U.S. EPA
OFFICE OF AIR QUALITY PLANNING AND STANDARDS
EMMISIONS, MONITORING & ANALYSIS DIVISION

$PM_{2.5}$ Speciation Network Newsletter

Issue 2 January 2005

Special points of interest:

- **Level 0 and Level 1 data validation of speciation data by RTI**
- **OAQPS is working on better access to Speciation Network data**
- **Sodium ion data has been flagged for the period September 2001 through January 2002**
- **New tools are being used to recommend Speciation Network design changes**

Inside this issue:

Newsletter Purpose

This is the second issue of the $PM_{2.5}$ Speciation Network newsletter. The objective of this newsletter is to inform the EPA Regions, States, Local and Tribal air monitoring agencies of recent program developments and activities, and to facilitate the communication of information to site operators, data analysts and policy makers regarding the performance of the speciation monitoring network and resulting data quality.

The Current Speciation Network Site Locations

Program Objectives

The characterization of $PM_{2.5}$ species plays a key role in policy decisions and health effects research. The main objectives of the speciation program are to provide data for:

- assessing the effectiveness of emission reductions strategies through the characterization of air quality trends;
- supporting the development of modeling tools and the application of source apportionment modeling for control strategy development in support of the National Ambient Air Quality Standards (NAAQS);
- supporting programs aimed at improving environmental welfare, such as the Regional Haze program; and
- supporting health effects and exposure research studies.

Upcoming Meetings

The Particulate Matter Supersites Program and Related Studies, AAAR International Specialty Conference will be held February 7-11, 2005 at the Sheraton Hotel in Atlanta, GA. More information on this meeting can be found at www.aaar.org

Laboratory Services Delivery Order Project Officers (DOPOs)

Analytical support from the speciation contract laboratory is accessed through three EPA Regional Delivery Order Project Officers (DOPOs) in Regions 2, 5 and 8. Analytical needs are initially submitted by the States to the corresponding EPA Regional Coordinator. The Coordinator consolidates all analytical requests received from States within their Region and submits them to the appropriate DOPO. The DOPO then consolidates analytical requests from several Regions and communicates them to the EPA Project Officer (PO). The PO prepares the funding request and forwards to the Contracting Officer to issue Delivery Orders to the contract laboratory. The DOPOs also serve as liaison between the States and Contract Laboratory in resolving issues and maintaining a smooth data review process. The DOPOs are:

Reshma Punwasie in Region 2,

Regina Charles in Region 5, and

Kenneth Wang in Region 8.

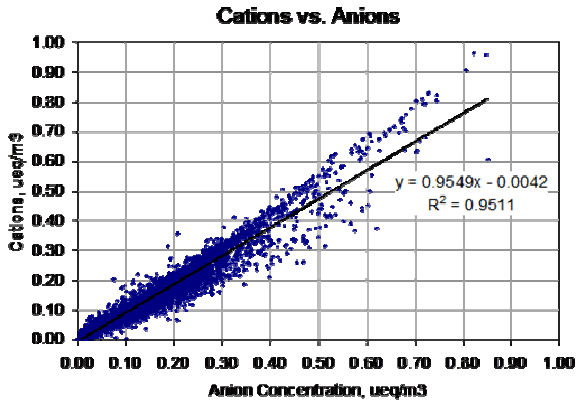
We thank them for their support to the speciation program. Their contact information is provided on the back page of this newsletter.

Speciation Data Validation Process

Research Triangle Institute (RTI) provides analytical laboratory services for the Speciation Network under contract with the EPA. As part of the analytical lab services, RTI performs Level 0 and Level 1 data validation and reports the preliminary data to the monitoring agencies on a monthly basis for review. Once the monitoring agency approves the data, it is finalized and formatted by RTI for uploading to the AQS.

Level 0 data validation coincides with the normal QA/QC operations carried out to ensure reliable data. Level 0 validation focuses on the correctness of individual operations or analyses and is independent of other results. Level 1 validation includes between-analyte data screening within a single sample event, and is useful for identifying suspicious or atypical results. Level 1 screening identifies samples for further investigation. If investigation turns up a problem, appropriate flags are assigned. Level 1 checks include mass balance, anion/cation balance, and correlation between sulfur and sulfate. The mass balance is the comparison of reconstructed mass versus speciation gravimetric mass. The ion balance (see figure below for example) is the theoretical value of the anion/cation balance, expressed as equivalent charges. The sulfur versus sulfate balance is where the sulfur from the XRF analysis is compared to the sulfate from the ion chromatography analysis. Level 1 validation checks are helpful for identifying:

- Filter misidentification (e.g., identifying a routine filter as a blank) or filters that have been inadvertently swapped between sampling events;
- Analytical laboratory issues; and
- Sampling problems that may have occurred at the sites, such as incorrect flow rates or bad flow controllers.



