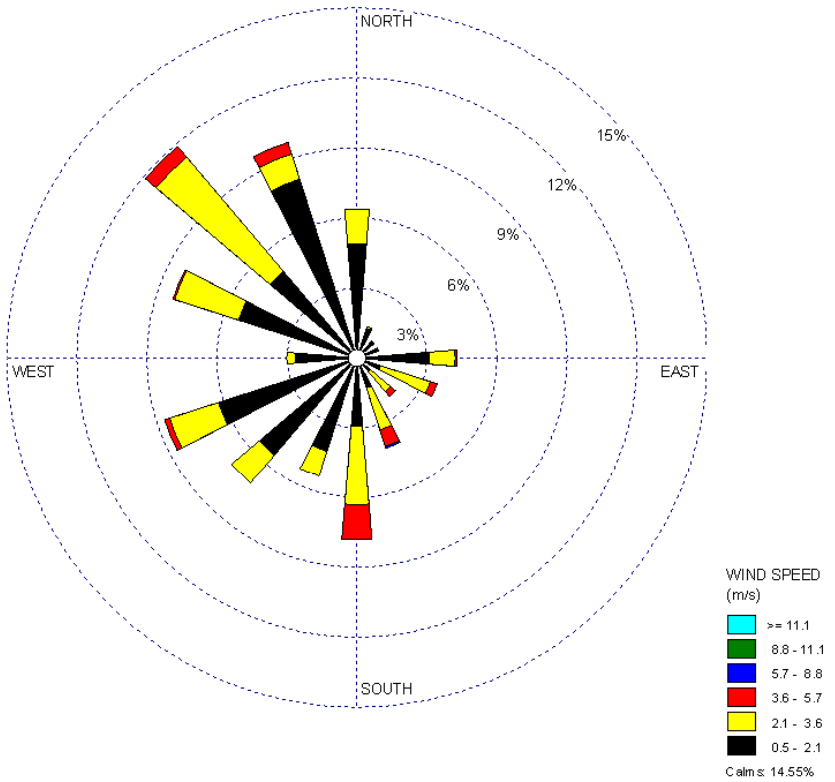
WRPLOT View - Lakes Environmental Software

WIND ROSE PLOT:

Mark Twain 2007 Winter 2007

DISPLAY:

Wind Speed
Direction (blowing from)



COMMENTS:	DATA PERIOD:	COMPANY NAME:	
	2007 **Jan 1 - Feb 28** **00:00 - 23:00**	MODELER:	
	CALM WINDS: **14.55%**	TOTAL COUNT: **1333 hrs.**	
	AVG. WIND SPEED: **1.69 m/s**	DATE: **5/4/2010**	PROJECT NO.:

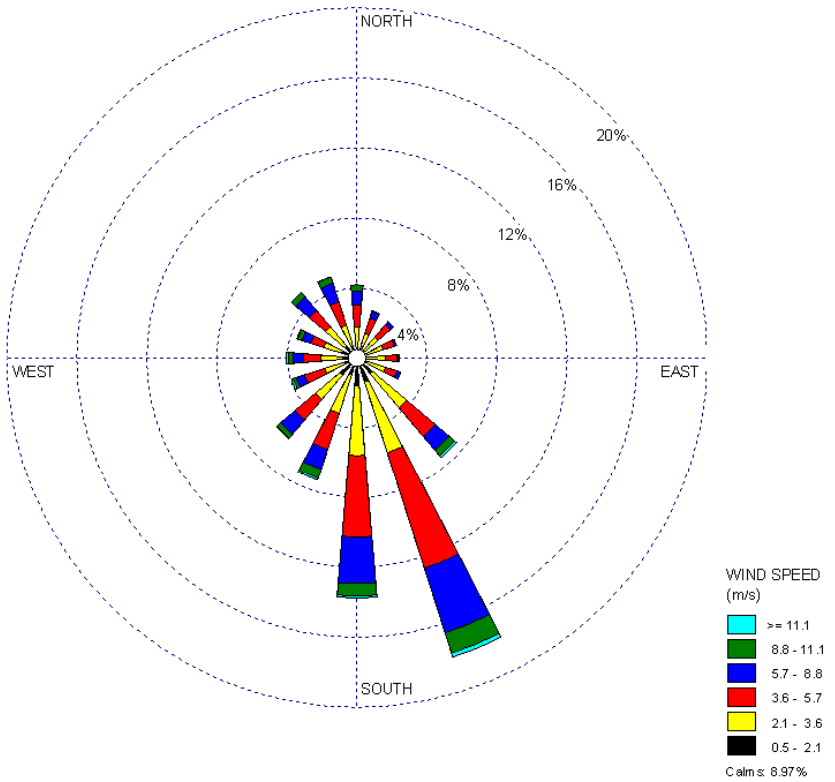
WRPLOT View - Lakes Environmental Software

WIND ROSE PLOT:

KSGF 2007 Annual
2007

DISPLAY:

Wind Speed
Direction (blowing from)



COMMENTS:	DATA PERIOD:	COMPANY NAME:	
	2007 **Jan 1 - Dec 31** **00:00 - 23:00**	MODELER:	
	CALM WINDS: **8.97%**	TOTAL COUNT: **8760 hrs.**	
	AVG. WIND SPEED: **4.13 m/s**	DATE: **4/29/2010**	PROJECT NO.:

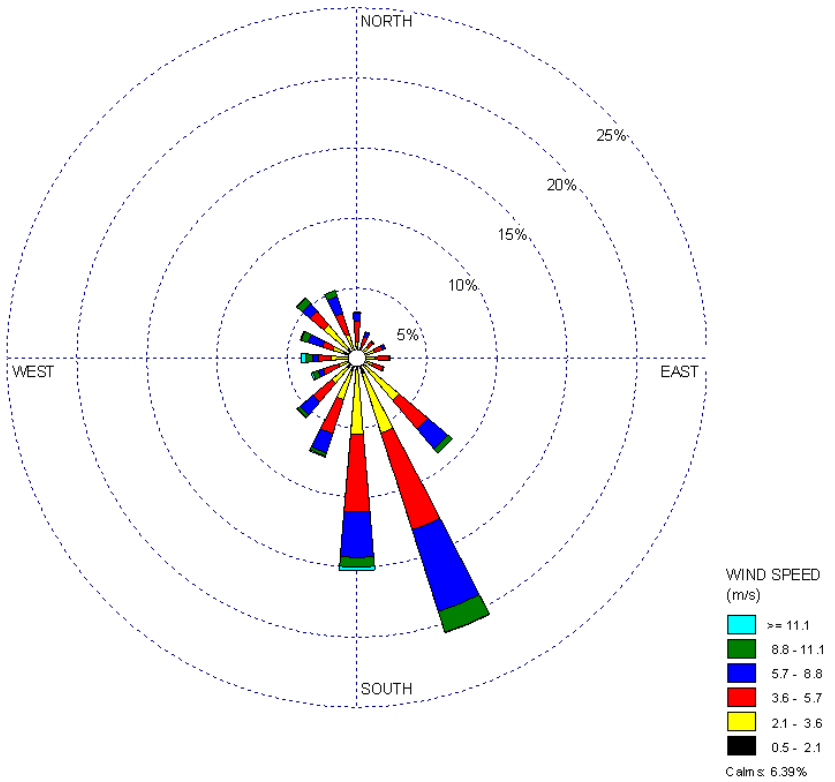
WRPLOT View - Lakes Environmental Software

WIND ROSE PLOT:

KSGF 2007 Spring 2007

DISPLAY:

Wind Speed
Direction (blowing from)



COMMENTS:	DATA PERIOD:	COMPANY NAME:	
	2007 **Mar 1 - May 31** **00:00 - 23:00**	MODELER:	
	CALM WINDS: **6.39%**	TOTAL COUNT: **2208 hrs.**	
	AVG. WIND SPEED: **4.51 m/s**	DATE: **4/29/2010**	PROJECT NO.:

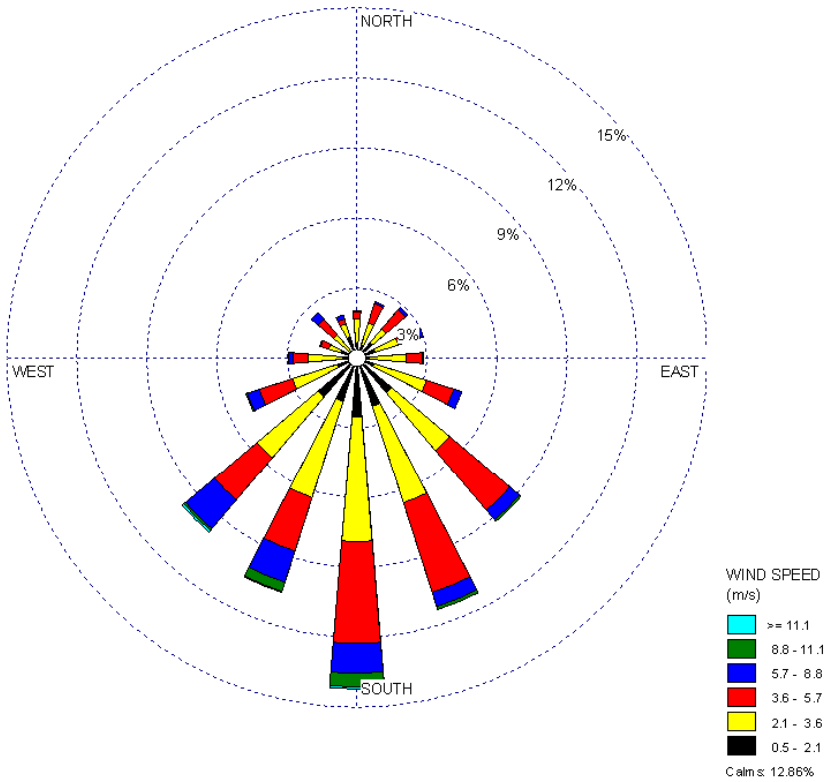
WRPLOT View - Lakes Environmental Software

WIND ROSE PLOT:

KSGF 2007 Summer 2007

DISPLAY:

Wind Speed
Direction (blowing from)



COMMENTS:	DATA PERIOD:	COMPANY NAME:	
	2007 **Jun 1 - Aug 31** **00:00 - 23:00**	MODELER:	
	CALM WINDS: **12.86%**	TOTAL COUNT: **2208 hrs.**	
	AVG. WIND SPEED: **3.26 m/s**	DATE: **4/29/2010**	PROJECT NO.:

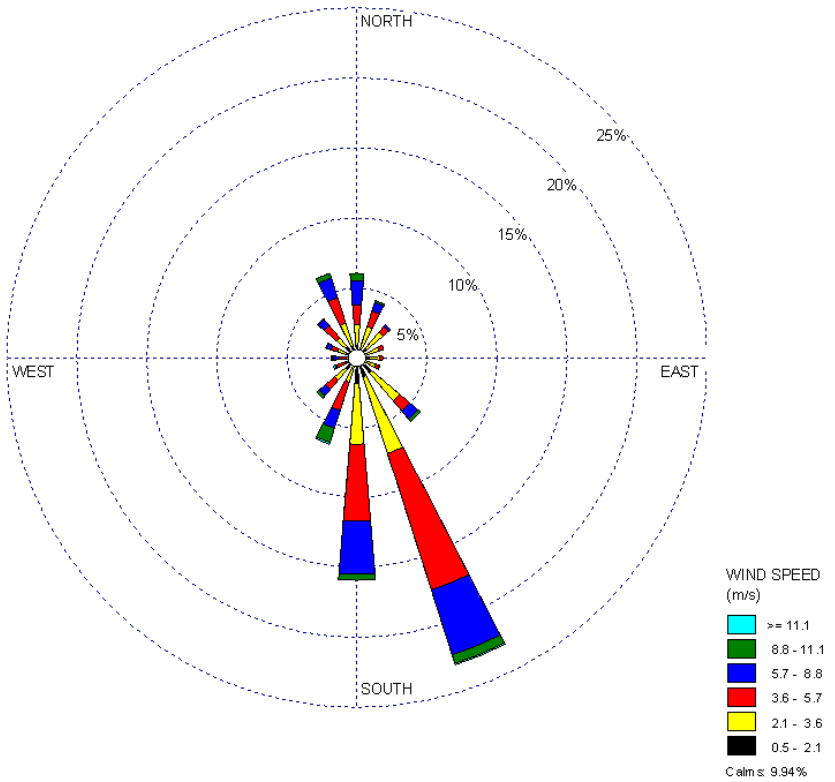
WRPLOT View - Lakes Environmental Software

WIND ROSE PLOT:

KSGF 2007 Fall 2007

DISPLAY:

Wind Speed
Direction (blowing from)



COMMENTS:	DATA PERIOD:	COMPANY NAME:	
	2007 **Sep 1 - Nov 30** **00:00 - 23:00**	MODELER:	
	CALM WINDS: **9.94%**	TOTAL COUNT: **2184 hrs.**	
	AVG. WIND SPEED: **4.01 m/s**	DATE: **4/29/2010**	PROJECT NO.:

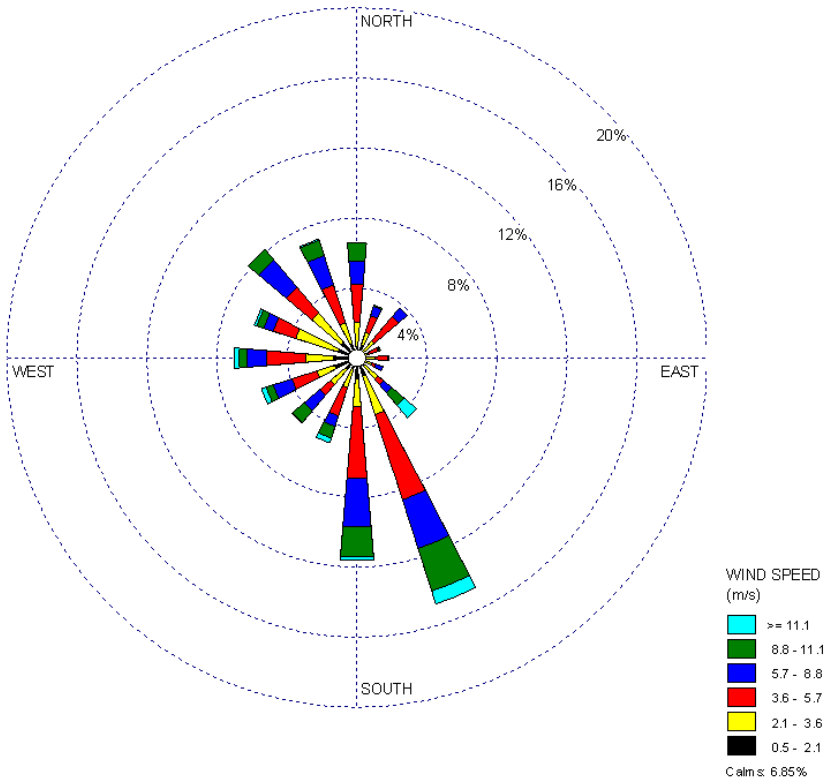
WRPLOT View - Lakes Environmental Software

WIND ROSE PLOT:

KSGF 2007 Winter 2007

DISPLAY:

Wind Speed
Direction (blowing from)



COMMENTS:	DATA PERIOD:	COMPANY NAME:	
	2007 **Jan 1 - Feb 28** **00:00 - 23:00**	MODELER:	
	CALM WINDS: **6.85%**	TOTAL COUNT: **1416 hrs.**	
	AVG. WIND SPEED: **4.91 m/s**	DATE: **4/29/2010**	PROJECT NO.:

