Update
$PM_{2.5}$ Monitoring Implementation
3/1/00

Table of Contents

Update - $PM_{2.5}$ Monitoring Implementation

Introduction

The deployment of a new $PM_{2.5}$ monitoring network is a critical component in the national implementation of the new $PM_{2.5}$ National Ambient Air Quality Standard (NAAQS). To date, over $128 million in federal funding has been provided to support a national monitoring network as described within President Clinton's Directive of July 16, 1997, in addition to those funds provided for particulate matter research. The $PM_{2.5}$ network follows the regulations provided in Title 40 of the Code of Federal Regulations (40 CFR), Parts 50, 53, and 58, and published in the ***Federal Register*** on July 18, 1997. As described in the NAAQS packages, the ambient data from this network will drive an array of regulatory decisions, ranging from designating areas as attainment or nonattainment, to developing cost-effective control programs, and to track the progress of such programs.

This document provides a summary of progress to date, and an outline of the remaining actions that will be taken to complete the $PM_{2.5}$ monitoring network. A copy of the original $PM_{2.5}$ Monitoring Implementation Plan (3/98) is provided as an attachment for reference. The 1998 plan was used to describe the rationale underlying the network and its components; to establish and affirm major products (e.g., training programs, procurements) and timelines required to implement the network; to define roles and responsibilities of organizational groups and individuals; and to generate consensus among those responsible for network deployment and operation. Much work has gone into the program since 1998, and this summary attempts to describe how the program has evolved over that time period, and to highlight the major accomplishments.

A. Network Conceptualization and Major Program Components

Data from this program will be used for (1) $PM_{2.5}$ NAAQS comparisons, (2) development and tracking of implementation plans, (3) assessments for regional haze, and (4) assistance for health studies and other ambient aerosol research activities. The $PM_{2.5}$ network design addresses these four program objectives through a combination of siting and instrumentation strategies. The federal reference method (FRM) sampler design and network concepts like community-oriented monitoring (including "spatial averaging") are predicated on the need to produce data commensurate with those health studies underlying the development of the $PM_{2.5}$ NAAQS. The principal objective of the FRM sampler is to measure a particulate matter "indicator" which defines $PM_{2.5}$ and which tracks back to those measurements used in the health studies supporting the $PM_{2.5}$ NAAQS. The requirement that these instruments rely on specific design elements, rather than performance criteria alone, is structured to produce greater measurement precision and to avoid the data measurement uncertainties experienced in the PM_{10} monitoring program. Because the FRM $PM_{2.5}$ samplers do not provide temporally resolved data or full chemical characterization of ambient aerosols, other sampling instruments including continuous analyzers and speciation samplers constitute a major part of the $PM_{2.5}$ network.

Network Elements & Changes to Network Design Since 1998.

Compliance (mass) monitoring. The network design focus for compliance of both the annual and 24-hour $PM_{2.5}$ NAAQS strives to locate monitoring sites in populated areas, with a major emphasis on communities exposed to concentrations representing larger areas, or area-wide concentrations. This emphasis on area-wide concentrations again reflects the need to be consistent with studies underlying the $PM_{2.5}$ NAAQS, analogous to the rationale for the FRM specifications.

The national $PM_{2.5}$ network includes approximately 1,050 FRM sites, of which 850 sites are required as a minimum by the 40 CFR 58 regulation. (As of March 2000, 1,022 of these FRM sites are operating.) The sites that are not required to meet regulatory minimums (~200) are necessary in order to provide for adequate coverage of populated areas and for special purpose monitoring work. In 1997, the FRM network was designed to include nearly 1,400 sites. In March 1998, the National Academy of Science's report Research Priorities for Airborne Particulate Matter: Immediate Priorities and a Long-Range Research Portfolio[1], made the recommendation that the mass portion of the network be reduced, and that the chemical speciation and continuous monitoring efforts be increased. EPA responded to this report, and the FRM network size was reduced by approximately 350 sites. This reduction allowed for a shifting of resources to continuous mass and chemical speciation measurements described below. Table 1 illustrates how the network design has been modified, and provides an indication of how many sites are operating at this time.

---

[1]Published by the Committee on Research Priorities for Airborne Particulate Matter, National Research Council, National Academy of Sciences, March 1998.

Table 1. $PM_{2.5}$ Network Design Impacts from 1999 NAS Report & Current Operating Status.

Network Element	**Original # of Sites in 1997**	**Current # of Planned Sites**	**# of Sites Operating as of 3/1/00**
Compliance (FRM) sites	1,392	1,050	1,022
Chemical Speciation	~300 sites sampling either 1in6 or 1in 12 days.	54 "trends" sites sampling 1in3; ~40 sites used to support Supersites, sampling 1in3 generally; ~10 sites sampling daily to support ongoing health studies; ~200 sites used to support SIP and other work, sampling 1in6.	13
IMPROVE network expansion	108	110	35
Continuous mass sites	100	~210	115
Supersites	4 to 9	8 (based upon award)	Atlanta site operated in 1999; remainder expected in 2000-01.

