

US EPA ARCHIVE DOCUMENT

Executive Summary
PM_{2.5} Monitoring Implementation Plan
2/17/98

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This is a working document which will be updated periodically as necessary to include updated information on the PM_{2.5} monitoring program implementation. Areas where we anticipate revisions in the near future include:

1. National PM_{2.5} Sampler Procurement Contract awards will be made March 31, 1998. Additional information on the samplers available on this contract will be incorporated into this document. This will include a listing of all vendors who received contract awards, and all currently designated PM_{2.5} federal reference and equivalent methods.
2. FY99 Grant/resource information.
3. PM_{2.5} Sampler performance documentation procedures.

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Executive Summary
PM_{2.5} Monitoring Implementation Plan

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). Substantial resources are being provided to support a national monitoring network of approximately 1,500 PM_{2.5} sites as described within President Clinton's Directive of July 16, 1997. The network will follow 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. 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. It is important to establish the network as soon as practicable so that other programmatic efforts relying on PM_{2.5} environmental data are not delayed. This document outlines the actions that U.S.EPA and State/local air pollution control agencies must undertake to establish the PM_{2.5} monitoring network, and it will serve as the organizational basis for network implementation. This document is not a treatise on the fine particulate matter air pollution problem; rather, it is intended to provide a common foundation and approach for the many individuals and organizations responsible for developing and deploying the PM_{2.5} network. The objectives of this implementation plan are to:

- Describe the rationale underlying the network and its components.
- Establish and affirm major products (e.g., training programs, procurements) and timelines required to implement the network.
- Define roles and responsibilities of organizational groups and individuals.
- Generate consensus among those responsible for network deployment and operation.

This executive summary provides an overview of the PM_{2.5} implementation efforts including the basic rationale for the various network components, a summary of the implementation activities and resources, and a description of the various roles and responsibilities across organizations. After the executive summary, the document starts with an overview of the PM_{2.5} monitoring regulations (Section 2), and a discussion of roles and responsibilities among U.S.EPA groups and State/local agencies (Section 3). Sections 4 through 9 address major program components (network design, sampling, laboratory analysis/speciation, data management, special studies, and quality assurance) representing core implementation elements that relate directly to budget allocation categories. Section 10 addresses the use of data beyond the data assessment and management activities that are discussed in Section 7. Sections 11 through 14 address the support and peripheral activities required to implement and track progress of the program. These include procedures for allocating costs and developing budget

estimates (Section 11), a plan for tracking program implementation (Section 12), training activities (Section 13), a compilation of major procurements (Section 14), program integration, liaison and communication activities (Section 15), and a summary and timeline for major products (Section 15).

A. Program Goal and Objectives:

The goal of the PM_{2.5} monitoring program is to provide ambient data that support the nation's air quality programs, including both mass measurements and chemically resolved, or speciated, data. Data from this program will be used for PM_{2.5} NAAQS comparisons, development and tracking of implementation plans, assessments for regional haze, and assistance for studies of health effects, and other ambient aerosol research activities. Clearly, the most immediate and highest priority for this program is developing a mass measurement data base for PM_{2.5} NAAQS comparisons. Chemically resolved data serve the implementation needs and the development of emission mitigation approaches to reduce ambient aerosol levels. These needs include emissions inventory and air quality model evaluation, source attribution analysis, and tracking the success of emission control programs. Chemical measurements also provide support for scientific studies of health effects and atmospheric chemistry that will inform future reviews of the particulate matter NAAQS, and for regional haze assessments.

The following basic PM_{2.5} monitoring program objectives service the requisite PM_{2.5} program information needs:

1. Designation of federal reference and equivalent method (FRM/FEM) samplers to collect data for PM_{2.5} NAAQS comparison purposes.
2. Establishment of a network of 1,500 PM_{2.5} sites by December 31, 1999, with 1,100 PM_{2.5} sites established by December 31, 1998. These 1,500 sites includes those using FRM/FEM samplers, sites employing continuous analyzers, chemical speciation sites, visibility measurement sites, and special purpose monitoring sites.
3. Development of a national chemical speciation sampling and analysis program by December 31, 1998.
4. Collection, measurement and storage of quality assured data beginning on January 1, 1999, to support NAAQS comparisons, PM_{2.5} program implementation needs, and regional haze assessments.
5. Development of the Special Chemical Speciation Studies Program which provide information to inform existing and future studies on health effects and emission source apportionment activities inherent in the development of State implementation plans (SIP).

Each of the above objectives are tied into the Government Performance and Results Act (GPRA) U.S.EPA air program goals related to the PM_{2.5} air quality program. These GPRA goals are a part of the program specific guidance elements that will accompany future grant guidance (FY99 and beyond) that is forwarded to the U.S.EPA Regions and State/local agencies.

B. Network Conceptualization and Major Program Components

The planned network serves multiple information needs, and reflects new siting and collection strategies. Consequently, the planned network is complex, difficult to describe, and subject to multiple interpretations based on an individual's perspectives and program familiarity. For example, the community-oriented siting of samplers and collection of mass data for comparison to the annual $PM_{2.5}$ NAAQS is different than for other criteria pollutants, which focus on peak concentrations measured anywhere in the ambient air.

As discussed in the previous section, 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 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 FRM, built with many design-specified components, is similar conceptually to the samplers used in the epidemiological studies supporting the $PM_{2.5}$ NAAQS. However, the FRM may not completely characterize fine particulate which are complex multi-phase (gas, liquid, solid) mixtures composed of various chemical constituents which vary across particle size ranges. Under certain conditions, sampling can be subject to various positive and negative artifacts. The FRM design with a Teflon® filter can experience a loss of volatile constituents (i.e., release of nitric acid vapor from particulate ammonium nitrate), which can be more completely captured by other sampling approaches. However, 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 will constitute part of the instrument mix utilized in the $PM_{2.5}$ network.

Network Elements.

Compliance monitoring. The network design addresses the aforementioned four program objectives through a combination of siting and instrumentation strategies. 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 projected 1,500 site network includes 848 sites required as a minimum by the 40 CFR 58 regulation. (Typically, deployed regulatory networks are made of many more sites than the minimum required by regulation.) A strict interpretation of the regulations suggests that a minimum of 745 sites would be eligible for comparison to the PM_{2.5} NAAQS requiring the use of FRM/FEM samplers, and the remaining 103 sites are used to meet minimum background and transport requirements and may or may not employ FRM/FEM samplers. The 652 supplemental sites will be used to address the needs for broader coverage of populated areas, spatial averaging, special purpose monitoring, and visibility.

The description of the federal reference method for PM_{2.5} 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. The PM_{2.5} equivalent methods will 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. A description of these differences is also included in the "Guidance for Network Design and Optimum Site Exposure for PM_{2.5} and PM₁₀," dated December 1997 and available on the U.S.EPA Internet site at <http://www.epa.gov/ttn/amtic/pmstg.html>.

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/nonattainment must employ designated FRM/FEM sampling techniques.

Special Purpose Monitoring. Strict compliance monitoring for comparison to the PM_{2.5} NAAQS is the highest priority, but not the only one, for the network. Special Purpose Monitoring (SPM) sites will provide a means to characterize ambient aerosol levels in as many areas as possible. Historically, there have been monitoring disincentives associated with the consequence of a site showing violations of a NAAQS. As a result, the U.S.EPA has provided significant flexibility on the use of PM_{2.5} SPM data for the first two years of a PM_{2.5} SPM's operation. In accordance with regulations contained in 40 CFR §58.14, PM_{2.5} SPM data that are collected with FRM/FEM samplers would not be used for compliance purposes for the first two years of its operation. If the sampling period extends beyond the second year, all of the PM_{2.5} SPM data collected with a FRM/FEM would be subject to the same data analyses as other FRM/FEM sites. The U.S.EPA believes that there will be more than sufficient compliance monitoring sites; the flexibility provided by SPM sites allows for better spatial, temporal, and chemical characterization of ambient aerosols and ultimately a more sound information base for developing emission mitigation strategies. Monitoring agencies are also encouraged to use SPMs to identify and evaluate areas that might be impacted by elevated PM_{2.5} air pollution levels, and where additional FRM monitoring may be necessary. Note: the 40 CFR 58 regulations do not require SPM sites to be equipped with FRM/FEM samplers.

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. In addition, the monitoring regulations allow the use of continuous samplers to reduce the resource burdens of everyday sampling in other areas where FRM/FEM samplers are not required. 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. If continuous samplers gain equivalency as a federal equivalent PM_{2.5} method, these samplers will be used for PM_{2.5} NAAQS compliance.

Chemical speciation sampling and analysis. 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 being conducted in various locations across the country.