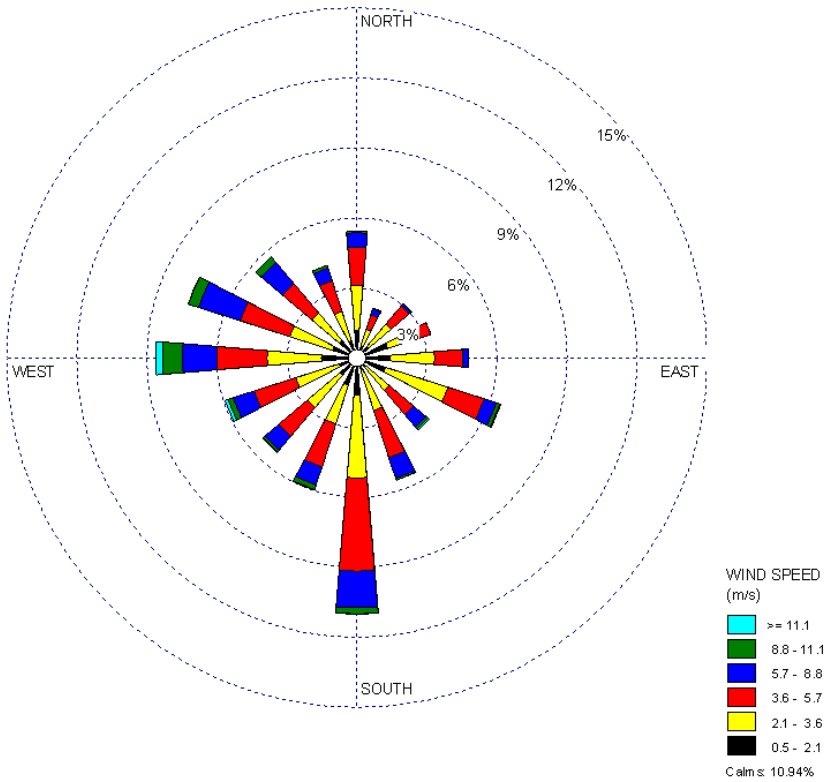
WRPLOT View - Lakes Environmental Software

WIND ROSE PLOT:

KSTL 2007 Annual
2007

DISPLAY:

Wind Speed
Direction (blowing from)



COMMENTS:	DATA PERIOD:	COMPANY NAME:	
	2007 **Jan 1 - Dec 31** **00:00 - 23:00**	MODELER:	
	CALM WINDS: **10.94%**	TOTAL COUNT: **8760 hrs.**	
	AVG. WIND SPEED: **3.74 m/s**	DATE: **4/29/2010**	PROJECT NO.:

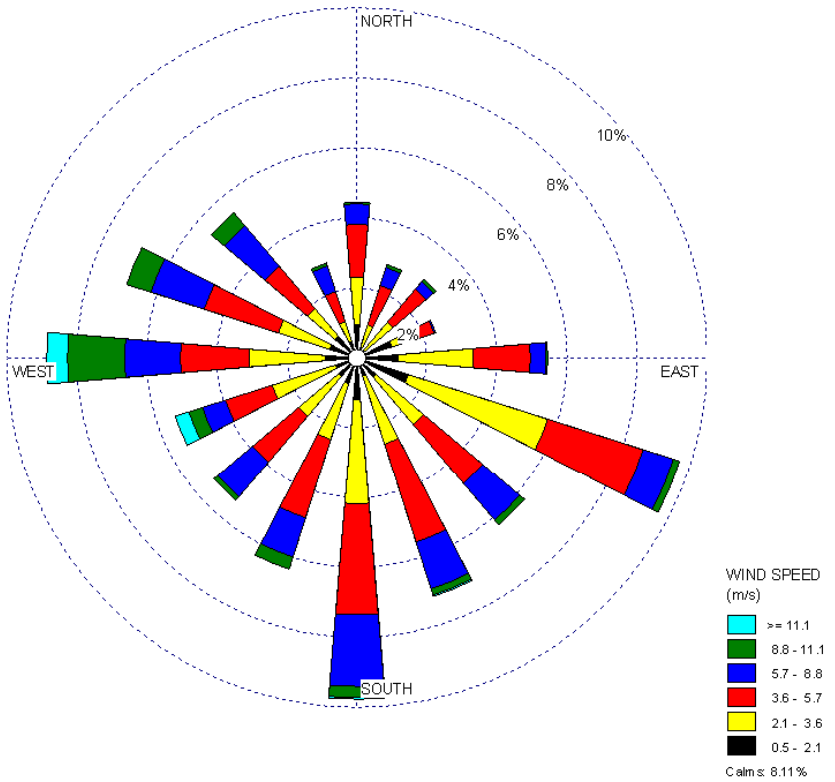
WRPLOT View - Lakes Environmental Software

WIND ROSE PLOT:

KSTL 2007 Spring 2007

DISPLAY:

Wind Speed
Direction (blowing from)



COMMENTS:	DATA PERIOD:	COMPANY NAME:	
	2007 **Mar 1 - May 31** **00:00 - 23:00**	MODELER:	
	CALM WINDS: **8.11%**	TOTAL COUNT: **2208 hrs.**	
	AVG. WIND SPEED: **4.22 m/s**	DATE: **4/29/2010**	PROJECT NO.:

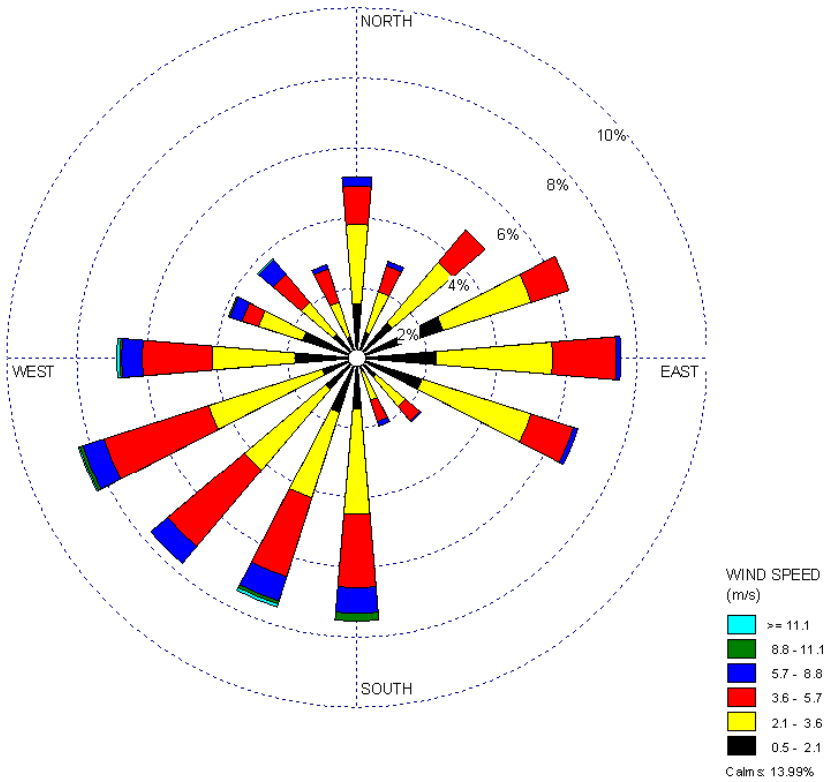
WRPLOT View - Lakes Environmental Software

WIND ROSE PLOT:

KSTL 2007 Summer 2007

DISPLAY:

Wind Speed
Direction (blowing from)



COMMENTS:	DATA PERIOD:	COMPANY NAME:	
	2007 **Jun 1 - Aug 31** **00:00 - 23:00**	MODELER:	
	CALM WINDS: **13.99%**	TOTAL COUNT: **2208 hrs.**	
	AVG. WIND SPEED: **3.02 m/s**	DATE: **4/29/2010**	PROJECT NO.:

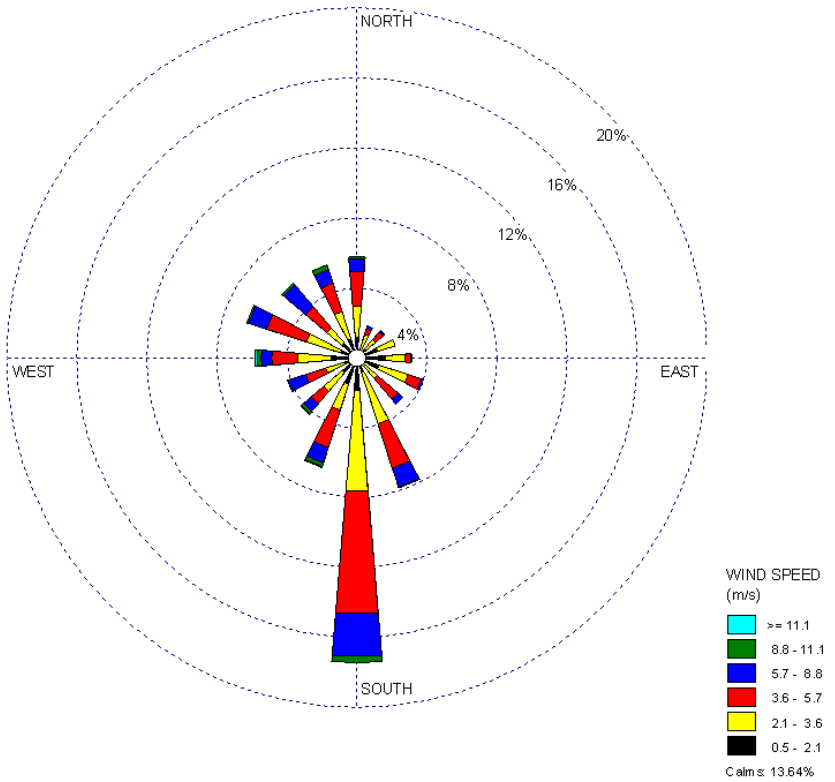
WRPLOT View - Lakes Environmental Software

WIND ROSE PLOT:

KSTL 2007 Fall 2007

DISPLAY:

Wind Speed
Direction (blowing from)



COMMENTS:	DATA PERIOD:	COMPANY NAME:	
	2007 **Sep 1 - Nov 30** **00:00 - 23:00**	MODELER:	
	CALM WINDS: **13.64%**	TOTAL COUNT: **2184 hrs.**	
	AVG. WIND SPEED: **3.47 m/s**	DATE: **4/29/2010**	PROJECT NO.:

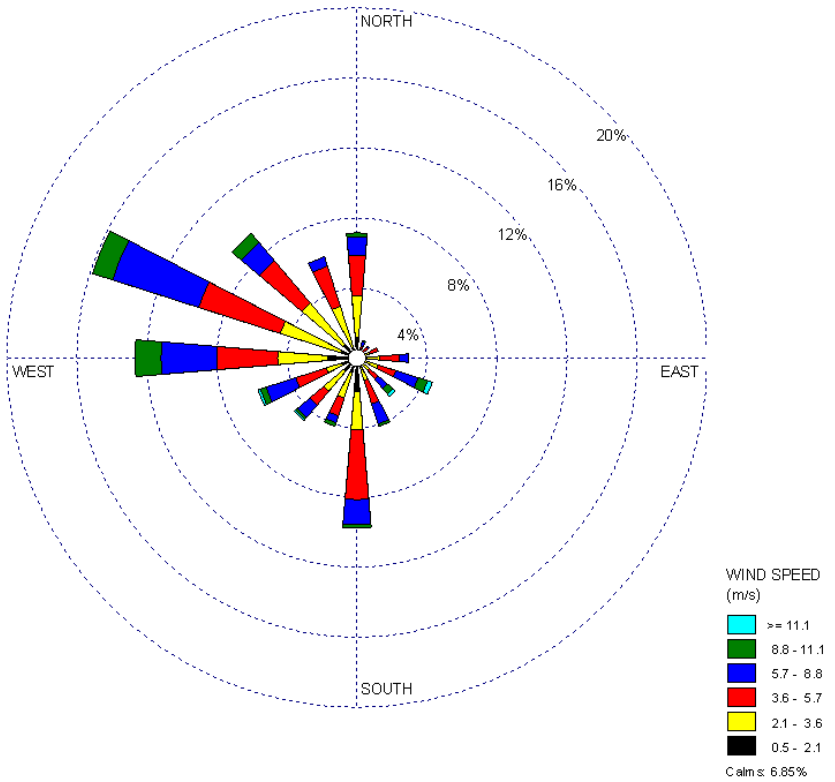
WRPLOT View - Lakes Environmental Software

WIND ROSE PLOT:

KSTL 2007 Winter 2007

DISPLAY:

Wind Speed
Direction (blowing from)



COMMENTS:	DATA PERIOD:	COMPANY NAME:	
	2007 **Jan 1 - Feb 28** **00:00 - 23:00**	MODELER:	
	CALM WINDS: **6.85%**	TOTAL COUNT: **1416 hrs.**	
	AVG. WIND SPEED: **4.48 m/s**	DATE: **4/29/2010**	PROJECT NO.:

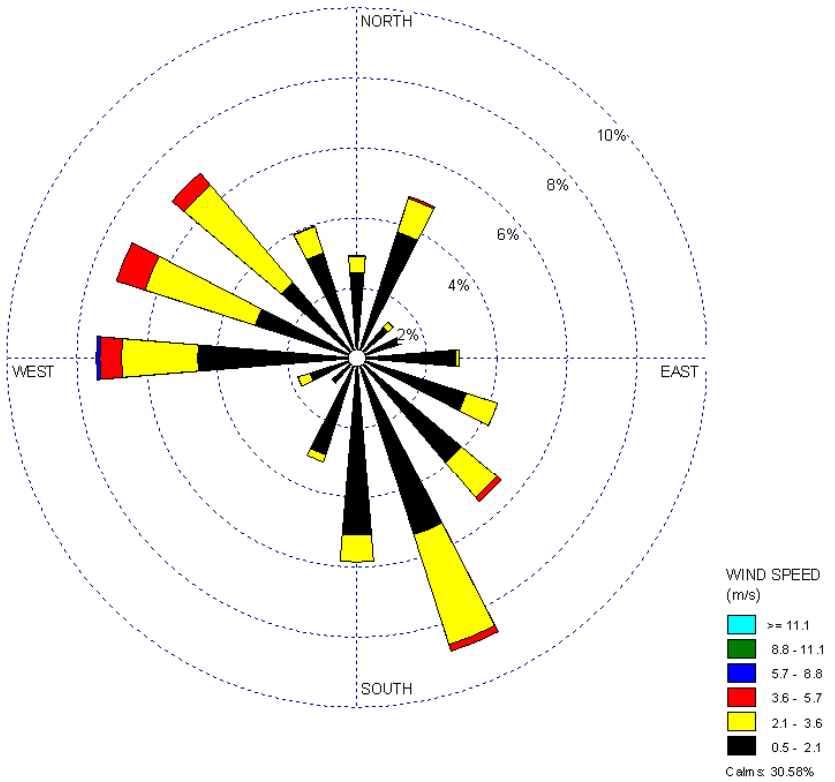
WRPLOT View - Lakes Environmental Software

WIND ROSE PLOT:

Blair Street 2007 Annual
2007

DISPLAY:

Wind Speed
Direction (blowing from)