The description of the $PM_{2.5}$ FRM is included in 40 CFR 50, Appendix L, published as a final rule in the Federal Register on July 18, 1997. Essentially, the $PM_{2.5}$ FRM is a gravimetric method that acquires deposits over 24-hour periods on Teflon®-membrane filters from air drawn at a controlled flow rate through a tested $PM_{2.5}$ inlet. The inlet and size separation components are specified by design as published in the Code of Federal Regulations. There are a number of designated federal reference method samplers at this time including:

- Single channel FRM samplers:
  - Andersen Model RAAS2.5-100 $PM_{2.5}$ Ambient Air Sampler; designated 6/11/98.
  - BGI Inc. Model PQ200 Ambient Fine Particle Sampler; designated 4/16/98.
  - Rupprecht & Patashnick Partisol®-FRM Model 2000 Air Sampler; designated 4/16/98.
  - Thermo Environmental Instruments, Inc. Model 605 "CAPS" Sampler; designated 10/29/98.

- Sequential FRM samplers:
  - Andersen Model RAAS2.5-300 $PM_{2.5}$ Sequential Ambient Air Sampler; designated 6/11/98.
  - Rupprecht & Patashnick Partisol®-Plus Model 2025 Sequential Air Sampler; designated 4/16/98.

- Portable FRM audit samplers (used in the quality assurance program):
  - Andersen Model RAAS2.5-200 $PM_{2.5}$ Ambient Audit Air Sampler; designated 3/11/99.
  - BGI Inc. Model PQ200A Ambient Fine Particle Sampler; designated 4/16/98.
  - Rupprecht & Patashnick Partisol® Model 2000 Audit Sampler; designated 4/19/99.

The $PM_{2.5}$ federal equivalent methods (FEM) vary from this basic FRM definition and are divided into three categories, Class I, II, and III. Definitions for each of these are provided in 40 CFR §53.1, published as a final rule in the Federal Register on July 18, 1997. The three classes of equivalent methods are used to describe the degree of variation between each equivalent $PM_{2.5}$ method and the $PM_{2.5}$ FRM design. There are no designated equivalent $PM_{2.5}$ methods at this time, nor have any manufacturers formally pursued this type of designation.

It is important to emphasize that all $PM_{2.5}$ sampling sites that provide data for comparison to either the 24-hour or the annual $PM_{2.5}$ NAAQS for the purposes of addressing attainment and nonattainment decisions must employ designated FRM/FEM sampling techniques.

Continuous sampling. The 40 CFR 58, Appendix D, §2.8.2.3 regulation requires that a continuous sampler be placed in each of the nation's 52 largest metropolitan areas or cities. At present, State and local agencies are operating approximately 115 continuous monitoring sites, and this number is expected to increase to approximately 200 by the end of 2000. Continuous $PM_{2.5}$ data will provide useful data for public reporting of short-term concentrations, for understanding diurnal and episodic behavior of fine particles, and for use by health scientists investigating exposure patterns.

State and local agencies have reported that they are using the TEOM method at a majority of these sites. Other methods to be used include beta gauge (BAM) monitors, nephelometers, and the CAMMS. EPA has established a continuous monitoring work group with the State and local agencies which has been a useful forum for discussing measurement approaches for continuous monitoring, quality assurance and control issues, and related topics.

Chemical speciation sampling and analysis. A large part of EPA's efforts to finish the $PM_{2.5}$ network deployment is focused on the deployment of the chemical speciation sites. This program element has received and will continue to receive a great deal of attention. Beginning in early 1999, the General Accounting Office, under direction from the Congress, conducted an audit of EPA's actions to address the National Academy of Sciences' report mentioned previously. This audit was completed in August 1999, and the GAO's only recommendation read: "We recommend that the Administrator, Environmental Protection Agency, ensure that all remaining monitors planned for the $PM_{2.5}$ network undergo and successfully pass full laboratory and full field testing and evaluation under actual operating conditions to ensure that the monitors meet data quality objectives before large-scale deployment of these monitors is authorized." The GAO report describes "full field testing" as "an evaluation of the

monitor under actual field conditions where temperature, humidity, and other factors, such as season of the year, are not simulated," and the "remaining monitors" include the chemical speciation samplers. The EPA agreed that the remaining monitors planned for the $PM_{2.5}$ network should undergo and successfully pass the full laboratory and full field testing evaluation, and we have taken steps to ensure that this work is completed.

The U.S.EPA recognizes that the $PM_{2.5}$ network will be the major source of information for developing emission mitigation strategies and for tracking the success of implemented control programs. The basic objective of the chemical speciation analysis is to develop seasonal and annual chemical characterizations of ambient aerosols across the nation. These chemically resolved data will be used to perform source attribution analyses, evaluate emission inventories and air quality models, and support health related research studies and regional haze assessments. Note that comparisons of air quality model predictions and mass measurements alone provide unsatisfactory tests of model behavior and are complicated further by the inherent uncertainties in mass measurements due to sampling artifacts. Speciated data provide a wealth of information (as opposed to mass concentrations alone) that potentially can uncover model flaws and lead to greater confidence in model predictions. Development of this program element is being made in consultation with State and local agency representatives and the scientific/research community and in consideration for national scientific programs such as the Inner City Asthma Study and the Supersites programs.

