Missouri Department of Natural Resources
Air Pollution Control Program
2009 Monitoring Network Plan

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Introduction

The Ambient Air Quality Monitoring Network for the State of Missouri consists of State and Local Air Monitoring Stations (SLAMS) and Special Purpose Monitoring Stations (SPMS) monitoring, with the intent to incorporate National Core (NCore) sampling no later than January 1, 2011, consistent with requirements in 40 CFR 58.10. The Missouri Department of Natural Resources operates an extensive network of ambient air monitors to comply with the Clean Air Act and its amendments. 40 CFR 58.10 requires that states submit an annual monitoring network plan including any proposed network changes. With regard to SLAMS changes, approval by the Environmental Protection Agency (EPA) Regional Administrator is required.

The plan must contain the following information for each monitoring station in the network:
1. The Air Quality System (AQS) site identification number for existing stations.
2. The location, including the street address and geographical coordinates, for each monitoring station.
3. The sampling and analysis method used for each measured parameter.
4. The operating schedule for each monitor.
5. Any proposal to remove or move a monitoring station within a period of eighteen months following the plan submittal.
6. The monitoring objective and spatial scale of representativeness for each monitor.
7. The identification of any sites that are or are not suitable for comparison against the annual $PM_{2.5}$ National Ambient Air Quality Standard (NAAQS).
8. The Metropolitan Statistical Area (MSA), Core-Based Statistical Area (CBSA), Combined Statistical Area (CSA) or other area represented by the monitor.

<u>Network Design</u>
Appendix D to Part 58 establishes the design criteria for the ambient air monitoring network. The network is designed to meet three general objectives: provide air pollution data to the public in a timely manner, support compliance with ambient air quality standards and emissions strategy development, and support air pollution research studies.

Specific objectives for the monitoring sites are to determine the highest pollution concentrations in an area (peak), to measure typical concentrations in areas of high population density (population), to determine the impact of significant sources or source categories (source), to determine general background levels (background),

and to determine the extent of regional pollutant transport among populated areas (transport). Minimum site requirements are provided for ozone and particulate matter based on metropolitan statistical area (MSA) population. There are no minimum site requirements for carbon monoxide, nitrogen dioxide, or sulfur dioxide. Minimum site requirements for lead only apply if violations of the lead standard have been recorded during the last two years.

Appendix E to Part 58 establishes the specific requirements for monitor/probe siting to insure that the ambient data represents the stated objectives and spatial scale. The requirements are pollutant/scale specific and involve horizontal/vertical placement,

$PM_{2.5}$ Standards

There is only one $PM_{2.5}$ sampler in Missouri that is not applicable for comparison to the annual NAAQS - Branch St. It is a middle-scale site focused on a group of sources in the industrial riverfront area and is not neighborhood scale.

Proposed Changes to Network

1. Proposed Lead Monitoring Network

This section briefly summarizes the lead monitoring review and proposed lead monitoring network. The complete "Missouri Lead Monitoring Network Plan" is available in a separate document.

On October 15, 2008, the EPA revised the level of the primary NAAQS for airborne lead from 1.5 micrograms per cubic meter ($\mu g/m^3$) to 0.15 $\mu g/m^3$, calculated as three-month rolling averages.

At the same time, EPA revised airborne lead monitoring requirements to require, at a minimum, monitoring in areas potentially impacted by sources of lead emissions greater than or equal to one ton per year. These source-oriented monitors must be operational by January 1, 2010. Identified sources include the Herculaneum, Glover, and Buick smelters and the mine/mill complexes at Buick, Brushy Creek, Fletcher, and Sweetwater, all operated by the Doe Run Company. In addition to these Doe Run sources, there are areas of former lead mining and processing in Missouri that have remaining waste materials that contain lead and are also candidate areas for airborne lead monitoring.

The proposed lead monitoring network includes ten (10) new sites in addition to existing sites in the Herculaneum area. Each of these sites will be operated every sixth day on the standard schedule.

- Herculaneum Area: Modify the current network to relocate all state samplers outside of the revised facility fenceline, and expand the geographical extent of the network to better define the extent of the area of nonattainment of the new standard. The net number of state sites would increase by one (1), but the number of state samplers in the area would remain the same.

- New Lead Belt and Related Facilities: Establish five (5) new State monitoring sites in the vicinity of the Buick Smelter and four mine/mill facilities in the Viburnum Trend area; establish one (1) new State site in the Glover area.