COMMENTS:	DATA PERIOD:	COMPANY NAME:	
	2007 **Jan 1 - Dec 31** **00:00 - 23:00**	MODELER:	
	CALM WINDS: **30.58%**	TOTAL COUNT: **8757 hrs.**	
	AVG. WIND SPEED: **1.22 m/s**	DATE: **5/4/2010**	PROJECT NO.:

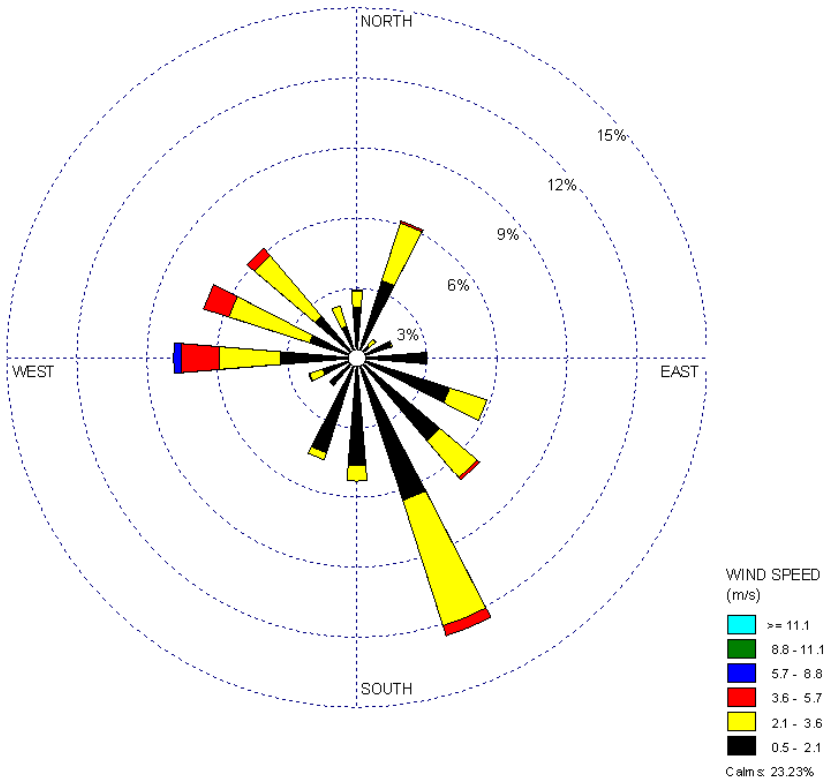
WRPLOT View - Lakes Environmental Software

WIND ROSE PLOT:

Blair 2007 Spring 2007

DISPLAY:

Wind Speed
Direction (blowing from)



COMMENTS:	DATA PERIOD:	COMPANY NAME:	
	2007 **Mar 1 - May 31** **00:00 - 23:00**	MODELER:	
	CALM WINDS: **23.23%**	TOTAL COUNT: **2208 hrs.**	
	AVG. WIND SPEED: **1.50 m/s**	DATE: **4/28/2010**	PROJECT NO.:

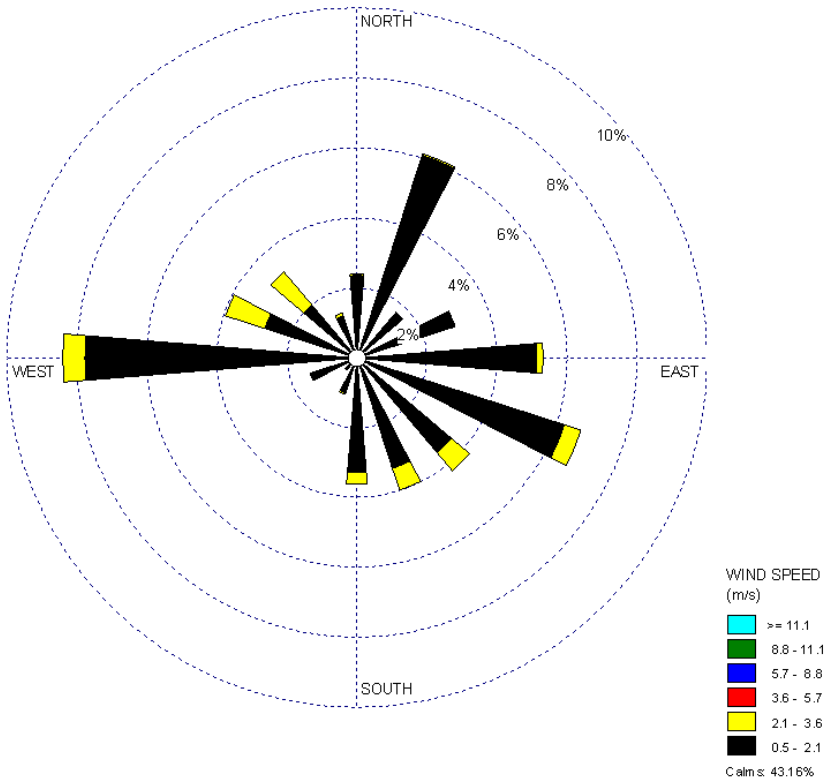
WRPLOT View - Lakes Environmental Software

WIND ROSE PLOT:

Blair 2007 Summer 2007

DISPLAY:

Wind Speed
Direction (blowing from)



COMMENTS:	DATA PERIOD:	COMPANY NAME:	
	2007 **Jun 1 - Aug 31** **00:00 - 23:00**	MODELER:	
	CALM WINDS: **43.16%**	TOTAL COUNT: **2208 hrs.**	
	AVG. WIND SPEED: **0.76 m/s**	DATE: **4/28/2010**	PROJECT NO.:

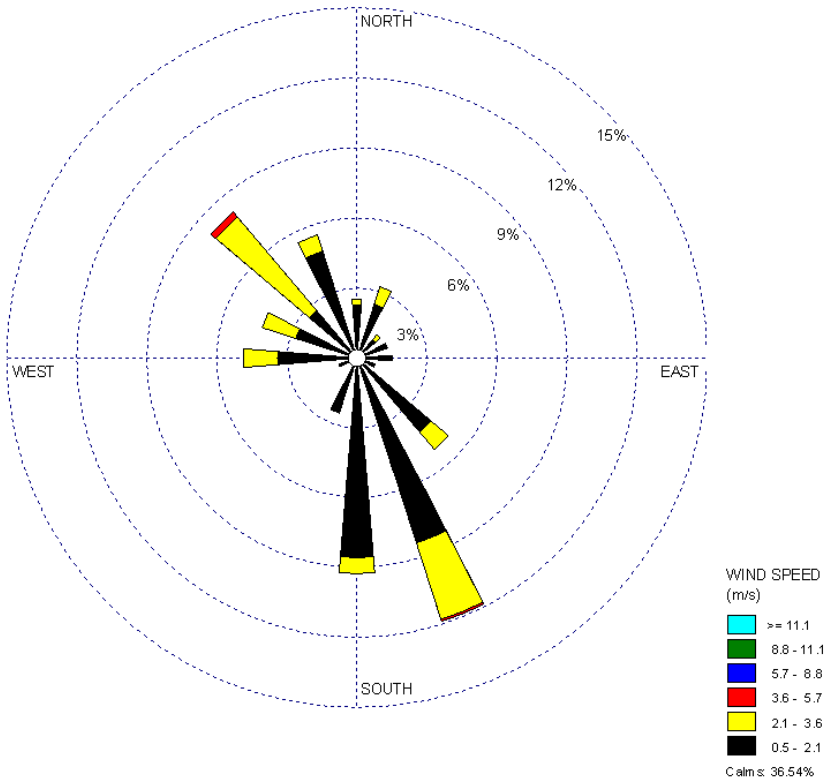
WRPLOT View - Lakes Environmental Software

WIND ROSE PLOT:

Blair Street 2007 Fall 2007

DISPLAY:

Wind Speed
Direction (blowing from)



COMMENTS:	DATA PERIOD:	COMPANY NAME:	
	2007 Sep 1 - Nov 30 00:00 - 23:00	MODELER:	
	CALM WINDS: 36.54%	TOTAL COUNT: 2184 hrs.	
	AVG. WIND SPEED: 1.00 m/s	DATE: 5/4/2010	PROJECT NO.:

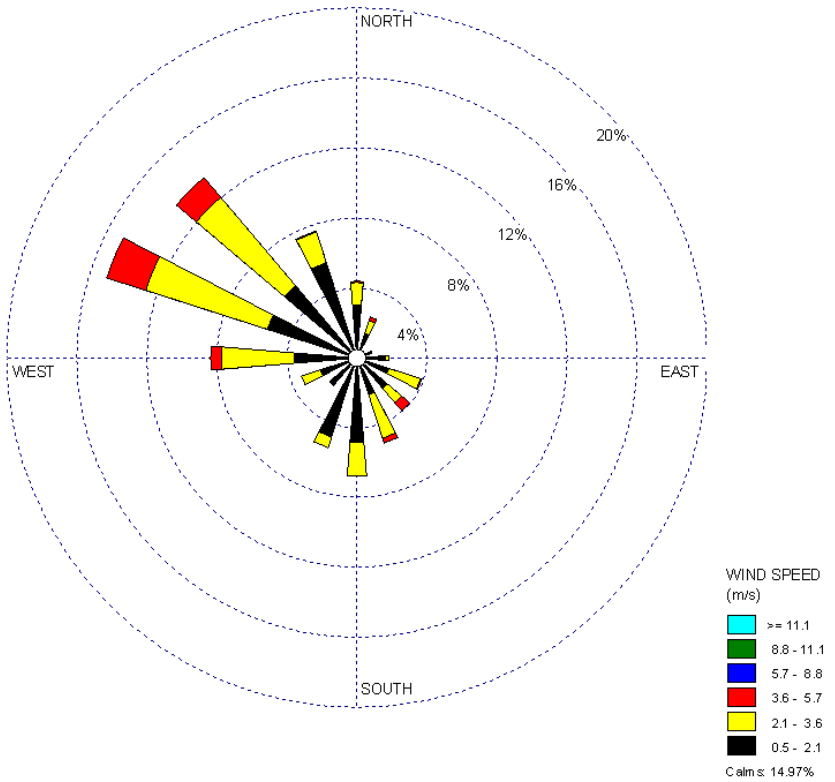
WRPLOT View - Lakes Environmental Software

WIND ROSE PLOT:

Blair 2007 Winter 2007

DISPLAY:

Wind Speed
Direction (blowing from)



COMMENTS:	DATA PERIOD:	COMPANY NAME:	
	2007 **Jan 1 - Feb 28** **00:00 - 23:00**	MODELER:	
	CALM WINDS: **14.97%**	TOTAL COUNT: **1416 hrs.**	
	AVG. WIND SPEED: **1.76 m/s**	DATE: **4/28/2010**	PROJECT NO.:

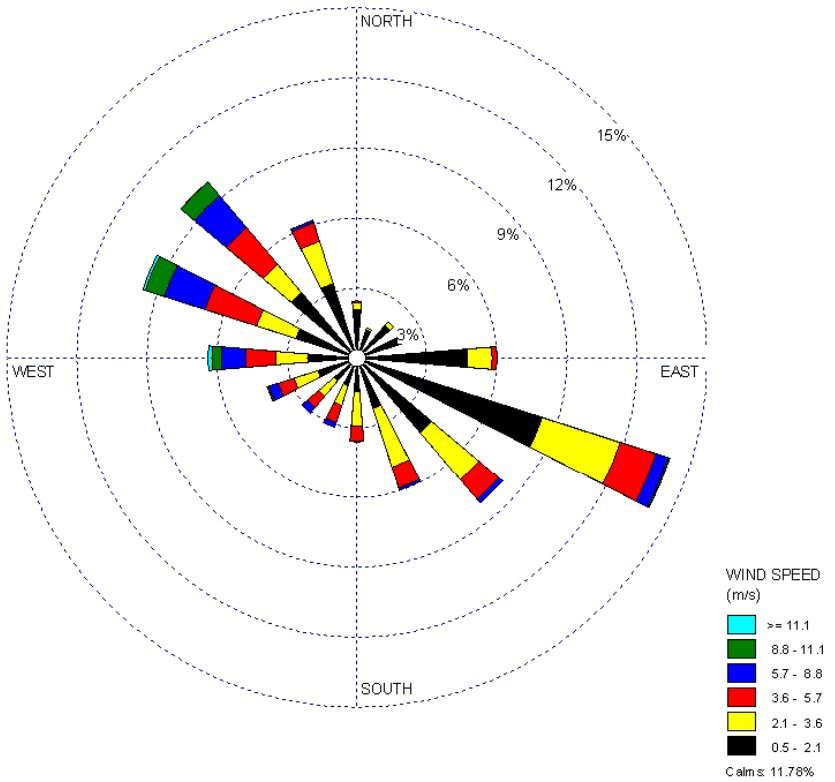
WRPLOT View - Lakes Environmental Software

WIND ROSE PLOT:

WEST ALTON 2007 ANNUAL
2007

DISPLAY:

Wind Speed
Direction (blowing from)



COMMENTS:	DATA PERIOD:	COMPANY NAME:	
	2007 **Jan 1 - Dec 31** **00:00 - 23:00**	MODELER:	
	CALM WINDS: **11.78%**	TOTAL COUNT: **8713 hrs.**	
	AVG. WIND SPEED: **2.47 m/s**	DATE: **5/14/2010**	PROJECT NO.:

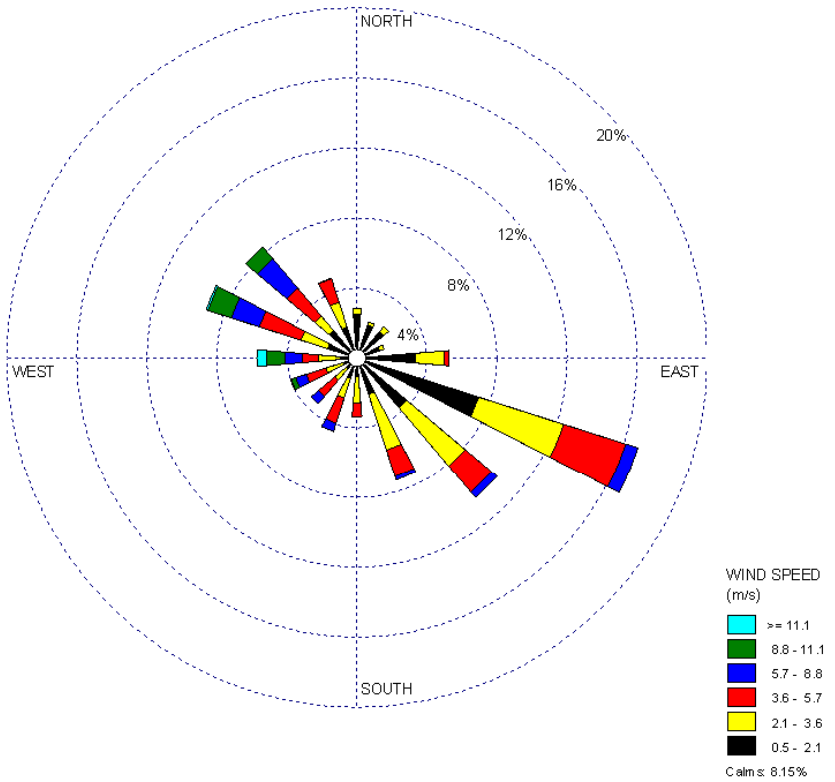
WRPLOT View - Lakes Environmental Software

WIND ROSE PLOT:

WEST ALTON 2007 SPRING 2007

DISPLAY:

Wind Speed
Direction (blowing from)