The previously mentioned NAS report and all related recommendations from the speciation expert panel, and the GAO report have changed the implementation of the speciation program in the following ways:

- The 54 trends sites will sample every third day. EPA, in conjunction with an external group of experts (expert panel), developed data quality objectives for the trends network which indicated a benefit in moving from an every sixth day schedule to an every third day schedule.
- Ten of the 54 trends sites will be designated as "daily sampling" sites. The every third day sampling schedule at these sites will be complimented by a combination of additional integrated and/or semi-continuous sampling methods.
- The full deployment of the speciation program will extend into the 4^{th} quarter of 2001 in order to increase the field testing and assessment of emerging sampling techniques.

The current commercially available sampler designs for the chemical speciation network are largely filter-based methods which use a combination of Teflon®, nylon, and quartz filters to capture the various constituents of most interest including elements, elemental and organic carbon, and major ions including nitrate, sulfate, chloride, and ammonium. However, technology in this area is expected to change and continuous chemical speciation methods are expected to be available in the future. EPA expects that the Supersite program will provide a useful interface to transition new speciation sampling

technologies into routine applications.

The EPA is developing laboratory standard operating procedures (SOPs) that will be consistent with techniques used by various agencies and research groups currently operating ambient air particulate matter speciation programs. Sampling for speciation purposes is a developing science, and as such, the U.S.EPA encourages creative approaches to speciation measurements. Retaining flexibility by not prescribing speciation sampling methods should be interpreted as a technology driver. Of course, the penalty for flexibility is some degree of data uncertainty stemming from different methods. The greatest uncertainty of the speciation sampling and analysis program exists in the laboratory protocols; therefore, the EPA is requiring greater standardization for the laboratory analysis component. The EPA has established a national laboratory analysis contract to support the chemical speciation program, and feedback from State and local monitoring agencies indicates that nearly all chemical speciation sampling programs will use this laboratory. All trends sites will use the national contract for filter analyses. The single exception to this is the Interagency Monitoring of Protected Visual Environments (IMPROVE) program, which has its own centralized laboratory.

The speciation program has been funded at a level to accommodate approximately 300 sites at the various sampling frequencies previously mentioned. This total of 300 sites reflects a planning estimate. Fifty-four speciation sites are required by 40 CFR 58, Appendix D, §2.8.1.5 regulation, and will serve as speciation trends sites. These 54 sites will be located in high population areas and in areas with emissions of interest such as the existing Photochemical Assessment Monitoring Stations (PAMS) #2 sites or at other sites with collocated FRM/FEM samplers. Additionally, approximately 40 sites will be used to coordinate the States' speciation programs with those of the Supersites. The balance between the 54 trends sites with the 40 Supersites support sites, and 300 planned sites reflects the need to tailor certain sites to area-specific needs. For example, some areas may choose to focus on episodes or specific seasons, such as winter time wood smoke. States will have some flexibility with these supplemental sites to design their speciation networks appropriately, for example, to operate fewer sites on more frequent schedules than an every sixth day schedule, or to adopt seasonal sampling regimes during periods of high particulate loadings. It is possible, and even likely, that some of these activities will be more resource intensive, particularly if additional types of analyses are needed or if advanced methods are used. These things will need to be taken into account in funding the program, and as necessary and technically warranted, they will impact the total number of supplemental (i.e., non-trends) speciation sites that will be installed. Alternative speciation approaches will be considered on a case-by-case basis through negotiation with appropriate EPA Regional Offices and the Office of Air Quality Planning and Standards (OAQPS).

Because data from the chemical speciation sites is of interest to the scientific community, the U.S.EPA encourages State and local agencies to develop their chemical speciation networks in consultation with local and national researchers who are conducting health effects studies. Funding to increase sampling frequencies at selected sites near Supersite study areas, and for a limited amount of daily speciation sampling is being provided through the State and local agency grant program.

Supersites (referred to as the "Special chemical speciation studies" in the March 1998 Implementation Plan). The primary objectives of the Supersites are to support SIP development activities, to provide information to support health effects studies and the reviews of the particulate matter NAAQS, and to assist in the testing of advanced sampling methods. The more "routine" chemical speciation program described above is a critical tool that will support both of these activities; however, they may need to be supplemented by more intensive data collection activities in order to better understand region-specific air pollution processes and to improve on the subsequent SIP development process. Assessments of technical tools such as source attribution techniques, emission inventories, or air quality models which predict over continuous time and space frames benefit from monitoring that has increased spatial, temporal, and chemical composition resolution. Historically, regulatory air programs have been criticized for not more fully utilizing special intensive studies to test the technical tools used for planning. To address these concerns, the U.S.EPA has established the Supersites which is dedicated to conducting specialized monitoring to address some of the rigorous demands involved in air quality assessments. The Supersite awards were announced in January 2000 and they include the following projects:

- Atlanta. Advanced methods evaluation leveraged with multiple air quality and related studies. Monitoring was conducted during the Summer 1999.
- Fresno. Methods evaluation with transition to routine networks leveraged with a major air quality study (CRPAQS) and several potential health related studies. Monitoring began in the Summer 1999 and will continue to Spring 2001 as the "CA Supersite Phase II". The Principal Investigator is John Watson, Desert Research Institute.
- Houston. David Allen, University of Texas at Austin, "Gulf Coast Aerosol Research & Characterization Program."
- St. Louis. Jay Turner, Washington University, "St. Louis - Midwest Supersite."
- Los Angeles. John Froines, University of California Consortium, "Southern California Particulate Matter Supersite."
- Baltimore. John Ondov, University of Maryland, "Baltimore Supersite: Highly Time & Size Resolved Concentrations of Urban $PM_{2.5}$ & its Constituents for Resolution of Sources & Immune Responses."
- Pittsburgh. Spyros Pandis, Carnegie Mellon University, "The Pittsburgh PM Supersite: A Multidisciplinary Consortium for Atmospheric Aerosols Research."
- New York City. Ken Demerjian, ASRC, State University of New York "$PM_{2.5}$ Technology Assessment & Characterization Study in New York."

The sampling and analysis may result in diurnal profiles of size-resolved and chemically speciated aerosols. In addition, secondary aerosol precursor and intermediate species such as nitric acid, ammonia, nitrogen dioxide and other NO_y constituents, peroxides and peroxy radicals could be measured to provide challenging tests of chemical mechanisms within air quality models. These measurements offer the peripheral advantage of supporting ozone and deposition assessments as well, since many of the physical and chemical processes operate across several pollutant categories.

Additional Supersites activities include enhancing some of the existing field studies, supporting existing programs, epidemiological and other health studies, and developing focused approaches on unique problem areas. The Supersites are being coordinated with ongoing national and regional activities in order to take full advantage of these efforts and available funding.

Funding for the Supersites is provided by EPA's Science and Technology (S&T) funds rather than §103 grant funds as for other program elements. The total funding package includes $20 million provided through the OAQPS, and $ million provided through the ORD.

IMPROVE Monitoring. There are a variety of strong technical connections between visibility and fine aerosols monitoring that support a comprehensive monitoring program that services both $PM_{2.5}$ and visibility assessments. The new $PM_{2.5}$ monitoring regulations encourage the placement of $PM_{2.5}$ monitors outside of population centers to facilitate implementation of the $PM_{2.5}$ NAAQS and to augment the existing visibility fine particle monitoring network. The coordination of these two monitoring objectives will facilitate implementation of a regional haze program and lead to an integrated monitoring program for fine particles. The 40 CFR 51 Regional Haze Regulation, published in the ***Federal Register*** on April 22, 1999, includes visibility monitoring requirements (www.epa.gov/oar/vis). This proposed haze regulation makes monitoring data representative of class I areas important to the State and local agencies since they are the basis for determining whether additional emission reductions would be needed to meet visibility targets.

The IMPROVE Network is operated by a Steering Committee that includes representatives of EPA, National Oceanic and Atmospheric Administration (NOAA), and the federal land managers (FLM) who are responsible for preserving and improving air quality over the lands in their charge (National Park Service, Forest Service, Fish and Wildlife Service and Bureau of Land Management). The IMPROVE Steering Committee also includes representatives from three state-based organizations (State and Territorial Air Pollution Program Administrators (STAPPA), Western States Air Resource Council (WESTAR), and Northeast States for Coordinated Air Use Management (NESCAUM)) in recognition of the States' interest in this program. Funding for basic IMPROVE network comes from the §105 funding, and resources to cover the IMPROVE expansion has been available through the §103 $PM_{2.5}$ grant budget. The IMPROVE Steering Committee has worked closely with the States to design the expanded IMPROVE network of 110 sites. Additionally, there are several State and tribal air monitoring agencies that have decided to purchase, install, and operate 11 additional IMPROVE type sites as part of their chemical speciation network in rural areas. We expect that the IMPROVE network expansion will be completed in 2000.

Quality Assurance and Data Assessment. The quality assurance (QA) program strives to ensure that the network produces $PM_{2.5}$ data of the quality necessary to support the objectives of the program. The quality assurance program covers many areas:

1. Establishment of data quality objectives that will ensure the usability and defensibility of

the $PM_{2.5}$ data in regulatory actions. At this time, EPA has started an evaluation of the $PM_{2.5}$ air quality data to determine if the monitoring system's performance meets these objectives. We intend to provide a report on the 1999 initial data in August/September 2000.

2. Development and implementation of a program for designating federal $PM_{2.5}$ reference and equivalent methods, ensuring that each type of monitoring instrument will operate within similar bias and precision limits.

3. Development of standardized operating procedures for field, sample handling, and laboratory activities, to ensure data comparability. This effort has been completed.

4. Requirements for a broad range of standardized quality control activities to evaluate and control measurement uncertainties or errors, including a template for State and local agencies to use to validate $PM_{2.5}$ data. This effort has also been completed.

5. Collocation of samplers to quantify measurement precision. As noted earlier, EPA will include information on the monitoring network's precision in a report on the 1999 initial data in August/September 2000.

6. Performance of a federally implemented independent FRM performance evaluation program (PEP) to quantify system bias. EPA will include information on the monitoring network's bias and PEP results in a report on the 1999 initial data in August/September 2000.

