QUALITY ASSURANCE PROJECT PLAN FOR PM $_{2.5}$ SPECIATION for St. Louis City

STATE FISCAL YEAR 2005

Prepared by the
Missouri Department of Natural Resources
Air and Land Protection Division
Air Pollution Control Program

Department of Natural Resources
P.O. Box 176
Jefferson City, Missouri 65102-0176

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Appendices

Distribution List

Individual	Title	Agency Represented
Leanne Tippett	Director	APCP, MDNR
John Madras	QA Manager	ALPD, MDNR
Mike Davis	Laboratory Chemist	EPA Region VII
Mark Ritter	Program Manager	City of St. Louis Air Pollution Control

QUALITY ASSURANCE APPROVAL

QA Manager John Madras 10/6/04
John Madras, Signature — Date

PROGRAM APPROVALS

Project Coordinator Calvin Ku 9/20/04
Calvin Ku, Signature — Date

Project Manager Tom Wiese 9-1-04
Tom Wiese, Signature — Date

Director, APCP Leanne Tippett-Mosby 9/27/04
Leanne Tippett-Mosby, Signature — Date

A. Project Management

1. Project / Task Organization

1.1. Key Program Personnel / Areas of Responsibility:

Sampling Operations:	Tom Wiese, St. Louis City
Sampling QC:	Tom Wiese, St. Louis City
Laboratory Operations / Quality Control:	Research Triangle Institute
Program Managers:	Calvin Ku, APCP Tom Wiese, St. Louis City
Data Processing /Data Validation:	Research Triangle Institute Joe Gallager, St. Louis City Bern Johnson, APCP
Data Quality Review:	Tom Wiese, St. Louis City Bern Johnson, APCP
Performance Auditing:	Don Gourley, AQAU
Systems Auditing:	Michael Davis, EPA Leland Grooms, EPA
Overall QA:	John Madras, APLD
Overall Project Coordination:	T. Calvin Ku, APCP

1.2. Major Functions:

APCP - Monitoring – Data Analysis Unit

1. Coordinate state Fine Particulate Matter ($PM_{2.5}$) speciation monitoring network, to consist of both National Air Monitoring Station (NAMS) and State/Local Air Monitoring Stations (SLAMS) sites.
2. Obtain, distribute, and manage funding for establishing and maintaining state $PM_{2.5}$

speciation monitoring network including new equipment purchases, and personnel.

3. Determine overall $PM_{2.5}$ speciation monitoring goals; design $PM_{2.5}$ speciation monitoring network, and propose $PM_{2.5}$ speciation monitoring plans to the Environmental Protection Agency (EPA).

4. Determine new $PM_{2.5}$ speciation NAMS and SLAMS siting locations, and review existing sites, if any, to meet the $PM_{2.5}$ speciation monitoring siting criteria.

5. Review and compile statewide $PM_{2.5}$ speciation data from reporting laboratories.

6. Review and/or verify data submitted to the Aerometric Information Retrieval System (AIRS) by the Research Triangle Institute (RTI).

7. Perform air quality and trends analysis

8. Prepare reports and respond to requests for information.

9. Evaluate federal regulations and EPA guidance for their impact on the state $PM_{2.5}$ speciation network.

10. Coordinate $PM_{2.5}$ ambient monitoring and speciation data with control strategy development efforts, in collaboration with the EPA, universities, national and/or other contract laboratories, regional planning organizations, federal land managers, and others involved in addressing $PM_{2.5}$ speciation and air quality efforts.

11. Coordinate $PM_{2.5}$ ambient monitoring and speciation data with enforcement efforts, negotiations with responsible parties, and development of state regulations.

12. Protect and promote public recognition of the air as a valuable natural resource.

13. Assist the local agencies in coordinating with the Delivery Order Project Officer (DOPO) on the transfer and tracking of $PM_{2.5}$ speciation filters from the monitoring site to RTI for analysis.

ESP - Air Quality Assurance Unit

1. Perform quarterly audits of $PM_{2.5}$ speciation samplers, including samplers used in the intercomparison and special studies. Each quarterly audit will include one-quarter of speciation samplers operated by St. Louis City (two per quarter) and one quarter of other speciation samplers operators operated by ESP (one per quarter).

City of Saint Louis Air Pollution Control

1. Assist the Air Pollution Control Program (APCP) in planning requirements such as equipment, staffing, and funding for the $PM_{2.5}$ NAMS site, to be located in the City of Saint Louis, and the first SLAMS site at Arnold.

3. Confer with the APCP, the Environmental Services Program (ESP), and the EPA to determine $PM_{2.5}$ speciation equipment needs. Take necessary steps to purchase or otherwise obtain equipment to accomplish project objectives as resources allow.