COMMENTS:	DATA PERIOD:	COMPANY NAME:	
	2007 **Mar 1 - May 31** **00:00 - 23:00**	MODELER:	
	CALM WINDS: **8.15%**	TOTAL COUNT: **2208 hrs.**	
	AVG. WIND SPEED: **3.04 m/s**	DATE: **5/14/2010**	PROJECT NO.:

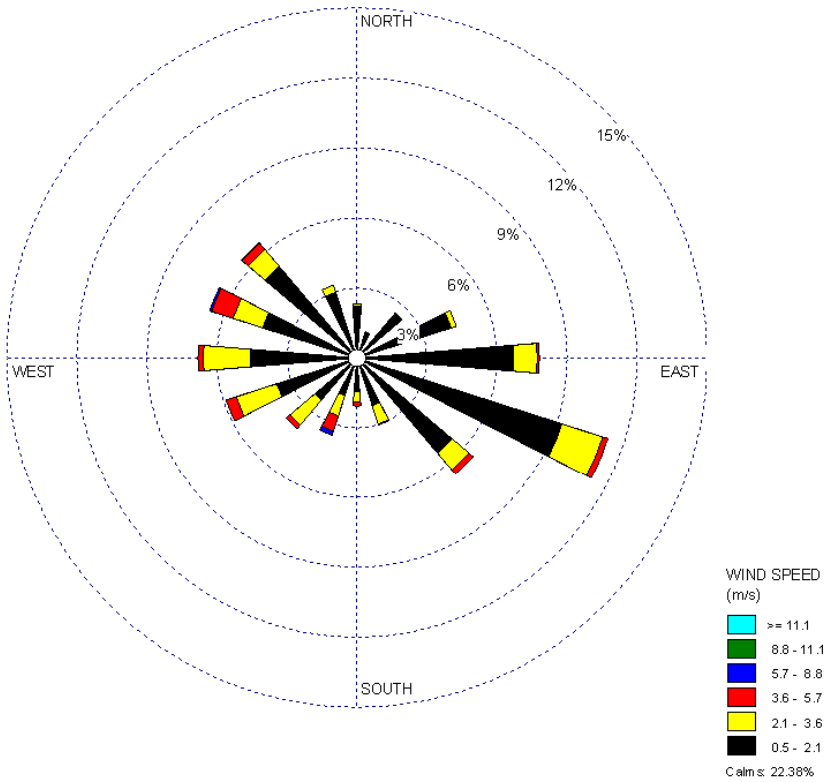
WRPLOT View - Lakes Environmental Software

WIND ROSE PLOT:

WEST ALTON 2007 SUMMER 2007

DISPLAY:

Wind Speed
Direction (blowing from)



COMMENTS:	DATA PERIOD:	COMPANY NAME:	
	2007 **Jun 1 - Aug 31** **00:00 - 23:00**	MODELER:	
	CALM WINDS: **22.38%**	TOTAL COUNT: **2194 hrs.**	
	AVG. WIND SPEED: **1.28 m/s**	DATE: **5/14/2010**	PROJECT NO.:

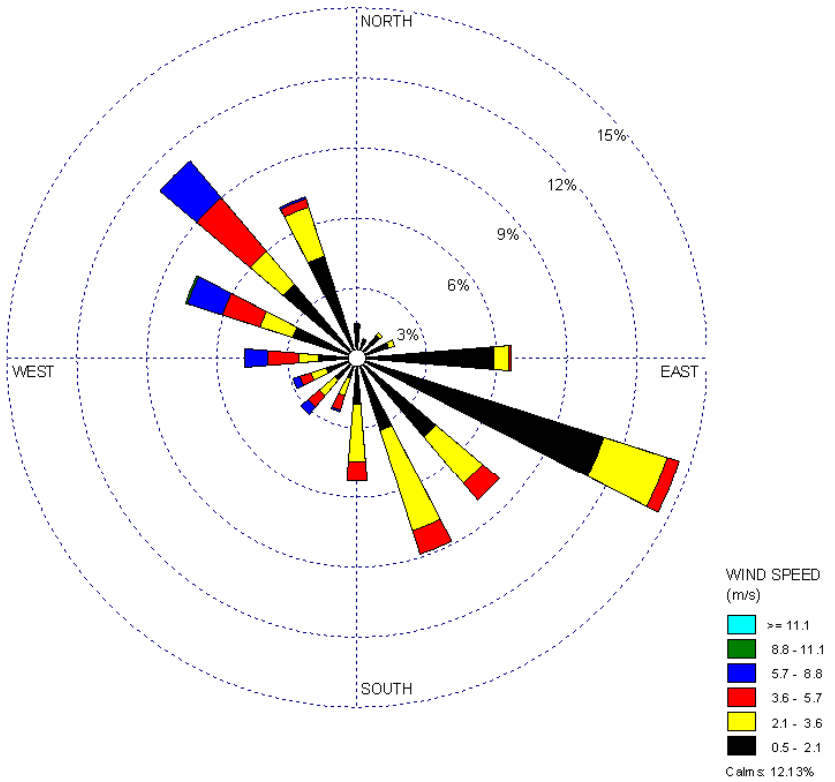
WRPLOT View - Lakes Environmental Software

WIND ROSE PLOT:

WEST ALTON 2007 FALL 2007

DISPLAY:

Wind Speed
Direction (blowing from)



COMMENTS:	DATA PERIOD:	COMPANY NAME:	
	2007 **Sep 1 - Nov 30** **00:00 - 23:00**	MODELER:	
	CALM WINDS: **12.13%**	TOTAL COUNT: **2184 hrs.**	
	AVG. WIND SPEED: **2.16 m/s**	DATE: **5/14/2010**	PROJECT NO.:

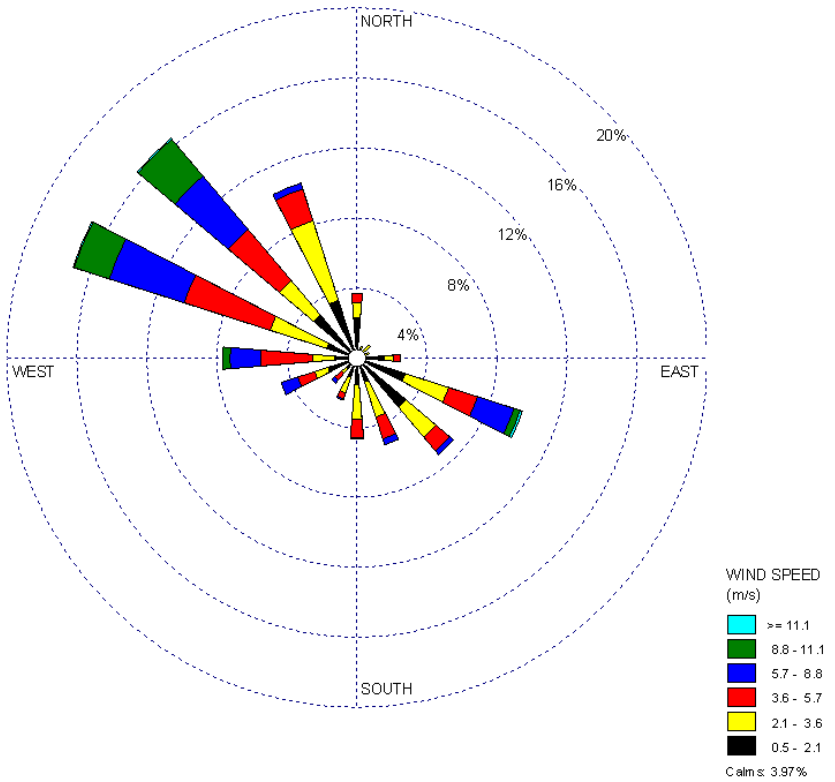
WRPLOT View - Lakes Environmental Software

WIND ROSE PLOT:

WEST ALTON 2007 WINTER 2007

DISPLAY:

Wind Speed
Direction (blowing from)



COMMENTS:	DATA PERIOD:	COMPANY NAME:	
	2007 **Jan 1 - Feb 28** **00:00 - 23:00**	MODELER:	
	CALM WINDS: **3.97%**	TOTAL COUNT: **1384 hrs.**	
	AVG. WIND SPEED: **3.68 m/s**	DATE: **5/14/2010**	PROJECT NO.:

WRPLOT View - Lakes Environmental Software

APPENDIX B: EPA REGION VII AIR MONITORING NETWORK ASSESSMENT GUIDANCE

5-YEAR AIR QUALITY SYSTEM ASSESSMENT
CFR REQUIREMENTS & REGIONAL RECOMMENDATIONS

The five year air quality surveillance system assessment is required to determine at a minimum:

1) If the network meets the monitoring objectives defined in Appendix D
2) Whether new monitoring sites are needed
3) Whether existing sites are no longer needed and can be terminated
4) Whether new technologies are appropriate for incorporation into the air monitoring network.
5) Whether the network sufficiently supports characterization of air quality in areas with large populations of susceptible individuals
6) Whether discontinuance of a monitoring site would have an adverse impact on other data users or health studies.
7) For PM2.5 the assessment must identify needed changes to population oriented sites

In order to assess the network's suitability for the seven objectives listed above the State agency will need to assess the following information.

1) Statewide and local level population statistics
2) Statewide ambient air monitoring network pollutant concentration measurement trends for the past 5-years
3) Statewide and local level emission source trends, characteristics, and inventory
4) Statewide plans to modify, add, or remove emission sources
5) Statewide and local level meteorological impacts on pollutant concentrations.
6) Potential impacts of precursor chemical emissions on pollutant concentrations
7) Potential impacts of pollutant and precursor transport on measured concentrations.
8) Atmospheric dispersion modeling output generated as part of a permit application or control strategy effectiveness demonstration.
9) Network suitability to measure the appropriate spatial scale of representativeness for selected pollutants.
10) Monitoring data spatial redundancy or gaps that need to be eliminated.
11) Programmatic trends or shifts in emphasis or funding that lead toward different data needs.

In order to generate the appropriate level of data necessary for this analysis the state agency should consider the following:

1) Statistical tools and methods
    a) Trend analysis of line charts and bar graphs of historical pollutant concentration trends in comparison with the NAAQS
    b) Correlation analysis to discern the similarity of measurements between individual monitoring stations on a single pollutant basis.
    c) Principal component analysis, if applicable for a given agency.

2) Graphical tools and methods
    a) Maps with multiple layers and overlays depicting:
        a.1) Monitor locations
        a.2) Emission inventory data
        a.3) Population data
        a.4) Affects of either adding or deleting a monitor from the network
        a.5) Spatial area served by a monitoring site for a given pollutant

APPENDIX C: NETWORK TABLE

Missouri Ambient Air Monitoring Network

MIC	***Microscale***	***1 to 100 square meters***
MID	***Middle***	***0.1 to 0.5 square kilometer***
NBR	***Neighborhood***	***0 .5 to 4 square kilometers***
REG	***Regional***	***> 10 square kilometers, rural***
URB	***Urban***	***4 to 50 square kilometers, city***
COM	***NAAQS Compliance***	
MET	***Meterological Data***	
RES	***Research***	
STA	***State Standard***	
SLAMS	***State and Local Monitoring Stations***	
NCORE	***National Multipollutant Monitoring Stations***	
SPM	***Special Purpose Monitoring***	
SPEC	***Speciation***	

City Utilities

James River South

AQS Site Number 29-077-0037

James River - South

Latitude:	37.104461	***AQCR:***	139	SW Missouri
Longitude:	-93.25339	***MSA:***	7920	Springfield, MO
Elevation:	1227			

Pollutant	***AQS Code***	***Monitor-Type***	***POC***	***Col***	***Freq***	***Scale***	***Obj***	***Unit-Code***	***Unit***	***Method-Code***	***Method***
Sulfur Dioxide (SO2)	42401	Industrial	3	☐	H	MID	COM	007	ppm	060	Pulsed fluorescent

Wildwood Lane

AQS Site Number 29-077-0040

1234 Wildwood Lane, Springfield, MO 12435

Latitude:	37.108889	***AQCR:***	139	SW Missouri
Longitude:	-93.252778	***MSA:***	7920	Springfield, MO
Elevation:	1231			

Pollutant	***AQS Code***	***Monitor-Type***	***POC***	***Col***	***Freq***	***Scale***	***Obj***	***Unit-Code***	***Unit***	***Method-Code***	***Method***
Sulfur Dioxide (SO2)	42401	Industrial	1	☐	H	MID	COM	007	ppm	060	Pulsed fluorescent

Doe Run Buick

DRB - North #5

AQS Site Number 29-093-0021

Latitude:	37.654167	**AQCR:**	138	SE Missouri
Longitude:	-91.130556	**MSA:**	0000	Not in a MSA
Elevation:				

Pollutant	AQS Code	Monitor-Type	POC	Col	Freq	Scale	Obj	Unit-Code	Unit	Method-Code	Method
Lead TSP - LC (Pb)	14129	Industrial	1	☐	1/6	MID	COM	105	ug/m^3-LC	113	Doe Run Mass Spectra ICAP

DRB - South #1

AQS Site Number 29-093-0016

Latitude:	37.625278	**AQCR:**	138	SE Missouri
Longitude:	-91.129167	**MSA:**	0000	Not in a MSA
Elevation:				

Pollutant	AQS Code	Monitor-Type	POC	Col	Freq	Scale	Obj	Unit-Code	Unit	Method-Code	Method
Lead TSP - LC (Pb)	14129	Industrial	1	☑	1/6	NBR	COM	105	ug/m^3-LC	113	Doe Run Mass Spectra ICAP

Doe Run Glover

DRG - Big Creek #5

AQS Site Number 29-093-0029

Latitude:	37.471667	**AQCR:**	138	SE Missouri
Longitude:	-90.689444	**MSA:**	0000	Not in a MSA
Elevation:				

Pollutant	AQS Code	Monitor-Type	POC	Col	Freq	Scale	Obj	Unit-Code	Unit	Method-Code	Method
Lead TSP - LC (Pb)	14129	Industrial	1	☐	1/6	NBR	COM	105	ug/m^3-LC	110	Pima Co., AZ Mass Spectra ICAP

DRG - Post Office #2

AQS Site Number 29-093-0027

Latitude:	37.486111	**AQCR:**	138	SE Missouri
Longitude:	-90.69	**MSA:**	0000	Not in a MSA
Elevation:				

Pollutant	AQS Code	Monitor-Type	POC	Col	Freq	Scale	Obj	Unit-Code	Unit	Method-Code	Method
Lead TSP - LC (Pb)	14129	Industrial	1	☑	1/6	NBR	COM	105	ug/m^3-LC	110	Pima Co., AZ Mass Spectra ICAP

Doe Run Herculaneum

Herculaneum, Broad Street

AQS Site Number **29-099-0015**

Broad St., Herclaneum, MO, 63048

Latitude:	38.261667	***AQCR:***	070	Metropolitan St. Louis
Longitude:	-90.379722	***MSA:***	7040	St. Louis, MO-IL
Elevation:	500			

Pollutant	***AQS Code***	***Monitor-Type***	***POC***	***Col***	***Freq***	***Scale***	***Obj***	***Unit-Code***	***Unit***	***Method-Code***	***Method***
Lead TSP - LC (Pb)	14129	Industrial/ SPM	1	☐	1/1	MID	COM	105	ug/m^3-LC	113	Doe Run Mass Spectra ICAP

Herculaneum, Church Street

AQS Site Number **29-099-0024**

951 Church Street, Herculaneum, MO 63048

Latitude:	38.258667	***AQCR:***	070	Metropolitan St. Louis
Longitude:	-90.380889	***MSA:***	7040	St. Louis, MO-IL
Elevation:	463			