7. Implementation of qualitative assessments at the local and Federal level to ensure the proper development and operation of the quality assurance program. This includes, for examples, technical systems audits and management system reviews.

8. Development and implementation of a data analysis plan for the currently operating 13 minitrends chemical speciation sampler intercomparison, and other speciation sampler intercomparisons as necessary (e.g., using advanced methods, comparisons between the IMPROVE and trends samplers.)

9. Work with the continuous monitoring work group to provide State and local agencies with approaches for correlating continuous measurements to FRM air quality data for use in Air Quality Index (AQI) reporting. AQI reporting is required for cities over 350,000 in population, as listed in 40 CFR 58, Appendix G.

10. Provide continuing technical support and evaluation including activities such as the OAQPS operated monitoring platform used to evaluate methods and measurement

approaches.

B. Implementing the Program: Milestones, Mechanisms, Training, and Resources

Schedules and Milestones. Table 2 provides an update to the original listing of the major actions, training, and milestones for the implementation of the $PM_{2.5}$ monitoring network. This list includes only the major milestones.

Table 2. $PM_{2.5}$ Monitoring Implementation Schedule.

ACTION	MILESTONE
40 CFR 50, 53, and 58 $PM_{2.5}$ regulation	July 18, 1997 Part 58 available on AMTIC* Parts 50 and 53 available on TTN Airlinks (http://www.epa.gov/ttn) Subsequent correction notice on 2/17/98;
States & Regions develop & approve network designs	September 1997 - June 30, 1998 Review & approval on July 1 of each year.
States establish 1,050 $PM_{2.5}$ sites	September 1997 - December 31, 1999
"Guidance for Network Design & Optimum Site Exposure for PM"	December 15, 1997 - Available on AMTIC under Network Design*
Award for national procurement contract to buy 46.2mm Teflon® filters for use in FRMs.	January 31, 1998
"Summary of Guidance: Filter Conditioning & Weighing Facilities & Procedures for $PM_{2.5}$ Reference and Class I Equivalent Methods"	February 27, 1998
"Particulate Matter ($PM_{2.5}$) Speciation Guidance (Draft to work group for review on February 25, 1998)	February 25, 1998 - 1st draft July 1998 - Recommendations from Expert Panel October 7, 1999 - Final
Model QA Project Plan Guidance Document	March 6, 1998 (final draft) March 31, 1998 final version signed by each Region
U.S.EPA awards nat'l $PM_{2.5}$ sampler proc. contract & makes first orders (info on # and type of samplers must be compiled by Regions and to OAQPS by March 2, 1998.)	March 25, 1998 contract award April 1998 first set of FRM orders June 1998 second set of FRM orders
FRM/FEM designations granted (Specific samplers and vendors listed here. This is a continuing process, however, and other samplers may go through with designation in the future.)	BGI single channel & portable 4/16/98 R&P single channel & sequentials 4/16/98 Andersen single channel & sequentials 6/11/98 Thermo Env. Instr. single channel 10/29/98 Andersen portable audit 3/11/99 R&P portable audit 4/19/99

QA Handbook (Red Book) with final Method 2.12 "Monitoring $PM_{2.5}$ in Ambient Air Using Designated Reference or Class I Equivalent Methods."	May 14, 1998 Final June 2000 - Next revision–to incorporate info learned from 1st year.
U.S.EPA/NARSTO Workshop on the Supersites program design with scientific community.	May 19, 1998 Steering Committee mtg. June 11, 1998 Workshop
U.S.EPA/AWMA Training on $PM_{2.5}$ Laboratory and Sampling Equipment	May 20-21, 1998 in RTP, NC
Vendors deliver first orders for FRM samplers to States	June 1, 1998 - November 3, 1998
"Guidance for Using Continuous Monitors in $PM_{2.5}$ Monitoring Networks"	June 5, 1998
FRM Performance Evaluation Program QA Project Plan	June 1998
States submit final 1998 $PM_{2.5}$ network descriptions to Regions	July 1, 1998
Regions approve final $PM_{2.5}$ network descriptions	July 31, 1998
FRM Performance Evaluation Program Implementation Plan	August 28, 1998
FY99 §103 grant guidance to Regions from OAR (Draft in March)	October 23, 1998 (Final)
Portable QA FRM audit samplers delivered to PEP Auditors	October 30, 1998
FRM Performance Evaluation Program Standard Operating Procedures	November 2, 1998
"Field Program Plan for the $PM_{2.5}$ Chemical Speciation Sampler Evaluation Study"	November 23, 1998
Speciation laboratory analysis contract award	December 1998
Development of the Data Quality Objectives (DQOs) for the 54 Trends Sites	December 16, 1998
Quality assurance project plans approved by Regions	December 31, 1998 - December 31, 1999
Supersites research public solicitation	March 9, 1999
$PM_{2.5}$ Data Validation Template for use with mass data.	April 6, 1999
Strategic Plan for Development of the Particulate Matter ($PM_{2.5}$) Quality System for the Chemical Speciation Monitoring Trends Sites"	May 19, 1999
"Visibility Monitoring Guidance" EPA-454/R-99-003	June 1999
States submit final 1999 $PM_{2.5}$ network descriptions to Regions	July 1, 1999
Atlanta Supersite data collection activities	Summer 1999
Fresno Supersite data collection activities, Phase 1 & 2	Summer 1999 to Spring 2001
"Quality Assurance Project Plan: $PM_{2.5}$ Speciation Trends Network"	October 27, 1999 (3rd Draft)