Level 1 data validation problems can also lead to systematic and procedural changes needed to prevent future occurrences. These data validation checks enable RTI to identify issues and follow-up with monitoring agencies to resolve them.

Once the data are sent to the monitoring agencies for review, flags may be added that are based on knowledge of site conditions and field calibration results, and additional validation is performed that evaluates data consistency and trends. After state agencies have the opportunity to review and provide concurrence on the final results, RTI loads the data into AQS. The turnaround time for laboratory analysis, data validation, review and input of data into AQS takes about 90 days. For more information on the RTI Data Validation Process for the $PM_{2.5}$ Speciation Network, refer to the report located on our website at: http://www.epa.gov/ttn/amtic/specdat.html

Speciation Data Availability

OAQPS is working on universal and enhanced access to air quality data though the AQS Data Mart

Wondering how you can get access to speciation data? All of the data collected as part of the NAMS Trends and SLAMS Speciation Network are required to be loaded into EPA's Air Quality System (AQS). The AQS is EPA's repository of ambient air quality data. There are currently three laboratories analyzing samples as part of the Speciation Network and reporting data to AQS. Primarily EPA Federal, Regional, states, local and Tribal agencies have access to AQS. If you have access to AQS, speciation data can be downloaded directly. If you do not have access to AQS, you can make a data request or you can download one of the already available detailed extraction files on our web site at http://www.epa.gov/ttn/airs/airsaqs/detaildata/requestingaqsdata.htm EPA's Office of Environmental Information (OEI) and the Information Transfer and Program Integration Division (ITPID) of the Office of Air Quality Planning, and Standards (OAQPS) is currently working on a way to provide universal and enhanced access to air quality data (including speciation data) through the development of the AQS Data Mart. The Data Mart is expected to reach initial production deployment in June 2005. If you would like more information on the Data Mart, please visit http://www.epa.gov/ttn/airs/airsaqs/sysoverview.htm#AQS%20Data%20Mart

QA Activities for the Continuous Speciation Study

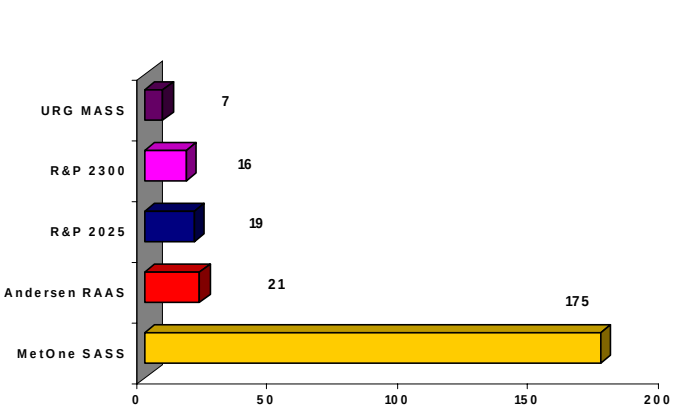
EPA's Office of Radiation and Indoor Air Radiation (ORIA), National Air and Radiation Environmental Laboratory (NAREL) provides QA assistance to OAQPS to evaluate data quality for the $PM_{2.5}$ Speciation Network. The ORIA laboratory in Montgomery, Alabama provides laboratory auditing activities and performs a variety of special studies to support the resolution of data quality issues. In addition to laboratory audits, NAREL also provides performance evaluation (PE) samples in support of the Continuous Speciation Study. Auditing continuous speciation instruments can be challenging because of the inability to provide an audit sample directly to the monitor inlet. NAREL has provided 4 rounds of PE samples in support of continuous speciation. PE samples are provided in the form of solutions to be spiked on the collection media for R&P sulfate and nitrate analyzers. PE samples have been recently developed to audit the newly acquired Sunset Laboratory analyzers. These PE samples are actual field sample punches that are incorporated into the monitors sample analysis chamber. PE samples have been very useful in identifying issues with the monitoring equipment. These issues are identified and resolution worked through our participating States and the vendors to improve the monitoring technologies. NAREL's PE reports will be posted soon at www.epa.gov/ttn/amtic. Questions regarding the NAREL QA activities for the Continuous Speciation Study should be directed to Solomon Ricks at 919-541-5242 or by e-mail at *ricks.solomon@epa.gov*