- Old Lead Belt Area: Establish two (2) new state monitoring sites, one in St. Joe State Park near tailings areas used for off-road vehicle activity, and one in Park Hills near remediation activity at the National Site.

- Tri-State Mining Area: Establish one (1) new state site near remediation activity on the Oronogo-Duenweg site in southwest Missouri.

The lead monitoring plan will be submitted to EPA by July 1, 2009, following a 30-day public comment period. Final selection of specific monitoring sites and site installation must be completed during July through December of 2009. In addition to the ten new sites listed above, the 2010 lead monitoring plan will call for establishing a new lead monitoring site in the Kansas City area by January 1, 2011.

2. NCore Site Recommendation for the St. Louis Area

The Blair Street site is being recommended as an NCore site. It is located within the St. Louis Metropolitan Statistical Area (MSA), north of downtown St. Louis, Missouri. 40 CFR 58 and the National Ambient Air Monitoring Strategy defines NCore sites as multipollutant sites operated to provide support to integrated air quality management data needs. The St. Louis area is somewhat removed from other large metropolitan centers and thereby provides a good location for evaluating secondary pollutant formation due to transport. Providing data that will increase knowledge of pollutants formation such as ozone and $PM_{2.5}$ and aiding in

evaluating the health of local residents are key reasons for establishment of NCore monitoring at this location.

The National Ambient Air Monitoring Strategy indicates the following criteria for NCore site placement in an urban area:

- A cross section of urban cities, emphasizing major urban areas with a population greater than 1 million, but also including a mix of large (0.5 to 1 million) and medium (0.25 to 0.5 million) cities with geographically and pollutant diverse locations suitable as reference sites for long term epidemiological studies.

- Leverage with existing sites where practical, such as the speciation, air toxics, Photochemical Assessment Monitoring Stations (PAMS), and Clean Air Status and Trends Network (CASTNET) sites.

- Consistency with collective criteria (i.e., does the selected site add holistic network value?).

- Other factors (e.g., resource allocation, tribal representation).

The Blair Street site was first established in 1990 to monitor $PM_{2.5}$. A number of monitors or samplers are already operating at the site, including ozone, Federal Reference Method (FRM) $PM_{2.5}$, continuous $PM_{2.5}$, $PM_{2.5}$ speciation, PM_{10}, carbon monoxide (CO), wind speed and direction and ambient temperature. Blair Street is also a National Air Toxics Trends Station (NATTS), with sampling for black carbon (aethalometer), toxic volatile organic compounds (VOCs) and metals hexavalent chromium, and polycyclic aromatic hydrocarbons (PAHs) ongoing. NATTS is a national air monitoring network focusing on trends of priority air toxic pollutants.

PM_{10} has been monitored at Blair Street since 2003. Two sites, one located northerly of Blair and another southerly have previously monitored exceedances. Continued PM_{10} sampling at Blair Street will therefore help characterize the spatial representation of PM_{10} concentrations in the area. The monitoring of CO concentrations began in 2005. No violations of CO have been monitored in the area but maintaining the CO analyzer at Blair Street is important to assisting with understanding ozone formation.

Ozone concentrations have been monitored at Blair Street since 2005 and ozone concentrations are clearly in violation of the May 2008 revised NAAQS in the St. Louis MSA (see map and table below). In addition, monitoring sites in counties just south of the St. Louis MSA also show violations. Levels at Mark Twain State Park, the background sites, 75 miles north of the MSA, are near violation levels. Several of the required NCore parameters are important aids in evaluating ozone formation. In addition, the suite of toxic VOCs concentrations (already being monitored at Blair Street) and NO_y or NO_x (not monitored), in a similar manner to Type 2 PAMS sampling, could be of great value in understanding their impact on ozone formation. While ozone levels are generally lower in the downtown area, their relationship to levels in other parts of the area can be an inference in determining ozone formation.