Pollutant	***AQS Code***	***Monitor-Type***	***POC***	***Col***	***Freq***	***Scale***	***Obj***	***Unit-Code***	***Unit***	***Method-Code***	***Method***
Lead TSP - LC (Pb)	14129	Industrial	1	☑	1/3	NBR	COM	105	ug/m^3-LC	113	Doe Run Mass Spectra ICAP

Herculaneum, Dunklin High School

AQS Site Number **29-099-0005**

1 Black Cat Dr., Herculaneum, MO, 63048

Latitude:	38.267222	***AQCR:***	070	Metropolitan St. Louis
Longitude:	-90.379444	***MSA:***	7040	St. Louis, MO-IL
Elevation:	445			

Pollutant	***AQS Code***	***Monitor-Type***	***POC***	***Col***	***Freq***	***Scale***	***Obj***	***Unit-Code***	***Unit***	***Method-Code***	***Method***
Lead TSP - LC (Pb)	14129	Industrial	3	☐	1/3	MID	COM	105	ug/m^3-LC	113	Doe Run Mass Spectra ICAP

Herculaneum, Main Street

AQS Site Number 29-099-0004

Main St., Herculaneum, MO, 63048

Latitude:	38.2633	**AQCR:**	070	Metropolitan St. Louis
Longitude:	-90.3785	**MSA:**	7040	St. Louis, MO-IL
Elevation:	450			

Pollutant	AQS Code	Monitor-Type	POC	Col	Freq	Scale	Obj	Unit-Code	Unit	Method-Code	Method
Lead TSP - LC (Pb)	14129	Industrial	2	☐	1/1	MID	COM	105	ug/m^3-LC	113	Doe Run Mass Spectra ICAP

Herculaneum, Sherman

AQS Site Number 29-099-0013

Sherman St., Herclaneum, MO, 63048

Latitude:	38.27171	**AQCR:**	070	Metropolitan St. Louis
Longitude:	-90.376520	**MSA:**	7040	St. Louis, MO-IL
Elevation:	450			

Pollutant	AQS Code	Monitor-Type	POC	Col	Freq	Scale	Obj	Unit-Code	Unit	Method-Code	Method
Lead TSP - LC (Pb)	14129	Industrial	1	☐	1/6	NBR	COM	105	ug/m^3-LC	113	Doe Run Mass Spectra ICAP

Herculaneum, South Cross

AQS Site Number 29-099-0022

843 Cross Street, Herculaneum, MO 63048

Latitude:	38.260694	**AQCR:**	070	Metropolitan St. Louis
Longitude:	-90.381083	**MSA:**	7040	St. Louis, MO-IL
Elevation:	456			

Pollutant	AQS Code	Monitor-Type	POC	Col	Freq	Scale	Obj	Unit-Code	Unit	Method-Code	Method
Lead TSP - LC (Pb)	14129	Industrial	1	☐	1/1	NBR	COM	105	ug/m^3-LC	113	Doe Run Mass Spectra ICAP

Ursuline North

AQS Site Number 29-099-0025

Glennon Heights Rd, Crystal City, MO 63019

Latitude:	38.243	***AQCR:***	070	Metropolitan St. Louis
Longitude:	-90.37372	***MSA:***	7040	St. Louis, MO-IL
Elevation:	578			

Pollutant	***AQS Code***	***Monitor-Type***	***POC***	***Col***	***Freq***	***Scale***	***Obj***	***Unit-Code***	***Unit***	***Method-Code***	***Method***
Lead TSP - LC (Pb)	14129	Industrial	2	☐	1/6	NBR	COM	105	ug/m^3-LC	113	Doe Run Mass Spectra ICAP

Environmental Services

Alba

AQS Site Number 29-097-0004

20400 Millwood Road, Alba, MO

Latitude:	37.238472	**AQCR:**	139	SW Missouri
Longitude:	-94.42475	**MSA:**	3710	Joplin, MO
Elevation:	950			

Pollutant	AQS Code	Monitor-Type	POC	Col	Freq	Scale	Obj	Unit-Code	Unit	Method-Code	Method
Ambient Avg Temp	68105	SPM	1	☐	1/1	NBR	MET	017	deg C	780	Instrumental
Avg Baro Pressure	68108	SPM	1	☐	1/1	NBR	COM	059	mm (Hg)	780	Instrumental
Indoor Temperature	62107	SPM	1	☐	H	NBR	MET	017	deg C	013	Electronic Averaging
Ozone (O3)	44201	SLAMS	1	☑	H	NBR	COM	007	ppm	047	Ultra-violet Photometric

Arnold West

AQS Site Number 29-099-0019

1709 Lonedell Drive, Arnold, MO 63010

Latitude:	38.448581	**AQCR:**	070	Metropolitan St. Louis
Longitude:	-90.398436	**MSA:**	7040	St. Louis, MO-IL
Elevation:	625			

Pollutant	AQS Code	Monitor-Type	POC	Col	Freq	Scale	Obj	Unit-Code	Unit	Method-Code	Method
Indoor Temperature	62107	SPM	1	☐	H	NBR	MET	017	deg C	013	Electronic Averaging
Outdoor Temperature	62101	SPM	1	☐	H	NBR	MET	017	deg C	040	Electronic Averaging
Ozone (O3)	44201	SLAMS	1	☑	H	NBR	COM	007	ppm	047	Ultra-violet Photometric
PM2.5 AQI/Speciation	88502	SPEC	5	☐	1/3	NBR	RES	105	ug/m^3-LC	810	METONE SASS

PM2.5 Continuous	88503	SPM	3	☐	H	NBR	AQI	105	ug/m^3-LC	761	PM2.5 VSCC FDMS
PM2.5 FEM/FRM	88101	SLAMS	3	☐	H	NBR	COM	105	ug/m^3-LC	181	PM2.5 VSCC FEM
PM2.5 Tot Atmospheric	88500	SPM	3	☐	H	NBR	AQI	105	ug/m^3-LC	761	PM2.5 VSCC FDMS
Resultant Wind Direct	61104	SPM	1	☐	H	NBR	MET	014	deg	020	Vector Summation
Resultant Wind Speed	61103	SPM	1	☐	H	NBR	MET	012	mph	020	Vector Summation

Bills Creek

AQS Site Number **29-179-0001**

731 Danny Lane, O'Fallon, MO 63366

Latitude: 37.53467 ***AQCR:*** 138 SE Missouri

Longitude: -91.14857 ***MSA:*** 0000 Not in a MSA

Elevation: 996

Pollutant	*AQS Code*	*Monitor-Type*	*POC*	*Col*	*Freq*	*Scale*	*Obj*	*Unit-Code*	*Unit*	*Method-Code*	*Method*
Lead TSP - LC (Pb)	14129	SLAMS	1	☐	1/6	NBR	COM	105	ug/m^3-LC	085	Kansas Emission Spectra ICAP

Bixby West

AQS Site Number **29-093-0032**

Highway 32, West of Bixby

Latitude: 37.65376 ***AQCR:*** 138 SE Missouri

Longitude: -91.13104 ***MSA:*** 0000 Not in a MSA

Elevation: 1346

Pollutant	*AQS Code*	*Monitor-Type*	*POC*	*Col*	*Freq*	*Scale*	*Obj*	*Unit-Code*	*Unit*	*Method-Code*	*Method*
Ambient Avg Temp	68105	SPM	1	☐	1/1	NBR	MET	017	deg C	780	Instrumental
Avg Baro Pressure	68108	SPM	1	☐	1/1	NBR	COM	059	mm (Hg)	780	Instrumental
Lead TSP - LC (Pb)	14129	SLAMS	1	☑	1/6	NBR	COM	105	ug/m^3-LC	085	Kansas Emission Spectra ICAP

Bonne Terre - NO2 (NO, NO3) monitor proposed for temporary shutdown

AQS Site Number 29-186-0005

Smith Rd & Westover Rd,

Latitude:	37.90084	***AQCR:***	138	SE Missouri
Longitude:	-90.42388	***MSA:***	0000	Not in a MSA
Elevation:	840			

Pollutant	***AQS Code***	***Monitor-Type***	***POC***	***Col***	***Freq***	***Scale***	***Obj***	***Unit-Code***	***Unit***	***Method-Code***	***Method***
Ambient Avg Temp	68105	SPM	1	☐	1/1	NBR	MET	017	deg C	780	Instrumental
Avg Baro Pressure	68108	SPM	1	☐	1/1	NBR	COM	059	mm (Hg)	780	Instrumental
Indoor Temperature	62107	SPM	1	☐	H	REG	MET	017	deg C	013	Electronic Averaging
Nitric Oxide (NO)	42601	SPM	1	☐	H	REG	COM	007	ppm	074	Chemiluminescence
Nitrogen Dioxide (NO2)	42602	SLAMS	1	☐	H	REG	COM	007	ppm	074	Chemiluminescence
Oxides of Nitrogen (NO3)	42603	SPM	1	☐	H	REG	COM	007	ppm	074	Chemiluminescence
Ozone (O3)	44201	SLAMS	1	☑	H	REG	COM	007	ppm	047	Ultra-violet Photometric
PM2.5 AQI/Speciation	88502	SPEC	5	☐	1/6	REG	RES	105	ug/m^3-LC	810	METONE SASS
Resultant Wind Direct	61104	SPM	1	☐	H	REG	MET	014	deg	020	Vector Summation
Resultant Wind Speed	61103	SPM	1	☐	H	REG	MET	012	mph	020	Vector Summation
Solar Radiation	63301	SPM	1	☐	H	REG	MET	025	Langleys /min	011	Pyranometer

Carthage

AQS Site Number 29-097-0003

530 Juniper, Carthage, MO

Latitude:	37.1982	**AQCR:**	139	SW Missouri
Longitude:	-94.307778	**MSA:**	3710	Joplin, MO
Elevation:	986			

Pollutant	AQS Code	Monitor-Type	POC	Col	Freq	Scale	Obj	Unit-Code	Unit	Method-Code	Method
Indoor Temperature	62107	SPM	1	☐	H	NBR	MET	017	deg C	013	Electronic Averaging
PM10	81102	SLAMS	3	☐	H	MID	COM	001	ug/m^3	079	R&P SA246B TEOM
Resultant Wind Direct	61104	SPM	1	☐	H	NBR	MET	014	deg	020	Vector Summation
Resultant Wind Speed	61103	SPM	1	☐	H	NBR	MET	012	mph	020	Vector Summation

Corridon

AQS Site Number 29-179-0003

415 RR1, Ellington, MO 63638

Latitude:	37.36414	**AQCR:**	138	SE Missouri
Longitude:	-91.12226	**MSA:**	0000	Not in a MSA
Elevation:	980			

Pollutant	AQS Code	Monitor-Type	POC	Col	Freq	Scale	Obj	Unit-Code	Unit	Method-Code	Method
Lead TSP - LC (Pb)	14129	SLAMS	1	☐	1/6	NBR	COM	105	ug/m^3-LC	085	Kansas Emission Spectra ICAP

Eldorado Springs

AQS Site Number 29-039-0001

Hiway 97 & Barnes Rd

Latitude:	37.700861	**AQCR:**	139	SW Missouri
Longitude:	-94.034811	**MSA:**	0000	Not in a MSA
Elevation:	965			

Pollutant	AQS Code	Monitor-Type	POC	Col	Freq	Scale	Obj	Unit-Code	Unit	Method-Code	Method
Indoor Temperature	62107	SPM	1	☐	H	REG	MET	017	deg C	013	Electronic Averaging
Outdoor Temperature	62101	SPM	1	☐	H	REG	MET	017	deg C	040	Electronic Averaging
Ozone (O3)	44201	SLAMS	1	☐	H	REG	COM	007	ppm	047	Ultra-violet Photometric
PM2.5 Continuous	88503	SPM	3	☐	H	REG	AQI	105	ug/m^3-LC	761	PM2.5 VSCC FDMS
PM2.5 FEM/FRM	88101	SLAMS	3	☐	H	REG	COM	105	ug/m^3-LC	181	PM2.5 VSCC FEM
PM2.5 Tot Atmospheric	88500	SPM	3	☐	H	REG	AQI	105	ug/m^3-LC	761	PM2.5 VSCC FDMS
Resultant Wind Direct	61104	SPM	1	☐	H	REG	MET	014	deg	020	Vector Summation
Resultant Wind Speed	61103	SPM	1	☐	H	REG	MET	012	mph	020	Vector Summation

Farrar

AQS Site Number 29-157-0001

Hiway C & Perry County Road 328, Farrar, MO,

Latitude:	37.6992	**AQCR:**	138	SE Missouri
Longitude:	-89.690900	**MSA:**	0000	Not in a MSA
Elevation:	497			

Pollutant	AQS Code	Monitor-Type	POC	Col	Freq	Scale	Obj	Unit-Code	Unit	Method-Code	Method
Indoor Temperature	62107	SPM	1	☐	H	NBR	MET	017	deg C	013	Electronic Averaging

Ozone (O3)	44201	SLAMS	1	☑	H	NBR	COM	007	ppm	047	Ultra-violet Photometric
Resultant Wind Direct	61104	SPM	1	☐	H	NBR	MET	014	deg	020	Vector Summation
Resultant Wind Speed	61103	SPM	1	☐	H	NBR	MET	012	mph	020	Vector Summation

Finger Lakes

AQS Site Number **29-019-0011**

1505 East Peabody Road, Columbia, MO 63202

Latitude:	39.07811	***AQCR:***	137	Northern Missouri
Longitude:	-92.31613	***MSA:***	1740	Columbia, MO
Elevation:	710			

Pollutant	***AQS Code***	***Monitor-Type***	***POC***	***Col***	***Freq***	***Scale***	***Obj***	***Unit-Code***	***Unit***	***Method-Code***	***Method***
Indoor Temperature	62107	SPM	1	☐	H	NBR	MET	017	deg C	013	Electronic Averaging
Ozone (O3)	44201	SLAMS	1	☑	H	NBR	COM	007	ppm	047	Ultra-violet Photometric

Fletcher

AQS Site Number **29-179-0002**

Forest Rd 2236, Westfork, MO 64498

Latitude:	37.46889	***AQCR:***	138	SE Missouri
Longitude:	-91.08847	***MSA:***	0000	Not in a MSA
Elevation:	1256			

Pollutant	***AQS Code***	***Monitor-Type***	***POC***	***Col***	***Freq***	***Scale***	***Obj***	***Unit-Code***	***Unit***	***Method-Code***	***Method***
Lead TSP - LC (Pb)	14129	SLAMS	1	☐	1/6	NBR	COM	105	ug/m^3-LC	085	Kansas Emission Spectra ICAP

Foley

AQS Site Number 29-113-0003

#7 Wild Horse, Foley, MO,

Latitude:	39.0447	**AQCR:**	137	Northern Missouri
Longitude:	-90.8647	**MSA:**	7040	St. Louis, MO-IL
Elevation:	715			

Pollutant	AQS Code	Monitor-Type	POC	Col	Freq	Scale	Obj	Unit-Code	Unit	Method-Code	Method
Indoor Temperature	62107	SPM	1	☐	H	NBR	MET	017	deg C	013	Electronic Averaging
Ozone (O3)	44201	SLAMS	1	☑	H	NBR	COM	007	ppm	047	Ultra-violet Photometric
Resultant Wind Direct	61104	SPM	1	☐	H	NBR	MET	014	deg	020	Vector Summation
Resultant Wind Speed	61103	SPM	1	☐	H	NBR	MET	012	mph	020	Vector Summation