The speciation program will provide identification of the chemical constituents including elements, elemental and organic fractions of carbon, and major ions including nitrate, sulfate, chloride, and ammonium. The design of the speciation sampler will be similar to that established in the Interagency Monitoring of Protected Visual Environments (IMPROVE) visibility monitoring program. Recognizing that the FRM with a Teflon® filter is limited with regard to capturing certain volatiles (e.g., nitrates) and enabling subsequent chemical analyses, the sampling approach for speciation is very simple: add two additional samplers (or modules) that have a nylon filter for nitrate capture and a quartz filter that is required for combustion analysis to separate the elemental and organic carbon fractions. Note: speciated data are not compared to the PM_{2.5} NAAQS and are not the basis for designating areas as attainment or nonattainment. The U.S.EPA is not requiring FRM/FEM designation for speciation samplers in recognition of substantial uncertainties and rapidly emerging technologies.

The U.S.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 U.S.EPA is requiring greater standardization for the laboratory analysis component.

Funding is provided for approximately 300 sites which would sample specifically for the purpose of providing speciated data. Fifty speciation sites are required by 40 CFR 58, Appendix D, §2.8.1.5 regulation, the majority of which will be placed 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 (with some exceptions for State and local air monitoring stations (SLAMS) sites designated as background or transport which may not include FRM/FEM samplers). The balance between the 50 required sites and 300 planned sites reflects the need for tailoring 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. Retaining a minimum of 50 sites for consistency across space and time for longer-term trends allows other sites to use a wider variety of approaches to address particular regional and local issues.

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.

The U.S.EPA does not believe that a single nationwide approach to speciation sampling and analysis is the best approach everywhere. The U.S. EPA does expect agencies to use a more standardized approach to sampling and analysis at the 50 required trends sites; however, flexibility in the approaches used at other chemical speciation sites is provided. These approximately 250 additional speciation sites may follow a sampling and analysis program similar to the 50 trends sites; however, alternative speciation approaches will be considered on a case-by-case basis through negotiation with appropriate U.S.EPA Regional Offices and the Office of Air Quality Planning and Standards (OAQPS).

Special chemical speciation studies. The two primary objectives of the special chemical speciation studies are to support SIP development activities and to provide information to support health effects studies and the reviews of the particulate matter NAAQS. 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, part of the monitoring program is dedicated to conducting specialized monitoring to address some of the rigorous demands involved in air quality assessments. Such monitoring is expected to include establishing “super” sites that sample for an array of chemical species on frequent sampling intervals at 5-7 locations, depending upon available resources, across the country. The sampling and analysis might 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. Other potential activities in special chemical speciation studies include enhancing some of the existing field studies, supporting existing programs, epidemiological and other health studies, developing focused approaches on unique problem areas, and conducting elevated sampling through aircraft or other means. The Special Chemical Speciation Studies will be coordinated with ongoing national and regional activities in order to take full advantage of these efforts and available funding.

Funding for the Special Chemical Speciation Studies is provided by U.S.EPA's Science and Technology (S&T) funds rather than §103 grant funds as for other program elements. U.S.EPA will conduct a workshop in the Spring of 1998 which will bring together the scientific and health effects research community for the purpose of providing input into this program's design.

Integration with visibility measurements. 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, proposed in the *Federal Register* on July 31, 1997, includes visibility monitoring requirements. This proposed haze regulation makes monitoring data representative of class I areas important to the states since they are the basis for determining whether additional emission reductions would be needed to meet visibility targets. The states would have the responsibility for ensuring the collection and use of the data to determine whether the targets are met. There are strong technical connections between visibility and fine aerosols monitoring that support a comprehensive monitoring program that services both PM_{2.5} and visibility assessments. These technical links include:

1. Fine particles are responsible for nearly all pollution-related visibility degradation.
2. Visibility extinction budgets are calculated through speciated aerosol measurements; the measurement and analysis approaches virtually are the same.
3. Spatial scales associated with visibility measurements (regional) are frequently the same as spatial scales associated with background and transport PM_{2.5} measurements (regional, urban). It is important to consider data collected in the regional haze program as part of the PM_{2.5} data analysis activities.
4. Sources that affect visibility are the same sources that affect PM_{2.5}, and control programs that impact visibility impact PM_{2.5} levels.
5. The new PM_{2.5} monitoring regulations permits the use of the IMPROVE samplers for background and transport sites, in spite of the fact that the IMPROVE sampler is not a federal reference or equivalent method for PM_{2.5}.

Clearly, the technical justification exists for merging these monitoring efforts. Since the late 1980's, the IMPROVE Steering Committee has managed and coordinated a network of approximately 30 IMPROVE sites and 40 IMPROVE "look-alike" sites to provide visibility-related information about aerosols and their chemical constituents in rural/remote environments. The IMPROVE chemically speciated data will also be useful in the overall PM_{2.5} program. In fact, the nation is currently in the unusual position where aerosols are better characterized in rural/remote environments relative to urban and populated areas, due to the effectiveness of the IMPROVE program. Similarly, there is pragmatic value of combining resource planning and network deployment efforts simultaneously as combined planning is far less burdensome than separate efforts.

For the past several years, State §105 grant funds have been used to support visibility monitoring via the IMPROVE program. 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). Their involvement in such monitoring programs represents a major advantage to U.S.EPA and the States for a number of reasons. They have access to secure monitoring locations and have provided staff to operate the equipment. For many sites, they have contributed the resources to purchase and operate complimentary monitoring equipment. They provide contract management for all phases of the field program (equipment procurement, deployment and maintenance; sample analyses; quality assurance; and data 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. With the technical connections between visibility and fine aerosols logically pointing to a comprehensive monitoring program that services PM_{2.5} and visibility assessments, a technical plan has been developed to integrate the PM_{2.5} network with the existing IMPROVE network. This plan includes establishment of 78 additional IMPROVE sites in or near Federal Class I areas over the next two years. Combined with the existing 30 IMPROVE sites funded through §105 Grants, these 108 sites, whose principal objective is visibility, will be considered part of the 1,500 site PM_{2.5} network. The estimated costs are \$2.47 million for 1998, and \$4.39 million for 1999. The plan also specifies that the IMPROVE protocol be changed to make it more compatible with the national PM_{2.5} monitoring program. Specifically, the IMPROVE sites would operate on a 1 day in 3 schedule for PM_{2.5} sampling, the past and new data would be stored in the new Aerometric Information Retrieval System (AIRS) database, and that a fraction of the IMPROVE sites would have collocated PM_{2.5} sampling with either IMPROVE or federal reference method samplers for gravimetric precision and inter-method comparison. It is anticipated that an expanded IMPROVE network will provide PM_{2.5} data that could be useful at some locations to aid States in the implementation of the new PM regulation.

The IMPROVE Steering Committee is committed to work closely with the States to select the class I areas for the expanded network as well as specific sites for monitors within the

selected areas. The first priority is to deploy monitoring sites that are representative of all of the class I areas that can be accomplished in a cost-effective manner. This may be done by some combination of high elevation and low elevation sites in a region with clusters of nearby class I areas (e.g. along the Cascade or Sierra mountain ranges).

By Feb 17, 1998, the chair of the IMPROVE Steering Committee will send a preliminary list of 25 to 30 class I areas to all appropriate State representatives for their comments and suggestions. The letter will also invite State representatives to accompany the FLM and IMPROVE contractors to select the specific locations for equipment during field trips (Spring 1998) to selected areas in their states or adjoining states. Responses from the states concerning the first 20 class I areas will be requested within three weeks (3/10/98). The same process operated on a somewhat more leisurely schedule will be conducted for the remaining 58 sites to be installed in 1999.

The IMPROVE Steering Committee has adopted several resolutions to facilitate the integration of the PM_{2.5} and Visibility networks:

- * The IMPROVE Steering Committee agrees to select additional sites in close consultation and full partnership with affected states for an expanded IMPROVE network in visibility-protected class I areas that can be monitored routinely in a cost-effective manner.
- * The IMPROVE Steering Committee endorses a continued and expanded state-FLM partnership to provide for the upgrade, continued operation and analytical support of aerosol monitoring at the 30 existing IMPROVE monitoring sites and the expansion of this network from 30 to 108 sites. The committee will seek recommendations from the States and FLMs for selection of areas and sites for representative visibility monitoring and will strive for consensus in development of the new national network. The purpose of this expansion is to track visibility in 156 mandatory class I areas and to provide information about regional transport of fine particles that will support PM_{2.5} SIPs. The State's contribution of \$103 and \$105 grant dollars will pay for new or upgraded monitors, quality assurance and analytical support. The FLMs will coordinate and arrange for all operational support for the collection of aerosol samples.
- * The IMPROVE Steering Committee agrees to the following in order to promote integration of the IMPROVE aerosol monitoring with the national PM monitoring program:
 - the sampling schedule will be changed to a 1 day in 3 schedule starting in 1998;
 - that all past and new data will be provided to U.S.EPA for storage in the new AIRS database; and
 - that a fraction of the monitoring sites will include routine collocated sampling to allow precision and comparability assessments.

Quality Assurance. 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.
2. Development and implementation of a program for certifying 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.
4. Requirements for a broad range of standardized quality control activities to evaluate and control measurement uncertainties or errors.
5. Collocation of samplers to quantify measurement precision.
6. Performance of a federally implemented independent FRM performance audit to quantify system bias.
7. Implementation of qualitative assessments at the local and Federal level to ensure the proper development and operation of the quality assurance program.