2005-2008 Missouri Ozone Data

	4th High 8-hr Average (ppb)				Design Value		2008 # of
	2005 ppb	2006 ppb	2007 ppb	2008 ppb	2005-2007 std=85ppb	2006-2008 std=75ppb	Exceedance std=75ppb
St. Louis							
Arnold	92	79	87		86		
Arnold West				70			2
West Alton	89	91	89	76	89	85	4
Orchard Farm	92	92	83	72	89	82	2
Blair	89	76	87	73	84	78	1
Margaretta	91	76	91	76	86	81	4
Sunset Hills	89	80	89	66	86	78	0
Maryland Hts.	88	84	94	69	88	82	1
Pacific	87	79	85	64	83	76	0
Bonne Terre	84	77	89	71	83	79	1
Foley	89	84	88	72	87	81	0
Kansas City							
Liberty	88	93	81	70	87	81	0
Watkins Mill	79	91	73	69	81	77	0
Rocky Creek	87	87	89	69	87	81	1
RG South	81	78	72	66	77	72	1
Trimble	87	85	83	70	85	79	2
Springfield							
Hillcrest H.S.	77	74	80	67	77	73	1
Fellows Lake				69			1
Outstate							
Mark Twain	76	74	75	64	75	71	0
Eldorado Spgs	79	75	74	67	76	72	1
Farrar	80	80	81	70	80	77	0

$PM_{2.5}$ mass concentrations have been monitored at Blair Street since 1990. The concentrations, in the Missouri portion of the area, are in compliance with both the 24-hour and annual standards. Through 2007, the Illinois site had two violating monitors. For 2008, if a fireworks exceptional event flag placed on the highest value for the Granite City site is concurred with by EPA, the area monitoring will show compliance. Illinois EPA has not yet certified its 2008 data submittal, nor has EPA indicated concurrence with this flag. Continuous $PM_{2.5}$ has been monitored since 2002. One sampler in Illinois, just across the river, is in violation of the annual standard. A $PM_{2.5}$ Speciation Trends Network (STN) sampler has also been operated at the Blair Street site since 2000. Results from measurements at this site, along with results from other area sites, have contributed significantly to the understanding of the sources, transport, and distribution of secondary aerosol in the region. Continued $PM_{2.5}$ mass in combination with STN sampling at the site along with other NCore parameter measurements, especially SO_2 and NO_x or NO_y, will continue to contribute to this understanding.

Some aspects of the current understanding of STN results from Blair Street and other area sites are summarized below. More detailed discussion of these results may be found in the "Technical Support Document for Designation of Areas in Missouri for the $PM_{2.5}$ 24-Hour National Ambient Air Quality Standard," Missouri Department of Natural Resources, 2007.

- Sulfate tends to be high in summer and contribute to summer $PM_{2.5}$ mass peaks. The sulfate concentration is fairly uniform throughout the St. Louis area and tends to be higher when airflow is clockwise (along the Ohio River Valley) around a high pressure area. These results suggest that coal combustion along the Ohio River is a major source or sulfate aerosol in the St. Louis area. Sulfate aerosol concentration decreases across Missouri from east to west, again consistent with regional sources to the east.

- Nitrate tends to be high in winter and contribute to winter mass peaks. The spatial distribution of nitrate concentrations suggests that some part of the nitrate particulate matter results from localized urban and/or suburban sources.

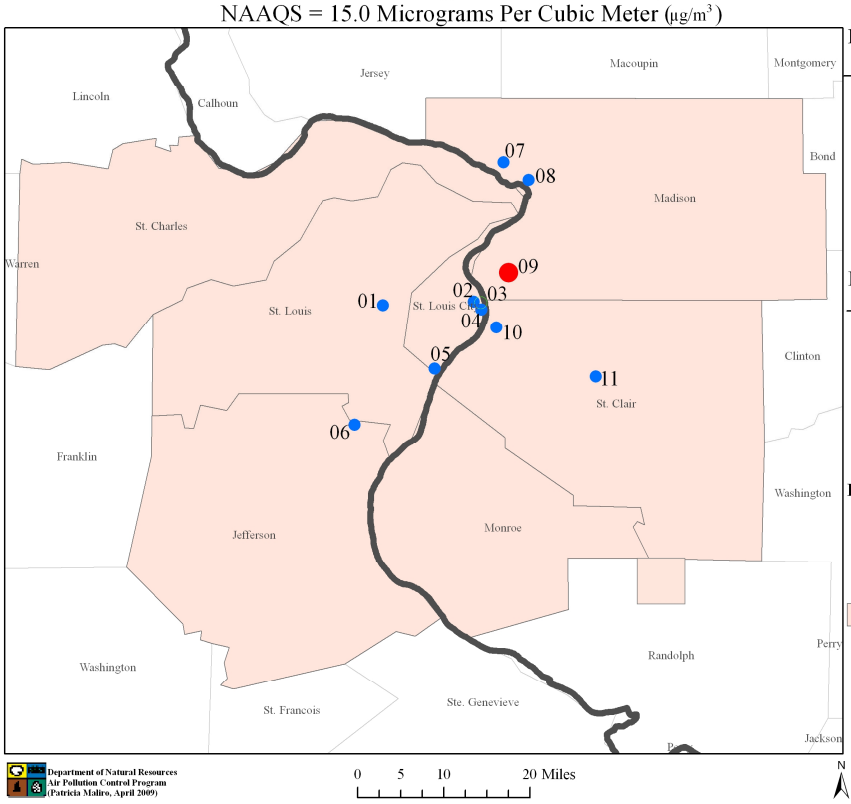
- Organic and elemental carbon peaks do not show as much seasonality, but tend to occur in the fall. The spatial distribution of elemental carbon concentrations suggests that elemental carbon emissions are quite localized in the urban area.