4. Lease property for $PM_{2.5}$ speciation monitoring sites and contract with cooperators, if needed.

5. Prepare or assist with $PM_{2.5}$ speciation site installation; install and calibrate $PM_{2.5}$ speciation monitoring instruments.

6. Provide technical assistance to air monitoring staff from other agencies if needed.

7. Coordinate with the DOPO on the transfer and tracking of $PM_{2.5}$ speciation filters from the monitoring site to RTI for analysis.

8. Collect $PM_{2.5}$ speciation filter samples, fill out appropriate records, check equipment, settings, and any other necessary conditions for errors and malfunctions.

9. Conduct $PM_{2.5}$ speciation filter handling, holding, scheduling, tracking, shipping, storage, and temperature and humidity maintenance requirements, procedures, and related preparations.

10. Perform required weekly, biweekly, or monthly checks of instruments; evaluate instrument performance and take corrective action when needed; maintain appropriate instrument certifications.

11. Evaluate the condition of $PM_{2.5}$ speciation field equipment, and maintain equipment replacement schedule. Purchase equipment needed to complete $PM_{2.5}$ speciation sampling commitments as resources allow.

12. Review and/or verify data submitted to AIRS by RTI. Report to the Missouri Department of Natural Resources (MDNR) and DOPO as appropriate.

13. Assist the MDNR with air quality and trends analysis.

14. Prepare Standard Operating Procedures (SOP) for the collection and handling of $PM_{2.5}$ speciation filters.

15. Assist the APCP in preparing revisions of the $PM_{2.5}$ speciation Quality Assurance Project Plan (QAPP).

16. Protect and promote public recognition of the air as a valuable natural resource.

Delivery Order Project Officer

1. Coordinate filter transfers and paperwork, tracking, and scheduling from Missouri $PM_{2.5}$ speciation sites to the national contract laboratory at RTI.

Research Triangle Institute

1. Plan and provide requirements for $PM_{2.5}$ speciation analyses: weighing room, instruments & equipment for all chemical analyses, supplies, and storage provisions, staffing, and funding for the $PM_{2.5}$ speciation NAMS and SLAMS sites.

2. Prepare SOPs for the handling and analysis of $PM_{2.5}$ speciation filters, and verification and validation of $PM_{2.5}$ speciation data.

3. Prepare or assist with $PM_{2.5}$ speciation filter handling, holding, scheduling, tracking, shipping, storage, and temperature and humidity maintenance requirements, procedures, and related preparations. In accordance with EPA guidance and SOPs:

    a. Weigh Teflon filters for mass.
    b. Analyze Teflon filters for 48 elements (see section A.2 for list).
    c. Analyze nylon filters for nitrate, sulfate, ammonium, sodium, and potassium ions.
    d. Analyze quartz filters for organic, elemental, and carbonate carbon.

4. Validate data sets (speciated $PM_{2.5}$ analytical results).

5. Report appropriate information back to EPA, DOPOs, MDNR, or the City.

6. Enter data (speciated $PM_{2.5}$ analytical results) into AIRS.

7. Store and maintain all $PM_{2.5}$ filters as required in EPA guidelines.

Office of Air Quality Planning and Standards (OAQPS) & EPA Region VII

1. Provide guidance, information, and assistance for the operation of the $PM_{2.5}$ Speciation Trends Network.

2. Problem Definition / Background

$PM_{2.5}$ chemical speciation is a key component of the EPA's overall $PM_{2.5}$ program. It is included in the monitoring requirements and principles set forth by the *Federal Register* (62 FR 38763), promulgated as part of the $PM_{2.5}$ National Ambient Air Quality Standards (NAAQS) review completed in 1997. Approximately 300 sites will comprise the full chemical speciation network. About 50 NAMS sites will be used for the determination of long-term trends of selected $PM_{2.5}$ constituents, and an additional 250 sites will be used to provide state and local agencies information for developing effective State Implementation Plans (SIP). Individual SLAMS speciation networks are to be given flexibility in terms of selecting sites, sampling technology, site mobility, and additional or alternative target analytes.