In addition, the consistency derived from the designation of federal reference and equivalent methods should be considered a major component of the quality assurance program. The complex nature of aerosols present substantial challenges in estimating system bias. Unlike criteria pollutant gases, aerosol standards for instrument calibration do not exist. Consequently, an important national FRM audit program will be implemented to capture overall system accuracy (bias and precision).

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

Schedules and Milestones. Table 1 provides a listing of the major actions, training, and milestones for the implementation of the PM_{2.5} monitoring network.

Table 1. 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)
States & Regions develop network designs	September 1997 - June 30, 1998 Progress posted on AMTIC*
States establish 1,500 PM _{2.5} sites	September 1997 - December 31, 1999
U.S.EPA Regions send States §103 PM _{2.5} grant guidance memo from OAR	January 9, 1998
Network design guidance (draft 9/20/97)	December 15, 1997 - Available on AMTIC under Network Design*
Delivery of 50 prototype PM _{2.5} samplers to States via Regions	December 1997 - February 28, 1998
QA guidance on sampling/filter handling (Method 2.12) (Final Red Book guidance available in March 1998)	December 1997 - Draft available on AMTIC under Quality Assurance*
Delivery of 37 mm Teflon® filters for dichots (nat'l purchase)	December 1997
U.S.EPA Regions will negotiate §103 work plans	December 15, 1997 - January 31, 1998
Preliminary feedback from States on # samplers and site types	January 15, 1998
PM _{2.5} : A Fine Particle Standard specialty conference sponsored by Air and Waste Management Association (AWMA)	January 28-30, 1998 Long Beach, California
Award for national procurement contract to buy 46.2mm Teflon® filters	January 31, 1998
U.S. EPA Network Design Videotape	February 1998 Jan Cortelyou, 919-541-5393
States §103 grant applications due to Regions containing approved program work plans and draft network plans	February 1, 1998
U.S.EPA Regions award §103 grants for PM _{2.5} monitoring	February 15 - March 1, 1998
Model QA Project Plan Guidance Document	February 28, 1998
FY99 §103 grant guidance to Regions from OAR	March 1998
QA Handbook (Red Book) with final Method 2.12 (Draft Method 2.12 available in December 1997)	March 1998

APTI Course SI436 - "Site Selection for the Monitoring of SO ₂ and PM-10 in Ambient Air" revised	March 1998 Deborah Miller, 919-541-5552
Regions provide OAQPS with sampler ordering information for FY98 based on State/local agency requests.	March 2, 1998
U.S. EPA APDLN Broadcast - PM _{2.5} Monitoring Update - Network Design/Balance Room Focus	March 25, 1998 Jan Cortelyou, 919-541-5393
FRM/FEM designations granted	March 31, 1998 and ongoing
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 31, 1998
U.S.EPA Workshop on the Special Chemical Speciation Studies program design with scientific community.	Spring 1998 (Specific details will be made available as soon as possible.)
U.S.EPA Regions provide comments to States on the draft network plans submitted with grant applications.	April 2, 1998
Continuous monitoring guidance (Draft in February 1998)	April 1998
U. S. EPA Videotape - Monitor Operations, Balance Room Set-up, COC	April 1998 Jan Cortelyou, 919-541-5393
Speciation monitoring guidance (Draft in February 1998)	May 1998
FRM Performance Audit Implementation Plan	May 1998
U. S. EPA APDLN Broadcast - PM _{2.5} Monitoring Update - Monitoring Focus	May 1998 Jan Cortelyou, 919-541-5393
FRM Performance Audit Standard Operating Procedures	May 1998
U.S.EPA/AWMA Training on PM _{2.5} Laboratory and Sampling Equipment	May 20-21, 1998 in RTP, NC Details available on AMTIC*
U.S.EPA orders 46.2 mm filters for speciation samplers (national small purchase)	May 1998
Vendors begin deliveries of FRM/FEM samplers to States (from 3/31/98 order)	June 1, 1998
Delivery of 46.2mm Teflon® filters	June 1, 1998
FRM Performance Audit QA Project Plan	June 1998
APTI Course SI434 - "Introduction to Ambient Air Monitoring" revised	June 1998 Deborah Miller, 919-541-5552
Site review guidance for "quality assuring 187 sites"	June 1998
States submit final PM _{2.5} network descriptions to Regions	July 1, 1998
Regions approve final PM _{2.5} network descriptions	July 31, 1998

APTI Course 435 - "Atmospheric Sampling" revised	July 1998 Deborah Miller, 919-541-5552
APTI Course 470 - "Quality Assurance for Air Pollution Measurement Systems" revised	August 1998 Deborah Miller, 919-541-5552
Speciation samplers delivered to States	September 30, 1998
Delivery of 46.2mm filters for speciation samplers (nat'l small purchase)	September 30, 1998
Portable QA FRM audit samplers delivered	October 30, 1998
APTI Course SI471 - "General Quality Assurance Considerations for Ambient Air Monitoring" revised	October 1998 Deborah Miller, 919-541-5552
U. S. EPA APDLN Broadcast - PM _{2.5} Monitoring Update - QA/QC Focus	October 1998 Jan Cortelyou, 919-541-5393
U. S. EPA Videotape - PM _{2.5} Monitoring QA/QC	Fall 1998 Jan Cortelyou, 919-541-5393
Speciation laboratory analysis contract award	December 1998
U. S. EPA APDLN Broadcast - PM _{2.5} Monitoring Update - Chemical Speciation Focus	December 1998 Jan Cortelyou, 919-541-5393
U. S. EPA Videotape - Chemical Speciation	December 1998/Winter 1999 Jan Cortelyou, 919-541-5393
Quality assurance project plans approved by Regions	December 1, 1998
1,100 PM _{2.5} sites are established	December 31, 1998
States begin "routine" data collection at 1,100 sites	January 1, 1999
1,500 PM _{2.5} sites are established (1,100 from 1998 + 400 add'l sites)	December 31, 1999
States begin "routine" data collection at 400 add'l sites (total of 1,500 sites nationally)	January 1, 2000
U.S.EPA Regions conduct oversight conference calls and/or visits with States on implementation of PM _{2.5} monitoring networks.	Quarterly
U.S.EPA reports on the States PM _{2.5} Monitoring Network implementation in mid-year and end-of-year grant reports.	Semi-annually

**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 is developing national procurement contracts for elements of the program that benefit from centralized (or regional) coordination. Potential benefits include 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 efforts in place or under development

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 spare parts 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 is slated for March 31, 1998. Copies of the request for proposals can be downloaded from the U.S.EPA's AMTIC Internet site at <http://www.epa.gov/ttn/amtic/amticpm.html>.
2. National 5-year contract for purchasing the 46.2 mm Teflon® filters used for the PM_{2.5} FRM/FEM; national small purchases for the 46.2 mm quartz and nylon filters used in the PM_{2.5} speciation modules; and a national purchasing vehicle for the 37 mm Teflon® filters used for dichotomous samplers.
3. Field and laboratory support for national FRM audits.
4. Laboratory services for chemical speciation filter analyses.
5. OAQPS small purchase orders for 50 prototype PM_{2.5} samplers for delivery to Regions and then on to State and local agencies for subsequent use to familiarize monitoring contacts with sampler operation. Funds for these samplers were taken from U.S.EPA OAQPS' budget, and did not require a §103 grant tap. These samplers will be delivered to each Regional Office by February 28, 1998.

These procurement efforts are a service provided by the U.S.EPA, and although State/local agency participation is not mandatory, the practical considerations of resource planning by the government and the vendor community almost demand an extremely high level of participation in these efforts.

Resources and Grant Allocations. Funds to support the complete deployment of the 1,500 site PM_{2.5} network by December 31, 1999, are expected to be provided under authority of the Clean Air Act §103. These funds will cover all network establishment and operational costs (all categories of capital, operations and maintenance, and labor) in FY98 and FY99. A summary of the funded PM_{2.5} monitoring network elements is provided in Table 2. These grant funds cannot be spent on programs unrelated to establishing the PM_{2.5} network, nor for items that do not directly benefit the States/local agencies. Since several aspects of the monitoring program involve national procurements, substantial levels of Grant funds will be withheld to meet these expenditures. 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 audit costs.

Table 2. §103 Grant Funding and PM_{2.5} Monitoring Network Elements.