- Results for ammonium are similar to those for nitrate in seasonal dependence, but show little difference between area sites, suggesting that there is a strong regional component to ammonium aerosol.

The major contributors to the urban excess $PM_{2.5}$ mass in the St. Louis area are, then, nitrate and organic and elemental carbon. NCore parameter measurements are expected to enhance this understanding of the contribution of regional versus local sources to the $PM_{2.5}$ concentration in the St. Louis area.

2006-2008 Annual $PM_{2.5}$ Design Values (DV) for the St. Louis Area

NAAQS = 15.0 Micrograms Per Cubic Meter ($\mu g/m^3$)



Missouri

Site#	SiteName (DV)
01	Ladue (12.3)
02	Blair Street (13.4)
03	Branch Street (-)
04	Mound Street (13.6)*
05	South Broadway (13.2)
06	Arnold West (12.6)

Illinois

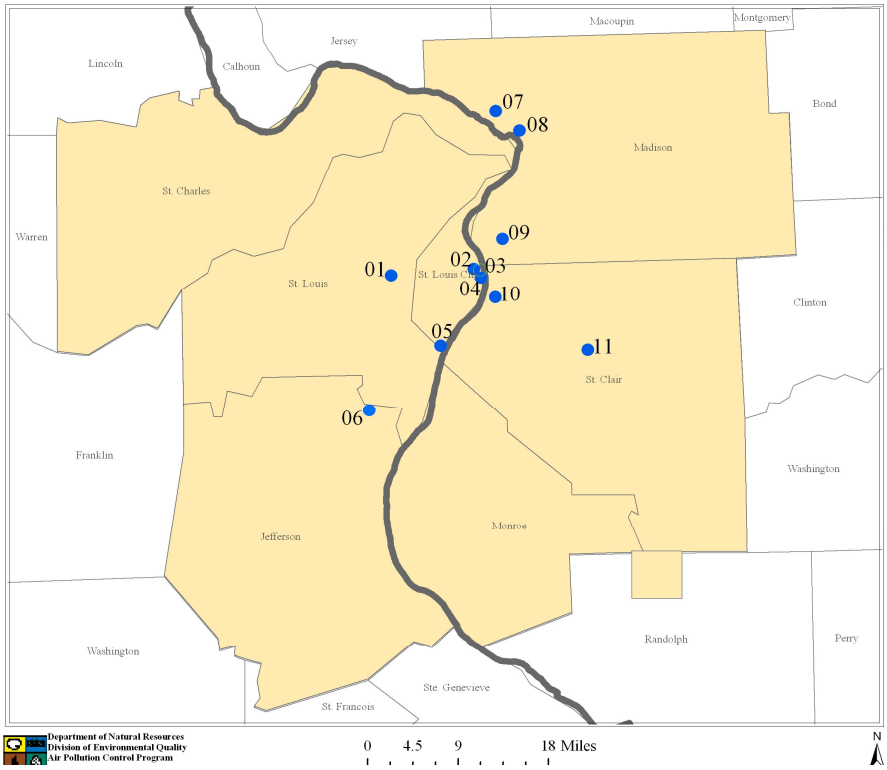
Site#	SiteName (DV)
07	Alton (13.5)
08	Wood River (13.2)
09	Granite City (15.7)
10	East St. Louis (14.2)
11	Swansea (13.1)

Legend

- Data less than 3 years
- Monitor in Compliance
- Monitor in Violation
- Non-Attainment Area
- (-) Data less than 3 years
- * Special Purpose Monitor

2006-2008 24-hour $PM_{2.5}$ Design Values (DV) for the St. Louis Area

NAAQS = 35.0 Micrograms Per Cubic Meter ($\mu g/m^3$)