Front Street - Not yet operating

AQS Site Number 29-095-0018

Front St. and Chouteau TRFY

Latitude:	39.131262	**AQCR:**	094	Metropolitan Kansas City
Longitude:	-94.527412	**MSA:**	3760	Kansas City, MO-KS
Elevation:				

Pollutant	AQS Code	Monitor-Type	POC	Col	Freq	Scale	Obj	Unit-Code	Unit	Method-Code	Method
PM10	81102	SLAMS	1	☐	1/6	NBR	COM	001	ug/m^3	127	R&P 2025 Sequential
PM10 - LC	85101	SPM	1	☐	1/6	NBR	COM	105	ug/m^3-LC	127	R&P 2025 Sequential

Glover

AQS Site Number 29-093-0033

Hiway 49, approx. 0.4m S. Hiway 21/49/72 Intersection

Latitude:	37.48964	**AQCR:**	138	SE Missouri
Longitude:	-90.69247	**MSA:**	0000	Not in a MSA
Elevation:	881			

Pollutant	AQS Code	Monitor-Type	POC	Col	Freq	Scale	Obj	Unit-Code	Unit	Method-Code	Method
Lead TSP - LC (Pb)	14129	SLAMS	1	☐	1/6	NBR	COM	105	ug/m^3-LC	085	Kansas Emission Spectra ICAP

Green City - NH3 & H2S monitors proposed for temporary shutdown

AQS Site Number 29-211-0003

23000 Harvest Rd., Green City, MO

Latitude:	40.203197	**AQCR:**	137	Northern Missouri
Longitude:	-92.930272	**MSA:**	0000	Not in a MSA
Elevation:	1027			

Pollutant	AQS Code	Monitor-Type	POC	Col	Freq	Scale	Obj	Unit-Code	Unit	Method-Code	Method
Ammonia (NH3)	42604	SPM	1	☐	H	NBR	STA	007	ppm	051	TECO17 Chemiluminescence
Hydrogen Sulfide (H2S)	42402	SPM	1	☐	H	NBR	STA	007	ppm	020	Pulsed fluorescent
Indoor Temperature	62107	SPM	1	☐	H	NBR	MET	017	deg C	013	Electronic Averaging
Resultant Wind Direct	61104	SPM	1	☐	H	NBR	MET	014	deg	020	Vector Summation
Resultant Wind Speed	61103	SPM	1	☐	H	NBR	MET	012	mph	020	Vector Summation

Herculaneum, Dunklin High School

AQS Site Number 29-099-0005

1 Black Cat Dr., Herculaneum, MO, 63048

Latitude:	38.267222	**AQCR:**	070	Metropolitan St. Louis
Longitude:	-90.379444	**MSA:**	7040	St. Louis, MO-IL
Elevation:	445			

Pollutant	AQS Code	Monitor-Type	POC	Col	Freq	Scale	Obj	Unit-Code	Unit	Method-Code	Method
Lead TSP - LC (Pb)	14129	SLAMS	1	☐	1/3	NBR	COM	105	ug/m^3-LC	085	Kansas Emission Spectra ICAP

Herculaneum, Main Street

AQS Site Number 29-099-0004

Main St., Herculaneum, MO, 63048

Latitude:	38.2633	**AQCR:**	070	Metropolitan St. Louis
Longitude:	-90.3785	**MSA:**	7040	St. Louis, MO-IL
Elevation:	450			

Pollutant	AQS Code	Monitor-Type	POC	Col	Freq	Scale	Obj	Unit-Code	Unit	Method-Code	Method
Ambient Avg Temp	68105	SPM	1	☐	1/1	NBR	MET	059	mm (Hg)	780	Instrumental
Avg Baro Pressure	68108	SPM	1	☐	1/1	NBR	COM	017	deg C	780	Instrumental
Indoor Temperature	62107	SPM	1	☐	H	NBR	MET	017	deg C	013	Electronic Averaging
Lead TSP - LC (Pb)	14129	SLAMS	1	☑	1/1	MID	COM	105	ug/m^3-LC	085	Kansas Emission Spectra ICAP
Resultant Wind Direct	61104	SPM	1	☐	H	NBR	MET	014	deg	020	Vector Summation
Resultant Wind Speed	61103	SPM	1	☐	H	NBR	MET	012	mph	020	Vector Summation
Sulfur Dioxide (SO2)	42401	SLAMS	1	☑	H	MID	COM	007	ppm	060	Pulsed fluorescent
Sulfur Dioxide 5-min (SO2)	42406	SPM	1	☑	H	MID	COM	007	ppm	060	Pulsed Fluorescent

Herculaneum, Sherman

AQS Site Number 29-099-0013

Sherman St., Herclaneum, MO, 63048

Latitude:	38.27171	**AQCR:**	070	Metropolitan St. Louis
Longitude:	-90.376520	**MSA:**	7040	St. Louis, MO-IL
Elevation:	450			

Pollutant	AQS Code	Monitor-Type	POC	Col	Freq	Scale	Obj	Unit-Code	Unit	Method-Code	Method
Lead TSP - LC (Pb)	14129	SLAMS	2	☐	1/6	NBR	COM	105	ug/m^3-LC	085	Kansas Emission Spectra ICAP

Liberty - NO2 (NO, NO3) monitor proposed for temporary shutdown

AQS Site Number 29-047-0005

116th, Liberty, MO

Latitude:	39.303056	**AQCR:**	094	Metropolitan Kansas City
Longitude:	-94.376389	**MSA:**	3760	Kansas City, MO-KS
Elevation:	930			

Pollutant	AQS Code	Monitor-Type	POC	Col	Freq	Scale	Obj	Unit-Code	Unit	Method-Code	Method
Indoor Temperature	62107	SPM	1	☐	H	URB	MET	017	deg C	013	Electronic Averaging
Nitric Oxide (NO)	42601	SPM	1	☐	H	URB	COM	007	ppm	074	Chemiluminescence
Nitrogen Dioxide (NO2)	42602	SLAMS	1	☐	H	URB	COM	007	ppm	074	Chemiluminescence
Outdoor Temperature	62101	SPM	1	☐	H	URB	MET	017	deg C	040	Electronic Averaging
Oxides of Nitrogen (NO3)	42603	SPM	1	☐	H	URB	COM	007	ppm	074	Chemiluminescence
Ozone (O3)	44201	SLAMS	1	☑	H	NBR	COM	007	ppm	047	Ultra-violet Photometric
PM2.5 AQI/Speciation	88502	SPEC	5	☐	1/3	NBR	RES	105	ug/m^3-LC	810	METONE SASS
PM2.5 Continuous	88503	SPM	3	☐	H	NBR	AQI	105	ug/m^3-LC	761	PM2.5 VSCC FDMS

PM2.5 FEM/FRM	88101	SLAMS	3	☐	H	NBR	COM	105	ug/m^3-LC	181	PM2.5 VSCC FEM
PM2.5 Tot Atmospheric	88500	SPM	3	☐	H	NBR	AQI	105	ug/m^3-LC	761	PM2.5 VSCC FDMS
Resultant Wind Direct	61104	SPM	1	☐	H	URB	MET	014	deg	020	Vector Summation
Resultant Wind Speed	61103	SPM	1	☐	H	URB	MET	012	mph	020	Vector Summation
Solar Radiation	63301	SPM	1	☐	H	URB	MET	025	Langleys /min	011	Pyranometer

Mark Twain - SO2 & PM10 monitors proposed for temporary shutdown

AQS Site Number **29-137-0001**

Hiway V & 107, Mark Twain State Park, MO

Latitude: 39.475139 ***AQCR:*** 137 Northern Missouri

Longitude: -91.789019 ***MSA:*** 0000 Not in a MSA

Elevation: 677

Pollutant	*AQS Code*	*Monitor-Type*	*POC*	*Col*	*Freq*	*Scale*	*Obj*	*Unit-Code*	*Unit*	*Method-Code*	*Method*
Indoor Temperature	62107	SPM	1	☐	H	REG	MET	017	deg C	013	Electronic Averaging
Ozone (O3)	44201	SLAMS	1	☐	H	REG	COM	007	ppm	047	Ultra-violet Photometric
PM10	81102	SLAMS	1	☐	1/6	REG	COM	001	ug/m^3	127	R&P 2025 Sequential
PM10 - LC	85101	SPM	1	☐	1/6	REG	COM	105	ug/m^3-LC	127	R&P 2025 Sequential
Resultant Wind Direct	61104	SPM	1	☐	H	REG	MET	014	deg	020	Vector Summation
Resultant Wind Speed	61103	SPM	1	☐	H	REG	MET	012	mph	020	Vector Summation
Sulfur Dioxide (SO2)	42401	SLAMS	1	☐	H	REG	COM	007	ppm	060	Pulsed fluorescent
Sulfur Dioxide 5-min (SO2)	42406	SPM	1	☐	H	REG	COM	007	ppm	060	Pulsed Fluorescent

Mound Street - PM10 monitor (St. Louis City) proposed for temporary shutdown

AQS Site Number **29-510-0087**

1716 N. 2nd St, St. Louis, MO

Latitude:	38.642808	***AQCR:***	070	Metropolitan St. Louis
Longitude:	-90.184961	***MSA:***	7040	St. Louis, MO-IL
Elevation:	455			

Pollutant	***AQS Code***	***Monitor-Type***	***POC***	***Col***	***Freq***	***Scale***	***Obj***	***Unit-Code***	***Unit***	***Method-Code***	***Method***
Benzene	45201	SPM	1	☐	H	MID	RES	008	ppb	157	OPSIS AR500
Formaldehyde	43502	SPM	1	☐	H	MID	RES	008	ppb	157	OPSIS AR500
Indoor Temperature	62107	SPM	1	☐	H	NBR	MET	017	deg C	013	Electronic Averaging
Mercury vapor	42242	SPM	1	☐	H	MID	RES	121	ppt	157	OPSIS AR500
Resultant Wind Direct	61104	SPM	1	☐	H	MID	MET	014	deg	020	Vector Summation
Resultant Wind Speed	61103	SPM	1	☐	H	MID	MET	012	mph	020	Vector Summation
Toluene	45202	SPM	1	☐	H	MID	RES	008	ppb	157	OPSIS AR500

New Bloomfield

AQS Site Number **29-027-0002**

2625 Meadow Lake View

Latitude:	38.70608	***AQCR:***	137	Northern Missouri
Longitude:	-92.09308	***MSA:***	0000	Not in a MSA
Elevation:	860			

Pollutant	***AQS Code***	***Monitor-Type***	***POC***	***Col***	***Freq***	***Scale***	***Obj***	***Unit-Code***	***Unit***	***Method-Code***	***Method***
Indoor Temperature	62107	SPM	1	☐	H	NBR	MET	017	deg C	013	Electronic Averaging
Ozone (O3)	44201	SLAMS	1	☑	H	NBR	COM	007	ppm	047	Ultra-violet Photometric

Resultant Wind Direct	61104	SPM	1	☐	-H	NBR	MET	014	deg	020	Vector Summation
Resultant Wind Speed	61103	SPM	1	☐	H	NBR	MET	012	mph	020	Vector Summation

Oates

AQS Site Number 29-179-0004

13155 Hiway KKK, Oates, MO

Latitude:	37.56485	**AQCR:**	138	SE Missouri
Longitude:	-91.11423	**MSA:**	0000	Not in a MSA
Elevation:	1134			

Pollutant	AQS Code	Monitor-Type	POC	Col	Freq	Scale	Obj	Unit-Code	Unit	Method-Code	Method
Lead TSP - LC (Pb)	14129	SLAMS	1	☐	H	NBR	COM	105	ug/m^3-LC	085	Kansas Emission Spectra ICAP

Orchard Farm

AQS Site Number 29-183-1004

2165 Hiway V, St. Charles, MO, 63301

Latitude:	38.902222	**AQCR:**	070	Metropolitan St. Louis
Longitude:	-90.446944	**MSA:**	7040	St. Louis, MO-IL
Elevation:	441			

Pollutant	AQS Code	Monitor-Type	POC	Col	Freq	Scale	Obj	Unit-Code	Unit	Method-Code	Method
Indoor Temperature	62107	SPM	1	☐	H	NBR	MET	017	deg C	013	Electronic Averaging
Ozone (O3)	44201	SLAMS	1	☑	H	URB	COM	007	ppm	047	Ultra-violet Photometric

Park Hills

AQS Site Number 29-187-0006

105 Industrial Dr., Park Hills, MO 63601

Latitude:	37.86485	**AQCR:**	138	SE Missouri
Longitude:	-90.50804	**MSA:**	0000	Not in a MSA
Elevation:	743			

Pollutant	AQS Code	Monitor-Type	POC	Col	Freq	Scale	Obj	Unit-Code	Unit	Method-Code	Method
Lead TSP - LC (Pb)	14129	SLAMS	1	☐	1/6	NBR	COM	105	ug/m^3-LC	085	Kansas Emission Spectra ICAP

Pevely

AQS Site Number 29-099-0009

500 Dow Industrial Dr., Pevely, MO 63070

Latitude:	38.2861	**AQCR:**	070	Metropolitan St. Louis
Longitude:	-90.38094	**MSA:**	7040	St. Louis, MO-IL
Elevation:				

Pollutant	AQS Code	Monitor-Type	POC	Col	Freq	Scale	Obj	Unit-Code	Unit	Method-Code	Method
Lead TSP - LC (Pb)	14129	SLAMS	1	☐	1/6	NBR	COM	105	ug/m^3-LC	085	Kansas Emission Spectra ICAP

Pevely North

AQS Site Number 29-099-0026

Pevely, MO 63070

Latitude:	38.296	**AQCR:**	070	Metropolitan St. Louis
Longitude:	-90.393	**MSA:**	7040	St. Louis, MO-IL
Elevation:	582			

Pollutant	AQS Code	Monitor-Type	POC	Col	Freq	Scale	Obj	Unit-Code	Unit	Method-Code	Method
Lead TSP - LC (Pb)	14129	SLAMS	1	☐	1/6	NBR	COM	105	ug/m^3-LC	085	Kansas Emission Spectra ICAP

Richards Gebauer-South

AQS Site Number 29-037-0003

1802 E. 203rd St, Belton, MO

Latitude:	38.770278	**AQCR:**	094	Metropolitan Kansas City
Longitude:	-94.580000	**MSA:**	3760	Kansas City, MO-KS
Elevation:	1072			

Pollutant	AQS Code	Monitor-Type	POC	Col	Freq	Scale	Obj	Unit-Code	Unit	Method-Code	Method
Indoor Temperature	62107	SPM	1	☐	H	URB	MET	017	deg C	013	Electronic Averaging
Ozone (O3)	44201	SLAMS	1	☑	H	NBR	COM	007	ppm	047	Ultra-violet Photometric
PM2.5 Continuous	88503	SPM	3	☐	H	NBR	AQI	105	ug/m^3-LC	761	PM2.5 VSCC FDMS
PM2.5 FEM/FRM	88101	SLAMS	3	☐	H	NBR	COM	105	ug/m^3-LC	181	PM2.5 VSCC FEM
PM2.5 Tot Atmospheric	88500	SPM	3	☐	H	NBR	AQI	105	ug/m^3-LC	761	PM2.5 VSCC FDMS
Resultant Wind Direct	61104	SPM	1	☐	H	URB	MET	014	deg	020	Vector Summation
Resultant Wind Speed	61103	SPM	1	☐	H	URB	MET	012	mph	020	Vector Summation