NAMS Trends Sites - A national speciation network of about 50 NAMS trends sites is to be established, to provide nationally consistent data for the assessment of trends. The NAMS network will provide a basic, long-term record characterizing the chemical constituents of $PM_{2.5}$. This network will serve as a model for other chemical speciation efforts, and represents a small fraction of the chemical speciation effort that EPA expects to support with Federal funds. The NAMS trends portion of the chemical speciation network will quantify $PM_{2.5}$ filter mass to obtain ambient concentrations as is done for the regular compliance $PM_{2.5}$ monitoring network, and also analyze for the principal chemical constituents of $PM_{2.5}$, namely metals, ions, and carbon-containing compounds:

> Elemental analysis - 48 elements (sodium, magnesium, aluminum, silicon, phosphorus, sulfur, chlorine, potassium, calcium, scandium, titanium, vanadium, chromium, manganese, iron, cobalt, nickel, copper, zinc, gallium, arsenic, selenium, bromine, rubidium, strontium, yttrium, zirconium, niobium, molybdenum, silver, cadmium, indium, tin, antimony, cesium, barium, lanthanum, hafnium, tantalum, wolfram (tungsten), iridium, gold, mercury, lead, cerium, samarium, europium, and terbium)
>
> Major Ions - sulfate, nitrate, ammonium, sodium, and potassium.
>
> Carbon - total, elemental, organic, and carbonate carbon.

SLAMS Sites – The EPA does not believe that a single nationwide approach to $PM_{2.5}$ speciation sampling and analysis is the best approach for all 300 locations. The EPA expects that most sites will follow a sampling and analysis program similar to the NAMS sites; however, alternative speciation approaches for non-routine NAMS will be considered on a case-by-case basis through negotiation by state agencies with EPA regional offices and headquarters. EPA encourages State and Local agencies to consider additional chemical analyses beyond the constituents specified for NAMS. For example, detailed analysis for compounds comprising the organic carbon fraction could provide valuable insight into development of more refined source-receptor relations,

particularly in areas with significant carbon-based aerosols. EPA also encourages the use of continuous monitoring techniques to the extent possible.

2.1 Program Components

The speciation program includes multiple elements with different, yet overlapping objectives. The major program components include:

- The 50 NAMS sites;
- Approximately 200 dedicated SLAMS sites for evaluating source-receptor relationships in support of SIPs;
- 7 Supersites areas, including St. Louis, for advanced monitoring technology assessments, such as atmospheric processes, impacts on public health, and epidemiological issues;
- Approximately 50 sites to be integrated as satellites to the Supersites program, and;
- Approximately 100 Interagency Monitoring of Protected Visual Environments (IMPROVE) sites dedicated to assessing regional haze progress.

2.2 Future Intercomparison Studies

The continuous intercomparison study will compare performance of yet-to-be determined $PM_{2.5}$ continuous samplers with the Federal Reference Method (FRM) samplers and the existing $PM_{2.5}$ speciation NAMS sampler.

3. Project /Task Description

The overall goal of the $PM_{2.5}$ monitoring program is to provide ambient data that support the nation's air quality program objectives. The $PM_{2.5}$ monitoring program includes a large compliance network in addition to the speciation program, which will be used to make attainment and nonattainment decisions. All of the elements of this large program are designed to complement one another in meeting the multiple objectives of the overall integrated program.

The major program objectives for the routine NAMS $PM_{2.5}$ network are:

Objective 1. Spatial and Temporal Characterizations of Aerosols

The analytes, sampling periods, frequency, spatial resolution, and data accuracy have been selected to serve the overall data use. The primary use of these data will be to develop general characterizations of aerosols across the major urban areas of the country, depicting seasonal and annual patterns. To the extent that networks include sites located in transport and/or background

locations, similar characterizations of rural/regional environments, especially in combination with the IMPROVE program, are expected outputs. The subsequent objectives all require this initial characterization step, that of developing common spatial and seasonal/annual profiles of aerosol components.

Objective 2. Air Quality Trends Analysis and Tracking Progress of Control Programs

The use of observational data to play a central role in ongoing SIP improvement has been encouraged by the scientific community through the 1991 National Academy of Sciences Report on Tropospheric Ozone and the North American Research Strategy for Tropospheric Ozone assessment. The ability to detect trends in ambient concentrations that are associated with planned air quality control efforts is needed for SIP assessments.

Objective 3. Developing Emission Control Strategies

Speciated data will be used in evaluating air quality model performance. A combination of air quality modeling and source attribution analyses will generate objective information to decision makers for emission control strategy development. A variety of source attribution techniques will be exercised. Also, information is needed that clarifies more definitively the associations between adverse health impacts and specific aerosol properties. Thus the speciation program must enlist input from health scientists to study fine particle emissions from combustion processes containing trace elements of varying toxicity. Information is needed which relates the harmful health effects of emissions from such processes as fossil fuel combustion, prescribed burning, wild land fires, as well as urban and rural $PM_{2.5}$ concentrations, to the magnitude of toxicity relative to the exposure of populations to such particles. Some $PM_{2.5}$ may not be harmful, such as the $PM_{2.5}$ transported from North Africa, which is thought to primarily be very finely ground limestone.