FY98 - \$35,678,000 §103 Grant Funding Provided to States <i>Elements Funded:</i>	FY99 - \$51,852,500 Submitted in President Clinton's FY99 Budget Request <i>Anticipated Elements:</i>
1,100 PM _{2.5} Sites (existing sites and new FRM/FEM sites, all categories of site preparation, site establishment, samplers, and associated equipment.)	1,500 PM _{2.5} sites (includes 400 additional sites plus costs for 1,100 existing sites, all categories of site operation and maintenance, site preparation, site establishment, samplers, and associated equipment. Also, includes sampler replacement costs for existing non-FRM/FEM sites--approx. 141 dichots, continuous samplers, PM ₁₀ -PM _{2.5} conversions, and nephelometers.)
Filters (46.2 mm Teflon®, nylon, & quartz, for use in FY99 + 37 mm Teflon® filters)	Filters (46.2 mm Teflon®, nylon, & quartz, for use in FY00 + 37 mm Teflon® filters)
Meteorological equipment, installation, operation and maintenance (25 stations)	Operation and maintenance for established meteorological stations
Continuous samplers (52)	Continuous Samplers (operation and maintenance for 52 sites + possible other new sites)
Characterization (or saturation) studies	Laboratory upgrades (weighing rooms, balances, etc.)
Laboratory upgrades (weighing rooms, balances, etc.)	Speciation sampling (additional modules, sampling and analysis, operation and maintenance)
Speciation sampler modules (20)	IMPROVE sites (58 additional sites + operation and maintenance for existing sites)
IMPROVE sites (30 upgrades to existing sites + 20 new sites)	National FRM performance audits
National FRM performance audit infrastructure costs	

President Clinton's FY99 budget request includes \$51,852,500 for PM_{2.5} ambient air monitoring activities. The FY99 budget must still be acted on by Congress, and its amount could potentially change during this process. It is expected that Congress will authorize funds under the authority of the Clean Air Act (CAA) §103, as was the case in FY98. At present, this amount for FY99 is less than what is expected to be needed to fully implement the entire PM_{2.5} monitoring program elements as listed in Table 2 above, although it is expected to be sufficient to fund the operation and maintenance of the PM_{2.5} sites established in FY98 and the establishment of 400 additional sites in 1999. Depending upon the final budget figure for FY99, it may be necessary to defer the implementation of some program elements into FY00. The

U.S.EPA is currently reviewing the program needs for FY99 and identifying potential areas for deferment should this become necessary. Some of the elements under consideration include the meteorological monitoring, portions of the routine chemical speciation and analysis program, savings from temporary reductions in mass sampling frequencies, portions of the continuous sampling element, and replacement costs for older existing particulate matter equipment. It is U.S.EPA's intention to take all measures to ensure that any deferment does not impact the basic deployment of the 1,500 sites. U.S.EPA will share this information on the FY99 budget, and any new information on the FY00 budget, as it becomes available.

Internal U.S.EPA Resources. The U.S.EPA is providing significant resources to the PM_{2.5} monitoring program in addition to the §103 State and local agency grant funds to support the mainstream monitoring and monitoring support operations. The additional U.S.EPA resources, spread among the Office of Air Quality Planning and Standards, the Office of Research and Development, the Contracts Management Division, and the Regional Offices, support a variety of activities including: overall program management, development of guidance and training products, and the management of grants, procurements, and contracts. Complete details of the internal U.S.EPA budget requirements are included in other sections of the full PM_{2.5} Monitoring Implementation Plan.

Training. The implementation of any new ambient monitoring program requires resources dedicated to providing appropriate training in a number of diverse subjects; deploying a network to monitor a new pollutant with a new sampling method requires exceptional efforts. Given that the new monitoring network for PM_{2.5} will involve the selection of new sites, the operation of new federal reference method (FRM) samplers, the evaluation of other candidate monitoring methods, the analysis of existing demographics, and new metrics, a comprehensive and diverse training program is required. This program is designed in cooperation with the State and Territorial Air Pollution Program Administrators/Association of Local Air Pollution Control Officials (STAPPA/ALAPCO) PM Monitoring Training Subgroup to meet the needs of a range of environmental managers, data analysts, and technical staff, at the federal, state, and local government levels as well as selected representatives from the private sector.

Four PM_{2.5} monitoring training areas are currently being focused on, including PM_{2.5} network design, sampler operations and the FRM, 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**
- **Satellite Training** - Satellite training workshops will be crafted to provide an initial overview for managers and a technical program for monitoring and laboratory technicians with an interactive component. These productions will be available on video tape for later viewing. The first of these broadcasts took place on October 14, 1997, and four additional ones are planned.
- **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. Additionally, U.S.EPA is exploring the use of contractual assistance for both State and local government in the design and operation of 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>. The current nine categories of PM_{2.5} information are: Federal Register, Network Design, Federal Reference Method, Points of Contact, Implementation, Quality Assurance, Speciation, Training, and National Monitor Procurement. 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. This forum area is reviewed each day, and responses to each question will be provided as requested.
- **End User Provided Training** - Each of the Stakeholders in this project are supplying some PM_{2.5} training.
- **Hands On Training** - The U.S.EPA's OAQPS and ORD are developing an onsite monitoring platform in Research Triangle Park, NC, that is planned to serve as a technical training center and research platform for routine and emerging sampling technologies (Jenkins Road Platform). The U.S.EPA is also providing each Regional Office with prototype PM_{2.5} FRM/FEM samplers to be used to familiarize State/local agency personnel in basic sampler operation.

The U.S.EPA has formulated a PM_{2.5} Training Group to provide counsel in the development of PM_{2.5} training programs. Currently U.S.EPA is engaging the assistance of such varied groups as the NESCAUM, the Western States Air Resources Council (WESTAR), the Mid-Atlantic Region Regional Air Management Association (MARAMA), the California Air Resources Board (CARB), the AWMA, the STAPPA/ALAPCO, and others.

D. Roles and Responsibilities

The degree of complexity and the number of agencies involved with the PM_{2.5} monitoring program require that the flow of information and associated communications be structured to optimize the collective resources. The only realistic perspective on implementing this large program is one that recognizes that deployment and operation of this network is a shared responsibility among the involved governmental entities at the national, state, and local levels. The purpose of the following descriptions of roles across programs is to facilitate communications, and to outline very basic responsibilities.

State and local agency responsibilities. U.S.EPA could not effectively plan and execute this program without State/local participation. State and local agencies bear a tremendous level of responsibility for developing, implementing, and tracking the PM_{2.5} monitoring program. It is imperative that State and local agencies work with the U.S.EPA Regional Offices throughout this process to identify problems as early as possible, and to help find solutions to many of these issues. Some of the major activities that States and locals will deal with during the period of this program include:

- Participate in the PM_{2.5} network development activities. Identify and communicate PM_{2.5} network implementation problems to Regions as early as possible. Characterize problems in spending resources adequately, in obtaining technical guidance, and other issues that might complicate the implementation of this program.
- Provide PM_{2.5} network descriptions; work with Regions in developing these descriptions; work with the scientific community in designing the chemical speciation site networks.
- Provide QAPPs; work with Regions in developing these QAPPs.
- Provide information to Regions for sampler and filter orders from national contracts and other procurement vehicles.
- Identify and establish PM_{2.5} monitoring sites.
- Purchase support equipment for PM_{2.5} monitoring sites and network.
- Prepare sites and install PM_{2.5} monitoring equipment.
- Conduct acceptance review of PM_{2.5} samplers upon receipt. Inform U.S.EPA of any major acceptance problems.
- Participate in/run characterization studies.
- Participate in training activities, including multi-State conferences, U.S.EPA satellite broadcasts, and other training vehicles.
- Operate and maintain PM_{2.5} sites including operating FRM/FEM samplers, continuous samplers, and speciation samplers.
- Work with an existing laboratory or establish laboratory capabilities to conduct mass analysis determinations.
- Work with speciation laboratories to conduct filter analyses.
- Input PM_{2.5} mass and supporting data into the U.S.EPA's AIRS; conduct associated data validation activities.
- Review PM_{2.5} networks annually, and provide SLAMS data reports.
- Communicate with the public, including providing information on the PM_{2.5} network as requested, pollutant index reporting, and other bulletins.

- Provide PM₁₀ network reduction proposals to the Regional Offices as appropriate. PM₁₀ network reductions are encouraged as PM_{2.5} networks are being deployed.

The Office of Air and Radiation's Office of Air Quality Planning and Standards, the Office of Research and Development's National Exposure Research Laboratory, and the ten Regional Offices are the primary participants in the overall implementation of the PM_{2.5} monitoring network. The Office of Administration and Resources Management's Contracts Management Division is providing critical contractual support to establish the variety of national procurement contracts and small purchases. Major responsibilities for each of these offices are listed here.

U.S.EPA Regional Office Responsibilities. The U.S.EPA Regional Offices are the major communication link with State/local agencies in terms of both communicating the needs and concerns of States to U.S.EPA program offices and in communicating the objectives and guidance that often are developed by OAR to the State/local/tribal agencies. This role is rather complex and absolutely necessary in the development of effective policies and programs.