Rocky Creek

AQS Site Number 29-047-0006

13131 Hiway 169 NE, Kansas City, MO

Latitude:	39.3322	**AQCR:**	094	Metropolitan Kansas City
Longitude:	-94.5806	**MSA:**	3760	Kansas City, MO-KS
Elevation:	983			

Pollutant	AQS Code	Monitor-Type	POC	Col	Freq	Scale	Obj	Unit-Code	Unit	Method-Code	Method
Indoor Temperature	62107	SPM	1	☐	H	NBR	MET	017	deg C	013	Electronic Averaging
Ozone (O3)	44201	SLAMS	1	☑	H	NBR	COM	007	ppm	047	Ultra-violet Photometric

Resultant Wind Direct	61104	SPM	1	☐	H	URB	MET	014	deg	020	Vector Summation
Resultant Wind Speed	61103	SPM	1	☐	H	URB	MET	012	mph	020	Vector Summation

Savannah

AQS Site Number **29-003-0001**

11796 Hwy 71, Savannah, MO

Latitude:	39.9544	**AQCR:**	137	Northern Missouri
Longitude:	-94.849	**MSA:**	7000	St. Joseph, MO
Elevation:	1120			

Pollutant	AQS Code	Monitor-Type	POC	Col	Freq	Scale	Obj	Unit-Code	Unit	Method-Code	Method
Indoor Temperature	62107	SPM	1	☐	H	NBR	MET	017	deg C	013	Electronic Averaging
Ozone (O3)	44201	SLAMS	1	☑	H	NBR	COM	007	ppm	047	Ultra-violet Photometric
Resultant Wind Direct	61104	SPM	1	☐	H	NBR	MET	014	deg	020	Vector Summation
Resultant Wind Speed	61103	SPM	1	☐	H	NBR	MET	012	mph	020	Vector Summation

St. Joe State Park

AQS Site Number **29-187-0007**

2800 Pimville Road, Park Hills, MO 63601

Latitude:	37.81413	**AQCR:**	138	SE Missouri
Longitude:	-90.50738	**MSA:**	0000	Not in a MSA
Elevation:	850			

Pollutant	AQS Code	Monitor-Type	POC	Col	Freq	Scale	Obj	Unit-Code	Unit	Method-Code	Method
Lead TSP - LC (Pb)	14129	SLAMS	1	☐	1/6	NBR	COM	105	ug/m^3-LC	085	Kansas Emission Spectra ICAP

St. Joseph Pump Station

AQS Site Number 29-021-0005

South Hiway 759, St. Joseph, MO

Latitude:	39.741667	**AQCR:**	094	Metropolitan Kansas City
Longitude:	-94.858333	**MSA:**	7000	St. Joseph, MO
Elevation:	818			

Pollutant	AQS Code	Monitor-Type	POC	Col	Freq	Scale	Obj	Unit-Code	Unit	Method-Code	Method
Indoor Temperature	62107	SPM	1	☐	H	NBR	MET	017	deg C	013	Electronic Averaging
Outdoor Temperature	62101	SPM	1	☐	H	NBR	MET	017	deg C	040	Electronic Averaging
PM10	81102	SLAMS	1	☑	1/3	NBR	COM	001	ug/m^3	127	R&P 2025 Sequential
PM10 - LC	85101	SPM	1	☑	1/3	NBR	COM	105	ug/m^3-LC	127	R&P 2025 Sequential
PM2.5 Continuous	88503	SPM	3	☐	H	NBR	AQI	105	ug/m^3-LC	761	PM2.5 VSCC FDMS
PM2.5 FEM/FRM	88101	SLAMS	3	☐	H	NBR	COM	105	ug/m^3-LC	181	PM2.5 VSCC FEM
PM2.5 Tot Atmospheric	88500	SPM	3	☐	H	NBR	AQI	105	ug/m^3-LC	761	PM2.5 VSCC FDMS
PM-Coarse	86101	SLAMS	1	☐	1/1	NBR	COM	105	ug/m^3-LC	178	2000-D Dichotomous

Trimble

AQS Site Number 29-049-0001

7536 SW O Hiway

Latitude:	39.5306	**AQCR:**	137	Northern Missouri
Longitude:	-94.556	**MSA:**	3760	Kansas City, MO-KS
Elevation:	1020			

Pollutant	AQS Code	Monitor-Type	POC	Col	Freq	Scale	Obj	Unit-Code	Unit	Method-Code	Method
Indoor Temperature	62107	SPM	1	☐	H	URB	MET	017	deg C	013	Electronic Averaging

Ozone (O3)	44201	SLAMS	1	☑	H	NBR	COM	007	ppm	047	Ultra-violet Photometric
Resultant Wind Direct	61104	SPM	1	☐	H	URB	MET	014	deg	020	Vector Summation
Resultant Wind Speed	61103	SPM	1	☐	H	URB	MET	012	mph	020	Vector Summation

Troost

AQS Site Number **29-095-0034**

724 Troost, Kansas City, MO

Latitude:	39.104722	***AQCR:***	094	Metropolitan Kansas City
Longitude:	-94.570556	***MSA:***	3760	Kansas City, MO-KS
Elevation:	947			

Pollutant	***AQS Code***	***Monitor-Type***	***POC***	***Col***	***Freq***	***Scale***	***Obj***	***Unit-Code***	***Unit***	***Method-Code***	***Method***
Ambient Avg Temp	68105	SPM	1	☐	1/1	NBR	MET	017	deg C	118	R&P 2025 Sequential
Avg Baro Pressure	68108	SPM	1	☐	1/1	NBR	COM	059	mm (Hg)	118	R&P 2025 Sequential
Indoor Temperature	62107	SPM	1	☐	H	NBR	MET	017	deg C	013	Electronic Averaging
Nitric Oxide (NO)	42601	SPM	1	☐	H	URB	COM	007	ppm	074	Chemiluminescence
Nitrogen Dioxide (NO2)	42602	SLAMS	1	☐	H	URB	COM	007	ppm	074	Chemiluminescence
Outdoor Temperature	62101	SPM	1	☐	H	NBR	MET	017	deg C	040	Electronic Averaging
Oxides of Nitrogen (NO3)	42603	SPM	1	☐	H	URB	COM	007	ppm	074	Chemiluminescence
PM10	81102	SLAMS	1	☐	1/6	NBR	COM	001	ug/m^3	127	R&P 2025 Sequential
PM10 - LC	85101	SPM	1	☐	1/6	NBR	COM	105	ug/m^3-LC	127	R&P 2025 Sequential
PM2.5 AQI/Speciation	88502	SPM	3	☐	H	NBR	AQI	105	ug/m^3-LC	761	PM2.5 VSCC FDMS
PM2.5 Continuous	88503	SPM	3	☐	H	NBR	AQI	105	ug/m^3-LC	761	PM2.5 VSCC FDMS

PM2.5 FEM/FRM	88101	SLAMS	1	☐	1/1	NBR	COM	105	ug/m^3-LC	118	R&P 2025 Sequential
PM2.5 FEM/FRM	88101	SLAMS	3	☐	H	NBR	COM	105	ug/m^3-LC	181	PM2.5 VSCC FEM
PM2.5 Tot Atmospheric	88500	SPM	3	☐	H	NBR	AQI	105	ug/m^3-LC	761	PM2.5 VSCC FDMS
Sulfur Dioxide (SO2)	42401	SLAMS	1	☐	H	MID	COM	007	ppm	060	Pulsed fluorescent

Ursuline North

AQS Site Number **29-099-0025**

Glennon Heights Rd, Crystal City, MO 63019

Latitude: 38.243 ***AQCR:*** 070 Metropolitan St. Louis

Longitude: -90.37372 ***MSA:*** 7040 St. Louis, MO-IL

Elevation: 578

Pollutant	*AQS Code*	*Monitor-Type*	*POC*	*Col*	*Freq*	*Scale*	*Obj*	*Unit-Code*	*Unit*	*Method-Code*	*Method*
Lead TSP - LC (Pb)	14129	SLAMS	1	☐	1/6	NBR	COM	105	ug/m^3-LC	085	Kansas Emission Spectra ICAP

Van Brunt - To be relocated to Front Street

AQS Site Number **29-095-0035**

5301 E. 24th, Kansas City, MO

Latitude: 39.075833 ***AQCR:*** 070 Metropolitan St. Louis

Longitude: -94.521389 ***MSA:*** 7040 St. Louis, MO-IL

Elevation: 895

Pollutant	*AQS Code*	*Monitor-Type*	*POC*	*Col*	*Freq*	*Scale*	*Obj*	*Unit-Code*	*Unit*	*Method-Code*	*Method*
PM10	81102	SLAMS	1	☐	1/6	NBR	COM	001	ug/m^3	127	R&P 2025 Sequential
PM10 - LC	85101	SPM	1	☐	1/6	NBR	COM	105	ug/m^3-LC	127	R&P 2025 Sequential

Watkins Mill

AQS Site Number 29-047-0003

Watkins Mill Rd,

Latitude:	39.407419	**AQCR:**	094	Metropolitan Kansas City
Longitude:	-94.265142	**MSA:**	3760	Kansas City, MO-KS
Elevation:	987			

Pollutant	AQS Code	Monitor-Type	POC	Col	Freq	Scale	Obj	Unit-Code	Unit	Method-Code	Method
Indoor Temperature	62107	SPM	1	☐	H	URB	MET	017	deg C	013	Electronic Averaging
Ozone (O3)	44201	SLAMS	1	☑	H	URB	COM	007	ppm	047	Ultra-violet Photometric

Webb City

AQS Site Number 29-097-0005

2424 N. Main, Webb City, MO 64870

Latitude:	37.16995	**AQCR:**	139	SW Missouri
Longitude:	-94.46307	**MSA:**	3710	Joplin, MO
Elevation:	963			

Pollutant	AQS Code	Monitor-Type	POC	Col	Freq	Scale	Obj	Unit-Code	Unit	Method-Code	Method
Lead TSP - LC (Pb)	14129	SLAMS	1	☐	1/6	NBR	COM	105	ug/m^3-LC	085	Kansas Emission Spectra ICAP

West Alton - NO2 (NO, NO3) monitor proposed for temporary shutdown

AQS Site Number 29-183-1002

Hiway 94, West Alton, MO

Latitude:	38.8725	**AQCR:**	070	Metropolitan St. Louis
Longitude:	-90.226389	**MSA:**	7040	St. Louis, MO-IL
Elevation:	425			

Pollutant	AQS Code	Monitor-Type	POC	Col	Freq	Scale	Obj	Unit-Code	Unit	Method-Code	Method
Indoor Temperature	62107	SPM	1	☐	H	NBR	MET	017	deg C	013	Electronic Averaging

Nitric Oxide (NO)	42601	SPM	1	☐	H	URB	COM	007	ppm	074	Chemiluminescence
Nitrogen Dioxide (NO2)	42602	SLAMS	1	☐	H	URB	COM	007	ppm	074	Chemiluminescence
Outdoor Temperature	62101	SPM	1	☐	H	NBR	MET	017	deg C	040	Electronic Averaging
Oxides of Nitrogen (NO3)	42603	SPM	1	☐	H	URB	COM	007	ppm	074	Chemiluminescence
Ozone (O3)	44201	SLAMS	1	☑	H	URB	COM	007	ppm	047	Ultra-violet Photometric
Resultant Wind Direct	61104	SPM	1	☐	H	NBR	MET	014	deg	020	Vector Summation
Resultant Wind Speed	61103	SPM	1	☐	H	NBR	MET	012	mph	020	Vector Summation
Solar Radiation	63301	SPM	1	☑	H	NBR	MET	025	Langleys /min	011	Pyranometer

Springfield

Fellows Lake

AQS Site Number **29-077-0042**

4208 E Farm Road 66, Springfield, MO 65803

Latitude:	37.319444	***AQCR:***	139	SW Missouri
Longitude:	-93.204444	***MSA:***	7920	Springfield, MO
Elevation:	1346			

Pollutant	***AQS Code***	***Monitor-Type***	***POC***	***Col***	***Freq***	***Scale***	***Obj***	***Unit-Code***	***Unit***	***Method-Code***	***Method***
Ozone (O3)	44201	SLAMS	1	☑	H	NBR	COM	007	ppm	047	Ultra-violet Photometric
Resultant Wind Direct	61104	SPM	1	☐	H	URB	MET	014	deg	020	Vector Summation
Resultant Wind Speed	61103	SPM	1	☐	H	URB	MET	012	mph	020	Vector Summation

Hillcrest High School - NO2 (NO, NO3) monitor proposed for temporary shutdown

AQS Site Number **29-077-0036**

3319 N. Grant, Springfield, MO

Latitude:	37.256069	***AQCR:***	139	SW Missouri
Longitude:	-93.299692	***MSA:***	7920	Springfield, MO
Elevation:	1321			

Pollutant	***AQS Code***	***Monitor-Type***	***POC***	***Col***	***Freq***	***Scale***	***Obj***	***Unit-Code***	***Unit***	***Method-Code***	***Method***
Nitric Oxide (NO)	42601	SPM	1	☐	H	URB	COM	007	ppm	074	Chemiluminescence
Nitrogen Dioxide (NO2)	42602	SLAMS	1	☐	H	URB	COM	007	ppm	074	Chemiluminescence
Oxides of Nitrogen (NO3)	42603	SPM	1	☐	H	URB	COM	007	ppm	074	Chemiluminescence
Ozone (O3)	44201	SLAMS	1	☐	H	NBR	COM	007	ppm	047	Ultra-violet Photometric

Missouri State University - SO2, CO, & PM10-coll monitors proposed for temporary shutdown

AQS Site Number **29-077-0032**

Missouri State University, Springfield, MO

Latitude:	37.199473	***AQCR:***	139	SW Missouri
Longitude:	-93.284681	***MSA:***	7920	Springfield, MO
Elevation:	1316			

Pollutant	***AQS Code***	***Monitor-Type***	***POC***	***Col***	***Freq***	***Scale***	***Obj***	***Unit-Code***	***Unit***	***Method-Code***	***Method***
Ambient Avg Temp	68105	SPM	1	☑	1/3	NBR	MET	017	deg C	118	R&P 2025 Sequential
Avg Baro Pressure	68108	SPM	1	☑	1/3	NBR	COM	059	mm (Hg)	118	R&P 2025 Sequential
Carbon Monoxide (CO)	42101	SLAMS	1	☐	H	MID	COM	007	ppm	054	Non-dispersive Infrared
PM10	81102	SLAMS	1	☑	1/6	NBR	COM	001	ug/m^3	127	R&P 2025 Sequential
PM2.5 FEM/FRM	88101	SLAMS	1	☑	1/3	NBR	COM	105	ug/m^3-LC	118	R&P 2025 Sequential
PM2.5 Tot Atmospheric	88500	SPM	1	☐	H	NBR	AQI	105	ug/m^3-LC	184	Sharp
Sulfur Dioxide (SO2)	42401	SLAMS	1	☐	H	NBR	COM	007	ppm	060	Pulsed fluorescent

South Charleston

AQS Site Number **29-077-0026**

5012 S. Charleston, Springfield, MO

Latitude:	37.122561	***AQCR:***	139	SW Missouri
Longitude:	-93.263161	***MSA:***	7920	Springfield, MO
Elevation:	1234			

Pollutant	***AQS Code***	***Monitor-Type***	***POC***	***Col***	***Freq***	***Scale***	***Obj***	***Unit-Code***	***Unit***	***Method-Code***	***Method***
Sulfur Dioxide (SO2)	42401	SLAMS	1	☐	H	NBR	COM	007	ppm	060	Pulsed fluorescent