Deployment of initial chemical speciation sites ("mini-trends")	November 1999 (Equipment delivery & training) February 2000 (1st data collection) May 2000 (study completion)
1,050 $PM_{2.5}$ FRM sites are established + all required continuous monitoring sites & States begin "routine" data collection.	December 31, 1999
Supersites award announcement at the PM2000 Conference in Charleston, SC	January 25, 2000 Sampling to begin in 2000-2001.
Chemical Speciation Program Satellite Broadcast	March 21, 2000
$PM_{2.5}$ Monitoring, Quality Assurance & Data Analysis Workshop (targets State, local and tribal monitoring agencies)	May 22-25, 2000 in RTP
States submit 2000 $PM_{2.5}$ network descriptions to Regions, which includes chemical speciation sites.	July 1, 2000
Deployment of all chemical speciation trends sites (54 total including 10 daily sites), and speciation sites used to support Supersites activities (~40).	December 31, 2000
Deployment of supplemental chemical speciation sites (~200).	October 2000 - October 2001

**For $PM_{2.5}$ information on the Ambient Monitoring Technology Information Center (AMTIC), see http://www.epa.gov/ttn/amtic/amticpm.html*

Major National Procurements. The U.S.EPA developed national procurement contracts for elements of the program that benefit from centralized (or regional) coordination. The benefits from these including a net reduction in administrative burden, the advantage of economies of scale, consistency in services/products supplied, and the increased ability to account for expenditure of State Grant funds. National procurement vehicles include:

1. Multi-vendor, 5-year, National $PM_{2.5}$ Sampler Procurement Contract for the purchase of samplers including FRM/FEM (both single channel and sequential varieties), speciation samplers, and portable FRM audit samplers, and associated accessories for each. The Request for Proposals was published on October 29, 1997, the vendor pre-proposal conference was held on November 6, 1997, and contract award was made on March 25, 1998.

2. National 5-year contract for purchasing the 46.2 mm Teflon® filters used for the $PM_{2.5}$ FRM/FEM; and a national purchasing vehicle for the 37 mm Teflon® filters used for dichotomous samplers.

3. Field and laboratory support for national FRM Performance Evaluation Program; awarded and operational by January 1, 1999.

4. Laboratory services for chemical speciation filter analyses, awarded to Research Triangle Institute.

These procurement efforts are a service provided by the U.S.EPA, and although State/local agency participation is not mandatory, we have experienced an extremely high level of participation in these efforts.

Resources and Grant Allocations. Funds to support the complete deployment and operation of the $PM_{2.5}$ network were provided under authority of the Clean Air Act §103 in FY-98 ($35.6 million), FY-99 ($50.7 million), and FY-00 ($42.5 million). Since several aspects of the monitoring program involve national procurement, substantial levels of Grant funds have been withheld to meet these expenditures (~20-25%). Categories subject to grant withholding include funding for samplers purchased from the National $PM_{2.5}$ Sampler Procurement Contract (FRM/FEM, portable FRM audit samplers, and speciation samplers), filters, chemical speciation analyses, IMPROVE samplers, and national FRM performance evaluation program costs.

The FY-00 budget of $42.5 million is the level of funding that will be needed to fund the State and local agency operated portions of the $PM_{2.5}$ network as it is currently designed.

Training. The implementation of the $PM_{2.5}$ ambient monitoring program has required a significant amount of training in a number of diverse subjects. This training has been arranged by EPA (as listed in the milestone table), by the equipment manufacturers, and by State and local air quality monitoring agencies. The U.S.EPA's training program focuses on four areas: $PM_{2.5}$ network design, sampler operations, laboratory procedures, and quality assurance/quality control for field and laboratory activities. The U.S.EPA is using a number of mechanisms for both formal and informal training with stakeholders in the $PM_{2.5}$ monitoring program. A listing of these mechanisms follows:

- **Workshops** - The Regional offices have hosted workshops for their States on several occasions, and the OAQPS has hosted one workshop for all States in May 1998. OAQPS will host another $PM_{2.5}$ Monitoring, Quality Assurance, and Data Analysis Workshop on May 22-25, 2000 in Research Triangle Park, NC.
- **Satellite Training** - Satellite training workshops have been used to provide an initial overview for managers and a technical program for monitoring and laboratory technicians with an interactive component. These productions are available on video tape for later viewing.
- **Technical Assistance** - U.S.EPA is providing expert assistance from OAR, the Regional Offices and the Office of Research and Development (ORD) scientists and engineers in the design and implementation of specific $PM_{2.5}$ monitoring networks.
- **Courses** - The U.S.EPA is revising its existing Air Pollution Training Institute (APTI) courses to incorporate $PM_{2.5}$ monitoring information. Courses will take the form of on-

site training, satellite broadcasts, or self-instructional courses.