U.S.EPA's lead region for air monitoring issues is Region 6, and for air program issues it is Region 1; however, each of the ten Regional Offices have significant responsibilities toward developing, implementing, and tracking the PM_{2.5} program. These responsibilities include the following activities:

- Participate in the PM_{2.5} network development activities. Identify and communicate PM_{2.5} network implementation problems to OAQPS as early as possible.
- Provide support to the States as they develop their PM_{2.5} network descriptions; approve the initial network descriptions by July 31, 1998, and provide annual approvals thereafter.
- Provide support to the States as they develop their QAPPs; approve these QAPPs before formal data collection activities begin (January 1, 1999).
- Obtain and compile information from States for sampler and filter orders from national contracts; provide these orders to the OAQPS.
- Inform ORD and OAQPS of any major sampler acceptance problems identified during the State's acceptance review of PM_{2.5} samplers.
- Support the use of characterization, or saturation, studies.
- Participate in training activities, including multi-State conferences, U.S.EPA satellite broadcasts, and other training vehicles. Identify training needs and communicate these needs to OAQPS.
- Provide for the speciation laboratories to conduct filter analyses.
- Support the national FRM QA audits.
- Communicate with the public, including providing information on the PM_{2.5} network as requested, pollutant index reporting, and other bulletins.
- Provide SLAMS network approval authority and management activities. Take immediate action to review all SLAMS PM₁₀ proposed network reductions and all PM_{2.5} network additions. Work with State and local agencies to develop/amend QAPPs to consider PM_{2.5} measurements, and approve these plans prior to the collection of data.

U.S.EPA Office of Air Quality Planning and Standards responsibilities. Most budgetary and technical planning activities are coordinated through the OAQPS. The Monitoring and Quality Assurance Group (MQAG) within the Emissions, Monitoring, and Analysis Division (EMAD) is ultimately responsible for this implementation plan, most technical components (with support from ORD, Regional Offices, and States) and resource estimates underlying program implementation. Substantial additional support related to data analysis is provided from the Air Quality Trends and Analysis Group. Various forms of resource guidance necessary for the §103 and §105 grants distribution is coordinated through the Planning, Resources, and Regional Management staff within OAQPS. In addition, the Information Transfer and Program Integration Division is responsible for the AIRS data management system and for the Air Pollution Training Institute. OAQPS' responsibilities include:

- Primary responsibility for 40 CFR 58 regulation and communication to Regions, States/locals.
- Provide national program direction and planning.
- Provide §103 grant funding, allocations, and guidance.
- Provide for and support the AIRS national data repository.
- Provide training and guidance on the variety of elements required for the PM_{2.5} network deployment and operation; areas include network design, sampler operation, filter handling, speciation sampling and analysis, QA activities, etc.
- Work with the health effects research community to identify existing and future air monitoring needs to support epidemiological and other studies of health effects. Coordinate special chemical speciation studies program with these researchers and the ORD to ensure their usefulness to the health effects community.
- Assist in the development and approval of the PM_{2.5} networks; support both the Regional and State/local offices.
- Resolve issues associated with the PM_{2.5} program; act as a liaison with the Contracts Management Division, the Regions, and the ORD.
- Ensure that national or regional laboratories are available to support speciation and QA programs.
- Track progress in implementing the PM_{2.5} program. This includes working to identify air monitoring data needs to support State Implementation Plan activities.
- Identify and support characterization studies including the support of the saturation monitoring repository.
- Conduct management systems reviews of Regional Offices beginning in FY99.
- Provide support and direction for the national procurement contracts, including the preparation of statements of work, and technical evaluation of proposals.
- Establish communication links to Regions and State/local agencies through a variety of vehicles including work groups and electronic communications such as the Internet web site.
- Analyze and interpret the PM_{2.5} data, conduct comparisons against the NAAQS.
- Provide for the National Air Monitoring Station (NAMS) network approvals and for NAMS network management activities. Take immediate action to review all PM₁₀ proposed NAMS network reductions, and all PM_{2.5} NAMS network additions.

- Support the IMPROVE program and the operation of visibility measurement sites as they are integrated with the PM_{2.5} monitoring program.

U.S.EPA Office of Research and Development responsibilities: The ORD's National Exposure Research Laboratory provides many of the technical infrastructure elements for the program. This support includes:

- Designate PM_{2.5} samplers as FRM/FEM and provide technical support.
- Provide technical support for the national procurement contracts.
- Provide technical SOPs for filter weighing.
- Work with OAQPS and the Regions to support the QA program development, including providing Method 2.12 for PM_{2.5} monitoring.
- Provide technical SOPs and specifications for chemical speciation analyses.
- Work with OAQPS to develop the Special Chemical Speciation Studies program and act as a liaison with the health effects research community including the North American Research Strategy for Tropospheric Ozone (NARSTO) group.

U.S.EPA Contracts Management Division responsibilities. The Contracts Management Division (CMD) within the Office of Acquisition Management (OAM) is responsible for issuing contracts and various national procurements. These contracts are developed in concert with EMAD contract liaisons and MQAG and ORD technical staff. The CMD is responsible for all communications with vendors and extramural contract organizations. The CMD's responsibilities include:

- Develop national contracts for the sampler purchases and filter purchases; work with ORD and OAR contracts and technical staff to provide these products.
- Provide Contracting Officer and other contracting support for national procurements.

U.S. Department of Interior, National Park Service responsibilities. The National Park Service and federal land managers have a sincere interest in the Regional Haze program led by the U.S.EPA. They are currently operating IMPROVE visibility measurement sites, and they will continue to work with the U.S.EPA and other involved agencies in this regard.

- Work with State and local agencies to select class I areas to be monitored as part of the expanded IMPROVE/PM_{2.5} monitoring program.
- Deploy, operate, and maintain all IMPROVE sites in a cost-effective manner.
- Provide for upgrades and analytical support of aerosol monitoring at all IMPROVE sites as necessary.
- Provide existing and all new data from IMPROVE network to the U.S.EPA for storage in the AIRS database in a timely manner.

E. Communications

An organized communications framework is needed to facilitate the flow of information among the parties listed above as well as other users of the information produced by the PM_{2.5} network. Figure 1 provides an overview of the principal communications pathways. Note that in addition to communications among U.S.EPA and State/local agencies, other Federal agencies, industry and academia are important data users. Table 3 provides a listing of existing and emerging workgroups working within the PM_{2.5} program. Electronic transmission of information on this program is available through U.S.EPA's Internet site at <http://www.epa.gov/ttn/amtic/amticpm.html>.

Figure 1. Overview of Principal Communication Lines.

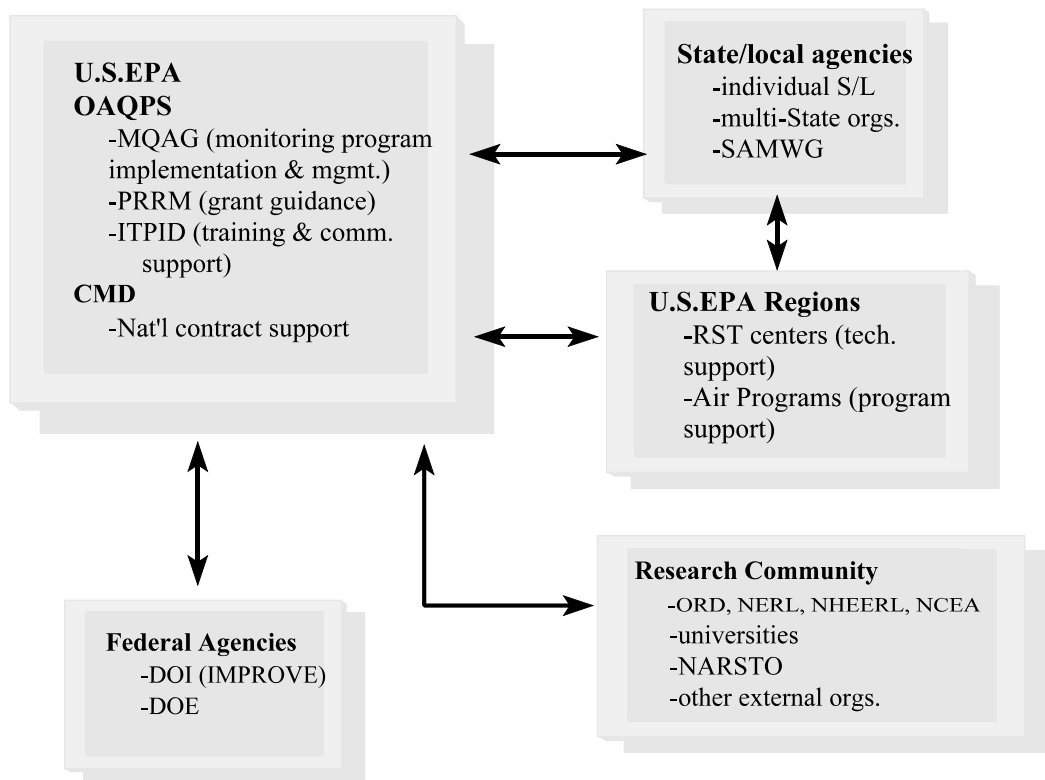


Table 3. Workgroups Addressing PM_{2.5} Monitoring Implementation

Existing Workgroups/Teams	Members & Primary Contacts	Function	Products
MQAG/U.S.EPA Implementation Team	MQAG/OAQPS/RO staff Lee Byrd, Rich Scheffe	Core working group to coordinate development of technical guidance products and budgets, and communicate program elements across OAQPS	State Grant Allocations; Cost Estimates; Consistent Communications; Overall Implementation Plan
PM _{2.5} Network Design Workgroup	OAQPS-MQAG, Regional Office staff Neil Frank	Core U.S.EPA monitoring workgroup to track progress and to deal with issues/problems related to the design of PM _{2.5} networks and their establishment.	Bi-monthly progress tracking reports; problem resolution on network design issues; network design guidance document
OAQPS PM _{2.5} QA Team	OAQPS-MQAG Mike Papp	Core team that is ultimately responsible for the development of the quality system and its associated guidance and training.	QA Guidance documents including distribution of Method 2.12 and QA Handbook revisions.
PM _{2.5} QA Workgroup	OAQPS-MQAG/Regional Office staff/ORD Mike Papp	Core work group to advise OAQPS PM _{2.5} QA Team on QA program	Technical input into guidance documents including Method 2.12 and QA Handbook revisions.
Chemical Speciation Workgroup	MQAG, RSTs, ORD, CARB Jim Homolya	Core work group to develop speciation program	Laboratory SOPs; Speciation Guidance Documents; Speciation Contract