St. Louis City

Blair Street

AQS Site Number **29-510-0085**

3247 Blair St, St. Louis, MO

Latitude:	38.656436	***AQCR:***	070	Metropolitan St. Louis
Longitude:	-90.198661	***MSA:***	7040	St. Louis, MO-IL
Elevation:	431			

Pollutant	***AQS Code***	***Monitor-Type***	***POC***	***Col***	***Freq***	***Scale***	***Obj***	***Unit-Code***	***Unit***	***Method-Code***	***Method***
Baro Pressure	64101	SPM	1	☐	H	NBR	MET	022	in (Hg)	011	Aneroid
Black Carbon (BC)	84313	SPM	1	☐	H	NBR	RES	001	ug/m^3	862	Aethelometer
Carbon Monoxide (CO)	42101	NCORE	1	☐	H	MID	COM	007	ppm	054	Non-dispersive Infrared
Elapsed Sample Time	68109	SPM	1	☑	1/1	NBR	COM	106	minutes	118	R&P 2025 Sequential
NOX/NOY	00001	SLAMS	1	☐	H	NBR	COM	007	ppm	074	Chemiluminescence
Outdoor Temperature	62101	SPM	1	☐	H	NBR	MET	017	deg C	040	Electronic Averaging
Ozone (O3)	44201	SLAMS	1	☑	H	NBR	COM	007	ppm	087	Ultra-violet Absorption
PM10	81102	SLAMS	1	☑	1/6	NBR	COM	001	ug/m^3	064	Hi-vol SA/GMW-321-B
PM2.5 AQI/Speciation	88502	SPM	3	☐	H	NBR	AQI	105	ug/m^3-LC	761	PM2.5 VSCC FDMS
PM2.5 AQI/Speciation	88502	SPEC	6	☐	1/3	NBR	RES	105	ug/m^3-LC	810	METONE SASS
PM2.5 Continuous	88503	SPM	3	☐	H	NBR	AQI	105	ug/m^3-LC	761	PM2.5 VSCC FDMS
PM2.5 FEM/FRM	88101	SLAMS	3	☐	H	NBR	COM	105	ug/m^3-LC	181	PM2.5 VSCC FEM
PM2.5 FEM/FRM	88101	SLAMS	1	☑	1/1	NBR	COM	105	ug/m^3-LC	118	R&P 2025 Sequential

PM2.5 Tot Atmospheric	88500	SPM	3	☐	H	NBR	AQI	105	ug/m^3-LC	761	PM2.5 VSCC FDMS
PM-Coarse	86101	SLAMS	1	☐	1/1	NBR	COM	105	ug/m^3-LC	178	2000-D Dichotomous
Relative Humidity	62201	SPM	1	☐	H	NBR	MET	019	%humidity	020	Computed (Indirect)
Resultant Wind Direct	61104	SPM	1	☐	H	NBR	MET	014	deg	020	Vector Summation
Resultant Wind Speed	61103	SPM	1	☐	H	NBR	MET	012	mph	020	Vector Summation
Solar Radiation	63301	SPM	1	☐	H	NBR	MET	025	Langleys /min	011	Pyranometer
Sulfur Dioxide (SO2)	42401	NCORE	1	☐	H	NBR	COM	007	ppm	060	Pulsed fluorescent
VOCs	00000	SPM	1	☐	1/6	NBR	RES	008	ppb	T15	SUMMA cannister TO-15

Branch Street

AQS Site Number **29-510-0093**

100 Branch St, St. Louis, MO

Latitude:	38.653716	***AQCR:***	070	Metropolitan St. Louis
Longitude:	-90.186816	***MSA:***	7040	St. Louis, MO-IL
Elevation:	422			

Pollutant	***AQS Code***	***Monitor-Type***	***POC***	***Col***	***Freq***	***Scale***	***Obj***	***Unit-Code***	***Unit***	***Method-Code***	***Method***
Elapsed Sample Time	68109	SPM	1	☐	1/1	NBR	COM	106	minutes	118	R&P 2025 Sequential
PM10	81102	SLAMS	1	☐	H	MID	COM	001	ug/m^3	079	R&P SA246B TEOM
PM2.5 FEM/FRM	88101	SLAMS	1	☐	1/3	NBR	COM	105	ug/m^3-LC	118	R&P 2025 Sequential
Resultant Wind Direct	61104	SPM	1	☐	H	NBR	MET	014	deg	020	Vector Summation
Resultant Wind Speed	61103	SPM	1	☐	H	NBR	MET	012	mph	020	Vector Summation

Hall Street

AQS Site Number 29-510-0088

6204 Hall St., St. Louis, MO

Latitude:	38.69075	**AQCR:**	070	Metropolitan St. Louis
Longitude:	-90.209306	**MSA:**	7040	St. Louis, MO-IL
Elevation:	417			

Pollutant	AQS Code	Monitor-Type	POC	Col	Freq	Scale	Obj	Unit-Code	Unit	Method-Code	Method
PM10	81102	SLAMS	1	☐	H	MID	COM	001	ug/m^3	079	R&P SA246B TEOM

Margaretta - CO monitor proposed for temporary shutdown

AQS Site Number 29-510-0086

4520 Margaretta, St. Louis, MO

Latitude:	38.673172	**AQCR:**	070	Metropolitan St. Louis
Longitude:	-90.239086	**MSA:**	7040	St. Louis, MO-IL
Elevation:	514			

Pollutant	AQS Code	Monitor-Type	POC	Col	Freq	Scale	Obj	Unit-Code	Unit	Method-Code	Method
Carbon Monoxide (CO)	42101	SLAMS	1	☐	H	MID	COM	007	ppm	054	Non-dispersive Infrared
Nitrogen Dioxide (NO2)	42602	SLAMS	1	☐	H	URB	COM	007	ppm	074	Chemiluminescence
PM10	81102	SLAMS	1	☐	1/6	NBR	COM	001	ug/m^3	064	Hi-vol SA/GMW-321-B
Sulfur Dioxide (SO2)	42401	SLAMS	1	☐	H	NBR	COM	007	ppm	039	Ultra-violet stimulated

Mound Street - PM10 monitor (St. Louis City) proposed for temporary shutdown

AQS Site Number **29-510-0087**

1716 N. 2nd St, St. Louis, MO

Latitude:	38.642808	***AQCR:***	070	Metropolitan St. Louis
Longitude:	-90.184961	***MSA:***	7040	St. Louis, MO-IL
Elevation:	455			

Pollutant	***AQS Code***	***Monitor-Type***	***POC***	***Col***	***Freq***	***Scale***	***Obj***	***Unit-Code***	***Unit***	***Method-Code***	***Method***
PM10	81102	SPM	1	☐	1/6	MID	COM	001	ug/m^3	064	Hi-vol SA/GMW-321-B

South Broadway - SO2 monitor proposed for temporary shutdown

AQS Site Number **29-510-0007**

8227 S. Broadway, St. Louis, MO

Latitude:	38.5425	***AQCR:***	070	Metropolitan St. Louis
Longitude:	-90.263611	***MSA:***	7040	St. Louis, MO-IL
Elevation:	452			

Pollutant	***AQS Code***	***Monitor-Type***	***POC***	***Col***	***Freq***	***Scale***	***Obj***	***Unit-Code***	***Unit***	***Method-Code***	***Method***
Elapsed Sample Time	68109	SPM	1	☐	1/1	NBR	COM	106	minutes	118	R&P 2025 Sequential
PM2.5 FEM/FRM	88101	SLAMS	1	☐	1/1	NBR	COM	105	ug/m^3-LC	118	R&P 2025 Sequential
Sulfur Dioxide (SO2)	42401	SLAMS	1	☐	H	NBR	COM	007	ppm	060	Pulsed fluorescent

St. Louis County

Clayton Animal Shelter - Pb monitor proposed for temporary shutdown

AQS Site Number **29-189-2003**

77 Hunter Ave, Clayton, MO

Latitude:	38.649722	***AQCR:***	070	Metropolitan St. Louis
Longitude:	-90.350556	***MSA:***	7040	St. Louis, MO-IL
Elevation:	528			

Pollutant	***AQS Code***	***Monitor-Type***	***POC***	***Col***	***Freq***	***Scale***	***Obj***	***Unit-Code***	***Unit***	***Method-Code***	***Method***
Lead TSP - LC (Pb)	14129	SLAMS	1	☑	1/6	NBR	COM	105	ug/m^3-LC	044	Flameless Atomic Absorp.Spectrometry

Ladue - NO2 (NO, NO3) & SO2 monitors proposed for temporary shutdown

AQS Site Number **29-189-3001**

55 Hunter Ave, Clayton, MO

Latitude:	38.650172	***AQCR:***	070	Metropolitan St. Louis
Longitude:	-90.350261	***MSA:***	7040	St. Louis, MO-IL
Elevation:	528			

Pollutant	***AQS Code***	***Monitor-Type***	***POC***	***Col***	***Freq***	***Scale***	***Obj***	***Unit-Code***	***Unit***	***Method-Code***	***Method***
Indoor Temperature	62107	SPM	1	☐	H	NBR	MET	017	deg C	013	Electronic Averaging
Nitric Oxide (NO)	42601	SPM	1	☐	H	URB	COM	007	ppm	099	Gas Phase Chemiluminescence
Nitrogen Dioxide (NO2)	42602	SLAMS	2	☐	H	URB	COM	007	ppm	099	Gas Phase Chemiluminescence
Outdoor Temperature	62101	SPM	1	☐	H	NBR	MET	015	deg F	040	Electronic Averaging
Oxides of Nitrogen (NO3)	42603	SPM	1	☐	H	URB	COM	007	ppm	099	Gas Phase Chemiluminescence
PM2.5 FEM/FRM	88101	SLAMS	3	☐	H	NBR	COM	105	ug/m^3-LC	181	PM2.5 VSCC FEM
PM2.5 Tot Atmospheric	88500	SPM	3	☐	H	NBR	AQI	105	ug/m^3-LC	761	PM2.5 VSCC FDMS

Resultant Wind Direct	61104	SPM	1	☐	H	NBR	MET	014	deg	020	Vector Summation
Resultant Wind Speed	61103	SPM	1	☐	H	NBR	MET	012	mph	020	Vector Summation
Sulfur Dioxide (SO2)	42401	SLAMS	1	☐	H	NBR	COM	007	ppm	039	Ultra-violet stimulated

Maryland Heights - NO2 (NO, NO3) & SO2 monitors proposed for temporary shutdown

AQS Site Number **29-189-0014**

13044 Marine Ave, Maryland Hts, MO

Latitude:	38.7109	***AQCR:***	070	Metropolitan St. Louis
Longitude:	-90.4759	***MSA:***	7040	St. Louis, MO-IL
Elevation:	633			

Pollutant	***AQS Code***	***Monitor-Type***	***POC***	***Col***	***Freq***	***Scale***	***Obj***	***Unit-Code***	***Unit***	***Method-Code***	***Method***
Indoor Temperature	62107	SPM	1	☐	H	NBR	MET	017	deg C	013	Electronic Averaging
Nitric Oxide (NO)	42601	SPM	1	☐	H	URB	COM	007	ppm	099	Gas Phase Chemiluminescence
Nitrogen Dioxide (NO2)	42602	SLAMS	1	☐	H	URB	COM	007	ppm	099	Gas Phase Chemiluminescence
Outdoor Temperature	62101	SPM	1	☐	H	NBR	MET	015	deg F	040	Electronic Averaging
Oxides of Nitrogen (NO3)	42603	SPM	1	☐	H	URB	COM	007	ppm	099	Gas Phase Chemiluminescence
Ozone (O3)	44201	SLAMS	1	☑	H	NBR	COM	007	ppm	087	Ultra-violet Absorption
Resultant Wind Direct	61104	SPM	1	☐	H	NBR	MET	014	deg	020	Vector Summation
Resultant Wind Speed	61103	SPM	1	☐	H	NBR	MET	012	mph	020	Vector Summation
Sulfur Dioxide (SO2)	42401	SLAMS	1	☐	H	NBR	COM	007	ppm	039	Ultra-violet stimulated

Oakville

AQS Site Number 29-189-0015

6115 Frontenac Pointe Ct., Oakville, MO

Latitude:	38.45671	**AQCR:**	070	Metropolitan St. Louis
Longitude:	-90.327477	**MSA:**	7040	St. Louis, MO-IL
Elevation:	477			

Pollutant	AQS Code	Monitor-Type	POC	Col	Freq	Scale	Obj	Unit-Code	Unit	Method-Code	Method
Indoor Temperature	62107	SPM	1	☐	H	NBR	MET	017	deg C	013	Electronic Averaging
PM10	81102	SLAMS	1	☐	H	MID	COM	001	ug/m^3	079	R&P SA246B TEOM
Resultant Wind Direct	61104	SPM	1	☐	H	NBR	MET	014	deg	020	Vector Summation
Resultant Wind Speed	61103	SPM	1	☐	H	NBR	MET	012	mph	020	Vector Summation

Pacific

AQS Site Number 29-189-0005

18701 Old Hiway 66, Pacific, MO

Latitude:	38.4902	**AQCR:**	070	Metropolitan St. Louis
Longitude:	-90.7052	**MSA:**	7040	St. Louis, MO-IL
Elevation:	524			

Pollutant	AQS Code	Monitor-Type	POC	Col	Freq	Scale	Obj	Unit-Code	Unit	Method-Code	Method
Indoor Temperature	62107	SPM	1	☐	H	NBR	MET	017	deg C	013	Electronic Averaging
Outdoor Temperature	62101	SPM	1	☐	H	NBR	MET	015	deg F	040	Electronic Averaging
Ozone (O3)	44201	SLAMS	1	☑	H	NBR	COM	007	ppm	047	Ultra-violet Photometric
Resultant Wind Direct	61104	SPM	1	☐	H	NBR	MET	014	deg	020	Vector Summation
Resultant Wind Speed	61103	SPM	1	☐	H	NBR	MET	012	mph	020	Vector Summation

Sunset Hills - NO2 (NO, NO3) & CO monitors proposed for temporary shutdown

AQS Site Number **29-189-0004**

4580 S. Lindbergh, Sunset Hills, MO

Latitude:	38.5325	***AQCR:***	070	Metropolitan St. Louis
Longitude:	-90.382778	***MSA:***	7040	St. Louis, MO-IL
Elevation:	600			

Pollutant	***AQS Code***	***Monitor-Type***	***POC***	***Col***	***Freq***	***Scale***	***Obj***	***Unit-Code***	***Unit***	***Method-Code***	***Method***
Carbon Monoxide (CO)	42101	SLAMS	1	☐	H	MID	COM	007	ppm	054	Non-dispersive Infrared
Indoor Temperature	62107	SPM	1	☐	H	NBR	MET	017	deg C	013	Electronic Averaging
Nitric Oxide (NO)	42601	SPM	1	☐	H	URB	COM	007	ppm	074	Chemiluminescence
Nitrogen Dioxide (NO2)	42602	SLAMS	1	☐	H	URB	COM	007	ppm	074	Chemiluminescence
Outdoor Temperature	62101	SPM	1	☐	H	NBR	MET	015	deg F	040	Electronic Averaging
Oxides of Nitrogen (NO3)	42603	SPM	1	☐	H	URB	COM	007	ppm	074	Chemiluminescence
Resultant Wind Direct	61104	SPM	1	☐	H	NBR	MET	014	deg	020	Vector Summation
Resultant Wind Speed	61103	SPM	1	☐	H	NBR	MET	012	mph	020	Vector Summation