- **Guidance Manuals**
- **Web Site** - Technical information pertaining to $PM_{2.5}$ monitoring is posted on the AMTIC, URL address http://www.epa.gov/ttn/amtic/amticpm.html. A public forum area is also available on this page which allows users to submit questions on the $PM_{2.5}$ monitoring program directly to U.S.EPA contacts on these subjects.

C. **Options for a Revised Coarse Particle NAAQS**

On May 14, 1999, the U.S. Court of Appeals for the District of Columbia Circuit issued an opinion in response to challenges to the NAAQS filed by industry and others (American Trucking Association v. U.S.EPA) that vacated the revised coarse particle (PM_{10}) NAAQS. (The 1987 PM_{10} NAAQS is still in place.) While the Court did find "ample support" for EPA's decision to regulate coarse particulate pollution, they did find that PM_{10} is "a poorly matched indicator for coarse particulate pollution" because PM_{10} contains fine particles.

EPA is now investigating the possibility of using a coarse particle indicator (PM_c) instead of the PM_{10} indicator in the currently applicable NAAQS. This coarse particle indicator would be defined as PM_{10} ! $PM_{2.5}$. The measurement approach would be to determine PM_c through taking the difference between concurrent, collocated measurements of PM_{10} and $PM_{2.5}$ (24 hour integrated measurements).

Our current thinking suggests that the $PM_{2.5}$ measurement would be as currently specified in 40 CFR Parts 50, 53, and 58, with the possible exception that specified-color filters and/or filter cassettes may be required to clearly distinguish between the PM_{10} and $PM_{2.5}$ samples. The PM_{10} measurement would also be as currently specified for $PM_{2.5}$ measurements in 40 CFR Parts 50, 53, and 58, with the following exceptions:

- The WINS shall be replaced by a straight tube (explicitly specified by drawing) [or by a "PM_{12}" WINS or modified inlet impactor to be developed (and explicitly specified by design), pending the results of inlet bounce tests to begin shortly].

- Specified-color filters and/or filter cassettes may be required to clearly distinguish between PM_{10} and $PM_{2.5}$ samples.

- PM_{10} samplers used for PM_c measurements must be clearly differentiated from PM_{10} samplers currently designated as meeting the original Appendix J or M PM_{10} requirements. This could result in two "classes" of PM_{10} samplers.

For both the $PM_{2.5}$ and PM_{10} measurements, EPA would expect to specify parameters such as the proximity (minimum and maximum separation and differential inlet height) of $PM_{2.5}$ and associated PM_{10} samplers; possibly the sampler data output string so that uniformity among all samplers and compatibility with AIRS is achieved; and the filter weighing, operational protocol, and quality assurance procedures for both PM_{10} and $PM_{2.5}$ to be matched. EPA would need to consider whether new performance and test requirements for sequential samplers may be necessary as well. Current thinking regarding the federal equivalent methods (FEMs) for PM_c includes various classes of equivalent methods such as:

Class I - same definition as for Class I $PM_{2.5}$ FEMs (i.e. minor deviations from PM_c FRM

requirements).

Class II - similar definition as for Class II $PM_{2.5}$ FEMs (filter based, $PM_{10}/PM_{2.5}$ differential method having non-minor deviations from PM_c FRM requirements) with both PM_{10} and $PM_{2.5}$ measurement techniques to be closely matched as to design and operation.

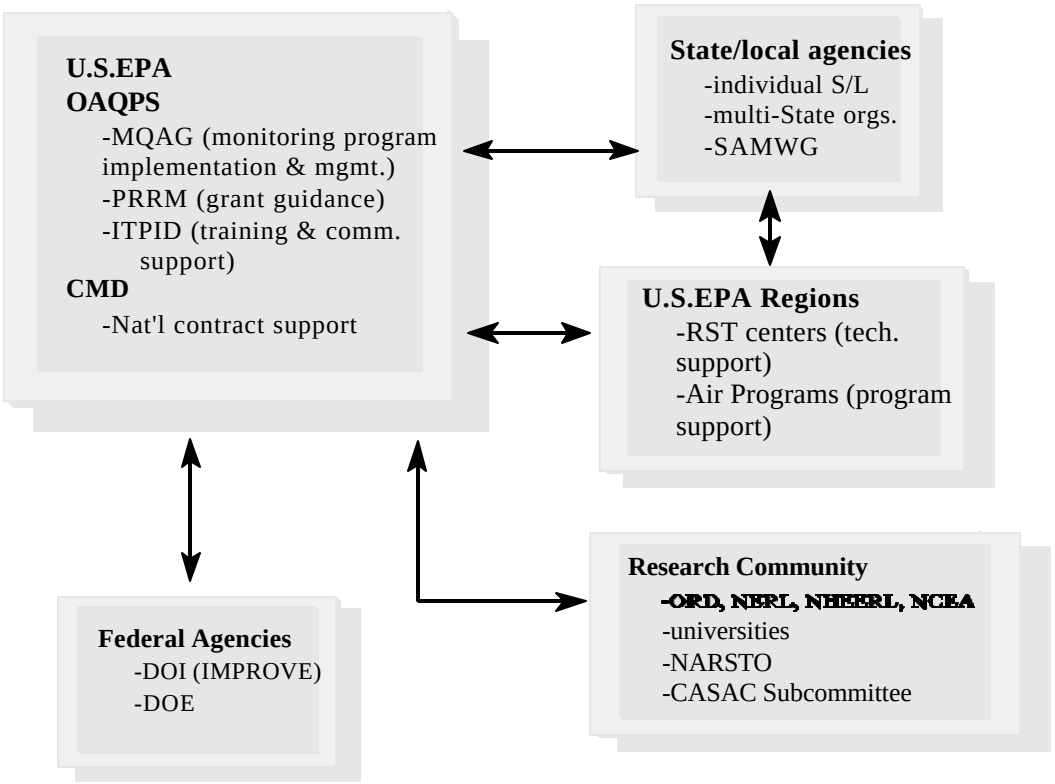
Class III - any candidate FEM not meeting Class I or Class II definition.