The SLAMS network's objectives are currently limited to spatial and temporal characterization.

4. Data Quality Objectives and Criteria for Measurement Data

4.1. NAMS DQO

Data Quality Objectives (DQO) are determined to ensure that the type, quantity, and quality of environmental monitoring data will be sufficient for the data's intended uses, while ensuring that resources are not wasted collecting unnecessary or redundant data.

The primary DQO for the Speciation Trends Network (STN) is to be able to detect a 3 to 5 percent annual trend in the concentration of any chemical analyte with 3 to 5 years of data at any given site, after adjusting for seasonality, with a power of 0.80 (an 80 percent probability of being correct).

The monitoring characteristics that were established for the trends network prior to the beginning of the DQO process are:

Number of sites: Approximately 50

Location of sites: 25 sites are to be located with a Photochemical Air Monitoring Station (PAMS); the remaining sites are to be selected in coordination with the EPA, the Regional Offices, and the States and Locals.

Sampling frequency: Once every 3 days.

Sampler type: The sampler will be a multiple filter device that collects 24-hour integrated samples.

Analytes/Method of measurement:
-Mass/particulate concentration, obtained by determining filter weight.
-48 elements (see section A.2), using X-Ray Fluorescence (XRF)
-Major ions - sulfate, nitrate, chloride, ammonium, and sodium, measured using ion chromatography
-Total, elemental, and organic carbon using thermal optical analysis, which may be either thermal optical reflectance, or thermal optical transmittance

The primary objective of the trends component of the $PM_{2.5}$ speciation network is to detect trends in individual component species on a site-by-site basis. Specifically, the decision-makers wanted to be able to detect a 3-5% annual trend (increasing or decreasing) with 3-5 years of data. This ability to detect trends is needed in order to evaluate the effectiveness of control strategies. Since control strategies likely will be developed, applied, and evaluated at the Metropolitan Statistical Area (MSA) level and given that at most one trend site will be within a MSA, the trends need to be accurate on a site by site basis.

The DQO study was done for four analytes: sulfate, nitrate, total carbon, and calcium. The study showed that a sampling frequency of every third day will detect a +/- 5% trend at any site over 5 years for three of the analytes. For nitrate, the study showed that 1/3 day sampling over 5 years would detect a change of 6.3%. Reducing this to 5% by increasing the frequency would not be cost effective, because the increased frequency did not increase the resolution for the other analytes. The study results were then applied to all analytes in the speciation program. These analytes were selected to ensure that data from the speciation trends sites could be compared with IMPROVE data sets, as they have historically been measured within the IMPROVE network.

- Sulfate is a direct indicator of anthropogenic emissions, primarily from fossil fuel-fired combustion sources and can be effectively measured by most fine particulate sampling systems. Sulfate levels are usually highest in the eastern United States.
- By contrast, nitrate is an indicator of secondary atmospheric aerosol formation resulting from nitrogen oxides emissions and is somewhat difficult to quantitatively sample because of volatilization artifacts which can occur in many sampling systems. Nitrate levels are usually the highest in the western United States.
- Total carbon in fine aerosol particles is associated with wood combustion and mobile source emissions.
- Calcium is an element that is generally associated with nonanthropogenic emissions such as windblown soils, geological/mineral materials, and suspended dusts. Geological material is mostly in the coarse particle fraction, and typically constitutes ~50% of PM_{10} while only contributing 5 to 15% of $PM_{2.5}$. Suspended dust consists mainly of oxides of aluminum, silicon, calcium, titanium, iron, and other metal oxides. The precise combination of these minerals depends on the geology of the area and industrial processes such as steel-making, smelting, mining, and cement production. Calcium is usually assumed to occur predominantly in particles greater than 2.5 microns, and should therefore be present at low background levels, and is expected not to vary with source emissions controls.

Data from the IMPROVE program was used for estimating the variability likely to be observed in national $PM_{2.5}$ speciation measurements. Since urban concentrations are anticipated to be higher than rural concentrations, inability to detect species should not be an issue. Thus, the parameter of interest is the percent reduction in $PM_{2.5}$ sulfate, nitrate, calcium, or total carbon concentration after adjustment for seasonal effects and auto-correlation. It was concluded that with 1 in 3 day sampling for five years, annual trends can be detected that are greater than 5% for sulfate, calcium, and total carbon. For nitrate, annual trends must be greater than 6.3% in order to be detected. Daily sampling provides little improvement in the ability to detect trends.

The DQOs will be reevaluated once data from the trends network becomes available. This is needed due to the assumptions that had to be made in this DQO process because of the use of IMPROVE data.