National Monitoring Contract Workgroup	EMAD, CMD, OAQPS, ORD David Mobley, Vickie Presnell	U.S.EPA OAQPS Work group to develop National Monitoring Contract for Samplers	National PM _{2.5} Sampler Procurement Contract
PM Steering Committee/ Associated Work Groups: -Allocation/Programmatic -Process -Communications	U.S.EPA OAR, Regions 1 & 6, States/Locals	The Allocation/Programmatic Workgroup addresses funding issues (including tribal monitoring) and the network phase-in options. The Process Workgroup is responsible for the development of grant guidance materials. The Communications Workgroup is responsible for reviewing and supporting OAR communication activities.	§103 grant application form (completed) Internet site for PM _{2.5} program
Standing Air Monitoring Workgroup (SAMWG)	States/Locals; U.S.EPA OAQPS, U.S.EPA Regional Offices, Rich Scheffe	Advisory Panel to OAQPS on monitoring plans; programmatic, policy and technical issues; liaison with other State and locals	
STAPPA/ALAPCO Monitoring Committee	States/locals, MQAG U.S.EPA contacts: Rich Scheffe, Lee Byrd	Committee to identify and provide comment to U.S.EPA on State/local agency issues that arise with the PM _{2.5} monitoring program implementation.	
IMPROVE Steering Committee	U.S.EPA; States; Universities Marc Pitchford Bruce Polkowsky	Directing IMPROVE visibility monitoring program	Provide for DOI operation of the IMPROVE visibility measurement sites.

F. Technical Components

The following overview describes the approaches developed on implementing the major technical program elements (Network Design, Chemical Speciation, Quality Assurance, and Data Analysis).

Network Design/Deployment of Samplers

The design of PM_{2.5} networks, including sampler siting, selection of sampler designs, and selecting sampling frequencies, consists of several phases beginning with the promulgated 40 CFR 58 monitoring regulations which provide general national direction, and leading to the final iterative stages where the details of exact locations and sampler selections are coordinated between State/local agencies and U.S.EPA. The eventual network design will reflect a balance of practical considerations and desired conceptual characteristics. Some of these practical considerations include the accelerated 2-year phase-in schedule which shifts greater emphasis to the use of existing platforms (as opposed to new locations) and the use of the National PM_{2.5} Sampler Procurement Contract's impact on the timing of sampler orders and delivery. Although the regulation indicates that the State's plans are due to U.S.EPA by July 1, 1998, State participation in the National PM_{2.5} Sampler Procurement Contract and the new 2-year funding schedule will require that draft plans must be submitted to and reviewed by U.S.EPA in a shorter time frame (sampler orders will be placed in March 1998).

Network design can be broken into two phases, the first consisting of "national" estimates or general guidance, and the second more refined stage where exact locations and other details are proposed by State/local agencies and approved by U.S.EPA Regional Offices. The first phase (a 1,500 site network deployed over a two year period) is complete and was formed by a combination of a basic network providing minimal population coverage together with a largely top-down allocation of supplemental monitoring sites proposed by U.S.EPA. The combination of required SLAMS monitoring sites which will utilize FRM/FEM samplers together with supplemental monitoring sites which can use alternative samplers will provide the States with broad flexibility in establishing their networks.

The more important second phase is largely a State/local activity that is coordinated with U.S.EPA Regional Offices. The means through which network design descriptions are finally developed can be broken into four categories:

1. Major National guidance
 - 40 CFR 58 monitoring regulations
 - Network design guidance documents
 - Grants guidance and associated resource allocations

2. Continuing guidance
 - Correction notices to existing regulation
 - Memoranda on specific topics such as waivers for every day sampling and changes to sampling protocols
 - Network design workgroup input
3. Workshops and meetings
4. Discussions/negotiations, technical reviews, and site visits among State/local and U.S.EPA agencies.

Once complete, the final network description will be forwarded to the appropriate Regional Office by July 1, 1998, for approval by the Regional Administrator by July 31, 1998. Each network description will contain information on site locations; monitoring methods; sampling frequency; monitoring objectives; optional community monitoring zones and sites intended for making comparisons to the PM_{2.5} NAAQS; and a plan for deployment of future sites, implementation of QA procedures and other needed changes to the monitoring network.

An OAQPS/Regional Office work group has been established to help facilitate the development of the new particulate matter monitoring networks. Through bi-weekly conference calls, the group has been reviewing network design issues, preparing supplemental guidance, and resolving technical issues related to establishment of the new PM_{2.5} monitoring sites. The group has adopted a network design status tracking report within which each Region summarizes the network design activities among its States. This report is available on the AMTIC Internet site at <http://www.epa.gov/ttn/amtic/amticpm.html>. The network design status tracking report will allow Regional and OAQPS management to judge the positive movement of network design activities and highlight problem areas that require additional attention or problem solving. The tracking system will first report on general activities such as completed Regional/State discussions/meetings and will later discuss specifics such as identification of monitoring equipment, numbers and location of monitoring sites and completion of grant agreements. Issues that cannot be resolved or major impediments to the implementation of the network will be identified for management review.

To ensure national consistency in the development of the particulate matter networks and adherence to the principles and goals set forth in the 40 CFR 58, the OAQPS/Regional Office work group will compare and evaluate the State network plans across all 10 U.S.EPA Regions. The group will serve in an advisory role and its review will focus on (a) consistent deployment of compliance monitoring sites which principally represent community-oriented air quality and (b) uniform implementation of allowable waivers for sampling frequency, siting and other network requirements. An initial review is being conducted based upon the January 15, 1998, submittal of draft network plans and periodically thereafter as revisions to the network plans are received. A final review will occur upon submittal of the July 1, 1998 formal network descriptions. This process is also intended to facilitate information exchange, to assist the States in benefitting from innovative ideas and capitalizing on opportunities to make efficient use of available monitoring resources.

Table 4 summarizes the steps, associated vehicles and milestones associated with network design and deployment of monitors.

Table 4. Network design components and key milestones.

Component	Role	Date
Monitoring Regulations	Description of network components and requirements	7/18/97
EPA and State Workshops	Forum for dissemination of guidance, regulation interpretations, and establishing initial network descriptions [MARAMA, NESCAUM, WESTAR, SAMWG, U.S.EPA OAQPS and Regional Office workshops]	9/97-continuous
Network Design Guidance	Conceptual guide to sampler placement, data uses and interpretation of U.S.EPA regulations. Available on AMTIC at http://www.epa.gov/ttn/amtic/amticpm.html .	draft 6/97; final 12/97
Grant Allocations to Regions	OAQPS estimate of monitoring sites and associated resources by State	12/97
Draft network descriptions to U.S.EPA RO's	Initial estimates of # and type of sites and samplers Numbers and types of sites and samplers for March order (These activities accelerate the schedule for developing draft network descriptions.)	1/15/98 3/2/98
Deployment of 50 prototype samplers	Initial U.S.EPA funded samplers delivered to each State for testing/familiarization purposes	12/97 - 3/98
National PM _{2.5} Sampler Procurement Contract	Vehicle to procure samplers for network	contract award 3/31/98
Network descriptions	Final network descriptions submitted by States to U.S.EPA RO's	7/1/98; approval by 7/31/98

Chemical Speciation: Network, Sampling, and Laboratory Services Support

Requirements

Chemical speciation is included in the discussion of major monitoring requirements and principles set forth by the final 40 CFR Part 58 regulations. A chemical speciation network of 50 PM_{2.5} sites that provides a first order characterization of the metals, ions, and carbon constituents of PM_{2.5} is a requirement of this rule. These sites will be part of the NAMS network and will provide national consistency for trends purposes and serve as a model for other chemical speciation efforts. This required network represents a small fraction of all the chemical speciation work that U.S.EPA expects to support with Federal funds. Additional efforts may be used to enhance the required network and to tailor the collection and analyses of speciated data to the needs of individual areas. For planning purposes, U.S.EPA anticipates the national deployment of approximately 300 speciation samplers over the next two years.