Missouri

Site#	SiteName (DV)
01	Ladue (28.1)
02	Blair St. (30.7)
03	Branch St.(-)
04	Mound St. (30.2)*
05	South Broadway (29.8
06	Arnold West (29.8)

Illinois

Site#	SiteName (DV)
07	Alton (30.9)
08	Wood River (29.4)
09	Granite City (34.7)**
10	East St. Louis (29.1)
11	Swansea (29.3)

Legend

- Data less than 3 years
- Site below NAAQS
- Site above NAAQS
- Non-attainment Area
- (-) Data less than 3 years
- * Special Purpose Monitor
- ** Excludes the flagged value of 41.8$\mu g/m^3$ (07/05/2008)

Oxides of Nitrogen (NO_x) as an alternative to Reactive Nitrogen (NO_y) Sampling

Reactive nitrogen (NO_y) consists of NO_x and its oxidation products, the most important of which are NO, NO_2, HNO_3 and aerosol NO_3, peroxyacetyl nitrate (PAN) and other organic nitrates, NO_3, N_2O_5, HNO_3, and HNO_4. Research indicates that in highly polluted areas, NO_x ambient levels are a large portion of NO_y.

Ambient levels of NO_2 and NO_x in St. Louis and Kansas City are highest in large, highly populated urban areas in Missouri, as evidenced by tables 2.A. and 2.B. below. In particular, monitoring at the Troost site, adjacent to downtown Kansas City is elevated, with NO_x levels approaching 30 ppb. The most recent NO2 sampling being conducted in downtown St. Louis was at the Clark site, ending in early 2005. NO_x results were not submitted by St. Louis City, but ratios of NO_x to NO_2 average 1.4 statewide, including 1.7 at Troost. Applying that 1.4 ratio conservatively to Margaretta and Clark for 2003 and 2004 yields calculated NO_x similar to Troost. If the 1.7 ratio at Troost is used, even higher NO_x is calculated.

Table 2. c. of AQS 2008 high NO_y annual mean data is indicative of the general equivalency of NO_x and NO_y values at those polluted areas. The exception is the Allen Park, MI site (261630001), which is approximately 10 miles southwest of Detroit city center.

The Blair site, similar to Troost, is near the core of a large metropolitan area. Other NO_x monitoring around St. Louis show elevated NO_x. Based on our evaluation, we believe that elevated NO_y and NO_x, on the order each of 25 ppb annual average is occurring at Blair. NO_x should be a very high percentage of NO_y at Blair, and NO_x sampling instead of NO_y should be adequate at Blair. We propose that NCore NO_x sampling at Blair be conducted, but that if annual mean concentrations are less than 20 ppb, NO_y monitoring should be considered to be added to the site.

Table 2. a. Missouri NO_2 and NO_x Annual Averages 2008 (ppm)

Monitor Id	Obs Cnt	Arith Mean NO_2	Arith Mean NO_x
Liberty	8695	0.0052	0.0073
Springfield MSU	8736	0.0089	0.0132
Kansas City Troost	8734	0.0169	0.0280
West Alton	8039	0.0066	0.0083
Bonne Terre	8345	0.0030	0.0053
Sunset Hills	8726	0.0101	0.0125
Maryland Hgts	8626	0.0073	0.0082
Ladue	8683	0.0138	0.0225

Table 2. b. St. Louis Clark and Tucker and Margaretta NO_2 and Calculated NO_x, 2003 and 2004 (ppm)

	Year	Obs Cnt	NO_2	Calc NO_x
Clark and Tucker	2004	8477	0.0223	0.032222
Margaretta	2004	8660	0.0176	0.025431
Clark and Tucker	2003	8581	0.0203	0.029332
Margaretta	2003	8666	0.0188	0.027165

Table 2. c 2008 AQS Ten Highest Arithmetic Mean NO_y and NO_x (ppm)

Monitor Id	Obs Cnt	NO_y Arith Mean	NO_x Arith Mean
0401399974260001	3262	0.03978	0.0401
1308900024260000	8392	0.03119	0.0335
4210100044260000	7825	0.02928	NA
2616300014260000	3968	0.02496	0.0179
5303300804260000	8632	0.02473	NA
4014311274260000	2295	0.01899	0.0193
3711900414260000	8492	0.0171	0.0162
2608100204260000	6179	0.0166	NA
4820100244260000	7229	0.01656	0.016
3718300144260000	7784	0.01591	0.016

Summary of NCore Changes

Given that the area is monitoring violations of the ozone standard, annual $PM_{2.5}$ standard and has had PM_{10} exceedances, the appropriateness of NCore sampling in the St. Louis area is clear. Suitability of Blair especially, as the NCore site is also obvious. It is already a NAATS and STN site and most of the required pollutants and meteorological parameters at the NCore sites are already being monitored at the site. Because of its existence since 1990, Blair historical data will aid in evaluating pollutant trends as it transitions to NCore. Retaining Blair as the NCore site will minimize resource allocation significantly.