4.2. SLAMS DQO

Current data shows that $PM_{2.5}$ levels in the St. Louis metropolitan area exceed the NAAQS annual average. The concentrations are highest over East St. Louis and downtown. The averages gradually decrease as distance from downtown increases, as was expected. The exception to this pattern is Arnold. The Arnold site had been anticipated as an upwind site, and therefore to have a lower average concentration. It's

average is higher than expected.

Data from the St. Louis Mini-Trends site (Feb-Oct 2000) showed that the following species have mean concentrations over the sampler detection limits:

- $PM_{2.5}$ mass
- sulfate, nitrate, ammonium, sodium, and phosphate ions
- organic, elemental and carbonate carbon
- aluminum, calcium, iron silicon, sulfur, sodium, cerium, lanthanum, zinc, tin, cesium, nickel, lead, and copper

The DQO for SLAMS sites is for spatial and temporal characterization of the species listed above. The boundaries, on the Missouri side, for the spatial characterization are St. Louis City, St. Louis County, and northern Jefferson County. Based on the sampling frequency and the data to date at the Blair St. site, it is believed that air quality for some area around the Blair St. and Arnold sites can be characterized on a quarterly basis.

5. Special Training Requirements/Certification

Personnel assigned to $PM_{2.5}$ ambient air monitoring activities have the requisite degrees, work experience, personal attributes, and training requirements appropriate for their positions. Air monitoring staff personal position description forms are on file in the MDNR Human Resources Office. Records on personnel qualifications and training are maintained by the state agency and are accessible for review during audit activities.

Adequate education and training are integral to the MDNR monitoring program. Training is aimed at increasing the effectiveness of employees and their organization. Appropriate training shall be available to all employees supporting the Ambient Air Quality Monitoring Program, commensurate with their duties. Such training may consist of classroom lectures, workshops, teleconferences, and on-the-job training.

6. Documentation and Records

This table represents the categories and types of records and documents that are kept related to air monitoring. These documents are retained indefinitely at the locations shown.

Categories	Record/Document Types	Location
Management and Organization	State Implementation Plan Reporting agency information Organizational structure of $PM_{2.5}$ speciation monitoring program Personnel qualifications and training Quality management plan Document control plan Network reviews	APCP APCP QAPP APCP/City APLD QAPP APCP
Site Information	Network description Site characterization file Site maps Site audits	APCP APCP APCP APCP
Environmental Data Operations	FY 2005 $PM_{2.5}$ speciation QAPP SOPs Field and laboratory notebooks Sample handling/custody records	APCP/City City/ RTI City City /RTI
Raw Data	Any original data	City/RTI
Data Reporting	Annual SLAMS air quality information Data/summary reports Journal articles/papers/presentations	APCP AIRS APCP
Data Management	Data algorithms Data management plans/flowcharts $PM_{2.5}$ Data	RTI/APCP/City QAPP APCP/City /RTI
Quality Assurance	Control charts Data quality assessments QA reports System audits	City /RTI City /RTI ESP/City/ RTI EPA

B. Measurement/Data Acquisition

1. Sampling Process Design

A detailed list of FY 2005 $PM_{2.5}$ Speciation QAPP projects is outlined in Appendix 2 of this document.

2. Sampling Methods Requirements

Refer to City SOP.

3. Sample Handling and Custody Requirements

Speciation filters will be sent to RTI for analysis.

4. Analytical Methods Requirements

Refer to RTI SOPs.

5. Quality Control Requirements

Refer to City SOP.

6 Instrument/Equipment Maintenance and Calibration Requirements

Refer to City SOP.

7. Inspection/Acceptance Requirements for Supplies and Consumables

Refer to City SOP.

8. Data Acquisition Requirements - Nondirect Measurements

Refer to City SOP.

9. Data Management

Refer to City SOP.

C. Assessment and Oversight

1. Assessment and Response Actions

Quality assurance activities will be conducted by the Air Quality Assurance Unit (AQAU) and systems audits by EPA Region VII (see Appendix 3).

2. Reports to Management

Reference to the following table used by the Missouri $PM_{2.5}$ compliance network should be helpful in identifying additional reports which are needed by the $PM_{2.5}$ speciation network.