Implementation

Sampling. At present, the speciation monitoring program consists of two components; sampling and laboratory analysis. The National PM_{2.5} Sampler Procurement Contract includes the provision for the purchase of over 300 speciation samplers, including accessories, and replacements for establishing the speciation monitoring network. The State and local PM_{2.5} network design descriptions will contain specific details on speciation monitoring requirements and siting. Speciation samplers will be provided as requested by the State and local agencies through delivery orders placed under the National PM_{2.5} Sampler Procurement Contract. The sampling approach currently being considered is consistent with that in the IMPROVE program. Essentially, three monitors (or modules) simultaneously collect on three filter media: Teflon®, nylon and quartz. The various filter media will provide appropriate substrates for elemental analysis through X-ray fluorescence (teflon), collection of nitrates (nylon) and combustion analysis for total elemental and organic carbon (quartz). The samplers can be similar to FRM/FEM instruments, or other available samplers. The FRM/FEM at a site can be used as one of the three modules since it already is equipped with a teflon filter. Many positive and negative artifacts are associated with aerosol sampling, especially with respect to organic compounds. Largely unquantifiable uncertainties exist that will drive research and development of new methods for sampling and analysis dedicated to characterizing the chemical constituents of aerosols. Given the expectation that new methods will emerge combined with the noncompliance use of the data (i.e., speciated data are not compared to NAAQS), the U.S.EPA is not requiring FRM/FEM designations for speciation samplers. For example, continuous speciated measurement systems may eventually be available that are suitable for these applications, and these systems would be considered for incorporation into the PM_{2.5} network when appropriate.

Laboratory Analyses. Samples collected from the speciation samplers will be analyzed for a predetermined list of target constituents through a network of 1-3 central contract

laboratories¹. The constituents of interest are similar to those currently being measured within the IMPROVE monitoring program. The contract laboratories will utilize uniform standard operating procedures (SOPs) and be directed and coordinated through three U.S.EPA Regional Delivery Order Project Officers (DOPOs) located in the Eastern, Midwestern, and Western parts of the country. QA oversight for the speciation laboratory services contractors will be provided by a complement of U.S.EPA Regional Science and Technology (RST) centers, each with specialized expertise in a particular set of speciation target constituents. The specific details regarding the services provided by a particular regional laboratory are being developed through an inter-laboratory workgroup facilitated by Regions 1 and 7. Note that U.S.EPA Regional Office air programs will receive support for the QA of speciated samples on a national level from the RST laboratories.

Resources

Speciation samplers will be purchased, installed, and operated using resources obtained through the State §103 grants for at least FY98 and FY99. Monitoring resource allocations for each state will be consistent with approved network design and siting plans. Speciation laboratory support services will be provided by establishing fixed-price unit costs for an appropriate tier of speciation analyses that can be provided. Each state will then allocate a portion of §103 grant monies to be included in a combined cost center to fund the contract laboratory services on a indefinite-quantity, indefinite-delivery basis. A deployment of 300 speciation samplers with one-in-six day sampling for 50 sites and one-in-twelve day sampling for the remaining 250 sites will require an estimated combined §103 grant allocation of \$2.25M/year which support 2-3 contract laboratories to provide analytical services. The Regional Delivery Order Project Officers and QA support from the U.S.EPA Regional Science Centers will be provided using existing staffing and laboratory resources. OAQPS/EMAD will utilize existing staff and internal FY-98 funding to develop guidance on speciation monitoring, sample analysis, data analysis, and overall program management and coordination.

Roles and Responsibilities

The following organizations are identified with the requirements and implementation of the speciation monitoring and analysis program:

Requirement	Organization
Network Design and Siting	States(lead), OAQPS(support)
Speciation Monitoring Guidance	OAQPS
Speciation Sampler Purchase	States(lead), OAQPS(support)
Speciation Laboratory Services Support	OAQPS(lead), U.S.EPA Regions 2, 5, 10(lead)
Speciation Laboratory QA Auditing and Technical Assistance	U.S.EPA Regions 1, 2, 7,9,10 (lead), OAQPS

¹ Certain States will operate their own laboratories for chemical analyses. Given the need for consistent application of laboratory methods and limited resources, most States that have been surveyed (informally) did not expect to develop laboratory capability for the chemical analysis of filters.

The network design and siting requirements for the speciation sampling portions of the PM_{2.5} program are being met through the development of the State network design and siting activities. These descriptions will provide information on speciation sampler purchase needs and planned locations. OAQPS/EMAD will assist the states in speciation sampler siting. The Speciation Monitoring Guidance is being developed by OAQPS/MQAG with contractor support from Desert Research Institute and in consultation with several technical elements within the IMPROVE monitoring program. The guidance document will aid states in the use and application of speciation samplers. The Speciation Sampler Purchase will be supported by the National PM_{2.5} Sampler Procurement Contract. The Speciation Laboratory Services Support and Speciation Laboratory QA Auditing requirements are being addressed by a Speciation Workgroup led by OAQPS/MQAG with participation by selected U.S.EPA Regions.

Schedule

The schedule of outputs and deliverables for the five speciation program requirement categories is contained in Table 6.

Table 6. Schedule for Speciation Program.

Speciation Program Requirement	Delivery Dates
Network design and siting a. Guidance provided to States by OAQPS b. Draft State design descriptions	12/15/97 1/15/98
Speciation monitoring and analysis guidance	Draft 2/98 Final 5/98
Speciation Sampler Purchase a. Summarize sampler and filter requirements from States b. Initial delivery of speciation samplers & filters to States	3/2/98 9/15/98
Speciation Laboratory Services Support a. Development of services contract scope of work and SOPs b. Award services contract c. Begin speciation analytical services support	2/28/98 12/15/98 2/15/99
Speciation Laboratory QA Auditing a. Develop QA protocols and Regional RST support plan b. Integrate QA auditing and technical support with State monitoring program and analytical services support contract c. Develop schedule and implement regional QA auditing and technical support for speciation analytical services	5/15/98 12/15/98 2/15/99

PM_{2.5} Quality Assurance

An important concern in any organization that is collecting and evaluating environmental data must be the quality of the results. A quality system is being developed and documented to ensure that the PM_{2.5} monitoring results:

- ▶ Meet OAR’s regulatory and scientific data needs;
- ▶ Satisfy customers expectations;
- ▶ Comply with applicable standards and specifications;
- ▶ Comply with statutory (and other) requirements;
- ▶ Reflect consideration of cost and economics.

The quality system includes a number of quality assurance and quality control activities including:

- ▶ **Flow check audits** - on every SLAMS monitor once every two weeks for automated instruments and each calendar quarter for manual instruments performed by the State/Locals.
- ▶ **Collocated sites**- 25% of the SLAMS performed every 6 days by the State/locals
- ▶ **FRM Performance Audits** - on 25% of the sites 4 times a year performed by the U.S.EPA Regions.
- ▶ **Technical systems audits** -performed by the State/locals and U.S.EPA.
- ▶ **Internal quality control**- activities performed as part of standard operating procedures

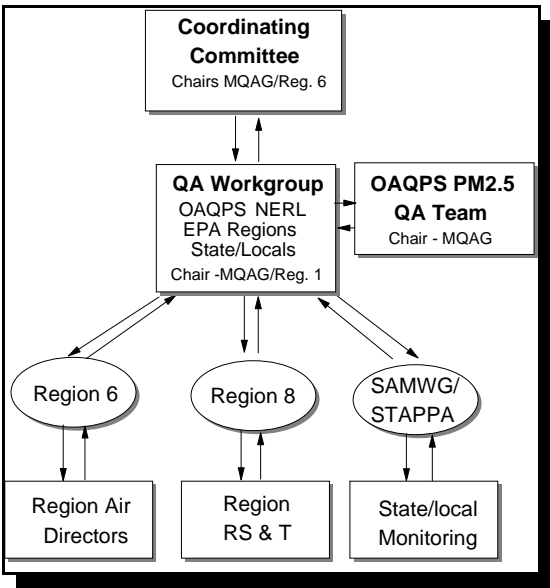


Figure 9.1 QA Communications

Each of these activities provides information that helps to control and evaluate the measurement system to ensure that the PM_{2.5} network produces the quality of data necessary for informed decision makers.

The quality system for PM_{2.5} is being developed and will be implemented through a coordinated effort between U.S.EPA OAQPS and Regions, and the State and local monitoring community. Figure 9.1 represents the communication network for QA activities. This communication network is being used to develop and implement the PM_{2.5} quality system and resolve QA issues. The various groups in this figure have the following responsibilities:

Coordinating Committee -This committee, co-chaired by Region 6 and OAQPS/MQAG has been established to address issues related to the implementation of the monitoring program. The co-chairs of the QA workgroup sit on this committee and report on QA issues needing resolution or clarification. This committee meets every two weeks.