40 CFR Appendix D calls for NCore sites to measure $PM_{2.5}$ mass, speciated $PM_{2.5}$, $PM_{10-2.5}$ mass, speciated $PM_{10-2.5}$, ozone, SO_2, CO, NO/NO_y (or in some cases NO_x),wind speed, wind direction, relative humidity, and ambient temperature. To date, no method for speciated $PM_{10-2.5}$ is available, so this cannot be measured at this time. In order for the Blair site to meet the available NCore requirements, it is recommended that PM_{coarse} ($PM_{10-2.5}$) and trace SO_2, and NO_x analyzers be deployed at the site. In the case of PM_{coarse}, it is recommended that a low-volume PM_{10} sampler be deployed since the site already includes an FRM $PM_{2.5}$ sampler. PM_{coarse} is currently derived from PM_{10} and $PM_{2.5}$ measurements.

3. Revised $PM_{2.5}$ Monitoring

EPA has approved the revised $PM_{2.5}$ monitoring network in the PM2.5 Clean Air Act 103 work plan. Currently, only one site in the St. Louis area is monitoring over the annual standard, in Granite City, Illinois. No Missouri sites are over the standard. Kansas City, including Kansas sites, Springfield, and all outstate areas are in compliance with the annual standard. All sites in Missouri are in compliance with the 24-hour standard, and in the St. Louis area as a whole, with the uploading of 2008 data. Sites in Kansas City, Springfield, and outstate areas are in compliance with the standard.

Four monitoring sites have been selected for discontinuance. These include the Ste. Genevieve monitoring site in the city of St. Genevieve, where two cement kiln operations are located, the Oakville site in south St. Louis County, located next to a quarry, the Mound St site in St Louis City, and the Clayton site in St. Louis County. A denser monitoring network in St. Louis has been employed for several years due to higher PM2.5 levels, however, all four of these sites have monitored compliance with the PM2.5 NAAQS for several years.

40 CFR 58.14 (c) (3), *System modification* states that "State, or where appropriate, local agency requests for SLAMS monitor station discontinuation, subject to the review of the Regional Administrator, will be approved if any of the following criteria are met and if the requirements of appendix D to this part, if any, continue to be met. Other requests for discontinuation may also be approved on a case-by-case basis if discontinuance does not compromise data collection needed for implementation of NAAQS and if the requirements of appendix D to this part, if any, continue to be met…
(3) For any pollutant, any SLAMS monitor in a county (or portion of a county within a distinct attainment, nonattainment, or maintenance area, as applicable) provided the monitor has not measured violations of the applicable NAAQS in the previous five years, and the approved State Implementation Plan (SIP) provides for a specific, reproducible approach to representing the air quality of the affected county in the absence of actual monitoring data."

For each of these sites, no violations of either $PM_{2.5}$ NAAQS has been monitored in the last five years (see table below). In accord with the above requirement, the Mound St. site was originally implemented as a middle scale site, but in the 2007 Network Plan submitted to Region VII it was determined to be neighborhood scale, given the change in emissions levels near the site (including fuel changeovers at Tri-Gen steam generation plant to natural gas

from coal). Given the close proximity, the Blair neighborhood scale site provides air quality data sufficient for compliance determination for this portion of the city. With regard to Clayton, the Ladue site is within 100 meters and with the Ladue Tapered Element Oscillating Microbalance (TEOM) conversion to a Federal Equivalent Method (FEM), this will provide air quality data representative for the County. Arnold is the closest site to Ste Genevieve, and with values somewhat higher. In addition, we are maintaining Speciation sampling at Bonne Terre, which includes total PM2.5 mass. Ste Genevieve values have always been well below the standard, so that the Arnold monitoring provides an assurance that the Ste Genevieve air is within compliance limits. Oakville was implemented as a SPM, so it is not required to stand the same scrutiny, however, data values are low.