	Type	Agency Responsible	Frequency	Receiving Agency
1.	System Audits	EPA	As scheduled	APCP
2.	Completeness	APCP	Quarterly; Annual	City
3	AIRS/AQ	RTI	Quarterly	AIRS
4.	Audit	AQAU	Quarterly; Annual	APCP, EPA
5.	Monitoring Network Review	APCP	As Scheduled	EPA/City
6.	Data Assessment	APCP	Annually	EPA
7.	Ambient Data	ESP/City	Quarterly	RTI
8.	Network Description Table Revisions	APCP	Annual or as Necessary	City/EPA

D. Data Validation and Usability

1. Data Review, Validation and Verification Requirements

The verification and validation process is used to decide the degree to which each data item has met applicable quality specifications. If this process is followed, the quality of data should be achieved to meet the DQO for trend detection. The specific requirements for verification and validation will be developed by estimating the potential effect that each error component may have on the quality of the reduced and analyzed data, and its effect on attainment of the DQOs. Verification and

validation are not the same as Data Quality Assurance (DQA) or evaluation of the DQOs, processes that are described later in this QAPP. Only after the data set has been verified and validated can it be assessed and/or used to address the specific scientific and regulatory questions embodied in the DQOs.

Data validation reports should be included in regular Quality Control (QC) reports to management. Verification of data for the $PM_{2.5}$ speciation network is the joint responsibility of RTI, the City, and the APCP. The responsibilities of each are detailed in Section D.2.

Validation is needed for QC and calibration information; field and trip blanks, leak checks, temperature and barometric pressure sensor checks, filter integrity inspections, and laboratory QC samples. Level 0 validation will occur both in the field and the laboratory, while Level I validation will take place after concentration results from the National Contract Laboratory have been compiled.

Level 0 Verification is a basic review of the data, such as the site, date, time, channel assignments, Custody and Field Data Form (CAFDF), filters and denuders, holding times, shipping and storage conditions, data transmission, recording integrity, calibration status of samplers and sensors, audit status, and operational flags.

Level I Data Validation is the process of evaluating the correctness of individual or groups of items within the data set using statistical methods and other screening techniques. It will first involve the processing of verification results and data screens into AIRS data flags and then providing an overall assessment of the validity of the data.

Level II Validation involves comparisons with other independent data sets for external consistency. These include intercomparisons of collocated measurements.

Level III Validation involves a more detailed analysis as part of the data interpretation process, when inconsistencies in analysis and modeling results are found to be caused by measurement errors.

After the data set has been subjected to the verification and validation process, it is reported to the AIRS by the RTI, see Appendix 4 for the AIRS $PM_{2.5}$ Speciation codes. States are to review the data there the same as if it was routed through them first - the purpose is to expedite the posting of data onto AIRS, based on delays experienced in posting PAMS monitoring data. There may be Level III data validation as well, conducted as part of the data interpretation process prior to final acceptance and formal release of the test results.

2. Validation and Verification Methods

The collecting agency will screen data before reporting it to the APCP by removing such things as

calibration data and unverified data. Data, which cannot be verified, will not be reported to the APCP (see QA/QC SOPs). The APCP will screen the data, including running it through the anomaly data computer programs and submit any questionable data to the collecting agency for validation. The collecting agency must respond as soon as possible but no later than five working days after the request.

RTI – RTI staff performs the initial data validation by ensuring that instrument data, such as flow rates and sample volume, are within expected parameters. They apply data flags when necessary. Before data is uploaded to AIRS, each batch of speciation data is posted on a website, where it is inspected by City, ESP, and APCP staff.

City – City staff inspect the data prior to AIRS upload to ensure that flags are appropriate, record monitor performance, and report any errors to APCP.