Sunset Field Instrument; courtesy of Sunset Labs at www.sunlab.com

R&P 8400S Sulfate monitor; courtesy of R&P Co., Inc. at www.rpco.com

Distribution of Sampler Types

The Speciation Network currently consists of 54 Trends and 184 SLAMS sites. There are five sampler types being used in the network. Sampler selection is at the discretion of the state/local agency. Three sampler types are exclusively used in the Trends network. These are the ThermoAndersen RAAS, MetOne SASS, and URG MASS. Forty-two of the Trends sites use the MetOne SASS, while 6 sites use the RAAS and 6 sites use the MASS. Of the 184 SLAMS, 133 sites use the SASS, 19 the R&P 2025 FRM, 16 the RAAS, 16 the R&P 2300, and 1 the MASS. Most of the R&P SLAMS samplers are located in Region 6 and Region 2. Clearly, the majority of the network is outfitted with the MetOne SASS sampler.



Speciation Data Issues

This section is being used to make data users aware of issues identified with speciation data, corrective actions taken, and the timeframes where data may have been affected.

High Sodium Ion on Nylon Filters

Research Triangle Institute (RTI) performs the laboratory analysis for all filters in the Speciation Trends Network. RTI was alerted to a problem with high sodium values on nylon filters by the New York State Department of Environmental Conservation speciation data users. RTI began investigating the problem and identified an issue with background sodium levels. Data validation procedures were in place and have subsequently been tightened further to identify issues sooner. RTI devised a new filter cleaning procedure to ensure low background concentrations of all ions on the nylon filters. All sodium ion data from field samples collected from September 1, 2001 through January 31, 2002 were flagged in AQS. Additional review indicated that some suspect filters remained in the system in February 2002. These data should also be used with caution. The problem did not affect the other ions (potassium, ammonium, sulfate and nitrate) measured. RTI's full report on the issue can be found at: http://www.epa.gov/ttn/amtic/specdat.html

Sodium ion data from field samples collected September 1, 2001 through January 31, 2002 were flagged in AQS

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Speciation News

Network Design—New Tools

EPA is recommending reductions in the current number of SLAMS speciation sites. In order to make preliminary recommendations to the Regions regarding cuts, the current speciation network design was evaluated. Two tools were used to evaluate the network: 1) a "decision matrix" and 2) a GIS mapping tool. The "decision matrix" was developed by EPA and used to rank existing monitoring sties based on set network design criteria. The criteria included distance to nearby sites, PM2.5 design values, spatial gradient in monitored values, population density, collocation with Photochemical Assessment Monitoring Stations (PAMS) or air toxics monitors, and projected residual nonattainment areas. The speciation trends sites were protected. The decision matrix was used to rank site locations for the SLAMS. Sites were ranked as either "low value" or "high value" sites and subjectively reviewed. "Low value" sites were the primary targets for removal, along with redundant sites (where sites were close together and no concentration gradients existed). New sites were added in a few cases; largely where PM2.5 non-attainment areas were projected (using Clean Air Interstate Rule modeling) to remain in 2010. New sites were also added in a few cities (population >250,000) where speciation monitors did not exist, and to fill gaps in monitoring at rural locations. For more information on the preliminary recommendations contact Kevin Cavender at 919-541-2364 or *cavender.kevin@epa.gov*

The Monitoring and Quality Assurance Group (MQAG) has been renamed the Ambient Air Monitoring Group (AAMG). The AAMG is responsible for identifying ambient monitoring needs based on OAQPS's data requirements, and for developing the national monitoring program and quality assurance infrastructure to support these requirements with high quality ambient air data.

$PM_{2.5}$ Speciation Program Contacts

Recent staff changes have been made in the program. The current list of contacts are given below.

Program Lead: Joann Rice; 919-541-3372; *rice.joann@epa.gov*

Quality Assurance Coordinator: Dennis Crumpler; 919-541-0871; *crumpler.dennis@epa.gov*

RTI Contract Manager: Solomon Ricks; 919-541-5242; *ricks.solomon@epa.gov*

Delivery Order Project Officers (DOPOs):

Regions 1, 2, 3, 4 — Reshma Punwasie; 732-321-6682; *punwasie.reshma@epa.gov*
Regions 5, 6, 7 — Regina Charles; 312-886-6205; *charles.regina@epa.gov*
Regions 8, 9, 10 — Ken Wang; 303-312-6738; *wang.kenneth@epa.gov*

Data Analysis Contact: Tesh Rao; 919-541-1173; *rao.venkatesh@epa.gov*

IMPROVE Steering Committee Chair: Marc Pitchford; 702-862-5432; *marcp@dri.edu*

AAMG Group Leader: Rich Scheffe; 919-541-4650; *sheffe.rich@epa.gov (on rotation)*

Acting AAMG Group Leader: Phil Lorang; 919-541-5463; *lorang.phil@epa.gov*