Ste. Genevieve	2004	2005	2006	2007	2008	2004-2006	2005-2007	2006-2008
98th %	25.8	36.1	29.3	30.7	23.2	30.4	32.0	27.7
Ann Mean	12.39	15.03	11.82	13.07	11.7	13.1	13.3	12.2
Oakville								
98th %					24.5			24.5
Ann Mean					13.42			13.4
Clayton								
98th %	25.6	43.5	27.7	30.3	26.4	32.3	33.8	28.1
Ann Mean	12.24	15.49	11.76	13.09	12	13.2	13.4	12.3
Mound								
98th %	30.3	40.8	29.6	33.8	27.1	33.6	34.7	30.2
Ann Mean	13.57	15.88	13.65	14.34	12.67	14.4	14.6	13.6

In addition, the Thermo Electron Corporation indicates the approval of Federal Equivalent Monitoring (FEM) status for upgraded version C TEOM samplers such as MDNR and St. Louis County currently operate is assured. Currently all MDNR TEOMS are collocated with FRMs. The St. Louis County Ladue TEOM is less than 100 meters from the Clayton FRM. If we upgrade these samplers, based on our review of 40 CFR 58, Appendix A, 3.2.5, we will only need to continue collocated FRM sampling at one MDNR site, and would also ask St. Louis County to discontinue the Clayton FRMs, since the Ladue TEOM would then provide compliance data comparable to the Clayton samplers. We would also be able to relocate the collocated TEOM at Arnold to Richards-Gebauer South, as with the number of TEOMS operated, there is no requirement for TEOM/TEOM collocation.

With these changes, the following table reflects a network of 5 Federal Reference Method (FRM) samplers, 2 collocated FRM samplers, 4 speciation, 9 continuous

(7 FEM TEOMs, one TEOM not FEM, one Sharp), and 3 IMPROVE samplers (2 of the IMPROVE samplers are operated by federal agencies, as described.

REVISED $PM_{2.5}$ MONITORING NETWORK

Site	Schedule*	Type	Agency	NAAQS
1. Blair St.	1	FRM	City	24 hr & Annual
	12	Collocated	City	
	3	Speciation	City	
	H	TEOM	City	AQI
2. Branch St.	3	FRM	City	24 hr
3. South Broadway	1	FRM	City	24 hr & Annual
4. Ladue	H	TEOM FEM	County	24 hr & Annual/AQI
5. Arnold	3	Speciation	ESP	
	H	TEOM FEM	ESP	24 hr & Annual/AQI
6. Liberty	3	Speciation	ESP	
	H	TEOM FEM	ESP	24 hr & Annual/AQI
7. Troost	1	FRM	ESP	24 hr & Annual
	12	Collocated	ESP	
	H	TEOM FEM	ESP	24 hr & Annual/AQI
8. Richards-Gebauer South	H	TEOM FEM	ESP	24 hr & Annual/AQI
9. MSU	3	FRM	S/GC	24 hr & Annual
	12	Collocated	S/GC	
	H	SHARP	S/GC	AQI
10. Pump Station	H	TEOM FEM	ESP	24 hr & Annual/AQI
11. El Dorado Springs	H	TEOM FEM	ESP	24 hr & Annual/AQI
	3	IMPROVE	ESP	
12. Bonne Terre	3	Speciation	ESP	
13. Mingo	3	IMPROVE	FWS	
14. Hercules Glades	3	IMPROVE	FS	

1 = Everyday sampling; 3 = Every third day; 6 = Every sixth day; H = Continuous monitoring, hourly data reported.
AQI – Air Quality Index; ESP – MDNR Environmental Services Program; S/GC – Springfield/Green County; FWS – Fish and Wildlife Service; FS – Forest Service

Network Description/Components

See Appendix 2 for the Network Description, which includes the following components.

Site Data

All ambient air monitoring sites are recorded in the EPA's Air Quality System (AQS) database. Data includes location data such as latitude & longitude.

AQS Site Code

The site code includes a numerical designation for State, county, and individual site. The state and county codes are assigned a number based on the alphabetical order of the State or county. Site numbers are assigned sequentially by date established in most counties. St. Louis County sites also have a division for municipality within St. Louis County.

Street Address

The official Post Office address of the lot where the monitors are located. Because not all sites are located in cities or towns, the street address is occasionally given as the intersection of the nearest streets or highways.

Geographical Coordinates

The coordinate system used by MDNR is latitude and longitude.