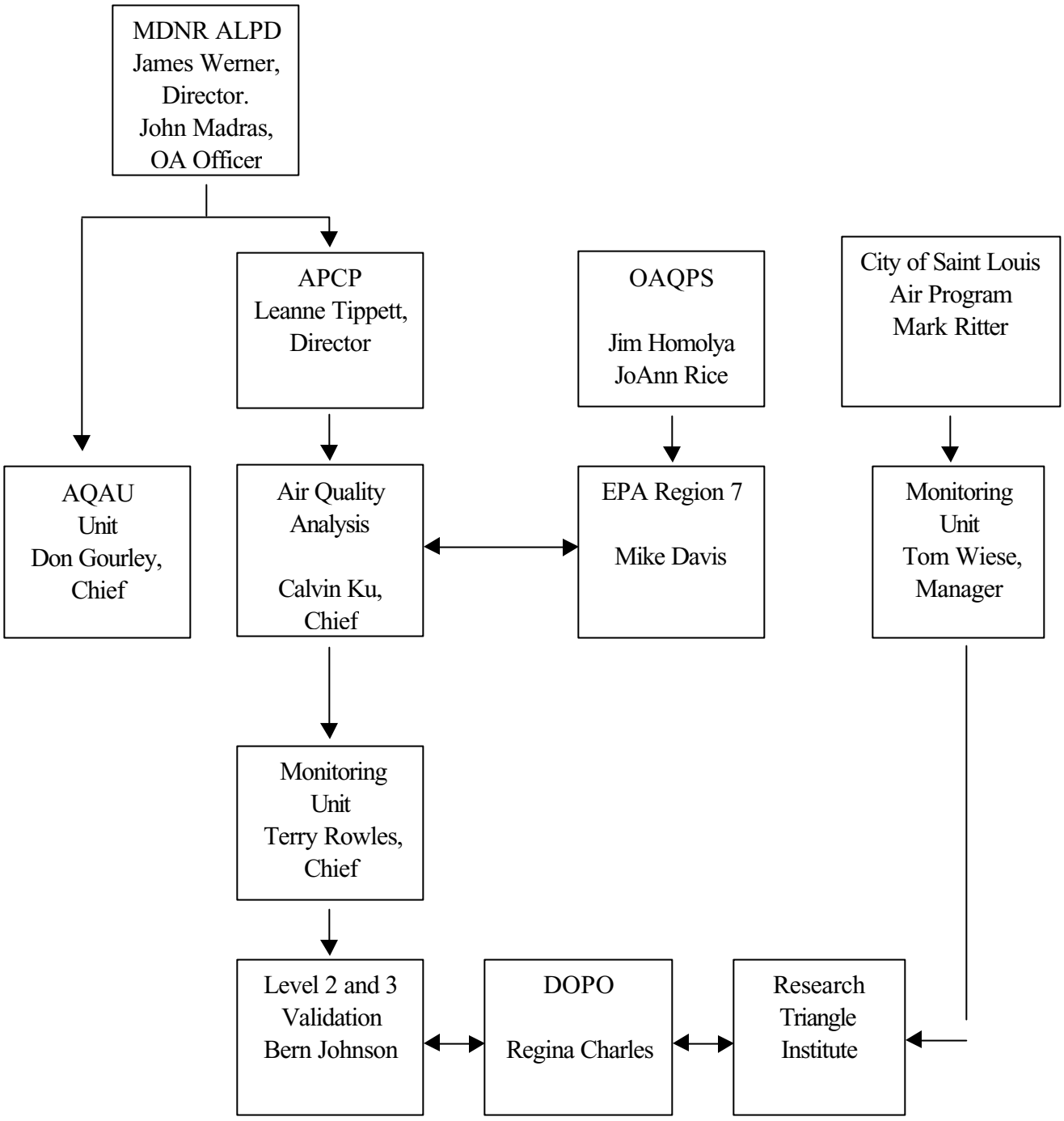
APCP – APCP staff examine data for values that appear to be outliers. If any outliers are encountered, they will inquire with City and/or RTI staff. After APCP staff are satisfied that there are no errors in the batch reports, they will notify RTI within 45 days and authorize the uploading of data to AIRS.

3. Reconciliation with Data Quality Objectives

NAMS – Organization of Air Quality and Planning Standards (OAQPS) will use data uploaded to AIRS for NAMS DQO purposes.

SLAMS – APCP staff will examine data for purposes of meeting the DQOs. This includes activities such as assembling data into graphs and tables for analysis, selecting individual species for more detailed statistical analysis, and presenting summaries of data to interested parties.

Appendix 1 - $PM_{2.5}$ Speciation Monitoring Organizational Chart



Appendix 2 – $PM_{2.5}$ Speciation Project List

A. The following projects from the FY 2004 QAPP, by the indicated key agencies, are requested for continuation in the $PM_{2.5}$ QAPP FY 2005:

1. City of St. Louis
   Operate the Blair St. PM2.5 Speciation sampler on a 1/3 day schedule.

Table 1: $PM_{2.5}$ Speciation Monitoring Network Sampling Schedule.

TYPE	PM2.5 Monitoring Site	Run Schedule (samples /month)	Total No. of Samples /Month	Total No. of Filters /Month, including blanks*
NAMS	Blair St.	1 in 3 day 10-11 runs (30-33)	10-11	30-33

* Each 1/3-day sample requires 1 blank filter.

Table 2: $PM_{2.5}$ Speciation Monitoring Parameter Table.

Parameter	NO OF SAMPLES/ MONTH	SAMPLE MATRIX	METHOD Reference	SAMPLE Preservation	HOLDING TIME	NO OF SAMPLERS
88101 $PM_{2.5}$ Mass, Elements	10-11	Teflon filter	40 CFR 50 App L; Compendium Method IO-3.3	*	*	1
Ions	10-11	Teflon filter	*	*	*	1
Nitrate	0	Nylon Filter	*	*	*	0 (not operational)
Carbon	10-11	Quartz filter	Method 5040*	*	*	1
TOTALS	30-33					1

Appendix 3 – Data Quality Requirements and Assessments

A. Accuracy, Precision, and Bias

Accuracy standards, determined by flow rate audits, are being updated by EPA, based on information from the MiniTrends study. Flow rate requirements for each model of sampler will be included in this section as soon as possible.