PM_{2.5} QA Workgroup- This group is made up of OAQPS, NERL, EPA Regions, and State and

local participants and it is used as an advisory group to assist the OAQPS PM_{2.5} QA Team develop an appropriate and “implementable” quality system. The workgroup is chaired by Region 1 and OAQPS/MQAG. It is used to help develop consensus QA approaches, resolve specific QA issues, and is also used as a communication device to ensure the Regional Air Directors, Regional Science and Technology (RST) Directors, and State and local monitoring communities have input into the development of the quality system. This group meets every two weeks.

OAQPS QA Team - The QA Team is made up of quality assurance personnel in the OAQPS MQAG and meets weekly to address implementation of the PM_{2.5} quality system, develop budget allocations, develop/revise regulations, guidance and training, address specific technical issues and ensure proper communications among OAQPS, Regions, ORD, and State and local monitoring community. This group is ultimately responsible for the development of the quality system and its related guidance and training.

Elements of the quality system include planning, implementation, assessment and reporting. A listing of these products are included in Table 7. The development of these products will be the ultimate responsibility of the OAQPS PM_{2.5} QA Team but will require the input of many organizations as well as contractor support.

Planning - Includes the development of:

- ▶ **Data quality objectives**- in order to understand and control measurement uncertainty (precision and bias) to acceptable levels.
- ▶ **Guidance documents** - which would include the QA Hand Book, various project specific guidance (e.g., FRM performance audits), training guidance and standard operating procedures
- ▶ **Training activities**- in order to ensure proper implementation of the quality system training is required. This PM_{2.5} Implementation Plan includes a section specific to training.

Implementation - will include:

- ▶ **Internal quality control** - Implementation of the various internal quality control activities to control and evaluate sample collection instruments, which would include the monitoring and laboratory instruments.
- ▶ **Collocated monitoring** - Implementation of collocated monitoring by the State/locals at 25% of the SLAMS monitoring sites.
- ▶ **FRM Performance Audits** - Independent performance audits conducted through the U.S.EPA Regions and/or by organizations not responsible for routine monitoring.

Assessments -will include:

- ▶ **Technical systems audits**- Conducted by the U.S.EPA Regions of each reporting organization once every three years.
- ▶ **Network Reviews** - Conducted by the Regions and OAQPS to ensure network representativeness
- ▶ **Management Systems Reviews** - Conducted by OAQPS to review U.S.EPA Regions

management/implementation of the PM_{2.5} quality system.

Reports - will include:

- ▶ **Data Quality Assessments** - Yearly assessments of data quality in relation to the data quality objectives and the quality system.
- ▶ **P&A Reports** - Quarterly and annual reports associated with the precision and bias data.
- ▶ **QA Reports** - All encompassing reports generated approximately every 3 years that provide uncertainty estimates in the data base and report on the effectiveness of the QA program to provide data of acceptable quality.

FRM Performance Audits. These audits are an additional element to the PM_{2.5} program that attempt to quantify total system performance (precision and bias). Reference standards for aerosols are not available to challenge samplers in a manner comparable to gaseous pollutants. The FRM audits are designed to test the entire measurement system (sampler through laboratory filter weighing) through an independent means. The U.S.EPA Regional Office RST laboratories will be responsible for these audits. A combination of U.S.EPA contract and Federal personnel will perform these audits. Two Regional Laboratories will develop filter weighing facilities as centers for these audits. Field activities will be conducted by each Region.

Products and Deliverables

Table 9-2 Products and Deliverables.

Product/Deliverable	Completion
Planning Products	
QA Hand Book	3/98
Mass DQOs	10/97
Mass Model QAPP	2/98
FRM Performance Audit Implementation Plan	5/98
FRM Performance Audit SOPs	5/98
FRM Performance Audit QAPP	6/98
Network Review Guidance	6/98
Data Review Guidance	1/99
Implementation (Dates are implementation dates)	
FRM Performance Audits	1/1/99
Technical Systems Audits	1/1/99
Network Reviews	9/30/98
Management Systems Reviews	1/1/99
Assessments	
Data Quality Assessments	9/30/99
P & A Reports	6/3/99
QA Reports	1/1/00

Analysis of PM_{2.5} Data

The relationship between data collection activities and data interpretation and analysis is a factor in the network's design and subsequent changes in later years. That is, although data collection precedes analysis and interpretation, an understanding of the data's use, particularly with respect to making comparisons to the PM_{2.5} NAAQS, must drive the design of a data collection program.

The following includes some of the anticipated analyses of the PM_{2.5} data. Many of these analyses will be performed by OAQPS, others by the regions and state and local agencies, and some by other interest groups. To assist the state and local agencies, OAQPS/EMAD will provide guidance regarding various techniques for analyzing the PM_{2.5} mass and speciated data. Additionally, OAQPS/EMAD will conduct workshops to assist the state and local agencies in the use of these techniques for analyzing the PM_{2.5} data.

The PM_{2.5} data analysis will proceed in three phases. The first phase includes the period when the PM_{2.5} networks are being deployed up to the initial PM_{2.5} data reporting efforts. During this time, the guidance on the techniques useful in analyzing PM_{2.5} data will be developed. The second phase will occur from the time that the monitoring agencies first begin to report data until a couple of quarters of data are available. During this time, OAQPS will assess the data for its precision and accuracy and conduct some preliminary exploratory data analyses. The purpose of this phase is to provide a report documenting the quality of the data initially collected and steps needed to ensure adequate remedies to problems identified in this process. The third phase begins once there is sufficient, quality-assured data to conduct the analyses based on several quarters worth of data. During this third phase, OAQPS will work with the Regional Offices to conduct data analysis workshops to assist the state and local agencies.

Uses of the PM_{2.5} Mass Data.

Support of the PM NAAQS. After at least 3 years of data are available, the measured PM_{2.5} levels will be compared to the 24-hour and annual NAAQS for the purpose of determining nonattainment designations. Prior to the designations, the data will be analyzed for informational purposes and as part of the ongoing PM NAAQS review process.

Analysis of Trends. The annual trend in PM_{2.5} concentrations will be analyzed to track progress in solving PM_{2.5} air quality problems. Initially, a baseline will be established, from which progress can be evaluated.

Exploratory Data Analysis. Currently, our understanding of the extent of transport contributions, temporal variability, spatial variability, and impact of meteorology for PM_{2.5} concentrations is limited due to the minimal network currently measuring PM_{2.5} concentrations. Exploratory data analyses will be performed to enhance our understanding of the sources of variability. This understanding is essential for developing strategies for controlling PM_{2.5} concentrations.

Episode Selection for Air Quality Modeling. Since air quality models predict

concentrations for only a few days per year, due to the expense of running such models, it is important to determine which days, or episodes, to model. The PM_{2.5} monitoring network will provide the needed data for determining the relationship between urban scale or mesoscale meteorological observations and PM_{2.5} concentrations to aid in episode selection.

Uses of the PM_{2.5} Speciation Data.

Exploratory Data Analysis. As with PM_{2.5} mass data, exploratory data analyses will enhance our understanding of the extent of transport contributions, the spatial and temporal variability of the constituents of the fine particulate and the impact of meteorology on the constituents. Furthermore, at the sites with both PM_{2.5} speciation monitoring and PAMS monitoring, we will perform analyses to investigate the relationships between PM_{2.5} constituents and other ozone precursors. Additionally, where PM_{2.5} mass and speciation samplers are collocated, we will develop an empirical relationship between the PM_{2.5} mass observations and the total mass concentration obtained from the speciation samplers. Such an analysis will provide information about the quality of the gravimetric measurements.

Analysis of Trends. The annual trend in PM_{2.5} constituents will be analyzed to track progress in solving PM_{2.5} air quality problems. Initially, a baseline will be established, from which progress can be evaluated. Additionally, it is possible to construct estimates of visibility from the constituents measured at the PM_{2.5} speciation sites, thus trends in visibility can be analyzed.

Source Apportionment. The PM_{2.5} mass samplers will identify the regions of the country with high PM_{2.5} concentrations. The speciation network will be used to determine which constituents contribute to the high mass concentrations. Such information will be used in developing strategies for controlling PM_{2.5}.

Air Quality Model Evaluation. The speciation network will provide the data necessary to evaluate the predicted concentrations from air quality models to the ambient concentrations, at a species level. Such comparisons will be useful for identifying ways to improve the air quality models.

Additionally, the data from the PM_{2.5} network will provide information that will assist with numerous other studies. For examples, the data will be invaluable to studies evaluating the costs and benefits of the CAA requirements and to the ongoing health effects studies.

Schedule

A data analysis program is under development, and details regarding mechanisms, programs, and schedules are forthcoming.

Common Acronyms in the PM_{2.5} Program

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>.

AWMA - Air and Waste Management Association

CAA - Clean Air Act

CFR - Code of Federal Regulations

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

CORE - Community-oriented monitoring

DOPO - Delivery order project officer(s)

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

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

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

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

PAMS - Photochemical Assessment Monitoring Station

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

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

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

WESTAR - Western States Air Resources Council