Air Quality Control Region (AQCR)

Air Quality Control Region are defined by EPA and designate either urban regions, like St. Louis or Kansas City, or rural sections of a State, such as northeast or southwest Missouri.

AQCR	AQCR Name
070	Metropolitan St. Louis
094	Metropolitan Kansas City
137	Northern Missouri
138	SE Missouri
139	SW Missouri

Metropolitan Statistical Area

MSAs are defined by the U.S. Census Bureau.

MSA Code	MSA Name
0000	Not in a MSA
1740	Columbia, MO
3710	Joplin, MO
3760	Kansas City, MO-KS
7000	St. Joseph, MO
7040	St. Louis, MO-IL
7920	Springfield, MO

Monitor Data

Each monitor is designed to detect a specific chemical pollutant or group of related pollutants. A site may have one or many monitors and not all sites will have the same monitors.

Pollutant

The common name of the pollutant. "Criteria" pollutants are defined by statute in the Clean Air Act.

AQS Pollutant Code

Each pollutant has a specific numerical code to distinguish it from others. One monitor in St. Louis City uses a code of '00000' because the monitor detects an entire group of chemicals, volatile organic pollutants, which are too numerous to list individually.

Pollutant Code	Pollutant
00000	VOCs
12128	Lead
14129	Lead – Local Conditions
42101	Carbon Monoxide
42242	Mercury vapor
42401	Sulfur Dioxide
42402	Hydrogen Sulfide
42406	Sulfur Dioxide 5-min
42602	Nitrogen Dioxide
42604	Ammonia
43502	Formaldehyde
44201	Ozone
45201	Benzene
45202	Toluene
61103	Resultant Wind Speed
61104	Resultant Wind Direct
62101	Outdoor Temperature
62107	Indoor Temperature
62201	Relative Humidity
63301	Solar Radiation
64101	Barometric Pressure
81102	PM_{10}
84313	Black Carbon

85101	PM_{10} - LC
88101	$PM_{2.5}$ FRM
88500	$PM_{2.5}$ Tot Atmospheric
88501	$PM_{2.5}$ Raw Data
88502	$PM_{2.5}$ AQI/Speciation
88503	$PM_{2.5}$ reference

POC

The Parameter Occurance Code distinguishes between different monitors for the same pollutant, most often collocated monitors used for precision and quality assurance. For $PM_{2.5}$, different POCs are assigned to FRM, collocated FRM, continuous, and speciation monitors.

Collocated

Collocated monitors are used for precision and quality assurance activities, and for redundancy for critical pollutants such as ozone.

Sampling Frequency

Sampling frequency varies for each pollutant, depending on the nature of the NAAQS standard and the technology used in the monitoring method. Most gaseous pollutants use continuous monitors and are averaged over one hour. Particulate pollutants are mostly filter-based and averaged over one day.

Scale of Representation

Each monitor is intended to represent an area with similar pollutant concentration. The scales range from only a few meters to many kilometers.

MIC Microscale - defines the concentration in air volumes associated with area dimensions ranging from several meters up to about 100 meters.

MID Middle - defines the concentration typical of areas up to several city blocks in size with dimensions ranging from about 100 meters to 0.5 kilometers.

NBR Neighborhood - defines concentrations within an extended area of a city that has relatively uniform land use with dimensions in the 0.5 to 4.0 kilometers.

URB Urban - defines an overall citywide condition with dimensions on the order of 4 to 50 kilometers.

REG Regional - defines air quality levels over areas having dimensions of 50 to hundreds of kilometers.

Monitoring Objective

Each monitor has a distinct objective such as providing real-time data for public awareness or use in determining compliance with regulations.

Objective Code Objective

AQI	Public Information
COM	NAAQS Compliance
MET	Meteorological Data
RES	Research
STA	State Standard

Units

The physical terms used to quantify the pollutant concentration, such as parts per million or micrograms per cubic meter.

Unit Code	Unit Description
001	$\mu g/m^3$
007	parts per million
008	parts per billion
012	miles per hour
013	knots
014	degree, compass
015	degree Fahrenheit
017	degree Celsius
018	Langleys
019	percent humidity
022	inches Mercury
025	Langleys per minute
105	$\mu g/m^3$ LC
121	parts per trillion

Monitoring/Analytical Method

Each monitor relies on a scientific principle to determine the pollutant concentration, which is described by the sampling method. Each method code is specific for a particular pollutant, therefore a three numeral code may be used for different methods for different pollutants.

APPENDIX 1: MISSOURI MONITORING NETWORK DESCRIPTION