Precision cannot be calculated without a collocated sampler. There are currently no plans to operate any collocated speciation samplers.

B. Completeness

Since these monitors are not used for any compliance determination, there is no completeness requirement. However, the department will maintain the goal of 75% data completeness.

Appendix 4 – AIRS $PM_{2.5}$ Speciation Codes

Parameter	Description	Standard Units
68101	Sample Flow Rate, CV	107 Percent
68102	Sample Volume	65 Cubic Meters
68103	Sample Min Temperature	17 Degrees Centigrade
68104	Sample Max Temperature	17 Degrees Centigrade
68105	Sample Avg Temperature	17 Degrees Centigrade
68106	Sample Min Baro Pressure	59 Millimeters Mercury
68107	Sample Max Baro Pressure	59 Millimeters Mercury
68108	Sample Avg Baro Pressure	59 Millimeters Mercury
68109	Elapsed Sample Time	106 Minutes
88101	$PM_{2.5}$ mass	107 micrograms/cubic meter
88102	Antimony	“
88103	Arsenic	“
88104	Aluminum	“
88107	Barium	“
88109	Bromine	“
88110	Cadmium	“
88111	Calcium	“
88112	Chromium	“
88113	Cobalt	“
88114	Copper	“
88115	Chlorine	“
88117	Cerium	“
88118	Cesium	“
88121	Europium	“
88124	Gallium	“
88126	Iron	“
88127	Hafnium	“
88128	Lead	“
88131	Indium	“
88132	Manganese	“
88133	Iridium	“
88134	Molybdenum	“
88136	Nickel	“
88140	Magnesium	“
88142	Mercury	“

88143	Gold	“
88146	Lanthanum	“
88147	Niobium	“
88152	Phosphorus	“
88154	Selenium	“
88160	Tin	“
88161	Titanium	“
88162	Samarium	“
88163	Scandium	“
88164	Vanadium	“
88165	Silicon	“
88166	Silver	“
88167	Zinc	“
88168	Strontium	“
88169	Sulfur	“
88170	Tantalum	“
88172	Terbium	“
88176	Rubidium	“
88180	Potassium	“
88183	Yttrium	“
88184	Sodium	“
88185	Zirconium	“
88186	Wolfram	“
88301	Ammonium	“
88302	Sodium	“
88303	Potassium	“
88304	OCX	“
88305	Organic carbon	“
88306	Nitrate	“
88307	Elemental carbon	“
88308	Carbonate carbon	“
88403	Sulfate	“

Appendix 5 – List of Acronyms

AIRS	- Aerometric Information Retrieval System
ALPD	- Air and Land Protection Division
APCP	- Air Pollution Control Program
AQAU	- Air Quality Auditing Unit
CAFDF	- Custody and Field Data Form
CAP	- Community Air Project
CFR	- Code of Federal Regulations
City	- City of St. Louis Air Pollution Control
COC	- Chain of Custody
DBMS	- DataBase Management System
DOPO	- Delivery Order Project Officer
DQA	- Data Quality Assurance
DQO	- Data Quality Objective
EPA	- Environmental Protection Agency
ESP	- Environmental Services Program
FRM	- Federal Reference Method
GC	- Gas Chromatography
IMPROVE	- Interagency Monitoring of Protected Visual Environments
MASS	- Mass Aerosol Speciation Sampler
MDNR	- Missouri Department of Natural Resources
MQO	- Measurement Quality Objective
MSA	- Metropolitan Statistical Area
NAAQS	- National Ambient Air Quality Standards
NAMS	- National Air Monitoring Station
OAQPS	- Organization of Air Quality and Planning Standards
PAMS	- Photochemical Air Monitoring Station
PM2.5	- Fine Particulate Matter
QAPP	- Quality Assurance Project Plan
QC	- Quality Control
RAAS	- Reference Ambient Air Sampler
RO	- Reporting Organization
RSC	- Regional Speciation Coordinator
RTI	- Research Triangle Institute
SAAS	- Spiral Ambient Air Sampler
SIP	- State Implementation Plan
SLAMS	- State/Local Air Monitoring Station
SOP	- Standard Operating Procedure
STN	- Speciation Trends Network
XRF	- X-Ray Fluorescence