Obviously, significant effort will be necessary through the coming months in this area.

D. Communications

The roles and responsibilities described in the March 1998 Implementation Plan have not changed significantly over the course of the last 2 years, with the exception of how involved the scientific community has become. This is particularly true with regard to the chemical speciation program design and the Supersites program. The program has benefitted greatly from the expertise of external experts, and we intend to maintain this communication system. As presented in March 1998, Figure 1 provides an overview of the principal communications pathways.

Figure 1. Overview of Principal Communication Lines.



Common Acronyms

AIRS - Aerometric Information Retrieval System (maintained by the U.S.EPA)

ALAPCO - Association of Local Air Pollution Control Officials

AMTIC - Ambient Monitoring Technology Information Center, from U.S.EPA Internet site at http://www.epa.gov/ttn/amtic. Particulate matter information is available at http://www.epa.gov/ttn/amtic/amticpm.html.

APDLN - Air Pollution Distance Learning Network, U.S.EPA

APTI - Air Pollution Training Institute, U.S.EPA

AWMA - Air and Waste Management Association

CAA - Clean Air Act

CASAC - Clean Air Scientific Advisory Committee

CFR - Code of Federal Regulations

CMD - Contracts Management Division (within the Office of Acquisition Management, U.S.EPA)

CMZ - Community monitoring zone

CORE - Community-oriented monitoring

DOI - U.S. Department of Interior

DOPO - Delivery order project officer(s)

DQA - Data quality assessment

DQO - Data quality objectives

EORG - Education and Outreach Group, Information Transfer and Program Integration Division, Office of Air Quality Planning and Standards, U.S.EPA

FACA - Federal Advisory Committee Act

FLM - Federal land manager

FRM/FEM - Federal Reference Method/Federal Equivalent Method as approved by U.S.EPA

GPRA - Government Performance and Results Act

IMPROVE - Interagency Monitoring of Protected Visual Environments

ITPID - Information Transfer and Program Integration Division (within U.S.EPA OAQPS)

MARAMA - Mid-Atlantic Regional Air Managers Association

MQAG - Monitoring and Quality Assurance Group (within Emissions, Monitoring & Analysis Division of the Office of Air Quality Planning and Standards, U.S.EPA)

MSR - Management Systems Review

NAAQS - National Ambient Air Quality Standard

NARSTO - North American Research Strategy for Tropospheric Ozone

NAMS - National Air Monitoring Station(s)

NCEA - National Center for Environmental Assessment, U.S.EPA

NERL - National Exposure Research Laboratory (within the Office of Research and Development, U.S.EPA)

NESCAUM - Northeast States for Coordinated Air Use Management

NHEERL - National Health and Environmental Effects Laboratory, U.S.EPA

NOAA - National Oceanic and Atmospheric Administration

NPAP - National Performance Audit Program

NPS - National Park Service, U.S. Department of Interior

OAQPS - Office of Air Quality Planning and Standards, Office of Air and Radiation, U.S.EPA

OAR - Office of Air and Radiation

OPMO - Office of Program Management Operations, Office of Air and Radiation, U.S.EPA

ORD - Office of Research and Development, U.S.EPA

PAMS - Photochemical Assessment Monitoring Station

PM - Particulate matter, also further described for fine particles ($PM_{2.5}$), PM_{10}, and coarse particles (PM_c).

PRRMS - Planning, Resources, and Regional Management Staff (within U.S.EPA OAQPS)

PTFE - polytetrafluoroethylene

QA - Quality assurance

QAPP - Quality assurance project plan

RO - U.S.EPA Regional Office

RST - Regional Science and Technology laboratories/centers, U.S.EPA Regional Offices

RTP - Research Triangle Park, North Carolina

SAMWG - Standing Air Monitoring Work Group

SIP - State implementation plan

SLAMS - State or Local Air Monitoring Station(s)

SOP - Standard operating procedure

SPM - Special purpose monitor

STAPPA - State and Territorial Air Pollution Program Administrators

TSA - Technical systems audit

XRF - X-ray fluorescence

WESTAR - Western States Air Resources Council